

SAMPE Europe Conference 2021 Baden/Zurich

Innovating Towards Perfection

Baden/Zurich, Switzerland and Online
29-30 September 2021

Volume 1 of 2

ISBN: 978-1-7138-4428-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2021) by SAMPE Europe
All rights reserved.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact SAMPE Europe
at the address below.

SAMPE Europe
c/o Mr. Rudolf de Ruijter
de Ruijter Consultancy
PO Box 557
NL-8440 AN Heerenveen
Netherlands

Phone: +31 6 51381263

conference@sampe-europe.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

DESIGN AND ADDITIVE MANUFACTURING OF AN AEROSPACE COMPOSITE FITTING USING DED TECHNOLOGY	1
<i>S. Anandan, R. Fenrich, P. Woytowicz, M. Zydzik, D. Sireude, L. Dubreuil, O. Vincent</i>	
CONTINUOUS FIBRE REINFORCED THERMOPLASTICS FOR ADDITIVE MANUFACTURING.....	9
<i>A. Gilliot</i>	
INFLUENCE OF SELF AND EXTERNAL HEATING ON ELECTRICAL PROPERTIES OF CONDUCTIVE 3D PRINTED FILAMENT	15
<i>R. Delbart, C. Robert, T. Noble, F. Martinez-Hergueta, T. Hoang</i>	
PRODUCTION OF CONTINUOUS FIBER REINFORCED 3D-PRINTING FILAMENTS USING ULTRASOUND.....	23
<i>M. Titze, F. Kuhnast, M. Rege, J. Riemenschneider</i>	
INVESTIGATIONS INTO FATIGUE BEHAVIOR OF 3D PRINTED CONTINUOUS CARBON FIBER REINFORCED POLYMER (CFRP) TENSION STRAPS.....	30
<i>T. Vidrih, P. Winiger, G. Terrasi</i>	
ADDITIVE MANUFACTURING OF CONTINUOUS FIBRE REINFORCED PLASTIC COMPONENTS BY A NOVEL LASER SINTERING PROCESS	43
<i>M. Baranowski, S. Beichter, M. Griener, S. Coutandin, J. Fleischer</i>	
HIGHLY ALIGNED DISCONTINUOUS FIBRE COMPOSITE FILAMENTS FOR FUSED DEPOSITION MODELLING: PRODUCTION AND CHARACTERISATION.....	56
<i>N. Krajangsawasdi, M. Longana, B. Woods, I. Hamerton, D. Ivanov</i>	
ESTIMATION-BASED TEMPERATURE CONTROL IN LASER-ASSISTED, THERMOPLASTIC AUTOMATED TAPE PLACEMENT	65
<i>A. Peitz, M. Nalborczyk, M. Emonts, K. Fischer, C. Brecher</i>	
NUMERIC OPTIMIZATION OF IN-SITU CONSOLIDATED PANELS WITH DIFFERENT TAPE SEQUENCE STRATEGIES	73
<i>D. Fricke</i>	
IDENTIFICATION OF A FILM TO SEAL THE PREFORM IMPREGNATION DURING THE COMPRESSION RESIN TRANSFER MOLDING PROCESS	80
<i>M. Vollmer, D. Konig, I. Gilch, H. Waller-Ehrt, S. Zaremba, C. Hubner, P. Mertiny, K. Drechsler</i>	
LIGHTWEIGHT STRUCTURAL COMPONENTS BY CONTINUOUS FIBER ADDITIVE MANUFACTURING.....	94
<i>B. Ingenhut, F. Mackenzie, G. Bex, A. Cate</i>	
REINFORCEMENT OF STEREOLITHOGRAPHIC MANUFACTURED STRUCTURES BY THE SUBSEQUENT INFUSION OF SHORT CARBON FIBERS.....	102
<i>T. Schlotthauer, A. Geitner, C. Seifarth, O. Schendel, T. Luck, R. Kaindl, D. Kopp, S. Spalt, P. Walter, D. Nolan, P. Middendorf</i>	

