

1. Applications

PO_1-01 AERO-ELASTIC ANALYSIS AND OPTIMIZATION OF COMPOSITE PLATE WINGS

Mohamed Mahran (Cairo University)
Hani Negm (Cairo University)
Karam Maalawi (National Research Center, Cairo)
Adel ElSabbagh (Ain Shams University)

A mathematical model for aero-elastic analysis and optimization of composite plate-like wings is developed. The required steady and unsteady aerodynamic analyses are performed using the vortex and doublet lattice methods, respectively.

PO_1-02 BOTTOM-UP PARAMETRIC HYBRID COST ESTIMATION FOR COMPOSITE AEROSPACE PRODUCTION

Christian Hueber (Montanuniversitaet Leoben)
Konstantin Horejsi (FACC Operations GmbH)
Ralf Schledjewski (Montanuniversitaet Leoben)

In this conference paper we present ALPHA, our self developed hybrid cost tool, designed for the aerospace industry. We will describe the underlying estimation principle and demonstrate its capability on a case study.

PO_1-03 DESIGN OF CFRP STIFFENED PANELS BY PFA

Fulvio Romano (CIRA Italian Aerospace Research Centre)
Francesco Di Caprio (CIRA Italian Aerospace Research Centre)
Umberto Mercurio (CIRA Italian Aerospace Research Centre)
Leonardo Lecce (University of Naples)

Evaluation of the collapse load of stiffened CFRP wing panels, in presence of discrete damages, by applying progressive failure analysis methodology. Definition of a new design methodology against the traditional design approach.

PO_1-04 DEVELOPMENT OF A CARBON/EPOXY COMPOSITE NOZZLE MANUFACTURED BY FILAMENT WINDING

Ingo Hermann Dalibor (Universidade Federal do Rio Grande do Sul)
Humberto Almeida Jr (Universidade Federal do Rio Grande do Sul)
Olexiy Shynkarenko (UnB)
Sandro Amico (Universidade Federal do Rio Grande do Sul)

The subject of this development is a linerless nozzle manufactured by filament winding process with prepreg carbon fiber and a inner coating specially developed to withstand high temperatures.

PO_1-05 EXPERIMENTAL METHODOLOGY TO DETERMINE THE ABSORBED ENERGY IN AN AERONAUTICAL STRUCTURE UNDER IMPACT LOADS USING DIGITAL IMAGE CORRELATION

Elías López Alba (Universidad de Jaén)
Ángel Molina Viedma (University of Jaén)
Francisco Alberto Díaz Garrido (University of Jaén)

In this work and energy balance for an aeronautical structure under impact loads were evaluated. An experimental methodology was developed to quantify the transformation of the transmitted energy into the different damages produced at the specimens.

PO_1-06 HIGH SPEED DIGITAL IMAGE CORRELATION FOR MODE SHAPE MEASUREMENTS ON A CARBON FIBER CURVED PANEL

Ángel Molina Viedma (University of Jaén)
Luis Felipe Sesé (University of Jaén)
Elías López Alba (Universidad de Jaén)
Francisco Alberto Díaz Garrido (University of Jaén)

In this paper, Digital Image Correlation, DIC, and High Speed Cameras, are applied to determine the mode shapes [2] of a carbon fiber aeronautical panel. results show full-field displacements corresponding to each mode shape over the whole surface.

PO_1-07 ON CHARACTERIZING MICROSCOPICALLY THE ADHESION INTERPHASE FOR THE ADHESION BETWEEN BRASS-PLATED STEEL CORD WITH LOW BRASS PLATING AND RUBBER COMPOUND VARIED WITH CO SALT BY AUGER ELECTRON SPECTROSCOPY

Gyung Soo Jeon (Jeonnam Provincial College)

The effect of the Co salt loading in rubber compound on the adhesion interphase to brass-plated steel cord with low brass plating was studied to elucidate the adhesion retention after hostile aging.

PO_1-08 SHEET MOLDING COMPOUNDS CONTAINING CELLULOSE NANOCRYSTALS COATED GLASS FIBERS

Mark Miller (Georgia Institute of Technology)
Amir Asadi (Georgia Institute of Technology)
Robert Moon (Georgia Institute of Technology)
Kyriaki Kalaitzidou (Georgia Institute of Technology)

Glass fibers are coated with cellulose nanocrystals (CNC) by immersing them in CNC aqueous suspension prior to use in sheet molding compound production to enhance the interfacial and mechanical properties of composites.

PO_1-09 ADHESION TEST OF RESIN-INFUSED BASALT FIBERS FOR WIND ENERGY APPLICATIONS

Wilko Happach (RWTH Aachen University)
Davide Pico (RWTH Aachen University)
Alexander Lükking (RWTH Aachen University)
Gunnar Seide (RWTH Aachen University)
Thomas Gries (RWTH Aachen University)

Rotor wind blades are principally made of E-glass fibers reinforcement into an epoxy resin. This fibers have already reached the limit of their mechanical properties, therefore new materials like Basalt fibers are needed.

PO_1-10 NUMERICAL SIMULATION OF MECHANICAL BEHAVIOR OF A HIGH-VOLTAGE COMPOSITE CABLE FOR OFFSHORE WIND-ENERGY

Fouad Ech-Cheikh (CEA) Raj Jyoti Das (IFSTTAR)
Monssef Drissi-Habti (IFSTTAR)
Nicolas Ravot (CEA) Fabrice Auzanneau (CEA)

In this study, a simple straight "1+6" strand is modelled as a copper conductor and the relationship between mechanical loads to which conductors are subjected to and its mechanical responses is addressed.

PO_1-11 ON DETERMINING THE CHEMICAL STABILITY OF BASALT FIBRES IN AN ARTIFICIAL ALKALINE MEDIUM FOR TEXTILE REINFORCED CONCRETE (TRC) APPLICATIONS

Davide Pico (RWTH Aachen University) Udit Gohil (RWTH Aachen University) Alexander Lükking (RWTH Aachen University) Cynthia Morales Cruz (RWTH Aachen University) Michael Raupach (RWTH Aachen University) Thomas Gries (RWTH Aachen University)

On determining the chemical stability of Basalt fibres in an artificial alkaline medium for Textile Reinforced Concrete (TRC) applications

PO_1-12 FUNCTIONALIZED ORMOCER®-BASED RESINS AS BASIS FOR HIGHLY AESTHETIC, LOAD-STABLE AND BIOCOMPATIBLE DENTAL MATERIALS

Jeannette Hoffmann (Fraunhofer ISC)
Herbert Wolter (Fraunhofer ISC)
Somchith Nique (Fraunhofer ISC)

Biocompatible dental hybrid composites well-adjusted to mechanical/optical properties of natural teeth (dentine/enamel) realized by functionalized ORMOCER® resins along with adapted particle systems represent an excellent material for e.g. crowns.

2. Materials Science

<p>PO_2-01 MECHANICAL CHARACTERIZATION BASALT AND GLASS FIBER EPOXY COMPOSITE BY THE RING-TYPE TEST SPECIMENS</p> <p>Mauro Lapena (aSpace and Aeronautic Institute) Gerson Marinucci (IPEN)</p> <p><i>The aim of this work is to compare mechanical properties between basalt and E-glass rings manufactured by filament winding. Split-disk tensile tests provide reasonably accurate information with regard to the apparent tensile strength.</i></p>	<p>PO_2-02 EFFECTS OF SIZING ON THE MECHANICAL AND ELECTRICAL PROPERTIES OF CARBON FIBERS</p> <p>Shinn-Shyong Tzeng (Tatung University) Yen-Ju Wang (Tatung University)</p> <p><i>Effects of sizing on the mechanical and electrical properties of carbon fibers were investigated. Desizing was found to decrease the fiber tensile strength significantly for carbon fibers with surface striations.</i></p>	<p>PO_2-03 ENVIRONMENTALLY FRIENDLIER METHOD TO DEPOSIT CELLULOSE NANO-CRYSTALS ON REGENERATED CELLULOSE FILAMENTS AND EFFECT OF THE TREATMENT ON MECHANICAL PROPERTIES OF FIBERS</p> <p>Abdelghani Hajlane (Lulea University of Technology) Hamid Kaddami (Laboratory of Organometallic and Macromolecular Chemistry-Composite Materials) Roberts Joffe (Lulea University of Technology)</p> <p><i>This paper presents environmentally friendlier technique for deposition of cellulose nano-whiskers onto the surface of regenerated cellulose fibres using γ-methacryloxypropyltrimethoxysilane as coupling agent.</i></p>	<p>PO_2-04 FUTURE DIRECTIONS AND TRENDS OF CARBON FIBRE MARKET</p> <p>Franz Pursche (Institute of Textile Technology (ITA)) Andreas De Palmenauer (RWTH Aachen University) Thomas Gries (RWTH Aachen University) Gunnar Seide (RWTH Aachen University)</p> <p><i>Overview of carbon fibre development and outlook on carbon fibre needed properties for upcoming carbon fibre markets.</i></p>
<p>PO_2-05 RESEARCH ON MELT SPUN PMMA COMPOSITES WITH ALIGNED CARBON FIBERS</p> <p>Muchao Qu (Friedrich-Alexander University) Dirk Schubert (Friedrich-Alexander University)</p> <p><i>PMMA/carbon fibers (CF) composite fibers with highly oriented CFs were melt spun, with the concentration of CFs up to 56 vol. %. The percolation threshold of the composite fibers was estimated between 23.96 vol. % and 28.64 vol. %.</i></p>	<p>PO_2-06 CHARACTERIZATION OF VINYLESTER RESIN MODIFIED WITH ELECTROSPUN BNNS/PMMA NANOFIBERS</p> <p>Sukran Gurcan (Anadolu University) Abdullah Tugrul Seyhan (Anadolu University)</p> <p><i>Characterization of vinyl ester resin modified with BNNS filled PMMA electrospun nanofibers was carried out in terms of thermal response of the resulting composites.</i></p>	<p>PO_2-07 MEASUREMENT OF ACOUSTOELASTIC COEFFICIENT ON CARBON FIBER REINFORCED POLYMER COMPOSITES USING LCR WAVES</p> <p>Wei Wang (Harbin Institute of Technology) Yumin Zhang (Harbin Institute of Technology) Yufeng Zhou (Harbin Institute of Technology)</p> <p><i>Using critically refracted longitudinal wave, we acquired the relations between variation of the time-of-flight and applied stress along different direction, which is meaningful for accurate measurement of residual stress in CFRP composites.</i></p>	<p>PO_2-08 MECHANICAL AND PHYSICAL PROPERTIES OF SOME FLAX FIBER REINFORCED EPDM COMPOSITES</p> <p>Anton Airinei (Petru Poni Institute of Macromolecular Chemistry) Maria Daniela Stelescu (National Research and Development Institute for Textile and Leather, Leather and Footwear Research Institute) Nicusor Fifere (Petru Poni Institute of Macromolecular Chemistry) Cristian Varganici (Petru Poni Institute of Macromolecular Chemistry) Elena Manaila (National Research and Development Institute for Textile and Leather, Leather and Footwear Research Institute)</p> <p><i>Polymer composites based on EPDM and flax fibers have been obtained by melt blending technique. The structural characteristics of some EPDM/flax fibers composites were evaluated by mechanical and water absorption properties, thermal stability.</i></p>
<p>PO_2-09 MECHANICAL PROPERTIES OF PA6 COMPOSITES REINFORCED WITH SURFACE-TREATED PITCH CARBON FIBERS</p> <p>Jin Woo Yi (Korea Institute of Materials Science) Wonoh Lee (Korea Institute of Materials Science) Dong Gi Seong (Korea Institute of Materials Science) Sang Woo Kim (Korea Institute of Materials Science) Moon Kwang Um (Korea Institute of Materials Science)</p> <p><i>Polymer composites were successfully fabricated by a film infusion process with PA6 as matrix and phenoxy resin-coated pCFs as reinforcement. ILSS show that interfacial adhesion between PA6 and the carbon fiber can be improved by the phenoxy resins.</i></p>	<p>PO_2-10 NON-DESTRUCTIVE DETERMINATION OF MORPHOLOGICAL PARAMETERS OF POLYMER BASED PARTICLE COMPOSITES BY MEASURING PERMITTIVITY</p> <p>Jörg Bossert (Friedrich Schiller University Jena) Mike Mühlstädt (Friedrich Schiller University Jena) Matthias Arras (Friedrich Schiller University Jena) Klaus D. Jandt (Friedrich Schiller University Jena)</p> <p><i>This preliminary study demonstrates that the presented technique can be considered as a promising non-destructive testing method for monitoring the integrity of shear-sensitive flaky particles embedded in a polymer matrix.</i></p>	<p>PO_2-11 NUCLEATING ACTIVITY OF CORK IN POLYPROPYLENE-BASED COMPOSITES</p> <p>Sara Magalhães da Silva (University of Aveiro) Paulo Silva Lima (Universidade de Aveiro) José Martinho Oliveira (Universidade de Aveiro)</p> <p><i>The nucleating activity () of cork-polymer composites (CPC) in a polypropylene (PP) matrix was analyzed by Dobrev and Gutzow method. Results suggest that cork can act as a nucleating agent during non-isothermal crystallization.</i></p>	<p>PO_2-12 OPTIMIZATION OF HEAT FUSION OF THERMOPLASTIC RESIN BY MOLECULAR DYNAMICS AND A RESPONSE SURFACE METHOD</p> <p>Kento Takeuchi (Tokyo University of science) Ryosuke Matsuzaki Tomonaga Okabe (Tohoku University) Yutaka Oya (Tohoku University)</p> <p><i>We simulated heat fusion and uniaxial elongation of thermoplastic resins by MD simulation and optimized heat fusion condition by response surface method. We obtained optimum condition and the interfacial strength of optimum model is the highest.</i></p>

