

SCIENTIFIC PROGRAMME

MONDAY

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
8:30	Opening Ceremony (MUC)							
9:00	Plenary Lecture 1 - Tony Kelly Lecture (MUC) by Ignaas Verpoest, Katholieke Universiteit Leuven, Belgium: COMPOSITES RESEARCH: INSPIRED BY PEOPLE, CHALLENGED BY NATURE							
10:00	<p>3.01 Fracture and Damage - Micromechanics (1/8)</p> <p>MON-1_MUC_3.01-01 A THERMODYNAMICALLY BASED WORK POTENTIAL THEORY FOR PREDICTING PROGRESSIVE DAMAGE AND FAILURE IN 3D TEXTILE COMPOSITES</p> <p>Sam Huang (New York State University at Stony Brook) Evan Pineda (NASA)</p> <p><i>In this paper, a 3D thermodynamically-based work potential theory for modeling progressive damage for laminated, unidirectional composites, extend from 2D Schapery's theory, is used to predict the response of textile composites.</i></p>	<p>3.07 Thin Ply Composites (1/3)</p> <p>MON-1_SEV_3.07-01 DAMAGE MECHANISMS IN THIN-PLY COMPOSITES : FREE EDGE/BULK MEASUREMENTS AND MULTISCALE MODELLING</p> <p>Sébastien Kohler, Joel Cugnoni (Ecole Polytechnique Fédérale de Lausanne) Robin Amacher (Lab. of Applied Mechanics and Reliability Analysis, EPFL) John Botsis (Ecole Polytechnique Fédérale de Lausanne)</p> <p><i>Results of simultaneous acoustic emission measurements and optical observation at the edge of unnotched quasi-isotropic symmetric tension specimen. Comparison of this data with the early results of a multiscale plane-strain model.</i></p>	<p>3.06 Textile Composites (1/6)</p> <p>MON-1_VEN_3.06-01 A NUMERICAL MODELLING APPROACH FOR PREDICTING DEFECT GENERATION IN 2D WOVEN FABRICS DURING MULTI-LAYERED PREFORMING PROCESSES</p> <p>Adam Thompson (University of Bristol) Jonathan Belnoue (University of Bristol)</p> <p><i>A hybrid element approach is proposed and used to simulate the interaction of multiple layers during the preforming process of composite manufacture. The accuracy of the method is examined and compared with experimental results.</i></p>	<p>3.04 Delamination (1/4)</p> <p>MON-1_BUD_3.04-01 A FINITE THICKNESS INTERFACE ELEMENT FOR COMPOSITE DELAMINATION</p> <p>José Reinoso (University Seville) Marco Paggi (IMT Institute for Advanced Studies Lucca) Antonio Blázquez (University of Seville)</p> <p><i>Novel finite thickness interface model for triggering delamination failure in composites.</i></p>		<p>3.11 Dynamic Loading - Impact, Crash, Blast (1/6)</p> <p>MON-1_BIA_3.11-01 A COMPARISON OF QUASI-STATIC INDENTATION AND LOW VELOCITY IMPACT ON HYBRID COMPOSITE-METALLIC STRUCTURES USING MICRO-FOCUS COMPUTED TOMOGRAPHY</p> <p>Trevor Allen, Sharif Ahmed, Philippa Reed, Ian Sinclair, Mark Spearing (University of Southampton)</p> <p><i>The equivalence of quasi-static indentation and low velocity impact loading regimes has been assessed in hybrid composite-metallic structures. The results demonstrate a strong equivalence between QSI and LVI loading regimes in these structures.</i></p>	<p>3.23 Maintenance and Repair (1/2)</p> <p>MON-1_RHO_3.23-01 BONDED HARD-PATCH COMPOSITE SCARF REPAIRS: INFLUENCE OF MACHINING TECHNIQUES AND SURFACE TREATMENT</p> <p>Paul Wales (University of Limerick) Cormac O'Brien, Alan Conneely, Gerard O'Connor (NUI Galway) Kali Katnam (University of Manchester) Robert Young (University of Manchester)</p> <p><i>Hard patch CFRP scarf repairs were investigated for understanding the influence of machining techniques of surfaces to be bonded on structural repair efficiency. Manual sanding, manual sanding after CNC machining and laser ablation were examined.</i></p>	<p>2.02 Polymer Matrix Materials (1/4)</p> <p>MON-1_BRU_2.02-01 A REACTIVE MOLECULAR DYNAMICS SIMULATION OF HYDROLYSIS DEGRADATION IN POLYMERS</p> <p>Behrouz Arash (Delft University of Technology) Barend J. Thijse (Delft University of Technology) Alessandro Pecenko (Bosch Thermotechnik GmbH) Angelo Simone (Delft University of Technology)</p> <p><i>We perform reactive molecular dynamics simulations to investigate the mechanism of chemical aging of polyamide polymers by means of hydrolysis in an acidic solution at high temperature.</i></p>
10:20	<p>MON-1_MUC_3.01-02 CHARACTERIZATION OF INTERFACIAL STRENGTH BETWEEN FIBER AND MATRIX BASED ON IMAGE ANALYSIS OF PHOTOELASTICITY</p> <p>Kosuke Takahashi (Hokkaido University) Bentang Arief Budiman (Tokyo Institute of Technology) Kazuki Inaba (Tokyo Institute of Technology) Kikuo Kishimoto (Tokyo Institute of Technology)</p> <p><i>Interfacial strength between fiber and matrix is evaluated by stress contour observed in photoelastic images of single fiber fragmentation test, based on non-rigid bonding model of a cohesive surface.</i></p>	<p>MON-1_SEV_3.07-02 DAMAGE SEQUENCE IN THIN- AND ULTRA-THIN-PLY COMPOSITE LAMINATES UNDER OUT-OF-PLANE LOADING</p> <p>Ahmed Wagih (University of Girona) Emilio González, N. Blanco, Pere Maimí (AMADE, Universidad de Girona) Jose Ramon Sainz de Aja (Aernnova Engineering Solutions Ibérica S.A.) Federico Martin De La Escalera (Aernnova Engineering Solutions Ibérica S.A.)</p> <p><i>This paper investigates experimentally the damage in thin- and ultra-thin-ply laminates under out-of-plane loading for better understanding the damage sequence during impact test.</i></p>	<p>MON-1_VEN_3.06-02 ACOUSTIC EMISSION FEATURES IN TEXTILE REINFORCED THERMOSET AND THERMOPLASTIC COMPOSITES</p> <p>Alessandro D'Etorre (Politecnico di Milano) Valter Carvelli (Politecnico di Milano) Stepan Lomov (KU Leuven)</p> <p><i>The Acoustic Emission cluster analysis was applied to investigate the AE clustering in thermoset and thermoplastic reinforced 2D textiles. The initial cracks observation showed the correlation to the cluster of low amplitude and low frequency events.</i></p>	<p>MON-1_BUD_3.04-02 A MULTI-SCALE MODELLING METHOD FOR TUFTED COMPOSITES: UNIT-CELL MODEL</p> <p>Camilla Osmiani (University of Bristol) Galal Mohamed (Rolls-Royce / University of Bristol) Giuliano Allegri (Imperial College London) Ivana Partridge (University of Bristol)</p> <p><i>This paper focuses on 'micro-local' scale modelling for tufted composites. The characterisation of the mode I bridging law of single carbon tufts is reported here, and a strategy for model development is proposed.</i></p>		<p>MON-1_BIA_3.11-02 A NUMERICAL-EXPERIMENTAL STUDY OF THE DAMAGE RESPONSE OF STITCHED COMPOSITE LAMINATES TO LOW VELOCITY IMPACT</p> <p>Luca Francesconi (University of Cagliari) Francesco Ginesu (University of Cagliari) Francesco Aymerich (University of Cagliari)</p> <p><i>The study examines experimentally and by FE analyses the effect of stitching on the impact behaviour of cross-ply carbon/epoxy laminates. The developed model is able to capture the role of stitching in enhancing the impact damage resistance of the laminates.</i></p>	<p>MON-1_RHO_3.23-02 BONDED REPAIRS OF COMPOSITE STRUCTURES: VOID FORMATION MECHANISMS IN AN ADHESIVE FILM</p> <p>Mathieu Préau (McGill University) Nadine Auda-Kothari (McGill University) Pascal Hubert (McGill University)</p> <p><i>Moisture-induced void formation and growth in a repair adhesive film was monitored throughout the cure. Porosity measurements matched well a diffusion-based analytical model for a variety of processing conditions representative of repair environments.</i></p>	<p>MON-1_BRU_2.02-02 ASSESSMENT OF SELF-HEALING EFFICACY OF THERMOPLASTIC IONOMER FILMS INTERLEAVING CARBON-FIBRE REINFORCED EPOXY MATRIX LAMINATES</p> <p>Jose Tarpani (University of Sao Paulo) Karen Morioka (University of Sao Paulo)</p> <p><i>Mech. testing along with IR inspection of ballistically pre-impacted and subsequently heat treated thermoplastic ionomeric films interleaving CFR epoxy matrix laminates have demonstrated the achievement of thermally-activated self-healing process.</i></p>
10:40	<p>MON-1_MUC_3.01-03 COMBINED FE/STATISTICAL APPROACH FOR THE STRENGTH OF COMPOSITE FIBRE BUNDLES CONSIDERING HIERARCHICAL FAILURE</p> <p>Gaël Graill (Imperial College London) Marie Coq (Imperial College London) Charlotte Guesdon (Imperial College London) Soraia Pimenta (Imperial College London) Silvestre Pinho (Imperial College London) Paul Robinson (Imperial College London)</p> <p><i>A hierarchical model for the strength of composite fibre bundles is presented, which takes into account the stochastic single fibre strength distribution and realistic full stress fields around clusters of any size, predicted with FE.</i></p>	<p>MON-1_SEV_3.07-03 DESIGN SPACE INTERROGATION FOR NEW C-PLY LAMINATE ARCHITECTURES</p> <p>Christopher York (University of Glasgow) Sérgio Frascino Müller de Almeida (University of São Paulo)</p> <p><i>This article investigates the extent to which new NCF architectures can be tailored to achieve warp free tapered laminates without the need for deposition with off axis alignment, hence ply discontinuities. Buckling strength is also considered.</i></p>	<p>MON-1_VEN_3.06-03 ARCHITECTURAL DESIGN OF 3D WOVEN COMPOSITES ASSISTED BY FE MULTISCALE MODELING</p> <p>Quentin Roirand (MINES ParisTech) Alain Thionnet (MINES ParisTech) Lucien Laiarinandrasana (MINES ParisTech)</p> <p><i>Composite materials reinforced with three-dimensional polymeric yarns fabric are investigated. This study aims at providing some rules for an architecture optimization of woven composites in regard with the failure processes.</i></p>	<p>MON-1_BUD_3.04-03 ACCURATE CHARACTERIZATION OF MODE II INTRALAMINAR DELAMINATION FRACTURE TOUGHNESS IN INTERLAYER-TOUGHENED CFRP</p> <p>Masaki Hojo (Kyoto University) Kazuki Ohashi (Kyoto University) Takuma Inoue (Kyoto University) Narumichi Sato (Toray) Masaaki Nishikawa (Kyoto University) Nakoki Matsuda (Kyoto University) Manato Kanesaki (Kanazawa Institute of Technology)</p> <p><i>Mode II intralaminar delamination fracture toughness was firstly investigated. The intralaminar fracture toughness of interlayer-toughened CFRP was almost identical to the interlaminar and intralaminar fracture toughness of non-toughened CFRP.</i></p>		<p>MON-1_BIA_3.11-03 AN INVESTIGATION ON THE INFLUENCE OF LOADING RATE ON THE FRACTURE TOUGHNESS OF UHMW-PE COMPOSITES</p> <p>Michael May (Fraunhofer EMI) Torsten Lässig (Fraunhofer EMI) Stefan Hiermaier (Fraunhofer EMI)</p> <p><i>A material model for cohesive interface elements is proposed which allows describing the rate-dependent evolution of strength and fracture toughness of Dyneema HB26 composites. The model is verified against DCB tests at high rates of loading.</i></p>	<p>MON-1_RHO_3.23-03 NUMERICAL AND EXPERIMENTAL INVESTIGATION INTO THE INFLUENCE OF GEOMETRIC PARAMETERS OF HYBRID COMPOSITE REPAIRS ON MECHANICAL PERFORMANCE</p> <p>Markus Linke (University of Applied Sciences Hamburg) Philipp Abel (RWTH Aachen University) Thomas Gries (RWTH Aachen University)</p> <p><i>The paper is about a hybrid repair for composites where the bonding area is reinforced with yarns that built small scale form fittings elements after curing in a co-bonding process. The tensile strength is restored to 86% of the undamaged specimens.</i></p>	<p>MON-1_BRU_2.02-03 CHARACTERIZATION OF A NEW THERMOPLASTIC REACTIVE ACRYLIC-BASED ADHESIVE FOR MULTILAYER COMPOSITE LAMINATES</p> <p>Quentin Charlier (INSA de Lyon) Frédéric Lortie (Ingénierie des Matériaux Polymères Lyon) Pierre Gérard (ARKEMA, Groupement de Recherche de Lacq) Jean-François Gérard (INSA de Lyon)</p> <p><i>Study focus on characterization of acrylic reactive systems used as adhesive for composite laminates during polymerization. Conversion degree, viscosity and cure exothermicity evolution with time, influence of glass fiber presence were investigated.</i></p>
11:00	Coffee Break							

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)
Opening Ceremony (MUC)							
Plenary Lecture 1 - Tony Kelly Lecture (MUC) by Ignaas Verpoest, Katholieke Universiteit Leuven, Belgium: COMPOSITES RESEARCH: INSPIRED BY PEOPLE, CHALLENGED BY NATURE							
2.07 Graphene, Graphene-Based Composites (1/4)	2.06 Nano Composites (1/7)	5.11 Upscaling and Automation (1/1)	5.08 Liquid Composite Molding (1/2)	5.09 Manufacturing Processes for Thermoplastic Composites (1/7)	4.02 X-ray Computed Tomography (1/2)		1.01 Aerospace (1/6)
<p>MON-1_BRI_2.07-01 A COMPARISON OF THE MICRO-MECHANICS OF GRAPHENE- AND TRANSITION METAL DICALCOGENIDE- NANOCOMPOSITES.</p> <p>Fang Wang, Mark Bissett, Daniel Wolfson (University of Bath) Reshef Tenne (Weizmann Institute, Israel) Robert Young, Ian Kinloch (University of Manchester)</p> <p><i>The micro mechanics of 2-dimensional reinforcements in polymer composites has been studied using Raman spectroscopy, with the results being used to establish the design rules for such composites.</i></p>	<p>MON-1_NAP_2.06-01 A STUDY ON FATIGUE BEHAVIOR OF NANOINTERLEAVED WOVEN CFRP</p> <p>Tommaso Brugo, Giangiacomo Minak, Andrea Zucchelli (University of Bologna) Xiu Yan (University of Strathclyde) Hamed Saghaei, Mohamad Fotoohi (Amirkabir University of Technology) Roberto Palazzetti (University of Strathclyde)</p> <p><i>DCB virgin and nanomodified CFRP were tested and compared. Static tests showed nanomodified specimens 130% stronger. Crack grow ratio chart showed that nanomodified specimen can sustain a 85% higher load and that fracture propagates 30 times slower.</i></p>	<p>MON-1_LON_5.11-01 AUTOMATED APPLICATION OF LIGHTNING PROTECTION MATERIAL ON DOUBLE CURVED FUSELAGE PANELS OF CARBON FIBRE AIRCRAFTS – FROM THE IDEA TO THE APPLICATION.</p> <p>Marcin Malecha, Clemens Schmidt-Eisenlohr, Patrick Kaufmann, Christian Rähz (German Aerospace Center)</p> <p><i>We're presenting our solution for automated application of lightning strike protection material on double curved fuselage parts. Our approach speeds up the lay-up, shortens the process and allows application of wider cuts compare to manual process.</i></p>	<p>MON-1_BOR_5.08-01 AUDI ULTRA-RTM: A TECHNOLOGY FOR HIGH PERFORMANCE AND COST EFFECTIVE CFRP PARTS FOR HIGH VOLUME PRODUCTION</p> <p>Günter Deinzer (Audi AG) Martin H. Kothmann (Audi AG) David Roquette (Audi AG) Felix Diebold (Audi AG)</p> <p><i>Within the last few years the Audi AG researched and developed the ultra-RTM technology which allows a cost-effective manufacturing for high-performing CFRP structures.</i></p>	<p>MON-1_STG_5.09-01 QSP®: AN INNOVATIVE PROCESS BASED ON TAILORED PREFORMS FOR LOW COST AND FAST PRODUCTION OF OPTIMIZED THERMOPLASTIC COMPOSITE PARTS</p> <p>Damien Guillon (CETIM) Alain Lemascon (CETIM) Clément Callens (CETIM)</p> <p><i>CETIM has developed a pilot line to produce in 1 minute complex composite parts able to fulfill the requirements of mass production industries: - from raw material to net shaped part, - production efficiency, - multi-thickness & multi-orientation.</i></p>	<p>MON-1_AUG_4.02-01 APPLICATION OF X-RAY COMPUTED MICRO-TOMOGRAPHY TO THE STUDY OF DAMAGE, SELF HEALING AND OXIDATION OF THERMOSTRUCTURAL COMPOSITES</p> <p>Olivier Caty, Vincent Mazars, Bertrand Remi (University of Bordeaux) Denneulin Sebastien (Herakles (SAFRAN)) Guillaume Couegnat, Gerard Vignoles (University of Bordeaux)</p> <p><i>Failure and oxidation of self healing phases in CMC are studied in-situ using µCT. Crack networks were analysed during tension at high temperature (20°C to 1250°C). Image based FE models were built to better understand tests.</i></p>	<p>MON-1_ATH_1.01-01 „INNOVATIVE AIRCRAFT POLYMER MATRIX COMPOSITES (IAPMC)“ PROJECT IN SIP- SM41 JAPAN - INTELLIGENT PROCESS MONITORING AND QUALITY ASSESSMENT OF CFRP STRUCTURES</p> <p>Nobuo Takeda, Shu Minakuchi, Akira Hamamoto (University of Tokyo)</p> <p><i>The main purpose of this project is to develop high-rate production aircraft PMC products and quality assurance technology for next-generation CFRP aircraft structures, including Low-cost Autoclave and OoA CFRP, and Thermoplastic CFRP.</i></p>	
<p>MON-1_BRI_2.07-02 COMPRESSION BEHAVIOUR OF EMBEDDED GRAPHENES OF VARIOUS THICKNESSES</p> <p>Costas Galiotis (Institute of Chemical Engineering Sciences/ Foundation of Research and Technology Hellas) Charalampos Androulidakis (University of Patras) Emmanuel Koukaras, John Parthenios, Konstantinos Papagelis (Institute of Chemical Engineering Sciences/Foundation of Research and Technology Hellas)</p> <p><i>In the present the mechanical behaviour of multi layer graphenes embedded in polymer matrices is examined using Raman spectroscopy.</i></p>	<p>MON-1_NAP_2.06-02 CARBON NANO-INK COATED OPEN CELL POLYURETHANE FOAM WITH MULTILAYERED SKELETON FOR DAMPING APPLICATIONS</p> <p>Xiao-Chong Zhang (University of Bristol) Fabrizio Scarpa (University of Bristol) Ronan McHale (Thomas Swan & Co. Ltd.) Andrew Limmack (University of Bristol) Hua-Xin Peng (Zhejiang University)</p> <p><i>CNT-CNT sliding mechanism was utilised to create frictional energy dissipation in high density nano-filler regions to improve damping performance of an open cell foam through multilayered nano-inks coatings on foam skeleton.</i></p>	<p>MON-1_LON_5.11-02 AUTOMATING LAYUP OF SHEED PREPREG ON COMPLEX MOULDS</p> <p>Michael Elkington (University of Bristol) Carwyn Ward (University of Bristol) Kevin Potter (University of Bristol)</p> <p><i>A new two-stage method for the automated manufacture of high performance composites components is presented which uses multiple end effectors to combine the flexibility of Hand Layup with the speed and consistency of existing automated systems.</i></p>	<p>MON-1_BOR_5.08-02 DUAL SCALE FLOW DURING VACUUM INFILTRATION OF FIBER-REINFORCED COMPOSITES: FROM IN SITU SYNCHROTRON EXPERIMENTS TO NUMERICAL SIMULATIONS</p> <p>Joaquín Vila, Federico Sket (IMDEA Materials Institute) Carlos González, Javier Llorca (Polytechnic University of Madrid & IMDEA Materials Institute)</p> <p><i>This presentation is a contribution to understand the phenomena that control vacuum-assisted resin infusion at the mesoscopic and microscopic scales using X-ray microtomography and vacuum-infusion tests, together with numerical simulations.</i></p>	<p>MON-1_STG_5.09-02 AUTOMATED PRODUCTION OF CARBON FIBER REINFORCED THERMOPLASTIC SINE WAVE BEAMS</p> <p>Frederic Fischer, Matthias Beyrle, Manuel Endraß, Leonhard Häberle, Thomas Stefani, Matthias Gutschon, Philipp Gänswürger, Georg Braun, Michael Kupke (German Aerospace Center)</p> <p><i>With this paper DLR ZLP (AU) will give insight into current work on automated production of carbon fiber reinforced thermoplastic aerospace structures, via vacuum consolidation (OoA), hot press processing and implant resistance welding.</i></p>	<p>MON-1_AUG_4.02-02 DEFORMATION ANALYSIS OF POLYMER FOAMS UNDER COMPRESSION LOAD USING IN SITU COMPUTED TOMOGRAPHY AND FINITE ELEMENT SIMULATION METHODS</p> <p>Oliver Weißenborn, S. Geller, Mike Gude, Folke Post, S. Praetorius, Axel Voigt, S. Aland (Technical University of Dresden)</p> <p><i>A novel in situ CT device is used to perform compression tests on closed-cell polymeric foams to analyse the deformation behaviour. With the introduction of a phase field function, complex structures can be meshed for simulation.</i></p>	<p>MON-1_ATH_1.01-02 COMPOSITE FATIGUE DAMAGE EVOLUTION USING DISCRETE DAMAGE MODELING</p> <p>Endel Iarve (University of Texas Arlington) Kevin Hoos (University of Dayton) Michael Braginsky (University of Texas Arlington) Eric Zhou (University of Dayton) David Mollenhauer (Air Force Research Laboratory)</p> <p><i>Discrete Damage Modeling was used to simulate IM7/977-3 [30/60/90/-60/-30]2s laminate under cyclic loading.</i></p>	
<p>MON-1_BRI_2.07-03 FREEZE-CAST GRAPHENE AEROGELS AND THEIR EPOXY COMPOSITES WITH ULTRALOW PERCOLATION THRESHOLD</p> <p>Zhenyu Wang, Xi Shen, Ne Myo Han, Xu Liu, Ying Wu, Jang-Kyo Kim (Hong Kong University of Science and Technology)</p> <p><i>A unidirectional freeze casting method is used to fabricate graphene aerogels with aligned porous structure. Its epoxy composites had an ultralow percolation threshold of 0.007 vol% with anisotropic electrical properties in two orthogonal directions.</i></p>	<p>MON-1_NAP_2.06-03 CREEP BEHAVIOUR OF PP/CNT NANOCOMPOSITES: AN EXPERIMENTAL STUDY VALIDATED WITH CREEP MODEL</p> <p>Deniz Ürk, Abdullah Dönmez, Didem Ovalı, Şenol Ataoglu, M.Lütfi Öveço lu, Hülya Cebeci (Istanbul Technical University)</p> <p><i>The creep-recovery behaviour of isotactic polypropylene-multi wall carbon nanotubes (PP/CNT) nanocomposites has been studied with long-term tensile test at dynamic mechanical analysis.</i></p>	<p>MON-1_LON_5.11-03 ROBOT-FORMING OF PREPREG STACKS - DEVELOPMENT OF EQUIPMENT AND METHODS</p> <p>Andreas Björnsson (Linköping University) Marie Jonsson (Swerea SICOMP) Jan Erik Lindbäck (SAAB Aerostructures) Malin Åkermo (KTH Royal Institute of Technology) Kerstin Johansen (Linköping University)</p> <p><i>The development of tools and the establishment of a forming-sequence for sequential forming of prepreg stacks to an Ω-shaped geometry using a standard dual-arm robot is presented. Tests show that stacks can be formed using the developed method.</i></p>	<p>MON-1_BOR_5.08-03 HYBRID-MATRIX PROCESSING: HOW TO CO-INJECT MULTIPLE RESIN SYSTEMS INTO ONE COMPOSITE PART?</p> <p>Jan Krollmann, Carlos Sanchez Alvarado, Patrick Carqueville, Roman Snajdr (Technical University of Munich) Swen Zaremba, Klaus Drechsler (Technical University of Munich/ Institute for Carbon Composites)</p> <p><i>A method for the co-injection of multiple resin systems in on composite part with defined out-of-plane transition is investigated. Based on local, reversible compaction of the preform flow fronts can be controlled during the RTM injection process.</i></p>	<p>MON-1_STG_5.09-03 CERAMIC PRESSING TOOL FOR VARIOTHERMAL PROCESSING OF THERMOPLASTIC FIBER COMPOSITES</p> <p>Florian Kühn (IVW GmbH) Luisa Medina, David Becker (Institute for Composite Materials) M. Zwick (Forschungsinstitut für anorganische Werkstoffe – Glas/ Keramik – GmbH) M. Knoch (FCT Ingenieurkeramik GmbH) B. Romahn (Weberit Werke Dräbing GmbH) Peter Mitschang (Institute for Composite Materials)</p> <p><i>Development of tools made of the ceramic material silicon carbide (SiC) for variothermal processing of thermoplastic fiber composites with high energy efficiency as well as fast heating and cooling rates.</i></p>	<p>MON-1_AUG_4.02-03 EX-SITU TIME-LAPSE X-RAY CT STUDY OF 3D MICROSTRUCTURAL FATIGUE DAMAGE EVOLUTION IN UNI-DIRECTIONAL COMPOSITES</p> <p>Kristine Munk Jespersen (Technical University of Denmark) Ying Wang (University of Manchester) Jens Zangenberg (Composite Mechanics, LM Wind Power Blades) Tristan Lowe, Philip J. Withers (University of Manchester) Lars P. Mikkelsen (Technical University of Denmark)</p> <p><i>In this study, fatigue damage progression in terms of individual fibre fractures and off-axis cracks in a NCF fiber composite is observed in-destructively by transilluminated white light imaging and ex-situ X-ray computed tomography.</i></p>	<p>MON-1_ATH_1.01-03 ALIGNED CARBON NANOTUBE WEBS IN AEROSPACE CARBON FIBRE REINFORCED POLYMER COMPOSITES FOR ANTI-ICING/DE-ICING APPLICATIONS</p> <p>Yao Xudan (Queen's University Belfast) Brian Falzon (Queen's University Belfast) Stephen Hawkins (Queen's University Belfast)</p> <p><i>This paper reports on an initial investigation into the use of carbon nanotube (CNT) webs incorporated at an interface of a carbon fibre composite laminate to increase thermal conductivity for energy efficient anti-icing/de-icing applications.</i></p>	

Coffee Break

8:30

9:00

10:00

10:20

10:40

11:00

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
11:30	<p>3.01 Fracture and Damage - Micromechanics (2/8)</p> <p>MON-2_MUC_3.01-04 COMPOSITE MATERIALS UNDER TRANSVERSE BIAxIAL LOADS: STUDY OF THE INFLUENCE OF A NEARBY FIBRE ON THE INTERFACE CRACK GROWTH UNDER TENSION.</p> <p>Carlos Sandino (University of Seville) Elena Correa (University of Seville) Federico Paris (Universidad de Sevilla)</p> <p><i>The interface crack growth associated with the inter-fibre failure under biaxial tension is studied by means BEM model. The influence of a secondary fibre on the evolution of an interface crack is analysed using Interfacial Fracture Mechanics.</i></p>	<p>3.07 Thin Ply Composites (2/3)</p> <p>MON-2_SEV_3.07-04 EFFECT OF PLY THICKNESS ON THE IMPACT RESPONSE OF INTERLEAVED NON-CRIMP-FABRIC LAMINATES</p> <p>Santiago García Rodríguez (AMADE, Universidad de Girona) Vicky Singery (CHOMARAT) Philippe Sanial (CHOMARAT) Josep Costa (AMADE, Universidad de Girona)</p> <p><i>The effect of ply-thickness and interleaving by non-woven thermoplastic veils on the damage resistance of thin-ply NCF laminates was studied. Non-woven polyamide veils contribute to delay delamination onset and/or to arrest their propagation.</i></p>	<p>3.06 Textile Composites (2/6)</p> <p>MON-2_VEN_3.06-04 AVOIDING INTERPENETRATIONS AND FIBRE VOLUME FRACTION CORRECTIONS IN REPRESENTATIVE UNIT CELLS FOR TEXTILE COMPOSITES THROUGH ADVANCED GEOMETRY GENERATION</p> <p>Ruben Sevenois (Ghent University) David Garoz Gomez (Ghent University) Francisco A. Gilabert (Ghent University) Wim Van Paepegem (Ghent University)</p> <p><i>A new geometry generation method for RUCs is shown which takes into account ply nesting and generates yarn cross sectional areas as observed from in-situ measurements. The generated geometry can be used for local stress and strain field prediction.</i></p>	<p>3.04 Delamination (2/4)</p> <p>MON-2_BUD_3.04-04 CHARACTERIZATION OF PURE MODE I, II AND III DELAMINATION OF LAMINATED COMPOSITE BY USING EDGE RING CRACK SPECIMEN</p> <p>Yangyang Ge (Institut Universitaire de Technologie, Département GMP) Xiaojing Gong (Institut Supérieur de l'Aéronautique et de l'Espace, ISAE) Emmanuel De-Luycker (Université de Toulouse) Anita Hurez (Univ. Bourgogne Franche-Comté)</p> <p><i>Edge Ring Crack (ERC) specimen tests are proposed in order to study pure mode I, mode II and mode III delamination behavior of laminated composite.</i></p>	<p>3.21 Effects of Manufacturing Effects (EoE) (1/2)</p> <p>MON-2_STO_3.21-01 A BIPHASIC MODEL TO PREDICT THE COMPRESSION STRENGTH OF MISALIGNED THERMOPLASTIC COMPOSITE</p> <p>Damien Guillon (CETIM) Dao Co (CETIM) Cyril Priem (GeM Nantes) Martin Antoine (GeM Nantes) Patrick Rozycki (Institut de Recherche en Génie Civil et Mécanique)</p> <p><i>Compression strength obtained from a numerical biphasic model for thermoplastic and misaligned fibers are compared to experimental data. Choice of materials parameters are deeply discussed. The model provides interesting results if calibrated.</i></p>	<p>3.11 Dynamic Loading - Impact, Crash, Blast (2/6)</p> <p>MON-2_BIA_3.11-04 LOW-VELOCITY IMPACT BEHAVIOR MODELLING OF BRAIDED TEXTILE COMPOSITES FOR SPORTS PROTECTION</p> <p>Chen Wang (Nanyang Technological University) Anish Roy (Loughborough University) Zhong Chen (Nanyang Technological University) Vadim Silberschmidt (Loughborough University)</p> <p><i>A multi-scale computational approach is explored to predict low-velocity impact performance of braided textile composites under impact conditions with energy levels between 3 J to 9 J; the obtained results are compared with original experiments.</i></p>	<p>3.23 Maintenance and Repair (2/2)</p> <p>MON-2_RHO_3.23-04 RELATIONSHIP BETWEEN INTERLAMINAR SHEAR STRENGTH AND REPAIR CONDITIONS OF DELAMINATION BY THERMAL FUSION BONDING IN CF/PA6 LAMINATES</p> <p>Manato Kanesaki (Kanazawa Institute of Technology) Mototsugu Tanaka (Kanazawa Institute of Technology) Hiroshi Saito (Kanazawa Institute of Technology) Kiyoshi Uzawa (Kanazawa Institute of Technology) Masaki Hojo (Kyoto University) Isao Kimpara (Kanazawa Institute of Technology)</p> <p><i>We evaluated the effectiveness of repair using TFB on the delamination in CFRTP laminate. Interlaminar shear test using double-notched specimen was carried out to evaluate interlaminar shear strength at the region of repaired delamination.</i></p>	<p>2.02 Polymer Matrix Materials (2/4)</p> <p>MON-2_BRU_2.02-04 COMPARISON OF PROCESS CHAINS FOR THE PRODUCTION OF THERMOPLASTIC UD-TAPES AND ORGANIC SHEETS</p> <p>Andreas Erber (SGL Technologies) Steffen Janetzko (SGL Technologies) S. Spitzko (SGL Technologies) Patrik-Vincent Brudzinski (SGL Technologies)</p> <p><i>The paper shows a comparison of different process chains to produce UD-tapes and Organic Sheets. The investigation comprises different technologies and therefore process chains like film, powder-, solventimpregnation and pultrusion.</i></p>
11:50	<p>3.01 Fracture and Damage - Micro-Scale Modeling (2/5)</p> <p>MON-2_MUC_3.01-05 COMPOSITE MICRO-SCALE MODEL ACCOUNTING FOR DEBONDING, STRAIN RATE-DEPENDENCE AND DAMAGE UNDER IMPACT USING AN EXPLICIT FINITE ELEMENT SOLVER</p> <p>Francisco A. Gilabert (Ghent University) David Garoz Gomez (Ghent University) Ruben Sevenois (Ghent University) Siebe Spronk (Ghent University) Ali Rezaei (Ghent University) Wim Van Paepegem (Ghent University)</p> <p><i>This work presents a micro-scale simulation model that can be used to analyze the mechanical response of UD composites undergoing high strain rates. The model includes features like fiber-matrix debonding, strain-rate dependency and matrix failure.</i></p>	<p>3.07-05 EVALUATION OF FLEXURAL MODULUS OF ULTRA-THIN CHOPPED CARBON FIBER TAPE REINFORCED THERMOPLASTICS</p> <p>Yuto Nakashima (University of Tokyo) Hirofumi Suganuma (University of Tokyo) Shinichiro Yamashita (University of Tokyo) Jun Takahashi (University of Tokyo)</p> <p><i>Test results by small specimens of UT-CTT, which are a kind of randomly oriented strands made by water dispersed thin tape, tend to be somewhat scattered. Flexural moduli and scatter were evaluated with prediction model and experiments.</i></p>	<p>3.06-05 AVOIDING SPIRIOUS TRANSVERSE MODES IN 3D TEXTILE COMPOSITE REINFORCEMENT FORMING SIMULATION</p> <p>Philippe Boisse (INSA de Lyon) S. Mathieu (INSA de Lyon) N. Hamila (INSA de Lyon)</p> <p><i>The specific anisotropy of 3D reinforcements due to the possible slippage between fibers induces spurious transverse modes in bending-dominated 3D simulations. 2 solutions are proposed. One uses an assumed strain method. The second bending stiffness.</i></p>	<p>3.04-05 DELAMINATION INITIATION AND PROPAGATION MODELLING WITH AN ENRICHED SHELL ELEMENT FORMULATION</p> <p>Johannes Främy (Chalmers University of Technology) Martin Fagerström (Chalmers University of Technology) Jim Brouzoulis (Chalmers University of Technology)</p> <p><i>The potential of an adaptive shell element formulation is shown, where delamination cracks are automatically introduced by an adaptive enrichment of the displacement field. A method to improve the transverse stresses in shells is also discussed.</i></p>	<p>3.21-02 AN EXPERIMENTAL STUDY ON THE INFLUENCE OF FLOW CHANNEL INDUCED FIBER UNDULATION.</p> <p>Christoph Kracke (BMW AG) Bernhard Staudt (BMW AG) Simon Bickerton (University of Auckland) Peter Mitschang (Institute for Composite Materials)</p> <p><i>This study deals with the potential of flow channels in RTM tools for faster impregnation. It is investigated how such flow channels influence the mechanical performance of the part.</i></p>	<p>3.11-05 CHARACTERISATION OF HIGH STRAIN RATE DEPENDENCY OF 3D WOVEN CFRP MATERIALS</p> <p>Nicolas Tran (Snecma) Julien Berthe (ONERA-The French aerospace Lab) Mathias Brieu (Ecole Centrale de Lille) Gérard Portemont (ONERA-The French aerospace Lab) Eric Deletombe (ONERA-The French aerospace Lab) Julien Schneider (Snecma)</p> <p><i>This paper focuses on the characterisation of high strain rate dependency of a 3D woven CFRP materials. Thereby, an experimental protocol was developed, validated and applied in order to characterize the strain rate sensibility.</i></p>	<p>3.23-05 REPAIR PROCEDURE ON VEGA SRM SKIRT</p> <p>Giovangiuseppe Giusto (CIRA Italian Aerospace Research Centre) Felice De Nicola (CIRA Italian Aerospace Research Centre) Francesco Di Caprio (CIRA Italian Aerospace Research Centre) Umberto Mercurio (CIRA Italian Aerospace Research Centre) Antonio Zallo (Avio SpA) Valeria Vinti (Avio SpA) Arsenio Cutolo (University of Naples) Massimiliano Fraldi (University of Naples)</p> <p><i>The aim of the present work is to present a repair procedure for composite skirt of VEGA Solid Rocket Motors (SRM), validated on scaled cylinder representative of the Skirt of the P80-SRM by experimental compression tests.</i></p>	<p>2.02-05 CORRELATION OF THE DIELECTRIC PROPERTIES OF AN EPOXY RESIN WITH THE DEGREE OF CURE</p> <p>Amke Eggers (Clausthal University of Technology) Dilmurat Abliz (Clausthal University of Technology) Gerhard Ziegmann (Clausthal University of Technology) Dieter Meiners (Clausthal University of Technology)</p> <p><i>DEA can monitor the cure of a resin. Molecular alterations during the cure change the permittivity. From DSC measurements the degree of cure is fitted, which can be correlated with the DEA measurements by knowing the time lapse of both experiments.</i></p>
12:10	<p>3.01-06 COMPUTATIONAL MICROMECHANICS ON POLYMER MATRIX COMPOSITES UNDER DIFFERENT ENVIRONMENTS: LONGITUDINAL, TRANSVERSE AND SHEAR PLY PROPERTIES</p> <p>Fernando Naya (IMDEA Materials Institute) Claudio Lopes (IMDEA Materials Institute) Carlos González (Polytechnic University of Madrid & IMDEA Materials Institute)</p> <p><i>A coupled experimental-computational micromechanical framework to determine the mechanical properties of unidirectional composites under RT/DRY and HOT/WET conditions is described in this paper.</i></p>	<p>3.07-06 GEOMETRICALLY NONLINEAR ASYMPTOTIC HOMOGENIZATION MODELING OF A THIN COMPOSITE LAYER WITH WAVY SURFACES</p> <p>Gobinda Saha (University of New Brunswick) Alexander Kalamkarov (Dalhousie University) Francesco Tornabene (University of Bologna)</p> <p><i>This paper develops the geometrically non-linear composite plate model to analyze the effective elastic properties through the application of the modified asymptotic homogenization method. The analytical formulae for effective moduli are derived.</i></p>	<p>3.06-06 CHARACTERISTIC LOAD CASES OF BIAxIAL BRAIDS</p> <p>Daniel Michaelis (University of Stuttgart) Peter Middendorf (University of Stuttgart)</p> <p><i>CFRP specimens are tested in tension and compression, and two characteristic load cases are identified by examining the damage behaviour: in load case 1 failure is triggered by shear, while in load case 2 failure is dominated by cross-fibre tension.</i></p>	<p>3.04-06 EFFECT OF ADHESIVE LAYER ON THE MODE I INTERLAMINAR DELAMINATION OF CFRP BONDED JOINTS</p> <p>Nassima Nasri (EPFL) Joel Cugnoni (Ecole Polytechnique Fédérale de Lausanne) John Botsis (Ecole Polytechnique Fédérale de Lausanne)</p> <p><i>This work reports on the results of an experimental and numerical study of the influence of an adhesive layer on the mode I interlaminar delamination of Asymmetric DCB unidirectional composites.</i></p>	<p>3.21-03 CHARACTERISATION OF DEFECTS - DURABILITY RELATIONSHIPS FOR COMPLEX GEOMETRY PREPREG LAMINATES</p> <p>Mark Battley (University of Auckland) Simon Bickerton (University of Auckland) Alexandre Mordasini (University of Auckland) Abhiram Ramesh (University of Auckland) Nathan Connell (University of Auckland) Logan Dunning Beck (University of Auckland)</p> <p><i>The characteristics and formation of defects and imperfections during manufacturing of corner sections in thick carbon-fibre epoxy prepreg laminates is studied and their effect on damage initiation and durability investigated.</i></p>	<p>3.11-06 DEVELOPMENT AND VALIDATION OF A STRAIN-RATE AND TEMPERATURE DEPENDENT CRUSHING MODEL FOR EXPANDED POLYSTYRENE FOAM APPLIED IN BICYCLE HELMETS</p> <p>Anastasiia Krundaeva (Ghent University) Guido De Bruyne (University of Antwerp) Wim Van Paepegem (Ghent University)</p> <p><i>This research is aimed at developing a strain-rate and temperature dependent crushing model for expanded polystyrene foam. This work is also aimed to establish a comparison of the FE analysis in LS-DYNA with the dynamic compression test result.</i></p>	<p>3.23-06 SIZE REDUCED COMPOSITE REPAIRS BY PLY WISE SCARFING</p> <p>Dirk Holzhüter (German Aerospace Center) Jens Kosmann (German Aerospace Center) Christian Hühne (German Aerospace Center) Michael Sinapius (Technische Universität Braunschweig) Martin Schollerer (German Aerospace Center)</p> <p><i>The study introduces the concept of ply wise scarfed composite joints. The results are relevant to increase the number of bonded repairs under current certification restrictions and to develop high strength composite scarf repairs.</i></p>	<p>2.02-06 DEVELOPMENT OF CARBON FELT BASED THERMOPLASTIC COMPOSITE BIPOLAR PLATES FOR PEMFC</p> <p>Ha Eun Lee (Jeonbuk university to Chonbuk National University) Seong Su Kim (Jeonbuk university to Chonbuk National University)</p> <p><i>In this study, the carbon felt made of pan based carbon fiber was used to fabricate the bipolar plate for PEMFCs.</i></p>

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
2.07 Graphene, Graphene-Based Composites (2/4)	2.06 Nano Composites (2/7)	5.07 Pultrusion and Filament Winding (1/1)	5.08 Liquid Composite Molding (2/2)	5.09 Manufacturing Processes for Thermoplastic Composites (2/7)	4.02 X-ray Computed Tomography (2/2)	6.01 Smart Structures (1/2)	1.01 Aerospace (2/6)	
<p>MON-2 BRI_2.07-04 GRAPHENE WOVEN FABRIC/POLYDIMETHYLSILOXANE COMPOSITES AS FLEXIBLE STRAIN AND TEMPERATURE SENSORS FOR WEARABLE APPLICATIONS</p> <p>Xu Liu, Chen Tang, Shuai Xiong, Siyuan Xi, Xiaohan Du, Yuefeng Liu, Ying Wu, Zhenyu Wang, Xi Shen, Qingbin Zheng (Hong Kong University of Science and Technology)</p> <p><i>Highly sensitive strain sensors based on graphene woven fabric/polydimethylsiloxane composites are developed and integrated into a wearable musical instrument which allows musician to easily produce music with hand gestures through cellphones.</i></p>	<p>MON-2 NAP_2.06-04 DEVELOPMENT OF GRAPHENE NANOPATELETS REINFORCED ALUMINIUM MATRIX NANOCOMPOSITES BY A COMBINATION OF SEMI-SOLID STIRRING AND ULTRASONIC TREATMENT</p> <p>Sinan Kandemir (İZMİR INSTITUTE OF TECHNOLOGY) Yücel Aydoğan (İZMİR INSTITUTE OF TECHNOLOGY)</p> <p><i>The aim of this study is to disperse graphene nanoplatelets (GNPs) into liquid aluminium. 0.5 wt.% GNPs were first incorporated into aluminium alloy under semi-solid stirring, and then the composite was ultrasonically treated in molten alloy.</i></p>	<p>MON-2 LON_5.07-01 CHARACTERISATION OF ULTRAVIOLET CURING RESINS FOR 3D PULTRUSION</p> <p>Iván Sáenz Domínguez (Mondragon Unibertsitatea) Josu Tena (University of Mondragon) Modesto Mateos (Mondragon Unibertsitatea) Mariasun Sarrionandia (Mondragon Unibertsitatea) Jon Aurrekoetxea (Mondragon Unibertsitatea)</p> <p><i>The aim of this study is to compare two resins, unsaturated polyester and styrene-free vinyl ester, in order to demonstrate the suitability of the new styrene-free resins.</i></p>	<p>MON-2 BOR_5.08-04 INFLUENCE OF TEXTILE ARCHITECTURE BY PROCESSING CARBON FIBER BASED NON-CRIMP FABRICS IN AUTOMOTIVE SERIAL APPLICATION USING HIGH-PRESSURE-RTM</p> <p>Christian Koch (BMW Group) Andreas Nomm (BMW Group) Franz Maidl (BMW Group) Thomas Maurer (BMW Group) Jochen Toepler (BMW Group) Simon Bickerton (University of Auckland) Elisabeth Ladstätter (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>This study demonstrated the correlation of CF-NCF permeability (in lateral and transverse direction) measured at low, laboratory scale pressures, to results observed in preproduction and production level processes (high-pressure RTM).</i></p>	<p>MON-2 STG_5.09-04 CONTINUOUS IMPREGNATION PROCESS BY FIXED ROLLERS DOUBLE BELT PRESS</p> <p>Osuke Ishida (Kanazawa Institute of Technology) Gaku Fukushima (Kanazawa Institute of Technology) Junichi Kitada (SANDVIK K.K.) Toshihide Sekido (Kanazawa Institute of Technology) Kiyoshi Uzawa (Kanazawa Institute of Technology)</p> <p><i>The continuous impregnation mechanism by fixed rollers double belt press was investigated. The process model was developed and evaluated experimentally. That will lead to obtain optimum process and improve machine capability.</i></p>	<p>MON-2 AUG_4.02-04 IN-SITU X-RAY COMPUTED TOMOGRAPHY ANALYSIS OF ADHESIVELY BONDED RIVETED LAP JOINTS</p> <p>René Fülbel (Technical University of Dresden) Maik Gude (Technical University of Dresden) Achim Mertel (Leichtbau-Zentrum Sachsen)</p> <p><i>The paper describes a new approach for analysing damage and failure phenomena in combined hybrid joints. A combination of destructive and non-destructive test methods makes it feasible to detect crack initiation and propagation in single-lap joints.</i></p>	<p>MON-2 ING_6.01-01 AEROELASTIC RESPONSE OF SHAPE MEMORY ALLOY HYBRID COMPOSITE CYLINDRICAL SHELLS UNDER SUPERSONIC FLOW</p> <p>Alfredo Faria (RWTH Aachen University) Mauricio Donadon (RWTH Aachen University)</p> <p><i>This paper investigates a particularly important structural characteristic of SMAHC laminates: the aeroelastic stability boundary of flutter.</i></p>	<p>MON-2 ATH_1.01-04 A MULTIPHYSIC APPROACH TO PREDICT THE DEGRADATION OF A COMPOSITE MATERIAL DUE TO CURRENT INJECTION</p> <p>Jean Rivenc (Airbus Group) Richard Perraud (Airbus Group Innovations) Gilles Peres (Airbus Group Innovations) Thierry Zink (Airbus SAS) David Andissac (Airbus Operations) Jacques Cinquin (Airbus Group Innovations)</p> <p><i>An study is performed in order to analyse the degradation of a composite material when a short-circuit current flows in the structure. A multiphysics model is developed in order to predict the shape and the depth of the degradation.</i></p>	11:30
<p>MON-2 BRI_2.07-05 GRAPHENE-BASED HYBRID MICROSTRUCTURES FOR INTERLAMINAR REINFORCEMENT OF FIBER-REINFORCED POLYMERS</p> <p>Luis Carlos Herrera-Ramírez (IMDEA Materials Institute) Roberto Guzman de Villoria (IMDEA Materials Institute)</p> <p><i>In this work, hybrid micro-particles have been synthesized and added to the interlaminar region of laminate to modify their delamination behaviour. For comparison purposes, laminates with graphite nanoplates have also been produced.</i></p>	<p>MON-2 NAP_2.06-05 DEVELOPMENT OF NANOSTRUCTURED ALUMINA-BASED METAL MATRIX FUNCTIONALLY GRADED COMPOSITE COATINGS</p> <p>Gobinda Saha (University of New Brunswick) Mohsen Mohammadi (University of New Brunswick)</p> <p><i>This research paper present the experimental results obtained from high-energy mechanical alloying of nanocrystalline alumina-nickel(chrome) composite cermet under a set of design of experiments, followed by thermal spraying of the feedstock.</i></p>	<p>MON-2 LON_5.07-02 MODELLING AND SIMULATION OF THE PULTRUSION PROCESS WITH CLOSED INJECTION AND IMPREGNATION MOLDS</p> <p>Renato Bezerra (Fraunhofer ICT) Frank Henning (Karlsruhe Institute of Technology)</p> <p><i>Simulation models of pultrusion dies with injection and impregnation chambers are presented. Two different mold inlet geometries are studied. Velocity and pressure fields, temperature, degree of cure and viscosity evolution are determined.</i></p>	<p>MON-2 BOR_5.08-05 SLIP AND WRINKLE BEHAVIOR OF MULTI-LAYERED FIBER PREFORM IN RESIN TRANSFER MOLDING PROCESS</p> <p>Dong Gi Seong (Korea Institute of Materials Science) Shin-O Kim (Korea Institute of Materials Science) Moon Kwang Um (Korea Institute of Materials Science)</p> <p><i>Structural factors and process conditions of fiber preform affecting the flow induced fiber deformation in resin transfer molding are investigated by measuring the related forces including friction and bulk stiffness of fiber preform.</i></p>	<p>MON-2 STG_5.09-05 DEVELOPMENT OF A NOVEL CONSOLIDATION PROCESS FOR CONTINUOUS-FIBER-REINFORCED THERMOPLASTICS</p> <p>Sebastian Baumgärtner (Fraunhofer ICT) Christoph Lohr (Karlsruhe Institute of Technology) Frank Henning (Karlsruhe Institute of Technology)</p> <p><i>A novel consolidation approach for thermoplastic composites was developed, in which a vacuum is used to apply pressure to the laminate while infrared radiation heats the thermoplastic material through a transparent mold wall.</i></p>	<p>MON-2 AUG_4.02-05 MECHANISMS OF AIR REMOVAL AND VOID DEVELOPMENT IN OUT-OF-AUTOCCLAVE PROCESSING OF HAND LAY-UP LAMINATES</p> <p>Juan José Torres (IMDEA Materials) Federico Sket (IMDEA Materials Institute) Carlos González (Polytechnic University of Madrid & IMDEA Materials Institute) M. Simmons (Hexcel Composites)</p> <p><i>The aim of this study is to understand the void formation, transport mechanisms and porosity evolution during OoA consolidation process in laminates produced by hand lay-up (HLU) and cured in an industrial oven, using vacuum bag only (VBO) technique.</i></p>	<p>MON-2 ING_6.01-02 CONTROLLABLE STIFFNESS COMPOSITES: AN OVERVIEW</p> <p>Alexander Bismarck (University of Vienna) Henry Maples (University of Vienna) Charnwit Tridech (Imperial College London) Bohao Zhang (Imperial College London) Paul Robinson (Imperial College London)</p> <p><i>Composites with controllable stiffness have a number of potential applications including their use as skin materials in morphing aerostructures. Concepts to realise such composites will be discussed.</i></p>	<p>MON-2 ATH_1.01-05 INNOVATIVE TOOL AND PROCESS CONCEPT FOR DRILLING CFRP/TITANIUM STACK MATERIAL</p> <p>Marco Schneider (Fraunhofer IPA) Andreas Gebhardt (Fraunhofer IPA) Philipp Esch (Fraunhofer IPA)</p> <p><i>An innovative tooling concept for drilling lightweight stack material is developed and presented. The counter drilling concept achieves higher tool performance and quality output.</i></p>	11:50
<p>MON-2 BRI_2.07-06 HIERARCHICAL POLYPROPYLENE NANOCOMPOSITES BASED ON GRAPHENE AND CARBON FIBERS</p> <p>Susana Quiles-Díaz (Institute of Polymer Science and Technology (ICTP-CSIC)) H. Salavagione (Institute of Polymer Science and Technology (ICTP-CSIC)) P. Enrique (Institute for the Structure of Matter (IEM-CSIC)) Araceli Flores (Institute for the Structure of Matter (IEM-CSIC)) F. Ania (Institute for the Structure of Matter (IEM-CSIC)) M. A. Gómez-Fatou (Institute of Polymer Science and Technology (ICTP-CSIC))</p> <p><i>Reinforced-hierarchical polymer nanocomposites based on carbon derivatives produces advanced materials with significant improvement in their thermal, mechanical and electrical properties.</i></p>	<p>MON-2 NAP_2.06-06 DEVELOPMENT OF UNTWISTED CARBON NANOTUBE YARN WITH HIGH STRENGTH BY HEAT TREATMENT</p> <p>Taesung Kim (Waseda University) Hidefumi Nikawa (HONDA R&D) Atsushi Hosoi (Waseda University) Hiroyuki Kawada (Waseda University)</p> <p><i>Untwisted carbon nanotube yarns were fabricated by the dry spinning method using a die and graphitized in order to develop CNT yarns with high strength and stiffness.</i></p>	<p>MON-2 LON_5.07-03 OPTICAL PROCESS MODEL FOR LASER-ASSISTED TAPE WINDING</p> <p>Jasper Reichardt (University of Twente) Ismet Baran (University of Twente) Remko Akkerman (University of Twente)</p> <p><i>An optical process model for the laser-assisted tape winding process is developed. The proposed optical model is coupled to a thermal model to assess the sensitivity of the nip-point temperature to optical process parameters.</i></p>	<p>MON-2 BOR_5.08-06 SURFACE QUALITY CHARACTERISATION OF COMPOSITE COMPONENTS FOR AEROSPACE APPLICATIONS</p> <p>Peter Schubel (University of Nottingham) Xuesen Zeng (University of Nottingham) Julien Lorrillard (Aircelle Ltd, SAFRAN Group) Harshad Mistry (Aircelle Ltd, SAFRAN Group) Ian Taylor (Aircelle Ltd, SAFRAN Group)</p> <p><i>This study focuses on benchmarking Class-A surface finish of composite components processed through vacuum assisted resin transfer moulding (VARTM) for use in the aerospace sector.</i></p>	<p>MON-2 STG_5.09-06 DEVELOPMENT OF AN ADDITIVE MANUFACTURING PROCESS FOR THE PROCESSING OF ENDLESS FIBER REINFORCED POLYMERS</p> <p>Matthias Domm (Institute for Composite Materials) Jonas Fischer (Institute for Composite Materials) Peter Mitschang (Institute for Composite Materials)</p> <p><i>Polymer parts manufactured by Additive Manufacturing are limited in their achievable mechanical properties. In order to face this drawback, a concept was developed to process continuous fiber reinforced polymers with Additive Manufacturing.</i></p>	<p>MON-2 AUG_4.02-06 QUANTITATIVE EVALUATION OF INDUCED POROSITY REFERENCE SAMPLES IMPLEMENTED BY DRILL HOLE IN CFRP USING XCT AND VARIOUS SEGMENTATION PARAMETERS</p> <p>Gurusprasad Rao (FH OÖ Forschungs- & Entwicklungs GmbH) Bernhard Plank (University of Applied Sciences Upper Austria) Christoph Heinzl (University of Applied Sciences Upper Austria) Johann Kastner (University of Applied Sciences Upper Austria)</p> <p><i>This paper is regarding volume porosity evaluation in CFRP using XCT by implanting known amount of voids. Drilling of holes of 200 and 300 µm is performed. Scans at various voxel sizes are analysed. Repeatability is checked and verified.</i></p>	<p>MON-2 ING_6.01-03 ELECTRICAL SELF-SENSING OF DAMAGE WITHIN COMPOSITE STRUCTURES</p> <p>Ahmed Alsaadi (University of Sheffield) S. A. Hayes (University of Sheffield)</p> <p><i>Health monitoring of CFRP laminates was investigated by using electrical resistance technique. A practical sensing procedure, which focuses on low cost and high sensitivity, was applied to monitor and identify damage in fabric CFRP.</i></p>	<p>MON-2 ATH_1.01-06 DEVELOPMENT OF CARBON FIBER REINFORCED PLASTIC FITTINGS TO ATTACH RODS IN CENTRAL WING BOX OF AIRBUS AIRCRAFT</p> <p>Jerome Terrazzoni (Airbus Operations) Jean-Brice Rousset (Airbus Operations) Florent Fauchery (SKF Aerospace) Jean-Michel Buchin (SKF Aerospace)</p> <p><i>Carbon fiber reinforced plastic fitting is developed by SKF Aerospace using unfolding concept (patented) for use in Airbus A350 eXtra Wide Body aircraft for weight saving purpose. Specimens are tested to check compliance with requirements.</i></p>	12:10