APPLICATION OF ADDITIVE MANUFACTURING FOR THE PRODUCTION OF MULTI-MATRIX COMPOSITES	110
<i>S. Konze, A. Spickenheuer, F. Conrad, J. Herold, M. Wildemann, J. Schirmer, M. Stommel</i>	
MONOLITHIC Z-WING COVER AND CO-INFUSED OMEGA STRINGERS WITH AUTOMATED LAMINATION OF NCF.....	118
<i>P. Olaskoaga, F. Vallejo, N. Perez-De-Eulate, L. Rubio, R. Buelga, J. Guerrero, A. Gandarias, H. Gutierrez, A. Loidi</i>	
THE AIRTECH DEVELOPMENT PROCESS FOR DAHLTRAM - LARGE SCALE ADDITIVE MANUFACTURING COMPOUNDED RESINS	126
<i>Z. Skelton, O. Bottler</i>	
NET-SHAPE OUT-OF-AUTOCLAVE: THE DEMONSTRATION	134
<i>A. Vierset</i>	
NEW MATERIAL OPTIONS AND THEIR ADVANTAGES FOR THE FUTURE HYDROGEN STORAGE MARKET.....	146
<i>B. Rolink, J. Lowe</i>	
A SMART INTERFACE FOR AUTOMATED FIBRE PLACEMENT.....	157
<i>M. Arruda, K. Ma, M. Palardy-Sim, S. Bolduc, C. Ward</i>	
IMPLEMENTATION OF A FLOW REGULATION SYSTEM FOR GRANULATE BASED EXTRUSION ADDITIVE MANUFACTURING.....	165
<i>N. Tagscherer, R. Edelmann, A. Rybarz, S. Zaremba, K. Drechsler</i>	
WET COMPRESSION MOULDING PROCESS DEVELOPMENT FOR HIGH RATE, COMPLEX SHAPE AUTOMOTIVE STRUCTURES	175
<i>A. Mills, K. Jani, M. Smith, J. Snudden</i>	
DEVELOPMENT OF NOVEL TRANSPORTATION SHELLS FOR USE IN HIGH VOLUME COMPOSITE PART MANUFACTURE: THE CLAMSHELL CONCEPT	185
<i>K. Willicombe, I. Hamerton, C. Ward</i>	
THERMOPLASTIC LASER ASSISTED TAPE PLACEMENT DEVELOPMENT FOR PROCESSING A NOVEL CARBON FIBER REINFORCED POLYPHTALAMIDE TAPE.....	193
<i>H. Baumann, M. Schwane, M. Schulz, H. Janssen, C. Brecher</i>	
SENSOR-BASED PROCESS MONITORING OF IN-SITU POLYMERIZATION IN T-RTM MANUFACTURING WITH CAPROLACTAM.....	201
<i>J. Faber, . Vistein, A. Chaloupka, M. Achzet, F. Linscheid, S. Kurt, M. Sause</i>	
INFLUENCE OF HYGROTHERMAL AGEING ON POWDER EPOXY COMPOSITES FOR TIDAL TURBINE BLADES	210
<i>C. Floreani, C. Robert, P. Alam, P. Davies, C. Bradaigh</i>	
DURABILITY INVESTIGATION OF FIBER REINFORCED POLYMER BARS IN MARINE ENVIRONMENTS	218
<i>G. Xian, M. Yang, Z. Lu</i>	
INVESTIGATION OF AN INNOVATIVE WOOD-PLASTIC HYBRID LAID FABRIC FOR THE REPLACEMENT OF STEEL REINFORCEMENTS IN CONSTRUCTIONS.....	226
<i>J. Herz, M. Sigruner, M. Krekemeyer, M. Kazmi, J. Schuster, D. Muscat, N. Stubbe</i>	

PROSPECTS OF FIBRE-POLYMER COMPOSITES FOR BENDING-ACTIVE ENGINEERING STRUCTURES	235
<i>T. Habibi, T. Keller</i>	
NEW CIRCULAR MODEL - INNOVATIVE SECOND LIFE CARBON FIBRE COMPOUNDS.....	243
<i>J. Kupski, S. Bucher, C. Brauner</i>	
FULLY INTERLINKED PROCESSING OF THERMOPLASTIC COMPOSITE TAPES.....	251
<i>N. Muller</i>	
HOLISTIC OPTIMIZATION OF THE HIGHSPEED TAPE LAY-UP PROCESS USING A DIGITAL TWIN	268
<i>T. Neumeyer, C. Runge, A. Gebhardt, M. Loegel, L. Bartel, M. Muhlbacher, V. Altstadt</i>	
FAST AND FLEXIBLE MANUFACTURING OF THERMOPLASTIC COMPOSITE LAMINATES FOR AUTOMOTIVE AEROSPACE.....	279
<i>M. Kremers</i>	
INTERLAYER HYBRIDISATION OF SELF-REINFORCED POLYPROPYLENE WITH UNIDIRECTIONAL FLAX REINFORCEMENTS	298
<i>P. Woody, J. Van Damme, Y. Swolfs</i>	
GRAPHENE COATED CARBON FIBRES AS STRUCTURAL SUPERCAPACITOR ELECTRODES	307
<i>O. Hubert, N. Todorovic, A. Bismarck</i>	
IMPROVING FLEXURAL MODULUS OF INTERLEAVED COMPOSITES USING REINFORCED THERMOPLASTIC INTERLEAVES	315
<i>G. Murali, P. Robinson, A. Bismarck, C. Burgstaller</i>	
INLINE QUALITY CONTROL FOR THERMOPLASTIC AUTOMATED FIBER PLACEMENT BY 3D PROFILOMETRY	323
<i>A. Schuster, M. Mayer, L. Brandt</i>	
INVESTIGATION OF THE SHEAR STRENGTH OF PARTIALLY IMPREGNATED FIBRE REINFORCED POLYMERS.....	332
<i>V. Kumaran, R. Schweizer, M. Zogg, L. Weiss, R. Trosch, M. Niederberger, S. Rooj, K. Wegener</i>	
DEVELOPMENT OF OPTIMIZATION TOOL FOR INDUCTION HEATING COILS FOR THERMOPLASTIC COMPOSITES	345
<i>J. Hyun, D. Barazanhy, J. Pandher, M. Van Tooren, M. Mitrovic, A. Kim</i>	
ENABLING STEREOLITHOGRAPHY TO MANUFACTURE INJECTION MOULDS FOR HIGH-PERFORMANCE FIBRE REINFORCED THERMOPLASTICS FOR AIRCRAFT APPLICATIONS.....	356
<i>C.-A. Keun, S. Detjen, S. Kaysser</i>	
ELECTRICAL INSULATION OF COMPOSITES FOR POWER GRIDS APPLICATIONS	365
<i>R. Velthuis, D. Botor, J. Van Loon, G. Meier</i>	
EFFICIENT METHOD FOR QUALITY ASSESSMENT IN DRILLING CFRP BASED ON DIGITAL IMAGES.....	373
<i>L. Seeholzer, F. Kneubuhler, C. Meier, K. Wegener</i>	