2. Materials Science

<p>PO_2-13 AN INTERFACE MODEL OF THE FIBER PULLOUT PROCESS OF THE CARBON NANOTUBES (CNT) HYBRIDIZED CARBON FIBER (HCF) COMPOSITES</p> <p>Zhang Yao (Institute of Soild Mechanics, Beihang University) Zixing Lu (Institute of Soild Mechanics, Beihang University) Zhenyu Yang (Beihang University)</p> <p><i>An interface model which combines the CNT pullout theory and the cohesive zone model is proposed for analyzing interfacial shear strength during fiber pull-out process of the hybridized carbon fiber composites.</i></p>	<p>PO_2-14 EFFECT OF ATMOSPHERIC PRESSURE PLASMA TREATMENT ON INTERFACIAL BONDING OF CF/PP COMPOSITES</p> <p>Mototsugu Tanaka (Kanazawa Institute of Technology) Naoki Osawa (Kanazawa Institute of Technology) Tomotaka Kitagawa (Kanazawa Institute of Technology) Takumi Okumura (Kanazawa Institute of Technology) Miho Onodera (Kanazawa Institute of Technology) Tomoya Nagano (Kanazawa Institute of Technology) Masatoshi Orito (Kanazawa Institute of Technology) Manato Kanesaki (Kanazawa Institute of Technology) Hiroshi Saito (Kanazawa Institute of Technology) Satoshi Osawa (Kanazawa Institute of Technology)</p> <p><i>We developed a prototype, which can conduct the surface treatment of CFs and PP separately by the air dielectric barrier discharge. The effect of treatment condition on interfacial bonding was evaluated in UD-CF/PP films.</i></p>	<p>PO_2-15 STUDY ON THE LOW FRICTION POLYMER FIBER STITCHED CARBON FIBER/PHENOLIC COMPOSITE MATERIALS FOR JOURNAL BEARING APPLICATION</p> <p>Minhye Jung (Korea Institute of Carbon Convergence Technology (KCTECH)) Hyun Kyu Shin (Korea Institute of Carbon Convergence Technology(KCTECH)) Seong Su Kim (Chonbuk National University)</p> <p><i>Composite journal bearings were fabricated using a carbon fiber/phenol composite by stitching the continuous carbon fiber fabrics along the thickness direction using a low friction polymer fibers to enhance the ILSS and the tribological properties.</i></p>	<p>PO_2-16 THERMO-OXIDATIVE DEGRADATION OF CARBON FIBER SIZINGS AND ITS IMPACT ON THE MECHANICAL PERFORMANCE OF CARBON FIBER REINFORCED POLYPROPYLENE COMPOSITES</p> <p>Christoph Unterweger (Kompetenzzentrum Holz GmbH) Jiri Duchoslav (Johannes Kepler University Linz) David Stifter (Johannes Kepler University Linz) Christian Fürst (Kompetenzzentrum Holz GmbH)</p> <p><i>Thermo-oxidative stability of CF sizings during heat treatment experiments and processing was investigated by XPS. Alike the stability of the sizings, mechanical properties of PP/CF composites also displayed a dependency on processing temperature.</i></p>
<p>PO_2-17 TITANIUM DIOXIDE NANOPARTICLES-COATED ARAMID FIBER SHOWING ENHANCED INTERFACIAL STRENGTH AND UV RESISTANCE PROPERTIES</p> <p>Ben Wang (Xi'an Jiaotong University) Yugang Duan (Xi'an Jiaotong University) Jingjing Zhang (Xi'an Jiaotong University)</p> <p><i>A developed low-temperature hydrothermal method was employed to grow TiO2 nanoparticle on the aramid fiber surface with the aim to enhance the poor interfacial strength and the UV resistance properties of the fiber material.</i></p>	<p>PO_2-18 BIONANOCOMPOSITES BASED ON UNMODIFIED AND SURFACE MODIFIED NANOFIBRILLATED CELLULOSE EXTRACTED FROM WHEAT STRAW</p> <p>Mandeep Singh (Panjab University) Anupama Kaushik (Panjab University)</p> <p><i>TPS bionanocomposites were prepared by reinforcing unmodified and surface modified nanofibrillated cellulose. Study reported considerable improvement in the barrier properties the bionanocomposites reinforced with surface modified nanofibers.</i></p>	<p>PO_2-19 EFFECT OF STACKING SEQUENCE ON LOW VELOCITY IMPACT AND POST-IMPACT BEHAVIOR OF FLAX/POLYAMIDE 11 COMPOSITES</p> <p>Yann Lebaupin (estaca'lab) Michael Chauvin (estaca'lab) Thuy-Quynh Truong Hoang (estaca'lab) Fabienne Touchard (P' Institute)</p> <p><i>In this paper, a fully biosourced composite: flax/ Polyamide 11 is studied. Different stacking sequences are studied in order to investigate the lay-up effect on the impact and post impact behavior of these composites. Impact energy applied is 3.6 J.</i></p>	<p>PO_2-20 GREEN COMPOSITES: CHALLENGES TO REACH HIGH PERFORMANCE COMPONENTS</p> <p>Silvia Lloret Pertegás (Montanuniversitaet Leoben) A. Anusic (Montanuniversitaet Leoben) Katharina Resch (Montanuniversitaet Leoben) Ralf Schledjewski (Montanuniversitaet Leoben)</p> <p><i>The major focus is on Biocomposites' processability. Challenges in processing are analyzed. The final performance of the bio-based composite is compared with conventional systems, i.e. epoxy-glass.</i></p>
<p>PO_2-21 INVESTIGATION OF INFRARED HEATING OF NATURAL FIBER REINFORCED THERMOPLASTIC POLYMERS</p> <p>Jovana Dzalto (Institute for Composite Materials) Luisa Medina (Institute for Composite Materials) Peter Mitschang (Institute for Composite Materials)</p> <p><i>The aim of this study is to investigate an optimum IR heater temperature in order to facilitate an optimal heating of natural fiber reinforced polypropylene without thermal degradation of natural fibers.</i></p>	<p>PO_2-22 MECHANICAL PROPERTIES OF HEMP FIBRE/ EPOXY COMPOSITES - INFLUENCE OF FIBRE CHEMICAL TREATMENTS</p> <p>Raffaele Sepe (Second University of Naples) Flavia Bollino (Second University of Naples) Angelo Ceparano (Second University of Naples) Giuseppe Lamanna (Second University of Naples)</p> <p><i>In this paper, tensile and flexural strength of epoxy matrix composite reinforced with woven hemp was studied. Fibre-matrix adhesion was promoted by fibre surface modifications using an alkaline treatment and a silane coupling agent.</i></p>	<p>PO_2-23 FLAX FIBRE REINFORCEMENT CHARACTERIZATION FOR UNIDIRECTIONAL COMPOSITE APPLICATION</p> <p>Lauric Gaffiot (Cermav - CNRS) Laurent Heux (Cermav - CNRS)</p> <p><i>Treatments for the compatibilization of natural fibres with polymer matrix have been developed and characterized on different scales from the technical fibres to the composite.</i></p>	<p>PO_2-24 DENTAL POLYACIDS CONTAINING AMINO ACIDS AND METHACRYLATE MOIETIES</p> <p>Tinca Buruiana (Petru Poni Institute of Macromolecular Chemistry) Marioara Nechifor (Petru Poni Institute of Macromolecular Chemistry) Violeta Melinte (Petru Poni Institute of Macromolecular Chemistry) C. Prejmerean (University Babes Bolyai) Emil Buruiana (Petru Poni Institute of Macromolecular Chemistry)</p> <p><i>Results concerning synthesis and some properties of resin-modified glass ionomers based on poly(acrylic acid-co-itaconic acid-co-N-acryloyl-L-alanine/glycine) containing methacrylate moieties, BisGMA, TEGDMA and bioactive glass were reported.</i></p>

2. Materials Science

<p>PO_2-25 SWELLING OF FLAX FIBERS: EFFECT OF A THERMAL TREATMENT ON THEIR DIMENSIONAL STABILITY</p> <p>Monica Francesca Pucci (EMSE) Pierre-Jacques Liotier (Mines Saint-Etienne) David Seveno (KU Leuven) Carlos Fuentes (KU Leuven) Aart Van Vuure (KU Leuven) Sylvain Drapier (Mines Saint-Etienne)</p> <p><i>This paper describes how flax fibers were submitted to a thermal treatment to modify their wettability and sensitivity to liquid sorption. Swelling of untreated and treated fibers was measured combining an optical and a tensiometric methods.</i></p>	<p>PO_2-26 TENSILE PROPERTIES OF BOWING NATURAL LFT COMPOSITES</p> <p>Junji Noda (Yamaguchi University) Kousuke Torii (Yamaguchi University) Syotaro Hiramatsu (Yamaguchi University) Koichi Goda (Yamaguchi University)</p> <p><i>Natural LFT composites with high Young's modulus were developed using M-PaRI process. From fiber morphologies, it was confirmed the bowing natural fibers occurred near skin. Young's modulus prediction based on FEM was conducted and discussed.</i></p>	<p>PO_2-27 THE INFLUENCE OF MALEIC ANHYDRIDE ADDITION ON THE MECHANICAL PROPERTIES OF PP/BUCKWHEAT HUSK COMPOSITES</p> <p>Marek Szostak (Technical University of Poznan) Jacek Andrzejewski (Technical University of Poznan) Kamila Witowska (Technical University of Poznan)</p> <p><i>The influence of maleic anhydride on the structure and mechanical properties of PP/buckwheat husk composites was examined static tensile tests and SEM observations. Effectiveness of MAPP modification was compared with wood polymer composite.</i></p>	<p>PO_2-28 ANISOTROPIC NANOSTRUCTURE INSPIRED BY NATURE FOR ENERGY ABSORBING COMPOSITE INTERFACES</p> <p>Francois De Luca (Imperial College London) Alexander Bismarck (University of Vienna) Milo Shaffer (Imperial College London)</p> <p><i>A nacre-nanomimetic with the classic „brick-and-mortar“ structure of natural nacre was assembled. Therefore, an increase in the absolute interface density enabled for substantial plastic deformation.</i></p>
<p>PO_2-29 EFFECT OF EPOXY-GNPS NANOCOMPOSITES COATINGS ON THE WEAR BEHAVIOUR OF ALUMINIUM</p> <p>Monica Campo (Universidad Rey Juan Carlos) A. Jimenez-Suarez (Universidad Rey Juan Carlos) A. Urena (Universidad Rey Juan Carlos)</p> <p><i>Epoxy coatings, reinforced with different graphene nanoplates percentages (0-10 wt%), have been deposited on aluminium substrates to improve its wear behavior. The wear of aluminium significantly improves due to the lubricant effect of graphene.</i></p>	<p>PO_2-30 EFFECTS OF THE SUPPORTS WITH DIFFERENT DIMENSIONS ON ELECTROCHEMICAL PERFORMANCE OF PLATINUM NANOPARTICLES</p> <p>Yu-Chun Chiang (Yuan Ze University) Pai-Hsuan Wu (Yuan Ze University) Heng-I Yueh (Yuan Ze University)</p> <p><i>The characteristics and electrochemical activity of Pt nanoparticles deposited on carbon nanotubes, graphene sheets and carbon blacks were studied. The Pt deposited on graphene sheets exhibited the highest electrochemical performance.</i></p>	<p>PO_2-31 FABRICATION OF HIGH HARDNESS AND HIGH STRENGTH ALTi-TiB2 COMPOSITE MATERIALS</p> <p>Masashi Yoshida (Ube National College of Technology)</p>	<p>PO_2-32 GRAPHENE MODIFIED CFRP FOR ENHANCED DAMAGE BEHAVIOR</p> <p>Daniel Fritsch (Technische Universität Hamburg Harburg) Hans Wittich (Technische Universität Hamburg-Harburg) Bodo Fiedler (Technische Universität Hamburg-Harburg)</p> <p><i>This contribution presents the effect of graphene modification on epoxy matrix material's fracture toughness and the compression after impact strength of the graphene modified CFRP produced in vacuum assisted resin transfer moulding (VARTM) method.</i></p>
<p>PO_2-33 INVESTIGATING THERMAL AND MECHANICAL PROPERTIES OF GRAPHENE/EPOXY NANOCOMPOSITES - EXPERIMENTS</p> <p>Jia-Lin Tsai (National Chiao Tung University) Ming-Wei Lee (National Chiao Tung University) Tai-Yuan Wang (National Chiao Tung University)</p> <p><i>The research investigated the thermal and mechanical properties of functionalized graphene/epoxy nanocomposites. Results indicated that Young's modulus and thermal conductivity of the nanocomposites increased when the graphene was functionalized.</i></p>	<p>PO_2-34 PIEZORESISTIVE THERMOPLASTIC FILM FOR COMPOSITES EMBEDDED HEALTH-MONITORING SYSTEM</p> <p>Ruggero Volponi (CIRA Italian Aerospace Research Centre) Paola Spena (IMAST) Felice De Nicola (CIRA Italian Aerospace Research Centre) Pietro Russo (Consiglio Nazionale delle Ricerche)</p> <p><i>The present work show a way to integrate a piezoresistive nanocharged thermoplastic thin film into a fiber reinforced composite to improve an embedded health-monitoring system.</i></p>	<p>PO_2-35 SIMULATION OF IMPREGNATION TO THE CNT FOREST BY MOLECULAR DYNAMICS METHOD</p> <p>Tomohiro Tajiri (Tokyo University of Science) Ryosuke Matsuzaki Yoshinobu Shimamura (Shizuoka University)</p> <p><i>We conducted a molecular dynamic (MD) simulation of introduction of water into between CNTs of VACNFs, and evaluated water permeability. The aims were to verify the application of Gebart equation and investigate the flow tendency.</i></p>	<p>PO_2-36 THEORETICAL MODELLING OF THE ELASTIC MODULUS OF POLYMER NANOCOMPOSITES</p> <p>Tom Thorvaldsen (Norwegian Defence Research Establishment (FFI)) Bernt B. Johnsen (Norwegian Defence Research Establishment (FFI)) Torbjørn Olsen (Norwegian Defence Research Establishment (FFI)) Finn Knut Hansen (University of Oslo)</p> <p><i>Mathematical models are investigated and suggested for the calculation of the elastic modulus of polymer nanocomposites, with particular emphasis on the effect from agglomerates and the particle interphase properties.</i></p>