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
12:30	<p>MON-2_MUC_3.01-07 DETECTION OF MICROCRACK INITIATION IN EPOXY MATRIX MATERIAL WITH USE OF ACOUSTIC EMISSION</p> <p>Krzysztof Konstowicz (University of Bielsko-Biala) Marek Nowak (Cracow University of Technology) Ireneusz Baran (Cracow University of Technology) Magdalena Zia̧bka (AGH University of Science and Technology) Jan Chłopek (AGH University of Science and Technology)</p> <p><i>Detection of micro-crack initiation in neat epoxy resin was studied in SBS tests using Acoustic Emission and SEM. Micro-cracks with size of a few μm and more were found before failure, forming near structural irregularities of epoxy resin.</i></p>	<p>MON-2_SEV_3.07-07 INFLUENCE OF 90° LAYER THICKNESS ON DAMAGE INITIATION AND PROPAGATION IN CFRP CROSS-PLY LAMINATES</p> <p>Christian Leopold (Technische Universität Hamburg-Harburg) Sergej Harder (Technische Universität Hamburg-Harburg) Christina Buggisch (Technische Universität Hamburg-Harburg) Wilfried Liebzig (Technische Universität Hamburg-Harburg) Bodo Fiedler (Technische Universität Hamburg-Harburg)</p> <p><i>The influence of layer thickness on failure initiation and damage propagation as matrix cracks in the 90°-layers of cross-ply laminates is investigated experimentally and simulated by using finite element simulation.</i></p>	<p>MON-2_VEN_3.06-07 COUPLED STRESS AND ENERGY ANALYSIS OF CRACK ONSET IN TEXTILE COMPOSITES AT THE MESOSCOPIC SCALE</p> <p>Martin Hirsekom (ONERA-The French aerospace Lab) Aurélien Doitrand (ONERA-The French aerospace Lab) Christian Fagiano (ONERA-The French aerospace Lab) Vincent Chiaruttini (ONERA-The French aerospace Lab)</p> <p><i>The energy condition allows for an estimation of the initiation location and length of transverse yarn cracks, and the subsequent yarn-yarn decohesion. The use of a stress criterion alone significantly underestimates the strain at damage onset.</i></p>	<p>MON-2_BUD_3.04-07 ENHANCEMENT OF FRACTURE RESISTANCE OF COMPOSITE LAMINATES BY THE CREATION OF MULTIPLE DELAMINATIONS</p> <p>Bent F. Sørensen (Technical University of Denmark) Stergios Goutianos (Technical University of Denmark)</p> <p><i>Cohesive zone modelling is used to study delamination. A secondary crack can open when the peak traction value of its cohesive law is less than that of the primary crack and the layer between the two interfaces is sufficiently thin.</i></p>	<p>MON-2_STO_3.21-04 EFFECT OF THE COVER FACTOR OF 2D BIAxIAL AND TRIAXIAL BRAIDED CARBON COMPOSITES ON THEIR IN-PLANE LAMINATE PROPERTIES</p> <p>Frieder Heieck (University of Stuttgart) Peter Middendorf (University of Stuttgart)</p> <p><i>The effect of the cover factor on the in-plane mechanical properties of biaxial and triaxial braided carbon fiber composites is investigated. A method of optical measuring the cover factor is presented.</i></p>	<p>MON-2_BIA_3.11-07 ELASTIC STRESS OR STRAIN THRESHOLD FOR CARBON/EPOXY MATERIALS BEHAVIOR</p> <p>Magali Castres (ONERA-The French aerospace Lab) Julien Berthe (ONERA-The French aerospace Lab) Mathias Brieu (Ecole Centrale de Lille) Eric Deletombe (ONERA-The French aerospace Lab)</p> <p><i>Composite materials are widely used in the aeronautical industry. The behaviour of such materials can be splitted into two domains a first linear and a second non linear. In this work the transition between the linear and non linear part is studied.</i></p>	<p>MON-2_BRU_2.02-07 DIELECTRIC PROPERTIES OF POLYSTYRENE/ALUMINA COMPOSITES FOR MICROELECTRONIC DEVICES</p> <p>Bahar Basturk (Celal Bayar University) Emre Yalamaç (Celal Bayar University) Serdar Gültekin (Celal Bayar University)</p> <p><i>In this study, the dielectric properties of pure PS and PS/Al2O3 composites were investigated which may be an alternative material system as the substrate component of printed circuit boards-PCBs.</i></p>	
12:50	<p>MON-2_MUC_3.01-08 DISCRETIZING THE DEFORMATION WITHIN A STRESS BASED FUNCTIONALLY GRAD-ED INTERPHASE IN A MICROMECHANICS COMPOSITE MODEL</p> <p>Trevor Sabiston (University of Waterloo) Mohsen Mohammadi (University of New Brunswick) Mohammed Cherkaoui (Georgia Institute of Technology) Kaan Inal (University of Waterloo)</p> <p><i>A new micromechanics frame work is proposed, where a functionally graded interphase is used to account for the force transfer between the matrix and the reinforcements to predict the multi-axial response of unidirectional composites.</i></p>	<p>MON-2_SEV_3.07-08 SELECTIVE PLY-LEVEL HYBRIDISATION FOR IMPROVED NOTCHED RESPONSE</p> <p>Albertino Arêiro (DEMeUniversidade do Porto) Carolina Furtado (DEMeUniversidade do Porto) Giuseppe Catalanotti (INEGI) José Xavier (Universidade de Trás-os-Montes e Alto Douro) Pedro Camanho (University of Porto)</p> <p><i>Selective ply-level hybridisation, where thin off-axis plies are combined with thicker 0° plies, results in an unnotched response equivalent to the thin-ply laminate, but enhances the notched response as compared to thin- and blocked-ply laminates.</i></p>	<p>MON-2_VEN_3.06-08 DAMAGE MECHANISM IN OPEN HOLE CARBON TEXTILE REINFORCED EPOXY COMPOSITES</p> <p>Valter Carvelli (Politecnico di Milano) Kazuya Okubo (Doshisha University) Toru Fujii (Doshisha University)</p> <p><i>In this experimental investigation the damage mechanisms and the damage evolution were observed during tensile quasi-static and cyclic loadings of open hole carbon balanced plain weave reinforced epoxy laminates.</i></p>	<p>MON-2_BUD_3.04-08 FATIGUE CRACK GROWTH IN MODE II OF ADHESIVELY JOINED COMPOSITES</p> <p>Anders Biel (Technical University of Denmark) Helmuth Toftgaard (Technical University of Denmark)</p> <p><i>Experiments are performed, to derive fatigue crack propagation data of adhesively joined composites loaded in shear.</i></p>	<p>MON-2_STO_3.21-05 EFFECT OF VOIDS ON INTERLAMINAR BEHAVIOUR OF CARBON/EPOXY COMPOSITES</p> <p>Iryna Gagauz (University of Bristol) Luiz Kawashita (University of Bristol) Stephen Hallett (University of Bristol)</p> <p><i>In this work an investigation of void influence on the interlaminar shear strength of carbon/epoxy composites was performed using void morphology analysis. The results are useful to understand the material behaviour and refine numerical models.</i></p>	<p>MON-2_BIA_3.11-08 AN EXPERIMENTAL STUDY OF THE MODE I INTERLAMINAR FRACTURE TOUGHNESS OF VECTRAN/EPOXY COMPOSITES</p> <p>Syed Idros Syed Abdullah (Imperial College London) Lorenzo Iannucci (Imperial College London) Emile Greenhalgh (Imperial College London)</p> <p><i>Mode I interlaminar fracture toughness of Vectran/Epoxy is investigated and compared with UD CF/Epoxy. The interlaminar fracture toughness of Vectran/Epoxy was found to be significantly higher than CF/Epoxy, thus providing better impact protection.</i></p>	<p>MON-2_BRU_2.02-08 DOSE CONTROL OF DOUBLE-SIDED IRRADIATION FOR POLYMER-MATRIX COMPOSITES FABRICATED BY IN-SITU CURING WITH LOW ENERGY E-BEAM</p> <p>Jingjing Zhang (Xi'an Jiaotong University) Yugang Duan (Xi'an Jiaotong University) Xinming Zhao (Armoured Engineering Institute) Ben Wang (Xi'an Jiaotong University)</p> <p><i>Dose control of double-sided irradiation for polymer-matrix composites fabricated by in-situ curing with low energy E-Beam</i></p>	
13:10	Lunch Break							
14:10	<p>Keynote lecture 1 (MUC) by Francisco Chinesta, École Centrale de Nantes, France: ADVANCED MODELING AND REAL TIME SIMULATION OF COMPOSITES MANUFACTURING PROCESSES: REALIZING TECHNOLOGICAL DREAMS</p>				<p>Keynote lecture 2 (BIA) by Stepan V. Lomov, Katholieke Universiteit Leuven, Belgium: MULTI-SCALE MODELLING OF SPATIAL VARIABILITY IN TEXTILE COMPOSITES: UNCERTAINTY QUANTIFICATION BASED ON EXPERIMENTAL DATA OF INTERNAL GEOMETRY</p>			
15:00	<p>3.01 Fracture and Damage - Micromechanics (3/8)</p> <p>MON-3_MUC_3.01-09 EVALUATION OF INTERFACIAL STRENGTH IN MICRODROPLET TEST USING EXPERIMENT AND COMPUTATIONAL SIMULATION</p> <p>Mio Sato (Tokyo University of Science) Erina Imai (Tokyo University of Science) Jun Koyanagi (Tokyo University of Science)</p> <p><i>This paper presents an evaluation method for fiber/matrix interfacial strength. In this study, we determine interfacial strength by comparing experimental data with FEM computational simulations of the microdroplet tests.</i></p>	<p>3.07 Thin Ply Composites (3/3)</p> <p>MON-3_SEV_3.07-09 STUDY ON THE STRENGTH OF THIN-PLY LAMINATES OF CFRP UNDER INTERLAMINAR SHEAR LOADINGS</p> <p>Huang Chunfang (NUDT) Jiang Dazhi (National University of Defense Technology) Mingchang He (National University of Defense Technology) Jiayo Xiao (National University of Defense Technology) Qing Zheng (National University of Defense Technology) Su Ju (National University of Defense Technology)</p> <p><i>In this paper, interlaminar shear strength of a carbon fiber/epoxy thin-ply laminates under short-beam bending loads was investigated. Loading-deflection curves of the laminate specimens were obtained.</i></p>	<p>3.06 Textile Composites (3/6)</p> <p>MON-3_VEN_3.06-09 ENVIRONMENTAL EFFECTS ON HIGH TEMPERATURE FATIGUE OF CARBON-POLYIMIDE TEXTILE COMPOSITES FOR AIRCRAFT APPLICATIONS</p> <p>Federico Foti (ENSMA) Marco Gigliotti (ENSMA) Yannick Pannier (ENSMA) D. Mellier (ENSMA)</p> <p><i>Fatigue test on carbon fiber/polyimide matrix composite samples are performed under controlled environment at 250°C. Digital Image Correlation and μCT scans are used, respectively, to measure strain at the sample surface and for damage assessment.</i></p>	<p>3.04 Delamination (3/4)</p> <p>MON-3_BUD_3.04-09 INITIATION OF DELAMINATIONS INDUCED BY TRANSVERSE CRACKS IN CROSS-PLY LAMINATES UNDER STATIC LOADINGS: MODELLING AND EXPERIMENTS</p> <p>Elisa Novello (University of Padova) Paolo Andrea Carraro (University of Padova) Michele Zappalorto (University of Padova) Marino Quaresimin (University of Padova)</p> <p><i>In the present work, the delamination onset induced by the presence of transverse cracks in cross-ply laminates subjected to static loadings is thoroughly investigated, both analytically and experimentally.</i></p>	<p>3.21 Effects of Manufacturing Effects (EoE) (2/2)</p> <p>MON-3_STO_3.21-06 EFFECTS OF PROCESS-INDUCED FIBER BUNDLE WAVINESS ON THE MECHANICAL PROPERTIES OF CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITES</p> <p>Tomohiro Yokozeki (University of Tokyo) Kotaro Akakabe (University of Tokyo) Takahira Aoki (University of Tokyo) Akira Kobiki (IHI corporation)</p> <p><i>This study experimentally investigates the quantitative measurement of fiber bundle waviness in unidirectional CFRTP using the microscope and the X-ray CT scanning. Flexural strength deterioration is evaluated as a function of the waviness parameter.</i></p>	<p>3.11 Dynamic Loading - Impact, Crash, Blast (3/6)</p> <p>MON-3_BIA_3.11-09 EXPERIMENTAL CHARACTERIZATION OF THE OUT-OF-PLANE SHEAR STRENGTH OF ULTRA-HIGH-MOLECULAR WEIGHT POLYETHYLENE COMPOSITE BY USING THE SPLIT-HOPKINSON BAR DEVICE</p> <p>Maria Luisa Ruiz Ripoll (Fraunhofer EMI) Oliver Millon (Fraunhofer EMI) Torsten Lässig (Fraunhofer EMI) Werner Riedel (Fraunhofer EMI)</p> <p><i>The quasi-static and dynamic out-of-plane shear behavior of UHMW-PE composite is experimentally characterized. A new testing method for the measurement of out-of-plane strength and stiffness using Split Hopkinson Bar is presented.</i></p>	<p>Industry Session 1</p> <p>2.02 Polymer Matrix Materials (3/4)</p> <p>MON-3_BRU_2.02-09 EFFECTS OF SILANIZED NANODIAMOND ON THE MECHANICAL AND DYNAMIC-MECHANICAL PROPERTIES OF POLY(DIMETHYL SILOXANE) NANOCOMPOSITE</p> <p>Faezeh Hajiali (Sharif University of Technology) Akabr Shojaei (Sharif University of Technology)</p> <p><i>It was found that silanized nanodiamond that the young's modulus and tensile strength of PDMS enhanced 25% and 70%, respectively, by adding 0.2 wt% sND.</i></p>	
	<p>Presentations of the Sponsoring and Exhibiting Companies</p>							

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
<p>MON-2_BRI_2.07-07 STUDY ON CONDUCTIVITY OF POLY(ANILINE SULFONIC ACID) (PAS) /GRAPHENE OXIDE (GO) COMPOSITES</p> <p>Shigeji Konagaya (Nagoya Industrial Science Research Institute) Mariko Terada (Nagoya University)</p> <p><i>The conductivity enhancement of PAS/GO thin film solids is ascribed to the promotion of thermal reduction of GO to rGO by SO3H groups in PAS.</i></p>	<p>MON-2_NAP_2.06-07 EFFECT OF INFRARED LASER IRRADIATION ON THE PIEZO-ELECTRIC PROPERTIES OF THE TiO2 COATED MWCNT REINFORCED PVDF FILM</p> <p>Da Hye Kim (JBNU) Kun Jeong (Chonbuk National University) Seong Su Kim (Chonbuk National University)</p> <p><i>In this work, MWCNTs were coated with anatase TiO2 nanoparticles by hydrothermal process and Infrared radiation was applied to TiO2 coated MWCNT/PVDF solution to enhance the interaction between the TiO2 coated MWCNT nanoparticles and F atoms of PVDF.</i></p>	<p>MON-2_LON_5.07-04 PROCESS INDUCED TRANSVERSE SHEAR STRESSES IN THICK UNIDIRECTIONAL PULTRUDED PROFILES</p> <p>Ismet Baran (University of Twente) Remko Akkerman (University of Twente)</p> <p><i>The residual transverse stresses might be critical for UD composites since their transverse shear strength is relatively low. In this paper, the process induced transverse shear stresses are predicted for a UD 100x100 mm pultruded square profile.</i></p>	<p>MON-2_BOR_5.08-07 RESIN FLOW IN COMPRESSION MOLDING PROCESSES</p> <p>Paul Bockelmann (Technical University of Munich / Institute for Carbon Composites) Johannes Maierhofer (Technical University of Munich) Jan Krollmann (Technical University of Munich) Sven Zarella (Technical University of Munich / Institute for Carbon Composites) Pierre Mertiny (University of Alberta)</p> <p><i>Resin flow of two variants of compression molding were visually investigated with fluorescent photography. It was found that process parameters and the type of matrix pre-application strongly determine resin distribution after compression.</i></p>	<p>MON-2_STG_5.09-07 DEVELOPMENT OF COMMINGLING NOZZLES FOR HYBRID YARN PRODUCTION BY CFD SIMULATION</p> <p>Klaus Vonberg (RWTH Aachen University) Thomas Gries (RWTH Aachen University) Gunnar Seide (RWTH Aachen University)</p> <p><i>The technique of Computational Fluid Dynamics is useful to analyse the flow field inside commingling nozzles. In the frame of this paper the procedure during the simulation is described and related to the commingling process.</i></p>	<p>MON-2_AUG_4.02-07 THREE-DIMENSIONAL CHARACTERIZATION OF STRUCTURE AND DAMAGE OF POLYMERS USING A TALBOT-LAU GRATING INTERFEROMETER μ-XCT</p> <p>Johann Kastner, Sascha Senck, Bernhard Plank, Dietmar Salzberger (University of Applied Sciences Upper Austria) Guru Prasad Rao (FH OÖ Forschungs- & Entwicklung GmbH) Christian Gusebauer (University of Applied Sciences Upper Austria)</p> <p><i>We present results of a novel Talbot-Lau grating interferometry desktop μ-XCT-system which are compared to conventional high resolution XCT-results. Three different kind of damages in composites are characterized: impact, tensile and cyclic loading.</i></p>	<p>MON-2_ING_6.01-04 FUNCTION INTEGRATION FOR INJECTION MOULDED STRUCTURES USING FIBRE REINFORCED GRIDS</p> <p>Martin Pohl (Technical University of Dresden) Robert Kupfer (Technical University of Dresden) Niels Modler (Technical University of Dresden)</p> <p><i>Multiaxial textile grids with integrated wires can be used for both, reinforcement of injection moulded structures and electrical function integration. To connect electronic components to the wires, various contact technologies are evaluated.</i></p>	<p>MON-2_ATH_1.01-07 FATIGUE SUBSTANTIATION AND DAMAGE TOLERANCE EVALUATION OF FIBER COMPOSITE H145 COMPONENTS</p> <p>Max Wedekind (Airbus Helicopters) Christeline Salmon (Airbus Helicopters) Elif Ahi (Airbus Helicopters)</p> <p><i>The new EASA rules for helicopter certification, §27/29.571 and 573 respectively, require a flaw tolerant fatigue substantiation. Within this paper the flaw tolerant safe life substantiation is shown for different composite components.</i></p>	12:30
<p>MON-2_BRI_2.07-08 MECHANICAL AND DIELECTRIC PROPERTIES OF POLYHEDRAL OLIGOMERIC SILSESQUOXANES MODIFIED GRAPHENE OXIDE/POLYIMIDE NANOCOMPOSITES</p> <p>Chen-Chi Ma, Sheng-Chi Lin, Jeng-An Wang, Wei-Hao Liao, Sheng-Tsung Hsiao, Yu-Sheng Wang, Shin-Ming Li (National Tsing Hua University)</p> <p><i>Octa(aminophenyl) silsesquioxane (OAPS) functionalized graphene oxide (GO) reinforced polyimide (PI) composites; 3.0 wt % OAPS-GO exhibited 11.2-folds increase in tensile strength compared with neat PI; Dk value of 1.9 was achieved.</i></p>	<p>MON-2_NAP_2.06-08 EFFECT OF MOISTURE ON ELECTRICAL RESISTIVITY OF CNT REINFORCED EPOXY NANOCOMPOSITES</p> <p>Sima Navabizadeh (Concordia University) Suong V. Hoa (Concordia University) Daniel Rosca (Concordia University)</p> <p><i>We investigate the effect of moisture on the electrical resistivity of epoxy containing CNT. The effect of different type, and different concentrations of nanotubes on the rate of diffusion as well as the maximum amount of water absorbed were studied.</i></p>	<p>MON-2_LON_5.07-05 VALIDATION OF RING FILAMENT WOUND FIBER PATHS FOR UNIDIRECTIONAL PRE-FORM PLY MANUFACTURING</p> <p>Felipe Alberto Finkenwerder (Airbus Group Innovations) Matthias Geistbeck (Airbus Group Innovations) Peter Middendorf (University of Stuttgart)</p> <p><i>The objective of the present study is to validate geodesic and non-geodesic trajectories at room temperature conditions by unidirectional ring filament winding.</i></p>			<p>MON-2_AUG_4.02-08 ULTRA-FAST TIME-LAPSE SYNCHROTRON RADIATION IMAGING OF COMPRESSIVE FAILURE IN UD CFRP</p> <p>Ying Wang, Serafina Consuelo Garcea, Tristan Lowe (University of Manchester) Eric Maire (INSA de Lyon) Costas Soutis (University of Manchester) Philip J. Withers (University of Manchester)</p> <p><i>In this paper, the compressive failure of unidirectional carbon fibre/epoxy composite rods is studied using ultra-fast time-lapse synchrotron X-ray imaging, involving both two-dimensional radiography and three-dimensional computed tomography.</i></p>	<p>MON-2_ING_6.01-05 INTERLEAVING FOR EASY REPAIR OF INTERLAMINAR DAMAGE - CAN IT BE DONE?</p> <p>Paul Robinson (Imperial College London) Bohao Zhang (Imperial College London) Alexander Bismarck (University of Vienna) Henry Maples (University of Vienna)</p> <p><i>An easy-repair laminate concept is investigated to address the repair problem posed by interlaminar damage due to impact. Good strength recovery is achieved when the laminate is heated and subjected to external pressure.</i></p>	<p>MON-2_ATH_1.01-08 FORMING THE FUTURE: STRUCTURAL APPLICATIONS FOR FIBRE REINFORCED THERMOPLASTICS IN NEXT GENERATION AIRFRAMES</p> <p>Robert Jarczyk, Lukas Meis, Tim Neitzel, Klaus Edelmann, Angelos Miaris (Premium AEROTECH GmbH)</p> <p><i>Premium AEROTECH has developed from scratch a process for the production of complex detailed parts reinforced with unidirectional thermoplastic tapes. The developed process meets all requirements concerning production stability and part quality.</i></p>	12:50
Lunch Break								13:10
<p>Keynote lecture 3 (NAP) by Jinson Leng, Harbin Institute of Technology, China: ACTIVE DEFORMABLE COMPOSITE STRUCTURES: OPPORTUNITIES AND CHALLENGES</p>				<p>Keynote lecture 4 (STG) by Gerald Pinter, Montanuniversität Leoben and Polymer Competence Center Leoben, Austria: ADVANCED TECHNIQUES FOR THE CHARACTERIZATION OF FATIGUE IN SHORT AND CONTINUOUS FIBRE REINFORCED POLYMER MATRIX COMPOSITES</p>				14:10
2.07 Graphene, Graphene-Based Composites (3/4)	2.06 Nano Composites (3/7)	5.06 Automated Placement Technologies (1/5)	5.02 Process Simulation II - Curing & PID (1/2)	5.09 Manufacturing Processes for Thermoplastic Composites (3/7)	4.04 Micro- and Nano-Scale Test Methods (1/1)	6.01 Smart Structures (2/2)	1.01 Aerospace (3/6)	
<p>MON-3_BRI_2.07-09 MECHANICAL REINFORCEMENT OF CROSSLINKED CYCLOSILOXANE BASED POLYMER NETWORK WITH BASAL-PLANE FUNCTIONALIZED GRAPHENE AT EXTREMELY LOW LOADING</p> <p>Yu-jie Song (Nanyang Technological University) Xiu-zhi Tang (Nanyang Technological University) Yen Nan Liang (Nanyang Technological University) Chen-zhong Mu (Nanyang Technological University) Ming Liu (Nanyang Technological University) Xiao Hu (Nanyang Technological University)</p> <p><i>Nanocomposites with loading of graphene (= 0.1 wt%) were fabricated and the improvement of mechanical properties were investigated. The reinforcing mechanism of low loading graphene were studied.</i></p>	<p>MON-3_NAP_2.06-09 EXPERIMENTAL METHODS AND RESULTS FOR THE REDUCTION OF RESIN SHRINKAGE BY THE ADDITION OF NANOPARTICLES FOR INCREASED DIMENSIONAL ACCURACY OF CARBON FIBER REINFORCED PLASTICS</p> <p>Wibke Exner (German Aerospace Center) Peter Wierach (German Aerospace Center)</p> <p><i>Process-induced distortions of carbon fiber reinforced plastics are a result of the resins chemical and thermal shrinkage. The addition of nanoparticles is one way to overcome this problem. Experimental methods and results are presented.</i></p>	<p>MON-3_LON_5.06-01 AUTOMATED FIBRE PLACEMENT EDGE OF PLY ACCURACY WITH RESPECT TO MACHINE PERFORMANCE AND DESIGN</p> <p>Ashley Barnes (Rolls-Royce / University of Bristol) James Tingle (Rolls-Royce Plc) James Lee (Rolls-Royce Plc)</p> <p><i>In an experimental study, a series of 12 ply laminates were Automated Fibre Placed and measured for the edge of ply accuracy to nominal definition, determining process capability and key error contributions.</i></p>	<p>MON-3_BOR_5.02-01 DEVELOPMENT OF A NUMERICAL APPROACH TO PREDICT PROCESS INDUCED DEFORMATIONS DURING CURE OF FIBRE-REINFORCED STRUCTURES</p> <p>A. Vandenbrande (Technical University of Dresden) Uwe Schuster (Technical University of Dresden) Andreas Hauffe (Technical University of Dresden) Klaus Wolf (Technical University of Dresden)</p> <p><i>Shape distortions of prepreg structures occurring during autoclave cycles are a common problem. A new method has been developed, where the spring-in of complex structures can be predicted very accurate, fast and without excessive experimental effort.</i></p>	<p>MON-3_STG_5.09-08 DIRECT THERMOPLASTIC MELT IMPREGNATION OF CARBON FIBRE FABRICS BY INJECTION MOLDING</p> <p>Julia Studer (Institute of Polymer Engineering, FHNW) Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland) Bodo Fiedler (Technische Universität Hamburg-Harburg)</p> <p><i>The influence of the fabric architecture on the processing window for a through-thickness impregnation with thermoplastic melt is discussed by implementing the experimental compaction and permeability behaviour of two fabrics in a numerical analysis.</i></p>	<p>MON-3_AUG_4.04-01 CHARACTERIZATION OF INTERPHASES BY NANOMECHANICAL MAPPING AND CORRELATION WITH MACROSCOPIC MECHANICAL PROPERTIES</p> <p>Lenaik Belec (University Toulon Var) Nicolas Spitz (University Toulon Var) Jean-François Chailan (University of Toulon)</p> <p><i>The heterogeneity of the matrix in UD glass fibre/epoxy composites is shown by Atomic Force Microscopy with a quantitative nano-mechanical mode. The results are compared to static and dynamic mechanical tests.</i></p>	<p>MON-3_ING_6.01-06 MODELLING THE CORRELATION BETWEEN THE DAMAGE STATE AND THE ELECTRICAL RESISTANCE CHANGE IN SYMMETRIC LAMINATES</p> <p>Paolo Andrea Carraro (University of Padova) Francesco Panozzo (University of Padova) Marino Quaresimin (University of Padova) Michele Zappalorto (University of Padova)</p> <p><i>A closed form solution is presented to predict the variation of the electrical resistance change in conductive laminates, caused by matrix cracking in one layer. The accuracy of the proposed model is verified by comparison to a bulk of FE analyses.</i></p>	<p>MON-3_ATH_1.01-09 FULL SCALE STATIC TEST OF A LIGHTWEIGHT COMPOSITE STRUCTURE</p> <p>Barbara Goller (Intales GmbH) Manfred Gratt (Intales GmbH) Federico Simonelli (FACC Aerostructures)</p> <p><i>A full scale static test of a lightweight composite structure is described, where all steps of load calibration, test preparation and monitoring are discussed. Also methods for assessing the data and comparison with the FE-model are presented.</i></p>	15:00

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
15:20	<p>MON-3_MUC_3.01-10 EXAMINATION OF DELAMINATION MIGRATION THROUGH MICRO-SCALE SIMULATION</p> <p>David Mollenhauer (Air Force Research Laboratory) Eric Zhou (University of Dayton) Endel Jarve (University of Texas Arlington) Michael Braginsky (University of Texas Arlington) Kevin Hoos (University of Dayton) Timothy Breitzman (U.S. Air Force Research Laboratory) Dan Rapping (Wright State University)</p> <p><i>Delamination migration is examined through a multi-scale, global-local modeling approach that incorporates Regularized eXtended Finite Element representations of matrix cracking at a homogenized ply-level to a micro-scale level.</i></p>	<p>MON-3_SEV_3.07-10 TESTING AND MODELLING OF TENSION AFTER IMPACT OF A THIN PLY TEXTILE COMPOSITE</p> <p>Robin Olsson (Swerea SICOMP) Fredrik Ahlqvist (Swerea SICOMP) Alann Andre (Swerea SICOMP) Peter Hellström (Swerea SICOMP) Elena Álvarez (Oxeon) Emilio González (AMADE, Universidad de Girona) Jose Ramon Sainz de Aja (Aernnova Engineering Solutions Ibérica S.A.) Federico Martin De La Escalera (Aernnova Engineering Solutions Ibérica S.A.)</p> <p><i>Experiments and FE-simulation of impact response, damage and tensile strength after impact of quasi-isotropic laminates from thin ply CFRP weaves. Fibre fracture, matrix cracks and delaminations were studied by deploying, microscopy and C-scan.</i></p>	<p>MON-3_VEN_3.06-10 NUMERICAL INVESTIGATION OF BRAIDED BASALT FIBER BRAIDS FOR POLYMER COMPOSITES</p> <p>Yordan Kyosev (Hochschule Niederrhein) Alena Cordes (Hochschule Niederrhein)</p> <p><i>This paper presents analysis of the possibilities of WiseTex and TexMind Braider for generation of the geometry of flat braids, produced of basalt fibers rowings.</i></p>	<p>MON-3_BUD_3.04-10 MODELING DELAMINATION MIGRATION IN MULTI-DIRECTIONAL COMPOSITE LAMINATES</p> <p>Tong-Earn Tay (National University of Singapore) X.F. Hu (National University of Singapore) M. Tirvaudey (École normale supérieure de Cachan) Vincent B.C. Tan (National University of Singapore)</p> <p><i>The present study develops an integrated extended finite element method (XFEM) and cohesive element (CE) method for 3D delamination migration in multi-directional composite laminates, and validates the results with experiment performed on a double-cantilever beam (DCB) with multi-directional lay-up.</i></p>	<p>MON-3_STO_3.21-07 INVESTIGATION INTO THE VARIABILITY OF CARBON FIBER NON-CRIMP FABRICS AND ITS INFLUENCE ON THE RTM-PROCESS</p> <p>Andreas Nonn (BMW Group) Christian Koch (BMW Group) Thomas Maurer (BMW Group) Simon Bickerton (University of Auckland) Christoph Greb (RWTH Aachen University) Thomas Gries (RWTH Aachen University)</p> <p><i>Unidirectional carbon fiber NCF single ply and stack properties are characterized non-destructively. The experimental results allow direct correlation of measured textile variability to flow front progression in 2D RTM short shot parts.</i></p>	<p>MON-3_BIA_3.11-10 HIGH TEMPERATURE STATIC AND LOW VELOCITY IMPACT BEHAVIOURS OF THERMOPLASTIC COMPOSITES BASED ON PEN AND WOVEN FABRICS</p> <p>Luigi Sorrentino (National Research Council of Italy)</p> <p><i>Thermoplastic composites based on PEN and four different woven fabrics (carbon, aramid, Vectran and basalt) were tested up to 100 °C by means of static flexural tests, low velocity impacts and dynamic mechanical scans (up to 220 °C).</i></p>	<p>Presentations of the Sponsoring and Exhibiting Companies</p>	<p>MON-3_BRU_2.02-10 IMPROVED ELECTRICAL, MECHANICAL AND EMI SHIELDING PROPERTIES OF PANI-VGCF-DBSA/DVB HYBRID NANOCOMPOSITE</p> <p>Vipin Kumar (University of Tokyo) Tomohiro Yokozeki (University of Tokyo) Teruya Goto (Yamagata University) Tatsuhiro Takahashi (Yamagata University) Sanjay R. Dhakate (Physics & Engineering of Carbon, CSIR-National Physical Laboratory, New Delhi) Bhanu Pratap Singh (Physics & Engineering of Carbon, CSIR-National Physical Laboratory, New Delhi)</p> <p><i>A Polyaniline (PANI) based electrically conductive thermosetting hybrid nano-composite has been prepared by incorporating high apparent-density type vapor grown carbon fibers (VGCF-H) as additional conductive filler.</i></p>
15:40	<p>MON-3_MUC_3.01-11 EXPERIMENTAL INVESTIGATION OF DAMAGE TRANSITION IN THERMOPLASTIC COMPOSITES AT THE MICROSCALE</p> <p>Arief Yudhanto (King Abdullah University of Science and Technology (KAUST)) Husam Wafei (King Abdullah University of Science and Technology (KAUST)) Gilles Lubineau (King Abdullah University of Science and Technology (KAUST)) Nikhil Verghese (SABIC T&I Corporate Research & Development, Composites) Recep Yaldiz (SABIC T&I Corporate Research & Development, Composites)</p> <p><i>Transition from transverse crack into delamination in thermoplastic composites is investigated microscopically by micro-scale 3-point bending test. Crack speed and influence of fibrillation in the wake of crack are discussed.</i></p>	<p>MON-3_SEV_3.07-11 TOWARD AEROSPACE GRADE THIN-PLY COMPOSITES</p> <p>Robin Amacher (Lab. of Applied Mechanics and Reliability Analysis, EPFL) Joel Cugnoni (Ecole Polytechnique Fédérale de Lausanne) Jens Brunner (Institute of Polymer Engineering, FHNW) Erich Kramer (Institute of Polymer Engineering, FHNW) Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland) Wayne Smith (North Thin Ply Technology) Kenneth Scobbie (Huntsman Advanced Material) L. Sorensen (RUAG Aerostructures) John Botsis (Ecole Polytechnique Fédérale de Lausanne)</p> <p><i>A new aerospace grade thin-ply composite is developed. It has outstanding CAI performance and a strong size-effect. Two hybrid versions enable to tune it with much improved translaminar toughness and even a pseudo-ductile behaviour where needed.</i></p>	<p>MON-3_VEN_3.06-11 EXPERIMENTAL CHARACTERIZATION OF TRIAXIAL BRAIDED COMPOSITES</p> <p>Alejandro Garcia-Carpintero (IMDEA Materials Institute) J.W. Roelse (Eindhoven University of Technology) J. J. M. Knippenberg (Eindhoven University of Technology) Jian Xu (IMDEA Materials Institute) Claudio Lopes (IMDEA Materials Institute) Carlos González (Polytechnic University of Madrid & IMDEA Materials Institute)</p> <p><i>An in-plane mechanical characterization and fracture toughness tests were carried out on triaxially braided composites at coupon level. In addition, the present damage mechanisms were identified.</i></p>	<p>MON-3_BUD_3.04-11 MODELING FATIGUE-DRIVEN DELAMINATION USING A THICK LEVEL SET INTERFACE MODEL</p> <p>Mohammad Latifi (Delft University of Technology) Frans Van der Meer (Delft University of Technology) Bert Sluys (Delft University of Technology)</p> <p><i>In this paper a combination of the thick level set method and interface elements is used to develop a new discontinuous method for modeling fatigue driven delamination in composite.</i></p>	<p>MON-3_STO_3.21-08 MODEL REDUCTION METHOD APPLIED TO 3D SIMULATION OF HONEYCOMB SANDWICHES WITH PARAMETRIZED GRADIENT OF PROPERTIES IN THE CORE</p> <p>Brice Bognet (Ecole Centrale de Nantes) Francisco Chinea (Ecole Centrale Nantes) Patrick De Luca (ESI Group)</p> <p><i>We demonstrate in this paper how to solve a 3D elasticity problem defined on a honeycomb sandwich geometry, using the Proper Generalized Decomposition (PGD). Moreover two additional parameter are integrated in the simulation, making it 5D.</i></p>	<p>MON-3_BIA_3.11-11 HIGH VELOCITY IMPACTS OF COMPOSITE FRAGMENTS</p> <p>Alberto Mata (Universidad Carlos III de Madrid) Jesus Pernas-Sanchez (Universidad Carlos III de Madrid) Jose Alfonso Artero-Guerrero (Universidad Carlos III de Madrid) D. Varas (Universidad Carlos III de Madrid) Jorge López-Puente (Universidad Carlos III de Madrid)</p> <p><i>This work studies the behaviour of composite fragments when impacting against a rigid from both experimental and numerical approaches. The numerical methodology proposed predicts faithfully the physics of the impact phenomenon.</i></p>		<p>MON-3_BRU_2.02-11 INVESTIGATION OF THE THERMAL CONDUCTIVITY OF HEXAGONAL BORON NITRIDE-EP-OXY COMPOSITES</p> <p>Björn Riecken (Hamburg University of Technology) Bodo Fiedler (Technische Universität Hamburg-Harburg)</p> <p><i>The present study investigates the influence of different dispersion techniques and attributed effects on the filler material on thermal conductivity of hexagonal boron nitride epoxy micro composites.</i></p>
16:00	<p>MON-3_MUC_3.01-12 FINITE ELEMENT SIMULATION OF NANO-FILAMENTS PULL-OUT FROM CEMENTITIOUS NANOCOMPOSITE MATERIALS USING AN ELASTIC-PLASTIC-DAMAGE AND COHESIVE SURFACE MODELS</p> <p>Rashid Abu Al Rub (Masdar Institute of Science and Technology)</p> <p><i>The main focus of this work is on investigating computationally the pull-out behavior of nano-filaments from the cement matrix.</i></p>	<p>MON-3_VEN_3.06-12 THERMOPLASTIC COMPOSITES FORMING SIMULATION. VISCOSITY AND THERMAL INFLUENCE ON DRAPING.</p> <p>Eduardo Guzman maldonado (INSA de Lyon) Hu Xiong (INSA de Lyon) Hamila Nahiene (INSA de Lyon) Philippe Boisse (INSA de Lyon)</p> <p><i>The simulation of thermoplastic prepreg forming is achieved by alternate thermal and mechanical analyses. The thermal properties are obtained from a mesoscopic analysis and a homogenization procedure.</i></p>	<p>MON-3_VEN_3.06-12 THERMOPLASTIC COMPOSITES FORMING SIMULATION. VISCOSITY AND THERMAL INFLUENCE ON DRAPING.</p> <p>Eduardo Guzman maldonado (INSA de Lyon) Hu Xiong (INSA de Lyon) Hamila Nahiene (INSA de Lyon) Philippe Boisse (INSA de Lyon)</p> <p><i>The simulation of thermoplastic prepreg forming is achieved by alternate thermal and mechanical analyses. The thermal properties are obtained from a mesoscopic analysis and a homogenization procedure.</i></p>	<p>MON-3_BUD_3.04-12 NEW TEST SET-UP FOR MEASURING RATE-DEPENDENT MODE-I DELAMINATION PROPERTIES OF UNIDIRECTIONAL AND WOVEN COMPOSITES</p> <p>Siebe Spronk (Ghent University) Joris Degrieck (Ghent University) Francisco A. Gilabert (Ghent University) F. Allayes (Ghent University) Wim Van Paepegem (Ghent University)</p> <p><i>A new experimental setup is designed to investigate the mode-I delamination of specimens after an impact load. Specimens are tracked during a test using a contactless optical method. Finite element analysis is used to extract the fracture toughness.</i></p>	<p>MON-3_STO_3.21-09 PROCESS-PARAMETER DEPENDENT SPRING-IN AND WARPAGE OF LOCALLY REINFORCED UD-TAPE LAMINATES AND V-SHAPED PROFILES</p> <p>Benjamin Hangs (Fraunhofer ICT) Tobias Link (Fraunhofer ICT) Frank Henning (Fraunhofer ICT)</p> <p><i>This study deals with thin-walled, locally reinforced laminates and V-shaped profiles made from thermoplastic UD tape. Process parameters are varied on three levels for both coupon types to investigate the influence on resulting shape deformations.</i></p>	<p>MON-3_BIA_3.11-12 HIGH-FIDELITY PROGRESSIVE FAILURE ANALYSES OF COMPOSITE LAMINATES UNDER IMPACT LOADING</p> <p>Zhoucheng Su (Institute of High Performance Computing) Dinh-Chi Pham (Department of Engineering Mechanics, Institute of High Performance Computing, A*STAR) Sridhar Narayanaswamy (Department of Engineering Mechanics, Institute of High Performance Computing, A*STAR)</p> <p><i>This paper presents an effective approach for high-fidelity progressive failure analyses of composite plates under impact loading. The dynamic response and damage patterns predicted agree well with those obtained from experiments in the literature.</i></p>		<p>MON-3_BRU_2.02-12 MECHANICAL BEHAVIOR OF AMORPHOUS PEEK IN THE RUBBERY STATE</p> <p>Lilian Martineau (Université de Toulouse) France Chabert (University of Toulouse) Gerard Bernhart (Université de Toulouse) Toufik Djilali (NIMITech Innovation)</p> <p><i>The mechanical behavior of amorphous poly(etheretherketone) (PEEK) was investigated just above the glass-transition temperature (Tg).</i></p>

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
<p>MON-3_BRI_2.07-10 ON THE MULTI-FUNCTIONAL BEHAVIOR OF GRAPHENE BASED NANO-REINFORCED POLYMERS</p> <p>Stavros Tsantalis (University of Patras) Christina Kostagiannakopoulou (University of Patras) George Sotiriadis (University of Patras) Vassilis Kostopoulos (University of Patras)</p> <p><i>The objective of present work is to investigate the influence of Graphene Nano-Platelets on the multi-functionality of nano-reinforced epoxy polymers. Thermal conductivity measurements, thermo-mechanical and mechanical tests were performed.</i></p>	<p>MON-3_NAP_2.06-10 FLEXIBLE THERMOELECTRIC MODULES BASED ON BITE NANOCOMPOSITES</p> <p>Giovanni Piero Pepe (Università di Napoli Federico II) Immacolata Pedaci (STMicro-electronics) Valeria Casuscelli (STMicro-electronics) Angela Cimmino (STMicro-electronics) Giuseppe Travaglini (STMicro-electronics) Maria Carmen Giordano (STMicro-electronics) Gianfranco Carotenuto (Institute for Polymers, Composites and Biomaterials - National Research Council)</p>	<p>MON-3_LON_5.06-02 AUTOMATED TAPE LAYING (ATL) PROCESS SIMULATION THROUGH 3D THERMO-MECHANICAL MODEL</p> <p>Yann Duplessis Kergomard (ESI Group) Britto Sathesh (Montanuniversität Leoben) L. Dufort (ESI Group) Ralf Schledjewski (Montanuniversität Leoben)</p> <p><i>The paper focuses on the ATP process simulation in the frame of the STELLAR project, and especially on the laser simulation to assess the heating flux boundary conditions, chaining with an explicit 3D thermo-mechanical simulation of the ATP process.</i></p>	<p>MON-3_BOR_5.02-02 HIGH-RATE, SPRING-IN COMPENSATED, NET-SHAPE MANUFACTURING OF RTM MADE COMPOSITE FRAMES WITHIN THE EU PROJECT MAAXIMUS</p> <p>Erik Kappel (German Aerospace Center) Björn Reinhard (German Aerospace Center) Tim Roser (Airbus Helicopters)</p> <p><i>The paper reports simulation-based prediction of process-induced distortions and the corresponding compensation of an RTM injection tool.</i></p>	<p>MON-3_STG_5.09-09 EXPERIMENTAL INVESTIGATION OF INTER-LAYER THERMAL CONTACT RESISTANCE AND ITS RELEVANCE FOR CONSOLIDATION OF THERMOPLASTIC COMPOSITES</p> <p>Philipp Maximilian Schäfer (Technical University of Munich / Institute for Carbon Composites) Silke Kreuzhage (Technical University of Munich) Sven Zarella (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>Thermal processes are decisive for the efficient manufacturing of thermoplastic tapes. We developed a method for determining the inter-layer thermal contact resistance of consolidated and unconsolidated tapes and investigated CFRP PA-6 tapes.</i></p>	<p>MON-3_AUG_4.04-02 FAILURE OF CARBON FIBER COMPOSITES WITH THERMOSET AND THERMOPLASTIC MATRIX INVESTIGATED BY IN-SITU MONITORING USING COMPUTED TOMOGRAPHY AND ACOUSTIC EMISSION</p> <p>Sinan Kalafat (University of Augsburg) Markus Sause (University of Augsburg)</p> <p><i>The investigated cases for thermo- and thermoplast based composites show fundamentally different behaviour of crack propagation. The CT images in combination with the acoustic emission provide an insight to the nature of both failure behaviours.</i></p>	<p>MON-3_ING_6.01-07 MODELLING THE SHAPE MEMORY CAPABILITY OF A HYBRID INTERLEAVED COMPOSITE</p> <p>Bohao Zhang (Imperial College London) Paul Robinson (Imperial College London) Alexander Bismarck (University of Vienna) Henry Maples (University of Vienna)</p> <p><i>This paper investigates finite element modelling of the shape memory capability of a polystyrene-interleaved composite. Such modelling could be useful in the design of deployable structures made of this shape memory composite.</i></p>	<p>MON-3_ATH_1.01-10 INTEGRATED HELICOPTER SIDE SHELLS IN INFUSION TECHNOLOGY</p> <p>Frank Weiland (Airbus Helicopters) Uwe Beier (Airbus Helicopters)</p> <p><i>An innovative manufacturing routine for CFRP shell structures has been developed and demonstrated. It combines a VAP-infusion with a joining technology based on the interdiffusion of thermoplastic films with epoxies for cost and weight efficiency.</i></p>	15:20
<p>MON-3_BRI_2.07-11 STRENGTHENING MECHANISM OF GRAPHENE/METAL NANOLAYERED COMPOSITES</p> <p>Zhenyu Yang (Beihang University) Dandan Wang (Beihang University) Jian Sun (Beihang University) Zixing Lu (Institute of Solid Mechanics, Beihang University)</p> <p><i>MD simulation was employed to investigate the deformation mechanisms of graphene/metal nanowires with layered structures. The strengthening mechanisms of nanolayered composites nanowires are revealed as dislocations blocked by graphene layers.</i></p>	<p>MON-3_NAP_2.06-11 REINFORCEMENT OF COMPOSITE MATERIALS USING ARCHITECTURED CARBON NANOTUBES - CARBON FIBERS</p> <p>Fabrice Laurent (Université de Haute Alsace) Hanae Oulanti (Université de Haute Alsace) Thang Lehuu (Université de Haute Alsace) Gildas L'Hostis (LPMT) Basma Hasioui (Université de Haute Alsace) Bernard Durand (LPMT)</p> <p><i>We present carbon nanotube (CNT) growth, using an oxyacetylene flame method, on carbon fibers, a method developed in the laboratory. The goal of this work is the "scaling-up" of the process in order to bring new properties to the composite materials.</i></p>	<p>MON-3_LON_5.06-03 AUTOMATIC LAMINATION AND IN-SITU CONSOLIDATION: CONTROLLING THE PROCESS.</p> <p>Isabel Martín (FIDAMC) Antonio Fernández-López (Universidad Politécnica de Madrid) A. Güemes (Universidad Politécnica de Madrid) Fernando Rodríguez (FIDAMC)</p> <p><i>The application of deconvolution and optimization methods to the exothermal peaks of crystallization over PEEK and CF/PEEK.</i></p>	<p>MON-3_BOR_5.02-03 INFLUENCE OF THE FIBRE VOLUME FRACTION PARAMETER ON THE PREDICTIONS OF THE CURE-INDUCED DEFORMATIONS IN THERMOSET COMPOSITE PARTS</p> <p>Antoine Parmentier (Cenaero) Benoit Wucher (Cenaero) David Dumas (Cenaero)</p> <p><i>The present study focuses on quantifying the influence of the fibre volume fraction parameter on the prediction of the cure-induced deformations in order to evaluate the level of refinement to introduce in the numerical model.</i></p>	<p>MON-3_STG_5.09-10 EFFECTS OF DIFFERENTLY IMPREGNATED CARBON FIBER REINFORCED TAPES WITH POLYAMIDE 6 ON FURTHER PROCESSING</p> <p>Veronika Radlmaier (Technical University of Munich / Institute for Carbon Composites) H. Baumann (Technical University of Munich / Institute for Carbon Composites) Patrik-Vincent Brudzinski (SGL Technologies) Andreas Erber (SGL Technologies) Hannes Koerber (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>This study aims to investigate if partially impregnated tapes can be completely impregnated throughout a typical production process for thermoplastic composite components.</i></p>	<p>MON-3_AUG_4.04-03 DETERMINATION OF ENVIRONMENTAL DEGRADATION OF MATRIX AND FIBRE MATERIALS WITH A NOVEL, STATISTICALLY RELIABLE MICRO-ROBOTIC APPROACH</p> <p>Essi Sarlin (Tampere University of Technology) Mathias von Essen (Tampere University of Technology) Sarianna Palola (Tampere University of Technology) Mari Lingren (Tampere University of Technology) Pasi Kallio (Tampere University of Technology) Jyrki Vuorinen (Tampere University of Technology)</p> <p><i>The environmental degradation of typical composite matrix and reinforcement materials is studied with a new micro-robotic approach and the results are compared against the results obtained by a traditional fibre tensile method.</i></p>	<p>MON-3_ING_6.01-08 SPRING ELEMENTS FOR REWOD ENERGY HARVESTERS: PRINTING EMULSION TEMPLATES TO MANUFACTURE MACROPOROUS POLYMERS</p> <p>Angelika Menner (University of Vienna) Qixiang Jiang (University of Vienna) Alexander Bismarck (University of Vienna)</p> <p><i>We report on the preparation and characterisation of emulsion templated, highly flexible and interconnected macroporous polymer springs which are a vital part of a novel REWOD energy harvesting device.</i></p>	<p>MON-3_ATH_1.01-11 APPLICATION POTENTIAL OF BASALT FIBERS IN AERONAUTICS</p> <p>Felix Bauer (University of Stuttgart) Manuel Kempf (Airbus Helicopters) Christian Wellhausen (Airbus Helicopters) Peter Middendorf (University of Stuttgart)</p> <p><i>Assessment of basalt fibers regarding their properties and available scatter. Use of the fiber diameter as an evaluation criterion for the spinning process control. Correlation of the diameter and its scatter with the mechanical fiber properties.</i></p>	15:40
<p>MON-3_BRI_2.07-12 IMPACT PROPERTIES OF GRAPHENE MODIFIED POLYMERS AND COMPRESSION AFTER IMPACT (CAI) PROPERTIES OF GRAPHENE MODIFIED CFRPS</p> <p>Christina Kostagiannakopoulou (University of Patras) Stavros Tsantalis (University of Patras) George Sotiriadis (University of Patras) Vassilis Kostopoulos (University of Patras)</p> <p><i>Present study investigates the influence of GNPs on the impact behavior of nano-reinforced polymers and CFRP laminates. Charpy tests reveal that the introduction of GNPs into the polymer improved 50% the impact resistance of the reference material.</i></p>	<p>MON-3_NAP_2.06-12 IMPROVING DELAMINATION STRENGTH THROUGH CNTS REINFORCEMENT: NUMERICAL SIMULATION</p> <p>Yassine El Assami (IFSTTAR) Monsef Drissi-Habti (IFSTTAR) V. Raman (Institut de Recherche Technologique (IRT) Jules VERNE) A. Pispupati (Institut de Recherche Technologique (IRT) Jules VERNE)</p> <p><i>The mechanical properties deduced from this multiscale approach will allow determining the properties of a new bonding layer that would be considered in macroscopic models.</i></p>	<p>MON-3_LON_5.06-04 CHALLENGES FOR THERMOPLAST-AUTOMATED FIBER PLACEMENT (TP-AFP) WITH IN SITU CONSOLIDATION ON 3D PARTS</p> <p>Andreas Kollmannsberger (Technical University of Munich) Elisabeth Ladstätter (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>Based on an optimized 2D steady-state process this paper focuses on describing the differences for 3D lay-up on v-shaped tools with a rounded corner. Test specimens with different leg angles are manufactured and tested according to ASTM 6415.</i></p>	<p>MON-3_BOR_5.02-04 MODELLING THERMAL DEFORMATIONS IN CURVED COMPOSITE LAMINATES USING STANDARD SHELL FINITE ELEMENTS</p> <p>Enrique Graciani (Universidad de Sevilla) Antonio Blázquez (University of Sevilla) Jesús Justo Estebanz (Universidad de Sevilla) Federico París (Universidad de Sevilla)</p> <p><i>A new modelling procedure for predicting the spring-in of L-shaped composite samples using standard shell FE models (with suitably modified in-plane coefficients of thermal expansion) is presented and successfully compared with solid FE models.</i></p>	<p>MON-3_STG_5.09-11 EVALUATION OF THE IMPREGNATION CHARACTERISTICS OF CARBON FIBER-REINFORCED COMPOSITES USING POLYPROPYLENE GEL-FILM.</p> <p>Soo Jin Ham (Chonbuk National University) Seung A Song (Chonbuk National University) Seong Su Kim (Chonbuk National University)</p> <p><i>In this study, we fabricated CFRPP by using a high speed resin transfer molding (RTM) with PP gel-film whose flow direction is through-thickness for the preform to solve the low impregnating property of the CFRPP.</i></p>	<p>MON-3_ING_6.01-09 THERMAL ACTIVATED COMPOSITE STRUCTURE WITH SHAPE MEMORY EFFECT</p> <p>Abdul Basit (NTU) Gildas L'Hostis (LPMT) Bernard Durand (LPMT)</p> <p><i>In this paper, after a definition of one way or two way shape memory effect and the notions of dual, triple or multi shape, properties which characterized the nature of the SMP, we present a high rigidity shape memory composite material.</i></p>	<p>MON-3_ATH_1.01-12 MANUFACTURING SIMULATION ENABLING COMPLEX COMPOSITE SINE WAVE SPARS</p> <p>Sebastian Weidinger (Premium Aerotec GmbH) Daniel Hartung (Premium Aerotec GmbH) Tobias Weber (Premium Aerotec GmbH)</p> <p><i>This paper shows the simulation of key manufacturing steps like draping and curing for a sine wave spar example, using AB-AQUS in combination with user defined material models.</i></p>	16:00	

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
16:50	3.01 Fracture and Damage - Micromechanics (4/8)	3.03 Fracture and Damage - Laminar Level (1/5)	3.06 Textile Composites (4/6)	3.04 Delamination (4/4)	3.15 Analysis and Design of Damage Tolerant Composite Structures (1/2)	3.11 Dynamic Loading - Impact, Crash, Blast (4/6)	ESCM Council Meeting 1	2.02 Polymer Matrix Materials (4/4)
16:50	<p>MON-4_MUC_3.01-13 IN SITU FIBRE FAILURE MAPPING ON CFRP BY ULTRAFAST X-RAY COMPUTED TOMOGRAPHY</p> <p>Serafina Consuelo Garcea (University of Manchester) Philip J. Withers (University of Manchester)</p> <p><i>Ultrafast in situ synchrotron X-ray computed tomography is used in this work to monitor real time (4D) accumulation of fibre breaks under quasi-static load till one second before the final failure of the coupon.</i></p>	<p>MON-4_SEV_3.03-01 AICC – AUTOMATIC INSPECTION OF CUT CARBON</p> <p>Markus Soutschek (Fraunhofer IPA)</p> <p><i>In this article, measurement methods and an optical test device for determining the quality of machined components (drill holes and edges) off CFRP are introduced. The measuring method was implemented in terms of a handset with the name AICC.</i></p>	<p>MON-4_VEN_3.06-13 FINITE ELEMENT ANALYSIS OF 3D WOVEN COMPOSITE T-JOINTS UNDER TENSILE LOADING</p> <p>Shibo Yan (University of Nottingham) Andrew Long (University of Nottingham) Xuesen Zeng (University of Nottingham)</p> <p><i>This paper presents a voxel-based method to predict the non-linear response and damage initiation for 3D woven composite T-joints, by incorporating realistic fibre geometry and cohesive zone model for meso-scale analysis.</i></p>	<p>MON-4_BUD_3.04-13 NOVEL STITCHING YARN FOR IMPROVED DELAMINATION PERFORMANCE OF CARBON FIBRE COMPOSITES</p> <p>Thomas Doohar (Ulster University-School of Engineering) Cormac McGarrigle (Ulster University-School of Engineering) Dorian Dixon (Ulster University-School of Engineering) Alistair McIlhagger (Ulster University-School of Engineering) Eileen Harkin-Jones (Ulster University-School of Engineering) Edward Archer (Ulster University-School of Engineering)</p> <p><i>Comparison between a commercial sewing yarn and those made with high temperature thermoplastics for improving the through thickness properties of fibre reinforced polymer composites.</i></p>	<p>MON-4_STO_3.15-01 ANALYSIS OF OMEGA STIFFENER UNDER BENDING AFTER IMPACT TESTS</p> <p>Muhammad Ridha (National University of Singapore) Tong-Earn Tay (National University of Singapore) Sven Werner (Airbus Operations) Paul Joern (Airbus Operations) Vincent B.C. Tan (National University of Singapore)</p> <p><i>The combined experimental and simulation studies shows that a proper progressive damage tools can give a better understanding of the failure mechanisms during impact and subsequent bending test. This can then be used to find better design solutions.</i></p>	<p>MON-4_BIA_3.11-13 IMPACT DAMAGE IN WOVEN CARBON FIBRE/EPOXY LAMINATES: EFFECT OF STEEL AND ICE PROJECTILES</p> <p>Laurence Coles (Loughborough University) Anish Roy (Loughborough University) Leonid Voronov (Perm National Research Polytechnic University) Boris Bolotov (Perm National Research Polytechnic University) Mikhail Nikhamkin (Perm National Research Polytechnic University) Vadim Silberschmidt (Loughborough University)</p> <p><i>Study of the dynamic ballistic impact and resulting damage of carbon fibre/epoxy composite specimens subjected to solid (steel) and fragmenting (ice) projectile impacts, using digital image correlation and 3D X-ray computer tomography.</i></p>	ESCM Council Meeting 1	<p>MON-4_BRU_2.02-13 MECHANICAL BEHAVIOUR OF EPOXY NETWORKS IN DEPENDENCE ON TIME, CURE AND TEMPERATURE</p> <p>Michael Müller (Technical University of Dresden) Hubert Jäger (Technical University of Dresden) Maik Gude (Technical University of Dresden) René Fußel (Technical University of Dresden) Eike Dohmen (Technical University of Dresden)</p> <p><i>The deformation potential of an epoxy systems can be significantly extended if appropriate testing temperature and degree of cure are adhered. This will allow the application of secondary forming operations for thermoset based composites.</i></p>
17:10	<p>MON-4_MUC_3.01-14 INTRALAMINAR FRACTURE TOUGHNESS CHARACTERIZATION: A COMPUTATIONAL MICROMECHANICS PERSPECTIVE</p> <p>Miguel Herraes (IMDEA Materials) Carlos González (Polytechnic University of Madrid & IMDEA Materials Institute) Claudio Lopes (IMDEA Materials Institute)</p> <p><i>A computational micromechanics model to capture the R-curve corresponding to the intralaminar cracking process through a fibre reinforced polymer has been developed. The model combines an embedded cell approach with the LEFM displacement field.</i></p>	<p>MON-4_SEV_3.03-02 AN ANISOTROPIC DAMAGE MODEL FOR CMCS UNDER NON-PROPORTIONAL LOADING CONDITIONS</p> <p>Emmanuel Baranger (Université Paris-Saclay)</p> <p><i>This paper presents a damage model describing the mechanical behavior of SiC/SiC composites under multi-axial non-proportional loadings. Fourth order damage variables are used associated to an anisotropic evolution law.</i></p>	<p>MON-4_VEN_3.06-14 FINITE ELEMENTS ANALYSIS VERSUS EXPERIMENTAL TESTING FOR A CFRP STRUCTURE</p> <p>Ricardo Sa (University of Minho) Ricardo Ferreira (PIEP - Innovation in Polymer Engineering) Nuno Gonçalves (PIEP - Innovation in Polymer Engineering) Nuno Vieira (PIEP - Innovation in Polymer Engineering) João P. Nunes (University of Minho) F. W. J. van Hattum (Saxion University of Applied Sciences)</p> <p><i>To validate the finite elements model at the basis of the optimization process a scale model prototype of the composite structure was built and tested. The experimental results were then compared with those obtained from numerical simulations</i></p>	<p>MON-4_BUD_3.04-14 PREDICTING DEBONDING AND DELAMINATION IN ADHESIVELY BONDED T-JOINTS</p> <p>Xiaodong Xu (University of Bristol) Michael Wisnom (University of Bristol) Stephen Hallett (University of Bristol) Gary Holden (BAE Systems) Barbara Gordon (BAE Systems)</p> <p><i>Different levels of FE modelling were conducted, in order to predict debonding and delamination in an adhesively bonded T-joint pull-off (T-pull) test.</i></p>	<p>MON-4_STO_3.15-02 FATIGUE LIFE OF POSTBUCKLED STRUCTURES WITH INDENTATION DAMAGE</p> <p>Carlos Davila (NASA) Chiara Bisagni (Delft University of Technology)</p> <p><i>The fatigue life of composite stiffened panels with indentation damage was investigated experimentally using single stringer compression specimens.</i></p>	<p>MON-4_BIA_3.11-14 IMPROVEMENT OF THE IN-PLANE CRUSHING RESPONSE OF CFRP SANDWICH PANELS BY THROUGH-THICKNESS REINFORCEMENTS</p> <p>Lourens Blok (University of Bristol) James Kratz (University of Bristol) Dirk Lukaszewicz (BMW Group) Simon Hesse (BMW Group) Christos Kassaroglou (Delft University of Technology) Carwyn Ward (University of Bristol)</p> <p><i>The in-plane crushing response of tufted and non-tufted sandwich structures was recorded using a drop-tower test rig, and high-speed camera footage was used to analyse the crushing morphology.</i></p>	ESCM Council Meeting 1	<p>MON-4_BRU_2.02-14 REACTIVITY OF EPOXY RESINS AT THE NANOSCALE</p> <p>David Seveno (KU Leuven) P. Bolhuis (University of Amsterdam)</p> <p><i>Combining reactive molecular dynamics and transition path sampling, the curing process of epoxy resins was investigated at the nanoscale. This novel modelling methodology permits to predict potential energy surfaces and optimum activation energies.</i></p>
17:30	<p>MON-4_MUC_3.01-15 INFLUENCE OF GRAPHENE NANOPARTICLES ON THE SIZE EFFECT OF EPOXY MATRIX</p> <p>Christian Leopold (Technische Universität Hamburg-Harburg) Wilfried Liebig (Technische Universität Hamburg-Harburg) Hans Wittich (Technische Universität Hamburg-Harburg) Bodo Fiedler (Technische Universität Hamburg-Harburg)</p> <p><i>The size effect of neat and graphene nanoparticle modified epoxy matrix is investigated. A significant size effect is identified for the neat matrix. For graphene modified matrix, failure initiates at the nanoparticles, counteracting any size effect.</i></p>	<p>MON-4_SEV_3.03-03 DAMAGE EVOLUTION UNDER LONG-TERM, HIGH AND CONSTANT LOADING OF A CARBON/EPOXY LAMINATE</p> <p>Aurore Girardot (CEA) Noël Lahellec (LMA-CNRS) Christian Hochard (LMA-CNRS) Sandrine Leroch (CEA)</p> <p><i>The objective of this work is to study, under high loads and long periods, the propagation of transverse cracks. Experimental results are presented and it is observed an evolution of the matrix damage which is compared to the evolution for cyclic loads.</i></p>	<p>MON-4_VEN_3.06-15 FROM A MICRO-CT IMAGE TO MODELS OF THE INTERNAL GEOMETRY, DEFECTS, MICROMECHANICS AND PERMEABILITY OF TEXTILE COMPOSITES – VOXTEX SOFTWARE</p> <p>Ilya Straumit (KU Leuven) Stepan Lomov (KU Leuven) Nghi Nguyen (KU Leuven) Martine Wevers (KU Leuven)</p> <p><i>Software VoxTex analyses a micro-CT image of a textile composite and transforms the image into a voxel model in which the fibrous structure of the reinforcement (fibre volume fraction and fibre direction) is identified for each voxel.</i></p>	<p>MON-4_BUD_3.04-15 PREDICTING LOW VELOCITY IMPACT DAMAGES IN STITCHED COMPOSITE LAMINATE</p> <p>Jonny Herwan (Aerospace Engineering Dept. Tokyo Metropolitan University) Atsushi Kondo (MSC. Software) Naoyuki Watanabe (Tokyo Metropolitan University)</p> <p><i>Quasi static indentation simulation has been developed employing cohesive contact surface and spring connector element as the main techniques. The predicted load displacement curves and delamination areas are closed to the experimental one.</i></p>	<p>MON-4_STO_3.15-03 DESIGN PARAMETER STUDY OF A CFRP T-JOINT UNDER OVERPRESSURE CONDITIONS DUE TO BALLISTIC IMPACT</p> <p>José Luis Sandoval Murillo (Fraunhofer EMI) Georg Ganzenmüller (Fraunhofer EMI) Sebastian Heimbs (Airbus Group Innovations) Michael May (Fraunhofer EMI)</p> <p><i>In this article a numerical parameter study on the mechanical response of composite T-joints is performed. The influence of different design parameters on the strength of the joint is quantified. Optimal values for these parameters are suggested.</i></p>	<p>MON-4_BIA_3.11-15 INFLUENCE OF LOAD APPLICATION AND FIXTURE ON CHARACTERISTIC VALUES AT SHORT-TIME-DYNAMIC COMPRESSION TESTING OF CARBON/EPOXY COMPOSITES</p> <p>Tobias Schmack (Audi AG) Daniel Huelsbusch (Technical University of Dortmund) Riccardo Righi (Audi AG) Julius Rausch (Audi AG) David Roquette (Audi AG) Günter Deinzer (Audi AG) Frank Walther (Technical University of Dortmund)</p> <p><i>This study deals with the comparison of two fixtures to obtain strain rate-dependent properties of carbon fiber-reinforced plastics (CFRP) under axial compression.</i></p>	ESCM Council Meeting 1	<p>MON-4_BRU_2.02-15 THERMOPLASTIC-BASED COMPOSITES AS PROCESSED BY RTM</p> <p>Jean-Charles Fontanier (INSA de Lyon) Frédéric Lortie (Ingénierie des Matériaux Polymères Lyon) Jean-François Gérard (INSA de Lyon) Pierre Gérard (ARKEMA, Groupe de Recherche de Lacq)</p> <p><i>Resin transfer molding (RTM) is commonly used to produce high performance thermoset-based composites. In order, to extend its development to sustainable solutions, new RTM-compatible reactive thermoplastic systems have to be developed.</i></p>