NET SHAPE CERAMIC MATRIX COMPONENTS PRODUCED BY COMPOSITE FLOW MOULDING	381
<i>G. Bianchi, S. Vitullo, A. Vodermayr, A. Ortona</i>	
HIGH PERFORMANCE COMPRESSION MOLDING	389
<i>J. Aubry, X. Danger, T. Richard</i>	
NOVEL STYRENE-FREE HIGH TEMPERATURE BMC MATERIALS BASED ON CYANATE ESTER RESINS	401
<i>G. La Delfa, R. Mazotti, S. Ellinger</i>	
A NOVEL METHOD FOR THE CHARACTERIZATION OF OUT-OF-PLANE SHEAR STIFFNESS FOR DRY CARBON FIBER PREFORMS	407
<i>D. Bublitz, M. Schletterer, A. Matschinski, D. Colin, K. Drechsler</i>	
EXPLAINABLE AI FOR ERROR DETECTION IN COMPOSITES: KNOWLEDGE DISCOVERY IN ARTIFICIAL NEURONAL NETWORKS	415
<i>F. Brillowski, M. Becker, M. Vermeulen, D. Trauth, T. Bergs, C. Greb, T. Gries</i>	
A DIGITAL TWIN FOR ESTIMATING PROCESS QUALITY DURING AUTOMATED FIBER PLACEMENT OF THERMOPLASTIC COMPOSITES	423
<i>M. Schulz, E. Survila, H. Janssen, C. Brecher</i>	
RAPID DETERMINATION OF SUITABLE REINFORCEMENT TYPE IN CONTINUOUS- FIBRE-REINFORCED COMPOSITES FOR MULTIPLE LOAD CASES	432
<i>B. Fengler, C. Zimmerling, L. Karger</i>	
DESIGN, MODELLING AND MANUFACTURING OF A VARIABLE-AXIAL COMPOSITE STRUCTURAL GUIDE VANE FOR A JET ENGINE INTERMEDIATE CASE IN THE CONTEXT OF INDUSTRY 4.0	439
<i>A. Dargel, J. Kluger, C. Klaus, A. Spickenheuer, L. Bittrich, S. Spitzer, K. Schubert, D. Feltin, M. Gude</i>	
ANALYSIS OF CHARACTERISATION METHODS FOR THE FORMING BEHAVIOUR OF TAPE-BASED LAMINATES.....	448
<i>C. Hopmann, M. Ophuls, D. Schneider, K. Fischer</i>	
COMPRESSIBILITY AND RELAXATION CHARACTERISTICS OF BINDERED NON- CRIMP-FABRICS UNDER TEMPERATURE INFLUENCE	456
<i>M. Bender, M. Hollitsch, E. Fauster</i>	
MACRO AND MICROSCALE FORMABILITY CHARACTERIZATION OF STRETCH BROKEN CARBON FIBRE COMPOSITE	464
<i>M. Egloff, R. Amendola, D. Bajwa, D. Cairns, A. Dynkin, J. Janicki, C. Ryan, J. Nelson</i>	
TOWARDS FASTER FE-CALIBRATION VIA ADVANCED MEASUREMENT TECHNIQUES	472
<i>C. David, S. Vohrer, X. Jiang</i>	
BONDING OF ADHESIVE-FREE THERMOPLASTIC SANDWICH PANELS WITH HONEYCOMB CORE FOR AIRCRAFT INTERIORS.....	482
<i>T. Latsuzbaya, P. Middendorf, D. Voelkle, C. Weber</i>	
DESIGN AND MANUFACTURING CARBON FIBER WHEEL RIM.....	492
<i>M. Samy, M. Abdelwahab, M. Abdelaziz</i>	