2. Materials Science

<p>PO_2-37 EFFECT OF DEFECTS ON THERMAL TRANSPORT PROPERTIES OF CNR-GRAPHENE NANOSTRUCTURE</p> <p>Shi Gang (NUDT) Yin Changping (National University of Defense Technology) Zhang Jianwei (National University of Defense Technology) Ju Su (National University of Defense Technology) Jiang Dazhi (National University of Defense Technology)</p> <p><i>In the paper, the molecular dynamic simulation method is used to investigate how defects in the CNR-graphene junctions affect thermal transport properties of the CNR/Graphene nanostructure.</i></p>	<p>PO_2-38 MECHANICAL PROPERTIES OF MODIFIED GRAPHENE NANOPATELETS REINFORCED EPOXY NANOCOMPOSITES</p> <p>Chin-lung Chiang (Hungkuang University) Wei Jen Chen (China University of Science and Technology) Yi-Luen Li (China University of Science and Technology) Ming-Chuen Yip (University of Macau) Ming-Yuan Shen (China University of Science and Technology)</p> <p><i>The graphene nanoplatelets (GNPs) modified with maleic acid (MA) were used to reinforce epoxy resin to prepare the nanocomposite and to investigate their mechanical properties, such as tensile and impact properties.</i></p>	<p>PO_2-39 IMPROVEMENT OF FLAX FIBER REINFORCED COMPOSITE BY HYBRIDIZATION WITH CARBON FIBER: SORPTION AND MECHANICAL PROPERTIES</p> <p>Meriem Fehri (université de Caen-Normandie) R. R. Ragueh (Université de Caen Normandie) Y. Lebarillier (Université de Caen Normandie) Alexandre Vivet (Université de Caen Normandie) Mohamed Haddar (LA2MP - EniSfax) Fakhreddine Dammak (LA2MP - EniSfax)</p> <p><i>Several hybrid stacking sequences made of carbon and flax plies have been tested to analyse the influence of the carbon fiber ply position inside the structure on the water recovery behavior and the buckling test response.</i></p>	<p>PO_2-40 EFFECT OF MECHANICAL ALLOYING ON THE PROPERTIES OF AA6005A/TIB MMC</p> <p>Victoria Utrilla (Universidad Rey Juan Carlos) N. Abuwarda (Universidad Rey Juan Carlos) M. Dolores Escalera (Universidad Rey Juan Carlos) Enrique Otero (Universidad Rey Juan Carlos) M. Dolores López (Universidad Rey Juan Carlos)</p> <p><i>An A6005 aluminium alloy composite reinforced with 5% titanium boride particles have been produced by P/M processing. After 8 hours of mechanical alloying, the best size distribution and good mechanical properties were obtained.</i></p>
<p>PO_2-41 EFFECTS OF HIGH TEMPERATURES ON ALUMINA CERAMIC FIBERS</p> <p>Teresa Go (RWTH Aachen University) Davide Pico (RWTH Aachen University) Alexander Lüking (RWTH Aachen University) Thomas Gries (RWTH Aachen University) Gunnar Seide (RWTH Aachen University)</p> <p><i>Commercial oxide ceramic fibers are exposed to different high temperatures (up to 1000 °C). After that, the structure is detected with wide angle x-ray diffraction.</i></p>	<p>PO_2-42 MECHANICAL CHARACTERIZATION AND DAMAGE EVOLUTION OF A CU-SiC – INTERPENETRATING METAL MATRIX COMPOSITE MANUFACTURED BY A SQUEEZE-CAST INFILTRATION METHOD</p> <p>Andreas Reeb (Karlsruhe Institute of Technology) Alexander Wanner (Karlsruhe Institute of Technology) Kay Weidenmann (Karlsruhe Institute of Technology)</p> <p><i>A first mechanical characterization of a Cu/SiC-composite with interpenetrating network structure manufactured by high temperature squeeze casting of SiC- preforms was performed by means of Ultrasonic Phase Spectroscopy and in situ compression tests.</i></p>	<p>PO_2-43 TECHNOLOGY OF PRODUCTION OF COMPOSITE POWDERS Ti6Al4V-AL2O3 FOR ADDITIVE METHODS OF PRODUCTION</p> <p>Pavel Lykov (South Ural State University) R.M. Baitimerov (South Ural State University) Sergei Sapozhnikov (South Ural State University) Sergey Vaulin (South Ural State University) Evgeniy Safonov (South Ural State University) Dmitry Zherebtcov (South Ural State University) Ryslan Abdrakhimov (South Ural State University)</p> <p><i>The purpose of this work is developing of the method for producing the composite powder (Ti6Al4V-Al2O3) suitable for use in additive technology. The method involves surface modification of metal powders as a second phase in a planetary mixer.</i></p>	<p>PO_2-44 CRYOGENIC PROPERTIES OF EPOXY RESIN MATRIX COMPOSITES PREPARED BY RTM PROCESS</p> <p>Han-Qiao Shi (Aerospace Research Institute of Materials & Processing Technology) Kung Gao (Aerospace Research Institute of Materials & Processing Technology) Jian-Bo Sun (Aerospace Research Institute of Materials & Processing Technology) Qian Liu (Aerospace Research Institute of Materials & Processing Technology) Bao-Gang Sun (Aerospace Research Institute of Materials & Processing Technology) Yi Zhang (Aerospace Research Institute of Materials & Processing Technology)</p> <p><i>For cryogenic application, M40-level braiding fabric/ epoxy composites were prepared via a RTM process. The mechanical properties of M40-level braiding fabric/epoxy composite at 80°C, RT and -196°C were examined. The effects of cryogenic temperature on the mechanical properties of the composite were studied.</i></p>
<p>PO_2-45 THE CRYSTALLINITY DEGREE INFLUENCE ON THE WEATHER RESISTANCE OF CF/PPS COMPOSITES</p> <p>Natassia Batista (UNESP) Mirabel Rezende (UNIFESP) Edson Botelho (UNESP)</p> <p><i>The influence of the polymer crystallinity on the weather resistance of CF/PPS composites exposed to hygrothermal, salt spray and UV radiation chambers were evaluated. The weathering showed to affect the crystallinity and mechanical properties.</i></p>	<p>PO_2-46 NON-LINEAR RESPONSE OF ENVIRONMENTALLY AGED POLYMER COMPOSITES: A PHYSICO-CHEMICAL AND MECHANICAL STUDY</p> <p>Sotirios Grammatikos (Chalmers University of Technology) Mark Evernden (University of Bath) Richard Ball (University of Bath)</p> <p><i>In this paper, the anomalous behaviour of polymer composites subjected to hygrothermal aging is discussed in reference to the results of a characterization study on polyester matrix fibre reinforced polymer (FRP) composites.</i></p>	<p>PO_2-47 THERMAL PERFORMANCE EVALUATION OF ENERGY EFFICIENT PARAFFINIC PCMS/EXPANDED VERMICULITE AND PERLITE COMPOSITES FOR ENERGY SAVING</p> <p>Su-Gwang Jeong (Soongsil University) Seong Jin Chang (Soongsil University) Seunghwan Wi (Soongsil University) Yujin Kang (Soongsil University) Sumin Kim (Soongsil University)</p> <p><i>This paper deals with the preparation, characterization, thermal properties and thermal reliability of form-stable composite phase change materials (PCMs), composed of n-octadecane, expanded vermiculite, and perlite for thermal energy storage.</i></p>	<p>PO_2-48 LONG-TERM THERMAL STABILITIES OF POLYIMIDE RESIN TRIA-X AND CARBON FIBER/TRIA-X COMPOSITE MATERIAL</p> <p>Yuki Kubota (Japan Aerospace Exploration Agency) Takefumi Furuta (Kanaka Co.) Yuichi Ishida (Japan Aerospace Exploration Agency) Rikio Yokota (Kanaka Co.) Masahiko Miyauchi (Kanaka Co.) Toshio Ogasawara (Tokyo University of Agriculture and Technology) Takuya Aoki (Japan Aerospace Exploration Agency)</p> <p><i>Long-term thermal stability of polyimide resin "TriA-X" and carbon fiber reinforced TriA-X was evaluated. Although the weight loss of the resin at 270°C was significant because of oxidation, the composite material maintained compression strength.</i></p>

2. Materials Science

PO_2-49 FIRE RETARDANT ZEIN-BASED MATERIALS

Letizia Verdolotti (Institute for Polymers, Composite and Biomedical Materials (IPCB)-CNR) Maria Oliviero (Institute for Polymers, Composite and Biomedical Materials (IPCB)-CNR) Marino Lavorgna (Institute for Polymers, Composite and Biomedical Materials (IPCB)-CNR) Salvatore Iannace (Institute for Macromolecular Studies) Giovanni Camino (Polytechnic of Turin) Paolo Vollaro (IMAST) Alberto Frache (Polytechnic of Turin)

Combustion behavior of a protein zein (TPZ) and the fire retardant effect of either lignin (AL) or ammonium polyphosphate (APP) is studied. A combination of the two has been identified to obtain a TPZ with a satisfactory fire retardant behavior.

PO_2-50 INVESTIGATION OF DAMAGE IN COMPOSITE STRUCTURES CAUSED BY SIMULATED LIGHTNING STRIKES

Gang Zhou (Loughborough University) Weiwei Sun (C-Power (Technology) Ltd) Ben Mahy (Loughborough University)

A study of the direct effects of lightning strike in both carbon/epoxy and E-glass/epoxy laminates has been carried out. The key damage characteristics are fibre fracture in tufting for carbon/epoxy and extensive delamination for E-glass/epoxy.

PO_2-51 PREPARATION AND FLAME RETARDANCY OF POLYURETHANE COMPOSITES USING MICROENCAPSULATION TECHNOLOGY

Wei Jen Chen (China University of Science and Technology) Ming-Yuan Shen (China University of Science and Technology) Chen-Feng Kuan (Far East University) Hsu-Chiang Kuan (Far East University) Jia-Ming Yang (Hung-Kuang University) Chin-lung Chiang (Hungkuang University)

In this study, a novel microcapsulated flame retardant was synthesized using in situ polymerization technology. The flame retardancy and thermal properties of the Si-PU/OFAPP composite was higher than that of the Si-PU/APP composite.

PO_2-52 SIMULATION OF BURST PRESSURE OF HYPERBARIC HYDROGEN TANKS IN FIRE CONDITIONS

Abdelkibir Benelfellah (Institute Pprime) Eric Lainé (Institute Pprime) Mikael Gueguen (Institute Pprime) Damien Halm (Institute Pprime) Denis Bertheau (Institute Pprime) Tom van Eekelen (Samtech - Siemens) Fabrice Germain (Samtech - Siemens)

The project FireComp deals with the safety of pressurized hydrogen storage vessels subjected to fire. The time to burst is simulated by two different thermomechanical models and compared to experimental data (bonfires on real tanks).

PO_2-53 THERMAL AND REACTION TO FIRE PROPERTIES OF CFRP UNDER VARIOUS HEAT IMPACT SCENARIOS -SPECIFIC HAZARDS

Sebastian Eibl (Bundeswehr research institute for materials, fuels and lubricants (WIWeB))

The work addresses specific dangers originating from CFRP structures under thermal load. It investigates effects of various types of heat loads, starting below the max. operational temperature limit (135°C), up to rapid matrix degradation (ca. 350°C).

PO_2-54 ELECTRICAL CONDUCTIVITY OF UNIDIRECTIONAL GLASS FIBRE REINFORCED COMPOSITE WITH CNT-MODIFIED EPOXY MATRIX

Andrey Aniskevich (InstitUniversity of Latvia) Vladimir Kulakov (InstitUniversity of Latvia)

The theoretical results predicted by the developed model using micromechanical approach for the CNT-epoxy nanocomposite filled with volume content of CNT up to 1% agreed well enough with the experimental data available.

PO_2-55 DISCRETE DAEM MODEL FOR THE STUDY OF THE KINETICS OF THE THERMAL DEGRADATION OF A LIGNIN NANOPARTICLE-REINFORCED PHENOLIC FOAM

Juan Carlos Domínguez (Complutense University of Madrid) Belén Del Saz-Orozco (Universidad Complutense de Madrid) Mercedes Oliet (Universidad Complutense de Madrid) María Virginia Alonso (Universidad Complutense de Madrid) F. Rodríguez (Complutense University of Madrid) Julián García (Universidad Complutense de Madrid)

The main goal of this work is the study of the kinetics of thermal degradation of phenolic and lignin nanoparticle-reinforced phenolic foams, and of the lignin nanoparticles used as reinforcement through a discrete distributed DAEM model.