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
2.07 Graphene, Graphene-Based Composites (4/4)	2.06 Nano Composites (4/7)	5.06 Automated Placement Technologies (2/5)	5.02 Process Simulation II - Curing & PID (2/2)	5.09 Manufacturing Processes for Thermoplastic Composites (4/7)	4.01 Full-Field Methods (1/3)	6.03 Structural Power Composites (1/1)	1.01 Aerospace (4/6)	16:50
<p>MON-4_BRI_2.07-13 ADDITIVE EFFECTS IN HYBRID MULTIFUNCTIONAL GRAPHENE-GLASS FIBRE-POLYPROPYLENE COMPOSITES</p> <p>Dimitrios Papageorgiou (University of Manchester) Robert Young (University of Manchester) Ian Kinloch (University of Manchester)</p> <p><i>The effect of the presence of graphite nanoplatelets (GNP) and glass fibres (GF) both individually and simultaneously in an isotactic polypropylene matrix was evaluated.</i></p>	<p>MON-4_NAP_2.06-13 MICROSTRUCTURE AND MECHANICAL PROPERTIES OF NANOCOMPOSITES COMPOUNDED WITH POLYOLEFIN AND HYDROPHOBIZING AGENT-TREATED CELLULOSE NANO FIBERS</p> <p>Kanzuya Nagata (Toyama Prefectural University) Shimichi Okuda (Toyama Prefectural University) Kazuaki Sanada (Toyama Prefectural University)</p> <p><i>The objective of this study is to investigate surface modifications occurring on cellulose nano fibers (CNFs) and the mechanical properties of nanocomposites consisting of polyolefins and hydrophobizing agent-treated CNFs.</i></p>	<p>MON-4_LON_5.06-05 CHARACTERISTICS AND PROCESSABILITY OF BINDERED DRY FIBRE MATERIAL FOR AUTOMATED FIBRE PLACEMENT</p> <p>Laura Veldenz (National Composites Centre) Mattia Di Francesco (National Composites Centre) Simon Astwood (National Composites Centre) Giuseppe Dell'Anno (National Composites Centre) Byung Chul Kim (University of Bristol) Kevin Potter (University of Bristol)</p> <p><i>A wide variety of dry fibre materials is available, the five examined materials show different behaviours in manufacturability. The use of the analytical hierarchy process enables a structured and purpose specific material selection.</i></p>	<p>MON-4_BOR_5.02-05 NUMERICAL OPTIMIZATION AND SENSITIVITY ANALYSIS OF PULTRUSION PROCESS PARAMETERS</p> <p>Alexander Safonov (Skolkovo Institute of Science and Technology (Skoltech)) Anton Saratov (Dataavance) Andrey Ushakov (Skolkovo Institute of Science and Technology (Skoltech))</p> <p><i>The mathematical model of material behavior during pultrusion is implemented within ABAQUS environment. For numerical optimization and sensitivity analysis of process parameters, the simulation scheme was developed in pSeven software suite.</i></p>	<p>MON-4_STG_5.09-12 EXPERIMENTAL INVESTIGATION OF THE RADIUS FORMING BEHAVIOR OF FIBER REINFORCED THERMOPLASTICS</p> <p>Alexander Schug (Fraunhofer ICT) Roland Hinterhözl (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>The following work focuses on the experimental analysis of the forming behavior of fiber reinforced thermoplastic layups with a special focus on the radii. Possible factors influencing the result and quality of the forming shall be investigated.</i></p>	<p>MON-4_AUG_4.01-01 A COMPOSITE ANISOGRID PANEL WITH SKIN: MECHANICAL TESTING AND DIC</p> <p>Giovanni Tataro (CIRA Italian Aerospace Research Centre) Claudio Ferrara (Sapienza University of Rome) Felice De Nicola (CIRA Italian Aerospace Research Centre)</p> <p><i>The axial compression test on a composite anisogrid panel with skin is discussed in the paper. The interpretation of the test results is enhanced via digital image correlation based on a stereo-camera system.</i></p>	<p>MON-4_ING_6.03-01 INITIAL STUDY OF THE MICROSTRUCTURE OF CARBON FIBRES ACTING AS NEGATIVE ELECTRODES IN STRUCTURAL BATTERY COMPOSITES</p> <p>Fang Liu (Chalmers University of Technology) Masoud Rashidi (Chalmers University of Technology) Leif Asp (Chalmers University of Technology)</p> <p><i>Using SEM and TEM we characterise carbon fibre microstructures for two fibres with different electrochemical performance. Differences in fibre microstructure allows us to explain why one fibre type works well whereas the other does not.</i></p>	<p>MON-4_ATH_1.01-13 NUMERICAL INVESTIGATION AND IMPROVEMENT OF THE CRASH BEHAVIOUR OF A SMALL AIRCRAFT COMPOSITE STRUCTURE</p> <p>Jan Kremberg (Universität Bremen) Christian Brauner (Faserinstitut Bremen) Mohamed Adli Dimassi (Faserinstitut Bremen) Axel S. Herrmann (Faserinstitut Bremen) Oliver Reinhardt (Flight Design GmbH) Harald Bachem (Ostfalia Hochschule für angewandte Wissenschaften)</p> <p><i>The ambition of the Safety-Box project is to increase occupant safety of a small aircraft. The crash behaviour of a composite airframe has been investigated and structural improvements have been developed in several FE simulations.</i></p>	16:50
<p>MON-4_BRI_2.07-14 THE EFFECT OF GRAPHITE NANOPATELETS (GNP) ASPECT RATIO AND HEAT TREATMENT ON NYLON 6/GNP NANOCOMPOSITES</p> <p>Muhammad Khairulanwar Mohd Halit (University of Manchester) Arthur Wilkinson (University of Manchester)</p> <p><i>The effect of GNP aspect ratio and GNP heat treatment on PA6 matrix were studied. Nanocomposites were processed using melt compounding method and characterized for thermal and mechanical properties. Results obtained were compared to unfilled PA6.</i></p>	<p>MON-4_NAP_2.06-14 MORPHOLOGY, MECHANICAL PROPERTIES AND PROCESSABILITY OF POLYETHYLENE TEREPHTHALATE MODIFIED BY POLYHEDRAL OLIGOMERIC SILSESQUOXANES</p> <p>Jacek Andrzejewski (Technical University of Poznan) Marek Szostak (Technical University of Poznan) Michał Grzelak (GTX Hanex Plastic) B. Dudzic (Adam Mickiewicz University in Poznan)</p> <p><i>The use of the POSS particles as a modifier for poly(ethylene terephthalate) was main subject of this research. The results obtained from the measurement and structural observations confirmed the possible nucleation effect of the used modifier.</i></p>	<p>MON-4_LON_5.06-06 IDENTIFICATION OF DEFECT IN THE AUTOMATED TAPE PLACEMENT PROCESS USING FIBRE BRAGG GRATING SENSORS</p> <p>Ebrahim Oromiehie (UNSW Australia) B.Gangadhara Prusty (UNSW Australia) Paul Compston (Australian National University) Ginu Rajan (University of Wollongong)</p> <p><i>In this paper, FBG sensors are implemented to identify defects during Automated Tape Placement lay-up process. Also, the capability of FBG sensor towards the measurement of acoustic emissions in a composite laminates is demonstrated experimentally.</i></p>	<p>MON-4_BOR_5.02-06 PRE-ASSESSMENT TOOL FOR DISTORTION IN FRAME-LIKE COMPOSITE STRUCTURES: INDUSTRIAL APPLICATION</p> <p>Maximilian Lipcan (Airbus Helicopters) Johannes Mattheus Balvers (Airbus Helicopters)</p> <p><i>It is strived for a pre-assessment tool for the early design phase that identifies earlier composite frame-like structures prone to distortion, by coupling their geometrical description to the spring-in equations of orthotropic strain mismatch.</i></p>	<p>MON-4_STG_5.09-13 FLOW BEHAVIOR OF COMPLEX SHAPED HYBRID CFRTP DURING COMPRESSION MOLDING</p> <p>Daiki Kobayashi (University of Tokyo) Yi Wan (University of Tokyo) Hanchul Lee (University of Tokyo) Taro Nakamura (University of Tokyo) Haowen Wei (University of Tokyo) Jun Takahashi (University of Tokyo) Isamu Ohsawa (University of Tokyo)</p> <p><i>The flowability of hybrid CFRTP was investigated by using rib formation mold. The fiber distribution of the plate part under the charging port of ribs was relatively kept successfully and the flexural rigidity was improved by hybridization.</i></p>	<p>MON-4_AUG_4.01-02 A NEW NDT METHOD FOR THE STUDY OF COMPOSITE BONDED REPAIR</p> <p>Matthias Barus (Université de Toulouse) Hélène Welemane (Université de Toulouse) Francis Collombet (Institut Clément Ader) Marie Laetitia Pastor (Université de Toulouse) A. Cantarel (Institut Clément Ader) Valérie Nassiet (Université de Toulouse) Laurent Couzeix (Institut Clément Ader) Yves-Henri Grunevald (Composites Expertises & Solutions)</p> <p><i>This paper deals with the NDT analysis of a bonded repair CFRP laminates by means of active Infrared Thermography. In regard to the close properties of the glue and the laminates, relevant additives are used to improve the detection of defects.</i></p>	<p>MON-4_ING_6.03-02 ELECTRICAL AND MECHANICAL PROPERTIES OF LiAlTi (PO4)3 SOLID ELECTROLYTE-BASED MULTIFUNCTIONAL POWER COMPOSITES</p> <p>Guangye Liao (German Aerospace Center) Sebastian Geier (German Aerospace Center) Thorsten Mahrholz (German Aerospace Center) Peter Wierach (German Aerospace Center) Martin Wiedemann (German Aerospace Center)</p> <p><i>This paper introduces a new method of producing power composites which can store (and delivering) electrical energy whilst learning mechanical loads simultaneously.</i></p>	<p>MON-4_ATH_1.01-14 NUMERICAL SIMULATION AND EXPERIMENTAL TEST CAMPAIGN OF COMPOSITE BRAIDED FRAMES UNDER A COMBINED COMPRESSION/BENDING LOAD</p> <p>Mathieu Vinot (German Aerospace Center) Paul Schatrow (German Aerospace Center) Ralf Sturm (German Aerospace Center) Frieder Heieck (University of Stuttgart) Daniel Fernández (University of Stuttgart)</p> <p><i>This paper discusses manufacturing process, experimental testing and numerical simulation of braided Ω-frame segments bonded to a multiaxial fabric skin, which represent a typical airframe structure.</i></p>	17:10
<p>MON-4_BRI_2.07-15 ELECTRICAL AND THERMAL CONDUCTIVITY OF AEROGEL/ EPOXY COMPOSITES</p> <p>Svenja Garlow (Technische Universität Hamburg-Harburg) M. Mecklenburg (Technical University Hamburg) R. Adelung (Kiel University) D. Smazna (Kiel University) Bodo Fiedler (Technische Universität Hamburg-Harburg) K. Schulte (Technical University Hamburg)</p> <p><i>In this paper we present the production of two carbon aerogels, Aerographite and a CNT foam, their processing into an epoxy composite and their electrical and thermal properties.</i></p>	<p>MON-4_NAP_2.06-15 MULTI-SCALE REINFORCEMENT OF COMPOSITES USING COATED FABRICS; EPOXY - CARBON NANOTUBE (CNT) - CARBON FIBRE (CF) COMPOSITES WITH IMPROVED INTER-LAMINAR FRACTURE TOUGHNESS</p> <p>Kinjalkumar Patel (University of Manchester) Arthur Wilkinson (University of Manchester) Prasad Potluri (University of Manchester)</p> <p><i>A woven carbon fibre fabric reinforcement was treated with MWCNT prior to moulding of composites by resin infusion to produce multi-scale composite with improved mode I and mode II inter-laminar fracture toughness.</i></p>	<p>MON-4_LON_5.06-07 DEVELOPMENT OF THE DIRECT ROVING PLACEMENT TECHNOLOGY (DRP)</p> <p>Yannis Grohmann (German Aerospace Center) Niels Stoffers (German Aerospace Center) Alexandra Kühn (German Aerospace Center) Thorsten Mahrholz (German Aerospace Center)</p> <p><i>Direct Roving Placement (DRP) is an upcoming low cost alternative to known Automated Fiber Placement (AFP) or Automated Tape Laying (ATL) processes. The main advantages of this technology are low material costs and high productivity.</i></p>	<p>MON-4_BOR_5.02-07 PREDICTING WRINKLE FORMATION IN COMPONENTS MANUFACTURED FROM TOUGHENED UD PREPREG</p> <p>Jonathan Belnoue (University of Bristol) James Kratz (University of Bristol) Oliver Nixon-Pearson (University of Bristol) Tassos Mesogitis (University of Bristol) Dmitry Ivanov (University of Bristol) Stephen Hallett (University of Bristol)</p> <p><i>The paper proposes a new numerical framework for the prediction of wrinkle formation in composite manufacturing. Two industry relevant cases (i.e. a gaps and overlaps specimen and a stepped laminate) are analysed using this new method.</i></p>	<p>MON-4_STG_5.09-14 HYBRID TEXTILES – THE OTHER WAY OF FORMING HIGH-PERFORMANCE THERMOPLASTIC COMPOSITES FOR PRIMARY STRUCTURE</p> <p>Maximilian Koerdert (Faserinstitut Bremen) Patrick Schiebel (Faserinstitut Bremen) Oliver Focke (Faserinstitut Bremen) Axel S. Herrmann (Faserinstitut Bremen)</p> <p><i>Thermofforming of endless-fibre reinforced peek from hybrid textiles incl. analysis of hybrid yarns and resulting part quality, influenced by fibre orientation and consolidation parameters. Concluding processing of an overmoulding step is illustrated.</i></p>	<p>MON-4_AUG_4.01-03 ASSESSMENT OF FRACTURE TOUGHNESS IN SANDWICH STRUCTURES USING HIGH SPEED INFRARED THERMOGRAPHY</p> <p>Janice Duliue-Barton (University of Southampton) Ole Thybo Thomsen (University of Southampton) Wei Wang (University of Southampton)</p> <p><i>A methodology has been developed for capturing the temperature increase at a propagating crack using high speed IR thermography. It is shown that by measuring the temperature the interfacial fracture toughness can be determined.</i></p>	<p>MON-4_ING_6.03-03 MULTIFUNCTIONAL COMPOSITES: MODELING INTERCALATION INDUCED STRESSES IN CONSTITUENTS OF MICRO-BATTERY</p> <p>Johanna Xu (Lulea University of Technology) Andreas Pupurs (Lulea University of Technology) Göran Lindbergh (KTH Royal Institute of Technology) Janis Varna (Lulea University of Technology)</p> <p><i>This paper demonstrates a methodology for addressing mechanical stresses arising in a conceptualized micro battery cell during electrochemical cycling, caused by time dependent gradients in lithium ion concentration distribution in the carbon fiber.</i></p>	17:30	

Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
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17:50	MON-3	<p>MON-4_MUC_3.01-16 LEBIM PREDICTIONS FOR FIBRE-MATRIX DEBONDS IN UNIDIRECTIONAL FIBRE-REINFORCED COMPOSITES UNDER BIAXIAL TRANSVERSE LOADS</p> <p>Luis Távara (Universidad de Sevilla) Vladislav Mantic (Universidad de Sevilla) Enrique Graciani (Universidad de Sevilla) Federico París (Universidad de Sevilla)</p> <p><i>Fibre-matrix interface debond onset and growth in a bundle of fibres are studied numerically. A fibre bundle subjected to far field biaxial transverse loads is considered. LEBIM is used to model the fibre-matrix interface cracks behaviour.</i></p>	<p>MON-4_SEV_3.03-04 EVALUATION OF IMPACT DAMAGE IN CIRCULAR LAMINATES SUBJECTED TO A TRANSVERSE LOAD</p> <p>Hiroshi Suemasu (Sophia University)</p> <p><i>Responses of nonlinear axisymmetric plates with multiple delaminations subjected to a transverse concentrated load are approximately solved to evaluate the significance of low velocity foreign object damage in quasi-isotropic composite laminates.</i></p>	<p>MON-4_VEN_3.06-16 INFLUENCE OF VOID CONTENT ON THE MECHANICAL PROPERTIES OF CARBON/PPS LAMINATES</p> <p>Julien Patou (Université de Toulouse) Emmanuel De-Luycker (Université de Toulouse) Gerard Bernhart (Université de Toulouse)</p> <p><i>Void content of several carbon fiber/PPS powdered laminates was investigated to assess the impact of porosity level on mechanical properties of thermoplastic materials. Mechanical properties were measured and results were related to void content.</i></p>	<p>MON-4_BUD_3.04-16 PREDICTION OF DELAMINATION OF STEEL-POLYMER COMPOSITES USING COHESIVE ZONE MODEL</p> <p>Jinhyeok Jang (Seoul National University) Minchang Sung (Seoul National University) Sungjin Han (Seoul National University) Woong-Ryeol Yu (Seoul National University)</p> <p><i>Prediction of delamination of steel-polymer composites using cohesive zone model and peeling tests.</i></p>	<p>MON-4_STO_3.15-04 MECHANICAL PROPERTIES OF GFR-POLYURETHANE AND -EPOXY FOR IMPACT RESISTANT APPLICATIONS UNDER SERVICE-RELEVANT TEMPERATURES</p> <p>Daniel Huelsbusch (Technical University of Dortmund) Yves Mueller (HSR Hochschule für Technik Rapperswil) Gion Andrea Barandun (HSR Hochschule für Technik Rapperswil) Michael Niedermeier (HRW Hochschule Ravensburg-Weingarten) Frank Walther (Technical University of Dortmund)</p> <p><i>New developed GFR-Polyurethane was characterized in terms of ILSS, CAI, tensile and fatigue tests and compared to GFR-Epoxy used in the aerospace industry. Furthermore, the influence of tempering on the mechanical properties was investigated.</i></p>	<p>MON-4_BIA_3.11-16 LOW VELOCITY IMPACT AND COMPRESSION AFTER IMPACT SIMULATION OF THIN PLY LAMINATES</p> <p>Albert Soto (University of Girona) Emilio González (AMADE, Universidad de Girona) Pere Maimí (AMADE, Universidad de Girona) Jose Ramon Sainz de Aja (Aernnova Engineering Solutions Ibérica S.A.) Federico Martin De La Escalera (Aernnova Engineering Solutions Ibérica S.A.)</p> <p><i>The paper deals with low velocity impact and compression after impact simulations of thin ply laminates (fabric plain weave). It studies the effect of the constitutive law and the number of interfaces for delamination on the CAI strength prediction.</i></p>	<p>ESCM Council Meeting 1</p>	<p>MON-4_BRU_2.02-16 LOWFLIP – TAILORED SNAP-CURE PREPREGS FOR NOVEL COMPOSITE PRODUCTION PROCESSES</p> <p>Thomas Meinhardt (SGL Carbon GmbH) Isabel Harismendy (Tecnalia Composites) Frieder Heieck (Tecnalia Composites)</p> <p><i>The EU-funded project LOWFLIP is aiming to develop automated, low cost manufacturing processes for composite parts using tailored snap-cure prepreg materials. The development of these fast curing prepregs and their properties are presented.</i></p>
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18:10	MON-3	<p>MON-4_SEV_3.03-05 COMPUTATIONAL FRAMEWORK FOR DAMAGE MODELLING OF FIBER REINFORCED COMPOSITES</p> <p>Michael Stuebner (University of Dayton) Endel Jarve (University of Texas Arlington) Artem Aleshin (University of South Carolina) Eric Zhou (University of Dayton) David Mollenhauer (Air Force Research Laboratory) Michael Braginsky, Brent Volk (US Air Force Research Laboratory)</p> <p><i>An advanced framework for damage modelling in composites applicable to a wide range of fiber-reinforced polymer matrix and ceramic matrix composites based on the FEM package BSAM designed at the University of Dayton Research Institute is presented.</i></p>	<p>MON-4_VEN_3.06-17 CHARACTERISATION OF THE EFFECT OF THROUGH-THICKNESS REINFORCEMENT ON IMPACT TOLERANCE AND OUT-OF-PLANE TENSILE PROPERTIES OF COMPOSITE MATERIALS</p> <p>Winifred Obande (University of Limerick) Walter Stanley (University of Limerick)</p> <p><i>Two types of carbon-fibre reinforced benzoxazine composites have been manufactured to characterise the effect of reinforcement architecture on impact and out-of-plane tensile performance. Results and observations are presented in this paper.</i></p>	<p>MON-4_BUD_3.04-17 STRATEGIES FOR MODELLING DELAMINATION GROWTH USING ISOGEOMETRIC CONTINUUM SHELL ELEMENTS</p> <p>Joris Remmers (Eindhoven University of Technology) Martin Fagerström (Chalmers University of Technology)</p> <p><i>In this paper we focus on the further development of the isogeometric continuum shell element to allow for an automated insertion of discontinuities.</i></p>	<p>MON-4_BIA_3.11-17 MEASUREMENT OF FRACTURE TOUGHNESS FOR FIBER COMPRESSIVE FAILURE MODE OF UD COMPOSITES UNDER HIGH RATE LOADING</p> <p>Peter Kuhn (Technical University of Munich / Institute for Carbon Composites) Giuseppe Catalanotti (INEGI) José Xavier (Universidade de Trás-os-Montes e Alto Douro) Rafael Cidade (Universidade Federal do Rio de Janeiro) Hannes Koerber (Technical University of Munich / Institute for Carbon Composites) Pedro Camanho (University of Porto)</p> <p><i>Experimental study of the compressive R-curve of an UD composite when submitted to dynamic loading. The data reduction couples the concepts of energy release rate, size effect law and R-curve.</i></p>	<p>ESCM Council Meeting 1</p>	<p>MON-4_BRU_2.02-17 VISCOELASTIC BEHAVIOUR OF LY5052 EPOXY RESIN IN RUBBERY STATE DURING CURING</p> <p>Sibin Saseendran (Swerea SICOMP) Maciej Wysocki (Swerea SICOMP) Janis Varna (Lulea University of Technology)</p> <p><i>A relationship between the rubbery modulus and the degree of cure for partially to fully cured LY5052 epoxy resin is investigated and experimentally tested. Using this relationship, master curves can be made independent of rubbery region properties.</i></p>
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18:30 **Speeches (MUC):** Gerhard Müller, Senior Vice President Academic and Student Affairs Technical University of Munich, Germany
 Franz Josef Pschierer, State Secretary in the Bavarian Ministry of Economic Affairs and Media, Germany
 Herbert Zeisel, MinDirig. "Key Technologies for Growth" at the Federal Ministry of Education and Research, Germany

19:00 **Round Table (MUC): THE RELEVANCE OF COMPOSITE MATERIALS FOR THE INDUSTRY AND GERMANY AS A BUSINESS LOCATION**

20:00 **Welcoming Reception**

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
<p>MON-4_BRI_2.07-16 UNIAXIAL LOADING OF POLYMER-EMBEDDED GRAPHENE: IS ORTHOGONAL BUCKLING AVOIDABLE?</p> <p>Maria Giovanna Pastore Carbone (FORTH/ICEHT) Georgia Tsoukleri (FORTH/ICEHT) Ioannis Polyzos (FORTH/ICEHT) John Parthenios (Institute of Chemical Engineering Sciences/Foundation of Research and Technology Hellas) Konstantinos Papagelis (Institute of Chemical Engineering Sciences/Foundation of Research and Technology Hellas) Costas Galiotis (Institute of Chemical Engineering Sciences/Foundation of Research and Technology Hellas)</p> <p><i>Graphene micro-ribbons have been designed to prevent orthogonal buckling associated with axial tensile deformation of graphene. Micro-ribbons were produced via UV lithography/oxygen plasma treatment and characterized by using Laser Raman Microscopy.</i></p>	<p>MON-4_NAP_2.06-16 SEMI INTERPENETRATING NETWORK DERIVED FROM POLYLACTIC ACID/POLYURETHANE BLEND AND REINFORCED WITH CELLULOSE NANOCRYSTALS</p> <p>Jatin Sethi (University of Oulu) Mirja Illikainen (University of Oulu) Mohini Sain (University of Toronto) Kristiina Oksman (Lulea University of Technology)</p> <p><i>The primary aim of current work is to prepare and characterize bioanocomposites based on cellulose nanocrystals and semi-interpenetrating networks prepared from Poly lactic acid and Polyurethane.</i></p>	<p>MON-4_LON_5.06-08 DEVELOPMENT OF A HYBRID TAIL ROTOR DRIVE SHAFT BY THE USE OF THERMOPLASTIC AUTOMATED FIBER PLACEMENT</p> <p>Stefan Ehard (Technical University of Munich / Institute for Carbon Composites) Elisabeth Ladstätter (Technical University of Munich / Institute for Carbon Composites) Michael Jürgens (Airbus Group Innovations) Laurent Bortolotto (Airbus Helicopters) Niklas Remer (Airbus Helicopters)</p> <p><i>This work investigates the TP-AFP process for joining CF/PEEK and titanium substrates. Different surface pre-treatments are analysed on their impact on the joint strength. Based on this a hybrid tail rotor drive shaft is manufactured and tested.</i></p>	<p>MON-4_BOR_5.02-08 PROCESS-INDUCED DISTORTIONS OF COMPOSITE STRUCTURES DUE TO THROUGH-THICKNESS FIBRE-VOLUME-FRACTION GRADIENTS</p> <p>Fabian Groh (German Aerospace Center) Erik Kappel (German Aerospace Center) Christian Hühne (German Aerospace Center) Florian Meyer (Audi AG)</p> <p><i>A comprehensive experimental study on the effect of a Vf-gradient on process induced deformations (PID). Result: Occurring local asymmetries are a second underlying mechanism for PID besides the classical spring-in for RTM parts.</i></p>	<p>MON-4_STG_5.09-15 HYBRID WELDING OF CARBON-FIBRE REINFORCED EPOXY BASED COMPOSITES</p> <p>Francesca Lionetto (University of Salento) Silvio Pappadà (Consorzio CETMA, Departments of Materials and Structures Engineering) Giuseppe Buccoliero (CETMA) Maria Nicolas Morillas (Delft University of Technology) Irene Fernandez Villegas (Delft University of Technology) Alfonso Maffezzoli (University of Salento)</p> <p><i>A new approach for the assembly of thermosetting composites by induction and ultrasonic welding was developed. A proper modification of the composite layup with a thermoplastic film in the stacking sequence of Carbon fabric/epoxy prepreg was proposed.</i></p>	<p>MON-4_AUG_4.01-04 CHARACTERIZATION OF DAMAGED COMPOSITE LAMINATES USING ELECTRONIC SPECKLE PATTERN INTERFEROMETRY</p> <p>(ESPI) Mohamed Loukil (Swerea SICOMP) Janis Varna (Lulea University of Technology)</p> <p><i>Degradation of the elastic properties of composite laminates with transverse cracks is due to two parameters: the crack opening displacement (COD) and the crack sliding displacement (CSD). These parameters are measured experimentally using ESPI.</i></p>	<p>MON-4_ING_6.03-04 WIRELESS DAMAGE MONITORING SYSTEM BASED ON RFID</p> <p>Alexander Horoschenkoff (Munich University of Applied Sciences) Leonhard Moosreiner (Munich University of Applied Sciences) Tobias Müller (BMW Group) Jürgen Rackles (Munich University of Applied Sciences)</p> <p><i>A new approach for radio frequency identification (RFID) has been investigated for wireless detection of microcracks and failure of preform overlappings.</i></p>	<p>MON-4_ATH_1.01-16 OVERVIEW OF R&T PROGRAM FFS: ADVANCED COMPOSITE AEROSTRUCTURES</p> <p>Mircea Calomfirescu (Airbus Defence and Space) Edgar Mennle (Airbus Defence and Space) Michael Hanke (German Aerospace Center) Christian Weimer (Airbus Group Innovations) Sebastian Nowotny (German Aerospace Center) Ulrich Christ (Bundeswehr research institute for materials, fuels and lubricants (WIWeB))</p> <p><i>This paper gives an overview on the R&T program FFS „Advanced Aerostructures“ which covers the following topics: - Structural Bonding incl. demonstration on Eurofighter Airbrake, - Advanced multiband radomes for future UAVs - Stealth Design.</i></p>	17:50
<p>MON-4_BRI_2.07-17 VERTICALLY AND DENSELY ALIGNED REDUCED GRAPHENE OXIDE/POLYDIMETHYLSILOXANE COMPOSITE FABRICATED BY A TWO-STAGE REDUCTION METHOD FOR HEAT-TRANSFER IN THERMAL INTERFACE MATERIALS</p> <p>Dong Han (Peking University) Yun-Hong Zhao (Peking University) Shu-Lin Bai (Peking University)</p> <p><i>In this work, we report a more efficient and simple method to fabricate a thermal-reduced vertically aligned reduced graphene oxide (TR-VaRGO)/polydimethylsiloxane (PDMS) composite, which has a high thermal conductivity of 1.349 W m⁻¹ K⁻¹.</i></p>	<p>MON-4_NAP_2.06-17 NANOCOMPOSITE DESIGN OF SILICA/EPOXY RESIN SYSTEM WITH LOW THERMAL EXPANSION COEFFICIENT VIA UNIFORM DISPERSION OF HYDROPHILIC COLLOIDAL SILICA NANOSPHERES</p> <p>Mitsuru Tanahashi (Nagoya University) Kazuma Hirota (Nagoya University)</p> <p><i>Possibility of designing and fabricating the silica/epoxy resin nanocomposite system with a low thermal expansion coefficient has been investigated according to design principle utilizing chemical interaction occurring at the silica/epoxy interfaces.</i></p>	<p>MON-4_LON_5.06-09 EFFECT OF PROCESS PARAMETERS ON THE QUALITY OF LAMINATES MADE BY AUTOMATED FIBER PLACEMENT (AFP) USING OUT-OF-AUTOClave (OOA) PREPREGS</p> <p>Hongjie Sun (Concordia University) Déric Godin (Concordia University) Anqi Dong (Concordia University) Suong V. Hoa (Concordia University) Hasan Salek (Bombardier Aerostructures and Engineering Services)</p> <p><i>This paper is the study on how different manufacturing parameters effect the quality, void content, in laminates made from out-of-autoclave (OOA) prepregs and using automated fiber placement (AFP).</i></p>		<p>MON-4_STG_5.09-16 IMPROVING THE PROCESSING PROPERTIES OF HYBRID COMPONENTS USING INTERLOCKING EFFECTS ON SUPPORTING STRUCTURES</p> <p>Jan Beuscher (Technische Universität Braunschweig, Institut für Werkzeugmaschinen und Fertigungstechnik) Michael Brand (Technical University of Braunschweig) Raphael Schnurr (Technical University of Braunschweig) Anke Müller (Technical University of Braunschweig) Markus Kühn (Technische Universität Braunschweig) Franz Dietrich (Technical University of Braunschweig) Klaus Dröder (Institute of Machine Tools and Production Technology)</p> <p><i>Multi-material design effects automation and process challenges because of differing processing properties of materials. This paper introduces a proposal for improving processing properties using interlocking effects between different materials.</i></p>				18:10
<p>Speeches (MUC): Gerhard Müller, Senior Vice President Academic and Student Affairs Technical University of Munich, Germany Franz Josef Pschierer, State Secretary in the Bavarian Ministry of Economic Affairs and Media, Germany Herbert Zeisel, MinDirig. "Key Technologies for Growth" at the Federal Ministry of Education and Research, Germany</p>								18:30
<p>Round Table (MUC): THE RELEVANCE OF COMPOSITE MATERIALS FOR THE INDUSTRY AND GERMANY AS A BUSINESS LOCATION</p>								19:00
<p>Welcoming Reception</p>								20:00

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
9:00	Plenary Lecture 2 (MUC) by Thomas Wolff, BMW AG, Germany: PROCESS CHAINS OF COMPOSITE TECHNOLOGIES FOR AUTOMOTIVE LIGHTWEIGHT DESIGN							
	3.01 Fracture and Damage - Micromechanics (5/8)	3.03 Fracture and Damage - Laminated Level (2/5)	3.06 Textile Composites (5/6)	3.05 Multiscale Modeling (1/5)	3.15 Analysis and Design of Damage Tolerant Composite Structures (2/2)	3.11 Dynamic Loading - Impact, Crash, Blast (5/6)		2.10 Environmental Effects (1/1)
10:00	TUE-1_MUC_3.01-17 LOAD TRANSFER IN A GRAPHENE/PDMS NANOCOMPOSITE UNDER NANOINDENTATION Guoxin Cao (Peking University) Tianxiao Niu (Peking University) Chunyang Xiong (Peking University) <i>Indentation response of graphene/PDMS nanocomposite (graphene monolayer mounted on PDMS substrate) performed by atomic force microscopy (AFM) is investigated by both experiments and computational simulations.</i>	TUE-1_SEV_3.03-06 DAMAGE AND STRENGTH ANALYSIS OF OPEN-HOLE LAMINATED PLATES UNDER TENSILE, COMPRESSIVE AND BENDING LOADINGS Frederic Laurin (ONERA-The French aerospace Lab) Cédric Julien (ONERA-The French aerospace Lab) Pascal Paulmier (ONERA-The French aerospace Lab) <i>The present paper deals with an experimental study on the damage and failure mechanisms encountered in laminated open-hole plates subjected bending loading.</i>	TUE-1_VEN_3.06-18 MESO-SCALE DAMAGE MODELING OF 3D TEXTILE COMPOSITES USING MESH SUPERPOSITION METHOD Ahmad Tabatabaei (KU Leuven) Enrico Bedogni (Università di Parma) António Melro (University of Bristol) Dmitry Ivanov (University of Bristol) Stepan Lovom (KU Leuven) <i>The intra-yarn and matrix damage in a multi-layer 2D plain weave glass/epoxy composite is modeled with mesh superposition (MSP) method and the results are compared with the experiments.</i>	TUE-1_BUD_3.05-01 A LINEAR THERMO-VISCO-ELASTIC ORTHOTROPIC CONSTITUTIVE LAW – APPLICATION TO COMPOSITES Heinz E. Pettermann (Vienna University of Technology) Antonio De Simone (Scuola Internazionale Superiore di Studi Avanzati) <i>A constitutive material law for linear thermo-viscoelasticity in the time domain under plane stress assumption is developed, and time dependent thermal expansion creep is treated. Various simulations on orthotropic problems are carried out.</i>	TUE-1_STO_3.15-05 NUMERICAL APPROACH TO DESIGN AERONAUTICAL COMPOSITE LAMINATE BASED ON IMPACT DAMAGE TOLERANCE PHILOSOPHY Nicolas Dubary (Institut Clément Ader) Christophe Bouvet (Institut Clément Ader) Samuel Rivallant (Institut Clément Ader) Léon Ratsifandrihana (Segula Technologies) <i>Investigating laminate's residual properties in function of damage detection is the main purpose of design by impact damage tolerance. The first step of numerical design approach is proposed with the Discrete Ply Model on several stacking sequences.</i>	TUE-1_BIA_3.11-18 MODELLING OF LOW VELOCITY IMPACTS ON UNIDIRECTIONAL COMPOSITE LAMINATES USING A SEMI-CONTINUOUS STRATEGY Bassam Mahmoud (Mechanical Engineering) Marcos Colungo Torrecilla (Universidade Federal de Toulouse Midi-Pyrenees) Pablo Navarro (Institut Clément Ader) Steven Marguet (Institut Clément Ader) Issam Tawk (University of Balamand) Jean-François Ferrero (Institut Clément Ader) <i>This paper deals about the modeling of unidirectional composite laminates under low velocity impacts. A semi-continuous FEM strategy is presented. Drop tower tests are performed to compare with numerical results. A good correlation is found.</i>		TUE-1_BRU_2.10-01 CHANGES IN FIRST-PLY-FAILURE MODE OF THERMALLY DEGRADED CFRP Johannes Wolfrum (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) E. Quan (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) G. Maier (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) <i>The goal of these investigations was to observe the onset of crack propagation of increasingly thermally degraded CFRP under tensile loading by using AE analysis. Thermal degradation was interpreted microscopically and by μ-ATR-FTIR spectroscopy.</i>
10:20	TUE-1_MUC_3.01-18 MICROMECHANICAL MODELING AND SIMULATION OF TRIANGLE-SECTION CARBON FIBER REINFORCED POLYMER COMPOSITES Lei Yang (Dalian University of Technology) Zhanjun Wu (Dalian University of Technology) Xin Liu (Dalian University of Technology) <i>The mechanical and damage behavior of unidirectional triangle-section fiber reinforced composites under transverse tension and compression were simulated, thus to reveal the effect of triangle-section fiber on the mechanical properties of CFRPs.</i>	TUE-1_SEV_3.03-07 DAMAGE MODEL FOR THE COMPOSITE MATERIAL UNDER MULTIAXIAL LOADING Pavel Dodonov (Krylov State Research Center) Nikolai Fedonyuk (Krylov State Research Centre) <i>In this study we examine the mechanical properties of the FRP made of NCF. We've analyzed and modified damage model, and calibrated it based on results of cyclic multiaxial loading experiments. The model is used to predict properties of hybrid FRP.</i>	TUE-1_VEN_3.06-19 MODELING OF THROUGH-THICKNESS INTRA-YARN FIBER VOLUME FRACTION GRADIENTS IN LAMINATED WOVEN FABRICS Mike Mühlstädt (Friedrich Schiller University Jena) Wolfgang Seifert (Friedrich Schiller University Jena) Stefan Maenz (Friedrich Schiller University Jena) Klaus D. Jandt (Friedrich Schiller University Jena) Jörg Bossert (Friedrich Schiller University Jena) <i>This study presents a method to quantify intra-yarn fiber volume fraction gradients (IY-FVFG) within laminated plain woven fabrics. A model was proposed to describe IY-FVFG. In addition, the formation of IY-FVFG was investigated.</i>	TUE-1_BUD_3.05-02 A MULTI-SCALE NUMERICAL METHODOLOGY FOR PREDICTING THE MECHANICAL PROPERTIES OF POROUS CFRP LAMINATES USING DATA FROM X-RAY COMPUTERIZED TOMOGRAPHY Konstantinos I. Tserpes (University of Patras) Antonis Stamopoulos (University of Patras) <i>A multiscale methodology which utilizes the porosity quantified with XCT was developed for predicting the impact of porosity to the mechanical performance of CFRPs. The method was applied to 3 porosity levels and validated with mechanical tests.</i>	TUE-1_STO_3.15-06 NUMERICAL STOCHASTIC STUDY OF DEFECTS IN COMPOSITE MATERIALS: INFLUENCE OF POROSITY AND WRINKLES ON THE MECHANICAL BEHAVIOR. Hassoun Ishak (Institut de Recherche Technologique (IRT) Jules Verne) Alexandre Clemenz (Institut de Recherche Technologique (IRT) Jules Verne) Frédéric Jacquemin (Institut de Recherche en Génie Civil et Mécanique) <i>In this paper we will study the influence of porosity and wrinkles defect on the mechanical behavior of a composite materials.</i>	TUE-1_BIA_3.11-19 NUMERICAL ANALYSIS OF LOW VELOCITY IMPACTS ON 5HS WOVEN COMPOSITE LAMINATES P. G. Rodriguez-Luján (Universidad Carlos III de Madrid) Jose Alfonso Artero-Guerrero (Universidad Carlos III de Madrid) Jesus Pernas-Sanchez (Universidad Carlos III de Madrid) D. Varas (Universidad Carlos III de Madrid) Jorge López-Puente (Universidad Carlos III de Madrid) <i>This work proposes a numerical methodology to model the response of woven laminates under low velocity impacts. The model is validated through experimental tests in which it is studied the influence of thickness, ply sequence and ply clustering.</i>		TUE-1_BRU_2.10-02 INFLUENCE OF WATER ON THE CYCLIC BEHAVIOUR OF A WOVEN GLASS/PA6,6 COMPOSITE Amélie Malpot (Institute Pprime) Fabienne Touchard (P' Institute) Sébastien Bergamo (Renault) <i>This study deals with the influence of moisture content on the fatigue behaviour of a woven glass fibre reinforced PA6,6 composite. A fatigue life model is developed in order to predict the fatigue life of this material in any moisture configuration.</i>
10:40	TUE-1_MUC_3.01-19 MICROMECHANICAL MODELING OF VISCOELASTIC-VISCOPLASTIC-DAMAGE BEHAVIOUR FOR POLYAMIDE WOVEN FABRIC COMPOSITES UNDER CYCLIC LOADING Francis Praud (Arts et Métiers ParisTech) George Chatzigeorgiou (Arts et Métiers ParisTech) Yves Chemisky (Arts et Métiers ParisTech) Fodil Meraghni (Arts et Métiers ParisTech) <i>The cyclic behaviour of thermoplastic woven composites is modelled using a multi-scale approach based on the periodic homogenization method in which the microstructure effects and the local behaviours of the matrix and the yarns are accounted.</i>	TUE-1_SEV_3.03-08 DAMAGE SUPPRESSION IN UD-CFRP WITH FIBRE DISCONTINUITY BY INTERLAMINAR TOUGHENING USING POLYAMIDE MESH Hayato Nakatani (Osaka City University) Tatsuya Imamura (Osaka City University) Katsuhiko Osaka (Osaka City University) <i>Polyamide mesh is inserted into UD-CFRP with fibre discontinuity to improve interlaminar crack onset stress. An analytical model successfully predicts the onset stress by using fracture toughness $G_{IIR}=3.82 \text{ kJ/m}^2$ obtained by a stabilized ENF test.</i>	TUE-1_VEN_3.06-20 MODELLING OF THE MECHANICAL RESPONSE OF THERMOPLASTIC MATRIX TEXTILE COMPOSITES UNDER DYNAMIC LOADING – A COMPARISON OF METHODS Jens Wiegand (Compact Engineering) Holger Boehm (Technical University of Dresden) Andreas Hornig (Technical University of Dresden) Jan Luft (Technical University of Dresden) Maik Gude (Technical University of Dresden) <i>The paper presents a comparison of Continuum Damage Mechanics and Plasticity methods for the modelling of thermoplastic matrix composites.</i>	TUE-1_BUD_3.05-03 MULTI-PHYSICS MOLECULAR-DYNAMICS-FEM FOR THE VIRTUAL DESIGN OF NANO-STRUCTURES AND DEVICES TOWARDS PROPERTY SPECIFICATIONS ACROSS SCALES Andre Wilmes (Imperial College London) Silvestre Pinho (Imperial College London) <i>A MDfEM for any multi-physics potential is shown. Novel Periodic Boundary Conditions for rotations in discrete and continuum domains with property homogenization across scales and physics is presented. Network-analysis based meshing is introduced.</i>	TUE-1_STO_3.15-07 PLY-BY-PLY DELAMINATION MORPHOLOGY IN COMPOSITE LAMINATES UNDER LOW-VELOCITY IMPACT Maria Francesca Pernice (University of Bath) Andrew Rhead (University of Bath) <i>Impact of quasi-isotropic, zero dominated and non-symmetric composite laminates shows delamination shape depends on the fibre orientation in the bounding plies at each interface and always extends in the fibre direction of the lower ply.</i>	TUE-1_BIA_3.11-20 OPTIMAL DESIGN OF CERAMIC/SANDWICH COMPOSITE STRUCTURES TO BETTER RESIST FOR AP PROJECTILE IMPACT Sergei Sapozhnikov (South Ural State University) Galina A. Forental (South Ural State University) <i>The typical ceramic/composite personal protective structures now are monolithic. Splitting composite part into two different thickness plates we have designed optimal sandwich structure which has 20% less weight with the same AP resistance.</i>		

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Plenary Lecture 2 (MUC) by Thomas Wolff, BMW AG, Germany: PROCESS CHAINS OF COMPOSITE TECHNOLOGIES FOR AUTOMOTIVE LIGHTWEIGHT DESIGN							
	2.06 Nano Composites (5/7)	5.06 Automated Placement Technologies (3/5)	5.14 Manufacturing of Short/Long Fiber Composites (1/2)	5.09 Manufacturing Processes for Thermoplastic Composites (5/7)	4.01 Full-Field Methods (2/3)	7.02 Recycling of Fibres and Composites (1/5)	1.01 Aerospace (5/6)
	<p>TUE-1_NAP_2.06-18 POLYMERIC COMPOSITES FILLED WITH CELLULOSE MICRO- AND NANOCRYSTALS FOR THE RESTORATION OF CELLULOSE-BASED ART-WORKS: CHARACTERIZATION AND APPLICATION</p> <p>Annalisa Cataldi (University of Trento) Flavio Deflorio (University of Trento) Alessandro Pegoretti (University of Trento)</p> <p><i>Polymeric composites filled with micro-and nanocellulose were developed and characterized. The final materials with improved mechanical properties were applied as adhesives for the oil paintings lining and as consolidants of damaged wood.</i></p>	<p>TUE-1_LON_5.06-10 EXPERIMENTAL ANALYSIS OF GAPS AND OVERLAPS CAUSED BY INTRA-PLY SECTORIZATION IN THE THERMOPLASTIC AUTOMATED FIBER PLACEMENT PROCESS</p> <p>Thomas Zenker (Fraunhofer ICT) Christian Schuerger (Fraunhofer ICT)</p> <p><i>Gap and overlap configurations were analyzed experimentally for the thermoplastic AFP-process in terms of preform surface homogeneity and influence on the layup of subsequent plies. Post-consolidation fiber angle distribution was investigated.</i></p>	<p>TUE-1_BOR_5.14-01 3D SIMULATION OF COMPOSITE STRANDS COMPRESSION MOLDING BY USING THE PROPER GENERALIZED DECOMPOSITION</p> <p>Chady Ghnatios (Notre Dame University-Louaize) Emmanuelle Abisset-Chavanne (Ecole Centrale Nantes) Christophe Binetruy (Ecole Centrale Nantes) Francisco Chinesta (Ecole Centrale Nantes) Anais Barasinski (Ecole Centrale de Nantes) Suresh Advani (University of Delaware)</p> <p><i>In this paper we model and simulate the compression molding of composite inserts inside a liquid matrix. Inserts can be unidirectional prepreg patches or fabrics. The modelling is based on the Ericksen flow formulation and the simulation on the PGD.</i></p>	<p>TUE-1_STG_5.09-17 INFLUENCE OF MAXIMUM TEMPERATURE AND COOLING PHASE ON THE LAP SHEAR STRENGTH OF INDUCTION JOINED GLASS FIBER REINFORCED THERMOPLASTICS AND STEEL</p> <p>Martina Hümbert (Institute for Composite Materials) Peter Mitschang (Institute for Composite Materials)</p> <p><i>This study investigates the influence of joining temperature and the temperature range during which pressure is applied on the joint strength of glass fiber reinforced thermoplastics and steel joined by induction joining.</i></p>	<p>TUE-1_AUG_4.01-05 DAMAGE EVOLUTION TEST MACHINE CONTROL BASED ON THERMOGRAPHY</p> <p>James Thatcher (University of Southampton) D.A. Crump (University of Southampton) Peter Bailey (Instron) Janice Duleue-Barton (University of Southampton)</p> <p><i>The possibility of controlling the rate of damage evolution during a cyclic test, using IRT, is investigated. The results, to establish the relationship between the recorded temperature change and damage condition in composite material, are described.</i></p>	<p>TUE-1_ING_7.02-01 A COST-EFFECTIVE CHEMICAL APPROACH TO RETAINING AND REGENERATING THE STRENGTH OF THERMALLY RECYCLED GLASS FIBRE</p> <p>Sairah Bashir (University of Strathclyde) Liu Yang (University of Strathclyde) R. Anderson (University of Strathclyde) N. B. Basri (University of Strathclyde) E. Saez-Rodriguez John Ligat (University of Strathclyde) James Thomson (University of Strathclyde)</p> <p><i>This paper explores alkaline treatments applied to thermally damaged glass fibres with the aim of restoring strength. Successful strength increase could potentially lead to reuse of thermally recycled glass filaments in composite applications.</i></p>	<p>TUE-1_ATH_1.01-17 RADOMES – BIG SIZED COMPOSITE STRUCTURES WITH MULTI-DISCIPLINARY REQUIREMENTS FOR UNMANNED RECONNAISSANCE AIR PLATFORMS</p> <p>Heinz Meister, Clemens Brand, Peter Starke (Airbus Defence and Space) Georg Doll, Jürgen Mosch (German Aerospace Center) Ulrich Christ, Thomas Krell (Bundeswehr research institute for materials, fuels and lubricants (WIWeB))</p> <p><i>A radome as a large composite structure was sized and designed for electromagnetic transparency. In order to analyze compliance with other multidisciplinary requirements, manufacturing, structural and other properties were tested.</i></p>
	<p>TUE-1_NAP_2.06-19 PRESSING-AND-FOLDING FOR THE PREPARATION OF EFFICIENT AND HIGHLY LOADED 2D MATERIALS-BASED POLYMER NANOCOMPOSITES</p> <p>Giovanni Santagiuliana (Queen Mary University of London) Olivier T. Picot (Queen Mary University of London) Nicola Pugno (University of Trento) Emiliano Bilotto (Queen Mary University of London) Ton Peijs (Queen Mary University of London)</p> <p><i>A new approach for the preparation of 2D materials-based polymer nanocomposites called Pressing & Folding, which allows the blending of materials with very different flow behaviours, differently from traditional techniques combined with static-mixers.</i></p>	<p>TUE-1_LON_5.06-11 OPTICAL MODELLING OF VCSEL-ASSISTED THERMOPLASTIC TAPE PLACEMENT</p> <p>Thomas Weiler (Aachen Center for integrative Lightweight Production) Michael Emonts (RWTH Aachen University) Stephan Gronenborn (Philips Photonics) Henning Janssen (Fraunhofer IPT)</p> <p><i>A method for the calculation of the process intensity distribution in the nip zone area of VCSEL-assisted tape placement is presented and for two processing scenarios were analyzed: one for tape laying and one for tape winding.</i></p>	<p>TUE-1_BOR_5.14-02 ADVANCED MODEL ORDER REDUCTION FOR SIMULATING COMPOSITES FORMING PROCESSES</p> <p>Anais Barasinski (Ecole Centrale de Nantes) Emmanuelle Abisset-Chavanne (Ecole Centrale Nantes) Chady Ghnatios (Notre Dame University-Louaize) Jose Vicente Aguado (Ecole Centrale de Nantes) Domenico Borzacchiello (Ecole Centrale Nantes) Francisco Chinesta (Ecole Centrale Nantes)</p> <p><i>This work concerns the integration of model order reduction techniques for elaborating Simulation Apps allowing real-time evaluation of process conditions in the field of composites manufacturing processes.</i></p>	<p>TUE-1_STG_5.09-18 INTRINSIC MANUFACTURE AND DESIGN OF POSITIVE LOCKING FIBRE REINFORCED THERMOPLASTIC/METAL LOW STRUCTURES</p> <p>Daniel Barfuss (Technical University of Dresden) Raik Grütznert (Fraunhofer IWU) Christian Garthaus (Technical University of Dresden) Maik Gude (Technical University of Dresden)</p> <p><i>An efficient and intrinsic manufacturing approach for hollow fibre reinforced thermoplastic profiles with multi-scale structured metallic load introduction elements has been developed.</i></p>	<p>TUE-1_AUG_4.01-06 DETECTION OF DELAMINATIONS IN 5-HARNESS SATIN GFRP EPOXY LAMINATES USING DIC</p> <p>Osman Ajmal (University of Surrey) Andrew Crocombe (University of Surrey) Michael Gower (NPL) David Jesson (University of Surrey) Stephen Ogin (University of Surrey)</p> <p><i>3D-DIC can be used to detect the presence and size of fully embedded delaminations within GFRP panels. This paper considers two types of delamination inserts from which the position and size of the defects were clearly visible from the DIC results.</i></p>	<p>TUE-1_ING_7.02-02 A DRY ALIGNING METHOD OF RECYCLED DISCONTINUOUS FIBERS FOR HIGH PERFORMANCE CFRTP</p> <p>Miyake Takushi (Gifu University) Imeda Satoshi (Gifu University)</p> <p><i>A dry fiber alignment method is newly developed for long reclaimed carbon fiber by utilizing modified yarn manufacturing process with using fluffy synthetic fibers as suspension of discontinuous carbon fiber.</i></p>	<p>TUE-1_ATH_1.01-18 STRUCTURAL ADHESIVE BONDING OF AIRCRAFT STRUCTURES - THE NECESSITY FOR RELIABLE AND ROBUST PROCESSES</p> <p>Jens Holtmannspötter (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) F. Zimmer (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) T. Hofmann (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) H.-J. Gudlat (Bundeswehr research institute for materials, fuels and lubricants (WIWeB))</p> <p><i>Structural adhesive bonding of aircraft structures – the necessity for reliable and robust processes.</i></p>
	<p>TUE-1_NAP_2.06-20 QUANTIFICATION OF INCORPORATION OF CELLULOSE NANOCRYSTALS AND CARBON NANOTUBES IN MELT COMPOUNDED THERMOPLASTICS USING RAMAN IMAGING</p> <p>Anna E. Lewandowska (University of Exeter) Stephen Eichhorn (University of Exeter)</p> <p><i>The contribution presents the advantages of Raman imaging as a complementary method to the conventional analytical techniques used to investigate nanocomposites. Raman imaging delivers broad information about the mixing of fillers and thermoplastics.</i></p>	<p>TUE-1_LON_5.06-12 LOWFLIP – AN INNOVATIVE DIRECT 3D PLACEMENT TECHNOLOGY FOR PLIES AND TAPES</p> <p>Marko Szczesny (University of Stuttgart) Frieder Heieck (University of Stuttgart) Peter Middendorf (University of Stuttgart) Riccardo Mezzacasa (Fundacion TECNALIA Research and Deveopment) Xabier Irastorza (Fundacion TECNALIA Research and Deveopment) Harald Sehrs Schön (FILL GmbH) Michael Schneiderbauer (FILL GmbH)</p> <p><i>A novel direct 3d placement method for plies and tapes developed within the LowFlip research project is presented. In addition data on a new out of autoclave prepreg with snap cure abilities and energy efficient tooling solutions are introduced.</i></p>	<p>TUE-1_BOR_5.14-03 DEVELOPMENT OF ADVANCED 3D PROCESS SIMULATION FOR CARBON FIBER SHEET MOLDING COMPOUNDS IN AUTOMOTIVE SERIES APPLICATIONS</p> <p>Vitali Romanenko (BMW Group) Miro Duhovic (Institute for Composite Materials) Joachim Hausmann (Institute for Composite Materials) Johannes Eschl (BMW Group)</p> <p><i>This work deals with a new approach for compression molding simulation using the coupled-eulerian method. First results for filling behavior are compared to experimental studies. Finally, a concept for mapping of fiber orientations is shown.</i></p>	<p>TUE-1_STG_5.09-19 LASER HEAT CONDUCTION WELDING OF INLINE CLEANED ENDLESS CARBON FIBRE REINFORCED THERMOPLASTICS</p> <p>Verena Wippo (Laser Zentrum Hannover e.V.) Jörg Ihde (Fraunhofer IFAM) Peter Jäschke (Laser Zentrum Hannover e.V.) T. Wuebben (Fraunhofer IFAM) Peter Linde (Airbus Operations) Oliver Suttmann (Laser Zentrum Hannover e.V.) L. Overmeyer (Laser Zentrum Hannover e.V.)</p> <p><i>Laser transmission welding was transferred to heat conduction welding for joining endless carbon fiber reinforced thermoplastics. The influence of surface contaminations and the effect of the removal technique on the lap shear strength were studied.</i></p>	<p>TUE-1_AUG_4.01-07 EVALUATING DELAMINATION GROWTH IN COMPOSITES UNDER DYNAMIC LOADING USING INFRARED THERMOGRAPHY</p> <p>Jagadeesh Narayana swamy (Delft University of Technology) Francisco Lahuerta (WMC, Knowledge centre) Andrei Anisimov (Delft University of Technology) Rogier Nijssen (Knowledge Centre WMC) R. M. Groves (Delft University of Technology)</p> <p><i>A novel method to use infrared thermography technique for the quantitative analysis of delamination area in composites under fatigue loading. The output of the test was promising and can be extended for more experimental and computational research.</i></p>	<p>TUE-1_ING_7.02-03 CARBON COMPOSITES RECYCLING STRATEGIES AND THEIR REALIZATION FOR NEW PRODUCTS</p> <p>Stefan Schlichter (ITA Augsburg GmbH)</p> <p><i>Carbon waste is difficult to process on textile equipment due to a lack of "typical textile" properties. It is therefore necessary to modify all machines and working elements in a typical textile recycling line to achieve acceptable results.</i></p>	<p>TUE-1_ATH_1.01-19 THE FUTURE MOBILE REPAIR SYSTEM - A TECHNOLOGY DEMONSTRATOR FOR THE AUTOMATED REPAIR OF CARBON FIBER REINFORCED PLASTICS</p> <p>Jens Holtmannspötter (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) J. de Freese (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) J. C Meyer (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) M. Niedernhuber (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) F. Feucht (Bundeswehr research institute for materials, fuels and lubricants (WIWeB))</p> <p><i>Automation of CFRP repair. Scarfing with a mobile five axis milling system.</i></p>