HOT MELT SPREADED THERMOPLASTIC TOWPREGS-RESEARCH OF THE MANUFACTURING PROCESS	503
<i>T. Gries, M. Schmidt, K. Cramer</i>	
A NUMERICAL FRAMEWORK TO QUANTIFY THE INFLUENCE OF THE MATERIAL BEHAVIOR OF DRY TEXTILES ON THE PREFORM QUALITY	511
<i>D. Colin, T. Hans, S. Bel, K. Drechsler</i>	
VALIDATION OF AN EFFICIENT VISCOSITY CHARACTERIZATION IN SHEET MOLDING COMPOUND FILLING SIMULATION	519
<i>A. Imbsweiler, Y. Shinoura, D. Colin, S. Zaremba, K. Drechsler</i>	
COST-EFFECTIVE PRODUCTION OF GLASS FIBRE REINFORCED TOWPREGS.....	527
<i>J. Von Helden, H. Baumann, H. Janssen, C. Brecher</i>	
HEAT TRANSFER ANALYSIS OF FLASHLAMP HEATING FOR AUTOMATED TAPE PLACEMENT	535
<i>A. Danezis, D. Williams, M. Edwards, A. Skordos</i>	
REDUCTION OF STABILIZATION TIME OF PAN-BASED CARBON FIBERS BY THERMOCHEMICAL PRETREATMENT	543
<i>Z. Liu, T. Gries</i>	
IMPACT TESTING OF A COMPOSITE GROUND INTERFACE PLATE.....	551
<i>A. Littlefield, D. Alfano Jr.</i>	
MANUFACTURING AND FLAME RETARDANCY MODIFICATION OF MONO-MATRIX SANDWICH COMPONENTS.....	567
<i>S. Kilian, C.-C. Hohne, A. Menrath</i>	
THERMAL ANALYSIS OF THE LASER-ASSISTED TAPE PLACEMENT PROCESS WITH A PIECE-FLOW PRINCIPLE	575
<i>P. Striet, M. Emonts, K. Fischer, C. Brecher</i>	
METHOD FOR EVALUATING COOLING STRATEGIES IN TERMS OF CHIP FORMATION/TRANSPORT IN DRILLING CFRP/AL-STACKS	583
<i>F. Kneubuhler, L. Seeholzer, M. Spahni, L. Di Pierno, K. Wegener</i>	
UNDERSTANDING THE INFLUENCE OF THE CONSOLIDATION ROLLER ON PREFORM QUALITY IN AUTOMATED DEPOSITION PROCESSING	591
<i>O. Taylor, M. Elkington, B. Hopper, S. Astwood, C. Ward</i>	
RATCHETING AND RECOVERY OF ADHESIVES UNDER TENSILE CYCLIC LOADING	601
<i>Y. Chen, L. Smith</i>	
MEASUREMENT OF THE "GREEN STRENGTH" OF PASTE ADHESIVES FOR WIND ENERGY ROTOR BLADES.....	609
<i>K. Jornot, V. Kumaran, M. Zogg, S. Leu, C. Di Fratta</i>	
STORAGE-STABLE, FIBER-REINFORCED ADHESIVE FILMS	624
<i>C. Hosotte, P. Frei, E. Roos, K. Huber, R. Schaller</i>	
NUMERICAL PREDICTION OF TRANSVERSE RESPONSE OF CONTINUOUS G/IPP COMPOSITES USING VISCOELASTIC MODEL: EFFECT OF STRAIN RATE	632
<i>S. Celik, I. Baran, L. Govaert, R. Akkerman</i>	

CHALLENGES OF SHEAR CHARACTERIZATION IN THE BIAS EXTENSION TEST OF FIBRE REINFORCED THERMOPLASTICS.....	640
<i>J. Graef, B. Engel</i>	

UPCYCLING WASTE PLASTICS IN CONTINUOUS FIBRE REINFORCED COMPOSITES	648
<i>I. Bruggencate, M. Del Vecchio, R. Voerman, F. Van Hattum</i>	

VOLUME 2

DEVELOPMENT OF AN ANALYTICAL MODEL TO PREDICT STORAGE MODULUS WITH FOUR INDEPENDENT PARAMETERS	656
<i>J. Esha</i>	

INTERMEDIATE RESULTS MECATESTERS PROJECT: WELDING OF LMPAEEK AND PEKK UD TAPES FOR FUSELAGE APPLICATIONS	664
<i>M. Labordus, T. Wirtz, T. Jansen, M. Bach, T. Salat</i>	

CONFORMAL TEMPERING CHANNELS IN A 3D PRINTED CORE FOR RTM TOOLING	673
<i>M. Feuchtgruber, P. Consul, D. Colin, S. Zaremba</i>	