PO_2-56 EFFECT OF MULTI-WALLED CARBON NANOTUBES ON MECHANICAL PROPERTIES OF CARBON FIBER POLYURETHANE FOAM SANDWICH STRUCTURES: OPTIMIZATION OF PARAMETERS USING TAGUCHI'S DESIGN

İdris Gürkan (Istanbul Technical University) Elif Demir (Istanbul Technical University) Hülya Cebeci (Istanbul Technical University)

Nanoparticle dispersion into polymers is the most critical issue, due to high surface energy of the particles. In present work, carbon nanotubes are dispersed in the rigid polyurethane foam and epoxy resin using different methods.

PO_2-57 FABRICATION AND CHARACTERISATION OF POLYURETHANE/SEPIOLITE POLYMER NANOCOMPOSITE FOAMS FOR ENHANCED ENERGY ABSORPTION.

Ellen Pope (University of Bristol) Jeroen van Duijneveldt (University of Bristol) Fabrizio Scarpa (University of Bristol)

Sepiolite clay rods with various surface chemistries were dispersed in a polyurethane foam precursor before being foamed up with MDI. Mechanical tests were performed to determine Young's Modulus, energy dissipation and loss factor.

3. Material and Structural Behavior - Simulation & Testing

<p>PO_3-01 A MESO-SCALE MODEL TO STUDY THE COMPRESSIVE STRENGTH OF WOVEN CARBON FIBER REINFORCED PLASTICS</p> <p>Jim Schormans (Eindhoven University of Technology) Wouter Wilson (Eindhoven University of Technology) Vikram Deshpande (University of Cambridge)</p> <p><i>A method to homogenize fiber-tows is proposed that enables the simulation of the formation of kink-bands in woven laminates under compression. The method is tested on a unidirectional composite as well as a woven composite.</i></p>	<p>PO_3-02 A NUMERICAL SIMULATION OF MECHANICAL PROPERTIES OF SMART POLYMER COMPOSITE WITH MICROCAPSULES FOR DAMAGE SENSING APPLICATIONS</p> <p>Daiva Zeleniakiene (Kaunas University of Technology) Vitalis Leisis (Kaunas University of Technology) Paulius Griskevicius (Kaunas University of Technology) Olga Bulderberga (Institute of Polymer Mechanics, University of Latvia) Andrey Aniskevich (Institute of Polymer Mechanics, University of Latvia)</p> <p><i>The mechanical behaviour of polymer composites with polyvinyl acetate matrix filled with melamine-formaldehyde resin microcapsules was investigated. Such composites as self-sensing materials could be used for damage sensing applications.</i></p>	<p>PO_3-03 ANALYSIS OF NOTCH EFFECT IN SHORT GLASS FIBRE REINFORCED POLYAMIDE 6</p> <p>Francisco T. Ibáñez-Gutiérrez (University of Cantabria) Sergio Cicero (University of Cantabria) Isidro Carrascal (University of Cantabria)</p> <p><i>An analysis of the notch effect in SGFR-PA6 through the evolution of the apparent fracture toughness and the application of the Theory of the Critical Distances. Also, the evolution of fracture micromechanisms has been related with radius increase.</i></p>	<p>PO_3-04 CONSTRAINT CONDITIONAL FINITE ELEMENT MODEL OF INTERFACIAL DEBONDING WITH ANISOTROPIC FRICTION</p> <p>Yamaguchi Takehiro (Yamaguchi University) Koichi Goda (Yamaguchi University) Ryuta Kitamura (Tokyo University of Science)</p> <p><i>In this study, we defined a new CC-FEM which was introduced anisotropic friction and genetic algorithm in order to extend two-dimensional model to three-dimensional version.</i></p>
<p>PO_3-05 STRESS MEASUREMENT DURING CRACK PROPAGATION IN METAL MATRIX COMPOSITES USING MICRO-RAMAN SPECTROSCOPY</p> <p>Akm Asif Iqbal (University Malaysia Pahang) Yoshio Arai (Saitama University)</p> <p><i>The measurement of stress in the SiC particles during crack propagation was investigated by micro-Raman spectroscopy. A high decrease in stress was observed with the interfacial debonding and with the SiC particle fracture.</i></p>	<p>PO_3-06 THE ANALYSIS OF STRESS STATE TYPES OF COMPOSITE CONSTITUENTS IN THE CASE OF TRANSVERSAL LOADING OF UNIDIRECTIONAL LAMINATE</p> <p>Boris Fedulov (Skolkovo Institute of Science and Technology (Skoltech)) Alexander Safonov (Skolkovo Institute of Science and Technology (Skoltech)) Andrey Ushakov (Skolkovo Institute of Science and Technology (Skoltech))</p> <p><i>This research performs a material model for thermoplastic polymer with taking into account susceptibility to the stress state type. All constants required for stress analysis based on polyetheretherketone(PEEK) thermoplastic material are demonstrated.</i></p>	<p>PO_3-07 DAMAGE BEHAVIOR AND MECHANICAL PROPERTIES IN CFRP AND GFRP ANGLE-PLY LAMINATES</p> <p>Shinji Ogihara (Tokyo University of Science) Nurul Nabihah Binti A. Hamid (Tokyo University of Science) Vladimir Vinogradov (Newcastle University) Ryuta Kitamura (Tokyo University of Science)</p> <p><i>This study investigates the mechanical properties and damage behavior and mechanical properties in CFRP and GFRP angle-ply CFRP laminates with different thicknesses.</i></p>	<p>PO_3-08 AN ASSESSMENT OF EXPERIMENTAL TECHNIQUES FOR MEASURING THE MODE I FRACTURE TOUGHNESS OF UHMW-PE COMPOSITES</p> <p>Torsten Lässig (Fraunhofer EMI) Franziska Nolte (Fraunhofer EMI) Werner Riedel (Fraunhofer EMI) Michael May (Fraunhofer EMI)</p> <p><i>The fracture toughness mode I is determined for a UHMW-PE composite. Several Double Cantilever Beam test setups were investigated. An alternative clamping condition and specimen geometry are presented that are suitable for flexible Composites.</i></p>
<p>PO_3-09 EVALUATION OF THE EFFECTS OF TUFTING ON PERFORMANCE OF COMPOSITE T-JOINTS</p> <p>Harry Clegg (University of Bristol) James Kratz (University of Bristol) Ivana Partridge (University of Bristol) Giuseppe Dell'Anno (National Composites Centre)</p> <p><i>Carbon fibre T-stiffened skin-stringer joints were manufactured with through-thickness carbon fibre reinforcement. Comparisons are made with unreinforced skin-stringer joints and changes in load carrying ability of the joint are quantified.</i></p>	<p>PO_3-10 EXPERIMENTAL STUDY OF THE INTERLAMINAR FRACTURE OF COMPOSITE MATERIALS IN MODE III</p> <p>Issam Tawk (University of Balamand) Jihad Rishmany (Mechanical Engineering) Nicolas Saba (Mechanical Engineering) Bassam Mahmoud (Mechanical Engineering)</p> <p><i>The aim of this study is to conduct experiments for mode III delamination based on the Modified Split Cantilever Beam (MSCB) test. The mode III energy release rate is presented for 3 different materials and 3 different specimen widths.</i></p>	<p>PO_3-11 HIGH RATE DELAMINATION FRACTURE OF AEROSPACE COMPOSITES</p> <p>Anastasios Toulitsis (Element Materials Technology) Stefanos Giannis (Element Materials Technology)</p> <p><i>The effect of test rate on the fracture toughness under Mode I and Mode II loading conditions for a CFRP composite material was investigated. A range of test speeds up to 1 m/s were studied. Software was developed to capture the delamination growth.</i></p>	<p>PO_3-12 INFLUENCE OF DELAMINATION ON THE MECHANICAL PROPERTIES OF COMPOSITE SANDWICH-PANELS</p> <p>Aleksandr Anoshkin (Perm National Research Polytechnic University) Valerii Zuiiko (Perm National Research Polytechnic University) M. A. Alikin (Perm National Research Polytechnic University) A. V. Tchugaynova (Perm National Research Polytechnic University)</p> <p><i>This work is devoted to development of a methodology based on the numerical simulation for assessment of the effect of delamination on the mechanical properties of composite sandwich panels with various types of core – tubular, cellular or honeycomb.</i></p>

3. Material and Structural Behavior - Simulation & Testing

<p>PO_3-13 MODE I AND II FRACTURE TOUGHNESS TESTING OF INTERLEAVES FOR BALLISTIC IMPACT</p> <p>Daniel Turkenburg (TNO Materials) Jamie Hartley (University of Bristol) Hartmut Fischer (TNO Materials) Geert Roebroeks (TNO Ballistics) Carwyn Ward (University of Bristol) Sander Gielen (TNO Materials)</p> <p><i>Interleaves in fiber reinforced polymer laminates have been varied to control the failure mechanism associated to ballistic impact on composites. Material synthesis, test-piece fabrication and mode I and mode II test results are discussed.</i></p>	<p>PO_3-14 NUMERICAL STUDY OF THE RESPONSE OF DYNAMIC PARAMETERS TO DEFECTS IN COMPOSITE STRUCTURES</p> <p>Grigorii Serovae (Perm National Research Polytechnic University) Valery Matveenko (Perm National Research Polytechnic University)</p> <p><i>A numerical study of the frequency response to defect of different size is carried out in the framework of three models of delamination in a composite structure, the advantages and drawbacks of each model are estimated in the process of simulation.</i></p>	<p>PO_3-15 EFFECT OF AUTOCLAVE CURE CYCLES ON THE INTERFACIAL PROPERTIES OF COMPOSITE LAMINATES</p> <p>Lihua Zhan (Central South University) Wei Tan (Queen's University Belfast) Tengfei Chang (Central South University) Xingxing Ding (Central South University)</p>	<p>PO_3-16 MULTISCALE MODELING OF A HIGHLY REINFORCED THERMOPLASTIC COMPOSITE : FROM MICROSTRUCTURAL SIMULATIONS OF THE TRANSVERSE DAMAGE KINETICS TOWARDS ENGINEERING STRUCTURE COMPUTATIONS.</p> <p>Pierre-Alexis Poulet (MINES ParisTech) Sébastien Joannès (MINES ParisTech) Lucien Laiarinandrasana (MINES ParisTech)</p> <p><i>Finite Element simulations based on representative periodic cells highlighted the effects of the variability of the microstructure on the stress-strain curve, as well as on the evolution of the porosity in the matrix between fibres.</i></p>
<p>PO_3-17 A FINITE ELEMENT MODEL FOR PLAIN WEAVE FABRIC BASED ON AN INNER BEAM STRUCTURE</p> <p>Benjamin Kaiser (Technische Hochschule Mittelhessen) Thomas Pyttel (Technische Hochschule Mittelhessen) Eberhard Haug (ESI Group) Fabian Duddeck (Technical University of Munich)</p> <p><i>The paper presents a finite shell element for plain weave fabrics. It is designed for draping and forming simulations. Instead of a classical constitutive law, a unit cell is modeled with crossed beams.</i></p>	<p>PO_3-18 COMPACT TENSION AND COMPRESSION TESTING OF BRAIDED COMPOSITES – CHALLENGES AND LIMITATIONS</p> <p>Sebastian Kilchert (Fraunhofer EMI) Tobias Gerster (Fraunhofer EMI) Matthias Nossek (BMW Group) Jens Fritsch (Fraunhofer EMI) Michael May (Fraunhofer EMI)</p> <p><i>The present publication aims to identify challenges and limitations of existing compact tension and compression test procedures applied to braided Composites.</i></p>	<p>PO_3-19 CHARACTERIZATION OF WRINKLING AND DE-WRINKLING BEHAVIOUR OF WOVEN FABRICS USING A MULTI-STEP BIAXIAL BIAS EXTENSION TEST</p> <p>Armin Rashidi Mehrabadi (University of British Columbia) Abbas Milani (University of Bristol)</p> <p><i>A multi-step biaxial bias extension (MBBE) test procedure is proposed to characterize forming and flattening of wrinkles of different sizes at shear angles below and above the locking, as both often seen in the composites thermo-forming practice.</i></p>	<p>PO_3-20 EFFECT OF SPECIMEN WIDTH ON STRENGTH IN OFF-AXIS COMPRESSION TESTS</p> <p>Dennis Wilhelmsson (Chalmers University of Technology) Leif Asp (Chalmers University of Technology) Renaud Gutkin (Swerea SICOMP) Fredrik Edgren (GKN Aerospace)</p> <p><i>Compression tests have been performed according to ASTM D6641 to check whether 12 mm is a sufficient width for off-axis tests of a unidirectional Non Crimp Fabric (NCF) reinforced carbon-fibre composite.</i></p>
<p>PO_3-21 NUMERICAL SIMULATION OF TRIAXIAL WOVEN CFRP UNDER TENSILE LOADING</p> <p>Jun Koyanagi (Tokyo University of Science) Erina Imai (Tokyo University of Science) Ryo Higuchi (Graduate School of Tohoku University) Akinori Yoshimura (Japan Aerospace Exploration Agency) Tomonaga Okabe (Tohoku University) Satoru Yoneyama (Aoyama Gakuin University) Takahira Aoki (University of Tokyo)</p> <p><i>Triaxial woven CFRP is numerically modeled by finite element analysis very accurately. Under a tensile loading, strain distribution obtained numerically is compared with that obtained experimentally. They show good agreement.</i></p>	<p>PO_3-22 VIRTUAL MECHANICAL TESTING OF A COMPLEX 3D WOVEN FABRIC: A UNIFIED SIMULATION METHODOLOGY FOR DEFORMATION MECHANICS OF TEXTILE STRUCTURES DURING TENSION, SHEAR AND DRAPING</p> <p>Lode Daelemans (Ghent University) Jana Faes (Ghent University) Samir Allaoui (Univ Orléans) Gilles Hivet (Univ Orléans) Wim Van Paepegem (Ghent University)</p> <p><i>We show a viable simulation methodology which allows for the virtual testing of fibrous materials such as 3D woven fabrics based on the digital element concept.</i></p>	<p>PO_3-23 STRESSES ALONG THE HOLE BOUNDARY OF UNSYMMETRIC COMPOSITE LAMINATES VIA BOUNDARY ELEMENT METHOD</p> <p>Chyanbin Hwu (National Cheng Kung University) H. W. Chang (National Cheng Kung University)</p> <p><i>The unsymmetric composite laminates are analyzed by the coupled stretching-bending boundary element. To avoid the singular problem encountered on the boundary node, a new method is proposed, which can be used to calculate the stresses along the hole.</i></p>	<p>PO_3-24 LINEARIZATION AND IMPLEMENTATION OF VENU MODEL IN SMALL STRAIN THEORY FOR POLYAMIDE 6.6</p> <p>Dimitrios Anagnostou (ENSAM) George Chatzigeorgiou (Arts et Métiers ParisTech) Jean-Luc Bouvard (CEMEF-Centre de Mise en Forme des Matériaux) Yves Chemisky (Arts et Métiers ParisTech) Fodil Meraghni (Arts et Métiers ParisTech) Noelle Billon (CEMEF-Centre de Mise en Forme des Matériaux)</p> <p><i>The VENU model, a visco-hyperelastic constitutive law designed for amorphous rubbery polymers, has been implemented in the small strain theory framework and it has been validated through comparison with experimental results in polyamide 6.6.</i></p>