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
11:30	<p>3.01 Fracture and Damage - Micromechanics (6/8)</p> <p>TUE-2_MUC_3.01-20 MICROMECHANICS AS A VIRTUAL TESTING TOOL TO UNDERSTAND DAMAGE BEHAVIOURS OF CONTINUOUS FIBRE-REINFORCED THERMOPLASTIC COMPOSITES</p> <p>Ditho Pulungan (King Abdullah University of Science and Technology (KAUST)), Gilles Lubineau (King Abdullah University of Science and Technology (KAUST)), Arief Yudhanto (King Abdullah University of Science and Technology (KAUST)) Recep Yaldiz (SABIC T&I Corporate Research & Development, Composites) Warden Schijve (SABIC T&I Corporate Research & Development, Composites)</p> <p>We used a micromechanical model to predict damages in thermoplastic composites and to understand their controlling parameters. We found that the ductility of the composite is mainly affected by inter-fiber distance rather than matrix ductility.</p>	<p>3.03 Fracture and Damage - Laminar Level (3/5)</p> <p>TUE-2_SEV_3.03-09 EFFECT OF THE PLY STACKING SEQUENCE ON THE TRANSLAMINAR FRACTURE COHESIVE LAW</p> <p>Adrián Ortega Novillo (AMADE, Universidad de Girona) Pere Mainí (AMADE, Universidad de Girona) Emilio González (AMADE, Universidad de Girona) Jose Ramon Sainz de Aja (Aernnova Engineering Solutions Ibérica S.A.) Federico Martin De La Escalera (Aernnova Engineering Solutions Ibérica S.A.)</p> <p>The translaminar Cohesive Law of several hybrid laminates are measured from the fracture test of a Compact Tension specimen. The measured Cohesive Laws are analyzed by comparing the different locations of each material along the laminate.</p>	<p>3.06 Textile Composites (6/6)</p> <p>TUE-2_VEN_3.06-21 MODIFICATION OF ENERGY RELEASE RATES IN TEXTILE REINFORCED THERMOPLASTIC COMPOSITES TO CONTROL DELAMINATION CHARACTERISTICS</p> <p>Moritz Kuitz (Technical University of Dresden) Andreas Hornig (Technical University of Dresden) Maik Gude (Technical University of Dresden)</p> <p>In the this study a modification strategy is presented to adjust the interlaminar properties and the corresponding delamination characteristics of a textile reinforced thermoplastic composite, consisting of glass fibre reinforced polypropylene.</p>	<p>3.05 Multiscale Modeling (2/5)</p> <p>TUE-2_BUD_3.05-04 A RATIONAL FIBRE PACKING DESCRIPTION TO MODEL AND PREDICT THE EFFECTIVE DIFFUSIVITY/CONDUCTIVITY OF A TRANSVERSELY RANDOM UD COMPOSITE: AN ANALYTICAL AND NUMERICAL-BASED APPROACH</p> <p>Sébastien Joannès (MINES ParisTech) Eveline Hervé-Luanco (University of Versailles)</p> <p>Diffusivity properties of fibre reinforced materials are homogenized by a Morphological Representative Pattern-based approach. Fibre packing effects and the influence of interphase areas are investigated. Closed-form analytical relations are given.</p>	<p>3.14 Novel Composite Microstructures: Design and/or Prototyping (1/2)</p> <p>TUE-2_STO_3.14-01 COMPRESSIVE PROPERTIES OF INSITU (AL3Zr+AL2O3)/2024AL COMPOSITES WITH A NETWORK REINFORCEMENT ARCHITECTURE</p> <p>Balasubramaniam Kaveendran (Harbin Institute of Technology) Gui Song Wang (Harbin Institute of Technology) Lin Geng (Harbin Institute of Technology) Lu Jun Huang (Harbin Institute of Technology) Yi Sun (Harbin Institute of Technology)</p> <p>The superior compressive properties of 2024Al matrix composites with a network distribution of reinforcements (insitu Al3Zr and Al2O3 particles) compared to a similar composite with a random discrete distribution of reinforcements.</p>	<p>3.11 Dynamic Loading - Impact, Crash, Blast (6/6)</p> <p>TUE-2_BIA_3.11-21 OUT OF PLANE IMPACT ON WOVEN COMPOSITES PLATES: EFFECTS OF THICKNESS, PLY SEQUENCE AND PLY CLUSTERING.</p> <p>P. G. Rodríguez-Luján (Universidad Carlos III de Madrid) Jesus Pernas-Sanchez (Universidad Carlos III de Madrid) Jose Alfonso Artero-Guerrero (Universidad Carlos III de Madrid) D. Varas (Universidad Carlos III de Madrid) Jorge López-Puente (Universidad Carlos III de Madrid)</p> <p>This work proposes an experimental methodology to study the response of woven laminates under low velocity impacts. The test are designed in order to study the influence of thickness, ply sequence and ply clustering.</p>	<p>2.09 Non-Polymer Matrix Composites (1/1)</p> <p>TUE-2_BRU_2.09-01 EVALUATION OF ALUMINA AS PROTECTIVE COATING FOR CARBON FIBERS IN ALUMINIUM-BASED COMPOSITES</p> <p>Mario Krug (Fraunhofer IKTS) Alfaferi Zainal Abidin (Fraunhofer IKTS) Mandy Höhn (Fraunhofer IKTS) Piotr Malczyk (Technical University of Dresden) Ingolf Endler (Fraunhofer IKTS) Alexander Michaelis (Fraunhofer IKTS)</p> <p>Al2O3-coated textile preforms infiltrated with 239D were dense with very low residual porosity. Alumina layer works properly to improve wettability with 239D-melt. But the alumina layer degrades by the reaction with the alloy component Mg.</p>	
11:50	<p>TUE-2_MUC_3.01-21 MICROSCALE MODELING OF PAPER</p> <p>Yujun Li (RWTH Aachen University) Scott Stapleton (University of Massachusetts Lowell) Stefanie Reese (RWTH Aachen University) Jaan-Willem Simon (RWTH Aachen University)</p> <p>This study aims to predict the mechanical properties of the paper layer by using a three-scale approach. The homogenization was performed first on the fiber wall level, and then on the generated artificial fiber network.</p>	<p>TUE-2_SEV_3.03-10 APPLICATIONS OF EQUILIBRIUM OF CONFIGURATIONAL FORCES FOR THE MEASUREMENT OF COHESIVE LAWS</p> <p>Ulf Stigh (University of Skövde)</p> <p>A methodology to develop test set-ups to measure cohesive laws is presented. This is based on equilibrium of configurational forces. Methods to measure data for adhesive layers and kink-bands in unidirectional composites are given.</p>	<p>TUE-2_VEN_3.06-22 FAILURE BEHAVIOUR OF TRIAXIAL BRAIDED COMPOSITES</p> <p>Tobias Wehrkamp-Richter (Technical University of Munich / Institute for Carbon Composites) Silvestre Pinho (Imperial College London) Roland Hinterhölzl (Technical University of Munich / Institute for Carbon Composites)</p> <p>The non-linear mechanical response of triaxial braided composites is predicted using meso-scale finite element unit cells.</p>	<p>TUE-2_BUD_3.05-05 A STATICALLY COMPATIBLE LAYERWISE STRESS APPROACH FOR MULTILAYERED MATERIALS</p> <p>Rawad Baroud (Ecole des Ponts ParisTech) Karam Sab (Navier Laboratory, Ecole des Ponts ParisTech) Jean-François Caron (Navier Laboratory, Ecole des Ponts ParisTech) Fouad Kaddah (Universite Saint Joseph) Wassim Raphael (Universite Saint Joseph)</p> <p>This paper presents a new layerwise model for multilayered plates, named SCLS1, as an abbreviation of Statically Compatible Layerwise Stresses with first-order membrane stress approximations per layer in thickness direction.</p>	<p>TUE-2_STO_3.14-02 DESIGNING TOUGHER MICROSTRUCTURES BY 3D PRINTING OF CONTINUOUS FIBRE-REINFORCED COMPOSITES</p> <p>Yentl Swolfs (KU Leuven) Silvestre Pinho (Imperial College London)</p> <p>A finite element model for maximizing the translaminar fracture toughness of fibre-reinforced composites was developed. The optimised microstructures were then 3D printed with continuous fibres and tested experimentally.</p>	<p>TUE-2_BIA_3.11-22 PREDICTION OF THE ENERGY ABSORPTION BEHAVIOUR OF LARGE COMPOSITE COMPONENTS SUBJECT TO IMPACT LOADS – ASSESSMENT OF INDIVIDUAL MECHANISMS AT PLY SCALE</p> <p>Martin Schwab (Vienna University of Technology) Heinz E. Pettermann (Vienna University of Technology)</p> <p>An efficient modelling strategy for simulating impact on structural composite components is presented. Thereby, an embedding approach combined with shell element based discretisation allows to keep the computational effort within reasonable bounds.</p>	<p>TUE-2_BRU_2.09-02 HYBRID SOL-GEL THIN FILMS WITH ALUMINA NANOPARTICLES WITH HYDROPHOBIC PROPERTIES</p> <p>Francisco Carreño (Universidad Complutense de Madrid) Oscar Rodriguez (Universidad Complutense de Madrid) Noemi Carmona (Universidad Complutense de Madrid)</p> <p>We have prepared hybrid silica-alkylsiloxane thin films. Samples have been characterized by scanning electron microscopy and water contact angle measurements. The results show a 130° water contact angle for the 'up to date' best set of parameters.</p>	
12:10	<p>TUE-2_MUC_3.01-22 MODELLING AND QUANTIFYING MODE I INTERLAMINAR FRACTURE IN PARTICLE-TOUGHENED CFRP MATERIALS</p> <p>Gregor Borstnar (University of Southampton) Mark Mavrogordato (University of Southampton) Mark Kazakov (UVICOM Co.Ltd) Qingda Yang (University of Miami) Ian Sinclair (University of Southampton) Mark Spearing (University of Southampton)</p> <p>Computed Tomography was used to capture Mode I delamination propagation in particle-toughened carbon/epoxy laminates. Digital Volume Correlation was used to quantify the strains ahead of the crack tip, which were compared to a plane strain FE model.</p>	<p>TUE-2_SEV_3.03-11 FRACTURE ASPECTS OF QUASI-ISOTROPIC CFRP LAMINATES UNDER UNIAXIAL COMPRESSION</p> <p>Yuuki Kano (Nagoya University) Masahiro Arai (Nagoya University) Eiichi Hara (Japan Aerospace Exploration Agency) Takashi Ishikawa (Nagoya University) Keita Goto (Nagoya University)</p> <p>We conducted compressive tests with coupon specimens observing failure of quasi-isotropic CFRP laminates. High speed imaging has been employed to find the location of initial fracture and illustrate the subsequent damages of the laminates.</p>	<p>TUE-2_VEN_3.06-23 THREE-DIMENSIONAL TEXTILE STRUCTURAL COMPOSITES WITH NEGATIVE POISSON'S RATIO</p> <p>Lili Jiang (Hong Kong Polytechnic University) Lin Zhou (Hong Kong Polytechnic University) Kun Xu (Chinese Academy of Sciences) Hong Hu (Hong Kong Polytechnic University)</p> <p>Two types of 3D auxetic textile structural composites were developed. They show different compressive properties and Poisson's ratio due to the difference of reinforcement structures. Composite B is better suitable for using as protection materials.</p>	<p>TUE-2_BUD_3.05-06 ATOMISTIC SIMULATION OF YIELD AND RUPTURE IN POLYMER MATRIX COMPOSITES</p> <p>Timothy Breitzman (U.S. Air Force Research Laboratory) Stephen Barr (Universal Technology Corporation) Gary S. Kedziora (Engility Corporation) James Moller (Miami University) Alison Ecker (University of Dayton) Dhriti Nepal (Air Force Research Laboratory) Rajiv Berry (Air Force Research Laboratory)</p> <p>A multiscale quantum mechanics and molecular mechanics framework is presented which seeks to inform micro scale material response laws. The simulations are focused on efficient and accurate prediction of bond scission in polymer networks.</p>	<p>TUE-2_STO_3.14-03 EXPERIMENTAL INVESTIGATIONS ON THE MECHANICAL PROPERTIES OF NEW TYPE OF INTERPENETRATING PHASE COMPOSITE BASED ON SCHWARTZ PRIMITIVE TRIPLY PERIODIC MINIMAL SURFACES</p> <p>Oraib Al-Ketan (Masdar Institute of Science and Technology) Rashid Abu Al Rub (Masdar Institute of Science and Technology)</p> <p>A new type of interpenetrating phase composite (IPC) is introduced. The composite has a reinforcement phase designed mathematically based on Schwartz Primitive (P) triply periodic minimal surfaces (TPMS).</p>	<p>TUE-2_BIA_3.11-23 STRUCTURAL OPTIMISATION OF A COMPOSITE AIRCRAFT FRAME FOR A CHARACTERISTIC RESPONSE CURVE</p> <p>Lennart Weiß (German Aerospace Center) Hardy Köke (German Aerospace Center) Martin Schlueter (Hokkaido University) Christian Hühne (German Aerospace Center)</p> <p>An heuristic optimisation technique for a desired dynamic response curve of CFRP z-frames used in aerospace applications is investigated. A mixed-integer distributed ant colony (MIDACO) algorithm was applied to identify dimensions and laminates.</p>	<p>TUE-2_BRU_2.09-03 NEWS INDICATORS FOR THE DAMAGE EVOLUTION AT HIGH TEMPERATURE UNDER AIR OF A SIC/ISI-B-C COMPOSITE SUBJECT TO CYCLIC AND STATIC LOADING</p> <p>Elie Racle (INSA de Lyon) Nathalie Godin (INSA de Lyon) Pascal Reynaud (INSA de Lyon) Mohamed R'Mili (INSA de Lyon) Gilbert Fantozzi (INSA de Lyon) Carole Rakotoarisoa (Snecma) Florent Bouillon (Herakles (SAFRAN)) Myriam Kaminski (ONERA-The French aerospace Lab)</p> <p>Different approaches based on acoustic emission are developed to quantify damage along the fatigue tests. New indicators of damage based on acoustic energy highlight critical times allowing an evaluation of the remaining lifetime.</p>	

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)
2.08 Fiber-Hybrid Composites (1/1)	2.06 Nano Composites (6/7)	5.06 Automated Placement Technologies (4/5)	5.14 Manufacturing of Short/Long Fiber Composites (2/2)	5.09 Manufacturing Processes for Thermoplastic Composites (6/7)	4.01 Full-Field Methods (3/3)	7.02 Recycling of Fibres and Composites (2/5)	1.01 Aerospace (6/6)
<p>TUE-2_BRI_2.08-01 IMPROVED MECHANICAL AND ELECTRICAL PROPERTIES OF CFRP MULTIAXIAL LAMINATES BY EMBEDDED METAL FIBERS</p> <p>Benedikt Hanemann (Institute for Composite Materials) Sebastian Backe (Institute of Materials Science and Engineering (WIKK)) Sebastian Schmeer (Institute for Composite Materials) Frank Balle (Technical University of Kaiserslautern) Ulf P. Breuer (Institute for Composite Materials)</p> <p><i>A steel and carbon fiber reinforced epoxy is investigated. Tests are conducted on coupons with different metal fiber volume fractions and various laminate architectures to analyze the electrical and mechanical material properties.</i></p>	<p>TUE-2_NAP_2.06-21 SIMULTANEOUSLY TOUGHENED AND ELECTRICALLY CONDUCTIVE EPOXY RESIN FORMULATIONS - THE EFFECT OF TOUGHENER ON THE MECHANICAL AND ELECTRICAL PROPERTIES</p> <p>Gökhan Bakis (University of Bayreuth) Rico Zeiler (University of Bayreuth) Holger Deutges (University of Bayreuth) Volker Altstädt (University of Bayreuth)</p> <p><i>In this research, simultaneously toughened and electrically conductive epoxy composites are produced. Organic tougheners showed enormous effect not only on fracture toughness but as well on electrical conductivity by affecting conducting network.</i></p>	<p>TUE-2_LON_5.06-13 MAXIMIZING THE OUT-OF-PLANE PERMEABILITY OF PREFORMS MANUFACTURED BY DRY FIBER PLACEMENT</p> <p>Oliver Rimmel (Institute for Composite Materials) David Becker (Institute for Composite Materials) Jens Mack (Institute for Composite Materials) Peter Mitschang (Institute for Composite Materials)</p> <p><i>Within this study influences on the out-of-plane permeability were investigated. The considered parameters were related to the material (e.g. binder amount) as well as the layup process and subsequent process steps.</i></p>	<p>TUE-2_BOR_5.14-04 FIBER AND RESIN FLOW EVALUATION OF SHORT CARBON FIBER-REINFORCED COMPOSITES USING MOVING PARTICLE SEMI-IMPLICIT METHOD</p> <p>Mahiro Teratani (Osaka University) Kazutaka Mukoyama (Osaka University) Shuhei Matsuzawa (Osaka University) Kenta Mitsufoji (Osaka University) Fumikazu Miyasaka (Osaka University) Koushu Hanaki (Osaka University) Tetsusei Kurashiki (Osaka University)</p> <p><i>Flowability of resin and fibers during press forming of short fiber-reinforced composites is evaluated by using Moving Particle Semi-implicit method.</i></p>	<p>TUE-2_STG_5.09-20 MECHANICAL PERFORMANCE OF LONG FIBRE REINFORCED STIFFENER PANELS MANUFACTURED USING LASER WELDING</p> <p>Peter Hansen (Element Materials Technology) Verena Wippo (Laser Zentrum Hannover e.V.) Sean Cooper (AGC AeroComposites) Dave Conway (AGC AeroComposites) Choothum Jeenjittakaw (Element Materials Technology) Peter Jäschke (Laser Zentrum Hannover e.V.)</p> <p><i>Laser transmission welding was applied to join glass fibre fabric reinforced polyetherimide materials in stiffened panels. Mechanical test were performed to compare the laser welded specimens with adhesively bonded coupons in static and fatigue tests.</i></p>	<p>TUE-2_AUG_4.01-08 FULL FIELD NON-DESTRUCTIVE EVALUATION OF COMPOSITE STRUCTURES USING VIBRATION BASED LOADING</p> <p>Rachael Tighe (University of Southampton) Janice Duleu-Barton (University of Southampton)</p> <p><i>As the first step towards strain based non-destructive evaluation using complimentary approaches, thermoelastic stress analysis and lock-in digital image correlation are used for the inspection of composite components using vibration based loading.</i></p>	<p>TUE-2_ING_7.02-04 CATALYSED THERMAL DECOMPOSITION OF MATRICES FOR CLOSED-LOOP RECYCLING OF FIBRE REINFORCED THERMOSETS</p> <p>Kyle Pender (University of Strathclyde) Liu Yang (University of Strathclyde)</p> <p><i>An investigation into catalysed thermal decomposition of epoxy resin was carried out with the goal to improve the commercial viability of glass/carbon fibre reinforced thermoset recycling.</i></p>	<p>TUE-2_ATH_1.01-20 THERMOPLASTIC COMPOSITES FOR AEROSPACE APPLICATIONS, DEVELOPMENTS TOWARDS HIGH-TEMPERATURE MATERIALS</p> <p>Hans Luinge (TenCate Advanced Composites) Joris Markenstein (TenCate Advanced Composites) Martino Marchetti (Delft University of Technology) Theo Dingemans (Delft University of Technology)</p> <p><i>Liquid Crystalline Materials are evaluated for use in high-temperature fiber reinforced composites. This paper will describe the properties and processability of this new range of materials.</i></p>
<p>TUE-2_BRI_2.08-02 INTERLAMINAR AND INTRALAMINAR PROPERTIES OF CARBON SPREAD TOW AND GLASS FIBRE HYBRID COMPOSITES FOR COST SAVING IN THE MASS PRODUCTION OF AUTOMOTIVE COMPONENTS</p> <p>Tomas Katafiasz (Imperial College London) Lorenzo Iannucci (Imperial College London) Emile Greenhalgh (Imperial College London)</p> <p><i>Characterising cost effective materials such as fibre hybrid composites is important in the automotive industry. This paper addresses two typical component failure modes found within such hybrids, these being interlaminar and intralaminar failure.</i></p>	<p>TUE-2_NAP_2.06-22 STUDY OF PHYSICO-CHEMICAL STRUCTURAL, THERMAL AND IN-VITRO CHARACTERISTICS OF ZINC AND MAGNESIUM SUBSTITUTED NANODIMENSIONAL HYDROXYAPATITE</p> <p>Seema Kapoor (Panjab University) Uma Batra (PEC University of Technology) Sonia Sharma (Panjab University) Suchita Kohli (Panjab University)</p> <p><i>Nanodimensional zinc and magnesium substituted hydroxyapatite powders were synthesized via a sol-gel route. Comprehensive characterization techniques provided experimental evidence of the effects of ion substitution on physicochemical, thermal and bioactive behavior of nanopowders.</i></p>	<p>TUE-2_LON_5.06-14 EFFECT OF MATERIAL CHARACTERISTICS ON THE LAYUP QUALITY OF THE CONTINUOUS MULTI-TOW SHEARING (CMTS) PROCESS</p> <p>Evangelos Zypmeloudis (University of Bristol) Kevin Potter (University of Bristol) Paul Weaver (University of Bristol) Byung Chul Kim (University of Bristol)</p> <p><i>CMTS is a novel material placement technology, with an advanced steering capability, that can increase the complexity of the parts that can be manufactured using automated methods.</i></p>	<p>TUE-2_BOR_5.14-05 ON THE RELEVANCE OF THE JEFFERY AND THE FOLGAR & TUCKER MODELS IN THE SIMULATION OF SHORT FIBER SUSPENSIONS KINEMATICS</p> <p>Marta Pérez (Ecole Centrale de Nantes) Adrien Scheuer (Université Catholique de Louvain) Emmanuelle Abisset-Chavanne (Ecole Centrale Nantes) Francisco Chinesta (Ecole Centrale Nantes) Roland Keunings (Université Catholique de Louvain)</p> <p><i>The classical Jeffery and Folgar & Tucker models are analyzed using a kinetic theory based approach, testing the model hypotheses influence on the fiber kinematics.</i></p>	<p>TUE-2_STG_5.09-21 MANUFACTURING OF A CARBON/POLYAMIDE BEAM BY VACUUM ASSISTED PULTRUSION</p> <p>Felix Lapointe (Polytechnique Montreal) Arnold Oswald (Ecole Polytechnique Montréal) Asami Nakai (Gifu University) Louis Laberge Lebel (Ecole Polytechnique Montréal)</p> <p><i>Carbon/PA thermoplastic composites were manufactured using vacuum assisted pultrusion. The effect of preheating methods, preheating temperatures, and vacuum level on the void content was studied.</i></p>	<p>TUE-2_AUG_4.01-09 HIGH RESOLUTION DIGITAL IMAGE CORRELATION STRAIN MEASUREMENTS OF ADHESIVELY BONDED JOINTS</p> <p>Jens Kosmann (German Aerospace Center) Thomas Löbel (German Aerospace Center) Dirk Holzhüter (German Aerospace Center) Christian Hühne (German Aerospace Center) Martin Schollerer (German Aerospace Center)</p> <p><i>The focus of this work is the high resolution digital image correlation strain measurement of adhesively bonded joints. Especially in scarf repaired coupons and crack lap shear specimens the strain distribution along the bondline is highly uneven.</i></p>	<p>TUE-2_ING_7.02-05 EFFECT OF RECYCLING ON NATURAL FIBRE POLYPROPYLENE COMPOSITES REGARDING THE CRYSTALLIZATION BEHAVIOUR AND FIBRE LENGTH DISTRIBUTION</p> <p>Anna Ramzy (Clausthal University of Technology) Ahmed ElSabbagh (Clausthal University of Technology) Leif Steuernagel (Clausthal University of Technology)</p> <p><i>Sisal fibre reinforced polypropylene composite is multistep processed and thermal, mechanical and rheological properties are detected and correlated to the fibre's shape and their distribution.</i></p>	<p>TUE-2_ATH_1.01-21 THE EFFECTS OF ULTRAVIOLET RADIATION (UVR) IN POLYMER-BASED COMPOSITES</p> <p>Tsz-ting Wong (Hong Kong Polytechnic University) Kin-tak Lau (Hong Kong Polytechnic University) Julie Etches (University of Bristol)</p> <p><i>UVR could cause serious damages to polymer-based materials. Mechanical properties of polymer-based composites under UVR exposure are studied. A ZnO filled HGF layer is introduced on FRPs for UVR protection and enhance the surface strength.</i></p>
<p>TUE-2_BRI_2.08-03 MODELLING THE TENSILE FAILURE OF HYBRID POLYMER COMPOSITES</p> <p>Rodrigo Tavares (Faculdade de Engenharia da Universidade do Porto) António Melro (University of Bristol) Albert Turon (AMADE, Universidad de Girona) Pedro Camanho (University of Porto)</p> <p><i>A micromechanical model that takes into account the statistical nature of fibre strength and the proper constitutive response of the matrix and fibre-matrix interface is developed to study the tensile failure of hybrid and non-hybrid composites.</i></p>	<p>TUE-2_NAP_2.06-23 THE FRACTURE PERFORMANCE AND PARTICLE DISPERSION OF RUBBER- AND NANOSILICA PARTICLE-MODIFIED EPOXIES</p> <p>Tasnuva Khaleque (Imperial College London) Soraia Pimenta (Imperial College London) Ambrose C. Taylor (Imperial College London)</p> <p><i>The microstructure and fracture performance of an anhydride cured epoxy polymer modified by preformed core-shell rubber particles and nanosilica particles are investigated. A quantitative study of the dispersion of particles is also performed.</i></p>	<p>TUE-2_LON_5.06-15 PREFORMING 2.0: WASTE EFFICIENT, FAST & TAILORED LAYUPS</p> <p>Thomas Dobiashch (Compositence GmbH)</p> <p><i>The avoidance of waste compared with a high productive are key factors to meet the commercial customer expectations for a serial production of products made out of composite materials.</i></p>	<p>TUE-2_BOR_5.14-06 OPTIMIZATION OF PROCESS CHAIN FOR CONTINUOUS-DISCONTINUOUS LONG FIBER REINFORCED POLYMER STRUCTURES</p> <p>Woramon Pangboonyanon (Karlsruhe Institute of Technology) MarieLouise Zaiß (Karlsruhe Institute of Technology) Jürgen Fleischer (Karlsruhe Institute of Technology) Gisela Lanza (Karlsruhe Institute of Technology)</p> <p><i>This paper considers the necessity of the preform step, the possibility to integrate the unidirectional tape with sheet molding compound and the quality assurance for these continuous-dicontinuous-semi-finished parts.</i></p>	<p>TUE-2_STG_5.09-22 MANUFACTURING OF BICOMPONENT FIBERS FOR THERMOPLASTIC COMPOSITES: A FEASIBILITY STUDY</p> <p>Christoph Schneeberger (ETH Zürich) Joanna C. H. Wong (ETH Zürich) Paolo Ermani (ETH Zürich)</p> <p><i>We propose an alternative concept for hybrid intermediate materials used in high volume production of thermoplastic composites by dip coating individual glass filaments with a polymer sheath in-line with the glass spinning process.</i></p>	<p>TUE-2_AUG_4.01-10 LOCAL DEFECT RESONANCE FOR EFFICIENT DEFECT DETECTION IN COMPOSITES</p> <p>Markus Rahammer (Institut für Kunststofftechnik) Igor Soldov (Institut für Kunststofftechnik) Nikolai Glunizkij (Institut für Kunststofftechnik) Marc Kreutzbruck (University of Stuttgart)</p> <p><i>Via the concept of local defect resonance it is possible to efficiently and selectively activate defects in composite materials, e.g. delaminations. Thermography and shearography are used for fast defect detection with vibration excitation.</i></p>	<p>TUE-2_ING_7.02-06 EFFECT OF THE SAMPLE GRANULOMETRY ON THE HYDROLYSIS OF CARBON FIBRE REINFORCED EPOXY (CFRE) IN HIGH TEMPERATURE AND HIGH PRESSURE WATER</p> <p>Gidéon Simenou Jambong (Laboratoire de Thermocinétique de Nantes) Eric Le Gal La Salle (ICAM Nantes) Jean-Luc Bailleul (Laboratoire de Thermocinétique de Nantes) Jérôme Bellettre (Laboratoire de Thermocinétique de Nantes)</p> <p><i>This investigation was undertaken in order to collect information about the effect of the granulometry on the degradation of the resin, during the high temperature and high pressure hydrolysis of CFRE.</i></p>	<p>TUE-2_ATH_1.01-22 VALIDATION AND INDUSTRIAL IMPLEMENTATION OF AN ANALYSIS METHOD FOR PREDICTING DISTORTIONS INDUCED BY COMPOSITE CURING PROCESS</p> <p>Daniel Hartung (Premium Aertec GmbH) Matthias Hartmann (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>The paper summarised the experimental material characterisation and development of a simulation of curing induced distortion for composite airframe structures. The simulation is validated with distortion measurements with serially produced frames.</i></p>

11:30

11:50

12:10

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
12:30	<p>TUE-2_MUC_3.01-23 MULTI-SCALE SIMULATIONS OF LARGE SCALE FIBER BRIDGING IN MODE I INTRA-PLY FRACTURE.</p> <p>Luis Pablo Canal Casado (Ecole Polytechnique Fédérale de Lausanne) Georgios Pappas (EPFL) John Botsis (Ecole Polytechnique Fédérale de Lausanne)</p> <p><i>An embedded cell simulation approach is used to study the toughening due to bridging in a unidirectionally reinforced carbon/epoxy composite in mode I intralaminar fracture.</i></p>	<p>TUE-2_SEV_3.03-12 IDENTIFYING FAILURE INITIATION IN AUTOMOTIVE STRUCTURES MADE OF NCF REINFORCED COMPOSITES FOR HOT SPOT ANALYSIS</p> <p>Henrik Molker (Volvo Car Corporation) Renaud Gutkin (Imperial College London) Silvestre Pinho (Imperial College London) Leif Asp (Chalmers University of Technology)</p> <p><i>Identification of hot spots in shell model structure with orthotropic composite materials using state of the art 3D failure criteria. The full 3D stress state is evaluated from shell element results, based on stress equilibrium.</i></p>	<p>TUE-2_VEN_3.06-24 VIRTUAL DESIGN OF TEXTILE COMPOSITES STARTS ON A FILAMENT LEVEL</p> <p>Oliver Döbrich (Technical University of Dresden) Thomas Gereke (Technical University of Dresden) Chokri Cherif (Technical University of Dresden)</p> <p><i>The paper introduces possibilities of virtual composite design on a micro-scale level.</i></p>	<p>TUE-2_BUD_3.05-07 TWO-SCALE DAMAGE MODELING OF A FIBRE REINFORCED COMPOSITE BASED ON X-RAY COMPUTED TOMOGRAPHY DATA</p> <p>Ilya Straumit (KU Leuven) Stepan Lomov (KU Leuven) Martine Wevers (KU Leuven)</p> <p><i>A two-scale progressive damage model is constructed, aimed at taking into account stochastic fibre failure, formation of clusters of fibre breaks, and the variability in the local fibre volume fraction as estimated from micro-CT data.</i></p>	<p>TUE-2_STO_3.14-04 EXPLORING THE TENSILE RESPONSE IN SMALL CARBON FIBRE COMPOSITE BUNDLES</p> <p>David Anthony (Imperial College London) Gaël Grail (Imperial College London) Alexander Bismarck (University of Vienna) Milo Shaffer (Imperial College London) Paul Robinson (Imperial College London) Soraia Pimenta (Imperial College London)</p> <p><i>Small AS4-carbon fibre-epoxy composite bundles with a restricted number of fibres, ca. 20, showed an average strength 6.5% higher than in standard lab-scale composite specimens using the same fibre type, with progressive failure in tension.</i></p>	<p>TUE-2_BIA_3.11-24 TESTING OF CFRP AT HIGH STRAIN RATES WITH THE SPLIT HOPKINSON TENSION BAR - EVALUATION OF TESTING QUALITY</p> <p>Hanna Paul (Fraunhofer EMI) Noah Ledford (Fraunhofer EMI) Richard Mohrmann (Fraunhofer EMI) Michael May (Fraunhofer EMI)</p> <p><i>Split Hopkinson Tension Bars are used to test materials at high strain rates under tensile loading. An alternative mounting concept is presented. The quality of the test results is evaluated using FEM Simulations and comparing real test results.</i></p>		<p>TUE-2_BRU_2.09-04 SYNTHESIZING CONDITIONS AND STRUCTURAL-PHASE STATE OF Ti-Nb ALLOY WHEN SELECTIVE LASER MELTING</p> <p>Alexander Saprykin (National Research Tomsk Polytechnic University) Yu. P. Sharkeev (Institute of Strength Physics and Material Science of Siberian Branch Russian Academy of Sciences) E. A. Ibragimov (Yurga Institute of Technology) E. V. Babakova (Yurga Institute of Technology) Zhanna G. Kovalevskaya (Institute of Strength Physics and Material Science of Siberian Branch Russian Academy of Sciences) A. Yu. Eroshenko (Institute of Strength Physics and Material Science of Siberian Branch Russian Academy of Sciences) Margarita Khimich (Institute of Strength Physics and Material Science of Siberian Branch Russian Academy of Sciences) P. V. Uvarkin (Institute of Strength Physics and Material Science of Siberian Branch Russian Academy of Sciences) I. A. Gluhov (Institute of Strength Physics and Material Science of Siberian Branch Russian Academy of Sciences)</p> <p><i>A searching experiment aimed at identifying appropriate process conditions to form single tracks of titanium and niobium composite powder is reported to be carried out by an SLM experimental facility.</i></p>
12:50	<p>TUE-2_MUC_3.01-24 ON THE INTER-FIBRE FAILURE IN FIBRE REINFORCED COMPOSITES</p> <p>Paolo Andrea Carraro (University of Padova) Marino Quaresimin (University of Padova) Michele Zappalorto (University of Padova)</p> <p><i>The competing mechanisms of debonding and matrix failure are treated with an analytical approach. It is shown that there exists a value of the fibre radius which discerns between a matrix and interface driven damage initiation.</i></p>	<p>TUE-2_SEV_3.03-13 INTERLAMINAR STRESSES AND EDGE EFFECTS IN QUASI-ISOTROPIC LAMINATES SUBJECT TO TENSILE LOADS</p> <p>Faustino Mujika (University of the Basque Country) Jesús M. Romera (University of the Basque Country)</p> <p><i>Interlaminar stresses in quasi-isotropic symmetric laminates subject to tension are analyzed analytically and checked numerically.</i></p>	<p>TUE-2_VEN_3.06-25 WARP AND WEFT DIRECTION DAMAGE DEVELOPMENT IN THE LATE-STAGE FATIGUE LIFE OF A 3D NON-CRIMP ORTHOGONAL WEAVE COMPOSITE</p> <p>Matthew Poole (University of Surrey) Stephen Ogin (University of Surrey) Paul Smith (University of Surrey) Garry Wells (Defence Science and Technology Laboratory (DSTL)) Prasad Potluri (University of Manchester) Philip J. Withers (University of Manchester)</p> <p><i>This paper presents the damage development throughout the lifetime of a five layer 3D non-crimp orthogonal woven composite fatigue loaded along the warp and weft directions.</i></p>	<p>TUE-2_BUD_3.05-08 DEFINITION OF PERIODIC BOUNDARY CONDITIONS IN EXPLICIT DYNAMIC SIMULATIONS OF MICRO- OR Meso-SCALE UNIT CELLS WITH CONFORMAL AND NON-CONFORMAL MESHES</p> <p>David Garoz Gomez (Ghent University) Francisco A. Gilabert (Ghent University) Ruben Sevenois (Ghent University) Siebe Spronk (Ghent University) Ali Rezaei (Ghent University) Wim Van Paepegem (Ghent University)</p> <p><i>Different formulations and implementations of Periodic Boundary Conditions (PBCs) have been studied under dynamic load using an explicit finite element solver. This work indicates in which micro/meso unit cells the PBCs must be carefully applied.</i></p>	<p>TUE-2_STO_3.14-05 HIERARCHICAL BRICK-AND-MORTAR COMPOSITES FOR DAMAGE TOLERANCE AND PROGRESSIVE FAILURE</p> <p>Soraia Pimenta (Imperial College London) Joel Henry (Imperial College London)</p> <p><i>Bio-inspired discontinuous microstructures – with staggered ‘bricks of bricks’ embedded in a matrix – are designed by FE, leading to composites with a non-linear response, delaying damage localisation, and promoting energy dissipation before failure.</i></p>	<p>TUE-2_BIA_3.11-25 THE ROAD MAP FROM FRACTURE TOUGHNESS TO RESIDUAL STRENGTH OF AIRCRAFT HIGH GRADE CFRPS</p> <p>Spyridon Psarras (Imperial College London) Lorenzo Iannucci (Imperial College London) Michel Fouinneteau (Airbus Operations)</p> <p><i>This paper presents the road map from obtaining the fracture toughness of aircraft high grade CFRPs up to predicting the damage size after LVI and CAI failure load. Finally, the predictions were compared with experimental results.</i></p>		<p>TUE-2_BRU_2.09-05 TUNGSTEN FIBRE-REINFORCED TUNGSTEN COMPOSITE – DEVELOPMENT OF A NEW HIGH PERFORMANCE MATERIAL</p> <p>Johann Riesch (Max-Planck-Institut für Plasmaphysik) Lorenzo Iannucci (Imperial College London) Jan W. Coenen (Forschungszentrum Jülich GmbH) Hanns Gietl (Max-Planck-Institut für Plasmaphysik) Till Höschel (Max-Planck-Institut für Plasmaphysik) Yiran Mao (Forschungszentrum Jülich GmbH) Christian Linsmeier (Forschungszentrum Jülich GmbH) Rudolf Neu (Max-Planck-Institut für Plasmaphysik)</p> <p><i>Overview of the development, manufacturing and characteristics of tungsten fibre-reinforced composites anticipated for the use in a future fusion reactor and possibly in other highly loaded structures.</i></p>
13:10	Lunch Break							
14:10	<p>Keynote lecture 5 (MUC) by Pedro Camanho, University of Porto, Portugal: ANALYSIS MODELS FOR POLYMER COMPOSITES ACROSS DIFFERENT LENGTH SCALES</p>				<p>Keynote lecture 6 (BIA) by Markus G. R. Sause, University of Augsburg, Germany: ADVANCES IN IN-SITU MONITORING OF FIBER REINFORCED COMPOSITES</p>			
15:00	Poster Session 1							

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
<p>TUE-2_BRI_2.08-04 PREDICTION OF MECHANICAL PROPERTIES OF HYBRID DISCONTINUOUS COMPOSITES</p> <p>Joel Henry (Imperial College London) Soraia Pimenta (Imperial College London) HaNa Yu (University of Bristol) Marco Luigi Longana (University of Bristol)</p> <p><i>A non-linear stress-strain response is predicted with an analytical model coupling shear-lag of the matrix with fibre strength variability. The model was validated experimentally, and captures hybrid effects in the material's stiffness and strength.</i></p>	<p>TUE-2_NAP_2.06-24 THERMAL CONDUCTIVITY AND PROCESSABILITY OF POLYMER COMPOSITES WITH NANO- AND MICRO-FUSIBLE FILLERS</p> <p>Kazuaki Sanada (Toyama Prefectural University) Ryouta Takeuchi (Toyama Prefectural University) Satoru Kamon (Toyama Prefectural University)</p> <p><i>The composites with the nano- and micro-fusible fillers were fabricated and the potential of nano- and micro-fusible fillers to increase the thermal conductivity and decrease the viscosity of the composites was investigated.</i></p>	<p>TUE-2_LON_5.06-16 INTIMATE CONTACT DEVELOPMENT IN LASER ASSISTED FIBER PLACEMENT</p> <p>Thijs Kok (TPRC) Wouter Groeve (TPRC) Laurent Warnet (University of Twente) Remko Akkerman (University of Twente)</p> <p><i>Experimental research on the intimate contact development during the laser assisted fiber placement process. The results suggest that the thermoplastic composite tape deconsolidates during the process, which might significantly affect the intimate contact development.</i></p>	<p>TUE-2_BOR_5.14-07 ASSESSING FIBRE KINEMATICS IN DILUTE FIBRE SUSPENSIONS WITH NON-NEWTONIAN SUSPENDING FLUIDS USING FAST X-RAY TOMOGRAPHY AND 3D FINITE ELEMENT SIMULATIONS</p> <p>Tanguy Laurencin (Laboratoire 3SR) Laurent Orgéas (CNRS) Pierre Dumont (INSA de Lyon) Patrice Laure (CNRS) Sabine Rolland du Roscoat (CNRS) L. Silva (CNRS) Steven Le Corre (University of Nantes) M. Terrien (CNRS)</p> <p><i>We conducted 3D in situ compression experiments using model non-Newtonian fibre suspensions that were imaged by fast X-ray microtomography. In parallel, these experiments were numerically simulated with an Eulerian multi-domain FE code.</i></p>	<p>TUE-2_STG_5.09-23 NEW PRODUCTION PROCESS FOR MANUFACTURING CONCENTRATED FIBER-REINFORCED THERMOPLASTIC HOLLOW PROFILE COMPONENTS</p> <p>Clemens Stefanziola (BMW Group) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites) Elisabeth Ladstätter (Technical University of Munich / Institute for Carbon Composites) T. Zimmermann (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>This article is to present a newly developed discontinuous production process – that is subdivided into five main steps – for continuous fiber-reinforced thermoplastic hollow profiles based on a continuously produced semi-finished product.</i></p>	<p>TUE-2_AUG_4.01-11 MICRO-SCALE STRAIN MAPPING IN NANO-ENGINEERED FIBER-REINFORCED COMPOSITES</p> <p>Mahoor Mehdikhani (KU Leuven) Anna Matveeva (KU Leuven) Mohammadali Aravand (KU Leuven) Brian Wardle (Massachusetts Institute of Technology) Stepan Lomov (KU Leuven) Larissa Gorbatikh (KU Leuven)</p> <p><i>The application of digital image correlation at the micro-scale to nano-engineered fiber-reinforced composites is investigated. The resulting strain maps are compared with a finite element model, simulating CNTs grown radially on microfibers.</i></p>	<p>TUE-2_ING_7.02-07 EFFECTS OF AUTOMATED PATCH PLACEMENT ON THE MECHANICAL PERFORMANCE OF REFORMED NCF CARBON FIBRE</p> <p>Jamie Snudden (University of Bristol) Bernhard Horn (Technical University of Munich) Carwyn Ward (University of Bristol) Kevin Potter (University of Bristol) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>A novel approach to reforming in-process scrap into an aligned material with a grid of discontinuities using the Fibre Patch Placement Process which had been modified. The reformed material was tested in flexure showing a low drop in performance.</i></p>	12:30	
<p>TUE-2_BRI_2.08-05 REPEATED LOW ENERGY IMPACT BEHAVIOUR OF SELF-REINFORCED POLYPROPYLENE FIBRE METAL LAMINATES</p> <p>Laurentzi Aretxabaleta (Mondragon Unibertsitatea) Joseba Inaki Múgica (Mondragon Unibertsitatea) Modesto Mateos (Mondragon Unibertsitatea) Jon Aurrekoetxea (Mondragon Unibertsitatea)</p> <p><i>In this study the impact-fatigue behaviour of a polypropylene SRFML has been characterized by drop weight impact tests at impact energies of 20, 15, 13, 10 and 8J. The main dissipation damage mechanisms of the material have been identified.</i></p>	<p>TUE-2_NAP_2.06-25 TOUGHENING AND MECHANICAL PROPERTIES OF EPOXY MODIFIED WITH BLOCK CO-POLYMERS AND TITANIUM DIOXIDE NANOPARTICLES</p> <p>Ankur Bajpai (Institute for Composite Materials) Bernd Wetzel (Institute for Composite Materials)</p> <p><i>This work focus to overcome the disadvantage of epoxy thermosets i.e. brittleness, and to systematically develop and understand novel polymeric nano composites which include block copolymers with tailored morphology to generate high toughness.</i></p>	<p>TUE-2_LON_5.06-17 SELECTIVE REINFORCEMENT OF STEEL WITH CF/PA-6 COMPOSITES IN A LASER TAPE PLACEMENT PROCESS: EFFECT OF SURFACE PREPARATION AND LASER ANGLE ON INTERFACIAL BOND STRENGTH</p> <p>Christopher Stokes-Griffin (The Australian National University) Stefan Ehard (Technical University of Munich/Institute for Carbon Composites) Andreas Kollmannsberger (Technical University of Munich) Paul Compston (Australian National University) Klaus Drechsler (Technical University of Munich/Institute for Carbon Composites)</p> <p><i>This paper investigates how to achieve good bonding between CF/PA6 composite tapes and steel substrates in an automated tape placement process using a high power near infra-red laser as a heat source.</i></p>		<p>TUE-2_STG_5.09-24 ON LINE AND IN-SITU CONSOLIDATION OF THERMOPLASTIC</p> <p>Riccardo Dell'Anna (University of Salento) Francesca Lionetto (University of Salento) Francesco Montagna (University of Salento) Alfonso Maffezzoli (University of Salento)</p> <p><i>High power ultrasound was used in order to mould thermoplastic composites in a process including the simultaneous fibers impregnation and plies consolidation.</i></p>				12:50
Lunch Break								13:10
<p>Keynote lecture 7 (NAP) by Leif Asp, Chalmers University of Technology, Sweden: NEXT GENERATION MULTIFUNCTIONAL COMPOSITES</p>				<p>Keynote lecture 8 (STG) by Peter Mitschang, Universität Kaiserslautern and Institut für Verbundwerkstoffe GmbH, Germany: INDUCTION WELDING - A FLEXIBLE TECHNOLOGY FOR VARIOUS APPLICATIONS</p>				14:10
Poster Session 1								15:00

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
	3.01 Fracture and Damage - Micromechanics (7/8)	3.03 Fracture and Damage - Laminar Level (4/5)	3.18 Hybrid Materials and Structures (1/4)	3.05 Multiscale Modeling (3/5)	3.14 Novel Composite Microstructures: Design and/or Prototyping (2/2)	3.12 Dynamik Loading - Vibration and Damping (1/1)		2.14 Foams, Cellular and Lattice Materials (1/2)
15:00	<p>TUE-3_MUC_3.01-25 PROGRESSIVE FAILURE ANALYSIS OF STATIC COMPRESSION OF FILLED-HOLE STRUCTURE BASED ON THE MICRO-MECHANICS OF FAILURE</p> <p>Hongneng Cai (Xi'an Jiaotong University) Fei Jiao (Xi'an Jiaotong University) Pengfei Yu (Xi'an Jiaotong University) Xiaofei Lou (Xi'an Jiaotong University)</p> <p><i>The static strength of filled-hole compressive (FHC) structure of polymer composites using the theory of micro-mechanics of failure (MMF) is analyzed.</i></p>	<p>TUE-3_SEV_3.03-14 INTRA-LAMINAR PROGRESSIVE DAMAGE OF GENERAL CONFIGURATION LAMINATED COMPOSITES</p> <p>Adi Adumitroaie (Johannes Kepler University Linz) Ever Barbero (West Virginia University) Martin Schagerl (Johannes Kepler University Linz)</p> <p><i>A new analytical model for progressive damage transverse matrix cracking in continuous fiber reinforced laminates is developed. The increase of fracture toughness during matrix crack multiplication (R-curve) is included into the model.</i></p>	<p>TUE-3_VEN_3.18-01 ANALYSIS OF MSD CRACK GROWTH IN MECHANICALLY FASTENED FIBRE METAL LAMINATE JOINTS</p> <p>Wandong Wang (Delft University of Technology) Calvin Rans (Delft University of Technology) Zhinan Zhang (First Aircraft Design and Research Institute of AVIC) Rinze Benedictus (Delft University of Technology)</p> <p><i>This paper outlines a prediction model for analysing MSD crack growth in mechanically fastened joints based on linear elastic fracture mechanics and the principle of superposition.</i></p>	<p>TUE-3_BUD_3.05-09 DEVELOPMENT OF A SENSITIVITY-BASED DESIGN METHODOLOGY FOR COMPOSITE STRUCTURES</p> <p>Ernesto Rodriguez Pila (I2M - Arts et Métiers ParisTech) Claire Guillebaud (I2M - Arts et Métiers ParisTech) Hervé Wargnier (I2M - Arts et Métiers ParisTech)</p> <p><i>The aim of the methodology is to lead the choice of the designer optimizing the cost of development and the level of confidence. This study deals with a sensibility analysis and an uncertainty study to identify the most relevant parameters of models.</i></p>	<p>TUE-3_STO_3.14-06 ON THE EFFECT OF FIBRE SHAPE IN FIBRE REINFORCED POLYMERS: STRENGTH AND TOUGHNESS</p> <p>Miguel Herraez (IMDEA Materials) Carlos González (Polytechnic University of Madrid & IMDEA Materials Institute) Claudio Lopes (IMDEA Materials Institute) Roberto Guzman de Villoria (IMDEA Materials Institute) Javier Llorca (Polytechnic University of Madrid & IMDEA Materials Institute) T. Varela (Airbus Operations) J. Sánchez (Airbus Operations)</p> <p><i>Computational micromechanics applied to evaluate the effect of fibre shape on the transverse tension and compression properties of unidirectional composites.</i></p>	<p>TUE-3_BIA_3.12-01 CHARACTERIZATION OF FIBRE-DIRECTION DEPENDENT DAMPING OF GLASS-FIBRE COMPOSITES AT LOW TEMPERATURES AND LOW FREQUENCIES</p> <p>Mathias Kliem (DTU Wind Energy (Section of Composites and Materials Mechanics)) Jan Høgsberg (Technical University of Denmark) Martin Dannemann (Technical University of Dresden)</p> <p><i>The paper presents the damping properties of Glass-fiber reinforced Epoxy and Glass-fiber reinforced Vinyl-ester at low temperatures and low frequencies.</i></p>		<p>TUE-3_BRU_2.14-01 ASSEMBLED 3D PERIODIC AUXETIC CELLULAR STRUCTURE AND ITS MECHANICAL PROPERTIES</p> <p>Li Ma (Harbin Institute of Technology)</p> <p><i>An interlocking assembly manufacture method for 3D periodic auxetic cellular structures was introduced. The method has the potential for mass production and automatic manufacturing. Auxetic performance of proposed structures is investigated theoretically and numerically.</i></p>
15:20	<p>TUE-3_MUC_3.01-26 PROPAGATION OF A TRANSVERSE CRACK INSIDE THE INTERLEAF OF A CROSS-PLY LAMINATE</p> <p>Valentin Priasso (Airbus Group Innovations) Jacques Lamon (CNRS) Pierre Ladevèze (ENS Cachan) Cuong Ha-Minh (Université Paris-Saclay) Caroline Petiot (Airbus Group Innovations)</p> <p><i>This study focuses on the propagation of a transverse crack, for a cross-ply laminate, inside the interleaf reinforced by thermoplastic particles. Trends in crack propagation were anticipated depending on main properties of the matrix and particles.</i></p>	<p>TUE-3_SEV_3.03-15 MODELLING DISCRETE MATRIX CRACKS, SPLITS AND CRACK-INDUCED DELAMINATION WITH THE FLOATING NODE METHOD</p> <p>Bo-Yang Chen (National University of Singapore) Tong-Earn Tay (National University of Singapore) Silvestre Pinho (Imperial College London) Vincent B.C. Tan (National University of Singapore)</p> <p><i>This paper presents the modelling of matrix cracks, splits and the crack-induced delamination using the floating node method.</i></p>	<p>TUE-3_VEN_3.18-02 CHARACTERISATION OF FIBRE-METAL-LAMINATES UNDER BEARING LOADING</p> <p>Björn Bosbach (Technische Universität Hamburg-Harburg) Hauke Meeuw (Technische Universität Hamburg-Harburg) Bodo Fiedler (Technische Universität Hamburg-Harburg)</p> <p><i>The hybrid composites with solid and perforated metal sheets are manufactured by Vacuum-Assisted-Resin-Transfer-Moulding. Resulting in high quality composites with enhanced load bearing capability.</i></p>	<p>TUE-3_BUD_3.05-10 EFFECTIVE PROPERTIES OF DISSIPATIVE COMPOSITES UNDER FULLY COUPLED THERMOMECHANICAL PROCESSES</p> <p>George Chatzigeorgiou (Arts et Métiers ParisTech) Nicolas Charalambakis (Aristotle University of Thessaloniki) Yves Chemisky (Arts et Métiers ParisTech) Fodil Meraghni (Arts et Métiers ParisTech)</p> <p><i>The current work deals with periodic composite media undergoing fully coupled thermomechanical loading. In these composites the material constituents are considered to obey the generalized standard materials laws.</i></p>	<p>TUE-3_STO_3.14-07 MODELLING, PROTOTYPING AND TESTING NACRE-INSPIRED MICROSTRUCTURES FOR IMPROVED DAMAGE TOLERANCE</p> <p>Federico Narducci (Imperial College London) Silvestre Pinho (Imperial College London)</p> <p><i>This paper presents the design of a novel CFRP composite with nacre-inspired microstructure. Analytical models are developed to predict the behaviour of such composite, and used to identify the optimal parameters for the subsequent experiments.</i></p>	<p>TUE-3_BIA_3.12-02 CHARACTERIZATION OF DYNAMIC FORCES IN ORTHOGONAL CUTTING OF CFRPS</p> <p>Bin Niu (Dalian University of Technology) Fuji Wang (Dalian University of Technology) Rui Yang (Dalian University of Technology) Shiyong Sun (Dalian University of Technology)</p> <p><i>This work deals with the characterization of the dynamic cutting forces and the chip formation in the orthogonal cutting of CFRP. The time series of the dynamic cutting forces are acquired by a force sensor.</i></p>		<p>TUE-3_BRU_2.14-02 CYCLIC OLEFIN COPOLYMER/ EXFOLIATED GRAPHITE NANOPATELETS NANOCOMPOSITES FOAMED THROUGH SUPERCRITICAL CARBON DIOXIDE</p> <p>Andrea Dorigato (University of Trento) Andrea Biani (University of Trento) Alessandro Pegoretti (University of Trento)</p> <p><i>Cyclic olefin copolymer (COC) nanocomposites filled with exfoliated graphite nanoplatelets (xGnP) and foamed through supercritical carbon dioxide at different pressure levels were prepared and characterized.</i></p>
15:40	<p>TUE-3_MUC_3.01-27 STRESS REDISTRIBUTION AROUND BROKEN FIBRES AND STRENGTH OF FIBRE BUNDLES</p> <p>Luc St-Pierre (Imperial College London) Silvestre Pinho (Imperial College London)</p> <p><i>Analytical and FE methods were used to analyse how stress redistribution varies with the number of broken fibres in a cluster. A FE model to predict the survival probability of microcomposites is also presented and validated against experiments.</i></p>	<p>TUE-3_SEV_3.03-16 NON-LOCALIZED FAILURE CRITERION FOR OPEN-HOLE AND PINNED JOINT COMPOSITE STRUCTURE USING CHARACTERISTIC AREA/VOLUME APPROACH</p> <p>Arruck Tragangoon (MINES ParisTech) Baramée Patamaprom (MINES ParisTech) Jacques Renard (MINES ParisTech)</p> <p><i>The method to predict the failure of composite laminate structure induced by local stress concentration is proposed. Open-hole and bolted joint specimens of woven glass/polyamide6 composite were investigated in this work.</i></p>	<p>TUE-3_VEN_3.18-03 DESIGNING A METAL-CFRP-HYBRID BY USING A STRUCTURED POLYMERIC COMPONENT ON THE INTERFACE</p> <p>Martin Pohl (Technical University of Dresden) Markus Stommel (Technical University of Dortmund)</p> <p><i>This contribution is about the development of a hybrid metal-CFRP-structure that uses a thermoplastic polymer to form a mechanical interlocking on the interface.</i></p>	<p>TUE-3_BUD_3.05-11 HOMOGENIZATION OF TEMPERATURE-DEPENDENT SHORT FIBER REINFORCED POLYPROPYLEN AND EXPERIMENTAL INVESTIGATIONS OF LONG FIBER REINFORCED VINYLESTER</p> <p>Loredana Kehrer (Karlsruhe Institute of Technology) Pascal Pinter (Karlsruhe Institute of Technology) Thomas Böhlke (Karlsruhe Institute of Technology)</p> <p><i>Using μCT data, effective material properties are calculated by the self-consistent, the interaction direct derivative and the Hashin-Shtrikman two-step method. Material properties of short and long fiber reinforced polymers are determined by DMA.</i></p>	<p>TUE-3_STO_3.14-08 HIGH-TOUGHNESS CFRP LAMINATES WITH ENGINEERED FRACTURE SURFACES: A SHARK-TEETH DESIGN</p> <p>Silvestre Pinho (Imperial College London) Gianmaria Bullegas (Imperial College London) Soraia Pimenta (Imperial College London)</p> <p><i>Carefully placed patterns of micro-cuts have been designed and then used to increase the trans laminar work of fracture in thin-ply composite laminates. These led to a 68% increase in notched strength and 460% increase in work of fracture.</i></p>	<p>TUE-3_BIA_3.12-03 DAMPING OF CARBON FIBRE AND FLAX FIBRE REINFORCED ANGLE PLY POLYMERS</p> <p>Marvin Rueppel (University of Applied Sciences and Arts Northwestern Switzerland) J. Rion (Bcomp AG) Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland) Kunal Masania (ETH Zürich)</p> <p><i>We mathematically relate the dynamic properties of carbon and flax fibre angle ply laminates at various angles. The resulting elastic modulus and specific damping capacity are measured using dynamic mechanical analysis and vibration beam measurements.</i></p>		<p>TUE-3_BRU_2.14-03 DESIGN AND OPTIMIZATION OF LAYERED COMPOSITE FOAM LINERS FOR PROTECTIVE HELMETS</p> <p>Yasmine Mosleh (KU Leuven) Bart Depreitere (KU Leuven) Jos Vander Sloten (KU Leuven) Jan Ivens (KU Leuven)</p> <p><i>In this study, different configurations of layered composite foam liners for a protective helmet were studied. In addition, the effect of using different materials as a helmet shell on the performance of a helmet in linear impact has been studied.</i></p>

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2.04 Bio Composites (1/6)	2.06 Nano Composites (7/7)	5.06 Automated Placement Technologies (5/5)	5.12 Online Process Monitoring and Controlling (1/3)	5.09 Manufacturing Processes for Thermoplastic Composites (7/7)	4.05 Novel Test Methods and Concepts (1/2)	7.02 Recycling of Fibres and Composites (3/5)	1.04 Renewable Energies (1/1)	
<p>TUE-3_BRI_2.04-01 ARE FLAX-EPOXY COMPOSITES TOUGH?</p> <p>Farida Bensadoun (KU Leuven) Ignaas Verpoest (KU Leuven) Aart Van Vuure (KU Leuven)</p> <p><i>This study was to determine the influence of fibre architectures on the interlaminar fracture toughness of flax fibre epoxy composites.</i></p>	<p>TUE-3_NAP_2.06-26 INCREASING THE DAMAGE RESISTANCE OF COMPOSITES BY INTERLEAVING THEM WITH ELECTROSPUN NANOFIBROUS VEILS</p> <p>Lode Daelemans (Ghent University) Sam van der Heijden (Ghent University) Ives De Baere (UGent, Department of Materials Science and Engineering) Hubert Rahier (Free University Brussels) Wim Van Paepegem (Ghent University) Karen De Clerck (Ghent University)</p> <p><i>Interleaving composites with electrospun nanofibrous veils is proving to be a viable technique in order to increase the delamination resistance. We provide a thorough insight into the mechanisms that result in a toughened response.</i></p>	<p>TUE-3_LON_5.06-18 STAXX COMPACT 1700 – LOW SCRAP FOR HIGH VOLUME COMPONENT PARTS PRODUCTION</p> <p>Matthias Meyer (BA Composites GmbH)</p> <p><i>STAXX will decrease the risk for the part manufacturer as it builds up upon well established technology and with regard on invests and production cost it is cost-efficient due to being a stand alone production system.</i></p>	<p>TUE-3_BOR_5.12-01 A MODEL-BASED CONCEPT FOR AN OPTIMIZED RESIN TRANSFER MouldING PROCESS</p> <p>Patrick Hergan (Montanuniversität Leoben) Ewald Fauster (Montanuniversität Leoben) Ralf Schledjewski (Montanuniversität Leoben)</p> <p><i>A concept of optimizing the resin transfer moulding process by using model modules will be presented. Therefore basic models which describe the major sub-domains of the process will be shown.</i></p>	<p>TUE-3_STG_5.09-25 PROCESSING AND PROPERTIES OF FULL-THERMOPLASTIC SANDWICH STRUCTURES FOR APPLICATION IN AIRCRAFT INTERIORS</p> <p>Mathias Muehlbacher (Neue Materialien Bayreuth GmbH) Thomas Neumeyer (Neue Materialien Bayreuth GmbH) Volker Altstädt (University of Bayreuth)</p> <p><i>In this study an approach for manufacturing all-thermoplastic sandwich structures based on fire resistant thermoplastics for usage in aircraft interiors is presented.</i></p>	<p>TUE-3_AUG_4.05-01 BROADBAND DIELECTRIC SPECTROSCOPY OF DIELECTRIC-CONDUCTOR COMPOSITES: CHARACTERIZATION OF PHYSICAL PROPERTIES AND APPLICATION POTENTIAL</p> <p>Viktor Bortun (Czech Academy of Sciences) Jan Petzelt (Institute of Physics AS CR) Dmitry Nuzhnyy (Institute of Physics AS CR) Martin Kempa (Institute of Physics AS CR) Maxim Savinov (Institute of Physics AS CR)</p> <p><i>Broadband dielectric spectra (1 mHz – 1 THz) of dielectric-conductor composites reveal essential information on their conductivity mechanisms, percolation phenomena, etc. and provide estimation of their potential for electromagnetic applications.</i></p>	<p>TUE-3_ING_7.02-08 EXPLORING THE FLEXURAL AND ADHESION BEHAVIOR OF COMPOSITE SANDWICH PANELS MADE OF RECYCLED FOAMED POLYPROPYLENE CORE AND GLASS/PP SKINS</p> <p>Mohammadreza Azad (Concordia University) Mehdi Hojjati (Concordia University) Hossein Borazghi (AS Composite)</p> <p><i>The effect of using a solid-surface polymer foam as the core material on the mechanical and physical properties of composite sandwich panels was investigated and results were compared with a typical PP honeycomb sandwich panel with the same thickness.</i></p>	<p>TUE-3_ATH_1.04-01 EXPERIMENTAL AND SIMULATED DEFECT DETECTION IN FIBRE REINFORCED COMPOSITE MATERIALS USING THE MICROWAVE NON-DESTRUCTIVE EVALUATION TECHNIQUE</p> <p>Michael Gower (NPL) Maria Lodeiro (NPL) Richard Shaw (NPL) Andrew Gregory (NPL) Rolf Judaschke (Physikalisch-Technische Bundesanstalt (PTB))</p> <p><i>An experimental and theoretical study into microwave non-destructive inspections using reference defect artefacts, incorporating artificial defects with well-defined sizes and positions, to compare results with CST Microwave Studio simulations.</i></p>	15:00
<p>TUE-3_BRI_2.04-02 ASSESSING THE FEASIBILITY OF NATURAL COMPOSITE FOR STRUCTURAL APPLICATIONS</p> <p>Jeanne Blanchard (University of Southampton) Adam Sobey (University of Southampton) James Blake (University of Southampton)</p> <p><i>A reliability assessment of a glass fibre composite grillage and the equivalent structure made of flax fibre reinforced composite was performed to investigate the applicability of natural composites to structural applications.</i></p>	<p>TUE-3_NAP_2.06-27 USE OF CARBON NANOTUBES IN STRUCTURAL COMPOSITES</p> <p>Nadir Kchit (Nanocyl) Michael Claes (Nanocyl)</p> <p><i>Thermoplastics carrier doped carbon nanotubes are used as additives in CFRP with the aim to improve a damage tolerance and electrical conductivity. Two approaches have been proposed; CNT-doped TP converted in veil film and CNT-doped TP in fine powder.</i></p>	<p>TUE-3_LON_5.06-19 TIME DEPENDENCE OF MULTI-CURVED SHAPES</p> <p>Michael Elkington (University of Bristol) Carwyn Ward (University of Bristol)</p> <p><i>An investigation into whether wrinkling during forming of pre-consolidated laminates can be reduced by dramatically lowering the forming rate.</i></p>	<p>TUE-3_BOR_5.12-02 ANALYSES AND VALIDATION TESTING OF A PIEZO SENSOR BASED PROCESS MONITORING SYSTEM AS INTEGRAL PART OF AN INTEGRATED PROCESS AND STRUCTURAL HEALTH MONITORING SYSTEM FOR CFRP REINFORCEMENTS MADE BY RTM</p> <p>Michael Scheerer (Aerospace & Advanced Composites GmbH) Zoltan Simon (Aerospace & Advanced Composites GmbH) Michael Marischler (Aerospace & Advanced Composites GmbH) Tim Roser (Airbus Helicopters) Bernhard Rittenschöber (ALPEX Technologies GmbH)</p> <p><i>Within this paper the authors present detailed simulation and experimental results of the process monitoring part of a novel integrated process and structural health monitoring system based on piezo sensors for CFRP reinforcements made by RTM.</i></p>	<p>TUE-3_STG_5.09-26 RESISTANCE WELDING OF CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITES USING SPREAD CARBON FIBER HEATING ELEMENT</p> <p>Daiki Tanabe (Osaka University) Fumio Kubohori (Kindai University) Kazuaki Nishiyabu (Kindai University) Tetsusei Kurashiki (Osaka University)</p> <p><i>The effects of processing conditions such as applied voltage, current and conducting time on the fusion behavior of CFRTP composites were investigated to get the optimum condition for resistance welding using spread carbon fiber heating element.</i></p>	<p>TUE-3_AUG_4.05-02 COMPOSITE TESTING 4.0 – A NEW APPROACH TOWARDS QUALITY ASSESSMENT USING COLLABORATIVE ROBOTICS AND MULTI SENSOR MEASUREMENT</p> <p>Franz Eder (Descam 3D Technologies GmbH) M. Kling (Automation W+R) Frieder Heieck (University of Stuttgart) J. Greiner (University of Stuttgart) Andrea Miene (Faserinstitut Bremen) C. Cherrier (Automation W+R) R. Clasen (Automation W+R) Richard Söhnchen (Descam 3D Technologies GmbH)</p> <p><i>Especially in the area of carbon composites, an increasing demand for a fast and easy to use quality inspection systems is obvious. We here present an unobstructed combination of collaborative robots with optical testing methods for CFRP parts.</i></p>	<p>TUE-3_ING_7.02-09 INVESTIGATION OF THE EFFECT OF HOT WATER AND WATER VAPOUR TREATMENTS ON THE STRENGTH OF THERMALLY CONDITIONED E-GLASS FIBRES</p> <p>Peter Jenkins (University of Strathclyde) Mhari Stafford (University of Strathclyde) James Thomason (University of Strathclyde)</p> <p><i>An investigation of possible strength recovery methods using hot water or water vapour was carried out on E-glass fibres. A strength increase of previously thermally conditioned fibres of up to 130 % was achieved.</i></p>	<p>TUE-3_ATH_1.04-02 SUBCOMPONENT TESTING OF TRAILING EDGE PANELS IN WIND TURBINE BLADES</p> <p>Kim Branner (Technical University of Denmark) Peter Berring (Technical University of Denmark) Philipp Ulrich Haselbach (Technical University of Denmark)</p> <p><i>This paper proposes a static sub-component test method designed to check the compressive strength of the trailing edge region in wind turbine blades. The aim is that the method can be in certification according to the new DNV GL rotor blade standard.</i></p>	15:20
<p>TUE-3_BRI_2.04-03 BACTERIAL CELLULOSE AS REINFORCEMENT FOR NATURAL FIBRE THERMOSET COMPOSITES</p> <p>Marta Fortea Verdejo (Universität Wien) Koon-Yang Lee (Imperial College London) Alexander Bismarck (University of Vienna)</p> <p><i>Natural fibre composites were manufactured using flax fibres as reinforcement and different thermoset polymers as matrix. The effect of introducing bacterial cellulose as additional binder to these composites was investigated.</i></p>	<p>TUE-3_NAP_2.06-28 VIBRATIONAL CHARACTERISTICS OF FUNCTIONALLY GRADED CARBON NANOTUBE-REINFORCED COMPOSITE PLATES UNDER UNCERTAINTY</p> <p>Salah Poursmaeeli (Shiraz University) S. Ahmad Fazelzadeh (Shiraz University) Esmael Ghanavloo (Shiraz University) A. Fereidoon (Semnan University)</p> <p><i>The natural frequency of carbon nanotube-reinforced composite plate under geometrical and mechanical uncertainty is investigated using the interval analysis method. The mechanical properties are predicted on the basis of the modified rule of mixture.</i></p>	<p>TUE-3_LON_5.06-20 USING REAL-TIME DATA FOR INCREASING THE EFFICIENCY OF THE AUTOMATED FIBRE PLACEMENT PROCESS</p> <p>Darren Winter (GKN Aerospace) Dennis Crowley (University of Bristol) Stephen Williams (GKN Aerospace) Carwyn Ward (University of Bristol)</p> <p><i>Our paper addresses the non-value added activities that hinder a breakthrough AFP process for airliner wing manufacture, from 'new product introduction' towards 'steady state manufacturing'.</i></p>	<p>TUE-3_BOR_5.12-03 ASSESSING THE RELIABILITY OF FILLING SIMULATIONS FOR RTM: CRITICAL COMPARISON OF THEORETICAL AND REALISTIC PERMEABILITY OF TYPICAL CURVATURES ENCOUNTERED IN RTM PREFORMS</p> <p>Spiridon Konstantopoulos (Montanuniversität Leoben) Ralf Schledjewski (Montanuniversität Leoben)</p> <p><i>Permeability of curvatures found in RTM is analyzed using flow sensors. A model is developed for interpretation to curvature permeability and the differences from in-plane permeability or the theoretically expected draped permeability are discussed.</i></p>	<p>TUE-3_STG_5.09-27 THERMOPLASTIC UNIDIRECTIONAL TAPES – AN APPROPRIATE ALTERNATIVE TO WOVEN FABRIC BASED ORGANIC SHEETS</p> <p>Michael Kropka (Neue Materialien Bayreuth GmbH) Mathias Muehlbacher (Neue Materialien Bayreuth GmbH) Volker Altstädt (University of Bayreuth)</p> <p><i>In this study, the mechanical properties of glass fiber reinforced organic sheets and UD-tape lay-ups were investigated and compared at different temperatures.</i></p>	<p>TUE-3_AUG_4.05-03 COMBINING WAVE AND SPECTROSCOPIC TECHNIQUES TO MONITOR THE DEVELOPMENT OF THERMOSETS DURING CURE</p> <p>John Puentes (University of Wisconsin-Madison) Lorenz Wruck (University of Wisconsin-Madison) Alexander Chaloupka (Fraunhofer ICT) Natalie Rudolph (University of Wisconsin-Madison) Tim Osswald (University of Wisconsin-Madison)</p> <p><i>This work presents the first attempt to use ultrasonic sensors and a Raman spectrometer in a single testing set-up. The aim is to evaluate methods to infer thermo-chemical and mechanical properties of thermosets in one experiment.</i></p>	<p>TUE-3_ING_7.02-10 KINETIC OF THE HYDROLYSIS OF THREE DIFFERENT CARBON FIBRE REINFORCED EPOXY (CFRE) IN HIGH TEMPERATURE AND HIGH PRESSURE WATER</p> <p>Gidéon Simenou Jambong (Laboratoire de Thermocinétique de Nantes) Eric Le Gal La Salle (ICAM Nantes) Jean-Luc Bailleul (Laboratoire de Thermocinétique de Nantes) Jérôme Bellettre (Laboratoire de Thermocinétique de Nantes)</p> <p><i>In this work, the kinetics of the resin degradation during the hydrolysis of three different CFRE were investigated. A kinetic model found in the literature was used to determine the global kinetics parameters.</i></p>	<p>TUE-3_ATH_1.04-03 THE POTENTIAL OF SMART CLIMBING ROBOT COMBINED WITH A WEATHERPROOF CABIN FOR ROTOR BLADE MAINTENANCE</p> <p>Josef Schleupen (University of Applied Sciences Aachen) Heiko Engemann (University of Applied Sciences Aachen) Mohsen Bagheri (University of Applied Sciences Aachen) Stephan Kallweit (University of Applied Sciences Aachen) Peter Dahmann (University of Applied Sciences Aachen)</p> <p><i>Introduction of a weatherproof cabin for inspection and repair of wind turbine rotor blades. A weather independent solution can increase the maintenance efficiency. Including a study of influences of the cabin structure to SMART's climbing process.</i></p>	15:40