AN ENERGY EFFICIENT PRODUCTION TECHNOLOGY FOR THE RECYCLING OF THERMOPLASTIC TAPE INTO A NEW SEMI-FINISHED PRODUCT FOR FURTHER USE.....	680
<i>M. Schwane, M. Schulz, H. Janssen, C. Brecher</i>	

INFLUENCE OF THE AERODYNAMIC PROCESS PARAMETERS IN THE FIBRE SPRAYING PROCESS ON THE BENDING STIFFNESS ORTHOTROPY OF FIBRE REINFORCED THEROPLASTIC PARTS	688
<i>C. Hopmann, E. Wilms, D. Schneider, K. Fischer</i>	

HYBRID-ADDITIVE PUNCH PRODUCTION FOR SHEAR CUTTING USING MULTI-MATERIAL LASER DIRECT ENERGY DEPOSITION	696
<i>S. Belitz, M. Eder, S. Meiniger, H. Zeidler, M. Weigold</i>	

MECHANICAL PROPERTIES OF ALIGNED DISCONTINUOUS NATURAL FIBRE EPOXY COMPOSITES PRODUCED BY THE HIPERDIF METHOD.....	705
<i>A. Kandemir, M. Longana, T. Panzera, G. Del Pino, I. Hamerton, S. Eichhorn</i>	

OPTIMISED JOULE HEATING OF CARBON FIBRES IN A LOW-COST, HIGH-SPEED POWDER-EPOXY TOWPREGGING PILOT PRODUCTION LINE.....	713
<i>M. Celik, T. Noble, J. Maguire, C. Robert, C. Bradaigh</i>	

INTERFACE IMPROVEMENTS IN OVERMOULDED COMPOSITES	722
<i>S. Ivan, S. Green, F. Ferfecki</i>	

DEVELOPMENT AND VALIDATION OF ADDITIVE MANUFACTURED LATTICE STRUCTURE SPACECRAFT COMPONENTS.....	732
<i>N. Eaton, M. Komarek</i>	

SEAMLESS SOLUTION FOR INDUSTRIAL-GRADE CONTINUOUS CARBON FIBRE 3D-PRINTED COMPOSITES	743
<i>Y. Willemin, M. Eichenhofer</i>	

AUTOMATION OF COMPOSITE REPAIRS: THE SANDING AND STEPPED LAP, MATERIAL REMOVAL PROCESSES	761
<i>M. Borst, K. Stamoulis, R. Van Den Eng, F. Schippers, G. Van Leeuwen</i>	

INFLUENCE ON THE STRAIN RATE AT ROOM TEMPERATURE OF A SILICONE RUBBER USED AS FIBER PLACEMENT ROLLER JACKET	774
<i>V. Backmann, J. Klungenbeck, A. Popp, K. Drechsler</i>	
WARPAGE OF FIBER-REINFORCED THERMOSET POLYMERS CO-BONDED TO THERMOPLASTICS.....	784
<i>O. Erartsin, J. Zanjani, I. Baran</i>	
MANUFACTURING OF LIGHTWEIGHT SANDWICH FOAM WITH OPTIMIZED BENDING PROPERTIES IN A HOT PRESS PROCESS	792
<i>M. Salmins, P. Mitschang</i>	
FABRICATION OF COMPOSITE ROD BY COMPRESSIVE PULTRUSION USING UD-CF/PEEK PREPREG TAPE AND ITS RIVET FASTENING BY ULTRA-COMPACT SERVO PRESS	800
<i>E. Takeshi, M. Ito, Y. Fujioka, K. Nishiyabu</i>	
MACHINE VISION FOR THE ASSESMENT OF COMPOSITE PRODUCTION QUALITY.....	814
<i>O. Dobrich, M. Hansmann, C. Brauner</i>	
DESIGN FOR AUTOMATION: LESSONS FROM A HIGH RATE DEVELOPMENT PROJECT	822
<i>J. Snudden, M. Stojkovic, A. Mills, K. Jani, M. Smith, A. Saadi</i>	
AUTOMATION OF COMPOSITE HAND-SANDING OPERATIONS FOR FREEFORM PARTS USING 6 AXIS ABRASIVE WATERJET ROBOTS	830
<i>A. Jaillon, F. Cenac</i>	
ROBOT-ASSISTED ADDITIVE MANUFACTURING – PROCESS AND POSSIBILITIES	838
<i>C. Aurer, W. Fischer, M. Edelmann, C. Brauner</i>	
WATER CONTENT IN UNCURED EPOXY MATRICES AND ITS ROLE ON POROSITY DEVELOPMENT IN AUTOCLAVE CURING.....	851
<i>G. Buccoliero, A. Sommi, F. Lionetto, A. Maffezzoli</i>	
SYSTEM CONCEPT FOR HUMAN-ROBOT COLLABORATIVE DRAPING.....	859
<i>C. Eitzinger, C. Frommel, S. Ghidoni, E. Villagrossi</i>	
DEVELOPMENT OF A TEXTILE PROCESS FOR COMPOSITE ROTOR BLADES	867
<i>J. Decaens, V. Deronde, F. Landry, Y. Gendreau, E. Ruiz</i>	
EFFECT OF TWIST ON BRAID ARCHITECTURE AND STABILITY	882
<i>B. Grimes, M. Thompson, F. Martin, T. Buns, N. Warrior</i>	
MULTI-PARAMETER PROCESS WINDOW ASSESSMENT OF OVERMOULDED CARBON FIBRE THERMOPLASTIC COMPOSITES	890
<i>C. Hartjes, S. Wijskamp</i>	
DESIGN AND OPTIMIZATION OF LIQUID COMPOSITE MOLDING PROCESSES THROUGH A NOVEL DIMENSIONLESS NUMBER.....	898
<i>C. Di Fratta, F. Trochu</i>	
HIGH-PERFORMANCE PULTRUSION FOR ADVANCED COMPOSITES	907
<i>A. Pouchias, G. Maistros, J. Hartley, V. Loukodimou, S. Lewis, M. Kazilas</i>	
NOVEL THIN CORE MATERIALS ENABLING INNOVATIVE MICRO-SANDWICHES`	915
<i>S. Laffranchini</i>	

