Mechanical Tests On Epoxy Resin Nanoscale Modulus

The objective of this research is to develop a test methodology to be used in determining which material properties affect the ultimate performance of a composite overwrapped pressure vessel (COPV) at liquid nitrogen (LN2) temperatures. The test methodology being evaluated is based on that used for ambient performance of COPVs and includes: resin properties, resin/fiber interface and COPV burst data. The suitability of these tests at LN2 temperatures will be evaluated. The resin properties are investigated by use of tensile tests to determine: strain to failure (%â), failure stress (óys), and elastic modulus (E). TThe objective of this research is to develop a test methodology to be used in determining which material properties affect the ultimate performance of a composite overwrapped pressure vessel (COPV) at liquid nitrogen (LN2) temperatures. The test methodology being evaluated is based on that used for ambient performance of COPVs and includes: resin properties, resin/fiber interface and COPV burst data. The suitability of these tests at LN2 temperatures will be evaluated. The resin properties are investigated by use of tensile tests to determine: strain to failure (%â), failure stress (óys), and elastic modulus (E). The resin/fiber interface is evaluated using short beam shear tests to determine the interlaminar shear strength (ILSS). These properties are compared with actual COPV burst pressures performed at ambient and LN2 temperatures. If a correlation can be found, this research lays the foundation for a method to quickly and efficiently screen candidate material systems for composite overwrapped pressure vessel (COPV) fabrication.he resin/fiber interface is evaluated using short beam shear tests to determine the interlaminar shear strength (ILSS). These properties are compared with actual COPV burst pressures performed at ambient and LN2 temperatures. If a correlation can be found, this research lays the foundation for a method to quickly and efficiently.

The objective of the research was to continue the experimental study of the effect of strain rate on mechanical response (deformation and failure) of epoxy resins and carbon fibers/epoxy matrix composites, and to initiate a study of the effects of temperature by developing an elevated temperature test. The experimental data provide the information needed for NASA scientists for the development of a nonlinear, rate dependent deformation and strength models for composites that can subsequently be used in design. This year effort was directed into testing the epoxy resin. Three types of epoxy resins were tested in tension and shear at various strain rates that ranges from 5 x 10(exp -5), to 1000 per second. Pilot shear experiments were done at high strain rate and an elevated temperature of 80 C. The results show that all, the strain rate, the mode of loading, and temperature significantly affect the response of epoxy.Gilat, AmosGlenn Research CenterSTRAIN RATE; EPOXY MATRIX COMPOSITES; EPOXY RESINS; MECHANICAL PROPERTIES; TORSIONAL STRESS; DEFORMATION; SHEAR STRAIN; NONLINEARITY; HIGH TEMPERATURE TESTS; STRESS-STRAIN DIAGRAMS; TENSILE TESTS; STRUCTURAL FAILURE

The author reviews the synthesis, manufacture and characterisation of epoxy monomers, cure reactions of epoxy resins, spectroscopic and analytical methods of studying cure, techniques for the modelling of cure, the use of additives and modifiers, and technologically driven advances in applications. An additional indexed section containing several hundred abstracts from the Rapra Polymer Library database provides useful references for further reading.

This conference book contains papers presented at the 8th GACM Colloquium on Computational Mechanics for Young Scientists from Academia and Industry. The conference was held from August 28th – 30th, 2019 in Kassel, hosted by the Institute of Mechanics and Dynamics of the department for civil and environmental engineering and by the chair of Engineering Mechanics / Continuum Mechanics of the department for mechanical engineering of the University of Kassel. The aim of the conference is, to bring together young scientits who are engaged in academic and industrial research on Computational Mechanics and Computer Methods in Applied Sciences. It provides a plattform to present and discuss recent results from research efforts and industrial applications. In more than 150 presentations, given by young scientists, current scientific developments and advances in engineering practice in this field are presented and discussed. The contributions of the young researchers are supplemented by a poster session and plenary talks from four senior scientists from academia and industry as well as from the GACM Best PhD Award winners 2017 and 2018.

Developments in the Science and Technology of Composite Materials

ECCM3 Third European Conference on Composite Materials 20.23 March 1989 Bordeaux-France

Materials

Advanced Glasses, Composites and Ceramics for High Growth Industries

Advanced Materials Science and Technology, ICMST 2010

Low Temperature Mechanical Testing of Carbon-Fiber/Epoxy-Resin Composite Materials

Epoxy resins, Plastics, Polymers, Specimen preparation, Test specimens, Testing conditions, Mechanical testing, Physical property measurement, Thermal testing, Electrical measurement, Water-absorption tests

Proceedings of the Second International Conference on Advanced Composite Materials and Technologies for Aerospace Applications held at Glynd

'Advanced Glasses, Composites and Ceramics for High-Growth Industries' (CoACH) was a European Training Network (ETN) project (http://www.coach-etn.eu/) funded by the Horizon 2020 program. CoACH involved multiple actors in the innovation ecosystem for advanced materials, composed of five universities and ten enterprises in seven different European countries. The project studied the next generation of materials that could bring innovation in the healthcare, construction, and energy sectors, among others, from new bioactive glasses for bone implants to eco-friendly cements and new environmentally friendly thermoelectrics for energy conversion. The novel materials developed in the CoACH project pave the way for innovative products, improved cost competitiveness, and positive environmental impact. The present Special Issue contains 14 papers resulting from the CoACH project, showcasing the breadth of materials and processes developed during the project.