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
16:00	<p>TUE-3_MUC_3.01-28 MICROMECHANICS OF DAMAGE EVOLUTION DURING LONGITUDINAL LOADING IN UD-FRPS WITH VARIABLE STRENGTH DISTRIBUTION ALONG FIBER LENGTH</p> <p>Nithin Parambil (Indian Institute of Science) K. M. P. Fathima (Indian Institute of Science) Suhasini Gururaja (Indian Institute of Science)</p> <p><i>A numerical framework for damage development in micro-scale UD-FRP composite with continuous fibers has been presented in this work. Multiple damage modes, viz., fiber breakage, matrix plasticity and fiber-matrix interface debonding has been simulate.</i></p>	<p>TUE-3_SEV_3.03-17 NUMERICAL ANALYSIS OF CARBON FIBER/EPOXY STITCHED LAMINATES WITH VARIED THROUGH THICKNESS STITCH DENSITY</p> <p>Prabji Joshi (Tokyo Metropolitan University) Atsushi Kondo (MSC, Software) Jun Watanabe (Toray)</p> <p><i>Carbon-fibre/epoxy T800SC-24kf laminates with stitch thread of vectran 200d with different stitch density (0.11mm-2 and 0.028mm-2) has been analyzed for deformation behavior under in-plane tensile loading based on continuum mechanics.</i></p>	<p>TUE-3_VEN_3.18-04 DIRECT ADHESION OF CFR-THERMOPLAST ON STEEL -TESTING AND SIMULATION OF THE LAP SHEAR FRACTURE OF FLEXIBLE SKINS</p> <p>Ferhat Yüksel (Fraunhofer ICT) Roland Hinterhözl (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>A novel joining technology by direct adhesion of carbon fiber-reinforced thermoplastic (CFRTP) with polyamide 6 matrix on steel is investigated. Besides testing the interface is modelled and the simulation shows good correlation with test results.</i></p>	<p>TUE-3_BUD_3.05-12 LOCAL REINFORCEMENT INFLUENCE ON CORRUGATED LAMINATES STRUCTURAL STIFFNESS RESPONSE FOR FLEXIBLE SKINS</p> <p>Claudia Thurnherr (ETH Zürich) Carlo M. Franceschi (ETH Zürich) Francesco M. Filotto (ETH Zürich) Gerald Kress (ETH Zürich) Paolo Ermanni (ETH Zürich)</p> <p><i>The present study investigates the influence of local reinforcements for corrugated laminates on the anisotropic stiffness response in order to optimize the bending to axial stiffness ratio.</i></p>	<p>TUE-3_STO_3.14-09 THE ROLE OF POLYMER PHASE ON THE DEFORMATION OF HIGHLY FILLED PARTICULATE POLYMER COMPOSITES</p> <p>Sambit Bapari (Indian Institute of Science) Atul Chokshi (Indian Institute of Science)</p> <p><i>We have studied difference in compressive strengths of highly filled polymer composites at different temperatures. It is evident that the polymer phase is playing a critical role even at volume fraction close to random close packing.</i></p>	<p>TUE-3_BIA_3.12-04 VIBRATION DAMPING OF NATURAL FIBRE-REINFORCED COMPOSITE MATERIALS</p> <p>Md Zillur Rahman (University of Auckland) Brian Mace (University of Auckland) Krishnan Jayaraman</p> <p><i>The effect of the fibre orientation on the damping of the composites is significant. Composites containing 45° fibre orientation exhibit the maximum damping. The loss factor generally lies in the range of 2-7% for various fibre orientations.</i></p>		<p>TUE-3_BRU_2.14-04 FABRICATION OF THE CARBON FOAMS DERIVED FROM PHENOLIC RESIN MIXED WITH MESOPHASE PITCH</p> <p>Seung A Song (Chonbuk National University) Seong Su Kim (Chonbuk National University)</p> <p><i>Carbon foams are attractive carbon materials due to their advantages such as light weight, high strength, temperature tolerance. Carbon foams have potential application such as energy absorption material, high temperature insulation.</i></p>
16:20	Coffee Break							
	3.01 Fracture and Damage - Micromechanics (8/8)	3.03 Fracture and Damage - Laminates Level (5/5)	3.18 Hybrid Materials and Structures (2/4)	3.05 Multiscale Modeling (4/5)	3.02 Fracture and Damage - Laminates Level (1/5)	3.09 High-Performance Discontinuous Fibre Composites (1/1)		2.14 Foams, Cellular and Lattice Materials (2/2)
16:50	<p>TUE-4_MUC_3.01-29 THE EFFECT OF CARBON NANOTUBES ON STRESS REDISTRIBUTION AROUND THE FIBRE BREAK</p> <p>Oksana Shishkina (KU Leuven) Valentin Romanov (KU Leuven) Yasmin Abidin (KU Leuven) Stepan Lomov (KU Leuven) Larissa Gorbatiikh (KU Leuven)</p> <p><i>This work is a numerical study to evaluate the influence of carbon nanotubes (CNTs) on the stress build-up in and around a broken fibre in a single carbon fibre/epoxy composite. The studied modifications on the fibre surface are CNT growth and sizing.</i></p>	<p>TUE-4_SEV_3.03-18 PROGRESSIVE MATRIX CRACKING INDUCED DELAMINATION: A COMPARISON OF FINITE ELEMENT MODELLING TECHNIQUES</p> <p>Johannes Reiner (University of Queensland) Martin Veidt (University of Queensland) Matthew Dargusch (University of Queensland) Lutz Gross (University of Queensland)</p> <p><i>Matrix Cracking Induced Delamination is numerically investigated in carbon fibre reinforced laminates subjected to four-point bending. Two finite element modelling techniques with and without pre-inserted transverse matrix cracks are presented.</i></p>	<p>TUE-4_VEN_3.18-05 HYBRID STRUCTURES OF METALS AND FIBER REINFORCED THERMOPLASTICS FOR CHASSIS COMPONENTS</p> <p>Katja Tenhaeff (BMW Group) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>A possible approach for a more flexible modular system is the systematic use of hybrid synergy parts. This paper presents a potential study for composite reinforcements for components with stiffness-driven design using geometrically simple parts.</i></p>	<p>TUE-4_BUD_3.05-13 MICRO-SCALE FINITE ELEMENT STUDY OF THE DAMPING IN UNIDIRECTIONAL FIBER REINFORCED COMPOSITES</p> <p>Ali Rezaei (Ghent University) David Garoz Gomez (Ghent University) Jana Faes (Ghent University) Francisco A. Gilabert (Ghent University) Wim Desmet (KU Leuven) Wim Van Paepegem (Ghent University)</p> <p><i>This article employs the strain energy finite element method to study the anisotropic damping of unidirectional fiber reinforced composites in micro-scale.</i></p>	<p>TUE-4_STO_3.02-01 FINITE ELEMENT IMPLEMENTATION OF A MODEL FOR LONGITUDINAL COMPRESSIVE DAMAGE GROWTH WITH FRICTION</p> <p>Sérgio Costa (Swerea SICOMP) Renaud Gutkin (Swerea SICOMP) Robin Olsson (Swerea SICOMP)</p> <p><i>A model for the longitudinal response of laminated fibre-reinforced composites during compressive damage growth is implemented in a Finite Element (FE) package and validated for mesh objectivity. The current work details the FE implementation.</i></p>	<p>TUE-4_BIA_3.09-01 ANALYSIS OF VISCOELASTIC BEHAVIOUR OF ULTRA-THIN CHOPPED CARBON FIBRE TAPE REINFORCED THERMOPLASTICS WITH DIFFERENT TAPE LENGTHS</p> <p>Xiuqi Lyu (University of Tokyo) Jun Takahashi (University of Tokyo) Yi Wan (University of Tokyo)</p> <p><i>Temperature dependence of UT-CTT have remarkable dependence on tape length. When testing temperature varies from -30 to 120 °C, the modulus variation ratio of UT-CTT (6 mm), UT-CTT (18 mm) and UT-CTT (30 mm) are around 32%, 23% and 20%, respectively.</i></p>		<p>TUE-4_BRU_2.14-05 MICROCELLULAR FOAMS FROM HIGH PERFORMANCE PEEK/PEI MISCIBLE BLENDS</p> <p>Luigi Sorrentino (National Research Council of Italy) Livia Caffero (National Research Council of Italy) Salvatore Iannace (Institute for Macromolecular Studies)</p> <p><i>The foamability of miscible blends based on PEEK and PEI has been investigated with the aim to find the proper conditions to develop low density microcellular foams for high performance lightweight applications.</i></p>
17:10	<p>TUE-4_MUC_3.01-30 THE INFLUENCE OF LOCAL DEFECTS AND NONLINEAR MATRIX BEHAVIOUR ON THE FAILURE PROCESS OF FIBER REINFORCED COMPOSITES</p> <p>Christiane Marotzke (BAM Federal Institute for Materials Research and Testing) Titus Feldmann (BAM Federal Institute for Materials Research and Testing)</p> <p><i>The stress and strain field arising in a unidirectional composite ply is analysed by means of a finite element model, focussing on the difference between elastic and plastic matrix material behaviour.</i></p>	<p>TUE-4_SEV_3.03-19 SCALING EFFECT IN NOTCHED COMPOSITES: THE DISCRETE PLY MODEL APPROACH</p> <p>Joel Serra (Institut Clément Ader) Christophe Bouvet (Institut Clément Ader) Bruno Castanié (Institut Clément Ader) Caroline Petiot (Airbus Group Innovations)</p> <p><i>Numerical and experimental investigations were carried out on the size effect in notched carbon/epoxy laminates. This paper presents a computational study of scaled open-hole tensile tests using the Discrete Ply Modeling (DPM) method.</i></p>	<p>TUE-4_VEN_3.18-06 FINDING THE BEST MATERIAL COMBINATIONS THROUGH MULTI-MATERIAL JOINING, USING GENETIC ALGORITHM</p> <p>Vahid Ghaffarimejlei (Technical University of Braunschweig) Ejko Türk (Technical University of Braunschweig) Thomas Vietor (Institut für Engineering Design)</p> <p><i>A methodology to discover the best combination of material in hybrid-material joining through genetic algorithm is introduced. An approach to apply the influence of manufacturing complexities in final selection of optimum structure is considered.</i></p>	<p>TUE-4_BUD_3.05-14 EFFICIENT MODELLING AND ACCURATE CERTIFICATION OF CURVED AEROSPACE LAMINATES</p> <p>Timothy Fletcher (University of Bath) Anne K. Reinartz (University of Bath) Timothy Dodwell (University of Exeter) Richard Butler (University of Bath) Robert Scheichl (University of Bath) Richard Newley (University of Bath)</p> <p><i>FEA of 4-Point Bend and L-Pull tests confirm that, away from the edges, the L-Pull generates plane strain conditions, indicative of a wide part. Resin treatment suppresses edge effects. FEA solver DUNE has potential for highly parallelized efficiency.</i></p>	<p>TUE-4_STO_3.02-02 A MODEL FOR THE PREDICTION OF TRANSVERSE CRACK AND DELAMINATION DENSITY PREDICTION BASED ON A STRENGTH AND FRACTURE MECHANICS PROBABILISTIC APPROACH</p> <p>Hortense Laeuffer (CNES) Brice Guiot (University of Bordeaux) Jean-Christophe Wahl (I2M - Arts et Métiers ParisTech) Nicolas Perry (Arts et Métiers ParisTech) Florian Lavelle (CNES) Christophe Bois (I2M - Arts et Métiers ParisTech)</p> <p><i>A damage meso-model with strength and energy criteria was introduced. Damage growth is managed by Fracture Mechanics using the energy release rates. Numerical and experimental results are presented.</i></p>	<p>TUE-4_BIA_3.09-02 CFRTP MECHANICAL PROPERTIES SIMULATION BY MORI-TANAKA MODEL AND EQUIVALENT LAMINATE METHODS</p> <p>Yi Wan (University of Tokyo) Jun Takahashi (University of Tokyo)</p> <p><i>CFRTP tensile properties were simulated by mori-tanaka model and equivalent laminate methods, the Mori-Tanaka model have better accuracy in predicting tensile moduli while equivalent laminate method predicted better strength results.</i></p>		<p>TUE-4_BRU_2.14-06 SIMULATION OF THE HEAT TRANSFER THROUGH FIBROUS INSULATION</p> <p>Andrew Webley (University of Strathclyde) Liu Yang (University of Strathclyde) David Nash (University of Strathclyde)</p> <p><i>This paper covers the thermal modelling of a randomly orientated sample of glass fibres.</i></p>

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)
<p>TUE-3_BRI_2.04-04 CELLULOSE NANOPAPER COMPOSITES: INFLUENCE OF NANOPAPER CHARACTERISTICS ON COMPOSITE PROPERTIES</p> <p>Andreas Mautner (Universität Wien) Koon-Yang Lee (Imperial College London) Wan Wan Nawawi (Imperial College London) Alexander Bismarck (University of Vienna)</p> <p><i>Cellulose nanopapers are promising scaffolds for composites. This study aims to develop methodologies to vary the porosity of nanopapers enabling improved resin infusion and investigate the influence of nanopaper properties onto composite properties.</i></p>	<p>TUE-3_NAP_2.06-29 VOID REDUCTION IN OUT-OF-AUTOCURE PROCESSING OF CARBON FIBER EPOXY COMPOSITES BY REINFORCING INTERLAMINAR REGIONS USING VERTICALLY ALIGNED CARBON NANOTUBES</p> <p>Yiyang Zhang (N12 Technologies) Mackenzie Devoe (N12 Technologies) Ben Bancroft (N12 Technologies) Heather Conway (N12 Technologies) Dan Chebot (N12 Technologies) Ryan D. Williams (N12 Technologies) Dina Deresh (N12 Technologies) Jay Maxwell (N12 Technologies) Christopher Gouldstone (N12 Technologies)</p> <p><i>Due to interlaminar VACNT reinforcement, ILSS and OHC strength are improved for up to 33% and 7%, respectively, for cross-ply epoxy laminates, through a combination of direct crack-arresting and reduced porosity.</i></p>	<p>TUE-3_LON_5.06-21 WINGCOVER - EFFICIENT PRODUCTION OF WING SHELLS IN DRY FIBER PLACEMENT TECHNOLOGY</p> <p>Niels Stoffers (Deutsches Zentrum für Luft- und Raumfahrt e.V.) Christian Krombholz (German Aerospace Center)</p> <p><i>The paper highlights the major results achieved by DLR during the joint project WingCover in cooperation with AIRBUS and CTC. The main focus is the manufacturability of wing shells in the DLR GroFi facility using AFP as well as DFP technology.</i></p>	<p>TUE-3_BOR_5.12-04 CURE INDUCED MULTI-AXIAL STRAIN DEVELOPMENT IN CURVED COMPOSITE COMPONENTS: FIBER-OPTIC-BASED MONITORING AND NUMERICAL ANALYSIS</p> <p>Takagaki Kazunori (University of Tokyo) Shu Minakuchi (University of Tokyo) Nobuo Takeda (University of Tokyo)</p> <p><i>Cure induced deformation (i.e. Spring-in) occurs in complex CFRP components. This research embedded optical fiber sensors into the diagonal directions in L-shaped parts and measured the through-thickness normal and shear strain using the sensors.</i></p>		<p>TUE-3_AUG_4.05-04 EXPERIMENTAL DETERMINATION OF OUT OF PLANE ELASTIC SHEAR MODULUS BY THREE POINT BENDING TEST WITH VARYING SPAN: APPLICATION TO COMPOSITE LAMINATES AND PARTICLE WOOD PANELS</p> <p>Andrea Bernasconi (Politecnico di Milano) Roberto Corradi (Politecnico di Milano) Riccardo Galeazzi (Politecnico di Milano)</p> <p><i>Exploit the three point bending test and by optimization algorithms, it is possible to determine the elastic constants of the composite materials. In this work, we present the application of this method to particleboard panel considered as a sandwich</i></p>	<p>TUE-3_ING_7.02-11 MECHANICAL RECYCLING OF CONTINUOUS FIBRE REINFORCED THERMOPLASTIC COMPOSITES USING COMPRESSION MouldING</p> <p>Julien Moothoo (Université Orléans) Pierre Ouagne (ENI Tarbes/ Université Orléans)</p> <p><i>Production scrap of continuous fibre reinforced laminates were cut into aggregates and processed in bulk form using compression moulding. The tensile properties of the recycled panels were characterised to assess this recycling technique.</i></p>	<p>TUE-3_ATH_1.04-04 TOWARDS RAIN EROSION CHARACTERIZATION OF WIND TURBINE BLADE COATINGS: EFFECT OF THE IN-MOULD CURING CONDITIONS ON THE COATING-LAMINATE INTERPHASE</p> <p>Enrique Cortés (Aerox Advanced Polymers) Fernando Sánchez (University CEU Cardenal Herrera) Trevor M. Young, Anthony O'Carroll (University of Limerick) David Busquets (Universidad Politécnica de Valencia) Francisco Chinesita (Ecole Centrale Nantes)</p> <p><i>Erosion damage is a major concern, be caused by rain droplet impact on the leading edges of the wind turbine blades. An investigation has been conducted to relate the in-mould curing of the coating on the interphase coat-laminate and the resulting rain erosion durability of the component.</i></p>
Coffee Break							
2.04 Bio Composites (2/6)	2.03 Interfaces and Interphases (1/3)	5.01 Process Simulation I - Draping and LCM (1/3)	5.12 Online Process Monitoring and Controlling (2/3)	5.03 Experimental Methods for Process Characterisation (1/3)	4.05 Novel Test Methods and Concepts (2/2)	7.02 Recycling of Fibres and Composites (4/5)	1.02 Ground-Based Transportation (1/4)
<p>TUE-4_BRI_2.04-05 EFFECT OF FIBRE VOLUME CONTENT ON THE MECHANICAL PERFORMANCE OF NATURAL FIBRE REINFORCED THERMOPLASTIC COMPOSITES</p> <p>Kunal Masania (ETH Zürich) Wilhelm Woigk (Institute of Polymer Engineering, FHNW) J. Rion (Bcomp AG) Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland)</p> <p><i>Here we aim to study the impregnation of the natural fibres by varying the provided amount of matrix material within the film stacking process. Along with correlating to properties, we show that in some applications higher vf is desired.</i></p>	<p>TUE-4_NAP_2.03-01 A CONTROLLABLE INTERFACE IN ZNO NANOWIRES-HYBRIDIZED CARBON FIBER COMPOSITES: A NUMERICAL AND EXPERIMENTAL STUDY</p> <p>Hongxiao Wang (Xi'an Jiaotong University) Yugang Duan (Xi'an Jiaotong University) Beng Wang (Xi'an Jiaotong University)</p> <p><i>This paper developed a numerical method to analyse the effect of the dimensions of ZWs on IFSS between fiber and EP. The results showed that adhesive properties between ZWs and epoxy increase with the increase of ZWs' diameter and length.</i></p>	<p>TUE-4_LON_5.01-01 BRIDGING SCALES IN FLUID-SOLID-POROUS MODELING APPROACHES OF INFUSION-BASED PROCESSES IN INDUSTRIAL CONTEXT</p> <p>Sylvain Drapier (Mines Saint-Etienne) Maxime Blais (Hexcel Reinforcements) Pierre-Jacques Liotier (Mines Saint-Etienne) Nicolas Moulin (Mines Saint-Etienne) J. Bruchon (Mines Saint-Etienne)</p> <p><i>Modelling infusion-based processes is a challenge that is partly raised through the fluid-solid-porous approach developed at Mines Saint-Etienne. In collaboration with Hexcel, research intend to bridge approaches at macro (existing) and micro scales.</i></p>	<p>TUE-4_BOR_5.12-05 DETERMINATION OF INTERACTIONS BETWEEN BAR SPREADING PROCESS PARAMETERS AND SPREADING QUALITY FOR THE DEVELOPMENT OF AN AUTOMATED QUALITY CONTROL OF SPREAD HIGH MODULUS FIBER TOWS</p> <p>Lars Appel, Adrian Kerber, Bahoz Abbas, Sabina Jeschke, Thomas Gries (RWTH Aachen University)</p> <p><i>The paper presents a bar spreading process study for the determination of the influencing effects on the spreading width and the quality of the spread tow. Furthermore, regression models are generated from the results of the study.</i></p>	<p>TUE-4_STG_5.03-01 CHARACTERIZATION AND MODELLING OF SPRING-IN EFFECT ON Z-SHAPE COMPOSITE PART</p> <p>Camille Sonnenfeld (ONERA-The French aerospace Lab) Romain Agogue (ONERA-The French aerospace Lab) Pierre Beauchêne (ONERA-The French aerospace Lab) Yasir Nawab (Université du Havre) Abdelghani Saouab (Université du Havre) Emmanuel Anray (Aircelle Ltd, SAFRAN Group) Bertrand Desjoeux (Aircelle Ltd, SAFRAN Group)</p> <p><i>This study focuses on the characterization and modeling of spring-in effect on Z-shape composite part manufactured with resin transfer molding process.</i></p>	<p>TUE-4_AUG_4.05-05 IN-SITU DETECTION OF PHASE TRANSITIONS OF SEMI-CRYSTALLINE CARBON FIBRE REINFORCED THERMOPLASTICS USING DIELECTRIC ANALYSIS AND ITS CORRELATION TO DMA AND DSC</p> <p>Alexander Chaloupka, Dominik Grund, André Wedel (Fraunhofer ICT) Natalie Rudolph (University of Wisconsin-Madison) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>A correlation of phase transitions of carbon fiber reinforced polyamide-6 determined by in-situ dielectric analysis, dynamic mechanical analysis and differential scanning calorimetry is done and a good agreement was found.</i></p>	<p>TUE-4_ING_7.02-12 QUANTIFYING VARIABILITY OF RECYCLED FIBRES IN COMPOSITES USING MULTILEVEL MONTE CARLO</p> <p>Timothy Dodwell (University of Exeter) Ken Evans (University of Exeter) Oana Ghita (University of Exeter) Anhadjeet Sandhu (University of Exeter) Luke Savage (University of Exeter)</p> <p><i>The paper presents a novel sequence of computational methodologies to efficiently quantify the variability in mechanical properties of composites remanufactured from recycled/recovered fibres.</i></p>	<p>TUE-4_ATH_1.02-01 ANALYSIS AND OPTIMIZATION OF A POLYURETHANE MATRIX COMPOSITE AUTOMOTIVE DOOR</p> <p>Christos Derdas (Henkel AG & Co KGaA) Georg Kaesmeier (Roding Automobile GmbH) Joern Holte (Roding Automobile GmbH) Georges Romanos (Henkel AG & Co KGaA) Frank Kerstan (Henkel AG & Co KGaA)</p> <p><i>The paper outlines the optimization of a Loctite MAX 3 Composite automotive door under FMVSS214S.</i></p>
<p>TUE-4_BRI_2.04-06 EFFECT OF MOISTURE ABSORPTION ON SELECTED MECHANICAL PROPERTIES OF NATURAL FIBER COMPOSITES BASED ON WOVEN FLAX FIBERS AND POLYPROPYLENE</p> <p>Markus Wolfahrt (Polymer Competence Center Leoben GmbH) Oliver Rausch-Schott (Polymer Competence Center Leoben GmbH) Judith Sinic (Wood Carinthian Competence Center) Stefan Pichler (Wood Carinthian Competence Center) Guenter Wuzella (Wood Carinthian Competence Center)</p> <p><i>In this work, an experimental investigation has been carried out to study the effect of moisture absorption on the tensile, flexural and impact properties of an unbalanced woven flax fiber/maleic anhydride grafted polypropylene composite.</i></p>	<p>TUE-4_NAP_2.03-02 BIOBASED AND BIOINSPIRED: INTERFACE MODIFICATION IN CELLULOSE/POLYOLEFIN COMPOSITES BY PHOTO-INITIALIZED THIN LAYER DEPOSITION</p> <p>Milan Kelch (The Biological Materials Groupe) Thomas Bohners (Deutsches Textilforschungszentrum Nord-West gGmbH) Jörg Müssig (University of Applied Sciences Bremen)</p> <p><i>The deposition of thin hydrophobic layers on the fibre surface is investigated as an alternative approach to improve poor fibre-matrix adhesion between naturally hydrophilic cellulose fibres and hydrophobic polyolefin matrices.</i></p>	<p>TUE-4_LON_5.01-02 CONSTITUTIVE MODELING OF CARBON FIBER FABRIC: FROM MATERIAL PARAMETER IDENTIFICATION TO APPLICATION IN FE FORMING SIMULATION</p> <p>Masato Nishi (JSOL Corporation) Ichiro Taketa (Toray) Akira Iwata (Toray) Tei Hirashima (JSOL Corporation)</p> <p><i>The influence of transverse shear deformation upon bending behavior, especially small wrinkling, was numerically examined in this paper. It has become clear that the small wrinkling is predominantly caused by transverse shear deformation.</i></p>	<p>TUE-4_BOR_5.12-06 DEVELOPING CONTROL SYSTEMS FOR THE RADIAL BRAIDING PROCESS</p> <p>Viktor Reimer (RWTH Aachen University) Mikhail Persiyonov-Dubrov (RWTH Aachen University) Josef Dawson (University of Canterbury) Thomas Gries (RWTH Aachen University)</p> <p><i>This paper describes the first step to develop a Model-Based Self Optimizing (MBSO) system for radial over-braiding process: designing a feedback loop to control the braiding angle.</i></p>	<p>TUE-4_STG_5.03-02 CHARACTERIZATION OF THE MULTI-AXIAL MATERIAL BEHAVIOR OF POLYMER FOAMS DURING RTM PROCESS</p> <p>Jens Gerstenkorn (Karlsruhe Institute of Technology) Martin H. Kothmann (Audi AG) Felix Diebold (Audi AG) Günter Deinzer (Audi AG) Luise Kärger (Karlsruhe Institute of Technology) Frank Henning (Karlsruhe Institute of Technology)</p> <p><i>The presented study deals with the characterization of the multi-axial material behavior of polymer foams under RTM process related conditions.</i></p>	<p>TUE-4_AUG_4.05-06 MODULES FOR AN EFFICIENT AND HOLISTIC APPLICATION OF NDT METHODS FOR FIBER REINFORCED POLYMERS</p> <p>Christian Grosse (Technical University of Munich)</p> <p><i>NDT techniques, their combination and numerical methods are modules that can be chosen to perform a measuring task. In the frame of holistic NDT a clear concept is required to organize the different modules in the best way.</i></p>	<p>TUE-4_ING_7.02-13 RECOVER: REGENERATING THE STRENGTH AND VALUE OF THERMALLY RECYCLED GLASS FIBRES.</p> <p>James Thomason (University of Strathclyde) Liu Yang (University of Strathclyde) Eduardo Saez (University of Strathclyde) Ulf Nagel (University of Strathclyde)</p> <p><i>Thermal recycling of end-of-life glass fibre composites or production waste gives fibres with no strength or value. ReCoVeR treatment of recycled fibres restores their strength and ability to act as effective reinforcement in second-life composites.</i></p>	<p>TUE-4_ATH_1.02-02 BENDING BEHAVIOR OF CFRP-REINFORCED THIN-WALLED METAL BEAMS – A THEORETICAL AND EXPERIMENTAL STUDY</p> <p>Marco Oxenbauer (BMW AG) Klemens Rother (University of Applied Sciences Munich)</p> <p><i>Investigation of the bending behavior of thin-walled CFRP metal hybrid beams and comparison to theoretical predicted properties and failure mechanisms.</i></p>

16:00

16:20

16:50

17:10

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
17:30	<p>TUE-4_MUC_3.01-31 ON THE ROLE OF SHEAR TRANSFER MECHANISMS IN THE LONGITUDINAL TENSILE FAILURE OF CFRP COMPOSITES</p> <p>Gianmaria Bullegas (Imperial College London) Silvestre Pinho (Imperial College London) Soraia Pimenta (Imperial College London)</p> <p><i>A three-Dimensional (3D) Fibre Bundle Model (FBM) has been developed to simulate the longitudinal tensile failure and predict the statistical strength distribution of CFRP bundles of different sizes.</i></p>	<p>TUE-4_SEV_3.03-20 SIZE EFFECT ON THROUGH-THICKNESS STRENGTH PROPERTIES OF 3D LOADED COMPOSITE LAMINATES</p> <p>Marco Hoffmann (Airbus Group Innovations) Kristian Zimmermann (Airbus Group Innovations) Brian Bautz (Airbus Group Innovations) Peter Middendorf (University of Stuttgart)</p> <p><i>The size effect on the through-thickness strength properties of unidirectional and quasi-isotropic carbon/epoxy laminates has been studied by a combined experimental and numerical approach. The results were evaluated by the Weibull statistical model.</i></p>	<p>TUE-4_VEN_3.18-07 A STUDY ON THE FORMING PROCESS AND MECHANICAL PROPERTIES OF CENTER-PILLAR REINFORCEMENT WITH CR420/CFRP HYBRID COMPOSITE MATERIALS</p> <p>Min-sik Lee (Pusan national university) Chung-gil Kang (Pusan national university)</p> <p><i>Center-pillar reinforcement was formed with a carbon fiber-reinforced plastic (CFRP)/CR420 hybrid composite. After forming, the differences in the mechanical properties of the specimens were investigated according to position through simulation.</i></p>	<p>TUE-4_BUD_3.05-15 MULTI-SCALE MATERIAL MODEL FOR 3D COMPOSITE USING MICRO CT IMAGES GEOMETRY RECONSTRUCTION</p> <p>Yang Liu (Ecole des Mines de Douai) Ilya Straumit (KU Leuven) Dmytro Vasiukov (Ecole des Mines de Douai) Stepan Lomov (KU Leuven) Stéphane Panier (Ecole des Mines de Douai)</p> <p><i>3D real model was reconstructed from micro CT images by taking advantage of the software VoxTex. Based upon such model both predicted linear and nonlinear mechanical behaviors showed good agreement with the experiments.</i></p>	<p>TUE-4_STO_3.02-03 AN EXPERIMENTAL METHOD TO DETERMINE THE LONGITUDINAL INTRALAMINAR FRACTURE TOUGHNESS OF HIGH TENSILE STRENGTH FIBRE-REINFORCED UNIDIRECTIONAL COMPOSITES</p> <p>Haibao Liu (Queen's University Belfast) Brian Falzon (Queen's University Belfast) Wei Tan (Queen's University Belfast)</p> <p><i>This paper proposes a simple, yet novel, improvement on the testing of a CT composite specimen for the measurement of high-strength fibre-dominated intralaminar fracture toughness.</i></p>	<p>TUE-4_BIA_3.09-03 ANALYSIS OF DAMAGE AND FAILURE MECHANISMS OF QUILTED STRATUM PROCESS® COMPOSITE PARTS</p> <p>Yann Todeschini (ONERA-The French aerospace Lab) Cédric Huchette (ONERA-The French aerospace Lab) Cédric Julien (ONERA-The French aerospace Lab) Denis Espinassou (CETIM)</p> <p><i>The research work proposed here aims at studying, from the experimental and numerical standpoints, the damage and failure mechanisms of heterogeneous laminates containing discontinuous plies.</i></p>		<p>TUE-4_BRU_2.14-07 NOVEL LATTICE STRUCTURES BASED ON CONTINUOUS FIBERS: FABRICATION AND MECHANICAL PROPERTIES</p> <p>Rehan Umer (Khalifa University) Hassan Jishi (Khalifa University) Wesley Cantwell (Khalifa University)</p> <p><i>Continuous fiber lattice structures were manufactured using a lost-mold technique. Lattice structures of BCC, BCCz, FCC, F2BCC, Pyramid and Octet designs were produced. The specific compression strengths were found superior to traditional cores.</i></p>
17:50		<p>TUE-4_SEV_3.03-21 STRESS INTENSITY FACTORS AND ENERGY RELEASE RATE FOR SYMMETRICALLY LAMINATED PLATES BASED ON THE CLASSICAL PLATE THEORY</p> <p>Kuang-Chong Wu (National Taiwan University) Horn-Jiunn Sheen (National Taiwan University)</p> <p><i>The stress and displacement fields near the tip of a through crack in an anisotropic elastic plate are examined according to the classical plate theory. Bending stress intensity factors are defined and the associated energy release rate derived.</i></p>	<p>TUE-4_VEN_3.18-08 HYBRID CORK-POLYMER COMPOSITES FOR IMPROVED STRUCTURAL DAMPING PERFORMANCE</p> <p>Matthew Blacklock (RMIT University) Nigel St.John (Maritime Disvision, DST-Group Melbourne) Russel Varley (CSIRO Manufacturing Victoria) Chung Wang (RMIT University Melbourne)</p> <p><i>The present work aims to investigate the effectiveness of cork material in improving the product of the stiffness and damping ratio of carbon-epoxy composite materials for structural applications.</i></p>	<p>TUE-4_BUD_3.05-16 MULTISCALE MODELLING AND SIMULATION OF FAILURE IN METAL-COMPOSITE INTERFACES</p> <p>Franz Hirsch (Technical University of Dresden) M. Kästner (Technical University of Dresden)</p> <p><i>In this contribution the inelastic behavior of bi-material interfaces is considered within a numerical homogenization approach. Studies show the influence of the elastic properties and the surface roughness on the overall interface characteristics.</i></p>	<p>TUE-4_STO_3.02-19 NUMERICAL AND EXPERIMENTAL STUDY ON THE FAILURE OF NON-CONVENTIONAL LAMINATES</p> <p>María Luisa Velasco López (University of Seville) Federico Paris (University of Seville) Juan Carlos Marín (University of Seville) Alberto Barroso (University of Seville)</p>	<p>TUE-4_BIA_3.09-04 EVALUATION AND VERIFICATION OF TEMPERATURE DEPENDENT OUT-OF-PLANE SHEAR MODULUS OF DISCONTINUOUS CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITE BY MODIFIED DOUBLE NOTCHED COMPRESSION METHOD.</p> <p>Wataru Nagatsuka (University of Tokyo) Tsiuyoshi Matsuo (University of Tokyo) Takashi Murakami (Shimadzu Corporation) Mitsuharu Kan (HONDA R&D) Jun Takahashi (University of Tokyo)</p> <p><i>This paper suggested the model for predicting the out-of-plane shear modulus of discontinuous carbon fiber reinforced thermoplastics have considered the viscoelastic properties of matrix resin. And it was verified by the improved test method.</i></p>		<p>TUE-4_BRU_2.14-08 ROBUST AND HIGHLY INTERCONNECTED POLYURETHANE DIACRYLATE BASED MACROPOROUS POLYMERS</p> <p>Qixiang Jiang (University of Vienna) Angelika Menner (University of Vienna) Alexander Bismarck (University of Vienna)</p> <p><i>Open porous polymers were obtained via polymerising emulsion templated based on polyurethane diacrylate and styrene; the resulting polymer foams (polyHIPEs) were tougher than the polyHIPE based on styrene and divinylbenzene.</i></p>
18:10		<p>TUE-4_SEV_3.03-22 TOWARDS THE MESH INSENSITIVE MODELING OF COMPOSITE DAMAGE IN AN EXPLICIT CRASH SIMULATION</p> <p>Sebastian Müller (ESI Group) Patrick De Luca (ESI Group) Alain Tramecon (ESI Group)</p> <p><i>The contribution presents a hybrid continuum / cohesive ply damage model in order to eliminate the mesh dependence of classical continuum damage formulations.</i></p>	<p>TUE-4_VEN_3.18-09 THE INTERFACE OF CFRP FACE SHEETS AND ALUMINIUM FOAM CORES IN HYBRID SANDWICH PANELS MANUFACTURED BY A PUR SPRAYING PROCESS</p> <p>Peter Rupp (Karlsruhe Institute of Technology) Florian Wafzig (Fraunhofer ICT) Kay Weidenmann (Karlsruhe Institute of Technology)</p> <p><i>Hybrid sandwich panels with CFRP face sheets and aluminum foam core structures were manufactured by means of a PUR spraying process. The interface of face sheets and core was investigated optically and with the climbing drum peel test.</i></p>	<p>TUE-4_BUD_3.05-17 MULTISCALE SIMULATION OF DAMAGE AND HEALING OF COMPOSITE STRUCTURES</p> <p>Lucas Brely (Universita di Torino) Federico Bosia (University of Torino) Nicola Pugno (University of Trento)</p> <p><i>We developed a numerical model to simulate the mechanisms involved in damage progression and energy dissipation in complex structures, considering heterogeneities, hierarchical structure and structural modifications of the material.</i></p>		<p>TUE-4_BIA_3.09-05 PREDICTION OF STIFFNESS FOR TOW-BASED DISCONTINUOUS COMPOSITES</p> <p>Yizhuo Li (Imperial College London) Soraia Pimenta (Imperial College London) Manon Thierry (Imperial College London) Wei Yu Tan (Imperial College London)</p> <p><i>An FE model with an inhomogeneous local stiffness field (generated from a statistical model) of TBDs was developed. It generates a heterogeneous strain field of a specimen under uniform stress, which agrees well with experimental data.</i></p>		
18:30	General Assembly (MUC)							
20:00	PhD Student Event							

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
<p>TUE-4_BRI_2.04-07 EFFECTS OF THE NATURAL FIBER STITCHING ON THE IMPACT AND COMPRESSION AFTER IMPACT RESPONSE OF THE FLAX/EPOXY COMPOSITES</p> <p>Mohammad Ravandi (National University of Singapore) Wern Sze Teo, Le Quan Ngoc Tran, Ming Shyan Yong (Singapore Institute of Manufacturing Technology) Tong-Earn Tay (National University of Singapore)</p> <p><i>This study experimentally investigates the effects of natural fiber stitching on low-velocity impact response and compression after impact (CAI) stiffness of the continuous flax/epoxy composite laminates.</i></p>	<p>TUE-4_NAP_2.03-03 EFFECT OF SURFACE MODIFICATION OF REGENERATED CELLULOSE FIBERS ON MOISTURE ABSORPTION AND FIBER/MATRIX ADHESION</p> <p>Roberts Joffe (Lulea University of Technology) Abdelghani Hajlane (Lulea University of Technology) Hamid Kaddami (Laboratory of Organometallic and Macromolecular Chemistry-Composite Materials)</p> <p><i>The paper demonstrates reduction of moisture absorption and improvement of the adhesion with epoxy of the hierarchical reinforcement obtained by grafting nano-crystals on micro-sized regenerated cellulose fibers.</i></p>	<p>TUE-4_LON_5.01-03 FORMING SIMULATION OF COMPOSITES WITH THERMO-VISCOUS PROPERTIES</p> <p>Martin Schulz (Dassault Systemes Deutschland GmbH) Jens Luecke (Dassault Systemes Deutschland GmbH)</p> <p><i>For the simulation of an thermofforming process of fiber reinforced thermoplastics a user defined material constitutive law as well as a user defined „sticky“ contact with anisotropic friction was developed for Abaqus. The status quo will be presented.</i></p>	<p>TUE-4_BOR_5.12-07 FROM LAB TO FACTORY: A KNOWLEDGE BASED APPROACH TO UNDERSTANDING AND LOWERING THE BARRIERS TO NEW TECHNOLOGY UPTAKE IN INDUSTRY, AS APPLIED TO IN-PROCESS MONITORING OF COMPOSITE MATERIALS.</p> <p>Tobias A. Weber (Airbus Helicopters) Jane J. Tellis (Airbus Helicopters) Miro Duhovic (Institute for Composite Materials)</p> <p>Laura Rhian Pickard (University of Bristol) Ivana Partridge (University of Bristol) Paul Shakespeare (University of Bristol)</p> <p><i>A comparison of knowledge transfer in academia and industry, to facilitate industrial uptake of in-process monitoring technologies.</i></p>	<p>TUE-4_STG_5.03-03 CHARACTERIZATION OF TOOL-PART-INTERACTION AND INTERLAMINAR FRICTION FOR MANUFACTURING PROCESS SIMULATION</p> <p>Tobias A. Weber (Airbus Helicopters) Jane J. Tellis (Airbus Helicopters) Miro Duhovic (Institute for Composite Materials)</p> <p><i>The paper explains and compares two testing methods for tool-part-interaction and interlaminar friction. The results are discussed, the factors influencing the two types of friction are identified and their interactions determined.</i></p>	<p>TUE-4_AUG_4.05-07 MONITORING FATIGUE DAMAGE IN CFRP USING ULTRASONIC BIREFRINGENCE</p> <p>Peter Fey (University of Stuttgart) Marc Kreutzbruck (University of Stuttgart)</p> <p><i>The progress of fatigue damage in CFRP under cyclic tensile load was monitored non-destructively using ultrasonic birefringence. Using a physics based model, the damage state of each fibre direction in a quasi-isotropic layup could be quantified.</i></p>	<p>TUE-4_ING_7.02-14 RECYCLING OF CARBON FIBERS FROM CARBON FIBER REINFORCED THERMOSET POLYMERS BY USE OF SUB- AND SUPERCRITICAL FLUIDS</p> <p>Anna Schneller (University of Augsburg) Lucile Henry (Institut de Chimie de la Matière Condensée de Bordeaux CNRS) Janosch Doerfler, W.M. Mueller (University of Augsburg) Cyril Aymonier (Institut de Chimie de la Matière Condensée de Bordeaux CNRS) Siegfried Horn (University of Augsburg)</p> <p><i>A fiber-matrix separation step is investigated since it has major impact on the properties and the processability of the recycled CF. The process is based on the solvolysis of a thermoset resin by two different sub- and supercritical fluids.</i></p>	<p>TUE-4_ATH_1.02-03 DIMENSIONING AND SIMULATION OF A CFRP – TRAILING LINK FOR THE REAR AXLE OF COMMERCIAL VEHICLES</p> <p>Florian Herrla (Universität der Bundeswehr München) Norbert Elbs (MAN Truck & Bus AG)</p> <p><i>This investigation shows the entire development of a trailing link concept in composite/aluminium differential construction for the rear axle of a MAN TGX long-haul transport vehicle with respect to cost-effective production.</i></p>	17:30
<p>TUE-4_BRI_2.04-08 EXPERIMENTAL CHARACTERISATION OF THE IMPACT RESISTANCE OF FLAX FIBRE REINFORCED COMPOSITE LAMINATES</p> <p>Karthik Ram Ramakrishnan (Ecole des Mines d'Alès) Stéphane Corn (Ecole des Mines d'Alès) Nicolas Le Moigne (Ecole des Mines d'Alès) Pierre Slangen (Ecole des Mines d'Alès) Anne Bergeret (Ecole des Mines d'Alès)</p> <p><i>The impact resistance of biocomposites made of commingled flax and polypropylene fibres is investigated. The different modes of damage and the critical energy for penetration were identified. An FE model was also developed to simulate the response.</i></p>	<p>TUE-4_NAP_2.03-04 INFLUENCE OF EPOXY- AND POLYAMIDE-COMPATIBLE CARBON FIBER SIZINGS ON INTERFACIAL FRACTURE TOUGHNESS AND IN-PLANE SHEAR PROPERTIES OF CARBON FIBER REINFORCED POLYAMIDE-6</p> <p>Michael Greisel (University of Augsburg) Alexander Kurek (SGL Carbon GmbH) Alexander Chaloupka (Fraunhofer ICT) Judith Moosburger-Will, W.M. Mueller, Markus Sause, Siegfried Horn (University of Augsburg)</p> <p><i>The present work demonstrates the effect of epoxy- and polyamide-compatible sizings in carbon fiber reinforced polyamide-6 composites on the micro-mechanical fracture toughness and the macro-mechanical in-plane shear properties.</i></p>	<p>TUE-4_LON_5.01-04 INVERSE CHARACTERIZATION METHOD FOR DRAPING SIMULATION BASED ON AUTOMATIC MEASUREMENT OF FIBER ORIENTATION</p> <p>Arnaud Dereims (ESI Group) Pierre Marquette (ESI Group) Pierre Guyon (ESI Group) Julien Colmars (University of Lyon) Anh Tuan Ta (INSA de Lyon) Philippe Boisse (INSA de Lyon)</p> <p><i>This paper presents an innovative methods allowing for inverse characterization of shearing stiffness which is a key input for draping or forming simulation of fabrics. This work was carried out within FibreMap project (FP7 European project).</i></p>	<p>TUE-4_BOR_5.12-08 IN-LINE MONITORING DURING PRODUCTION OF COMPOSITES BASE MATERIAL AND PREPREGS: HIGHER QUALITY DECREASES COSTS AND INCREASES CUSTOMER SATISFACTION</p> <p>Hans Oerley (Dr. Schenk GmbH Industriemesstechnik)</p> <p><i>Automatic optical inspection (AOI) systems are applied as in-line production process control. Covering the full width of the material they detect irregularities in composite materials and monitor material properties (i.e. fibre web formation, ...).</i></p>	<p>TUE-4_STG_5.03-04 THE INFLUENCE OF MOISTURE ON THE DE-CONSOLIDATION BEHAVIOUR OF CARBON FIBER REINFORCED PA-6 LAMINATES</p> <p>Thomas Guglhoer (University of Augsburg) Pierrette Krasovec (University of Augsburg) Markus Sause (University of Augsburg)</p> <p><i>De-consolidation behavior of dried and wet carbon fiber reinforced Polyamide 6 laminates was investigated via compression tests at elevated temperature. X-ray computed tomography and microscopy reveals an increase in porosity during heat treatment.</i></p>	<p>TUE-4_AUG_4.05-08 MOBILE NON-DESTRUCTIVE TESTING METHODS FOR SURFACE CHARACTERIZATION OF CFRP IN AEROSPACE</p> <p>Sebastian Heckner (Airbus Group Innovations) Christian Grosse (Technical University of Munich) Sebastian Eibl (Bundeswehr research institute for materials, fuels and lubricants (WIWeB)) Andreas Helwig (Airbus Group Innovations) Matthias Geistbeck (Airbus Group Innovations)</p> <p><i>This paper presents Non-Destructive Testing (NDT) techniques for detecting thermal degradation of the polymer matrix and silicone based release agent residues on Carbon Fiber Reinforced Plastic (CFRP) surfaces.</i></p>	<p>TUE-4_ING_7.02-15 RECYCLING OF PHENOLIC MOLDING COMPOUNDS AS FILLER IN PARTICULATE COMPOSITES</p> <p>Fabien Bernardeau (Ecole des Mines d'Alès) Didier Perrin (Ecole des Mines d'Alès) Anne-Sophie Caro (Ecole des Mines d'Alès) Jean-Charles Benezet (Ecole des Mines d'Alès) Patrick Ienny (Ecole des Mines d'Alès)</p> <p><i>A recycling method for thermoset material is proposed in this work, consisting in using it as a filler in a plastic. The effect of particle size distribution and coupling agent on mechanical properties are studied, as well as damaging mechanism.</i></p>	<p>TUE-4_ATH_1.02-04 EXPERIMENTAL INVESTIGATION OF AUTOMOTIVE COMPONENTS CONSISTING OF HYBRID FRP-METAL MATERIAL SYSTEMS UNDER DYNAMIC LOADING</p> <p>Michael Dlugosch (Fraunhofer EMI) Dirk Lukaszewicz (BMW Group) Jens Fritsch (Fraunhofer EMI) Stefan Hiermaier (Fraunhofer EMI)</p> <p><i>Generic components comprised of hybrid material systems consisting of steel and advanced composites are dynamically tested under axial impact and bending.</i></p>	17:50
<p>TUE-4_BRI_2.04-09 IMPREGNATED FIBRE BUNDLE TEST FOR NATURAL FIBRE COMPOSITES: FIBRES PROPERTIES</p> <p>Farida Bensadoun, Joris Baets (KU Leuven) Nina Graupner, Jörg Müssig (University of Applied Sciences Bremen) Peter Davies (IFREMER - Centre de Brest Marine Structures Group) Moussa Gomiña (Université de Caen Basse-Normandie) Antoine Kervoelen (Université de Bretagne Sud - Limatb) Christophe Baley (LIMATB-UBS)</p> <p><i>In this study, the Impregnated Fibre Bundle Test (IFBT), a common method used for the determination of carbon and glass fibre properties in composites, was adapted for flax and hemp fibres.</i></p>		<p>TUE-4_LON_5.01-05 INVESTIGATION AND SIMULATION OF PREFORMS BEHAVIOUR OF PREFORMS MADE BY DIRECT FIBRE PLACEMENT</p> <p>Manuel Tartler (Compositence GmbH) Dominik Hägele (Compositence GmbH) Julian Fial (University of Stuttgart) Mathias Engelfried (University of Stuttgart) Ingo Karb (Compositence GmbH) Peter Middelendorf (University of Stuttgart)</p> <p><i>FE-Simulations are needed to predict the forming capability and behaviour of preforms made by direct fibre placement. Material properties are measured by different test methods and the simulation results are compared to experimental forming tests.</i></p>	<p>TUE-4_STG_5.03-05 DUAL FLOW FRONT MEASUREMENTS FOR IMPROVED PERMEABILITY CHARACTERISATION</p> <p>Mikhail Matveev (University of Nottingham) Arthur Jones (University of Nottingham) Andrew Long (University of Nottingham) Andreas Endrueit (University of Nottingham)</p> <p><i>A comparison of two experimental techniques for flow front tracking for measuring the unsaturated permeability of fibre reinforcements is presented: one based on pressure transducers and the other using video recording of the evolving flow front.</i></p>	<p>TUE-4_AUG_4.05-09 PREDICTION OF TENSILE STRENGTH OF UNIDIRECTIONAL CARBON FIBER/EPOXY COMPOSITES USING THE FRAGMENTATION TEST</p> <p>Jun Watanabe (Toray) Fumihiko Tanaka (Toray) Ryo Higuchi (Graduate School of Tohoku University) Hiroaki Matsutani (Toray) Haruki Okuda (Toray) Tomonaga Okabe (Tohoku University)</p> <p><i>We investigated the fiber breakage behavior of unidirectional carbon fiber-reinforced epoxy matrix composites, estimated by taking into account the stress concentration in the adjacent fibers that results from matrix cracking around fiber breakages.</i></p>			18:10	
General Assembly (MUC)								18:30
PhD Student Event								20:00

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)	
9:00	Plenary Lecture 3 (MUC) by Gerd Wingefeld, SGL CARBON SE, Germany: COMPOSITE MATERIAL SOLUTIONS: PROGRESS OF THE PAST, SOLUTIONS OF TODAY, CONCEPTS FOR TOMORROW								
	3.02 Fracture and Damage - Lamina Level (2/5)	3.22 Ductile and Pseudo-ductile Composites (1/4)	3.18 Hybrid Materials and Structures (3/4)	3.10 Fatigue of Composites (1/6)	3.20 Joining and Joints (1/6)	3.08 Short Fibre Reinforced Thermoplastics (1/4)	3.05 Multiscale Modeling (5/5)	2.12 Lightning Strike, Fire Behavior and Fire Retardance/Resistance of Composites (1/3)	
9:50	<p>WED-1_MUC_3.02-04 ANALYSIS OF THE MATRIX TRANSVERSE DAMAGE IN A UD PLY OF AN UNBALANCED HYBRID PEEK-CARBON/GLASS COMPOSITE UNDER COMBINED STATIC LOAD</p> <p>Nassira Boulebbad-Gomez (Airbus Helicopters) Jean-Paul Charles (Airbus Helicopters) Noël Lahellec (LMA-CNRS) Christian Hochard (LMA-CNRS)</p> <p><i>A new material for a better identification of the model parameters for matrix transverse damage. Off-axis quasi-static tensile tests with loading/unloading cycles done using flat dumbbell-shaped specimens. Damage evolution of specimen is non linear.</i></p>	<p>WED-1_SEV_3.22-01 A PSEUDO DUCTILE ANGLE-PLY SUB-LAMINATE APPROACH FOR MULTIDIRECTIONAL THIN PLY CFRP LAMINATES</p> <p>Jonathan Fuller (University of Bristol) Meisam Jalalvand (University of Bristol) Michael Wisnom (University of Bristol)</p> <p><i>Analytical modelling of thin ply angle-ply CFRP laminates has shown that it is possible to achieve a pseudo ductile response with a [+theta/O]s layup. These layups are suggested as candidates for pseudo-ductile sub-laminates in multidirectional laminates.</i></p>	<p>WED-1_VEN_3.18-10 INFLUENCE OF INJECTION MouldING PROCESS PARAMETERS ON THE JOINT STRENGTH OF HYBRID FIBRE-REINFORCED THERMOPLASTIC WITH LASER-STRUCTURED METALS.</p> <p>Johann Maaß (Technical University of Dresden) Thomas Rief (Institute for Composite Materials) Maik Gude (Technical University of Dresden) Michael Krahl (Technical University of Dresden) Michel Wolf (Technical University of Dresden) Alexander Krämer (Technical University of Dresden) P. Amend (Bayerisches Laserzentrum GmbH) S. Roth (Bayerisches Laserzentrum GmbH)</p> <p><i>Metal surfaces structured by laser radiation in combination with thermoplastic injection moulding processes were investigated concerning sensitive process parameters leading to good joint strength for creating intrinsic hybrids.</i></p>	<p>WED-1_BUD_3.10-01 A COMPARATIVE STUDY OF THE STATIC AND CYCLIC ACOUSTIC EMISSION BEHAVIOR OF FIBER REINFORCED THERMOPLASTICS</p> <p>Constantin Bauer (Institute for Composite Materials) Thomas Rief (Institute for Composite Materials) Joachim Hausmann (Institute for Composite Materials) Thomas Schalk (ZF Friedrichshafen AG)</p> <p><i>The present work deals with the acoustic emission behavior of short fiber-reinforced thermoplastics. The aim of this work is to transfer the information acquired with acoustic emission in static tensile tests to the fatigue behavior of the material.</i></p>	<p>WED-1_STO_3.20-01 FATIGUE BEHAVIOUR AND DAMAGE TOLERANT DESIGN OF COMPOSITE BONDED JOINTS FOR AEROSPACE APPLICATION</p> <p>Thomas Kruse (Airbus Operations) Thomas Körwien (Airbus Defence and Space) Roman Ruzek (VZLU)</p> <p><i>Summary of the work performed on fatigue testing and crack arresting of high load transfer bonded CFRP joints by means of disbond stopping features. Target is the development of a new design of bonded joints compliant with today's certification rules.</i></p>	<p>WED-1_BIA_3.08-01 ANALYSIS OF CRACK PROPAGATION DURING FATIGUE TESTS IN INJECTION MouldED NOTCHED SPECIMENS MADE OF SHORT GLASS FIBRE REINFORCED POLYAMIDE</p> <p>Andrea Bernasconi (Politecnico di Milano) Edoardo Conrado (Politecnico di Milano) Peter Hine (University of Leeds)</p> <p><i>The influence of notch severity, fiber content and orientation on fatigue crack nucleation and propagation phases in injection moulded, v-notched specimens made of SGFRP has been analysed on the base of experimental observations.</i></p>	<p>WED-1_RHO_3.05-18 NEW PHENOMENOLOGICAL FAILURE MODEL FOR COMPOSITE MATERIALS FROM A HOMOGENIZED MICROMECHANICS APPROACH</p> <p>Shari King (University of Waterloo) Trevor Sabiston (University of Waterloo) Mohsen Mohammadi (University of New Brunswick) Kaan Inal (University of Waterloo)</p> <p><i>This work aims to accurately predict the response and failure of a unidirectional long-fibre composite materials using a physically based constitutive law.</i></p>	<p>WED-1_BRU_2.12-01 A MODEL FOR THE CHARACTERISATION AND DESIGN OF PASSIVE FIRE PROTECTION (PFP) SYSTEMS FOR STEEL STRUCTURES</p> <p>Geoff Gibson (Newcastle University) Wan Wan Jusoh (Newcastle University) George Kotsikos (Newcastle University) Pietro Di Modica (Newcastle University) Sandra Christke (Newcastle University)</p> <p><i>This paper will describe the use of a small-scale constant heat flux propane burner test to characterise PFP systems. Three such systems will be described, each working on a different principle with dissimilar boundary conditions.</i></p>	
10:20	<p>WED-1_MUC_3.02-05 ANALYSIS OF TRANSVERSE COMPRESSION AND IN-PLANE SHEAR IN UNIDIRECTIONAL COMPOSITES BY A PROGRESSIVE DAMAGE MODEL IN PRESENCE OF FIBER ROTATION</p> <p>Sina Eskandari (University of Porto) Francisco Andrade Pires (University of Porto) Pedro Camanho (University of Porto) Antonio T. Marques (University of Porto)</p> <p><i>An extended model is proposed to incorporate finite fiber rotation in fiber reinforced plastic laminates during the continuous damage evolution using continuum mechanics. The model prediction will be assessed with a set of experimental data.</i></p>	<p>WED-1_SEV_3.22-02 ACOUSTIC EMISSION BASED METHOD TO CHARACTERISE THE DAMAGE MODES IN UD THIN CARBON/GLASS HYBRID LAMINATES</p> <p>Mohamad Fotouhi (Amirkabir University of Technology) Putu Suwarta (University of Bristol) Meisam Jalalvand (University of Bristol) Gergely Czel (University of Bristol) Michael Wisnom (University of Bristol)</p> <p><i>This paper investigates the relationship between the features of acoustic emission signals and the corresponding damage modes in S-Glass/carbon UD hybrid laminates. The generated results are useful to characterise damage modes in hybrid laminates.</i></p>	<p>WED-1_VEN_3.18-11 MANUFACTURING OF HIGH PERFORMANCE CARBON FIBRE-REINFORCED METAL SANDWICH MATERIALS AND THEIR FORMING BEHAVIOUR</p> <p>Tino Wollmann (Technical University of Dresden) Christina Krbetschek (Technical University Bergakademie Freiberg) Benedikt Poggel (KIRCHHOFF Automotive Deutschland GmbH) Oliver Vogt (MgF Magnesium Flachprodukte GmbH) Christian Paul (ThyssenKrupp AG TechCenter Carbon Composites) J. Jaschinski (Technical University of Dresden) R. Kawalla (Technical University Bergakademie Freiberg) Niels Modler (Technical University of Dresden)</p> <p><i>The manufacturing of carbon fibre-reinforced metal sandwich materials consisting of cover sheets made of steel or magnesium and a core of carbon fibre-reinforced plastic as well as their forming behaviour is described in this paper.</i></p>	<p>WED-1_BUD_3.10-02 CREEP-FATIGUE INTERACTION IN COMPOSITE MATERIALS</p> <p>Abdolvahid Movahedi-Rad (Ecole Polytechnique Fédérale de Lausanne) Thomas Keller (Ecole Polytechnique Fédérale de Lausanne) Anastasios Vassilopoulos (EPFL)</p> <p><i>A novel phenomenological model taking into account the creep-fatigue interaction in composite materials' fatigue performance is introduced in this paper.</i></p>	<p>WED-1_STO_3.20-02 MECHANISMS TO ARREST A CRACK IN THE ADHESIVE BONDLINE OF FATIGUE LOADED CFRP-JOINTS USING A RIVETLESS NUTPLATE JOINT</p> <p>Ronny Sachse (University of Stuttgart) Anthony K. Pickett (Institut of Aircraft Design) Michael Gnädinger (Institut of Aircraft Design) Peter Middendorf (University of Stuttgart)</p> <p><i>Adhesively bonded composite joint configurations with different mechanical fasteners were investigated both experimentally and numerically to identify and quantify mechanisms that arrest crack growth in the adhesive bondline when loaded in fatigue.</i></p>	<p>WED-1_STO_3.20-02 MECHANISMS TO ARREST A CRACK IN THE ADHESIVE BONDLINE OF FATIGUE LOADED CFRP-JOINTS USING A RIVETLESS NUTPLATE JOINT</p> <p>Ronny Sachse (University of Stuttgart) Anthony K. Pickett (Institut of Aircraft Design) Michael Gnädinger (Institut of Aircraft Design) Peter Middendorf (University of Stuttgart)</p> <p><i>Adhesively bonded composite joint configurations with different mechanical fasteners were investigated both experimentally and numerically to identify and quantify mechanisms that arrest crack growth in the adhesive bondline when loaded in fatigue.</i></p>	<p>WED-1_BIA_3.08-02 ASSESSING A COMPLETE CAD SOLUTION FOR THE DESIGN AND USE OF SHORT FIBRE COMPOSITES BY MEANS OF A COMBINATION OF MOLDFLOW AND ABAQUS</p> <p>Peter Hine (University of Leeds) Bushra Parveen (University of Leeds) Fin Caton-Rose (University of Bradford)</p> <p><i>This paper assesses the current state of the art in the design and use of short fibre composites, by comparing the deflection of a real part with that predicted by the combination of a mould filling simulation and a finite element method.</i></p>	<p>WED-1_RHO_3.05-19 SIMULATION ON THERMO-PHYSICAL PROPERTIES OF FINE WEAVE PIERCED C/C COMPOSITE</p> <p>Heng Liang (Nanjing University of Aeronautics and Astronautics) Mingbo Tong (Nanjing University of Aeronautics and Astronautics) Yuqing Wang (Nanjing University of Aeronautics and Astronautics)</p> <p><i>Based on the meso and micro structures of fine woven pierced c/c composite, finite element models of single yarn and c/c composite are established respectively. By using the periodic boundary condition, the thermo-physical properties of composite are calculated.</i></p>	<p>WED-1_BRU_2.12-02 CHARACTERIZATION AND MODELLING OF THERMO-MECHANICAL BEHAVIOR OF AERONAUTICAL CFRP MATERIALS EXPOSED TO FIRE</p> <p>Denis Bertheau (Institute Pprime) Eric Lainé (Institute Pprime) Damien Marchand (Institute Pprime) Pasquale Antonio Pirozzi (Institute Pprime) Daniel Jarne Ornia (Universitat Politècnica de Catalunya) Rocio De Vincente (Institute Pprime)</p> <p><i>This study presents small scale tests on carbon epoxy laminates exposed to a flame, simulating post-crash or in flight fire. A thermal model has been developed to evaluate temperature profile and pyrolysis zone in the bulk of the composite material.</i></p>