3. Material and Structural Behavior - Simulation & Testing

<p>PO_3-25 MECHANICAL PERFORMANCE OF SHORT FIBER CHAOTICALLY REINFORCED THERMOPLASTICS AND THEIR PREDICTION.</p> <p>Izabella Rashkovan (UVICOM Co.Ltd) Mark Kazakov (UVICOM Co.Ltd)</p> <p><i>The damage of short carbon fiber randomly reinforced thermoplasts has been investigated. It was offered the fracture model and enough simple method of calculation of their strength.</i></p>	<p>PO_3-26 FATIGUE LIFE PREDICTION IN RUBBER MATERIAL UNDER CYCLIC LOADS AT VARIABLE TEMPERATURES</p> <p>Changsu Woo (Korea Institute of Machinery & Materials) H. S. Park (Korea Institute of Machinery & Materials)</p> <p><i>In this paper, fatigue life prediction methodology of vulcanized natural rubber was proposed by incorporating the finite element analysis and fatigue damage parameter determined from fatigue test.</i></p>	<p>PO_3-27 FATIGUE LIFE PREDICTION OF THICK CFRP LAMINATES WITH TOUGHENED INTERLAMINAR LAYERS IN THE OUT-OF-PLANE DIRECTION AT DIFFERENT STRESS RATIOS</p> <p>Atsushi Hosoi (Waseda University) Shiwon Tsuge (Waseda University) Sen Seki (Waseda University) Yuzo Fujita (Composite Materials Research Laboratories, Toray Industries) Ichiro Taketa (Toray) Hiroyuki Kawada (Waseda University)</p> <p><i>The fatigue properties in the out-of-plane direction of thick CFRP laminates with toughened interlaminar layers were evaluated at different stress ratios. A model proposed to predict the fatigue life showed good agreement with experimental results.</i></p>	<p>PO_3-28 PROGRESSIVE FATIGUE DAMAGE MODELING OF COMPOSITE CURVED STRUCTURES USED IN OFFLOADING HOSES</p> <p>Maikson Luiz Passaia Tonatto (Universidade Federal do Rio Grande do Sul) Maria Madalena de Camargo Forte (Universidade Federal do Rio Grande do Sul) Volnei Tita (USP) Sandro Amico (Universidade Federal do Rio Grande do Sul)</p> <p><i>A progressive fatigue damage modeling is proposed in order to simulate the fatigue behavior of unidirectional curved structure made of carbon fiber composite materials.</i></p>
<p>PO_3-29 USE OF NON-CONTACTING STRAIN MEASUREMENT TECHNIQUES IN FATIGUE TESTING OF POLYMER MATRIX COMPOSITES</p> <p>Peter Bailey (Instron) M. Higham (Instron)</p> <p><i>This paper presents a short investigation of the benefits of non-contact strain measurement for monitoring and control of fatigue tests on composites, better simulation, and helping understand the effects of strain rate on properties.</i></p>	<p>PO_3-30 EXPERIMENTAL AND NUMERICAL CHARACTERIZATION OF THE HYGROTHERMAL AND STRAIN-RATE DEPENDENT BEHAVIOUR OF WOVEN GLASS FIBRE REINFORCED POLYAMIDE</p> <p>Kodjo Mawuli Armattoe (Institut de Recherche Technologique (IRT) Jules Verne) Patrick Rozycki (Institut de Recherche en Génie Civil et Mécanique) Mamadou Mbacke (Institut de Recherche Technologique (IRT) Jules Verne)</p> <p><i>This paper deals with the influence of environmental conditions (temperature and humidity) and strain rate effect on the behavior of woven glass fiber reinforced polyamid 66.</i></p>	<p>PO_3-31 DYNAMIC CHARACTERISTICS OF COMPOSITE TAPERED TUBES</p> <p>Sang-Kyun Hwang (Andong National University) Hui Yun Hwang (Andong National University)</p>	<p>PO_3-32 INVESTIGATION OF NOVEL BAGASSE FIBRE HYBRID CRASH BARRIERS USING NUMERICAL SIMULATION</p> <p>Karthik Ram Ramakrishnan (Ecole des Mines d'Alès) Krishna Shankar (University of New South Wales, Canberra) Boju Hoo (University of New South Wales) Alan Fien (University of New South Wales)</p> <p><i>This paper presented the viability of designing deformable hybrid crash barriers with the natural fibres derived from sugarcane bagasse. Full-scale crash simulation was conducted using FE software LS-Dyna on two designs of hybrid composites.</i></p>
<p>PO_3-33 NUMERICAL MODELING OF DYNAMIC RESPONSE OF FABRIC MATERIALS SUBJECTED TO IMPACT LOADING</p> <p>Efthimis Giannaros (University of Patras) Athanasios Kotzakolios (University of Patras) Stavros Tsantzalis (University of Patras) George Sotiriadis (University of Patras) Vassilis Kostopoulos (University of Patras)</p> <p><i>The present research investigates the dynamic response of fabric materials subjected to impact loading. The major purpose of study is the implementation, calibration and validation of meso-scale technique and material model for fabrics modeling.</i></p>	<p>PO_3-34 RESEARCH OF MECHANICAL PROPERTIES OF HIGHLY-FILLED POLYMER COMPOSITES UNDER COMPLEX HARMONIC LOADINGS</p> <p>Andrey Yankin (Perm National Research Polytechnic University) Roman Bulbovich (Perm National Research Polytechnic University) Valery E. Wildemann (Perm National Research Polytechnic University) Stanislav Slovikov (Perm National Research Polytechnic University)</p> <p><i>In this work, nonlinear representations of stress and strain under two-frequency loadings were presented, and it was proposed to describe dynamic modules and loss angles by polynomials and to use a time-temperature superposition.</i></p>	<p>PO_3-35 INFLUENCES OF WATER ABSORPTION ON THE MECHANICAL PROPERTIES OF DISCONTINUOUS CF/PA6 AND CF/PP</p> <p>Hao Piao (University of Tokyo) Yoshiaki Kiryu (University of Tokyo) Lubai Chen (University of Tokyo) Shinichiro Yamashita (University of Tokyo) Haowen Wei (University of Tokyo) Isamu Ohsawa (University of Tokyo) Jun Takahashi (University of Tokyo)</p> <p><i>Influences of water absorption on the mechanical properties of discontinuous CF/PA6 composites were investigated. The mechanical properties of CF/PA6 composite present relatively present relatively high sensitivity on the water absorption.</i></p>	<p>PO_3-36 PREDICTION OF TENSILE CREEP FAILURE TIME</p> <p>Yoshiki Kobayashi (Kanazawa Institute of Technology) Masayuki Nakada (Kanazawa Institute of Technology) Yasushi Miyano (Kanazawa Institute of Technology)</p> <p><i>We propose the statistical prediction of creep failure time under the tension loading along the longitudinal direction of unidirectional CFRP based on the viscoelasticity of matrix resin. The applicability of our method is discussed experimentally.</i></p>

3. Material and Structural Behavior - Simulation & Testing

<p>PO_3-37 STATISTICAL LIFE TIME PREDICTION FOR UNIDIRECTIONAL CARBON FIBER REINFORCED THERMOPLASTICS UNDER CREEP LOADING</p> <p>Yoko Morisawa (Kanazawa Institute of Technology) Masayuki Nakada (Kanazawa Institute of Technology) Yasushi Miyano (Kanazawa Institute of Technology)</p> <p><i>The statistical creep failure time under tension loading for unidirectional CFRTP is predicted based on the viscoelastic behavior of matrix. The validity of predicted results is cleared by comparing with the experimental results.</i></p>	<p>PO_3-38 THE IMPACT OF ENVIRONMENTAL STRESS ON THE MECHANICAL BEHAVIOR OF FIBER-METAL-LAMINATES WITH ELASTOMER INTERLAYERS (FMEL)</p> <p>Matthias Stoll (Karlsruhe Institute of Technology) Kay Weidenmann (Karlsruhe Institute of Technology)</p> <p><i>CFRP-Aluminum-Laminates with an elastomer inter-layer are potentially damaged when subject to thermal cycling. Flexural properties were used to determine the residual properties and evaluate the influence of thermal cycling on the laminate.</i></p>	<p>PO_3-39 NON-DAMAGING AND SCALEABLE CARBON NANOTUBE SYNTHESIS ON CARBON FIBRES</p> <p>Hugo De Luca (Imperial College London) David Anthony (Imperial College London) Hui Qian (Imperial College London) Emile Greenhalgh (Imperial College London) Alexander Bismarck (University of Vienna) Milo Shaffer (Imperial College London)</p> <p><i>The continuous production of carbon nanotube-grafted-carbon fibres is demonstrated in an open chemical vapour deposition reactor, whilst maintaining the underlying original carbon fibres mechanical properties.</i></p>	<p>PO_3-40 ANALYSIS OF PARAMETRIC INFLUENCE ON MACHINING IN DRY DRILLING CARBON FIBER REINFORCED EPOXY COMPOSITES</p> <p>Mohamed Faycal Ameur (Ecole Nationale Supérieure de Technologie) Malek Habek (Université de Picardie Jules) Mohamed Kenane (Laboratoire des Sciences et Génie des Matériaux (Faculté de Génie Mécanique et Génie des Procédés USTHB) Hamdi Aouici (Ecole Nationale Supérieure de Technologie) Mohamed Cheikh (Université de Toulouse)</p>
<p>PO_3-41 DESIGN OPTIMIZATION OF CFRP RECTANGULAR BOX SUBJECTED TO ARBITRARY LOADINGS</p> <p>Qitao Guo (University of Tokyo) Zaoyang Li (University of Tokyo) Toshiro Ohori (University of Tokyo) Jun Takahashi (University of Tokyo)</p> <p><i>A rectangular box subjected to flexural and torsional loadings was optimized by using multi-material solution and thickness optimization. Weight reduction of 64.55% and 29.43% by CFRP can be achieved considering the flexural and torsional rigidity.</i></p>	<p>PO_3-42 FLEXURAL EXPERIMENTAL ANALYSIS COUPLED TO AN ACOUSTIC EMISSION STUDY OF A CURVED SANDWICH STRUCTURES MADE BY FILAMENT WINDING PROCESS</p> <p>Mohamed Haddad (Arts et Metiers ParisTech) Laurent Guillaumat (Ecole Nationale Supérieure d'Arts et Metiers)</p> <p><i>This study examines the quasi-static mechanical behavior of curved sandwiches, made by filament winding process of glass-fiber/vinylester composite skins with different types of foams, focusing on flexural deformation coupled to Acoustic Emission.</i></p>	<p>PO_3-43 INSTRUMENTED SPHERICAL INDENTATION BEHAVIOR OF MECHANICAL PROPERTIES OF METALLIC FOAMS: CHARACTERIZATION</p> <p>Ali Nayebi (Shiraz University) A. Surmiri (Shiraz University)</p> <p><i>Spherical indentation of metallic foams is simulated by FEM and the load - displacement is obtained. The stress-strain curves and the Elastic modulus of different metallic foams are characterized by the new proposed relations of the indentation test.</i></p>	<p>PO_3-44 MODEL OF DAMAGE EVOLUTION IN ELEMENTS OF SANDWICH PANELS WITH TRANSVERSELY ISOTROPIC PROPERTIES USING MULTI-CRITERIA APPROACH</p> <p>Mikhail Tashkinov (Perm National Research Polytechnic University) Valery E. Wildemann (Perm National Research Polytechnic University) Aleksandr Anoshkin (Perm National Research Polytechnic University) Anatoliy Tashkinov (Perm National Research Polytechnic University)</p> <p><i>The study presents continuum mechanical models of nonlinear deformation, accumulation of damage and failure in composite structure. The approach based on a set of failure criteria, which allows to distinguish damage mechanisms, is proposed.</i></p>
<p>PO_3-45 NUMERICAL EXPERIMENTAL STUDY ON INFLUENCE OF MULTIWALLED CARBON NANOTUBE ON INTERFACE FRACTURE OF SANDWICH COMPOSITE</p> <p>Alak Kumar Patra (Indian Institute of Technology Kharagpur) Nilanjan Mitra (Indian Institute of Technology Kharagpur)</p> <p><i>Finite element analysis (FEA) is followed by experiment on interface fracture toughness (GIC) of sandwich composite with and without MWCNT. MWCNT improved GIC by cost effective methodology. FEA results agree with experiment, HRTEM and FESEM analyses.</i></p>	<p>PO_3-46 SCALING EFFECTS IN THE COMPRESSION BEHAVIOR OF SANDWICH STRUCTURES WITH CORRUGATED COMPOSITE CORES</p> <p>Jin Zhou (University of Liverpool) Z. Guan (University of Liverpool) Rehan Umer (Khalifa University) S. Balawi (Khalifa University) Wesley Cantwell (Khalifa University)</p> <p><i>This project considers the mechanical properties and scaling effects in the compression behavior of sandwich structures manufactured using glass fibre/epoxy and carbon fibre/epoxy curvilinear composite cores.</i></p>	<p>PO_3-47 THE EFFECT OF SURFACE FINISHING OPTIONS FOR CORE MATERIALS ON MECHANICAL PROPERTIES OF SANDWICH STRUCTURES</p> <p>Cihan Kaboglu (Imperial College London) Soraia Pimenta (Imperial College London) Andy Morris (EDF Energy) John P. Dear (Imperial College London)</p> <p><i>This work studies the effect of surface finishing options for core materials on the mechanical properties of sandwich structures. It is shown that surface finishing options increase the shear strength of these structures.</i></p>	<p>PO_3-48 LAYERWISE MODELS FOR THE STUDY OF HYBRID MULTILAYERED STRUCTURES.</p> <p>Rawad Baroud (Ecole des Ponts ParisTech) Jean-François Caron (Navier Laboratory, Ecole des Ponts ParisTech) Robert Le Roy (Navier Laboratory, Ecole des Ponts ParisTech) Boumedienne Nedjar (Ecole des Ponts ParisTech)</p> <p><i>A Layerwise Stress approach is used for the calculation of a civil engineering complex structure as combining wood innovation, crossed and openwork plywood, and a high performance concrete slab. Comparisons with other models and experiments are made.</i></p>