FLAME RETARDANT MODIFIED RIGID EPOXY FOAMS PRODUCED BY AN INNOVATIVE PROCESS APPROACH USING CO ₂ AS BLOWING AGENT	925
<i>S. Kaysser, C. Keun, A. Wei, C. Bethke, V. Alstadt, H. Ruckdaschel</i>	
ELECTRICAL AND MECHANICAL BEHAVIOUR OF COPPER TUFTED CFRP COMPOSITE JOINTS	933
<i>M. Asareh, A. Pouchias, A. Zitoun, M. Yasae, M. Kazilas, A. Skordos</i>	
LIGHTWEIGHT ACOUSTIC MATERIALS FOR PASSENGER AIRCRAFT	941
<i>N. Eaton</i>	
EFFICIENT MANUFACTURING OF CFRP FOR NEW SPACE APPLICATIONS	950
<i>S. Buhler</i>	
EFFICIENCY ENHANCEMENT FOR CFRP-PREPREG AUTOCLAVE MANUFACTURING BY MEANS OF SIMULATION-ASSISTED LOADING OPTIMIZATION	962
<i>M. Enghard, T. Weber, J.-C. Arent</i>	
COMPOSITE ENGINE THRUST FRAME DESIGN AND MANUFACTURING USING FIBRE STEERING OPTIMIZATION FOR LAUNCHER STRUCTURES.....	970
<i>W. Van Den Brink, R. Maas, G. Poort, J. Fatemi, W. Gerrits</i>	
ULTRASENSITIVE AND HIGHLY STRETCHABLE SENSORS FOR HUMAN MOTION MONITORING MADE OF CARBON NANOTUBES REINFORCED POLY(ETHYLENE GLYCOL) DIGLYCIDYL ETHER (PEGDGE) AND GRAPHENE REINFORCED POLYDIMETHYLSILOXANE (PDMS)	982
<i>A. Del Bosque, X. Sanchez-Romate, M. Sanchez, A. Urena</i>	
COMPOSITES TOOLING MANUFACTURING FROM DIFFERENT AM TECHNIQUES.....	986
<i>C. Tosto, G. Cicala</i>	
INNOVATIVE MULTIFUNCTIONAL COMPOSITES BASED ON GRAPHENE NANOPATELETS.....	990
<i>F. Cilento, A. Martone, G. Mensitieri, M. Giordano</i>	
THEORETICAL AND PRACTICAL INVESTIGATION OF FLOW PROCESSES IN INJECTION CHAMBERS FOR THE PULTRUSION PROCESS WITH DIMENSIONLESS NUMBERS.....	994
<i>F. Tischer</i>	
ADAPTIVE SPECTRAL BAND INTEGRATION IN THERMOGRAPHIC INSPECTION OF COMPOSITES	996
<i>G. Poelman, S. Hedayatrasa, J. Segers, W. Van Paepegem, P. Kersemans</i>	
MODELING THE CONTRIBUTION OF FIBER BRIDGING IN UNIDIRECTIONAL COMPOSITES	998
<i>H. Ben-Gur, L. Banks-Sills</i>	
COEX FILAMENT WITH CONDUCTIVE INNER LAYER	1002
<i>J. Bischof</i>	
CORRELATION OF MOISTURE DIFFUSION AND MECHANICAL PROPERTY DEGRADATION IN POLYMER COMPOSITES	1004
<i>J. Bone, G. Sims, A. Maxwell, S. Frenz, S. Ogin, C. Foreman, R. Dorey</i>	