Plenary Lecture 3 (MUC) by Gerd Wingefeld, SGL CARBON SE, Germany: COMPOSITE MATERIAL SOLUTIONS: PROGRESS OF THE PAST, SOLUTIONS OF TODAY, CONCEPTS FOR TOMORROW

9:00

2.04 Bio Composites (3/6)	2.03 Interfaces and Interphases (2/3)	5.01 Process Simulation I - Draping & LCM (2/3)	5.12 Online Process Monitoring and Controlling (3/3)	5.03 Experimental Methods for Process Characterisation (2/3)	4.03 Structural Health Monitoring and Control (1/3)	7.02 Recycling of Fibres and Composites (5/5)	1.02 Ground-Based Transportation (2/4)
<p>WED-1_BRI_2.04-10 INFLUENCE OF FIBRE LOADING, FIBRE LENGTH, FIBRE ORIENTATION AND VOIDS ON THE CHARACTERISTICS OF COMPRESSION AND INJECTION MOULDED CELLULOSE FIBRE-REINFORCED POLYLACTIDE (PLA) COMPOSITES</p> <p>Nina Graupner (University of Applied Sciences Bremen) Jörg Müssig (University of Applied Sciences Bremen)</p> <p><i>Focus of this study is the investigation of the influences of fibre loading, fibre orientation, fibre length and voids on the mechanical characteristics of compression and injection moulded laccell fibre-reinforced polylactide (PLA) composites.</i></p>	<p>WED-1_NAP_2.03-05 INTERFACE ENHANCEMENT ON CFRP COMPOSITES BY EPOXIDATION OF CARBON FIBRES AT ROOM TEMPERATURE</p> <p>Nikos Koutroumanis (Institute of Chemical Engineering Sciences/Foundation of Research and Technology Hellas) Anastasios Manikas (FORTH/ICEHT) Panagiotis Nektarios Pappas (Institute of Chemical Engineering Sciences/Foundation of Research and Technology Hellas) Faidonas Petropoulos (Institute of Chemical Engineering Sciences/Foundation of Research and Technology Hellas) Lamprini Sygellou (Institute of Chemical Engineering Sciences/Foundation of Research and Technology Hellas) Costas Galotis (Institute of Chemical Engineering Sciences/Foundation of Research and Technology Hellas)</p> <p><i>A new epoxidation method at RT that exhibit a significant improvement of the interface between the CF and the surrounding epoxy resin has been proposed and verified by using a combination of mechanical and spectroscopic methods.</i></p>	<p>WED-1_LON_5.01-06 MESO-MACRO MODELLING THE IN-PLANE SHEAR DEFORMATION BEHAVIOUR OF NCF CARBON/EPOXY PREPREGS IN AUTOMOTIVE APPLICATIONS</p> <p>A. Khan (Coventry University) Phil Swanson (Coventry University)</p> <p><i>The present work is aimed at simulating the deformation behaviour of NCF prepregs with meso/macro-scale modelling approaches in Abaqus/Explicit using the hypoelastic computational model. The simulation results are compared with experiments.</i></p>	<p>WED-1_BOR_5.12-09 ON THE OBSERVATION OF FLOW FRONT POSITION UNDER VARIABLE INLET PRESSURE</p> <p>Luis Pina (INEGI) Fernando Silva (INEGI) Masoud Bodaghi (INEGI) F. Gomes de Almeida (INEGI)</p> <p><i>This paper describes the influence of variable inlet pressure on the flow front position and velocities in a one dimensional vacuum infusion process. Analytical models are derived for simulation purposes.</i></p>	<p>WED-1_STG_5.03-06 EXPERIMENTAL INVESTIGATION OF TEXTILE PERMEABILITY IN THE PRESENCE OF SPHERICAL INCLUSIONS</p> <p>Baris Caglar (Koc University - Ecole Polytechnique Fédérale de Lausanne) Véronique Michaud (EPFL) E. Murat Sozer (Koc University - Ecole Polytechnique Fédérale de Lausanne)</p> <p><i>For increasing content of hard spherical inclusions, in-plane permeability of a woven fabric is measured to decrease if inclusion diameter is smaller than the interbundle gap, while a non-monotonic relationship is observed for larger inclusions.</i></p>	<p>WED-1_AUG_4.03-01 ACOUSTIC EMISSION DETECTION OF DAMAGE INITIATION IN PLAIN WEAVE CFRP LOADED IN BENDING</p> <p>Marek Nowak (Cracow University of Technology) Maciej Panek (Wroclaw University of Technology) Ireneusz Baran (Cracow University of Technology) Krzysztof Konstowicz (University of Bielsko-Biala)</p> <p><i>Acoustic Emission (AE) was used to detect micro-crack initiation in carbon fiber reinforced composites in 4-point bending. Fiber debonding and breakage occurred simultaneously and were the first defects to initiate in the examined materials.</i></p>	<p>WED-1_ING_7.02-16 REPAIRABLE AND RECYCLABLE HIGH PERFORMANCE EPOXY THERMOSET COMPOSITES</p> <p>Alaitz Ruiz de Luzuriaga (CIDETEC) Alaitz Rekondo (CIDETEC) Roberto Martín (CIDETEC) Nerea Markaide (CIDETEC) Germán Cabanero (CIDETEC) Hans-Jürgen Grande (CIDETEC) Ibon Odriozola (CIDETEC)</p> <p><i>The recycling of FRPCs has been an important topic over the last two decades in order to make them more sustainable. In an approach to solve such limitations, a novel "dynamic" epoxy network based on reversible chemical crosslinks has been developed.</i></p>	<p>WED-1_ATH_1.02-05 INSTANTANEOUS FASTENING OF A CFRP AND STEEL PLATE BY A SELF-PIERCING RIVET</p> <p>Masahito Ueda (Nihon University) Vu Manh Cuong (Nihon University) Akira Todoroki (Tokyo Institute of Technology)</p> <p><i>A CFRP laminate and a steel plate were instantly fastened simultaneously using the self-piercing rivet. Tensile tests of the single-lap joint specimens were performed to investigate the viability of the mechanical fastener.</i></p>
<p>WED-1_BRI_2.04-11 USING PAPER AS REINFORCEMENT MATERIAL IN THERMOPLASTIC COMPOSITES: LAMINATE FABRICATION AND CHARACTERIZATION</p> <p>Martina Prambauer (Transfercenter für Kunststofftechnik GmbH) Christian Paulik (Johannes Kepler University Linz) Christoph Burgstaller (Transfercenter für Kunststofftechnik GmbH)</p> <p><i>Cellulose based paper sheets were used as a sustainable reinforcement material to produce thermoplastic composites. A suitable mechanical property profile was obtained making paper an interesting alternative reinforcement for thermoplastic laminates.</i></p>	<p>WED-1_NAP_2.03-06 INTERPHASE MODIFICATION BY TRANSCRYSTALLINITY PROMOTION INDUCED BY SUPRAMOLECULAR ASSEMBLY IN A HIGH PERFORMANCE THERMOPLASTIC COMPOSITE</p> <p>Anaud Martin (Luxembourg Institute of Science and Technology (LIST)) Frédéric Addiego (Luxembourg Institute of Science and Technology (LIST)) Sarah Reinard (Luxembourg Institute of Science and Technology (LIST)) Grégory Mertz (Luxembourg Institute of Science and Technology (LIST)) Julien Bardou (Luxembourg Institute of Science and Technology (LIST)) David Ruch (Luxembourg Institute of Science and Technology (LIST))</p> <p><i>This work addresses the fibre-matrix compatibilization of a PEEK composite reinforced with pitch-based carbon fibre. An environmentally friendly methodology was developed to modify interphase properties by pi-stacking and electrostatic interactions.</i></p>	<p>WED-1_LON_5.01-07 NUMERICAL METHODS FOR 3D COMPRESSIVE RTM SIMULATIONS</p> <p>Pierre Marquette (ESI Group) Arnaud Dereims (ESI Group) Takayuki Ogawa (ESI Group) Masatoshi Kobayashi (HONDA R&D)</p> <p><i>This paper presents advanced numerical methods for 3D compressive RTM simulations developed by ESI Group in partnership with HONDA R&D.</i></p>	<p>WED-1_BOR_5.12-10 ONLINE DETECTION AND CATEGORISATION OF DEFECTS ALONG CARBON FIBER PRODUCTION USING A HIGH RESOLUTION, HIGH WIDTH LINE SCAN VISION SYSTEM</p> <p>Steffen Geinitz (Fraunhofer ICT) André Wedel (Fraunhofer ICT) Andreas Margraf (Fraunhofer ICT)</p> <p><i>An optical system for the detection of fabrication defects during carbon fibre production and binder application is developed. The system allows a large scan width at high resolution, while maintaining data transfer at a minimum.</i></p>	<p>WED-1_STG_5.03-07 GEOMETRICAL INVESTIGATION FOR THE ELECTRICAL CHARACTERIZATION OF T700/M21 CFRP COMPOSITE DURING CURING</p> <p>Sonia Sassi (Université de Technologie de Compiègne) Philippe Marguerès (Université de Toulouse) M. Mounkaila (Équipe Nano Ingénierie et Intégration des Systèmes) Thierry Camps (Équipe Nano Ingénierie et Intégration des Systèmes) Philippe Olivier (Université de Toulouse)</p> <p><i>In the aim to use the electrical response of unidirectional CFRP during curing, geometrical parameters should be measured and correlated with each other both at local and global scales taking into account anisotropy and rheological transitions.</i></p>	<p>WED-1_AUG_4.03-02 ACOUSTIC EMISSION OF SIC/SIC COMPOSITE DURING TENSILE TEST AND STATIC FATIGUE AT INTERMEDIATE TEMPERATURE AFTER IMPACT DAMAGE.</p> <p>Pascal Reynaud (INSA de Lyon) Nathalie Godin (INSA de Lyon) Martin Picard (INSA de Lyon) Mohamed R'Mili (INSA de Lyon) Gilbert Fantozzi (INSA de Lyon)</p> <p><i>This paper discusses the tensile resistance of an impact-damaged SiC/SiC based ceramic composite. As-received and impact-damaged specimens were subjected to static fatigue tests at 650°C and 450°C, with AE monitoring.</i></p>	<p>WED-1_ING_7.02-17 SIZE EFFECTS IN RECYCLED THERMOPLASTIC CFRP FROM ELECTRODYNAMIC FRAGMENTATION</p> <p>Maxime Roux (University of Applied Sciences and Arts Northwestern Switzerland) Nicolas Eguemann (Cross Composite AG) Lian Giger (Cross Composite AG) Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland)</p> <p><i>An approach is presented to separate thermoplastic CFRPs into fragments using high voltage pulses through a method known as electrodynamic fragmentation. It was observed that smaller fragments considerably reduce the statistical variations.</i></p>	<p>WED-1_ATH_1.02-06 INTRODUCING CELLULOSE NANOCRYSTALS IN SHEET MOLDING COMPOUND (SMC)</p> <p>Amir Asadi (Georgia Institute of Technology) Mark Miller (Georgia Institute of Technology) Sanzida Sultana (Georgia Institute of Technology) Robert Moon (Georgia Institute of Technology) Kyriaki Kalaitzidou (Georgia Institute of Technology)</p> <p><i>Cellulose nanocrystals (CNC) are dispersed in the epoxy matrix prior to use in sheet molding compound (SMC) manufacturing line to enhance the mechanical properties of the SMC composites.</i></p>

9:50

10:20

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
10:40	<p>WED-1_MUC_3.02-06 CHARACTERIZATION AND MULTI-SCALE MODELING OF THE TRANSVERSE COMPRESSION OF THICK RTM-PROCESSED UNI-DIRECTIONAL SAMPLES</p> <p>Jeremy Chevalier (Université Catholique de Louvain) Y.A. Janssens (Université catholique de Louvain) Pedro Camanho (University of Porto) Thomas Pardoen (Université Catholique de Louvain) Frederic Lani (Ucl)</p> <p><i>Thick RTM-processed unidirectional samples were produced and tested in transverse compression. The experimental results were confronted to micro-mechanical analyses on RVE with well identified constituents' properties as input arguments.</i></p>	<p>WED-1_SEV_3.22-03 ANALYSIS OF FAILURE MECHANISMS IN HYBRID CARBON FIBRE/SELF-REINFORCED POLYPROPYLENE COMPOSITES</p> <p>Marina Selezneva (KU Leuven) Yentl Swolfs (KU Leuven) Tomoko Ichikawa (Toray) Ignaas Verpoest (KU Leuven) Larissa Gorbatikh (KU Leuven)</p> <p><i>Pseudo-ductile hybrids that contain stiff but brittle webs of discontinuous carbon fibres, and tough but compliant plies of self-reinforced polypropylene were developed. Their tensile properties and failure mechanisms are described in this paper.</i></p>	<p>WED-1_VEN_3.18-12 NUMERICAL INVESTIGATION OF BIO-INSPIRED TUBULAR COMPOSITE TO STEEL JOINTS</p> <p>Evangelos Ioannis Avgoulas (University of Cambridge) Michael Sutcliffe (University of Cambridge)</p> <p><i>The idea of a transitional zone of stiffness in tubular composite-to-steel joints was numerically investigated. An optimisation procedure was carried out to identify the material stiffness variation which gives the joint with the highest strength.</i></p>	<p>WED-1_BUD_3.10-03 CHANGE OF GLASS FIBER COMPOSITE CHARACTERISTIC DYNAMIC FATIGUE CURVE DUE TO ACCUMULATED STATIC FATIGUE DAMAGE.</p> <p>Reidar Anderssen (University of Agder) Ketil Bingslien (University of Agder)</p> <p><i>The DNV-OS-C501 material model does not address that the fatigue curve may change due to accumulated static fatigue damage. A model for the characteristic fatigue curve as a function of the time dependent stress rupture damage is proposed.</i></p>	<p>WED-1_STO_3.20-03 ARRESTING CRACK IN COMPOSITE BONDED JOINT USING FIBER-REINFORCEMENT-BASED DESIGN FEATURE</p> <p>Shu Minakuchi (University of Tokyo) Nobuo Takeda (University of Tokyo)</p> <p><i>Interlocked continuous fibers introduced in adhesive layer bridged crack and suppressed its propagation. Mode II fracture toughness tripled compared to specimen without arrester. New manufacturing method for robust arresting was also demonstrated.</i></p>	<p>WED-1_BIA_3.08-03 CREEP BEHAVIOUR OF SHORT FIBRE REINFORCED COMPOSITES: EFFECTS OF FIBER ORIENTATION AND FIBER MATRIX ADHESION</p> <p>Bernhard Moeginger (Hochschule Bonn-Rhein-Sieg) B. Hausener (Tomas Bata University in Zlín)</p> <p><i>Creep of short fiber reinforced PP conventionally and push pull processed was measured and modeled using the EVC to predict creep compliance from matrix creep taking into account orientation and length of fibers as well as fiber matrix adhesion.</i></p>	<p>WED-1_RHO_3.05-20 VIRTUAL MATERIAL CHARACTERIZATION PROCESS FOR COMPOSITE MATERIALS: AN INDUSTRIAL SOLUTION</p> <p>Laszlo Farkas (Siemens Industry Software NV) Kristof Vancooster (Siemens Industry Software NV) Hunor Erdelyi (Siemens Industry Software NV) Ruben Sevenoos (Ghent University) Stepan Lomov (KU Leuven) Tadashi Naito (HONDA R&D) Yuta Urushiyama (HONDA R&D) Wim Van Paepegem (Ghent University)</p> <p><i>This contribution demonstrates the different steps of a Virtual Material Characterization (VMC) process applied for the prediction of elastic properties of a real meso-scale composite geometry.</i></p>	<p>WED-1_BRU_2.12-03 COMPRESSIVE BEHAVIOR UNDER FIRE EXPOSURE OF CARBON FIBERS POLYPHENYLENE SULFIDE COMPOSITES FOR AERONAUTICAL APPLICATIONS</p> <p>Mohamed-Ali Maaroufi (Université et INSA de Rouen) Yann Carpiot (Université et INSA de Rouen) Benoit Vieille (INSA Rouen) Alexis Coppalle (Université et INSA de Rouen) Fabrice Barbe (Université et INSA de Rouen)</p> <p><i>The influence of fire exposure on compressive behaviors of carbon fibers woven-ply Polyphenylene Sulfide (PPS) has been investigated. Compression tests under one-sided heat flux or after prior fire exposure, as well as creep test, have been performed.</i></p>
11:00	Coffee Break							
	3.02 Fracture and Damage - Lamina Level (3/5)	3.22 Ductile and Pseudo-ductile Composites (2/4)	3.18 Hybrid Materials and Structures (4/4)	3.10 Fatigue of Composites (2/6)	3.20 Joining and Joints (2/6)	3.08 Short Fibre Reinforced Thermoplastics (2/4)	3.16 Fibre, Resin and Laminate Design for Optimized Performance and Manufacture (1/3)	2.12 Lightning Strike, Fire Behavior and Fire Retardance/Resistance of Composites (2/3)
11:30	<p>WED-2_MUC_3.02-07 DAMAGE REPRESENTATION AND DAMAGE EVOLUTION FOR LINEAR VISCOELASTIC UD COMPOSITE MATERIAL</p> <p>Fei Xu (University of Nottingham) Arthur Jones (University of Nottingham) Shuguang Li (University of Nottingham)</p> <p><i>Damage representation and damage evolution law for linear viscoelastic UD composites are built in this paper. A simple example is made to explain how to use this damage model.</i></p>	<p>WED-2_SEV_3.22-04 AVOIDING FREE EDGE DELAMINATION IN QUASI-ISOTROPIC PSEUDO-DUCTILE HYBRID LAMINATES – BY MATERIAL DISPERSION OR LAYER ANGLE DISPERSION?</p> <p>Meisam Jalalvand (University of Bristol) Mohamad Fotouhi (Amirkabir University of Technology) Gergely Czel (University of Bristol) Michael Wisnom (University of Bristol)</p> <p><i>Most hybrid material studies to date have been focused on Uni-Directional (UD) laminates. This paper presents two different strategies of hybridisation for multi-directional laminates and show which one is less susceptible to free-edge delamination.</i></p>	<p>WED-2_VEN_3.18-13 NUMERICAL SIMULATION OF WELDABLE METALLIC FORCE TRANSMISSION POINTS IN FIBRE REINFORCED THERMOPLASTICS (FRTP)</p> <p>Arne Kunze (Stiftung Institut für Werkstofftechnik) F. Jansen (Faserinstitut Bremen) Axel von Hehl (Stiftung Institut für Werkstofftechnik)</p> <p><i>This paper describes the mechanical design and numerical simulation of spot weldable organic sheets – components equipped with so called welding patches – on coupon level. Different geometries are developed, compared to each other an evaluated.</i></p>	<p>WED-2_BUD_3.10-04 DAMAGE EVOLUTION IN GLASS FIBRE REINFORCED COMPOSITES</p> <p>Steffen Stelzer (Montanuniversität Leoben) René Rieser (Montanuniversität Leoben) Gerald Pinter (Montanuniversität Leoben)</p> <p><i>Glass fibre reinforced epoxy composites with various stacking sequences are subjected to fatigue loading. The stiffness degradation of the samples is recorded via cyclic tensile tests and correlated to damage initiation and propagation.</i></p>	<p>WED-2_STO_3.20-04 A STUDY OF PHYSICAL AND MECHANICAL PROPERTIES OF A NANOMODIFIED THERMOPLASTIC ADHESIVE IN NORMAL AND ACCELERATED AGEING CONDITIONS</p> <p>Raffaele Ciardiello (Politecnico di Torino) Giovanni Belingardi (Politecnico di Torino) Brunetto Martorana (Centro Ricerche Fiat S.p.A.) Domenico Fondacaro (Centro Ricerche Fiat S.p.A.) Valentina Brunella (University of Torino)</p> <p><i>An innovative technology, based on magneto sensitive nanoparticles dispersed in hot melt adhesive (HMA), has been studied in order to reduce the cycle time of a vehicle and to allow for the recycling at the vehicle end of life.</i></p>	<p>WED-2_BIA_3.08-04 FATIGUE MECHANISMS IN SHORT GLASS FIBRE REINFORCED THERMOPLASTIC: IN SITU X-RAY MICRO TOMOGRAPHY OBSERVATIONS AND MICROSTRUCTURE MODELLING</p> <p>Héloïse Rolland (I2M - Arts et Métiers ParisTech) Nicolas Saintier (I2M - Arts et Métiers ParisTech) Charles Mareau (LAMPA - Arts et Métiers ParisTech) Gilles Robert (Solvay Engineering Plastics)</p> <p><i>X-ray microtomography has been used in situ to observe the fatigue mechanisms in the SGFR Polyamide 6,6. The stress field induced by the microstructure has been evaluated with numerical computation.</i></p>	<p>WED-2_RHO_3.16-01 OPTIBLESS - AN OPEN-SOURCE TOOLBOX FOR THE OPTIMISATION OF BLENDED STACKING SEQUENCES</p> <p>Terence Macquart (Bristol University)</p> <p><i>A free open-source toolbox for the optimisation of blended stacking sequences is presented (https://github.com/TMacquart/OptIBLESS). The toolbox capabilities and methodology are detailed and successfully applied to an optimisation problem.</i></p>	<p>WED-2_BRU_2.12-04 DAMAGE ANALYSIS FOR THERMAL LOADING INDUCED BY LASER IMPACT IN EPOXY COMPOSITE LAMINATE</p> <p>Cédric Huchette (ONERA-The French aerospace Lab) Gillian Leplat (ONERA-The French aerospace Lab) Valentin Biasi (The French Aerospace Lab) Thoulose</p> <p><i>The objective of this paper is to understand the damage scenario due to thermal loading in composite laminate. Thanks to an original experimental device and microscopic observation, the onset of delamination due to laser impact is discussed.</i></p>
11:50	<p>WED-2_MUC_3.02-08 EXPERIMENTAL AND NUMERICAL INVESTIGATIONS INTO DAMAGE MECHANISMS OF CFRP COMPOSITES UNDER OFF-AXIS COMPRESSION</p> <p>Fan Yang (Northwestern Polytechnical University) Yazhi Li (Northwestern Polytechnical University) Yan Li (Northwestern Polytechnical University)</p> <p><i>This paper presents an experimental investigation of CFRP specimens under off-axis compression. To reproduce the experimental observations, a computational method including a newly developed plastic model is illustrated.</i></p>	<p>WED-2_SEV_3.22-05 DEMONSTRATION OF PSEUDO-DUCTILITY IN QUASI-ISOTROPIC LAMINATES COMPRISING THIN-PLY UD CARBON/EPOXY HYBRID SUB-LAMINATES</p> <p>Gergely Czel (University of Bristol) Tamás Rév (University of Bristol) Meisam Jalalvand (University of Bristol) M. Fotouhi (University of Bristol) Michael Wisnom (University of Bristol)</p> <p><i>Tensile response of QI hybrid laminates were studied. It was confirmed that the ply fragmentation mechanism can be transferred to multi-directional laminates. Notch-insensitivity was demonstrated by locally active ply fragmentation.</i></p>	<p>WED-2_VEN_3.18-14 OPTIMISED THERMOSET MATRIX SYSTEMS FOR THE MANUFACTURING OF SHEET-METAL-FRP-HYBRID-STRUCTURES BY AN OPTIMISED RESIN TRANSFER MOULDING PROCESS</p> <p>Christian Lauter (University of Paderborn) Bamend Sannitther (University of Paderborn) Zheng Wang (University of Paderborn) Thomas Troester (University of Paderborn)</p> <p><i>Hybrid materials are a promising approach for lightweight design. Current research focusses on optimised thermoset resins and resin transfer moulding processes. Due to this efforts, for example cycle times and costs can be reduced effectively.</i></p>	<p>WED-2_BUD_3.10-05 EFFICIENT MICRO-MECHANICAL MULTIAXIAL FATIGUE TESTING AND MODELLING FOR GFRP LAMINATES</p> <p>Jens Ammitzbell Glud (Aalborg University) Janice Dulieu-Barton (University of Southampton) Ole Thybo Thomsen (University of Southampton) Lars Christian Terndrup Overgaard (Aalborg University)</p> <p><i>A micro-mechanical multiaxial fatigue model for predicting the layerwise crack density evolution in laminated composites.</i></p>	<p>WED-2_STO_3.20-05 A PROGRESSIVE DAMAGE MODEL FOR BOLTED JOINTS IN THREE-DIMENSIONAL WOVEN CARBON COMPOSITES SUBJECTED TO SINGLE-BOLT, DOUBLE-SHEAR LOADING</p> <p>Kyle Warren (Albany Engineered Composites) Harun Bayraktar (Albany Engineered Composites) Roberto Lopez-Anido (University of Maine) Senthil Vel (University of Maine)</p> <p><i>This paper explores a first-pass progressive damage model for a 3D woven aerospace composite single-bolt, double-shear joint. A mesoscale approach was adopted to separately consider the failure response of impregnated tows from surrounding matrix.</i></p>	<p>WED-2_BIA_3.08-05 FATIGUE STRENGTH OF STAMPABLE SHORT CARBON FIBRE REINFORCED THERMOPLASTIC COMPOSITE</p> <p>Masamichi Kawai (University of Tsukuba) Shogo Funaki (University of Tsukuba) Ichiro Taketa (Toray) Noriyuki Hirano (Toray)</p> <p><i>The fatigue behavior and its temperature dependence of stampable short carbon fiber reinforced polyamide composite are examined. Applicability of the anisomorphic constant fatigue life diagram approach is also evaluated.</i></p>	<p>WED-2_RHO_3.16-02 AUTOMATED DESIGN APPROACH AND POTENTIAL ASSESSMENT OF COMPOSITE STRUCTURES: FAST ANALYTICAL ENGINEERING TOOL FOR MULTIPLE LOAD CASES</p> <p>Dennis Zink (University of Stuttgart) Christoph Awe (University of Stuttgart) Peter Middendorf (University of Stuttgart)</p> <p><i>An alternative analytical evaluation of preferable fiber orientations is presented in this paper. The algorithm computes best fit material orientations based on principal stresses from multiple load cases and evaluates potential for FRP designs.</i></p>	<p>WED-2_BRU_2.12-05 EVALUATION OF LIGHTNING RESISTANCE OF CHOPPED CARBON FIBRE TAPE REINFORCED THERMOPLASTICS</p> <p>Shinichiro Yamashita (University of Tokyo) Takeo Sonehara (Shoden Corporation) Jun Takahashi (University of Tokyo) Kazumasa Kawabe (Industrial Technology of Fukui Prefecture) Tetsuhiko Murakami (Industrial Technology of Fukui Prefecture)</p> <p><i>A simulated lightning current was applied to chopped carbon fiber tape reinforced thermoplastics, which is a kind of ROS made by water dispersed prepreg tape. The damage behavior was characterized with high-speed camera and 3D measuring microscope.</i></p>

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
<p>WED-1_BRI_2.04-12 MECHANICAL AND ACOUSTIC BEHAVIOUR OF POROSITY CONTROLLED BIOCOSMPOSITE</p> <p>Justin Merotte (EcoTechnilin SAS) Antoine Le Duigou (LIMATB-UBS) Alain Bourmaud (LIMATB-UBS) Karim Behlouli (EcoTechnilin SAS) Christophe Baley (LIMATB-UBS)</p> <p><i>This paper studies the influence of a large range of porosity contents on the microstructure of biocomposites made from flax/PP nonwovens and correlates it to acoustic and tensile properties.</i></p>	<p>WED-1_NAP_2.03-07 INVESTIGATION OF THE SIZING BEHAVIOR OF CARBON FIBERS BY SINGLE FIBER DIP COATING EXPERIMENTS</p> <p>Eva Laukmanis (University of Augsburg) Tobias Neid (University of Augsburg) Judith Moosburger-Will (University of Augsburg) Siegfried Horn (University of Augsburg)</p> <p><i>Single filament sizing experiments are performed on carbon fibers with variable degrees of surface activation using two epoxy based sizing solutions. The evaluation of AFM images of the sized fibers permits an investigation of the sizing behavior.</i></p>	<p>WED-1_LON_5.01-08 NUMERICAL MODELLING OF FLOW AND HEAT TRANSFER FOR THE COMPRESSION RTM PROCESS WITH A FAST-CURE EPOXY</p> <p>Andre Keller (University of Applied Sciences and Arts Northwestern Switzerland) Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland) Kunal Masania (ETH Zürich)</p> <p><i>The aim of this study is to investigate the exothermic reaction, the resulting temperature gradient and degree of cure variation over the thickness of a composite plate during impregnation and cure with a fast-cure epoxy.</i></p>	<p>WED-1_BOR_5.12-11 QUALITY ASSURANCE SYSTEM FOR MONITORING THE ON-LINE RESIN IMPREGNATION DURING FIBER-TOW-PLACEMENT: A REVIEW OF THE STATE-OF-THE-ART APPROACHES</p> <p>Stefan Mittmann (Airbus Group Innovations) Christian Weimer (Airbus Group Innovations) A. Friedberger (Airbus Group Innovations) Andreas Gessler (Airbus Group Innovations)</p> <p><i>In this study an overview of the state-of-the-art approaches, their potentials and weak points as well as possible solutions for the measurement of the resin content of carbon fiber tows will be presented.</i></p>	<p>WED-1_STG_5.03-08 MEASUREMENTS OF DIMENSIONAL VARIATIONS OF SMC COMPOSITES DURING THE CURING CYCLE</p> <p>Romain Cardinaud (Plastic Omnium) Mael Peron (University of Nantes) Vincent Sobotka (University of Nantes) Nicolas Boyard (University of Nantes) Steven Le Corre (University of Nantes) Mustafa Sager (Plastic Omnium)</p> <p><i>The dimensional variations of a SMC material are investigated in using a standard linear dilatometer, the PVT- mould and a new specific device called HADDCC, in order to determine the thermal expansion and chemical shrinkage coefficients.</i></p>	<p>WED-1_AUG_4.03-03 AN AUTOMATED IMAGE PROCESSING ALGORITHM TO DETERMINE WRINKLE CHARACTERISTICS FROM B-SCANS</p> <p>Anhadeet Sandhu (University of Exeter) Timothy Dodwell (University of Exeter) Richard Butler (University of Bath)</p> <p><i>The paper presents an automated algorithm which extracts wrinkle characteristics from B-Scan images of large composite parts typically from low resolution images. The method is validated using a synthetic wrinkle with known characteristics.</i></p>	<p>WED-1_ING_7.02-18 THE HIGH PERFORMANCE DISCONTINUOUS FIBRE (HIPERDIF) TECHNOLOGY FOR CONSISTENT QUALITY CONTROL OF RECLAIMED CARBON FIBRES</p> <p>Marco Luigi Longana (University of Bristol) HaNa Yu (University of Bristol) Meisam Jalalvand (University of Bristol) Kevin Potter (University of Bristol)</p> <p><i>This paper describes the ongoing development of an alternative, improved method for the quality control of reclaimed carbon fibres based on specimens manufactured with the HiPerDIF (High Performance Discontinuous Fibre) method.</i></p>	<p>WED-1_ATH_1.02-07 RAISING MAXIMUM DESIGN STRAIN ENVELOPES OF FIBER RESIN COMPOSITE PRIMARY STRUCTURAL ELEMENTS SUPPORTED BY A LOAD AND OPERATIONAL MONITORING SYSTEM</p> <p>Stefan Herrmann (csi entwicklungs technik GmbH) Jörg Wellnitz (Technische Hochschule Ingolstadt) Niels Modler (Technical University of Dresden)</p> <p><i>The author describes the motivation for and implications of the introduction of an Operational Monitoring system to the automobile Body in White structure. A framework for Operational Monitoring and safe increase of the design strain is explained.</i></p>	10:40
Coffee Break								11:00
2.04 Bio Composites (4/6)	2.03 Interfaces and Interphases (3/3)	5.01 Process Simulation I - Draping & LCM (3/3)		5.03 Experimental Methods for Process Characterisation (3/3)	4.03 Structural Health Monitoring and Control (2/3)	7.01 Sustainability - Resource Efficient Technologies and Supply Chains (1/1)	1.02 Ground-Based Transportation (3/4)	
<p>WED-2_BRI_2.04-13 MECHANICAL BEHAVIOUR ANALYSIS OF FIBRE/MATRIX INTERFACE IN HEMP/EPOXY COMPOSITES BY DIGITAL IMAGE CORRELATION</p> <p>Amélie Perrier (Institute Pprime) Fabienne Touchard (P' Institute) Laurence Chocinski-Arnault (Institute Pprime) David Mellier (Institute Pprime)</p> <p><i>This work concentrates on strain field measurements around a hemp yarn in eco-composites under tensile loading by using DIC method. The local constitutive behaviours of the different constituents of the specimens could be approached by such analysis.</i></p>	<p>WED-2_NAP_2.03-08 STRAIN MONITORING OF GLASS FIBER EPOXY COMPOSITES USING A REDUCED GRAPHENE OXIDE DEPOSITED INTERPHASE</p> <p>Haroon Mahmood (University of Trento) Massimo Bersani (MiNALab Laboratory, Bruno Kessler Foundation) Alessandro Pegoretti (University of Trento)</p> <p><i>A method of inducing strain monitoring phenomenon in composites is presented in this paper. By electrophoretically depositing graphene nanosheets on glass fibers, a conductive interphase is created between the glass fibers and the epoxy matrix.</i></p>	<p>WED-2_LON_5.01-09 SENSITIVITY OF MATERIAL PROPERTIES ON THE WRINKLING BEHAVIOR OF UD-TAPE LAMINATES ANALYZED BY FINITE ELEMENT FORMING SIMULATION</p> <p>Dominik Doerr (Karlsruhe Institute of Technology) Tobias Joppich (Fraunhofer ICT) Fabian Schirmaier (Karlsruhe Institute of Technology) Tobias Mosthaf (Karlsruhe Institute of Technology) Luise Kärger (Karlsruhe Institute of Technology) Frank Henning (Karlsruhe Institute of Technology)</p> <p><i>Methods for Finite Element forming simulation are presented, validated and subsequently applied to a virtual sensitivity study, to investigate the influence of material properties on wrinkling behavior and fiber reorientation.</i></p>		<p>WED-2_STG_5.03-09 NON-DESTRUCTIVE EVALUATION OF PREFORM INJECTABILITY AND COMPRESSIBILITY FOR QUALITY ASSESSMENT IN A PRODUCTION ENVIRONMENT</p> <p>Tino Hermann (University of Auckland) Simon Bickerton (University of Auckland) S. van Oosterom (University of Auckland) G. Lamb (University of Auckland) Thomas Henke (BMW Group)</p> <p><i>An innovative non-destructive method is presented for assessment of the compressibility and injectability of textiles, stacks, and preforms. Fast non-destructive tests are required to support the industrialisation of FRP manufacture.</i></p>	<p>WED-2_AUG_4.03-04 CRACK GROWTH MONITORING AT CFRP ADHESIVE BONDINGS</p> <p>Wolfgang Adebahr (University of Stuttgart) Markus Rahammer (Institut für Kunststofftechnik) Ronny Sachse (University of Stuttgart) Peter Middendorf (University of Stuttgart) Marc Kreutzbruck (University of Stuttgart)</p> <p><i>This paper includes non-destructive crack growth monitoring via air-coupled ultrasound and thermography.</i></p>	<p>WED-2_ING_7.01-01 DEVELOPMENT OF AN LCA TOOL FOR THE COMPOSITES-INDUSTRY - EU CIA ECO CALCULATOR: CRADLE TO GATE LCA FOR COMPOSITE PARTS</p> <p>Jaap van der Woude (EuCIA) Ir. Ben Drogé (EuCIA) R. Frassine (EuCIA)</p> <p><i>A web-based tool to calculate Eco Impact Factors as defined by ILCD for composites from cradle to gate and can be used for further calculations. The methodology has followed the LCA Guidelines as described in ISO 14040 and 14044 standards.</i></p>	<p>WED-2_ATH_1.02-08 MAI SKELETT / MULTISKELETT A NOVEL DESIGN PHILOSOPHY BASED ON TRUSS ELEMENTS</p> <p>Thomas Hogger (BMW AG) Paul Winkler (P+Z Engineering GmbH) Tobias Wehrkamp-Richter (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>A novel design philosophy was developed with the project MAI Skelett and Multiskelett, which features an assembly of unidirectional fiber reinforced thermoplastic truss elements in combination with a thermoplastic injection molding.</i></p>	11:30
<p>WED-2_BRI_2.04-14 MECHANICAL PROPERTIES OF TOUGH PLASMA TREATED FLAX FIBRE THERMOPLASTIC COMPOSITES</p> <p>Wilhelm Woigk (Institute of Polymer Engineering, FHNW) J. Rion (Bcomp AG) C. Fuentes (EMPA) Carlos Fuentes (KU Leuven) Aart Van Vuure (KU Leuven) Kunal Masania (ETH Zürich) Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland)</p> <p><i>This paper presents the mechanical testing results of elementary flax fibres, thermoplastic and thermoset matrix materials along with a particular focus on the performance of untreated and plasma treated flax fibre/co-polyoxymethylene composites.</i></p>	<p>WED-2_NAP_2.03-09 THE ROLE OF THE EPOXY RESIN: CURING AGENT RATIO ON COMPOSITE INTERFACIAL STRENGTH AND THERMAL PERFORMANCE</p> <p>Ross Forbes Minty (University of Strathclyde) James Thomason (University of Strathclyde) Liu Yang (University of Strathclyde)</p> <p><i>This paper focuses on analyzing the interfacial and thermal properties of an epoxy resin glass fibre composite using the microbond technique and thermal analysis to gauge the influence of residual stress at the interface with varying system ratios.</i></p>	<p>WED-2_LON_5.01-10 SIMULATION METHOD FOR THERMOFORMING OF APPLICATION-ORIENTED TEXTILE STRUCTURES AND MULTI-LAYERED REINFORCED ORGANOSHEET</p> <p>Dominic Schommer (Institute for Composite Materials) Miro Duhovic (Institute for Composite Materials) Christian Goergen (Institute for Composite Materials) Joachim Hausmann (Institute for Composite Materials)</p> <p><i>This paper shows new improvements on a hybrid simulation method for modeling the thermoforming process for organosheet materials which make it possible to use the method for all customized reinforcement structures.</i></p>		<p>WED-2_STG_5.03-10 ON THE THERMAL BEHAVIOR OF THERMOPLASTIC LAMINATES DURING TRANSFER - A NOVEL WIND-TUNNEL APPROACH</p> <p>Daniel Kugele (Karlsruhe Institute of Technology) Julius Rausch (Audi AG) Jochen Kriegseis (Karlsruhe Institute of Technology) Kai Gündisch (Karlsruhe Institute of Technology) Luise Kärger (Karlsruhe Institute of Technology) Frank Henning (Karlsruhe Institute of Technology)</p> <p><i>The transfer step of the molten laminates has an important influence on the temperature distribution of the laminates and is therefore investigated in the present study.</i></p>	<p>WED-2_AUG_4.03-05 DEVELOPMENT OF DATA ACQUISITION DEVICES FOR ELECTRICAL IMPEDANCE TOMOGRAPHY OF COMPOSITE MATERIALS</p> <p>Sandra Gschöbmann (Johannes Kepler University Linz) Yingjun Zhao (Johannes Kepler University Linz) Martin Schagerl (Johannes Kepler University Linz)</p> <p><i>This contribution presents a simple and low-cost possibility to build a stand-alone data acquisition device to collect boundary voltage responses for EIT evaluation as a potential application for SHM using piezoresistive thin film sensors.</i></p>	<p>WED-2_ING_7.01-02 EFFECT OF DIFFERENT TECHNOLOGICAL AND ENERGY SUPPLY RELATED MEASURES ON THE PRIMARY ENERGY DEMAND OF CFRP PRODUCTION</p> <p>Daniel Wehner (Fraunhofer IBP) Andrea Hohmann (Fraunhofer ICT) Bernhard Schwab (Fraunhofer ICT) Stefan Albrecht (Fraunhofer IBP) Robert Ilg (Fraunhofer IBP) K. Sedlbauer (Fraunhofer IBP) P. Leistner (Fraunhofer IBP) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>The paper investigates on the major levers for optimizing energy use in CFRP production and processing in order to support the various actors involved along the different process routes in CFRP manufacturing.</i></p>	<p>WED-2_ATH_1.02-09 MANUFACTURING CFRP SANDWICH PARTS USING WET MOLDING</p> <p>Jan Schütte (BMW Group) Jürgen Hoffmann (BMW AG) Elisabeth Ladstätter (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>This paper deals with the influence of core compression and temperature profile on the properties of CFRP sandwich parts manufactured by wet moulding. The results demonstrate the feasibility of manufacturing sandwich parts in an automated process.</i></p>	11:50

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
12:10	<p>WED-2_MUC_3.02-09 MATRIX MICROCRACKING AND SPLITS MODELING IN LAMINATED COMPOSITES</p> <p>Hadrien Bainier (ENS Cachan) David Néron (ENS Cachan) Pierre Ladevèze (ENS Cachan)</p> <p><i>In this paper a new approach to tackle with transverse cracking localisation is proposed and the feasibility of the method is proved. Due to industrial requirements, the detection/computation strategy for splits has been implemented in SAMCEF.</i></p>	<p>WED-2_SEV_3.22-06 ENABLING LARGE STRETCHABILITY IN ASSEMBLIES OF NANOCARBONS THROUGH PRESTRESSING</p> <p>Tsu-Wei Chou (University of Delaware) Jiali Yu (University of Delaware)</p> <p><i>CNT fibers, graphene laminates, and CNT films are used to form stretchable composites which exhibit excellent flexibility and stretchability and showed stable electrical and electrochemical performances during repeated stretching cycles.</i></p>	<p>WED-2_VEN_3.18-15 SIMULATION CHAIN FOR METAL-CFRP SANDWICH MATERIALS IN THE DEVELOPMENT PROCESS OF AN AUTOMOTIVE FLOOR STRUCTURE</p> <p>Thorolf Schulte (RWTH Aachen University) Sebastian Wiedemann (Inpro Innovationsgesellschaft für fortgeschrittene Produktionssysteme in der Fahrzeugindustrie mbH) Michael Gerken (University of Paderborn) Christopher Schmal (University of Paderborn) Christian Paul (ThyssenKrupp AG TechCenter Carbon Composites) L. Eckstein (RWTH Aachen University) Frank Meissen (Inpro Innovationsgesellschaft für fortgeschrittene Produktionssysteme in der Fahrzeugindustrie mbH) Gerson Meschut (University of Paderborn)</p> <p><i>In this paper simulation models for novel steel-CFRP and magnesium-CFRP sandwich materials with thermoplastic matrix are being presented. The models are used to develop a lightweight automotive floor structure fulfilling various safety requirements.</i></p>	<p>WED-2_BUD_3.10-06 DAMAGE INITIATION CRITERION OF CFRP UNDER VIBRATION FATIGUE TESTING: EXPERIMENTS AND MODEL VALIDATION</p> <p>Fabrizio Magi (University of Bristol) Dario Di Maio (University of Bristol) Ibrahim Sever (Rolls-Royce Plc)</p> <p><i>This manuscript shows the evidence of a clean critical event in the fatigue life of a composite laminate, suggesting a novel failure criterion to be used for vibration fatigue testing. Experimental results are reported as well as FE simulations.</i></p>	<p>WED-2_STO_3.20-06 INFLUENCE OF THE SPECIMEN WIDTH ON THE EXPERIMENTAL MEASUREMENT OF THE COHESIVE LAW USING THE J-INTEGRAL APPROACH</p> <p>Mario Cabello (IK4-IKERLAN Technology Research Centre) Javier Zurbitu (IK4-IKERLAN Technology Research Centre) Albert Turon (AMADE, Universidad de Girona) Carlos Sarrado (AMADE, Universidad de Girona) Jordi Renart (AMADE, Universidad de Girona) Félix Martínez (IK4-IKERLAN Technology Research Centre)</p> <p><i>The influence of the specimen width in the procedures to obtain cohesive laws by J-integral method using an advanced analytical DCB model with a coupled cohesive damage is studied and a new correction function has been proposed.</i></p>	<p>WED-2_BIA_3.08-06 HIGH STRENGTH JOINING OF SHORT FIBRE REINFORCED POLYMERS AND METALS WITHOUT THE USE OF ADHESIVES IN COMPLEX JUNCTIONS</p> <p>Kim Kose (Inpro Innovationsgesellschaft für fortgeschrittene Produktionssysteme in der Fahrzeugindustrie mbH) Fred Eggers (Daimler AG) Birgit Faisst (TRUMPF Laser- und Systemtechnik GmbH) Leo Hoffmann (Neue Materialien Fürth GmbH)</p> <p><i>Joining of polymers to metals with a joining technique based on a finely-structured metal surface using only one-sided contact. Results are similar to conventionally joined hybrids and stays nearly unchanged after thermal and corrosive pre-loads.</i></p>	<p>WED-2_RHO_3.16-03 DIGITPRO – VALIDATING THE LINK BETWEEN BRAIDING SIMULATION, INFILTRATION AND MECHANICAL TESTING</p> <p>Jörg Dittmann (University of Stuttgart) Daniel Michaelis (University of Stuttgart) Patrick Böhrer (University of Stuttgart) Peter Middendorf (University of Stuttgart)</p> <p><i>A braided digital prototype is presented. The main goal is to connect the various input and output files of different software tools, to establish a user-friendly readability via a HDF5 file format as well as reducing the product design cycle time.</i></p>	<p>WED-2_BRU_2.12-06 EXPERIMENTAL STUDY OF THE BURNING BEHAVIOUR OF A COMMERCIAL CARBON FIBRE COMPOSITE MATERIAL USED IN HIGH PRESSURE VESSELS</p> <p>Juan P. Hidalgo (University of Edinburgh) Paolo Pironi (University of Edinburgh) Rory M. Hadden (University of Edinburgh) Stephen Welch (University of Edinburgh)</p> <p><i>This paper presents an analysis on the charring rate experienced by a commercial CFRP material used to construct composite pressure vessels for hydrogen storage and transport applications.</i></p>
12:30	<p>WED-2_MUC_3.02-10 MICROMECHANICS-BASED VALIDATION OF A MESOMODEL FOR MATRIX NONLINEARITY</p> <p>Frans Van der Meer (Delft University of Technology)</p> <p><i>The performance of a mesomechanical constitutive law for composites is assessed through comparison with micromechanical model results.</i></p>	<p>WED-2_SEV_3.22-07 USE OF FRICTION MECHANISM FOR PSEUDO DUCTILITY IN COMPOSITES</p> <p>Omar Bacarreza (Imperial College London) Raul Munoz (Imperial College London) Paul Robinson (Imperial College London) Milo Shaffer (Imperial College London)</p> <p><i>A novel method of introducing pseudo-ductility in brittle materials by means of friction mechanisms has been investigated. Tensile behaviour of the selected configuration indicates that the ductile behaviour can be achieved.</i></p>	<p>WED-2_VEN_3.18-16 ANALYSIS OF OUT-OF-PLANE BEHAVIOUR OF BOLTED JOINTS ASSEMBLIES FOR THERMOPLASTIC LAMINATES</p> <p>Romain Hamonou (Ecole Centrale de Nantes) Laurent Gornet (Institut de Recherche en Génie Civil et Mécanique) Frédéric Jacquemin (Institut de Recherche en Génie Civil et Mécanique) Stéphane Auger (CETIM)</p> <p><i>In this paper, an analysis of out-of-plane behavior of bolted joints assemblies for thermoplastic materials is presented.</i></p>	<p>WED-2_BUD_3.10-07 ENVIRONMENTAL EFFECTS ON THE BENDING FATIGUE OF LAMINATED COMPOSITES: EXPERIMENTAL AND MODELLING APPROACHES</p> <p>Maozhou Meng (Plymouth University) Huirong Le (University of Derby) Stephen Grove (University of Derby) MD Jahir Rizvi (Plymouth University)</p> <p><i>This paper investigates the effects of sea water immersion on the fatigue failure of CFRP composites. Dry and wet specimens were tested in a variety of bending conditions following the ISO standard. A FEA model was developed to simulate the problem.</i></p>	<p>WED-2_STO_3.20-07 COMPARATIVE ANALYSIS OF IN-PLANE AND OUT-OF-PLANE MECHANICAL BEHAVIOR OF SPOT-WELDED AND MECHANICALLY FASTENED JOINTS IN THERMOPLASTIC COMPOSITES</p> <p>Tian Zhao (Delft University of Technology) Genevieve Palardy (HS Delft) Irene Fernandez Villagas (Delft University of Technology) Calvin Rans (Delft University of Technology) Rinze Benedictus (Delft University of Technology)</p> <p><i>The in-plane and out-of-plane mechanical behaviour of ultrasonically spot-welded and mechanically fastened joints are characterized through double-lap shear and pull-through tests. Fractography is used to investigate the failure mechanisms of joints.</i></p>	<p>WED-2_BIA_3.08-07 IMPACT PERFORMANCE IN PP WITH PVA FIBER REINFORCEMENT</p> <p>Claudia Pretschuh (Wood K plus - Competence Centre for Wood Composites and Wood Chemistry) Lukas Sobczak (Borealis Polyolefine GmbH) Dietmar Salaberger (University of Applied Sciences Upper Austria) Michael Jerabek (Borealis Polyolefine GmbH) Thomas Lummerstorfer (Borealis Polyolefine GmbH)</p> <p><i>PVA fibers are acting as very efficient impact modifier for PP homopolymers. Very high notched impact strength values can be obtained, even at -20°C. Further the effect of coupling on the fiber-pull out behavior was presented.</i></p>	<p>WED-2_RHO_3.16-04 THE INFLUENCE OF FIBRE ANGLE AND RESIN PROPERTIES ON CONSOLIDATION OF CURVED LAMINATES</p> <p>Kevin Johnson (University of Bath) Samuel Erland (University of Bath) Richard Butler (University of Bath)</p> <p><i>A simple theoretical model is compared with experimental tests at different temperatures and pressures. Pressure-induced shear does not significantly prevent consolidation in curved laminates with differing fibre angles and stacking sequences.</i></p>	<p>WED-2_BRU_2.12-07 HIGH TEMPERATURE COMPRESSIVE PROPERTIES OF CARBON EPOXY COMPOSITE LAMINATES</p> <p>Julien Berthe (ONERA-The French aerospace Lab) Gérald Portemont (ONERA-The French aerospace Lab) Alain Deudon (ONERA-The French aerospace Lab) Matthieu Ragonet (ONERA-The French aerospace Lab)</p> <p><i>This paper is dedicated to the experimental study of the evolution of the mechanical compressive properties of CRFP with the increase of the temperature from below T_g to above T_g.</i></p>
12:50	<p>WED-2_MUC_3.02-11 MODELLING OF KINK-BAND GROWTH BASED ON THE GEOMETRICALLY NON-LINEAR THEORY</p> <p>Ragnar Larsson (Chalmers University of Technology) Mohammad Rouhi (Swerea SICOMP) Renaud Gutkin (Swerea SICOMP)</p> <p><i>We propose an efficient continuum damage model, able to predict fibre/matrix shear failure in a UD ply under compression. A key feature is to consider the geometrical fibre kinking instability on the macro-level based on a finite strain formulation.</i></p>	<p>WED-2_SEV_3.22-08 HYBRID EFFECT OF CARBON/GLASS COMPOSITES AS A FUNCTION OF THE STRENGTH DISTRIBUTION OF ALIGNED SHORT CARBON FIBRES</p> <p>HaNa Yu (University of Bristol) Marco Luigi Longana (University of Bristol) Yentl Swolfs (KU Leuven) Michael Wisnom (University of Bristol) Kevin Potter (University of Bristol)</p> <p><i>The effect of the strength distribution of aligned discontinuous carbon layers on the enhancement in strain at failure in interlaminated carbon/glass hybrid composites was investigated experimentally, and compared with an analytical model.</i></p>	<p>WED-2_VEN_3.18-17 SURFACE MODIFIED STEEL/EPOXY-BASED CFRP HYBRID LAMINATES UNDER MODE I, MODE II AND MIXED-MODE LOAD CONDITIONS</p> <p>Andreas Monden (University of Augsburg) Markus Sause (University of Augsburg) Siegfried Horn (University of Augsburg)</p> <p><i>CFRP/steel hybrid laminates were investigated to quantify mode I, mode II and mixed-mode fracture toughness via DCB, ENF and MMB tests. Surface treatments applied to the steel surfaces resulted in individual fracture toughness values.</i></p>	<p>WED-2_BUD_3.10-08 FATIGUE STRENGTH OF A MULTIAXIAL LOADED SHORT GLASS FIBRE REINFORCED POLYAMIDE</p> <p>Andreas Primetzhofner (Montanuniversität Leoben) Andreas Mosenbacher (Montanuniversität Leoben) Gerald Pinter (Montanuniversität Leoben)</p> <p><i>The applicability of the multi-axial Gough and Pollard fatigue criteria was examined for short fibre reinforced plastic. Although basically applicable, a distinctive manufacturing influence was determined.</i></p>	<p>WED-2_STO_3.20-08 COMPARISON OF THE ADHESIVE DYNAMIC SHEAR STRESS HOMOGENEITY BETWEEN METALLIC AND COMPOSITE SUBSTRATES OF A DOUBLE LAP JOINT.</p> <p>Georges Challita (Lebanese University) Rachad Hazimeh (Lebanese University) Khaled Khalil (Lebanese University) Ramzi Othman (King Abdulaziz University)</p> <p><i>This paper deals with a numerical method to design a double lap bonded structure with glass/PEEK substrates where a better dynamic shear stress homogeneity if the adhesive joint is offered. Comparison with steel substrates is carried out.</i></p>	<p>WED-2_BIA_3.08-08 INTERFACIAL DAMAGE AND LOAD TRANSFER MODELING IN SHORT FIBER REINFORCED COMPOSITES</p> <p>Kevin Bonnay (ENSAM) Nicolas Despringre (ENSAM) Yves Chemisky (Arts et Métiers ParisTech) Fodil Meraghni (Arts et Métiers ParisTech)</p> <p><i>Based on experimental observations for SFRC, an interfacial damage law and an adapted shear lag model is proposed and validated. Using a single set of parameters, the model is able to reproduce the behavior of an SFRC under various loading directions.</i></p>	<p>WED-2_RHO_3.16-05 INTEGRATED SIMULATION APPROACH FOR STRUCTURAL ANALYSIS OF COMPOSITE COMPONENTS CONSIDERING PROCESS SIMULATION DATA</p> <p>Natalie Mayer (Technical University of Munich) Jens Prowe (Airbus Group Innovations) Tamas Havar (Airbus Group Innovations) Roland Hinterhölzl (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>The aim in this study is to include virtual manufacturing process data in the structural finite element analysis on a component level. The main challenge here is to provide an as-built, more realistic structural simulation for composite components.</i></p>	