3. Material and Structural Behavior - Simulation & Testing

<p>PO_3-49 MICRO-CT ANALYSIS OF INTERLAMINAR GRADED INTERFACE STRENGTH (IGIS) COMPOSITES BASED ON A THERMOPLASTIC MATRIX</p> <p>Luigi Sorrentino (National Research Council of Italy) Pietro Russo (Consiglio Nazionale delle Ricerche) Fabrizio Sarasini (Università di Roma La Sapienza) Jacopo Tirillò (Università di Roma La Sapienza) Fabienne Touchard (P' Institute) Laurence Chocinski-Arnauld (Institute Pprime) David Mellier (Institute Pprime)</p> <p><i>MicroCT analysis was used to investigate the actual damage mechanisms occurring in IGIS laminates and showed how the graded interface strength is capable of shifting fibre breakage at higher impact energies and a allow higher elastic recovery.</i></p>	<p>PO_3-50 SIMULATION OF A METAL-THERMOPLASTIC COMPOSITE ASSEMBLY</p> <p>Simon Paroissien (Institut de Recherche Technologique (IRT) Jules Verne) Patrick Rozycki (Institut de Recherche en Génie Civil et Mécanique) Thierry Renault (Faurecia)</p> <p><i>This paper deals with an original way to simulate efficiently a complex multimaterial CMT Pin interface. Both a numerical and a multi scale analytical model are proposed and compared to an experimental campaign.</i></p>	<p>PO_3-51 STAMP FORMING OF STEEL-BASED FIBRE METAL LAMINATE</p> <p>Davood Rahiminejad (Australian National University) Adrian Lowe (Australian National University) Shankar Kalyanasundaram (Australian National University)</p> <p><i>Stamp forming of a steel-based Fibre Metal Laminate was studied using a hemispherical punch at different blank holder forces and preheat temperatures. The strain evolution pattern was analysed with an in-situ 3D photogrammetric measuring system.</i></p>	<p>PO_3-52 BUCKLING ANALYSIS OF ANISOTROPIC THIN-WALLED CIRCULAR CYLINDRICAL SHELLS SUBJECT TO COMBINED LOADING</p> <p>Esmael Ghavanloo (Shiraz University) S. Ahmad Fazlzadeh (Shiraz University)</p> <p><i>The governing equations are derived and analytical solution is presented for predicting the buckling behavior of the anisotropic thin-walled cylindrical shells subjected to combined loads by using the Flügge shell theory and complex method.</i></p>
<p>PO_3-53 EXPERIMENTAL INVESTIGATION OF MOLDED-IN THREADS AS A NEW SOLUTION FOR LOAD TRANSFER IN THICK-WALLED GFRP APPLICATIONS</p> <p>Marcel Bucker (Schäfer MWN GmbH) Jiri Duchoslav (Johannes Kepler University Linz) Nicole Motsch (Institute for Composite Materials)</p> <p><i>When forming threads directly in thick walled GFRP instead of cutting them, the fatigue behavior can be increased significantly. 16 test series were done, with variation of thread, manufacturing method, laminate and load direction.</i></p>	<p>PO_3-54 EXPERIMENTAL INVESTIGATION ON THE EFFECT OF BOLT-HOLE PERPENDICULARITY ERROR ON JOINT STRENGTH</p> <p>Xueshu Liu (Dalian University of Technology) Hang Gao (Dalian University of Technology) Yongjie Bao (Dalian University of Technology) Yidi Wang (Dalian University of Technology) Rupeng Li (Shanghai Aircraft Manufacturing) Lei Chen (Shanghai Aircraft Manufacturing)</p> <p><i>In this paper, an experimental study was performed to investigate the influence of perpendicularity error of hole on the joint strength. The specimens used in this study are made of carbon fiber/epoxy prepreg tapes IMS-194/CYCOM 977-2 with symmetrical lay-ups.</i></p>	<p>PO_3-55 FAILURE ANALYSIS OF ULTRA-THIN CHOPPED CARBON FIBER TAPE REINFORCED THERMOPLASTIC IN MECHANICAL JOINTS</p> <p>Linshu Meng (University of Tokyo) Hirokuni Wataki (University of Tokyo) Isamu Ohsawa (University of Tokyo) Jun Takahashi (University of Tokyo)</p> <p><i>Pin-loaded test of Ultra-thin chopped carbon fiber tape reinforced thermoplastic (UT-CTT) material was conducted, special failure modes different from laminates composite were observed in failure process of UT-CTT, which shows very stable failure.</i></p>	<p>PO_3-56 ENHANCED TENSILE STRENGTH CFRP ADHESIVE JOINT CONSTRUCTED FROM CARBON FIBER-REINFORCED PLASTIC AND DRY CARBON FIBER LAMINATES</p> <p>Mahmoud Abusrea (Kyushu University) Kazuo Arakawa (Kyushu University)</p> <p><i>This paper introduces three adhesive joints: the first is the original staircase joint and the other two are improved staircase joints.</i></p>
<p>PO_3-57 INFLUENCE OF THE TRACTION-SEPARATION COHESIVE LAW ON THE FAILURE LOAD OF ADHESIVELY-BONDED REPAIRS</p> <p>Lorena M. Fernandez-Cañadas (Universidad Carlos III de Madrid) Elena M. Moya-Sanz (Universidad Carlos III de Madrid) Inés Ivañez (Universidad Carlos III de Madrid) Sonia Sanchez-Saez (Universidad Carlos III de Madrid)</p>	<p>PO_3-58 LAP SHEAR STRENGTH OF SIMILAR GF/PP ADHERENDS BONED WITH TWO-PART ACRYLIC-BASED ADHESIVE</p> <p>Kimiyoshi Naito (NIMS) Hiroyuki Oguma (National Institute for Materials Science)</p>	<p>PO_3-59 OPTIMIZED HYBRID METAL-THERMOPLASTIC COMPOSITE JOINTS USING LASER MICROTEXTURING AS A SURFACE TREATMENT</p> <p>Pilar Rey Rodríguez (AIMEN Technology Centre) Clara Palleiro Palmou (AIMEN Technology Centre) Nerea Otero Ramudo (AIMEN Technology Centre)</p> <p><i>Laser textured aluminium parts were joined to fibre reinforced thermoplastic composite coupons by ultrasonic welding. The best laser microtexture pattern and joint configuration were selected to perform structural hybrid metal-composite joints.</i></p>	<p>PO_3-60 RESEARCH ON THE INTERFERING EFFECT OF METAL INSERTS IN FIBER-REINFORCED-PLASTICS MANUFACTURED BY THE RTM PROCESS</p> <p>Jonas Wilkening (Karlsruhe Institute of Technology) Florentin Pottmeyer (Institute For Applied Materials IAM-WK) Kay Weidenmann (Karlsruhe Institute of Technology)</p> <p><i>This paper aims on the systematic research on the interfering effects of inserts in CFRP parts. The specimens are tested under quasi-static tensile loads, while the load transfer is carried out by the laminate itself instead of the insert.</i></p>

3. Material and Structural Behavior - Simulation & Testing

<p>PO_3-61 EFFECT OF DWELL TIME ON THE PROPERTIES OF COMPOSITE MATERIALS</p> <p>Sanjeev Rao (Aerospace Research and Innovation Centre) Maryam Al-Kuwaiti (Strata Manufacturing) Vaughan Barber (Strata Manufacturing) A. Abusafieh (Strata Manufacturing) Wesley Cantwell (Khalifa University)</p> <p><i>Reserach has been carried out to examine the effect of longer soak time on the mechanical and material properties of the matrix and the composite part.</i></p>	<p>PO_3-62 EFFECT OF REPAIR DESIGN AND SURFACE TREATMENT ON ADHESIVELY BONDED COMPOSITE REPAIRS</p> <p>Florian Röper (Polymer Competence Center Leoben GmbH) Markus Wolfahrt (Polymer Competence Center Leoben GmbH) Georg Kucher (FACC Operations GmbH) Andreas Bubestinger (FACC Operations GmbH) Gerald Pinter (Montanuniversitaet Leoben)</p> <p><i>A combination of corona and wet chemical surface treatment is assessed. Furthermore, the influence of scarf angle, adhesive type and surface treatment on the mechanical performance of adhesively bonded composite repairs is investigated.</i></p>	<p>PO_3-63 RISK ASSESSMENT OF MECHANICAL FAILURE BY DETERMINING PROBABILITY OF FLEXURAL STRENGTH DETERIORATION IN EPOXY- GLASS LAMINATES AFTER LONG-TERM WATER IMPACT</p> <p>Aneta Krzyzak (Polish Air Force Academy)</p> <p><i>The paper presents how the risk of failure by flexural strength test changes depending on the period of water impact, pressure at production of laminates and the type of glass fibre preparation.</i></p>	<p>PO_3-64 EXPERIMENTAL AND NUMERICAL ANALYSIS OF REPAIRED STIFFENED CFRP PANELS UNDER COMPRESSION</p> <p>Dalong Dong (Shanghai Jiao Tong University) Hai Wang (Shanghai Jiao Tong University) Xiang Zhou (Shanghai Jiao Tong University)</p> <p><i>This paper presents an experimental and numerical study on the mechanical behaviors of CFRP stiffened panels containing two types of initial defects with three repair methods i.e. mechanical repair, adhesively bonded repair and scarf patch repair.</i></p>	<p>PO_3-65 EVALUATION OF THE GEOMETRY OF SINGLE-LAP ADHESIVE JOINTS IN COMPOSITE LAMINATES</p> <p>Elena M. Moya-Sanz (Universidad Carlos III de Madrid) Lorena M. Fernandez-Cañadas (Universidad Carlos III de Madrid) Inés Ivañez (Universidad Carlos III de Madrid) Shirley Garcia-Castillo (Universidad Carlos III de Madrid)</p>
--	--	--	---	--