PRINTED NANOCOMPOSITE HEAT SINKS FOR HIGH-POWER, FLEXIBLE ELECTRONICS	1008
<i>K. Burzynski, N. Glavin, E. Heckman, C. Muratore</i>	
EFFECT OF PEEK DEGRADATION ON COMMINGLED FABRICS CONSOLIDATION.....	1012
<i>L. Feuillerat, O. De Almeida, J.-C> Fontanier, F. Schmidt</i>	
NUMERICAL IMPACT ANALYSIS OF HIGH-PRESSURE COMPOSITE STORAGE VESSELS USING THE FINITE ELEMENT ETHOD.....	1016
<i>L. Schreyer, L. Karger</i>	
INTERLAMINAR STRENGTH OF ADDITIVE MANUFACTURED STRUCTURAL COMPONENTS MADE OF CONTINUOUS CARBON FIBER REINFORCED POLYMER OR LIQUID CRYSTAL POLYMER	1020
<i>M. Kung</i>	
ULTRASONIC WELDING OF PAEK COMPOSITES	1025
<i>M. Bonmatin, F. Chabert, G. Bernhart, T. Cutard, T. Djilali</i>	
EXPERIMENTAL AND NUMERICAL CHARACTERIZATION OF THE IN-PLANE MECHANICAL PROPERTIES OF INTERLACED COMPOSITES	1029
<i>R. Kok, F. Martinez-Hergueta</i>	
TETRA-FUNCTIONAL FURAN-BASED EPOXY-AMINE THERMOSETTING SYSTEMS WITH SUPERIOR CHARACTERISTICS FOR FUTURE ADHESIVE APPLICATIONS	1033
<i>X. Chu, J. La Scala, G. Palmese</i>	
DEVELOPMENT OF A THIN PLY, AFP PROCESSABLE PREPREG SYSTEM BASED ON TOUGHENED CYANATE ESTER FOR HIGH TEMPERATURE APPLICATIONS.....	1036
<i>L. Amirova, N. Gort, M. Grob, C. Brauner, T. Richard, T. Wille, M. Liebisch, W. Gerrits</i>	
EMBEDDED FBG SENSORS FOR COMPOSITE STRUCTURE HEALTH MONITORING APPLICATION.....	1046
<i>P. Shrestha, R. Evenblij, C. Brauner, N. Gort, W. Gerrits</i>	
THERMOMECHANICAL TESTING OF CFRP STRUCTURES UNDER VARYING THERMAL CONDITIONS.....	1056
<i>M. Liebisch, B. Hildebrandt, T. Wille, C. Brauner, W. Gerrits, I. Alberdi</i>	
SUCOHS PROJECT – SUSTAINABLE COST-EFFICIENT HIGH-PERFORMANCE COMPOSITE STRUCTURES DEMANDING TEMPERATURE OF FIRE RESISTANCE.....	1067
<i>T. Wille</i>	
POLYFURFURYL ALCOHOL RESINS IN FIRE RESISTANT APPLICATIONS OF ADVANCED COMPOSITE MANUFACTURING	1068
<i>M. Kelchtermans</i>	
ANALYSIS METHOD FOR PROCESS-INDUCED DEFORMATION AND RESIDUAL STRESSES OF HIGH-TEMPERATURE COMPOSITE STRUCTURES	1075
<i>N. Gort, L. Amirova, M. Grob, C. Brauner</i>	
SUSTAINABLE PLA BASALT TAPES FOR FUTURE LIGHTWEIGHT APPLICATIONS.....	1085
<i>B. Tillner, I. Jahn, K. Moser, T. Link, A. Menrath, F. Henning, E. Urinov, S. Hanstein</i>	
NOVEL APPROACH FOR SPORTING GOODS MADE OF SUSTAINABLE THERMOPLASTIC COMPOSITES	1095
<i>D. Stapf, G. Barandun, A. Trunz, M. Zahner</i>	