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
<p>WED-2_BRI_2.04-15 MICROSTRUCTURE AND MECHANICAL PROPERTIES OF HEMP TECHNICAL FIBRES FOR COMPOSITE APPLICATIONS BY MICRO COMPUTED TOMOGRAPHY AND DIGITAL IMAGE CORRELATION</p> <p>Carlos Fuentes (KU Leuven) Pieter Willekens (KU Leuven) Niels Hendrixx (KU Leuven) Benjamin Lemmens (KU Leuven) Joren Claeys (KU Leuven) Jorma Croughs (Campus GroupT, KU Leuven) Christine Dupont-Gillain (Université Catholique de Louvain) David Seveno (KU Leuven) Aart Van Vuure (KU Leuven)</p> <p><i>Strain mapping analysis was used for evaluating the local mechanical behaviour heterogeneity along technical hemp fibres, revealing 3 types of tensile stress-strain curves depending on their strength, and a complex pattern of strain concentrations.</i></p>	<p>WED-2_NAP_2.03-10 THERMOPLASTIC SURFACES FOR JOINING OF THERMOSET CFRP – EFFECT OF CURING CYCLE ON INTERFACIAL BOND STRENGTH</p> <p>Philipp Bruckbauer (Technical University of Munich / Institute for Carbon Composites) Frank Weiland (Airbus Helicopters) Uwe Beier (Airbus Helicopters) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>This paper investigates the influence of curing cycles on the development of thermoplastic-thermoset interphases. A strong dependency of the heating rate on the interphase size and the shear strength of CFRP specimen could be found.</i></p>	<p>WED-2_LON_5.01-11 THE COMPRESSION BEHAVIOUR OF NON-CRIMP FABRICS COMPOSITES FOR AUTOMOTIVE APPLICATIONS</p> <p>Modesto Mateos (Mondragon Unibertsitatea) Maider Baskaran (Mondragon Unibertsitatea) A. Aizpuru (Mondragon Unibertsitatea) Laurentzi Aretxabaleta (Mondragon Unibertsitatea) Jon Aurrekoetxea (Mondragon Unibertsitatea)</p> <p><i>The relaxation of a dry (no binder) 50k carbon fibre Non-Crimp Fabric (NCF) under maximum compression stage has been characterised for 3 different fibre volumes and fabric layer quantities by the use of fractional models.</i></p>		<p>WED-2_STG_5.03-11 ONE STEP TO COMPARABLE OFF-PLANE PERMEABILITY RESULTS – AN IMPROVED MEASURING METHOD FOR TRANSVERSE PERMEABILITY AND COMPACTION BEHAVIOR OF TEXTILE FIBER MATERIALS</p> <p>Robert Graupner (Fraunhofer ICT) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>For off-plane permeability measurement methods a homogeneous FVC is assumed. The investigation shows a contrary result when metal structures with holes are used. In consequence the permeability values are assumed to dependent on the used equipment.</i></p>	<p>WED-2_AUG_4.03-06 EXPERIMENTS ON DISTRIBUTED FIBER OPTIC SENSING FOR FATIGUE CRACK GROWTH MONITORING OF COMPOSITE ADHESIVELY BONDED SINGLE LAP JOINTS</p> <p>Andrea Bernasconi (Politecnico di Milano) Michele Carboni (Politecnico di Milano) Riccardo Galeazzi (Politecnico di Milano) Andrea Gianneo (Politecnico di Milano)</p> <p><i>In this work, the Optical Backscatter Reflectometry (OBR) distributed sensing technique is used to monitor fatigue crack growth in composite adhesive bonded joints. Results are referenced with measurements by phased array ultrasonic testing.</i></p>	<p>WED-2_ING_7.01-03 ENERGY EFFICIENCY AND ECOLOGICAL BENEFITS OF A SELF-HEATED CFRP-TOOL DESIGNED FOR RESIN TRANSFER MOULDING</p> <p>Elisa Arikian (Fraunhofer ICT) Andrea Hohmann (Fraunhofer ICT) Philipp Kammerhofer (Technical University of Munich / Institute for Carbon Composites) Matti Reppe (Qpoint Composite GmbH) Niklas Remer (Airbus Helicopters) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>The study shows that a self-heated CFRP tool leads to energy savings of 87% during the use-phase. Combined with a RTM process a cycle time reduction of 41% can be achieved. The LCA identifies a saving potential in all regarded impact categories.</i></p>	<p>WED-2_ATH_1.02-10 MANUFACTURING HIGH PERFORMANCE COMPOSITES USING SOLID EPOXY RESINS</p> <p>Henry Maples (University of Vienna) Thomas James (Formax) Alexander Bismarck (University of Vienna)</p> <p><i>A low cost composite manufacturing technique using solid epoxy resins is described.</i></p>	12:10
<p>WED-2_BRI_2.04-16 MICROSTRUCTURE, QUANTIFICATION AND CONTROL OF DISLOCATIONS IN BAST-TYPE PLANT FIBRES</p> <p>Bo Madsen (Technical University of Denmark) Catherine L. Lester (Technical University of Denmark) Ulrich A. Mortensen (Technical University of Denmark) Mustafa Aslan (Karadeniz Technical University) Hans Lilholt (Technical University of Denmark)</p> <p><i>Dislocations in plant fibres are investigated by using microscope and image analysis techniques. Straining of fibres, together with wetting, is applied to change the dislocation content. The effect is evaluated by tensile testing of fibres.</i></p>	<p>WED-2_NAP_2.03-11 TUNING INTERFACIAL ADHESION AND ITS IMPACT ON REINFORCING MECHANISMS FOR MONOLAYER GRAPHENE-POLYMER NANOCOMPOSITES</p> <p>Luqi Liu (National Center for Nanoscience and Technology, CHINA) Guorui Wang (National Center for Nanoscience and Technology, CHINA) Zhaohao Dai (National Center for Nanoscience and Technology, CHINA) Zhong Zhang (National Center for Nanoscience and Technology, CHINA)</p> <p><i>Based on in situ Raman spectroscopy, surface functionalization is employed to tune interfacial adhesion of graphene/PMMA interface and clarify impacts of interfacial chemistry on reinforcing mechanisms for the first time.</i></p>	<p>WED-2_LON_5.01-12 VISUALIZATION EXPERIMENT AND NUMERICAL SIMULATION OF LIQUID IMPREGNATION WITH RACE-TRACKING FOR RTM PROCESS</p> <p>Masatoshi Kobayashi (HONDA R&D) Koji Dan (HONDA R&D) Tsuyoshi Baba (HONDA R&D) Koshiro Yamakawa (Toray) Ryo Nakano (Toray)</p> <p><i>In order to predict impregnation with race-tracking, we proposed 3D numerical simulation by the Darcy equation and variable fluid conductance equation that could reproduce the Stokes flow. This method could represent actual complicated impregnation.</i></p>		<p>WED-2_STG_5.03-12 ROBUST OPTICAL 2D PERMEABILITY CHARACTERIZATION OF REINFORCING FABRICS</p> <p>Ewald Fauster (Montanuniversität Leoben) Harald Grössing (Montanuniversität Leoben) Ralf Schledjewski (Montanuniversität Leoben) K. Fellner (Polymer Competence Center Leoben GmbH)</p> <p><i>A new approach for compensating glass plate deformation in optical 2D permeability characterization involving a combination of image and data processing steps with structural FEM simulation in a fully automated evaluation procedure.</i></p>	<p>WED-2_AUG_4.03-07 INVESTIGATION OF EFFECT OF CNT WEIGHT FRACTION ON SMART PAINT FOR STRUCTURAL HEALTH MONITORING OF CARBON FIBRE REINFORCED COMPOSITES</p> <p>Yagmur Atescan (Istanbul Technical University) Hülya Cebeci (Istanbul Technical University)</p> <p><i>In this study, carbon nanotube (CNTs) polymer nanocomposites (CNT-PNCs) as a smart paint were used as a strain sensor to follow the mechanical deformations of the structures.</i></p>	<p>WED-2_ING_7.01-04 OPTIMISATION OF SOLVOLYSIS FOR RECYCLING CARBON FIBRE REINFORCED COMPOSITES</p> <p>Matthew Keith (University of Birmingham) Geraldine Oliveux (University of Birmingham) Gary Leeke (Cranfield University)</p> <p><i>Recycling CFRCs is investigated with an acetone/water solvent to determine optimum parameters such as reaction time, loading and post-solvolyis steps. Results show a resin removal of 98% is possible with an energy of 19 MJ.kg-1 of fibre recovered.</i></p>	<p>WED-2_ATH_1.02-11 NOVEL LIGHTWEIGHT COMPOSITE GRIPPER CONCEPTS FOR AUTOMOTIVE MANUFACTURING</p> <p>Niklas Minsch (Daimler AG) Farbod Nosrat Nezami (CIKONI composites innovation) Thomas Gereke (Technical University of Dresden) Chokri Cherif (Technical University of Dresden)</p> <p><i>A novel approach to evaluate concepts for supporting structures made of fiber-reinforced composites, as a main constituent of gripper tooling in the range of automotive handling operations, is presented.</i></p>	12:30
					<p>WED-2_AUG_4.03-08 INVESTIGATION OF IMPACT INDUCED DAMAGE ON COMPOSITE PLATES BY ANALYSING THE RADIATED AERIAL ACOUSTIC SIGNAL</p> <p>William Caster (Univ. Bourgogne Franche-Comté) N. Massé (Univ. Bourgogne Franche-Comté) Jérôme Rousseau (Univ. Bourgogne Franche-Comté) Stéphane Fontaine (Univ. Bourgogne Franche-Comté)</p> <p><i>This study is the analysis of the acoustic radiation caused by an impact on a composite structure and the use of signal entropy for non-contact detection and evaluation of the induced damage.</i></p>			12:50

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
14:10	Keynote lecture 9 (MUC) by Silvestre Pinho, Imperial College London, UK: MECHANICS OF COMPOSITES: FROM NANO TO MACRO AND FROM SIMULATION TO ACTUALLY ENGINEERING NEW MICROSTRUCTURES				Keynote lecture 10 (BIA) by Alexander Bismarck and Paul Robinson, Imperial College London and University of Vienna, UK and Austria: EXPLOITING COMPOSITE INTERPHASES: CONTROLLABLE STIFFNESS, SHAPE-MEMORY AND REPAIR			
15:00	Poster Session 2							
	3.02 Fracture and Damage - Lamina Level (4/5)	3.22 Ductile and Pseudo-ductile Composites (3/4)	3.17 Sandwich Structures (1/4)	3.10 Fatigue of Composites (3/6)	3.20 Joining and Joints (3/6)	3.08 Short Fibre Reinforced Thermoplastics (3/4)	Industry Session 2	2.12 Lightning Strike, Fire Behavior and Fire Retardance/Resistance of Composites (3/3)
15:00	<p>WED-3_MUC_3.02-12 ON A COUPLED ELASTO-PLASTIC DAMAGE MODEL FOR FIBER REINFORCED LAMINATES</p> <p>Swaroop Gaddikere Nagaraja (Montanuniversitaet Leoben) Clara Schuecker (Montanuniversitaet Leoben)</p> <p><i>A coupled Elasto-Plastic Damage model is proposed that captures non-linear material effects at the length scale of individual plies. The constitutive framework is thermodynamically consistent and adapted to a plane stress state.</i></p>	<p>WED-3_SEV_3.22-09 HYBRID UHMWPE/CARBON MICROBRAIDS FOR DUCTILE COMPOSITES</p> <p>Stefano Del Rosso (Imperial College London) Lorenzo Iannucci (Imperial College London) Paul Curtis (Defence Science and Technology Laboratory) Paul Robinson (Imperial College London)</p> <p><i>This paper presents a comprehensive series of mechanical tests performed on core-filled hybrid microbraids and composites manufactured using those microbraids as the reinforcing phase.</i></p>	<p>WED-3_VEN_3.17-01 AN UNDULATED SANDWICH PLATE WITH A NEW CORE</p> <p>Anil Uzal (Bogazici University) Fazil Onder Sonmez (Bogazici University) Nuri Ersoy (Bogazici University) Kenan Cinar (Bogazici University)</p> <p><i>A new core design is introduced. Failure behavior is investigated via three-point bending tests. Both the core and the face sheets are made of E-glass-fiber-reinforced epoxy. Acoustic emission method is used to detect the progression of damage.</i></p>	<p>WED-3_BUD_3.10-09 FATIGUE TESTING OF QUASI-UD AND CROSS-PLY REINFORCED COMPOSITES: THE RECENT ACHIEVEMENTS OF TEST SPECIMEN GENERATION</p> <p>Samuli Korkiakoski (Aalto University) Mikko Kanerva (Aalto University) Olli Saarela (Aalto University)</p> <p><i>Tension-tension fatigue testing results, damage development and final failure mode were studied using advanced dog-bone specimens for a quasi-UD GFRP laminate reinforced with NCFs and an aramid-fibre reinforced cross-ply laminate.</i></p>	<p>WED-3_STO_3.20-09 COMPOSITE ROBUST BONDING – AUTOMATION OF SURFACE PREPARATION PROCESS FOR STRUCTURAL BONDING APPLICATIONS</p> <p>Ana Amate-Ilescas (Airbus Operations) Benjamin Lindenberger (Airbus Operations) Jose Sánchez-Gómez (Airbus Operations)</p> <p><i>The aim of this work was to find possible alternatives for automation of surface treatment processes for CFRP composite structures prior to structural bonding that can replace current manual operations.</i></p>	<p>WED-3_BIA_3.08-09 INVESTIGATING FIBRE ORIENTATION, DISPERSION AND LENGTH REDUCTION IN LONG GLASS FIBRE REINFORCED INJECTION MOULDING</p> <p>Fin Caton-Rose (University of Bradford) Peter Hine (University of Leeds)</p> <p><i>An investigation into the orientation, distribution and breakage of short and long fibres during the injection moulding process.</i></p>	Presentations of the Sponsorship and Exhibiting Companies	<p>WED-3_BRU_2.12-08 INFLUENCE OF THE NUMBER, WEIGHT AND STACKING SEQUENCE OF METAL LAYERS ON THE FIRE PROPERTIES OF HYBRID CFRP-METAL COMPOSITES</p> <p>Imke Roese-Koerner (German Aerospace Center) Benjamin Schuh (German Aerospace Center) Torsten Rinneberg Peter Wierach (German Aerospace Center)</p> <p><i>An investigation of improved material solutions to mitigate fire, smoke and fumes in the event of a fire is presented. A number of hybrid CFRP-metal composites are inspected and their fire properties focusing on smoke production are evaluated.</i></p>
15:20	<p>WED-3_MUC_3.02-13 QUASI-STATIC DELAMINATION MODEL FOR LAYERED ANISOTROPIC MATERIAL STRUCTURES</p> <p>Filip Kšiňan (Technical University of Kosice) Roman Vodička (Technical University of Kosice)</p> <p><i>Mathematical model for numerical solution of damage in layered anisotropic material structures has been developed. The concept of solution is based on quasi-static rate-dependent evolution of the delamination process at the interface.</i></p>	<p>WED-3_SEV_3.22-10 HYDROGEL STATE IMPREGNATION OF CELLULOSE FIBRE-PHENOL COMPOSITES: EFFECTS OF FIBRE SIZE DISTRIBUTION</p> <p>Yvonne Aitomäki (Lulea University of Technology) Mikael Westin (Lulea University of Technology) Kristiina Oksman (Lulea University of Technology)</p> <p><i>Cellulose nanofibres networks produce films that have high stiffness and strength but are difficult to impregnate. Good impregnation is found if the CNF networks are impregnated in a hydrogel state.</i></p>	<p>WED-3_VEN_3.17-02 COLUMN INTERACTION IN TUFTED SANDWICH STRUCTURES UNDER EDGEWISE LOADING</p> <p>Jamie Hartley (University of Bristol) Gavin Tse (University of Bristol) James Kratz (University of Bristol) Carwyn Ward (University of Bristol) Ivana Partridge (University of Bristol)</p> <p><i>An experimental test method is used to characterise the behaviour of tufts within a sandwich structure under edgewise crush loading. Video tracking highlights drifting and stacking of the tufts, as well as secondary failure mechanisms taking place.</i></p>	<p>WED-3_BUD_3.10-10 FULLY REVERSED MODE II FATIGUE TESTING</p> <p>Rico Kühlewind (University of Bristol) Luiz Kawashita (University of Bristol) Stephen Hallett (University of Bristol)</p> <p><i>For a better understanding of composite fatigue, work on fully reversed mode II delamination growth was conducted. A test method was introduced. Test results are presented and compared to non reversed fatigue cases. Future challenges are identified.</i></p>	<p>WED-3_STO_3.20-10 EFFECT OF THE SURFI-SCULPT EFFECT ON THE STATIC MECHANICAL PROPERTIES OF COMPOSITE-METAL JOINTS STRENGTHENED BY SURFI-SCULPT</p> <p>Wei Xiong (Imperial College London) Xichang Wang (Beijing Aeronautical Manufacturing Technology Research Institute) Xiaoang Cao (First Aircraft Design Institute) John P. Dear (Imperial College London) Bamber Blackman (Imperial College London)</p> <p><i>The effect of the surfi-sculpt protrusion density on the static mechanical properties of composite-metal joints strengthened by surfi-sculpt is experimentally studied.</i></p>	<p>WED-3_BIA_3.08-10 MICROSTRUCTURE AND FRACTURE PROPERTIES OF GLASS FIBRE-REINFORCED POLYAMIDE 66 WITH HIGH VOLUME FRACTION OF GLASS FIBERS</p> <p>Kazuaki Mizumoto (YKK corporation) Kazuaki Sanada (Toyama Prefectural University) Makoto Kawagoe (Toyama Prefectural University) Mai Mizubayashi (YKK corporation)</p> <p><i>This paper presents the experimental results of fracture properties of injection-molded glass fiber/polyamide 66 composites. The amount of glass fibers was varied from 17 to 41 vol%.</i></p>		<p>WED-3_BRU_2.12-09 LIGHTNING DAMAGE SUPPRESSION IN A CFRP WITH A POLYANILINE-BASED CONDUCTIVE THERMOSET MATRIX</p> <p>Yoshiyasu Hirano (Japan Aerospace Exploration Agency) Tomohiro Yokozeki (University of Tokyo) Yuichi Ishida (Japan Aerospace Exploration Agency) Teruya Goto, Tatsuhiro Takahashi (Yamagata University) Danna Wian, Shoji Itho (Mitsubishi Plastics Inc.) Toshio Ogasawara (Tokyo University of Agriculture and Technology) Masaru Ishibashi (GSI Creos Corporation)</p> <p><i>The effectiveness of lightning damage suppression by a carbon-fiber-reinforced polymer (CFRP) laminate with polyaniline (PANI)-based conductive thermosetting resin was experimentally demonstrated by lightning tests and residual strength tests.</i></p>
15:40	<p>WED-3_MUC_3.02-14 STIFFNESS PREDICTION OF DAMAGED LAMINATES BASED ON THE CONCEPT OF LAMINATE EFFECTIVE STIFFNESS</p> <p>Janis Varna (Lulea University of Technology) Mohamed Loukil (Swerea SI-COMP)</p> <p><i>The concept of the effective stiffness of a unidirectional layer with intralaminar cracks is revisited performing 3-D FEM analysis of laminates, showing that in normalized form the effective stiffness is almost independent on the material and lay-up.</i></p>	<p>WED-3_SEV_3.22-11 MECHANICAL BEHAVIOR OF ANGLE-PLY LAMINATES</p> <p>Ulrich Mandel (Technical University of Munich / Institute for Carbon Composites) Robin Taubert (Technical University of Munich / Institute for Carbon Composites) Roland Hinterhölzl (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>A mechanism based nonlinear constitutive model for composite laminates is proposed. For validation, experimental results of angle-ply tension tests with varying of axis-angle and ply thicknesses are presented.</i></p>	<p>WED-3_VEN_3.17-03 DEFORMATION AND FAILURE BEHAVIOR OF PRE-DAMAGED FOAM-CORE SANDWICH STRUCTURES IN A FOUR-POINT BENDING CONFIGURATION</p> <p>Marianne John (Fraunhofer IMWS) Ralf Schlimper (Fraunhofer IWM) Christian Mudra (Airbus Operations)</p> <p><i>This article deals with the investigation of the mechanical behavior of pre-damaged foam-core sandwich structures. A four-point bending fixture was used to investigate the mechanical behavior of a sandwich structure with low velocity-impact damage.</i></p>	<p>WED-3_BUD_3.10-11 IN-SITU FATIGUE DAMAGE ASSESSMENT OF CARBON FIBRE REINFORCED POLYMER STRUCTURES USING ADVANCED EXPERIMENTAL TECHNIQUES</p> <p>Nikolaos Eleftheroglou (Delft University of Technology) Ralf Schlimper (Fraunhofer IWM) D. S. Zarouchas (Delft University of Technology) Theodoros Loutas (University of Patras)</p> <p><i>This study focused on the in-situ fatigue damage assessment of open-hole carbon/epoxy coupons using Acoustic Emission (AE) and Digital Image Correlation (DIC) techniques.</i></p>	<p>WED-3_STO_3.20-11 EFFECTS OF POST-TREATMENT FOR META-ARAMID NANOFIBER MATS ON THE ADHESION STRENGTH OF EPOXY ADHESIVE JOINTS</p> <p>Seungyoon On (Chonbuk National University) Seong Su Kim (Chonbuk National University)</p> <p><i>In this work, effects of post-treatment for meta-aramid nanofiber mats on the adhesion strength of epoxy adhesive joints were investigated.</i></p>	<p>WED-3_BIA_3.08-11 A MORPHOLOGICAL INDICATOR FOR THE DESCRIPTION OF THE SHORT-FIBER POSITION EFFECT ON THE BEHAVIOR OF A PERIODIC RVE</p> <p>François Rasselet (Safran Composites) Sébastien Joannès (MINES ParisTech) Emilie Roche (Safran Composites) Sébastien Pautard (Safran Composites) Jacques Renard (MINES ParisTech)</p> <p><i>Definition of a local indicator based on the first neighbor distance in a short-fiber reinforced unidirectional composite allowing the comprehension of the effect of the microstructure on the global elastic behavior and to short-list of accurate RVEs.</i></p>		<p>WED-3_BRU_2.12-10 MODELLING OF THE DEGRADATION OF A CARBON-EPOXY COMPOSITE MATERIAL SUBMITTED TO A COUPLED THERMO-MECHANICAL LOAD</p> <p>Camille Mercadé (Institute Pprime) Damien Halm (Institute Pprime) Thomas Rogame (Université de Poitiers)</p> <p><i>In this paper, a model coupling thermal degradation, heat transfers and mechanical behavior is presented, to model the phenomena occurring when a carbon-epoxy composite material is both submitted to high heat fluxes and to a mechanical loading.</i></p>

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)
Keynote lecture 11 (NAP) by Paolo Ermanni, ETH Zürich, Switzerland: MULTIFUNCTIONAL COMPOSITE STRUCTURES FOR MORPHING APPLICATIONS				Keynote lecture 12 (STG) by Pascal Hubert, McGill University Montreal, Canada: TOWARDS SUSTAINABLE MANUFACTURING OF COMPOSITE MATERIALS			
Poster Session 2							
2.04 Bio Composites (5/6)	2.01 Fibers (1/4)	5.13 Additive Manufacturing (1/2)	1.05 Civil Engineering (1/4)	5.04 Textile Composites (1/2)	4.03 Structural Health Monitoring and Control (3/3)	6.02 Self-Healing and Bio-Inspired Designs (1/3)	1.02 Ground-Based Transportation (4/4)
<p>WED-3_BRI_2.04-17 OPTIMIZED BAST FIBER REINFORCED POLYPROPYLENE FOR AUTOMOTIVE APPLICATIONS</p> <p>Florian Gortner (Institute for Composite Materials) Luisa Medina (Institute for Composite Materials) Peter Mitschang (Institute for Composite Materials)</p> <p><i>This paper deals both with the influence of the processing conditions on the mechanical properties and with the mechanical characterization of natural fiber reinforced polymer composites (NFRPC) with an area weight of 1700 g/m².</i></p>	<p>WED-3_NAP_2.01-01 COST EFFICIENT PRODUCTION OF CARBON FIBRES</p> <p>Franz Pursche (Institute of Textile Technology (ITA)) Thomas Gries (RWTH Aachen University) Gunnar Seide (RWTH Aachen University)</p> <p><i>Today's carbon fibre production is very energy- and costintensive, by which a further market penetration of carbon fibres is hindered. This research work shows a method to reduce stabilization times and therefore production cost of carbon fibres.</i></p>	<p>WED-3_LON_5.13-01 ADDITIVE MANUFACTURING OF THERMOSETTING RESINS</p> <p>Hilmar Koerner (Air Force Research Laboratory) Sarah Izor (Air Force Research Laboratory) Ruel McKenzie (Air Force Research Laboratory)</p> <p><i>The design of new high temperature thermosetting resins with high crosslink densities enables additive manufacturing of parts with high service temperatures and excellent thermo-oxidative stability.</i></p>	<p>WED-3_BOR_1.05-01 APPLICATION OF LATTICE COMPOSITE STRUCTURES AS REINFORCING ELEMENTS OF CONCRETE COLUMNS</p> <p>Andrey Skleznev (CRISM) Valery Vasiliev, Alexandr Razin (CRISM)</p> <p><i>Load-carrying capacity and stiffness of a concrete column with composite lattice reinforcement is studied experimentally. Numerical simulation of stress-strain state of the concrete reinforced with composite lattice structure is presented.</i></p>	<p>WED-3_STG_5.04-01 APPROACH TO CHARACTERIZE THE PROCESS DEPENDING MECHANICAL PROPERTIES OF UD-BRAIDED CFRP LAMINATES</p> <p>Christian Metzner (Airbus Group Innovations) Daniel Gizik (Airbus Group Innovations) Jörg Kaufmann (University of Chemnitz) Lothar Kroll (University of Chemnitz)</p> <p><i>In this study a methodic for the characterization of the process depending mechanical properties of unidirectional braided CFRP laminates is presented.</i></p>	<p>WED-3_AUG_4.03-09 NONDESTRUCTIVE TESTING OF COMPOSITES USING A NONLINEAR ACOUSTIC SPECTROSCOPY METHOD</p> <p>Sebastian Eckel, Fodil Meraghni, Pascal Pomarede (Arts et Metiers ParisTech) Nico Felicien Declercq (Georgia Tech Lorraine – G.W. Woodruff School of Mechanical Engineering)</p> <p><i>The work describes an acoustic method based on the damaged material's increased nonlinear transmission behavior. Consequently, the nonlinearity indicates the damage. The aim is to analyse and quantify the nonlinearity to measure the damage severity.</i></p>	<p>WED-3_ING_6.02-01 ARTIFICIALLY ROUGHENED MICROPLATELETS FOR HIGH-PERFORMANCE BIOINSPIRED COMPOSITES</p> <p>Daive Carnelli (ETH Zürich) Rafael Libanori (ETH Zürich) Tobias P. Niebel (ETH Zürich) Andre R. Studart (ETH Zürich)</p> <p><i>This study provides useful guidelines for the design and fabrication of tougher and lighter structural materials by focusing on the role of geometrical interlocking on the micron-scale mechanics of platelet-reinforced bioinspired composites.</i></p>	<p>WED-3_ATH_1.02-12 TIME AND COST EFFECTIVE HANDLING FOR BUILDING UP CARBON FIBER TAILORED BLANKS</p> <p>Jia-Yang Du (Premium Aerotec GmbH) Hilmar Apmann (Premium Aerotec GmbH) Markus Schmidler (J. Schmalz GmbH)</p> <p><i>A new time and cost efficient process enables to build up tailored blanks consisting of 15 different patches within 90 seconds and an accuracy of ±1 mm. Instead of handling each patch individually, stacks of patches are built beneath the endeffector.</i></p>
<p>WED-3_BRI_2.04-18 PROCESSING BAMBOO FOR STRUCTURAL COMPOSITES: INFLUENCE OF PRESERVATIVE TREATMENTS ON SURFACE AND INTERFACE PROPERTIES</p> <p>Darshil Upendra Shah (University of Cambridge) Bhavna Sharma (University of Cambridge) Michael H. Ramage (University of Cambridge)</p> <p><i>Engineered bamboo is being increasingly explored for infrastructure applications. We study the effects of two common preservation treatments, bleaching and steaming, on dynamic surface wettability and adhesive bonding properties of laminated bamboo.</i></p>	<p>WED-3_NAP_2.01-02 CARBON FIBRE WITH AND WITHOUT A PROTECTIVE ULTRATHIN ALUMINA FILM GRAFTED WITH CARBON NANOTUBES FOR HERARCHICAL COMPOSITES OBSERVED BY PTYCHOGRAPHIC X-RAY COMPUTED TOMOGRAPHY</p> <p>Wojciech Szmyt (Institute of Polymer Engineering, FHNW) Samuel Vogel (University of Applied Sciences and Arts Northwestern Switzerland) Mirko Holler, Ana Diaz, Jens Gobrecht (Paul Scherrer Institute) Michel Calame (University of Basel) Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland)</p> <p><i>In our present work we deliver the observation of the CF with and without a protective alumina film grafted with CNTs utilising ptychographic X-ray computed tomography. We present a data analysis methodology for iron nanoparticle detection.</i></p>	<p>WED-3_LON_5.13-02 ADDITIVE MANUFACTURING OF LOCALLY RESONANT COMPOSITE METAMATERIALS</p> <p>Irfan Raza (Imperial College London) Lorenzo Iannucci (Imperial College London) Paul Curtis (Defence Science and Technology Laboratory)</p> <p><i>A custom made multi-material 3D printer had been developed which is design to manufacture locally resonant type metamaterials.</i></p>	<p>WED-3_BOR_1.05-02 APPLICATION OF STEEL-GRFP HYBRID COMPOSITE TO ASYMMETRIC CABLE-STAYED BRIDGE FOR EMERGENCY DISASTER RELIEF</p> <p>Fang-Yao Yeh (National Center for Research on Earthquake Engineering) K.C. Chang (National Taiwan University) Y.C. Sung (National Taiwan University)</p> <p><i>This study develops an asymmetric cable-stayed temporary bridge system for emergency disaster relief. The proposed bridge can be assembled within 6 hours, and possesses the advantages of (1) quick assembly, (2) DIY by residents, and (3) reusability.</i></p>	<p>WED-3_STG_5.04-02 ASSESSMENT OF COMPOSITES REINFORCED WITH INNOVATIVE 3D WOVEN HOLLOW FABRICS</p> <p>Ruben Geerinck (University Ghent) Ives De Baere (UGent, Department of Materials Science and Engineering) Geert De Clercq (UGent, Department of Materials Science and Engineering) Jan Ivens (KU Leuven) Joris Degrieck (Ghent University)</p> <p><i>The development and production of complex 3D woven fabrics and their possibilities within composites with respect to production and properties are explored.</i></p>	<p>WED-3_AUG_4.03-10 ONLINE-MONITORING OF CARBON FIBER REINFORCED PLASTICS USING SILVER NANOPARTICLE BASED INK</p> <p>Till Augustin (Technische Universität Hamburg-Harburg) Hauke H. Langner (Helmut-Schmidt-Universität, Hamburg) Vico Haverkamp (Helmut-Schmidt-Universität, Hamburg) Bodo Fiedler (Technische Universität Hamburg-Harburg)</p> <p><i>Conductive paths of silver nanoparticle based ink are ink-jet printed on CFRP. Electrical resistance measurements allow for in situ detection of delaminations and surface cracks by measuring through the material and along the printed paths.</i></p>	<p>WED-3_ING_6.02-02 BIOINSPIRED COMPOSITES BY VACUUM ASSISTED MAGNETIC ALIGNMENT</p> <p>Madeleine Grossman (ETH Zürich) Florian Bouville (ETH Zürich) Rafael Libanori (ETH Zürich) Andre R. Studart (ETH Zürich)</p> <p><i>A new processing technique for making micro-structured ceramic reinforced polymer matrix composites is explored as a tool for building simultaneously strong and tough composites that mimic the biological composite nacre.</i></p>	<p>WED-3_ATH_1.02-13 TOWARDS THERMOPLASTIC CARBON FIBER REINFORCED PLASTICS FOR THE AUTOMOTIVE INDUSTRY – THE NEED FOR AND POTENTIALS OF FUSION BONDING AND HYBRIDIZATION.</p> <p>Alex Schwingschögl (Technical University of Munich / Institute for Carbon Composites) Nikhil Verghese (SABIC T&I Corporate Research & Development, Composites) Philipp Bruckbauer (Technical University of Munich / Institute for Carbon Composites) Stefan Ehard (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>Currently available welding / fusion techniques for thermoplastic composite and hybrid joining are assessed for their suitability in for the automotive environment.</i></p>
<p>WED-3_BRI_2.04-19 SINGLE STEP FUNCTIONALISATION OF CELLULOSES WITH DIFFERING DEGREES OF REACTIVITY AS A ROUTE FOR IN-SITU PRODUCTION OF ALL-CELLULOSE NANOCOMPOSITES</p> <p>Koon-Yang Lee (Imperial College London) Alexander Bismarck (University of Vienna)</p> <p><i>A method of manufacturing all-cellulose nanocomposites using a single step functionalisation of two different celluloses with differing reactivities is presented.</i></p>	<p>WED-3_NAP_2.01-03 EFFECT OF ROTATION BEHAVIOR ON MECHANICAL PROPERTIES OF MULTI-CELL TYPE NATURAL FIBRE</p> <p>Yuji Niitta (Ube National College of Technology) Koichi Goda (Yamaguchi University)</p> <p><i>In this study was investigated the relation between rotation behavior and fibre mechanical properties. Moreover, Influence of variation in microfibrillar angle on Young's modulus was explored for a single cell fibre using the finite element model.</i></p>	<p>WED-3_LON_5.13-03 CHARACTERIZATION OF COMPOSITES MADE BY ADDITIVE LAYER MANUFACTURING TECHNOLOGIES</p> <p>Jesús Justo Estebarez (Universidad de Sevilla) María José Mesa (Universidad de Sevilla) C. Brioso (Universidad de Sevilla) Luis Távora (Universidad de Sevilla) Federico París (Universidad de Sevilla)</p> <p><i>And compression properties of composites made by additive layer manufacturing technologies are obtained. The properties are compared with common prepreg and ALM materials.</i></p>	<p>WED-3_BOR_1.05-03 CARBON FIBER REINFORCED COMPOSITES PROVED TO BE VERY SUCCESSFUL IN CONSTRUCTION DURING A QUARTER OF A CENTURY</p> <p>Urs Meier (EMPA) Rolf Brönnimann (EMPA) Peter Anderegg (EMPA) Giovanni Terrasi (EMPA) Masoud Motavalli (EMPA) Christoph Czaderski (EMPA)</p> <p><i>The application of carbon fiber reinforced polymers (CFRP) in civil engineering was before 1991 unknown. Today it is worldwide well accepted and proved to be very reliable.</i></p>	<p>WED-3_STG_5.04-03 EXPERIMENTAL STUDY OF THE TOW BUCKLING DEFECT. TOWARDS THE DETERMINATION OF A MULTI-FACTOR APPEARANCE CRITERION FOR THE FORMING PROCESS SIMULATION.</p> <p>Pierre Ouagne (ENI Tarbes/ Université Orléans) Christophe Tephany, Jean Gillibert (Université Orléans) Damien Soulat (ENSAIT)</p> <p><i>This paper deals with the measurement by fringe interferometry of the tow buckle defect appearing during complex shape forming of fabric. The mechanisms conditioning the appearance and growth of the defect are related to an occurrence criterion.</i></p>	<p>WED-3_AUG_4.03-11 ROBUST FAILURE PREDICTION IN FIBER REINFORCED POLYMER RODS USING FREQUENCY ENTROPY OF CLUSTERED ACOUSTIC EMISSION EVENTS</p> <p>Mohammadhadi Shateri, Maha Ghaib, Dagmar Svecova, Douglas Thomson (University of Manitoba)</p> <p><i>A procedure based on the frequency entropy of clustered acoustic emission events is presented to determine when FRP rods are near the failure. Results show 40% and 60% of the ultimate load for GFRP and CFRP respectively, as exceeded service load.</i></p>	<p>WED-3_ING_6.02-03 MAGNETICALLY REINFORCED MULTI-STABLE SHELLS FOR BIO-INSPIRED SHAPE ADAPTATION</p> <p>Andres F. Arrieta (Purdue University) Jascha U. Schmid (ETH Zürich) Hortense Le Ferrand (ETH Zürich) Paolo Ermanni (ETH Zürich) Andre R. Studart (ETH Zürich)</p> <p><i>Bio-inspired hierarchical architectures using magnetically aligned micro-reinforcements are used to produce fast shape adaptation in composite systems based on structural multi-stability. Manufacturing procedures and experimental specimens are shown.</i></p>	<p>WED-3_ATH_1.02-14 TRANSLAMINAR FRACTURE TOUGHNESS CHARACTERISATION OF CARBON FIBRE REINFORCED THERMOPLASTIC COMPOSITES</p> <p>Muhammad Armeerul Atrash Mohsin (Imperial College London) Lorenzo Iannucci (Imperial College London) Emile Greenhalgh (Imperial College London)</p> <p><i>This paper presents the translamellar fracture toughness of NCF biaxial carbon/thermoplastic T700/PA6.6 composite system. The fracture toughness test was performed using compact tension specimens which were optimised through finite element modelling.</i></p>

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15:40

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
16:00	<p>WED-3_MUC_3.02-15 STRAIN RATE DEPENDENT DEFORMATION AND DAMAGE BEHAVIOUR OF TEXTILE-REINFORCED THERMOPLASTIC COMPOSITES</p> <p>Matthias Zschege (Fraunhofer IMWS) Mike Gude (Technical University of Dresden) Robert Boehm (Technical University of Dresden) Werner Hufenbach (Technical University of Dresden)</p> <p><i>A novel experimental procedure is developed for thermoplastic composites for determining elastic, inelastic and viscoelastic quantities with only one test. Additionally, a viscoelastic-plastic damage model is developed and implemented in ABAQUS.</i></p>	<p>WED-3_SEV_3.22-12 OPEN-HOLE RESPONSE OF PSEUDO-DUCTILE THIN-PLY ANGLE-PLY LAMINATES</p> <p>Xun Wu (University of Bristol) Jonathan Fuller (University of Bristol) Michael Wisnom (University of Bristol)</p> <p><i>This paper presents the response of pseudo-ductile thin-ply angle-ply laminates under open-hole tensile loading. The reduction of notch sensitivity within these laminates is also discussed.</i></p>	<p>WED-3_VEN_3.17-04 DESIGN AND AXIAL COMPRESSION OF COMPOSITE SANDWICH CYLINDRICAL SHELLS WITH CORRUGATED CORES</p> <p>Jian Xiong (Harbin Institute of Technology) Ying Gao (Harbin Institute of Technology) L. N. Feng (Harbin Institute of Technology)</p> <p><i>We present a new manufacturing technique for fabricating all composite cylindrical sandwich structures with corrugated cores and axial compression of two types of corrugated cylindrical shells have been conducted.</i></p>	<p>WED-3_BUD_3.10-12 INFLUENCE OF MICRO-VOIDS ON THE FATIGUE BEHAVIOUR OF GLASS/EPOXY LAMINATES</p> <p>Lucio Maragoni (University of Padova) Paolo Andrea Carraro (University of Padova) Marino Quaresimin (University of Padova)</p> <p><i>The influence of micro-sized voids on fatigue damage evolution is investigated on [0/90] S and [0/45/0/-45]S laminates, highlighting a large detrimental effect on both stacking sequence even for small void contents.</i></p>	<p>WED-3_STO_3.20-12 EXPERIMENTAL AND NUMERICAL STUDY OF ADHESIVELY BONDED TUBULAR SPECIMENS UNDER UNIAXIAL LOADING</p> <p>Sonia Braiek (University of Monastir) Redouane Zitoune (University of Toulouse) Ated Ben Khalifa (University of Monastir) Mondher Zidi (University of Monastir)</p> <p><i>The aim of this paper is the study experimentally and numerically the mechanical behavior and the damage propagation of E glass fiber/Vinylester resin adhesively bonded tube using Araldite adhesive.</i></p>	<p>WED-3_BIA_3.08-12 PARTICLE LEVEL SIMULATION OF FIBER MOTION TO DETERMINE CONTINUUM BASED MODELS PARAMETERS FOR FIBER ORIENTATION PRE-DICTION</p> <p>Camilo Perez (UW Madison) Andres Tapia (University of Wisconsin-Madison) Tim Osswald (University of Wisconsin-Madison)</p> <p><i>A particle level simulation was used to simulate fiber suspensions in the concentrated regime. Parameters used in large scale simulations were obtained through this simulations, specifically the Interaction Coefficient of the Folgar-Tucker model.</i></p>		<p>WED-3_BRU_2.12-11 THERMAL MODELLING OF EPOXY BASED INTUMESCENT COATINGS IN FIRE</p> <p>Kai Yi (Aerospace Research Institute of Materials & Processing Technology) Wan Wan Jusoh (Newcastle University) Geoff Gibson (Newcastle University) George Kotsikos (Newcastle University) Sandra Christke (Newcastle University)</p> <p><i>Mathematical modelling of heat transfer process and obtaining thermal information like time-temperature curve of in-house and commercially prepared epoxy based intumescent coating. The modelling predictions and the experimental results show a good agreement with each other.</i></p>
16:20	Coffee Break							
16:50	<p>3.02 Fracture and Damage - Lamina Level (5/5)</p> <p>WED-4_MUC_3.02-16 CONTROVERSIES IN SOME OF THE COMMONLY USED DAMAGE MODELS INCORPORATED IN COMMERCIAL FE CODES</p> <p>Elena Sitnikova (University of Nottingham) Tian-Hong Yu (University of Nottingham) Shuguang Li (University of Nottingham)</p> <p><i>The reliability of predictions of damage in UD composites resulting from the models implemented in Abaqus and LS-Dyna is questioned, following the assessment of the predictions given by the models in some basic loading cases.</i></p>	<p>3.22 Ductile and Pseudo-ductile Composites (4/4)</p> <p>WED-4_SEV_3.22-13 PSEUDO DUCTILITY IN UD CFRP THROUGH INTERLAMINAR AND PLY WEAKENING IN COMMERCIAL FE CODES</p> <p>Jingjing Sun (Imperial College London) Omar Bacarreza (Imperial College London) Paul Robinson (Imperial College London)</p> <p><i>This paper describes a study examining the behaviour of laminates containing continuous ply cuts. A simple analytical model has been used to predict the tensile response of these pre-weakened laminates.</i></p>	<p>3.17 Sandwich Structures (2/4)</p> <p>WED-4_VEN_3.17-05 DEVELOPMENT OF THE LIGHT-WEIGHT INSERTS FOR COMPOSITE SANDWICH PANELS WITH PYRAMIDAL TRUSS CORES</p> <p>Ge Qi (Center for Composite Materials, Harbin Institute of Technology) Li Ma (Harbin Institute of Technology) Jin-Shui Yang (Harbin Institute of Technology) Lin-Zhi Wu (Harbin Institute of Technology)</p> <p><i>Several types of inserts are proposed for composite sandwich panels with pyramidal truss cores. Brief analysis are carried on to discuss the feasibility and validity of insert methods.</i></p>	<p>3.10 Fatigue of Composites (4/6)</p> <p>WED-4_BUD_3.10-13 INVESTIGATION OF COMPOSITES VIBRATION FATIGUE BEHAVIOUR: HIGH FREQUENCY MODE II DELAMINATION PROPAGATION</p> <p>Guillaume Androuin (Institut Supérieur de l'Aéronautique et de l'Espace, ISAE) Laurent Michel (Institut Supérieur de l'Aéronautique et de l'Espace, ISAE) Xiaoqing Gong (Institut Supérieur de l'Aéronautique et de l'Espace, ISAE) Irène Maillet (DGA-TA)</p> <p><i>Mode II crack propagation tests were conducted at high frequency (>200Hz). Low frequency crack propagation tests were conducted at different load ratios. Results in terms of Fatigue Crack Growth Rate vs Energy Release Rate curves are compared.</i></p>	<p>3.20 Joining and Joints (4/6)</p> <p>WED-4_STO_3.20-13 FACTORS ESSENTIAL FOR ADHESIVELY BONDED COMPOSITE JOINT DESIGN IN AUTOMOTIVE APPLICATIONS</p> <p>Georges Romanos (Henkel AG & Co KGaA) Tim Welters (Henkel AG & Co KGaA) Juergen Becher (Henkel AG & Co KGaA) Christos Derdas (Henkel AG & Co KGaA)</p> <p><i>Adhesive bonding gains considerable attention as technique enabling composite parts to be effectively jointed in automotive mass applications. The paper addresses the major parameters and their impact to joint performance and substrate integrity.</i></p>	<p>3.08 Short Fibre Reinforced Thermoplastics (4/4)</p> <p>WED-4_BIA_3.08-13 SIMULATION OF THE DAMAGE MECHANISMS OF GLASS FIBER REINFORCED POLYPROPYLENE BASED ON MICRO SPECIMENS AND 1:1 MODELS OF THEIR MICROSTRUCTURE</p> <p>Sascha Fliegner (Fraunhofer IWM) Tobias Kennerknecht (Fraunhofer IWM) Matthias Kabel (Fraunhofer ITWM)</p> <p><i>Micro tensile specimens are tested until failure. The microstructure of each individual specimen is reconstructed in the form of a finite element model. The experimentally observed damage behavior is accurately captured by the simulations.</i></p>	ESCM Council Meeting 2	ESCM Council Meeting 2

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)
<p>WED-3_BRI_2.04-20 THE POTENTIAL OF EUROPEAN BAMBOO FIBRE FOR COMPOSITE APPLICATIONS: A CHEMICAL-MECHANICAL APPROACH</p> <p>Delphine Depuydt (KU Leuven) Nick Sweygers (Department of Chemical Engineering, Laboratory for Applied Physical Chemistry and Environmental Technology) Lise Appels (Department of Chemical Engineering, Laboratory for Applied Physical Chemistry and Environmental Technology) Jan Ivens (KU Leuven) Aart Van Vuure (KU Leuven)</p> <p>The presented work investigates the tensile properties as well as the sorption behaviour and chemical composition of European bamboo fibres.</p>	<p>WED-3_NAP_2.01-04 FUNCTIONALIZATION OF CARBON FIBERS BY ANODIC OXIDATION: SURFACE ANALYSIS BY X-RAY PHOTOELECTRON SPECTROSCOPY</p> <p>Matthias Bauer (University of Augsburg) Fabian Schubert (University of Augsburg) Judith Moosburger-Will (University of Augsburg) Siegfried Horn (University of Augsburg)</p> <p>The results in this work demonstrate the significant influence of the process parameter of anodic oxidation on carbon fiber surface composition and the possibility to design the carbon fiber surface chemistry. The characterization is done via XPS.</p>		<p>WED-3_BOR_1.05-04 CEMENT MORTAR REINFORCED WITH RECYCLED CARBON FIBRE AND CFRP WASTE</p> <p>Hoang Nguyen (Doshisha University) Toru Fujii (Doshisha University) Kazuya Okubo (Doshisha University) Valter Carvelli (Politecnico di Milano)</p> <p>In this experimental investigation, the effects of recycled carbon fibres (RCF) and carbon fibre reinforced polymer (CFRP) waste of different percentages were measured on the mechanical properties of Portland cement composites.</p>	<p>WED-3_STG_5.04-04 INVESTIGATION ON CREATION OF FIBROUS RINGS AND THEIR INFLUENCE ON THE BRAIDED PREFORM QUALITY</p> <p>Andreas Mierzwa (Technical University of Munich / Institute for Carbon Composites) Christoph Ebel (Technical University of Munich / Institute for Carbon Composites) Tobias Harbers (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p>During braiding of carbon fiber yarns specific defects may occur. One common defect is the fibrous ring. This paper deals with the origin of fibrous rings and its effects on the braided preform quality.</p>		<p>WED-3_ING_6.02-04 FIBRES IN BIOLOGY AND TECHNOLOGY: SMART FIBRE-REINFORCED MATERIALS AND STRUCTURES INSPIRED BY PLANTS AND ANIMALS</p> <p>Thomas Speck (Botanic Garden of the University of Freiburg) Tom Masselter (University of Freiburg) Simon Poppinga (University of Freiburg) Marc Thielen (University of Freiburg) Georg Bauer (University of Freiburg) Katharina Bunk (University of Freiburg) Linnea Hesse (University of Freiburg) Stefanie Schmier (University of Freiburg) Anna Westemeier (University of Freiburg)</p> <p>During the last decade biomimetics has attracted increasing attention. Fibre-reinforced structural materials found in plants and animals share many structural and functional properties with fibre-reinforced compound materials.</p>	
Coffee Break							
2.04 Bio Composites (6/6)	2.01 Fibers (2/4)	5.13 Additive Manufacturing (2/2)	1.05 Civil Engineering (2/4)	5.04 Textile Composites (2/2)		6.02 Self-Healing and Bio-Inspired Designs (2/3)	1.03 Marine (1/1)
<p>WED-4_BRI_2.04-21 THE RELATIONSHIP BETWEEN THE TENSILE PROPERTIES OF NATURAL FIBRES AND THEIR UD COMPOSITES</p> <p>Kevin Hendrickx (KU Leuven) Delphine Depuydt (KU Leuven) Aart Van Vuure (KU Leuven) Jan Ivens (KU Leuven)</p> <p>A method is presented to significantly reduce the amount of samples for single fibre testing. Furthermore, the relationship between single fibre tensile properties and the composite behavior was investigated using this novel testing method.</p>	<p>WED-4_NAP_2.01-05 GETTING BETTER PROCESS PARAMETERS WITH THE MULTISCALE MODELLING OF THE STABILIZATION PROCESS OF PAN-PRECURSORS DURING CARBON FIBER MANUFACTURING</p> <p>Musa Akdere (RWTH Aachen University) Franz Pursche (Institute of Textile Technology (ITA)) Christoph Fresewinkel (RWTH Aachen University) Thomas Gries (RWTH Aachen University) Gunnar Seide (RWTH Aachen University)</p> <p>The paper proposes a simulation model for the stabilization during carbon fibre manufacturing. The exothermic reaction during stabilization results in a higher fiber temperature, which can be predicted during all zones in this model.</p>	<p>WED-4_LON_5.13-04 GRAPHENE-ABS NANOCOMPOSITES FOR FUSED DEPOSITION MODELLING</p> <p>Sithiprumnea Dul (University of Trento) Haroon Mahmood (University of Trento) Luca Fambri (University of Trento) Alessandro Pegoretti (University of Trento)</p> <p>Graphene nanoplatelets (xGnP) were incorporated at 4 wt% in acrylonitrile-butadiene-styrene filaments obtained by melt mixing process for FDM machine. The results clearly show xGnP can improve the thermomechanical performances of 3D-printed parts.</p>	<p>WED-4_BOR_1.05-05 COMPOSITE MATERIAL IN REPAIR OF REINFORCED CONCRETE STRUCTURES</p> <p>Jules Assih (University of Reims Champagne-Ardenne) Ivelina Ivanova (University of Reims Champagne-Ardenne)</p> <p>This study is especially interested in repairing reinforced concrete beams and corbels by bonding composite materials. The purpose of the investigation was to better understanding the material behavior of strengthened damaged structures.</p>	<p>WED-4_STG_5.04-05 NEW TEXTILE TECHNOLOGIES FOR FRP-APPLICATIONS</p> <p>Günther Thielemann (Sächsisches Textilforschungsinstitut e.V.) Reinhard Helbig (STFI e.V.) Martin Braun (STFI e.V.)</p> <p>This paper presents three developments for efficient, waste and time reduced manufacturing processes for semi-finished fibre-reinforced composites.</p>		<p>WED-4_ING_6.02-05 IMPACT AND CAI TESTS ON DOPED CARBON FIBRE REINFORCED PLASTICS WITH BIS-MALEIMIDE BASED POLYMERS. THERMAL CHARACTERIZATION AND HEALING EFFICIENCY VALUE</p> <p>Athanasios Kotrotsos (Applied Mechanics Laboratory) Stavros Tzantalis (University of Patras) Aggelos C. Christopoulos (National Technical University of Athens) Theodoros Loutas (University of Patras) Vassilis Kostopoulos (University of Patras)</p> <p>The present work deals with the effect of the incorporation of bis-maleimide based pre-pregs on the impact and CAI tests of quasi isotropic CFRPs. Additionally the healing functionality and the thermal conductivity has been assessed.</p>	<p>WED-4_ATH_1.03-01 DEVELOPMENT OF PREFABRICATED COMPOSITE PATCHES FOR REPAIR OR STRENGTHEN MARINE STRUCTURES</p> <p>L. Mera (AIMEN Technology Centre) Sara Dasilva Costa (AIMEN Technology Centre) R. de la Mano (AIMEN Technology Centre) Pablo Yarza Sobral (AIMEN Technology Centre) Elena Rodriguez Senin (AIMEN Technology Centre)</p> <p>This paper discloses the procedure development for repair or strengthen marine structures. Thus, composite laminates, surface treatments and adhesives had been selected so to maximise the strength of the solution ensuring its performance over time.</p>

16:00

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	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
17:10	<p>WED-4_MUC_3.02-17 VARIATIONAL ANALYSIS OF ANGLE-PLY LAMINATES WITH ARRAYS OF PARALLEL INTRALAMINAR AND DELAMINATION CRACKS</p> <p>Vladimir Vinogradov (Newcastle University)</p> <p><i>A new variational stress analysis is suggested for effective elastic properties of angle-ply laminates with parallel (but not necessarily coplanar) intralaminar cracks and delamination cracks subjected to general in-plane membrane forces and moments.</i></p>	<p>WED-4_SEV_3.22-14 TAKING ADVANTAGE OF THE HYBRID EFFECT IN THIN-PLY PSEUDO-DUCTILE LAMINATES</p> <p>Michael Wisnom (University of Bristol) Gergely Czel (University of Bristol) Jonathan Fuller (University of Bristol) Meisam Jalalvand (University of Bristol)</p> <p><i>Hybrid laminates and angle-ply laminates with thin unidirectional carbon plies have been shown to give a pseudo-ductile response with more gradual failure. This paper shows the effect of ply thickness on the initial tensile failure strain.</i></p>	<p>WED-4_VEN_3.17-06 EXPERIMENTAL AND NUMERICAL ANALYSIS OF NOMEX HONEYCOMB SANDWICH PANEL INSERTS PARALLEL TO THE FACE SHEETS</p> <p>Ralf Seemann (Technische Universität Hamburg-Harburg) Dieter Krause (Technische Universität Hamburg-Harburg)</p> <p><i>Custom made sandwich inserts, which are placed parallel to the face sheets, are investigated under in-plane tensile loading in experimental and numerical studies. A non-linear simulation model capable of predicting the joint strength is derived.</i></p>	<p>WED-4_BUD_3.10-14 INVESTIGATION OF THE EFFECT OF WATER JET CUTTING AND MACHINING ON CRACK INITIATION IN OFF-AXIS TEST SPECIMENS</p> <p>Jens Jakob Bender (Aalborg University) Jens Ammitzbell Glud (Aalborg University) Esben Lindgaard (Aalborg University)</p> <p><i>The paper describes preliminary fatigue results from off-axis specimen tests. The transmitted light technique is used, but several complications with high contrast gradients are encountered and attempted solved using negative images on transparencies.</i></p>	<p>WED-4_STO_3.20-14 JOINING OF LIGHT METALS TO FIBER REINFORCED POLYMER COMPOSITES BY POWER ULTRASONICS</p> <p>Frank Balle (Technical University of Kaiserslautern) Florian Staab (Technical University of Kaiserslautern) Johannes Born (Composite Technology Center GmbH)</p> <p><i>The application of joining techniques like ultrasonic welding allows a very efficient design of multi-material-components. In the talk hybrid welds out of light alloys to different fiber reinforced thermoplastic composites will be discussed.</i></p>	<p>WED-4_BIA_3.08-14 SINGLE FIBRE CHARACTERIZATION OF CURVED FIBRES WITHIN A THERMOPLASTIC MATRIX USING X-RAY TOMOGRAPHY</p> <p>Dietmar Salaberger (University of Applied Sciences Upper Austria) Michael Jerabek (Borealis Polyolefine GmbH) Christian Hanneschläger (University of Applied Sciences Upper Austria) Johann Kastner (University of Applied Sciences Upper Austria)</p> <p><i>X-ray CT was used to determine key figures for fibre reinforced polymers. Bent fibres like long glass, Cellulose and PVA in PP were analysed. Algorithms for orientation and length were implemented. The Poly Inclusion model approach was tested.</i></p>	ESCM Council Meeting 2	
17:30	<p>WED-4_MUC_3.02-18 FAILURE ANALYSIS OF COMPOSITE PRESSURE VESSELS BASED ON THE ENHANCED FILAMENT WINDING SIMULATION: COMPARING LAYER-BASED AND FIBER BUNDLE-BASED APPROACHES</p> <p>Jörg Multhoff (ISATEC GmbH)</p> <p><i>Filament-wound composite pressure vessels are usually modeled using a multi-layered approach based on the classical laminate theory. A new approach based on a finite element formulation with an embedded fiber-bundle model is being explored.</i></p>	<p>WED-4_VEN_3.17-07 EXPERIMENTAL STUDY OF THE INDENTATION BEHAVIOUR OF TIED FOAM CORE SANDWICH STRUCTURES</p> <p>Mohamed Adli Dimassi (Faserinstitut Bremen) Oliver Focke (Faserinstitut Bremen) Christian Brauner (Faserinstitut Bremen) Axel S. Herrmann (Faserinstitut Bremen)</p> <p><i>The mechanical behaviour of TFC-Sandwich under quasi-static indentation loads was studied with the aim to investigate the effects of the pin material and pin volume fraction on the indentation response and to determine the pin failure modes.</i></p>	<p>WED-4_BUD_3.10-15 MODELLING THE DEGRADATION OF Z-PINS UNDER CYCLIC LOADING CONDITIONS</p> <p>Felix Warzok (University of Bristol) Giuliano Allegri (Imperial College London) Maik Gude (Technical University of Dresden) Stephen Hallett (University of Bristol)</p> <p><i>The findings from a previous micro mechanical study characterising the behaviour of Z-pins under various fatigue loading conditions are transferred into an analytical/numerical model and validated with bespoke meso scale DCB and ELS tests.</i></p>	<p>WED-4_STO_3.20-15 FUSION BONDING OF FIBER REINFORCED THERMOPLASTICS AND THERMOSETS</p> <p>Hinrich Grefe (Technical University of Braunschweig) Stefan Kreling (Technische Universität Braunschweig) R. van Moorlegem (Delft University of Technology) Irene Fernandez Villegas (Delft University of Technology) Klaus Dilger (Technische Universität Braunschweig)</p> <p><i>Fusion bonding of thermoplastic materials and thermosets will generate an adhesion based joint, with the strength highly dependent on the thermosets surfaces conditions.</i></p>	<p>WED-4_BIA_3.08-15 THROUGH-PROCESS MODELING FOR ACCURATE PREDICTION OF SHORT AND LONG TERM ANISOTROPIC MECHANICS IN FIBER REINFORCED THERMOPLASTICS</p> <p>Cathelin Julien (SABIC T&I Corporate Research & Development, Composites) Amin Sedighiamiri (Sabic) Tim Van Erb (Sabic)</p> <p><i>Through-process modelling for accurate prediction of short and long term anisotropic mechanics in fiber reinforced thermoplastics.</i></p>	ESCM Council Meeting 2		
19:30	Gala Dinner							

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)	
<p>WED-4_BRI_2.04-22 INVESTIGATION OF SOUND ABSORPTION AND VIBRATION DAMPING PROPERTIES OF FLAX FIBRE COMPOSITES</p> <p>Le Quan Ngoc Tran (Singapore Institute of Manufacturing Technology) Kede Huang (National University of Singapore) Abhishek Vishwanath Rammohan (National University of Singapore) Wern Sze Teo (Singapore Institute of Manufacturing Technology) Heow Pueh Lee (National University of Singapore)</p> <p><i>Sound absorption, sound transmission and vibration damping behaviour of flax fibre composites were investigated. The study showed the effects of fibre loading, fibre orientation and thickness on the sound and vibration properties of the composite.</i></p>	<p>WED-4_NAP_2.01-06 NANOCELLULOSE/POLY VINYL ALCOHOL FIBRES: A GREEN RENEWABLE HIGH PERFORMANCE COMPOSITE</p> <p>Won Jun Lee (Imperial College London) Adam Clancy (Imperial College London) Eero Kontturi (Aalborg University) Alexander Bismarck (University of Vienna) Milo Shaffer (Imperial College London)</p> <p><i>Preparation of high mechanical performance composite fibre with green renewable CNC nanofillers through wet spinning and post-processing.</i></p>	<p>WED-4_LON_5.13-05 MECHANICAL BEHAVIOUR OF PATTERNED MULTI-MATRIX COMPOSITES WITH GRADIENT PROPERTIES</p> <p>David Stanier (University of Bristol) Ian Gent (University of Bristol) Sree Shankhachur Roy (University of Manchester) Jan Hamerton (University of Bristol) Prasad Potluri (University of Manchester) Dmitry Ivanov (University of Bristol)</p> <p><i>This study is set to explore the feasibility of improving damage resilience around structural features in composite components through varying (a) the internal geometry of the fabric and (b) matrix properties.</i></p>	<p>WED-4_BOR_1.05-06 FAILURE MODES OF CARBON FIBER REINFORCED POLYMER PLATE - STEEL JOINTS WITH DUCTILE OR BRITTLE ADHESIVES</p> <p>Guijun Xian (School of Civil Engineering) Jun He (School of Civil Engineering)</p> <p><i>The failure mode of the FRP-steel joint depends on the relative strain between the CFRP and adhesives. When the adhesive possesses a low strain, the CFRP delamination failure tended to occur. A prediction model of maximum shear stress is proposed.</i></p>	<p>WED-4_STG_5.04-06 SPREADING OF HEAVY TOW CARBON FIBERS FOR THE USE IN AIRCRAFT STRUCTURES</p> <p>Daniel Gizik (Airbus Group Innovations) Christian Metzner (Airbus Group Innovations) Christian Weimer (Airbus Group Innovations) Peter Middendorf (University of Stuttgart)</p> <p><i>In this paper, a study on the process parameters of a commercial spreading machine was conducted. Several heavy tow carbon fibers were tested, compared and their quality regarding the spreading process was evaluated.</i></p>		<p>WED-4_ING_6.02-06 DAMAGE DEVELOPMENT UNDER FATIGUE LOADING IN OPEN HOLE COMPOSITES WITH VASCULESSERGING AS SELF HEALING RESERVOIRS</p> <p>Xenia Tsilimigkra (University of Patras) Stavros Tsantalis (University of Patras) George Sotiriadis (University of Patras) Vassilis Kostopoulos (University of Patras) T. Coope (University of Bristol) Rafael Luterbacher (University of Bristol) Ian Bond (University of Bristol)</p> <p><i>Open hole carbon and glass fiber reinforced polymers, integrated with vasculures, were compared regarding their damage development during interrupted fatigue tests. Ultrasonic C-Scan and Infrared Thermography was applied to visualize the damaged area.</i></p>	<p>WED-4_ATH_1.03-02 EXPERIMENTAL AND NUMERICAL STUDIES OF LARGE-SCALE FILAMENT WOUND T700/X4201 COMPOSITE RISERS UNDER BENDING</p> <p>Dinh-Chi Pham (Department of Engineering Mechanics, Institute of High Performance Computing, A*STAR) Zhoucheng Su (Institute of High Performance Computing) Sridhar Narayanaswamy (Department of Engineering Mechanics, Institute of High Performance Computing, A*STAR) Xudong Qian (National University of Singapore) Zhenyu Yang (Beihang University) Adam Sobey (University of Southampton) R. Ajit Sheno (University of Southampton)</p> <p><i>CFRP composite materials emerges as a potential offshore riser material. We investigate the bending performance of filament wound T700/X4201 composite risers through multi-level experimental procedure and a progressive failure modeling method.</i></p>	17:10
<p>WED-4_BRI_2.04-23 MULTI-DIE VACUUM ASSISTED PULTRUSION OF FLAX/PLA THERMOPLASTIC BIOCOMPOSITE ROD</p> <p>Arnold Oswald (Ecole Polytechnique Montréal) Felix Lapointe (Polytechnique Montréal) Louis Laberge Lebel (Ecole Polytechnique Montréal)</p> <p><i>This study reports the pultrusion of Flax/PLA thermoplastic biocomposite rods. A modular pultrusion line was built to enable different die configurations and implement a vacuum chamber. Effect of temperature, die configuration and vacuum were studied.</i></p>	<p>WED-4_NAP_2.01-07 MANUFACTURE OF CARBON-CARBON COMPOSITES USING CARBON NANOTUBE-GRAFTED CARBON FIBERS AND THEIR THEIR PROPERTIES</p> <p>Geunsung Lee (Seoul National University) Ji Ho Youk (Inha University) Jinyong Lee (Agency for defense development) Woong-Ryeol Yu (Seoul National University)</p> <p><i>In this study, we report about effects of grafted CNTs on carbon-carbon composites. Unidirectional, woven composites are manufactured using prepared CNT-grafted CFs and their mechanical/thermal/electrical properties are measured.</i></p>	<p>WED-4_LON_5.13-06 THE MANUFACTURE OF HONEYCOMB CORES USING FUSED DEPOSITION MODELLING</p> <p>David Pollard (University of Bristol) Carwyn Ward (University of Bristol) Guido Herrmann (University of Bristol) Julie Etches (University of Bristol)</p> <p><i>Exploring the use of 3D Printing for the manufacture of honeycomb cores, this paper evaluates the bond strength of the between filament layers, and the compressive properties of a cores with different wall thicknesses.</i></p>	<p>WED-4_BOR_1.05-07 FATIGUE BEHAVIOUR OF LAMINATED CARBON FIBRE REINFORCED POLYMER STRAPS FOR BRIDGE SUSPENDERS</p> <p>Giovanni Terrasi (EMPA) Fabio Baschnagel (ETH Zürich) Jing Gao (University of Xiamen) Urs Meier (EMPA)</p> <p><i>This paper focuses on the fretting fatigue behaviour of pin-loaded carbon fibre reinforced polymer (CFRP) straps studied as models for suspenders of arch bridges.</i></p>	<p>WED-4_STG_5.04-07 INFLUENCE STUDY AND COMPACTION BEHAVIOR USING ULTRASONIC WELDING FOR PREFORM ACTIVITIES</p> <p>Ulf Henning Neumann (Airbus Group Innovations) Peter Mitschang (Institute for Composite Materials) Christian Weimer (Airbus Group Innovations) Andreas Gessler (Airbus Group Innovations)</p> <p><i>This paper presents the influence shares of ultrasonic welding parameters for preforming of bindered dry fiber materials. Furthermore a comparison to conventional technologies will be shown regarding the compaction behavior and time efficents.</i></p>		<p>WED-4_ING_6.02-07 SELF-HEALING ELASTOMERS – HEALING FUNCTIONALISATION BY POLYMER ANALOGOUS SIDE-GROUP MODIFICATION</p> <p>Anke Nellesen (Bochum University of Applied Sciences) Max von Tapavicza (Fraunhofer UMSICHT) Annette Schmidt (Universität Köln)</p> <p><i>Based on biological self-repairing mechanisms self-healing strategies for elastomers were developed. Ionomeric modification has proven to be best for elastomers. After macroscopic cut, samples showed a recovery of up to 100 % (Elongation at break).</i></p>		17:30
Gala Dinner								19:30