4. Experimental Techniques

<p>PO_4-01 ANALYSIS OF POLYMERIZATION SHRINKAGE VECTORS OF PHOTO-CURED DENTAL COMPOSITE</p> <p>In-Bog Lee (Seoul National University) Hyun-Jeong Kweon (Seoul National University) Jin-Young Kim (Seoul National University)</p> <p><i>The polymerization shrinkage vectors of dental composite during photo-curing was investigated using a particle tracking method.</i></p>	<p>PO_4-02 IN-SITU MICROFOCUS X-RAY MONITORING OF DAMAGE ACCUMULATION IN COMPOSITE BULKHEAD UNDER LOADING</p> <p>Aleksandr Anoshkin (Perm National Research Polytechnic University) Valerii Zuiko (Perm National Research Polytechnic University) Vladimir Osokin (Perm National Research Polytechnic University) Pavel Pisarev (Perm National Research Polytechnic University)</p> <p><i>In present work the qualitative and quantitative analysis of micro damages appearing at various loading conditions in bulkhead partition made of CFRP was done using the microfocus X-ray monitoring method.</i></p>	<p>PO_4-03 USING ORIENTATIONS'S DETECTION TO COMPUTE ELASTIC PROPERTIES ON A COMPLEX TEXTURE OF 3D C/C COMPOSITE</p> <p>Morgan Charron (LCTS) Guillaume Couegnat (University of Bordeaux) Olivier Caty (University of Bordeaux) A. Dekeyrel (Herakles (SAFRAN)) Gerard Vignoles (University of Bordeaux)</p> <p><i>The purpose of this study is to estimate the effective elastic properties of a complex and tangled material, a 3D carbon/carbon composite with needle-stitched woven textile reinforcement, using orientation detection.</i></p>	<p>PO_4-04 NON-DESTRUCTIVE DETERMINATION OF THE LOCAL FIBER VOLUME CONTENT IN FLAT AL(OH)3-FILLED SMC PARTS FROM X-RAY PROJECTIONS</p> <p>Benjamin Bertram (Karlsruhe Institute of Technology) Pascal Pinter (Karlsruhe Institute of Technology) Kay Weidenmann (Karlsruhe Institute of Technology)</p> <p><i>Support vector machines (SVM) can be employed to estimate the fiber volume content (FVC). For low errors below 1 Vol.-%, the SVM was trained using the same matrix composition and image aquisition geometry whereas FVCs and thicknesses were varied.</i></p>
<p>PO_4-05 MONITORING OF THE MECHANICAL BEHAVIOR OF A COMPOSITE MATERIAL WITH HIGH PERFORMANCE BY FBG SENSORS</p> <p>F. Bernardo (ENEA) Piero De Fazio (ENEA) Francesco Grandizio (ENEA) Massimiliano Grieco (ENEA) Giuseppe Montesano (ENEA)</p> <p><i>This paper aims to verify the performance of a measuring deformation technique using optical fibers sensors (FBG) applied to fiber-reinforced concrete operating in a climate adverse environment, in particular the marine environment</i></p>	<p>PO_4-06 HIGH TEMPERATURE MECHANICAL CHARACTERIZATION OF MICRO- AND MESO-INTERFACES IN A 3D CARBON-CARBON COMPOSITE</p> <p>Adrien Gillard (Laboratoire des Composites Thermo-Structuraux (LCTS)) Guillaume Couegnat (University of Bordeaux) Stephane Jounnigot (University of Bordeaux) Olivier Caty (University of Bordeaux) Sylvain Chupin (CEA) Gerard Vignoles (University of Bordeaux)</p> <p><i>Push-out tests were conducted on a 3D Carbon-Carbon composite to study the micro- and meso-interface fracture mechanisms. Monotonic and cycled push-out tests brought characteristic values such as strength, dissipated energy and friction.</i></p>		

5. Manufacturing Technologies

<p>PO_5-01 LOWFLIP - DRAPING SIMULATION OF PREPREGS AT MESOSCOPIC AND MACROSCOPIC LEVEL</p> <p>Mathias Engelfried (University of Stuttgart) Tomáš Nosek (Mecas ESI s.r.o.) Frieder Heieck (University of Stuttgart) Patrick Böhler (University of Stuttgart) Peter Middendorf (University of Stuttgart)</p> <p><i>Different mesoscopic and macroscopic simulation approaches to predict the draping behaviour of prepreg materials are presented. The material models' generation as well as their validation by experiments are discussed.</i></p>	<p>PO_5-02 ON-LINE MIXING RTM PROCESS SIMULATION TREATING DUAL-SCALE FLOW</p> <p>Mathieu Imbert (ESI Group) Emmanuelle Abisset-Chavanne (Ecole Centrale Nantes) Sébastien Comas-Cardona (Ecole Centrale de Nantes) David Prono (ESI Group)</p> <p><i>A new flexible, accurate and efficient dual-scale simulation approach has been developed to treat on-line mixing RTM injections. First results reveal significant differences to classical single-scale simulations for highly reactive injection cases.</i></p>	<p>PO_5-03 EXPERIMENTAL AND NUMERICAL STUDY OF THE TOOL-PART INTERACTION IN FLAT AND DOUBLE CURVATURE PARTS</p> <p>Onur Yüksel (Bogazici University) Kenan Cinar (Bogazici University) Nuri Ersoy (Bogazici University)</p> <p><i>A 3-D numerical model, which is modified and verified with respect to overall deformation field of manufactured parts and enhanced by experimental measurement of tool part interaction, is developed to predict the process induced deformations.</i></p>	<p>PO_5-04 CORRELATION OF FLOW INDUCED STRAIN STATES AND YOUNG'S MODULUS IN CARBON REINFORCED MOULDING COMPOUNDS</p> <p>Markus Reiß (BMW AG) Johannes Eschl (BMW Group) Frank Henning (Karlsruhe Institute of Technology)</p> <p><i>This study investigates the coherence of the strain a SMC-material experiences in the flow process and the change in fibre orientation. A method is introduced to correlate calculated strain with mechanical values in order to assess fibre orientation.</i></p>
<p>PO_5-05 IN-SITU MONITORING AND SIMULATION OF CURE-PROCESS OF CFRP USING OPTICAL FIBER SENSORS</p> <p>Tatsuro Kosaka (Kochi University of Technology) G. Ueyama (Kochi University of Technology) K. Kusakawa (Kochi University of Technology)</p> <p><i>In-situ measurement method of degree-of-cure of FRP using optical fiber sensors was developed and applied to monitor cure process of CFRP.</i></p>	<p>PO_5-06 MECHANICAL CHARACTERIZATION OF COMPOSITE MATERIALS FROM CURVED STRUCTURES</p> <p>Mathilde Crozatier (Arts et Metiers ParisTech) Svetlana Terekhina (Ecole Nationale Supérieur d'Arts et Metiers) Frédéric Dau (Ecole Nationale Supérieur d'Arts et Metiers) Laurent Guillaumat (Ecole Nationale Supérieur d'Arts et Metiers)</p> <p><i>In order to carry out mechanical characterization, experiments of radial compression are conducted on composite ring. An inverse approach is adopted to get the elastic properties by Finite Element Method (FEM), using an optimization process.</i></p>	<p>PO_5-07 TOOLING OPTIMIZATION FOR COMPOSITE MATERIAL PARTS</p> <p>Alberto Mazarro (FIDAMC) Aquilino Garcia (FIDAMC)</p> <p><i>This Project studies manufacturing process optimization for complex composite materials parts trying to reduce costs. Springback effect and tooling thermal behaviour are taken into account to design an optimal tool and curing cycle.</i></p>	<p>PO_5-08 VISUALISING PROCESS INDUCED VARIATIONS IN THE MANUFACTURE OF TUFTED SANDWICH PANELS</p> <p>Emily Withers (University of Bristol) James Kratz (University of Bristol) Ian Hamerton (University of Bristol) Carwyn Ward (University of Bristol)</p> <p><i>This paper presents the development of a test bed which permits observation of loop formation during tufting. Needle insertion force data were obtained which along with the visual analysis aids understanding variation caused by the process.</i></p>
<p>PO_5-09 HYBRID, NEAR-NET-SHAPE AND NET-SHAPE MANUFACTURING OF COMPOSITE PARTS USING TOWPREG</p> <p>Jan Hodde (BMW AG) Matthias Meyer (BA Composites GmbH) Stefan Geh (SGL Carbon GmbH)</p> <p><i>360° analysis of low cost manufacturing with TowPreg.</i></p>	<p>PO_5-10 OPTIMISING HIGH-THROUGHPUT, AUTOMATED PREFORM PRODUCTION WITH NON-LINEAR SIMULATION OF THE PICK AND PLACE PROCESS FOR TECHNICAL FABRICS</p> <p>Christian Doersch (Fraunhofer IWES) Harsha Tummala (Fraunhofer IWES) Oliver Bagemiel (Fraunhofer IWES)</p> <p><i>Handling of textile blanks and cuttings for the production of composites is still complex. To reduce complexity in development of such handling processes there has been set up a digital tool to simulate and calculate optimal pick-up locations.</i></p>	<p>PO_5-11 MICRO-COMPUTED TOMOGRAPHY MEASUREMENT OF THE FIBRE MISALIGNMENT IN THE IN- AND OUT-OF-AUTOCLAVE AFP/ATL COMPOSITES</p> <p>Nghi Nguyen (KU Leuven) Mahoor Mehdikhani (KU Leuven) Ilya Straumit (KU Leuven) Larissa Gorbatikh (KU Leuven) Stepan Lomov (KU Leuven)</p> <p><i>The paper presents a method for characterization of fibre misalignment in-plane and out-of-plane of composite laminates manufactured by automated fibre placement/tape laying (AFP/ATL) using for assessment of the precision of tow placements process.</i></p>	<p>PO_5-12 CONTINUOUS TAPE LAYUP MOLDING OF CFRTF USING NEAR-INFRARED HEATING AND HIGH FREQUENCY INDUCTION ROLLER HEATING</p> <p>Daiki Tanabe (Osaka University) Fumio Kubohori (Kindai University) Shota Imamura (Kindai University) Hongfei Jiang (Kindai University) Kazuaki Nishiyabu (Kindai University)</p> <p><i>Tetsusei Kurashiki (Osaka University) This study aimed to predict the optimum processing condition for thermoplastic tape laying. It was found that the near infrared heating was required for removing the moisture contained in prepreg tape.</i></p>

5. Manufacturing Technologies

<p>PO_5-13 IN-SITU CONSOLIDATION OF POLYAMIDE (PA) COMPOSITES BY AUTOMATED PLACEMENT TECHNOLOGY</p> <p>Fernando Rodríguez (FIDAMC) Isabel Martín (FIDAMC) Katia Fernández (FIDAMC)</p> <p><i>FIDAMC has developed a thermoplastic fiber placement technology based on laser beam heating that will enable consolidation of the thermoplastic material (polyamide) out of autoclave.</i></p>	<p>PO_5-14 INFLUENCE OF LAYUP SPEED ON THE QUALITY OF THERMOPLASTIC PREFORMS MANUFACTURED BY LASER-ASSISTED AUTOMATED FIBRE PLACEMENT</p> <p>Mattia Di Francesco (National Composites Centre) Mario Valverde (University of Bristol) Carwyn Ward (University of Bristol) Peter Giddings (National Composites Centre) Giuseppe Dell'Anno (National Composites Centre) Kevin Potter (University of Bristol)</p> <p><i>Automated Fibre Placement of carbon fibre reinforced thermoplastics at high deposition rate is possible, but for a constant nip-point temperature process the preform quality varies with the layup speed.</i></p>	<p>PO_5-15 INFLUENCE OF PROCESS PARAMETERS AND MATERIAL AGING ON THE ADHESION OF PREPREG IN AFP PROCESSES</p> <p>Chinh Nguyen (German Aerospace Center) Christian Krombholz (German Aerospace Center)</p> <p><i>In order to increase the quality and process of automated manufactured CFRP parts, the tack between two prepreg plies depending on material aging at room temperature and different material temperature was analyzed with a lap shear test.</i></p>	<p>PO_5-16 IMPROVED CURE SIMULATION IN PULTRUSION PROCESS ABOUT HEATING SYSTEMS: A CASE STUDY</p> <p>Rita de Cássia Costa Dias (Montanuniversitaet Leoben) L. S. Santos (Universidade Federal Fluminense) Ralf Schledjewski (Montanuniversitaet Leoben)</p> <p><i>In this work some case studies related to the optimization of the die-temperature in the pultrusion of a thermosetting composite are presented.</i></p>
<p>PO_5-17 OUT OF DIE ULTRAVIOLET PULTRUSION PROCESS SET-UP: LIMITATIONS OF PHOTO-DIFFERENTIAL SCANNING CALORIMETRY ANALYSIS</p> <p>Iosu Tena (University of Mondragon) Iván Sáenz Domínguez (Mondragon Unibertsitatea) Modesto Mateos (Mondragon Unibertsitatea) Mariasun Sarrionandia (Mondragon Unibertsitatea) Jon Aurrekoetxea (Mondragon Unibertsitatea)</p> <p><i>The aim of this study is to analyse the limitations of the traditional photo-differential scanning calorimetry (photo-DSC) analysis compared to electric monitoring (DC sensor) in the out of die ultraviolet (UV) pultrusion process set-up.</i></p>	<p>PO_5-18 EFFECTS OF HEATING CONDITIONS ON HIGH FREQUENCY INDUCTION WELDING BEHAVIOR OF CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITES</p> <p>Tanabe Daiki (Osaka University) Kai Kurauchi (Kindai University) Yusuke Kawamura (Kindai University) Kazuaki Nishiyabu (Kindai University) Tetsusei Kurashiki (Osaka University)</p> <p><i>This study aims to reveal the induction welding behavior of CFRTP composites by high-frequency induction heating method. The effects of heating conditions were investigated to predict the optimum processing conditions.</i></p>	<p>PO_5-19 HEATING CARBON/THERMOPLASTIC FIBRE HYBRID NONWOVENS USING MICROWAVES TO PRODUCE ORGANO SHEETS</p> <p>Thomas Köhler (RWTH Aachen University) Gunnar Seide (RWTH Aachen University) Thomas Gries (RWTH Aachen University)</p> <p><i>Fibre reinforced thermoplastic composites have become increasingly important in the industry. Shorter cycle time can be achieved by quick heating. The volumetric heating of microwave technology can be used to heat carbon/polyamide hybrid nonwovens.</i></p>	<p>PO_5-20 MICROWAVE HEATING OF A COMPOSITE PART</p> <p>Anais Barasinski (Ecole Centrale de Nantes) Hermine Tertrais (Ecole Centrale de Nantes) Chady Ghnatios (Notre Dame University-Louaize) Francisco Chinesta (Ecole Centrale Nantes)</p> <p><i>The principal objective of this work is to model and simulate the interactions of the MW field with a composite laminated part, consisting of a stack of layers of different orientations, each layer made of resin matrix and carbon fibers.</i></p>
<p>PO_5-21 PROCESS DEVELOPMENT FOR GENERATIVE MANUFACTURING OF FIBER THERMOPLASTIC COMPOSITES STRUCTURES – THERMOPLASTIC PATCH PLACEMENT (TPP)</p> <p>Philipp Schwanemann (Institut für Leichtbau und Kunststofftechnik) Niels Modler (Technical University of Dresden) Bernhard Witschel (Institut für Leichtbau und Kunststofftechnik) Bernd Grüber (Institut für Leichtbau und Kunststofftechnik) Florian Lenz (Leichtbau-Zentrum Sachsen)</p> <p><i>Development of a novel process for the generative manufacturing of load-adapted curved composite shell structures. The Thermoplastic Patch Placement (TPP) process utilizes thermoplastic sheets for generative manufacturing structures.</i></p>	<p>PO_5-22 PROCESSING OF FIBRE REINFORCED THERMOPLASTIC COMPOSITES WITH ENHANCED THERMAL PROPERTIES</p> <p>Georg Brockerhoff (RWTH Aachen University) Robert Brüll (RWTH Aachen University) Thomas Gries (RWTH Aachen University) Gunnar Seide (RWTH Aachen University)</p> <p><i>This paper evaluates the effects of 5 weight percent (wt.-%) titanium dioxide (TiO2) in commingled hybrid yarns made of polyamide 6 (PA6) glass fibres on the cycle time during the consolidation process and the resulting mechanical properties.</i></p>	<p>PO_5-23 RAPID MANUFACTURING OF COMPOSITE STRUCTURES MADE OF FABRIC FLAX / POLYPROPYLENE</p> <p>Imed Derbali (Ecole Nationale Supérieur d'Arts et Metiers) Svetlana Terekhina (Ecole Nationale Supérieur d'Arts et Metiers) Laurent Guillaumat (Ecole Nationale Supérieur d'Arts et Metiers) Pierre Ouagne (ENI Tarbes/ Université Orléans)</p> <p><i>This paper present a new rapid manufacturing process of composites parts based on flax/PP comingled fabric. Then, an assessment of the new process by comparing the mechanical properties of a material produced by a traditional process will be presented.</i></p>	<p>PO_5-24 IMPROVING PROCESSABILITY AND MECHANICAL PERFORMANCE WITH THE USE OF UNIDIRECTIONAL THERMOPLASTIC TAPES IN COMPRESSION MOLDING FOR AUTOMOTIVE STRUCTURAL APPLICATIONS.</p> <p>Vincent Lutz (Plastic Omnium)</p> <p><i>Different composite architectures were processed with unidirectional tapes in a large manufacturing set-up.</i></p>