SUSTAINABLE SURFACE FUNCTIONALIZATION FOR ADHESIVE BONDING.....	1103
<i>M. Jacobs</i>	
USE OF CONSTRUCTION WASTE IN WOOD FIBRE COMPOSITES	1117
<i>M. Del Vecchio, F. Van Hattum, R. Voerman</i>	
INVESTIGATION OF A NEW INDUCTIVE DOUBLE BELT PRESS FOR IMPREGNATING GLASS FIBRE FABRICS WITH RECYCLED POLYETHYLENE TEREPHTHALATE.....	1126
<i>P. Wigger, M. Emonts, K. Fischer, C. Brecher</i>	
SYSTEMATIC INVESTIGATION OF THE CRITICAL FIBRE LENGTH OF CARBON FIBRE NONWOVEN COMPOSITES.....	1134
<i>M. Sauer, V. Schumm, K. Drechsler</i>	
RECYCLING OF THERMOSET PREPREG CUTOFFS BY A MATERIAL RECYCLING PROCESS ROUTE	1144
<i>M. Zogg, V. Kumaran, D. Montenegro, S. Steiner, F. Langenegger, A. Leuenberger, L. Weiss</i>	
THERMOPLASTIC COMPRESSION RESIN TRANSFER MOULDING FOR INDUSTRIAL APPLICATIONS.....	1156
<i>V. Werlen, C. Rytka, C. Dransfeld, V. Michaud, C. Brauner, P. Halime, S. Wegmann, Y. Khalaf</i>	
EXPERIMENTAL STUDY ON THE IMPACT DENT DEPTH RELAXATION OF THERMOPLASTIC AND THERMOSET COMPOSITES.....	1164
<i>F. Schimmer, N. Motsch-Eichmann, J. Hausmann</i>	
INVESTIGATION OF THE FRICTION BEHAVIOUR OF SPREAD CARBON FIBRE TOWS WITH REACTIVE BINDER.....	1172
<i>M. Liebl, M. Engelfried, S. Carosella, P. Middendorf</i>	
DEVELOPMENT OF A THERMOPLASTIC COMPOSITE WING RIB FOR HIGH-RATE PRODUCTION	1179
<i>M. Koetsier, P. Morgan, J. Teunissen, A. Offringa</i>	
INJECTION MOULDING WITH TAPE-REINFORCED EDGE LAYERS	1188
<i>P. Zahner, G. Barandun, C. Wick, M. Rudolph, K. Fleisch</i>	
TECHNOLOGY DEVELOPMENT TOWARDS INDUCTION WELDING OF A UD-PEKK TAIL SECTION WITH STIFFENERS.....	1194
<i>S. Sterk, J. De Kruijk, B. Nahuis</i>	
AN IMPREGNATION-FREE VALUE CHAIN FOR LARGE THERMOPLASTIC MATRIX COMPOSITES	1209
<i>C. Schneeberger, N. Aegerter, P. Ermanni</i>	
IN SITU POLYMERISATION ON GLASS FILAMENTS DURING THE MANUFACTURING PROCESS.....	1216
<i>M. Haag, A. Luking, L. Senneka, T. Becker, A. Niecke, D. Wedegartner, O. Strube, T. Gries</i>	
INDUCTION WELDING FOR DUSTLESS ASSEMBLY OF AIRCRAFT WITHIN A DECADE.....	1221
<i>M. Bach</i>	
IN- AND OFF-LINE NDT IN AUTOMATED IN-SITU CONSOLIDATION TAPE LAYUP.....	1234
<i>N. Yadav, M. Gurocak, A. Galic, R. Adam, R. Schledjewski</i>	

DEVELOPMENT OF AEROSPACE GRADE FST GLASS FIBRE THERMOPLASTIC PREPREGS	1242
<i>N. Pini, C. Braun, D. Grauer</i>	
INFLUENCE OF BINDER ON THE MECHANICAL PROPERTIES OF THIN-PLY COMPOSITES MANUFACTURED BY DRY-FIBRE-PLACEMENT AND VACUUM- ASSISTED RESIN INFUSION	1247
<i>P. Quenzel, T. Gries</i>	
INCREASING PROCESS ROBUSTNESS OF THE COMPRESSION RESIN TRANSFER MOLDING PROCESS BY REDUCING EDGE RACE-TRACKING	1265
<i>M. Vollmer, F. Nusser, D. Bublitz, H. Baumann, L. Grassl, S. Zaremba, F. Masseria, P. Mertiny, K. Drechsler</i>	
FORMATION OF DUAL-SCALE MORPHOLOGY IN EPOXY USING THEROPLASTIC MULTILAYERS SCAFFOLDS	1280
<i>U. Farooq, J. Teuwen, C. Dransfeld</i>	
NON-INTRUSIVE INTELLIGENT CURE MONITORING FOR ENHANCING THE MANUFACTURING OF HIGH-TEMP COMPOSITE STRUCTURES	1288
<i>N. Pantelelis, E. Bistekos, W. Gerrits, S. Wilkens, D. Breen, S. Wilson</i>	
HIGH CYCLE FATIGUE TESTING OF DISCONTINUOUS-FIBRE REINFORCED COMPOSITE MATERIALS.....	1298
<i>L. Walker, C. Brauner</i>	
THEORETICAL AND PRACTICAL INVESTIGATION OF FLOW PROCESSES IN INJECTION CHAMBERS FOR THE PULTRUSION PROCESS WITH DIMENSIONLESS NUMBERS.....	1309
<i>F. Tischer</i>	
ULTRASONIC WELDING OF PAEK COMPOSITES	1311
<i>M. Bonmatin, F. Chabert, G. Bernhart, T. Cutard, T. Djilali</i>	

Author Index