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
9:00	Plenary Lecture 4 (MUC) by Christian Weimer, AIRBUS Group, Germany: THE FUTURE COMPOSITE MATERIALS CHALLENGE IN AERONAUTICS							
	3.13 Durability, Ageing, Creep, Environmental Effects (1/2)		3.17 Sandwich Structures (3/4)	3.10 Fatigue of Composites (5/6)	3.20 Joining and Joints (5/6)	3.19 Buckling and Stability (1/2)	3.16 Fibre, Resin and Laminate Design for Optimized Performance and Manufacture (2/3)	2.11 High Temperature Polymer Composites (1/2)
10:00	<p>THUR-1_MUC_3.13-01 A MULTISCALE FINITE ELEMENT MODEL TO PREDICT THE DIFFUSIONAL BEHAVIOUR OF BIOCOSMITES DEDICATED TO STRUCTURAL APPLICATIONS</p> <p>Romain Leger (Ecole des Mines d'Alès) Guilherme Apolinario Testoni (Ecole des Mines d'Alès) Stéphane Corn (Ecole des Mines d'Alès) Patrick Jenny (Ecole des Mines d'Alès)</p> <p><i>This work is an attempt to develop a numerical parametric model to predict the durability of natural fibre reinforced composites. Sets of parameters have been chosen after an image analysis to build simplified models and simulate water diffusion.</i></p>		<p>THUR-1_VEN_3.17-08 FAILURE MODE MAPS FOR NATURAL FIBER REINFORCED COMPOSITE SANDWICH PANELS</p> <p>Juan Pablo Vitale (Universidad Nacional de Mar del Plata) Gaston Francucci (National University of Mar del Plata) Ariel Stocchi (National University of Mar del Plata)</p> <p><i>Based on theoretical approaches a map predicting the failure mechanism of sandwich panels beam geometry in three point bending can be constructed. In this work, failure maps for sandwich panels are presented for natural fiber honeycomb cores.</i></p>	<p>THUR-1_BUD_3.10-16 MODELLING THE HYSTERESIS BEHAVIOR OF FABRIC CARBON COMPOSITE USING A COLLABORATIVE ELASTO-PLASTIC DAMAGE MODEL WITH FRACTIONAL DERIVATIVE</p> <p>Alina Krasnobrizha (Ecole Centrale de Nantes) Laurent Gornet (Institut de Recherche en Génie Civil et Mécanique) Patrick Rozycki (Institut de Recherche en Génie Civil et Mécanique) Pascal Cosson (Institut de Recherche en Génie Civil et Mécanique)</p> <p><i>The developed modelling of self-heating test is a fast method to determine the fatigue limit for composites. The collaborative model is used to represent the elastoplastic damage behavior and the hysteresis loops and to calculate the dissipation.</i></p>	<p>THUR-1_STO_3.20-16 INDUCTION WELDING OF CARBON FIBER REINFORCED THERMOSET COMPOSITES VIA THERMOPLASTICS: OVERVIEW OF EXPERIMENTAL ANALYSIS OF INDUCTION WELDED SINGLE-LAP JOINTS.</p> <p>Florian Rieger, Liubov Sorochynska (Institute for Composite Materials) Michael Magin (Hochschule Kaiserslautern) Nicole Motsch (Institute for Composite Materials) Elias López Alba (Universidad de Jaén) Bernd Wetzel, Joachim Hausmann (Institute for Composite Materials)</p> <p><i>A method for joining fiber-reinforced polymers by induction welding via thermoplastic layers is presented in the paper. Shear test results and failure mechanism of induction welded specimens are compared to that of benchmark specimens.</i></p>	<p>THUR-1_BIA_3.19-01 BENDING-TWIST COUPLING MECHANISM BY ELASTIC INSTABILITY: AEROELASTIC STUDY</p> <p>Falk Runkel (ETH Zürich) U. Fasel (ETH Zürich) G. Molinari (ETH Zürich) Andres F. Arieta (Purdue University) Paolo Ermanni (ETH Zürich)</p> <p><i>We present a purely passive morphing mechanism for wings exploiting local elastic instabilities for continuous twist variations. The influence of various design parameters on the buckling-induced twist is assessed by aeroelastic analysis techniques.</i></p>	<p>THUR-1_RHO_3.16-06 INTEGRATED SIMULATION-SUPPORTED COMPOSITE PRODUCT DEVELOPMENT – DREAM OR REALITY?</p> <p>Thomas Burkart (P+Z Engineering GmbH) Monika Kreuzmann (P+Z Engineering GmbH) Petra Schilling (P+Z Engineering GmbH)</p> <p><i>In the paper a simulation-supported composite product development process is described and the advantages and challenges are described.</i></p>	<p>THUR-1_BRU_2.11-01 ADVANCED POLYIMIDE BASED COMPOSITES FOR IMPROVED PROCESSING</p> <p>Christoph Meier (Airbus Group Innovations) Patricia Parlevliet (Airbus Group Innovations) Manfred Döring (Fraunhofer LBF)</p> <p><i>Investigations into the neat resin properties as well as the processing of a recently developed thermoset system, consisting of a cyanate ester and a PETI resin in combination with a compatibilizer for the production of CFRP structures are described.</i></p>
10:20	<p>THUR-1_MUC_3.13-02 HYDROTHERMAL AGING OF NATURAL FIBERS COMPOSITE: DETERMINATION OF DIFFUSIVITY PARAMETERS</p> <p>Ludovic Freund (LaBPS) Vanessa Bouchart (LaBPS) Didier Perrin (Ecole des Mines d'Alès) Pierre Chevrier (LaBPS)</p> <p><i>In this paper, we determine the diffusive behavior of flax fibers and two polymers: the acrylic and vinyl ester. Measurements were made on composite material, and an inverse problem was used to obtain the properties of raw materials.</i></p>		<p>THUR-1_VEN_3.17-09 INFLUENCE OF GEOMETRY AND BASE MATERIAL ON THE COMPRESSIVE PROPERTIES OF FOLDCORES</p> <p>Fabian Muhs (University of Stuttgart) Yves Klett (Institute of Aircraft Design (IFB)) Peter Middendorf (University of Stuttgart)</p> <p><i>Using a new hybrid testing method, a study on the dependency of different base materials and geometries on the mechanical, flatwise compression properties for Miura-ori foldcores under otherwise identical conditions will be presented.</i></p>	<p>THUR-1_BUD_3.10-17 MODELLING INITIATION AND EVOLUTION OF FATIGUE DAMAGE IN COMPOSITE LAMINATES</p> <p>Marino Quresimin (University of Padova) Paolo Andrea Carraro (University of Padova) Elisa Novello (University of Padova)</p> <p><i>A damage based strategy for the prediction of fatigue damage and failure in composite laminates is presented. Results and predictions for initiation and propagation of off-axis cracks and delaminations are illustrated and discussed.</i></p>	<p>THUR-1_STO_3.20-17 A QUICK DESIGN TOOL FOR DCB BONDED JOINTS BASED ON A COHESIVE ZONE MODEL AND AN ANALYTICAL ELASTIC FOUNDATION MODEL</p> <p>Albert Turon (AMADE, Universidad de Girona) Mario Cabello (IK4-ikerlan Technology Research Centre) Carlos Sarrado (AMADE, Universidad de Girona) Javier Zurbitu (IK4-ikerlan Technology Research Centre) Jordi Renart (AMADE, Universidad de Girona) Félix Martínez (IK4-ikerlan Technology Research Centre)</p> <p><i>A new analytical DCB model has been proposed based on elastic foundation beam theory coupled with a cohesive zone damage model is proposed for the failure analysis of bonded joints.</i></p>	<p>THUR-1_BIA_3.19-02 BUCKLING BEHAVIOUR OF PPS/CF LAMINATES STIFFENED BY INDUCTION WELDING</p> <p>Gennaro Scarselli (Università del Salento) Silvio Pappadà (Consorzio CETMA, Departments of Materials and Structures Engineering) Giuseppe Buccoliero (CETMA) Andrea Salomi (CETMA) Alfonso Maffezzoli (University of Salento)</p> <p><i>The buckling and post-buckling behaviour under compression of a thermoplastic stiffened panel, assembled with an induction welding technique, and a L-shaped thermoplastic stringer is analysed experimentally and numerically.</i></p>	<p>THUR-1_RHO_3.16-07 OPTIMISING THE PLY DROPPING ORDER IN VARIABLE STIFFNESS LAMINATES USING STACKING SEQUENCE TABLES</p> <p>Daniël Peeters (Delft University of Technology) François-Xavier Irisarri (ONERA-The French aerospace Lab) Mostafa Abdalla (Delft University of Technology)</p> <p><i>The stacking sequence table method, optimising the ply drop order, is combined with a gradient-based optimisation, optimising the fibre angle distribution and ply drop location, to generate optimised variable stiffness, variable thickness laminates.</i></p>	<p>THUR-1_BRU_2.11-02 COMPOSITE MANUFACTURING TECHNOLOGIES FOR NOVEL HIGH TEMPERATURE COMPOSITES</p> <p>Patricia Parlevliet (Airbus Group Innovations) Christoph Meier (Airbus Group Innovations) Christian Metzner (Airbus Group Innovations)</p> <p><i>Several processing routes were investigated for manufacturing of novel composite structures based on cyanate ester/epoxy. High-quality laminates were obtained with RTM and toughening veil resulting in good mechanical properties at high temperatures.</i></p>
10:40	<p>THUR-1_MUC_3.13-03 EFFECT OF MOISTURE UPTAKE ON FLAX FIBER-REINFORCED COMPOSITE LAMINATES: INFLUENCE ON DYNAMIC AND QUASI-STATIC PROPERTIES</p> <p>Michaël Bergès, Romain Leger (Ecole des Mines d'Alès) Véronique Person, Vincent Placet, Emmanuel Ramasso, Jérôme Rousseau, Xavier Gabrion (Univ. Bourgogne Franche-Comté) Stéphane Corn (Ecole des Mines d'Alès) Stephane Fontaine (Univ. Bourgogne Franche-Comté) Patrick Jenny (Ecole des Mines d'Alès)</p> <p><i>This study proposes to investigate the effect of moisture uptake on a wide spectrum of mechanical behaviours of unidirectional flax fibre-reinforced epoxy laminates. It includes tensile monotonic and fatigue testing.</i></p>		<p>THUR-1_VEN_3.17-10 INFLUENCE OF IMPERFECTIONS ON THE STRUCTURAL BEHAVIOUR OF HONEYCOMB CORES</p> <p>Chris Fischer (Technical University of Dresden) Falk Hähnel (Technical University of Dresden) Andreas Hauffe (Technical University of Dresden) Klaus Wolf (Technical University of Dresden)</p> <p><i>In order to investigate the extend and effect of honeycomb imperfections an experimental and numerical study has been conducted. Some of the experimental findings are given in this paper as well as an example for the effect of geometric deviations.</i></p>	<p>THUR-1_BUD_3.10-18 NONDESTRUCTIVE INVESTIGATION OF THE VHCF-ENDURANCE ON CYCLICALLY LOADED CFRP BY X-RAY-REFRACTOGRAPHY</p> <p>Volker Trappe (BAM Federal Institute for Materials Research and Testing) Alexander Müller (BAM Federal Institute for Materials Research and Testing) Stefan Hickmann (BAM Federal Institute for Materials Research and Testing)</p> <p><i>A testing machine was integrated in a SAXS-setup. X-ray refraction topography was performed while the CFRP-samples were tensile and cyclically loaded. This non-destructive technique enables the detection of micro-cracking and IFF especially for CFRP.</i></p>	<p>THUR-1_STO_3.20-18 NUMERICAL INVESTIGATION OF INTERFERENCE FIT ASSEMBLIES AND THE INFLUENCE OF VARYING THE LAMINATE THICKNESS</p> <p>Philipp Fahr (Technical University of Munich) Roland Hinterhölzl (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>Numerical results of interference fit assemblies are compared with experimental and analytical. Reasons for better accordance of numerical results are discussed. Influence of laminate's thickness on contact pressure investigated in a numerical study.</i></p>	<p>THUR-1_BIA_3.19-03 DAMAGE SIMULATIONS IN A COMPOSITE Ω-STIFFENED PANEL IN POSTBUCKLING REGIME</p> <p>Antonio Blázquez (University of Seville) José Reinoso (University of Seville) Federico Paris (Universidad de Sevilla)</p> <p><i>Submodeling global-local technique is used in this work to simulate the initiation and development of skin-stringer debonding of a multi-stringer composite stiffened panel subjected to uniaxial compressive loading.</i></p>	<p>THUR-1_RHO_3.16-08 OPTIMIZATION OF FIBER-STEERED COMPOSITES BY USING THE ISO-CONTOUR METHOD WITH MAXIMUM CURVATURE CONSTRAINT</p> <p>Anna Arsenyeva (Technical University of Munich) Fabian Duddeck (Technical University of Munich)</p> <p><i>The paper presents a novel method for the optimization of fiber-steered composite shell structures, considering manufacturability constraints, expressed in terms of maximum allowed curvature - maximum fiber curvature constraint.</i></p>	<p>THUR-1_BRU_2.11-03 DETERMINATION OF THE FRACTURE TOUGHNESS IN WOVEN-PLY CARBON FIBERS POLYPHENYLENE SULFIDE THERMOPLASTIC COMPOSITES AT TEMPERATURES HIGHER THAN GLASS TRANSITION TEMPERATURE</p> <p>Manel Chabchoub (INSA Rouen) Benoit Vieille (INSA Rouen) Clément Keller (INSA Rouen) Moez Beyaoui (ENI Sfax) Mohamed Taktak (ENI Sfax) Mohamed Haddar (LA2MP - EniSfax) Lakhdar Taleb (INSA Rouen)</p> <p><i>This study was aimed at investigating the crack initiation and propagation in a 5-harness satin weave carbon fabric reinforced PolyPhenylene Sulphide (PPS) with quasi-isotropic stacking sequence.</i></p>
11:00	Coffee Break							

Plenary Lecture 4 (MUC) by Christian Weimer, AIRBUS Group, Germany: THE FUTURE COMPOSITE MATERIALS CHALLENGE IN AERONAUTICS

	2.01 Fibers (3/4)	5.05 Tailored Preforms (1/2)	5.10 Machining (1/2)	1.05 Civil Engineering (3/4)		6.02 Self-Healing and Bio-Inspired Designs (3/3)	1.08 Industrial Applications (1/1)
	<p>THUR-1_NAP_2.01-08 MECHANICAL CHARACTERIZATION OF JUVENILE AND RECYCLED CARBON FIBERS USING SINGLE FIBER TENSILE TESTS</p> <p>Jonas Hütter (Karlsruhe Institute of Technology) Ina Kohlschreiber (Karlsruhe Institute of Technology) Matthias Stoll (Karlsruhe Institute of Technology) Kay Weidenmann (Karlsruhe Institute of Technology)</p> <p><i>Recycling of composites is challenging due to the tight connections between fibers and matrix. Still, recycling is important when aiming for a more sustainable mobility. In this work, different fibers as well as different testing devices are compared.</i></p>	<p>THUR-1_LON_5.05-01 A HOLISTIC APPROACH TO QUALITY MANAGEMENT FOR COMPOSITE FORMING PROCESSES - PROCESS ASSESSMENT, SIMULATIVE MODELS, PROCESS DEVELOPMENT</p> <p>Farbod Nosrat Nezami (CIKONI composites innovation) Diego Schierle (CIKONI composites innovation)</p> <p><i>Using the example of automated preforming, the article introduces a holistic development approach, which covers process selection and process design as well as error detection and mechanical analysis of manufacturing effects on the part performance.</i></p>	<p>THUR-1_BOR_5.10-01 DESIGN OF A NEW TOOL WITH THE INTERMITTENT-SAW-TOOTH STRUCTURE FOR DAMAGE REDUCTION IN DRILLING OF CFRP COMPOSITES</p> <p>Rao Fu (Dalian University of Technology) Zhenyuan Jia (Dalian University of Technology) Fuji Wang (Dalian University of Technology) Youliang Su (Dalian University of Technology) Junwei Yin (Dalian University of Technology) Bin Niu (Dalian University of Technology) Wei Liu (Dalian University of Technology)</p> <p><i>The analysis of the drilling damage is conducted and a novel one-shot drill is proposed with the intermittent-sawtooth structure based on the elastic foundation beam theory. Encouraging reductions on drilling damages are achieved by the novel drill.</i></p>	<p>THUR-1_STG_1.05-08 MECHANICAL PROPERTIES OF NOVEL CARBON/GLASS FIBER HYBRID ROD FOR TENDONS</p> <p>Hiroyuki Oguma (National Institute for Materials Science) Kimiyoshi Naito (NIMS)</p> <p><i>Novel carbon/glass hybrid thermoplastic composite rods have been developed. To investigate mechanical properties of the composite rods, tensile tests, fatigue tests and observations were carried out.</i></p>		<p>THUR-1_ING_6.02-08 RECOVERY AFTER MODE I CRACK PROPAGATION AND IMPACT IN E-GLASS FIBER-REINFORCED POLY(E-CAPROLACTONE)/EPOXY BLENDS</p> <p>Amaël Cohades (EPFL) Véronique Michaud (EPFL)</p> <p><i>Blends of epoxy and PCL were used as a self-healing matrix in fiber-reinforced polymer composites. Modulus, toughness, impact performance as well as damage recovery after thermal mending were measured and compared to those of pure epoxy composites.</i></p>	<p>THUR-1_ATH_1.08-01 FILAMENT-WOUND COMPOSITE CYLINDERS WITH ARCH-SHAPED CROSS SECTIONS USING ULTRA-HIGH FIBER TENSION</p> <p>Yang Wang (Wuhan University of Technology) Lei Zu (Wuhan University of Technology) Jihui Wang (Wuhan University of Technology)</p> <p><i>The binding effect of fiber materials during the filament winding process was successfully simulated using the Finite Element Method (FEM). These results can be useful in designing the filament wound composite structure.</i></p>
	<p>THUR-1_NAP_2.01-09 MICROSCOPIC SURFACE CHARACTERIZATION OF TECHNICAL AND TEXTILE POLYACRYLONITRILE FIBERS</p> <p>Christina Kunzmann (University of Augsburg) Tobias Peter (University of Augsburg) Judith Moosburger-Will (University of Augsburg) Siegfried Horn (University of Augsburg)</p> <p><i>We present a new surface structure on nanoscale of PAN-based fibers utilizing AFM measurements.</i></p>	<p>THUR-1_LON_5.05-02 ADVANCED FORMING OF TAILORED TEXTILES USING LOCALLY MODIFIED PROPERTIES FOR OPTIMIZED LIGHT-WEIGHT STRUCTURES</p> <p>Julian Fial (University of Stuttgart) Patrick Böhrer (University of Stuttgart) Peter Middendorf (University of Stuttgart)</p> <p><i>This paper gives an insight in advanced forming of tailored fibre placement preforms. Local fibre tow manipulation is used to create three-dimensional structures. A mesoscopic reverse draping simulation provides the corresponding TFP yarn paths.</i></p>	<p>THUR-1_BOR_5.10-02 EFFECT OF THE RATIO OF CUTTING DEPTH TO EDGE DIAMETER ON CHIP FORMATION MECHANISM IN MACHINING OF CFRPS</p> <p>Youliang Su, Fuji Wang, Zhenyuan Jia, Junwei Yin, Rao Fu, Bin Niu, Wei Liu (Dalian University of Technology)</p> <p><i>This paper studies the chip formation mechanism in machining of CFRPs. The characteristic of cutting forces and the specific energy under different ratios of cutting depth to cutting edge diameter (RDD) are investigated by the orthogonal machining of CFRPs. And the tool-material interactions are analyzed to investigate the chip formation mechanism.</i></p>	<p>THUR-1_STG_1.05-09 PSEUDO-DUCTILE BRAIDED COMPOSITE RODS (BCRS) PRODUCED BY BRAIDTRUSION</p> <p>Luís Correia (TecMinho) Fernando Cunha (University of Minho) Carlos Mota (University of Minho) Raul Fangueiro (University of Minho) João P. Nunes (University of Minho)</p> <p><i>In this work, BCRs were produced using glass, glass/steel and basalt/steel hybrid fibres as reinforcements. Tensile tests were conducted to evaluate the Pseudo-ductility. The results show a modification of tensile behaviour from fragile to ductile.</i></p>		<p>THUR-1_ING_6.02-09 MENDABLE PROPERTIES OF DIELS ALDER THERMOSETS: THE INFLUENCE OF BACKBONE FLEXIBILITY AND CROSSLINKING DENSITY</p> <p>Eugenio Amendola (CNR - IPCB) Stefania Dello Iacono (CNR - IPCB) Alfonso Martone (CNR - IPCB) Maddalena Giordano (University of Naples) Alfonso Iadonisi (University of Naples)</p> <p><i>A family of thermosetting epoxy resins has been prepared and characterized, containing a pair of Diels-Alder (D-A) adducts in the epoxy precursor backbone.</i></p>	<p>THUR-1_ATH_1.08-02 DESIGN AND CERTIFICATION OF CFRP CHOPPER DISKS FOR THE NEAT II TIME-OF-FLIGHT SPECTROMETER: A LESSON LEARNED</p> <p>Matthias Weinzierl (Technical University of Munich) V. Antonelli (Technical University of Munich / Institute of Lightweight Structures) Horst Baier (Technical University of Munich / Institute of Lightweight Structures)</p> <p><i>CFRP Chopper disks rotate around an axis parallel to a neutron beam, reaching operational speeds of up to 366 Hz. This paper presents all the steps that led to an improved design of the system.</i></p>
		<p>THUR-1_LON_5.05-03 CUSTOMIZED WOVEN FABRICS MADE OF GLASS AND CARBON FIBRES FOR INDUSTRIAL APPLICATIONS</p> <p>Pascal Hubert (McGill University) Volker Hombach (Klevers GmbH & Co. KG) Marcel Haeske (Klevers GmbH & Co. KG) D. Neumann (RWTH Aachen University) Thomas Gries (RWTH Aachen University)</p> <p><i>The paper describes a route toward tailored fabrics that are specially designed and fabricated according to requirements of the FRP manufacturer. Therefore empiric relations between the weave process and the FRP properties are established by testing.</i></p>	<p>THUR-1_BOR_5.10-03 HIGH SPEED GRINDING OF PARTICULATE REINFORCED TITANIUM MATRIX COMPOSITES USING MONOLAYER BRAZED CBN WHEEL</p> <p>Changyong Yang (Nanjing University of Aeronautics and Astronautics) Xinxin Xi (Nanjing University of Aeronautics and Astronautics) W.F. Ding (Nanjing University of Aeronautics and Astronautics)</p> <p><i>High speed grinding experiments of particulate reinforced titanium matrix composites (PTMCs) were carried out using a monolayer brazed CBN superabrasive wheel at the wheel speed of 120 m/s. The grinding performance of PTMCs was examined and evaluated in terms of grinding forces, grinding temperature, surface defects and subsurface characteristics.</i></p>	<p>THUR-1_STG_1.05-10 THE ADAPTIVE DESIGN OF CFRP SINGLE-STRAP GROUND ANCHORS</p> <p>Hai Feng Fan (EPFL) Anastasios Vassilopoulos (EPFL) Thomas Keller (Ecole Polytechnique Fédérale de Lausanne)</p> <p><i>Pull-out experiments were performed on four carbon fiber-reinforced polymer (CFRP) ground anchors simulating their applications in rock and soil. The CFRP tendons used in these anchors comprise a single-strap end on both the ground and air sides.</i></p>		<p>THUR-1_ING_6.02-10 THE ADAPTIVE DESIGN OF HERBACEOUS PLANTS – INSPIRATION FOR BIOMIMETIC SOLUTIONS</p> <p>Olga Speck (University of Freiburg) M. Calliari (University of Freiburg) S. Anandan (University of Freiburg) C. Paul-Victor (University of Freiburg) Thomas Speck (Botanic Garden of the University of Freiburg)</p> <p><i>During evolution plants have evolved the capacity to deal with changing environmental conditions and injuries. Adaptive design in herbaceous plants is the result of significant changes of e.g. mechanical properties and / or geometric configuration.</i></p>	<p>THUR-1_ATH_1.08-03 DEVELOPMENT OF A NEW DEFORMABLE FLEXIBLE ACTIVE FOOT FOR HYDROD ROBOT USING 3D PRINTING OF COMPOSITE</p> <p>Mohamad El Asswad (LISV - UVSQ) Samer Alfayad (LISV - UVSQ) Khaled Khalil (Lebanese University) Fethi Ben Ouezdou (LISV - UVSQ)</p> <p><i>This paper describes the development of a new design of flexible active foot for HYDRO D Robot. This is using the technology of 3D printing of composite material. Optimization is carried out and results are discussed.</i></p>

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
	3.13 Durability, Ageing, Creep, Environmental Effects (2/2)		3.17 Sandwich Structures (4/4)	3.10 Fatigue of Composites (6/6)	3.20 Joining and Joints (6/6)	3.19 Buckling and Stability (2/2)	3.16 Fibre, Resin and Laminate Design for Optimized Performance and Manufacture (3/3)	2.11 High Temperature Polymer Composites (2/2)
11:30	<p>THUR-2_MUC_3.13-04 EXPERIMENTAL/NUMERICAL CHARACTERIZATION OF HYGROTHERMAL AGEING IN GLASS/EPOXY COMPOSITES</p> <p>Iuri Rocha (Knowledge Centre WMC) Sibrand Rajimakers (Knowledge Centre WMC) Rogier Nijssen (Knowledge Centre WMC) Frans Van der Meer (Delft University of Technology) L. J. Sluys (Delft University of Technology)</p> <p><i>A combined experimental/numerical approach is used to investigate the effect of water ingress in glass/epoxy composites. Mechanical tests after multiple immersion durations are combined with a multiphysics/multiscale FE2 numerical analysis method.</i></p>		<p>THUR-2_VEN_3.17-11 INVESTIGATIONS OF VARIOUS SANDWICH MATERIALS AND PROCESSES WITH RESPECT TO AEROSPACE APPLICATIONS</p> <p>Jonas Grünewald (Airbus Group Innovations) Jürgen Fillsinger (Airbus Group Innovations) Patricia Parlevliet (Airbus Group Innovations) Volker Altstadt (University of Bayreuth)</p> <p><i>In this paper two different approaches for the production of composite sandwiches are introduced, which show high potential to lower the manufacturing costs while featuring sufficient performance for certain aerospace applications.</i></p>	<p>THUR-2_BUD_3.10-19 NOVEL TEST METHOD FOR CHARACTERIZATION OF UNIDIRECTIONAL COMPOSITE FATIGUE PROPERTIES</p> <p>Andre Tost (IMA Materialforschung und Anwendungstechnik GmbH) Frank Heinrich (IMA Materialforschung und Anwendungstechnik GmbH) Jens Ridzewski (IMA Materialforschung und Anwendungstechnik GmbH)</p> <p><i>The development and test results of a novel test method for the fatigue characterization of unidirectional composites will be presented, suitable for all load ratios and a wide range of laminate thicknesses.</i></p>	<p>THUR-2_STO_3.20-19 METAL REINFORCEMENT AROUND FASTENER HOLES IN COMPOSITES</p> <p>Sahar Akbarpour (KTH Royal Institute of Technology) Stefan Hallström (KTH Royal Institute of Technology)</p> <p><i>A local reinforcement concept is introduced where metal inserts are implemented in the form of stacked patches around fastener holes in composites. The specimens with optimized inserts show 50-60% improved bearing strength in pin-loaded tests.</i></p>	<p>THUR-2_BIA_3.19-04 NUMERICAL INVESTIGATION ON INITIAL POST-BUCKLING BEHAVIOUR OF COMPOSITE THIN-WALLED STRUCTURE</p> <p>Jiayi Yan (University of Nottingham) Shuguang Li (University of Nottingham) Shihui Duan (Aircraft Strength Research Institute Xi'an City)</p> <p><i>(1) The analytical expression of first initial post-buckling coefficient of simply supported curved shell subjected to uniaxial compression is presented. (2) Numerical results show excellent agreements with analytical values.</i></p>	<p>THUR-2_RHO_3.16-09 STACKING SEQUENCE OPTIMIZATION OF CURVED UD-CFRP LAMINATES FOR IMPROVING UNFOLDING STRENGTH CONSIDERING THERMAL RESIDUAL STRESSES</p> <p>Juan Manuel González-Cantero (FIDAMC) Enrique Graciani (Universidad de Sevilla) Federico Paris (Universidad de Sevilla) Bernardo López (FIDAMC)</p> <p><i>The present study shows results of a new analytical model to analyse the effect of residual stresses, due to the cooling after solidification in the manufacturing process, on the unfolding failure. Results are used to optimize the stacking sequence.</i></p>	<p>THUR-2_BRU_2.11-04 FIBRE REINFORCED POLYIMIDE COMPOSITES AND STRUCTURES MANUFACTURED WITH RESIN TRANSFER MOULDING – OVERVIEW OF PROCEDURES AND PROPERTIES</p> <p>Patrik Fernberg (Swerea SICOMP)</p> <p><i>In this paper, the major outcomes from a recently completed research program with ambition to develop polyimide carbon fibre composites with temperature ability above 360°C are reported.</i></p>
11:50	<p>THUR-2_MUC_3.13-05 INFLUENCE OF WATER ABSORPTION ON LONG-TERM STRENGTH FOR UNIDIRECTIONAL CFRP</p> <p>Kazuki Komatsuda (Kanazawa Institute of Technology) Masayuki Nakada (Kanazawa Institute of Technology) Yasushi Miyano (Kanazawa Institute of Technology)</p> <p><i>The tensile and compressive static strengths in the longitudinal and transverse directions of unidirectional CFRP under Dry and Wet conditions are evaluated using accelerated testing methodology (ATM).</i></p>		<p>THUR-2_VEN_3.17-12 NOVEL CRACK STOPPER CONCEPTS FOR LIGHTWEIGHT FOAM CORED SANDWICH STRUCTURES - PERFORMANCE UNDER STATIC AND FATIGUE LOADS, FE-MODELLING AND POTENTIAL FOR USE IN REAL STRUCTURES</p> <p>Georgios Martakos (Aalborg University) Wei Wang (University of Southampton) Jens H Andreasen (Aalborg University) Janice Dullieu-Barton (University of Southampton) Christian Berggreen (Technical University of Denmark) Ole Thybo Thomsen (University of Southampton)</p> <p><i>Three novel crack stopper designs for foam cored composite sandwich structures have been investigated with respect to their ability to deflect and arrest propagating face sheet/core debonding cracks.</i></p>	<p>THUR-2_BUD_3.10-20 NUMERICAL AND EXPERIMENTAL EVALUATION OF FATIGUE PERFORMANCE OF BEARING LAMINATES</p> <p>Marco Hoffmann (Airbus Group Innovations) Victoria Otto (Airbus Helicopters) Tamas Havar (Airbus Group Innovations) Elif Ahci (Airbus Helicopters)</p> <p><i>A numerical method was developed to predict the fatigue behaviour of composite laminates. It was validated on coupon level and applied to predict the failure of bearing laminates.</i></p>	<p>THUR-2_STO_3.20-20 ADHESIVE PROPERTY MODIFICATION THROUGH ADDITION OF MWNTS FOR DISSIMILAR MATERIAL JOINT APPLICATIONS</p> <p>Maria Konstantakopoulou (Newcastle University) George Kotsikos (Newcastle University)</p> <p><i>The influence on the bond strength of co-cured CFRP/Steel and GFRP/Aluminium single lap joints with three overlap lengths (25mm, 40mm and 60mm) through the addition of MWNTs into the epoxy adhesive used has been investigated.</i></p>	<p>THUR-2_BIA_3.19-05 ON LAY-UP OPTIMIZATION OF ANISOTROPIC COMPOSITE PLATES IN POST-BUCKLING</p> <p>Sergey Selyugin (Airbus Operations)</p> <p><i>The post-buckling stiffness maximization optimality conditions. The conditions consist of two terms, one of them leads to zero twisting moment in principal curvature axes, another one leads to zero shear flow in principal 2D-strain axes.</i></p>	<p>THUR-2_RHO_3.16-10 STRESS ANALYSIS AND DESIGN SUGGESTIONS FOR MULTI-LOOP CARBON ROVING ROSETTES TO REINFORCE BOLT-LOADED OPEN-HOLE LAMINATES</p> <p>Luise Kärger (Karlsruhe Institute of Technology) Tim Botzkowski (EDAG Engineering GmbH) Siegfried Galkin (Karlsruhe Institute of Technology) Sebastian Wagner (Natural and Medical Sciences Institute (NMI)) Sebastian Sikora (German Aerospace Center)</p> <p><i>An alternative to TFP is presented, where winded carbon rovings are twisted around a bolt. Based on an experimentally validated, mesoscopic FE model generator, various multi-loop configurations are evaluated in terms of stresses and damage behavior.</i></p>	<p>THUR-2_BRU_2.11-05 THE EFFECT OF HIGH TEMPERATURE ON THE MECHANICAL PERFORMANCE OF NOVEL HIGH TG POLYIMIDE-BASED CARBON FIBRE-REINFORCED LAMINATES</p> <p>Spyros Tsampas (Swerea SICOMP) Patrik Fernberg (Swerea SICOMP) Roberts Joffe (Lulea University of Technology)</p> <p><i>In this study, the outcomes from the mechanical testing of the carbon fibre-reinforced polyimide composite system T650/NEXIM-ID® MHT-R at ambient and elevated temperatures are presented.</i></p>
12:10	<p>THUR-2_MUC_3.13-06 INVESTIGATION OF THERMAL AGEING OF ADVANCED CFRP TOOLING LAMINATE BY GAS PERMEABILITY</p> <p>Philipp Kammerhofer (Technical University of Munich / Institute for Carbon Composites) Swen Zaremba (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>Within this study the relation of tooling composite porosity and thermal ageing with subject to the ageing temperature, the laminate thickness and the application of binder within the laminate was observed.</i></p>		<p>THUR-2_VEN_3.17-13 PILOT STUDY ON AN ANALYTICAL SIZING TOOL APPROACH FOR INSERT LOAD INTRODUCTIONS IN SANDWICH ELEMENTS</p> <p>Johannes Wolf (German Aerospace Center) Marco Brysch (German Aerospace Center) Christian Hühne (German Aerospace Center)</p> <p><i>An analytic formula is used for predicting the transverse load capability of insert load introductions within an insert sizing tool. The discrepancies to experiments results as well as the parameters of influence are discussed.</i></p>	<p>THUR-2_BUD_3.10-21 OPEN HOLE AND COMPRESSION AFTER IMPACT TESTING OF CARBON FIBRE/EPOXY LAMINATES AND THE INFLUENCE OF ENVIRONMENTAL EXPOSURE</p> <p>Katleen Vallons (KU Leuven) Takuya Karaki (Toray) Ichiro Taketa (Toray) Stepan Lovom (KU Leuven) Ignas Verpoest (KU Leuven)</p> <p><i>This paper contains the results of a study on the open hole tensile and compression properties and the compression after impact properties of a carbon fibre - epoxy composite, with and without exposure to environmental conditioning.</i></p>	<p>THUR-2_STO_3.20-21 DESIGN TOOL FOR HYBRID BONDED/BOLTED COMPOSITE JOINTS</p> <p>Valentin Romanov (McGill University) Kobye Bodjona (McGill University) Larry Lessard (McGill University))</p> <p><i>An industry-relevant engineering tool is developed for the strength modeling and initial design of hybrid bolted/bonded joints. Fully parametric, this tool is intended to be put into the direct industrial use..</i></p>	<p>THUR-2_BIA_3.19-06 PROGRESSIVE FAILURE ANALYSIS IN POST-BUCKLED CFRP STIFFENED PANEL UNDER COMPRESSION</p> <p>Nidhal Bouslama (Université de Sherbrooke) Ahmed Maslouhi (Université de Sherbrooke) Patrice Masson (Mechanical Engineering Department) Said Jazouli (Bombardier Aerospace)</p> <p><i>A finite-element model is developed based on progressive failure analysis (PFA). The proposed model shows ability to predict correctly the final strength and simulate main damage modes involved in post buckled CFRP stiffened panel under compression.</i></p>	<p>THUR-2_RHO_3.16-11 THE INFLUENCE OF FIBRE ANGLE AND RESIN PROPERTIES ON UNCURED INTERPLY SHEAR</p> <p>Samuel Erland (University of Bath) Timothy Dodwell (University of Exeter) Richard Butler (University of Bath)</p> <p><i>Interply shear is investigated for angled ply interfaces using a previously established methodology. Results are discussed with the aid of surface topology data, with a view towards validating findings on a laminate scale demonstrator.</i></p>	<p>THUR-2_BRU_2.11-06 MULTIFUNCTIONAL HYBRID COMPOSITES FOR THERMAL BARRIER AND HIGH TEMPERATURE APPLICATIONS</p> <p>Luis Carlos Herrera-Ramírez (IM-DEA Materials Institute) Manuela Cano (IMDEA Materials Institute) Roberto Guzman de Villoria (IM-DEA Materials Institute)</p> <p><i>Here, we present a hybrid filler, based in hollow glass microspheres and carbon nanofibers. The resulting composites have lower density and thermal conductivity but improved thermal diffusivity and electrical conductivity, than the neat resin.</i></p>

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)
2.13 Electrical Properties of Continuous Fibre Reinforced Composites (1/1)	2.01 Fibers (4/4)	5.05 Tailored Preforms (2/2)	5.10 Machining (2/2)	1.05 Civil Engineering (4/4)	8.01 Composite Clusters and Networks (1/1)		
<p>THUR-2_BRI_2.13-01 A COMPREHENSIVE STRATEGY TO INCREASE THE OUT-OF-PLANE THERMAL CONDUCTIVITY OF CARBON FIBER COMPOSITES PROCESSED BY VACUUM ASSISTED RESIN TRANSFER MOLDING</p> <p>Jens Schuster (Hochschule Kaiserslautern) Martin Schütz (Hochschule Kaiserslautern)</p> <p><i>Design and modeling of thermal conductivity of carbon fiber reinforced plastics by introducing thermally high conductive vertical carbon fibers and aluminum particle loading of the matrix. The impregnation of the 3D-woven preform is done by VARTM.</i></p>	<p>THUR-2_NAP_2.01-10 SURFACE CHEMISTRY AND SURFACE ENERGY OF NATURAL FIBRES BY XPS, IN-LENS SEM AND INVERSE GAS CHROMATOGRAPHY</p> <p>Angelica Legras (University of Queensland) Michael T. Heitzmann (University of Queensland) Rowan W. Truss (University of Queensland)</p> <p><i>This paper highlights the capabilities and the complementarity of advanced surface techniques to characterise bast fibre surfaces in order to aid in the design and manufacturing of biocomposites.</i></p>	<p>THUR-2_LON_5.05-04 EXPERIMENTAL AND SIMULATION STUDY ON THE PERFORMANCE OF FIBER PATCH PLACEMENT (FPP)</p> <p>Neven Majic (Cevotec GmbH) Herbert Weidinger (Cevotec GmbH) Felix Michl (Cevotec GmbH) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>The presented work shows a study on the performance of patch-based composites compared to composites with quasi-isotropic (QI) laminate. Experimental results including a digital image correlation will be used to evaluate the simulation results.</i></p>	<p>THUR-2_BOR_5.10-04 IMPACT OF THE ABRASIVE WATER JET MILLING PROCESS ON THE DAMAGE AND SURFACE CHARACTERISTICS OF CFRP COMPOSITE.</p> <p>Akshay Hejjaji (Institut Clément Ader) Redouane Zitoune (University of Toulouse) Laurent Crouzeix (Institut Clément Ader) Francis Collobet (Institut Clément Ader) Sabine Le Roux (Institut Clément Ader)</p> <p><i>This work investigates the influence of abrasive water jet milling on the surface characteristics and damage of CFRP specimens. Jet pressure and milling path strategy are important parameters that affect the machining quality and damage (crater).</i></p>	<p>THUR-2_STG_1.05-11 METHODS FOR THE SERVICE LIFETIME PREDICTION OF COMPOSITE MATERIALS UNDER STATIC LOAD</p> <p>Stefan Gloggnitzer (Montanuniversität Leoben) Peter Guttman (Montanuniversität Leoben)</p> <p><i>Based on creep or creep rupture test in combination with time-temperature superposition models it is possible to describe the long term material behavior of thermoset unidirectional fiber reinforced composites for the usage in the civil industry.</i></p>	<p>THUR-2_AUG_8.01-01 FROM MANUAL TO SERIAL PRODUCTION – PHOTONIC TOOLS FOR LIGHTWEIGHT CONSTRUCTION</p> <p>Peter Jäschke (Laser Zentrum Hannover e.V.)</p> <p><i>In the initiative "Photonic Processes and Tools for Resource-Efficient Lightweight Construction" the BMBF is aiming at overcoming existing constraints regarding the wide use of lightweight materials in serial production.</i></p>		
<p>THUR-2_BRI_2.13-02 CONDUCTIVITY IMPROVEMENT BY USING SILVER COATED KNITTING YARN IN NCF REINFORCED LAMINATES</p> <p>Johannes Rehbein (German Aerospace Center)</p> <p><i>Using silver coated knitting yarns increases the through-thickness conductivity of NCF-reinforced laminates to up to 540 S/m.</i></p>	<p>THUR-2_NAP_2.01-11 INVESTIGATION OF THE STATISTICAL DISTRIBUTIONS OF FRACTURE STRENGTHS FOR VARIOUS FIBERS USING THE TOW TESTING APPROACH</p> <p>Jacques Lamon (CNRS)</p>	<p>THUR-2_LON_5.05-05 STRATEGIES TO INCREASE THE MECHANICAL PERFORMANCE OF LONG FIBER PATCH PREFORMS</p> <p>Bernhard Horn (Technical University of Munich) Christoph Ebel (Technical University of Munich / Institute for Carbon Composites) Klaus Drechsler (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>Patched laminates show a premature failure due to high peeling forces in the outer plies. The influence of these stresses on specimens with different amount of layers and strategies to reduce this effect are presented.</i></p>	<p>THUR-2_BOR_5.10-05 INFLUENCE OF AMPLITUDE AND FREQUENCY ON CUTTING AND SURFACE INTEGRITY DURING ULTRASONIC VIBRATION ASSISTED GRINDING CFRP</p> <p>Yan Chen (Nanjing University of Aeronautics and Astronautics) Yucan Fu (Nanjing University of Aeronautics and Astronautics)</p> <p><i>The feasibility of varying amplitude and frequency was analyzed by changing the overhang length of tool. And the effect of amplitude and frequency on the quality of machining was discussed.</i></p>	<p>THUR-2_STG_1.05-12 SHEAR CONNECTIONS BETWEEN GFRP PULTRUDED PROFILES AND CONCRETE: A COMPARISON BETWEEN BOLTING AND BONDING</p> <p>Alaa Koaik (Universite Lyon) Sylvain Bel (Universite Lyon) Bruno Jurkiewicz (Universite Lyon)</p> <p><i>In this paper, push out tests are conducted to examine the mechanical behavior of two different connections between GFRP pultruded profiles and concrete: mechanical bolting and adhesive bonding.</i></p>	<p>THUR-2_AUG_8.01-02 STRENGTHENING EUROPEAN COMPETITIVENESS THROUGH A PAN-EUROPEAN NETWORK OF CLUSTERS OF EXCELLENCE ON AUTOMOTIVE COMPOSITES</p> <p>Marcos Ierides (Bax & Willems Consulting Venturing) Laszlo Bax (Bax & Willems Consulting Venturing) Harilaos Vasiladis (Bax & Willems Consulting Venturing) Ignacio Magallon (Universitat Politècnica de Catalunya) Jacques Komornicki (European Chemical Industry Council - Cefic aisbl)</p> <p><i>The paper examines the potential of increasing Europe's competitiveness in the field of automotive composites by enhancing the communication, coordination, and knowledge exchange among existing clusters dispersed around Europe.</i></p>		11:50
<p>THUR-2_BRI_2.13-03 CYCLIC TESTING OF NOVEL CARBON FIBER BASED STRAIN SENSOR WITH SPATIAL RESOLUTION</p> <p>Robin Höhne (Technical University of Dresden) Pawel Kostka (Technical University of Dresden) Niels Modler (Technical University of Dresden)</p> <p><i>An innovative carbon fiber strain sensor based on a reversibly opening and closing of CF filament fragments is proposed. In this work, the cyclic behavior of the sensor is investigated for the first time in order to identify current limitations.</i></p>		<p>THUR-2_LON_5.05-06 TAILORED THERMOPLASTIC PREFORMING WITH CONTINUOUSLY AUTOMATED CUTTING AND ROBOTIC PICK AND PLACE PROCESSES OF VARIOUS SEMI-FINISHED GOODS</p> <p>Michael Kühnel (German Aerospace Center) Alfons Schuster (German Aerospace Center) Christian Rähdtz (German Aerospace Center) Michael Kupke (German Aerospace Center)</p> <p><i>In contrast to existing, inflexible and costly production lines and with respect to industry's needs DLR invented a highly flexible and continuously automated process chain "from fabric delivery to the tailored preform" with comparably low invest.</i></p>	<p>THUR-2_BOR_5.10-06 LASER CUTTING AND THE INFLUENCE ON THE MECHANICAL PROPERTIES OF LONG FIBRE REINFORCED CF/PPS AND CF/PEI</p> <p>Sandra Royo Pérez (Element Materials Technology) Peter Hansen (Element Materials Technology) Richard Staehr (Laser Zentrum Hannover e.V.) Sven Bluemel (Laser Zentrum Hannover e.V.) Verena Wippo (Laser Zentrum Hannover e.V.) Stefan Bastick (Element Materials Technology) Peter Jäschke (Laser Zentrum Hannover e.V.)</p> <p><i>This paper investigates the mechanical properties of laser cut thermoplastic carbon fibre reinforced plastics (CFRP) compared to conventionally machined specimens, mainly mechanical cutting, using standard and non-standard test geometries.</i></p>	<p>THUR-2_STG_1.05-13 TESTS FOR THE CHARACTERIZATION OF FIBER REINFORCED AUTOCLAVED AERATED CONCRETE</p> <p>Maria Bruna Alba (ENEA) Tiziana Cardinale (ENEA) Piero De Fazio (ENEA) G. F. Lista (ENEA) Corradino Spasato (ENEA)</p> <p><i>Main aim of this paper is to verify how the addition of basalt fibers to autoclaved aerated concrete may improve its performance from a mechanical point of view. The composite material has been characterized according to the standard rules.</i></p>	<p>THUR-2_AUG_8.01-03 THE CENTRE FOR RESEARCH AND TECHNOLOGY FOR RESOURCE-EFFICIENT LIGHTWEIGHT STRUCTURES OF ELECTRIC MOBILITY (FOREL)</p> <p>Michael Stegelmann (Technical University of Dresden) Michael Müller (Technical University of Dresden) Maik Gude (Technical University of Dresden)</p> <p><i>FOREL is a national, comprehensive platform for the development of lightweight system solutions for the electric mobility. The main topics and results of FOREL are presented in this paper.</i></p>		12:10

	Munich (MUC)	Seville (SEV)	Venice (VEN)	Budapest (BUD)	Stockholm (STO)	Biarritz (BIA)	Rhodes (RHO)	Bruges (BRU)
12:30	<p>THUR-2_MUC_3.13-07 RELATION BETWEEN TEMPERATURE AND PHYSICAL AGEING OF WIND TURBINE BLADE MATRIX MATERIAL</p> <p>Sibrand Raijmakers (Knowledge Centre WMC) Juri Rocha (Knowledge Centre WMC) Rogier Nijssen (Knowledge Centre WMC)</p> <p><i>The relation between temperature and physical ageing is evaluated for a neat epoxy material commonly used in wind turbine blades. The mechanical and thermal behaviour is analysed to quantify the degree of physical ageing with respect to ageing time.</i></p>		<p>THUR-2_VEN_3.17-14 STATIC AND CYCLIC DAMAGE BEHAVIOR OF A CELLULAR COMPOSITE AND ITS APPLICATION IN A SANDWICH STRUCTURE</p> <p>Sergej Diel (Audi AG) Otto Huber (University of Applied Sciences Landshut)</p> <p><i>A sandwich skateboard with carbon fiber reinforced face layers and a composite core (glass foam granule in epoxy resin) is shown. For the core material a continuum damage mechanics model for uniaxial static / cyclic loading is developed and verified.</i></p>	<p>THUR-2_BUD_3.10-22 PERIDYNAMICS FOR FATIGUE DAMAGE PREDICTION IN NOTCHED COMPOSITES</p> <p>Yile Hu (University of Arizona) Erdogan Madenci (University of Arizona) Nam Phan (Naval Air Systems Command (NAVAIR))</p> <p><i>This study presents a peridynamic modeling of laminated composites with arbitrary fiber orientation and stacking sequence in order to predict damage initiation and its growth under cyclic loading.</i></p>	<p>THUR-2_STO_3.20-22 QUASI-STATIC STRENGTH OF HYBRID BONDED-BOLTED SINGLE-LAP JOINTS</p> <p>Kobye Bodjona (McGill University) Larry Lessard (McGill University)</p> <p><i>In this work the quasi-static strength of bonded and hybrid bonded-bolted single-lap joints with different types of adhesive is investigated experimentally.</i></p>	<p>THUR-2_BIA_3.19-07 ROBUST SIZING OF LARGE THIN-WALLED, COMPOSITE STRUCTURES SENSITIVE TO BUCKLING.</p> <p>Vincent De Groof (Intales GmbH) Herbert Haller (Intales GmbH) Manfred Gratt (Intales GmbH)</p> <p><i>An iterative method for nonlinear buckling analysis using commercial FE solvers is presented. The method is verified and compared using results of a full scale test campaign.</i></p>	<p>THUR-2_RHO_3.16-12 ULTRA-LIGHTWEIGHT CFRP CORES MADE BY INTERLOCKING METHOD: FABRICATION AND EVALUATION</p> <p>Juan Pablo Vitale (Universidad Nacional de Mar del Plata) Gaston Francucci (National University of Mar del Plata) Helmut Rapp (Universität der Bundeswehr München) Ariel Stocchi (National University of Mar del Plata)</p> <p><i>In this paper, carbon fiber square-honeycomb are obtained by an interlocking method. Three different geometrical patterns are studied. Compressive and shear strength are evaluated. Results are compare to analytical and numerical models.</i></p>	
12:50			<p>THUR-2_VEN_3.17-15 TWO-SPAN TESTS FOR SANDWICH PANELS UNDER SIMULATED TEMPERATURE AND EXTERNAL LOAD</p> <p>Harald Nelke (Technische Universität Darmstadt) Jörg Lange (Technische Universität Darmstadt)</p> <p><i>Sandwich panels for building construction: Simulated central support tests are able to reproduce real two span conditions for wall panels. For roof panels they are clearly on the safe side. A wider mid-support increases the performance in both cases.</i></p>	<p>THUR-2_BUD_3.10-23 SUITABILITY OF STIFFNESS AND STRENGTH BASED CONCEPTS FOR THE FATIGUE-LIFE PREDICTION OF COMPOSITES</p> <p>Gerald Pinter (Montanuniversität Leoben) Julia Maier (Montanuniversität Leoben) Markus Wolfahrt (Polymer Competence Center Leoben GmbH) Clara Schuecker (Montanuniversität Leoben)</p> <p><i>A critical review on the applicability of fatigue-life prediction tools available at the moment in the scientific and industrial community is given. Potentials and weaknesses of the different theories are discussed.</i></p>	<p>THUR-2_STO_3.20-23 SHEAR-OUT FAILURE BEHAVIOUR OF SURFACE STRUCTURED METALLIC Z-REINFORCEMENTS FOR CFRP LAMINATES AND JOINTS</p> <p>Michael Juergens (Airbus Group Innovations) Manuel Tiago von Hafe Pérez Ferreira da Silva (Airbus Group) Elisabeth Ladstätter (Technical University of Munich / Institute for Carbon Composites)</p> <p><i>A novel reinforcement technology for CFRP/CFRP adhesively bonded joints is presented as a substitute for riveting and bolting. Shear out failure behaviour is discussed and a bridging law is established for further investigations on a component level.</i></p>	<p>THUR-2_BIA_3.19-08 TORSION-INDUCED BUCKLING OF VARIABLE STIFFNESS COMPOSITE CYLINDERS</p> <p>Mohammad Rouhi (Concordia University, Montreal) Hossein Ghayoor (Concordia University) Suong V. Hoa (Concordia University) Mehdi Hojjati (Concordia University)</p> <p><i>Variable stiffness composite cylinders with circular and elliptical cross-sections made by fiber steering are designed and optimized for maximum torsion-induced buckling capacity. A metamodeling based design optimization method is used for this work.</i></p>	<p>THUR-2_RHO_3.16-13 VARIABLE STIFFNESS COMPOSITES FOR ROTATING PRE-TWISTED PLATES</p> <p>Matthew Thomas (Bristol University) Paul Weaver (University of Bristol) Stephen Hallett (University of Bristol)</p> <p><i>A methodology for the design and optimisation of non-symmetric variable angle tow (VAT) laminates, with the aim of increasing the untwist of a rotating pre-twisted plate subjected to centrifugal force is discussed and the results shown.</i></p>	
13:10	Lunch Break							
14:10	Keynote lecture 13 (MUC) by Philippe Boisse, Institut National des Sciences Appliquées Lyon, France: COMPOSITE FORMING SIMULATIONS AT MACRO AND MESO SCALES				Keynote lecture 14 (BIA) by Bent F. Sørensen, Technical University of Denmark, Denmark: CHARACTERIZING DELAMINATION RESISTANCE IN TERMS OF MIXED MODE COHESIVE LAWS			
15:00	Plenary Lecture 5 - Albert Cardon Lecture (MUC) by Juan José Vilatela, IMDEA Materials Institute, Spain: MULTIFUNCTIONAL COMPOSITES WITH MACROSCOPIC CNT FIBRES							
15:50	Closing Ceremony (MUC)							

Brighton (BRI)	Naples (NAP)	London (LON)	Bordeaux (BOR)	Stuttgart (STG)	Augsburg (AUG)	Ingolstadt (ING)	Athens (ATH)
<p>THUR-2_BRI_2.13-04 ELECTRIC CURRENT DISTRIBUTION BETWEEN A PAIR OF ELECTRODES ON OPPOSITE SURFACES OF CFRP LAMINATES</p> <p>Takuya Yamane (Tokyo Institute of Technology) Akira Todoroki (Tokyo Institute of Technology) Yoshihiro Mizutani (Tokyo Institute of Technology) Yoshiro Suzuki (Tokyo Institute of Technology) Takayuki Nishi (Aerospace company, Fuji Heavy Industries Ltd.) Naoyuki Sekine (Aerospace company, Fuji Heavy Industries Ltd.) Ai Kawashima (Aerospace company, Fuji Heavy Industries Ltd.) Masahito Ueda (Nihon University)</p> <p><i>The electric current analysis method for laminated carbon composites using orthotropic electric potential function has been newly developed for the oblique electric current flow, and verified by the comparison with numerical and experimental results.</i></p>			<p>THUR-2 BOR 5.10-07 ANALYTICAL MODEL OF CRITICAL THRUST FORCE FOR EXIT-PLY DELAMINATION DURING DRILLING: THERMO-MECHANICAL ANALYSIS</p> <p>Jamel Saoudi (Institut Clément Ader) Redouane Zitoune (University of Toulouse) Suhasini Gururaja (Indian Institute of Science) Salah Mezlini (University of Monastir) Philippe Seitier (Insa Toulouse)</p> <p><i>An analytical model for the prediction of the critical thrust force for exit-ply delamination during drilling composite laminates accounting for thermal effect is proposed.</i></p>		<p>THUR-2_AUG_8.01-04 THE CONTRIBUTION OF MAI CARBON TO THE DEVELOPMENT OF CARBON COMPOSITES FOR THE HIGH VOLUME PRODUCTION</p> <p>Tjark von Reden (MAI Carbon)</p> <p><i>Main goal of the Cluster is the high-volume ability of Carbon Composites. Therefore over 35 R&D projects have been launched and show technical advances. Withal MAI Carbon also have different public relations activities to anchor carbon composites in the society and establish training and development.</i></p>		
<p>THUR-2_BRI_2.13-05 TOWARDS MESO SCALE RESISTIVITY-BASED MONITORING OF DEGRADATION IN LAMINATED COMPOSITES</p> <p>Gilles Lubineau (King Abdullah University of Science and Technology (KAUST)) Harilal Remesan (King Abdullah University of Science and Technology (KAUST)) Khaled Almuhammadi (King Abdullah University of Science and Technology (KAUST)) Lakshmi Selvakumaran (King Abdullah University of Science and Technology (KAUST)) Tushar Bera (King Abdullah University of Science and Technology (KAUST))</p> <p><i>A practical way to track damage in laminated composites is to monitor electrical impedance. We present some fundamental homogenization relations for meso scale electrical measurement as well as some spectroscopic results on illustrative examples.</i></p>			<p>THUR-2 BOR 5.10-08 THE IMPACT OF COOLING STRATEGIES AND FIXTURE OPTIONS ON THE THERMAL LOAD DURING LASER PROCESSING OF CARBON FIBRE REINFORCED THERMOPLASTICS</p> <p>Richard Staehr (Laser Zentrum Hannover e.V.) Jasmin Lindner (LASER on demand GmbH) Sven Bluemel (Laser Zentrum Hannover e.V.) Oliver Meier (LASER on demand GmbH) Peter Jäschke (Laser Zentrum Hannover e.V.) Oliver Suttman (Laser Zentrum Hannover e.V.) L. Overmeyer (Laser Zentrum Hannover e.V.)</p> <p><i>This investigation focusses on different fixture and cooling options and investigates their impact on the thermal load during laser processing of CFRP. The material temperature was measured with the heat affected zone.</i></p>				
Lunch Break							
<p>Keynote lecture 15 (NAP) by Hubert Jäger, Technische Universität Dresden, Germany: CARBON FIBRES - FROM HYPE TOWARDS REALITY FOR FUTURE LIGHTWEIGHT CONCEPTS</p>				<p>Keynote lecture 16 (STG) by Volker Altstädt, University of Bayreuth, Germany: THERMOPLASTIC LIGHTWEIGHT STRUCTURES - TRENDS AND DEVELOPMENTS TOWARDS SERIAL PRODUCTION</p>			
<p>Plenary Lecture 5 - Albert Cardon Lecture (MUC) by Juan José Vilatela, IMDEA Materials Institute, Spain: MULTIFUNCTIONAL COMPOSITES WITH MACROSCOPIC CNT FIBRES</p>							
<p>Closing Ceremony (MUC)</p>							

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