5. Manufacturing Technologies

PO_5-25 AN ANALYTICAL MODEL FOR PREDICTING CRITICAL FEED RATE IN DRILLING OF COMPOSITE MATERIALS

Navid Zarif Karimi (University of Bologna)
Hossein Heidary (Tafresh University)
J. Yousefi (Amirkabir University of Technology)
Giangiaco Minak (University of Bologna)

In this paper, elastic fracture mechanics, classical plate bending theory and the mechanics of oblique cutting were used to predict critical thrust force and feed rate at the onset of delamination in drilling of composite laminates.

PO_5-26 WET MACHINING OF CFRP

Marco Schneider (Fraunhofer IPA)
Andreas Gebhardt (Fraunhofer IPA)
Robert Beckenlechner (Fraunhofer IPA)

In this article, the potential of wet machining of CFRP is illustrated by means of the milling process.

PO_5-27 AUTOMATED HANDLING OF AUXILIARY MATERIALS FOR VACUUM BAGGING IN CFRP FUSELAGE PRODUCTION

Jan Faber (German Aerospace Center)
Clemens Schmidt-Eisenlohr (German Aerospace Center)

Vacuum infusion techniques and especially vacuum bagging involve a high amount of manual work. To increase productivity and efficiency, robot-based gripping systems could be used. Alongside the process chain, optimization potentials are discussed.

PO_5-28 DYNAMIC STRAIN MONITORING OF COMPOSITE LAMINATES DURING DRILLING USING FIBER BRAGG GRATING AND STRAIN GAUGE SENSORS

Zhu Pingyu (Guangzhou University)
Zhichao Yang (Guangzhou University)
Yongjing Li (Guangzhou University)
Wei Shi (Guangzhou University)

The stress concentrated response zones relative to cutting force on laminated composites are obtained under drilling loads. The location and occurrence of delamination can be identified by strain energy distribution of frequency variations.

PO_5-29 ANALYSIS OF FIBER ORIENTATION, MICROSTRUCTURE AND MECHANICAL PROPERTIES OF SPECIMENS MADE FROM FIBER-REINFORCED ABS MANUFACTURED BY FUSED FILAMENT FABRICATION (FFF)

Kay Weidenmann (Karlsruhe Institute of Technology)
Sascha Baumann (Fraunhofer ICT)
Pascal Pinter (Karlsruhe Institute of Technology)
Peter Elsner (Fraunhofer ICT)

This contribution aims on the systematic, quantitative analysis of the fiber orientation using X-ray computed tomography in specimens manufactured from fiber-reinforced ABS by fused filament fabrication and its impact on the mechanical properties.

PO_5-30 PROCESS AND MOLD DEVELOPMENT OF DIRECT LONG FIBER REINFORCED FOAM INJECTION MOLDING ON THE EXAMPLE OF POLYCARBONATE AND GLASFIBERS

Christoph Lohr (Karlsruhe Institute of Technology)
Andreas Menrath (Fraunhofer ICT)
Peter Elsner (Fraunhofer ICT)
Kay Weidenmann (Karlsruhe Institute of Technology)

Fiber reinforced polycarbonate (sandwich) blanks were manufactured in a combined foam injection molding and compounding process using a special developed and designed mold. The specimen were investigated on their mechanical properties.

PO_5-31 HYBRID RESIN IMPROVES POSITION AND ALIGNMENT OF CONTINUOUSLY REINFORCED PREPREG DURING COMPRESSION COMOLDING WITH SHEET MOLDING COMPOUND

David Bücheler (Fraunhofer ICT)
Frank Henning (Karlsruhe Institute of Technology)

Till now, there was no approved procedure for the reliable co-molding of prepreg material with SMC. Introducing a hybrid resin system will enable to manufacture composite parts of complex shape with continuous reinforcements at high quality.

PO_5-32 IMPROVEMENT OF COMPOSITE DRAPE FORMING QUALITY BY ENHANCING INTERPLY SLIP

Wei-Ting Wang (University of Bristol)
HaNa Yu (University of Bristol)
Kevin Potter (University of Bristol)
Byung Chul Kim (University of Bristol)

Interply friction is an important factor affecting composite drape forming quality. In this work, the effect of the interleaving materials on the interply friction as well as the interlaminar fracture toughness after curing were investigated.

PO_5-33 LASER HOLE CUTTING IN F-12 ARAMID COMPOSITES

Dongbing Geng (Aerospace Research Institute of Materials & Processing Technology)
Yi Zhang (Aerospace Research Institute of Materials & Processing Technology)
Kai Yi (Aerospace Research Institute of Materials & Processing Technology)

In the present study, laser holes cutting into F-12 laminates with different processing parameters of laser machining and composites properties are carried out by application of the CO2 laser.

PO_5-34 MECHANICAL PROPERTIES OF UNIDIRECTIONAL CONTINUOUS CARBON FIBER REINFORCED SHEET MOLDING COMPOUNDS (SMC)

Anna Trauth (Karlsruhe Institute of Technology)
David Bücheler (Fraunhofer ICT)
Frank Henning (Karlsruhe Institute of Technology)
Kay Weidenmann (Karlsruhe Institute of Technology)

Compression molding of unidirectional carbon fiber SMC, based on a hybrid resin system, offers a novel approach to process carbon fiber prepreps with mechanical properties comparable to epoxy based prepreg materials in a more economic way.

6. Multifunctional and Smart Composites

<p>PO_6-01 COVALENT MODIFICATION OF GOLD THIN FILMS FOR PLASMONIC APPLICATIONS: COMPARISON OF SPONTANEOUS AND ELECTROGRAFTING</p> <p>Olga Guselnikova (National Research Tomsk Polytechnic University) Pavel Postnikov (National Research Tomsk Polytechnic University) Oleksiy Lyutakov (University of Chemistry and Technology Prague)</p> <p><i>Facile procedure for covalent functionalization of optical-active gold thin films was developed using water-soluble arenediazonium tosylates. Spontaneous reaction and electrografting approaches were compared for optical applications.</i></p>	<p>PO_6-02 PERFORMANCE OF ACTIVE POLYMER-MATRIX COMPOSITE USING SHAPE MEMORY ALLOY WOVEN LAMINATES</p> <p>Min-Woo Han (Seoul National University) Hyung-Il Kim (Seoul National University) Sung-Hoon Ahn (Seoul National University)</p> <p><i>Polymer-matrix composite actuator using Shape Memory Alloy (SMA) woven laminates was investigated with different configurations of the lamina condition.</i></p>	<p>PO_6-03 PIEZOELECTRIC PVDF SMART FIBRE FOR COMPOSITE APPLICATIONS</p> <p>Seyedalireza Razavi (Imperial College London) Lorenzo Iannucci (Imperial College London) Emile Greenhalgh (Imperial College London)</p> <p><i>This research work investigates the feasibility of producing a piezoelectric Polyvinylidene Fluoride (PVDF) – hereafter called smart fibre, by employing the braiding manufacturing technique, for using in sensing and energy harvesting applications.</i></p>	<p>PO_6-04 MICROWAVE ACTIVATED SHAPE MEMORY POLYMER</p> <p>Zhihong XU (Nanjing University of Science and Technology) Zhang Yao (Institute of Solid Mechanics, Beihang University)</p> <p><i>In this paper the tetra-needle-shaped zinc oxide whisker (T-ZnOw) was filled in the shape memory polymer (SMP) with different weight fraction and the T-ZnOw/SMP composite obtained the ability of microwave absorption while maintaining the basic thermal mechanical properties and shape memory characteristics.</i></p>
<p>PO_6-05 BIOCAPSULES FOR SELF-HEALING EPOXY COMPOSITES</p> <p>Iee Lee Hia (Monash University Malaysia) Eng S. Chan (Monash University) Pooria Pasbakhsh (Monash University)</p> <p><i>A new self-healing capsule as the container for epoxy resin has been developed. These capsules are made of alginate biopolymer extracted from seaweed and epoxy resin has been successfully encapsulated to form self-healing capsules.</i></p>	<p>PO_6-06 GFRP COMPOSITE WITH DAMAGE VISUALIZATION CAPABILITY</p> <p>Olga Bulderberga (Institute of Polymer Mechanics, University of Latvia) Andrey Aniskevich (Institute of Latvia) S. Vidinejevs (University of Latvia)</p> <p><i>The method of manufacture of a GFRP composite with damage visualization capability is proposed.</i></p>	<p>PO_6-07 INTERLAMINAR FRACTURE OF COMPOSITES MADE BY THERMO-REVERSIBLE EPOXY</p> <p>Alfonso Martone (CNR - IPCB) Stefania Dello Iacono (CNR - IPCB) Mauro Zarrelli (CNR - IPCB) Michele Giordano (CNR - IPCB) Eugenio Amendola (CNR - IPCB)</p> <p><i>The interlaminar properties of carbon fiber composites made by a synthesised system (2Ph2Epo65 Diels-Alder epoxy) have been carried out to assess the multiple healing capability.</i></p>	<p>PO_6-08 STATISTICAL ANALYSIS OF THE MECHANICAL PROPERTIES OF NACRE</p> <p>Arunachalam Muthukaruppan (Indian Institute of Technology-Madras) Manoj Pandey (Indian Institute of Technology-Madras) Ashvini Shekhawat (Indian Institute of Technology-Madras)</p> <p><i>Monte Carlo simulations were carried out on the heterogeneous nacre model of different sizes subjected to uni axial tension in order to determine the material heterogeneity effect on the overall behavior of the material over several length scales.</i></p>
<p>PO_6-09 THERMALLY INDUCED SELF-HEALING CAPABILITY OF EPOXIES AND POLYURETHANES RESINS</p> <p>Stefania Dello Iacono (CNR - IPCB) Alfonso Martone (CNR - IPCB) Antonello Pastore (CNR - IPCB) Maddalena Giordano (University of Naples) Eugenio Amendola (CNR - IPCB)</p> <p><i>Intrinsic self-healing epoxies and polyurethanes containing D-A adducts, in addition to conventional epoxy and isocyanate precursors, have been prepared.</i></p>			

7. Recycling and Sustainability

**PO_7-01
FIBRE BASED NONWOVENS IN LIGHT WEIGHT
CONSTRUCTION – A TRANSFERABLE CONCEPT
FOR THE RECYCLING OF CARBON WASTE
MATERIAL**

Marcel Hofmann (STFI e.V.)
Bernd Gulich (STFI e.V.)

The poster explains pre-treatment of dry carbon fibres wastes with modified cutting and tearing process and the nonwoven production based on recovered carbon fibres as possibility for the realisation of textile fabrics.

**PO_7-02
UNCURED CFRP RECYCLING Nuria Fanegas
Martin (FIDAMC)**

Garcia Garcia Aquilino
Noelia Colas (AIRBUS Spain)

The target of this study is to transform uncured waste prepreg produced during the manufacturing of the CFRP composites into recycled raw material by cutting the prepreg into chopped material.