Epoxy resins, Plastics, Polymers, Adhesives, Specimen preparation, Test specimens, Testing conditions, Mechanical testing, Physical property measurement, Thermal testing, Electrical measurement, Water-absorption tests

Low Temperature Mechanical Testing of Carbon-fiber/epoxy-resin Composite Materials

Natural and Wood Fibre Reinforcement in Polymers

Recent Advances in Mechanical Infrastructure

Chemistry and Technology, Second Edition,

Effects of Flame Retardant Additives on the Performance of Epoxy Composites

Toughened Composites

The use of natural fibres as reinforcements in composites has grown in importance in recent years. Natural Fibre Composites summarises the wealth of significant recent research in this area. Chapters in part one introduce and explore the structure, properties, processing, and applications of natural fibre reinforcements, including those made from wood and cellulosic fibres. Part two describes and illustrates the processing of natural fibre composites. Chapters discuss ethical practices in the processing of green composites, manufacturing methods and compression and injection molding techniques for natural fibre composites, and thermoset matrix natural fibre-reinforced composites. Part three highlights and interprets the testing and properties of natural fibre composites including, non-destructive and high strain rate testing. The performance of natural fibre composites is examined under dynamic loading, the response of natural fibre composites to impact damage is appraised, and the response of natural fibre composites in a marine environment is assessed. Natural Fibre Composites is a technical guide for professionals requiring an understanding of natural fibre composite materials. It offers reviews, applications and evaluations of the subject for researchers and engineers. Introduces and explores the structure, properties, processing, and applications of natural fibre reinforcements, including those made from wood and cellulosic fibres Highlights and interprets the testing and properties of natural fibre composites, including non-destructive and high strain rate testing Examines performance of natural fibre composites to impact damage, and the response of natural fibre composites in a marine environment

Mechanical Tests on Epoxy Resin Nanoscale Modulus Measurement and Long Term Creep Behavior

The recent developments in the area of Mechanical Engineering Design is very encouraging and this book by results of International Conference on Mechanical Engineering Design (ICMED 2016, Chennai, TamilNadu, India, April 25-26, 2016) will provide an effective medium for the dissemination of recent advances and original works of industry professionals, academicians and research scholars from around the globe in Mechanical Engineering Design and its impact on the components manufacturing process in an integrated, highly focused and coherent format. We hope that the outcomes of this book will help in different working situations, bridge research and practice and respond positively to emerging issues in various mechanical engineering designs.

The American Society for Testing and Materials published the first test standard for plastics in 1937. These 21 papers presented at an ASTM symposium held in November 1998, while demonstrating how sophisticated test standards have become, also address their limitations. Papers are organized by the m

Study of High Strain Rate Response of Composites

Technical Abstract Bulletin

Symposium on Toughened Composites

Results of Radiation Tests at Cryogenic Temperature on Some Selected Organic Materials for the LHC

Modern Technologies for Engineering, Applied Mechanics and Material Science

Epoxy Resins

The book presents latest research-based innovations in the field of mechanical infrastructure presented in the International Conference on Recent Advances in Mechanical Infrastructure (ICRAM 2021). The broad research topics presented in this book are recent advances in thermal infrastructure: This includes aerodynamics, renewable energy, computational fluid dynamics, carbon dioxide capture and sequestration, energy and thermo-fluids, fluid dynamics, fuels and combustion, heat and mass transfer, internal combustion engine, and refrigeration and air conditioning. Recent advances in manufacturing infrastructure includes green manufacturing, instrumentation and control, material characterization, manufacturing techniques, rapid prototyping, polymers, and composites. Recent advances in infrastructure planning and design includes applied mechanics, bio-mechanics, computer-aided engineering design, finite element analysis, industrial tribology, machine design, robotics and automation, dynamics and vibration, industrial engineering, and optimization.

The potential use of natural fibres as substitutes to synthetic fibres (glass in particular) is of great interest due to growing global environmental and social concern, uncertainties in the supply and price of petroleum based products, and new environmental regulations that have forced the search for renewable green materials, which are compatible with the environment. In addition, glass fibres can also cause acute irritation to the skin, eyes and upper respiratory tract if one is being exposed to their use for a prolonged period of time.

The goal of this study was to explore the possibility of using the sugar palm (Arenga pinnata) fibres as the reinforcement material in epoxy matrix. The mechanical performances of composite materials strongly depend on the nature and orientation of the fibre, the nature of the matrix and the quality of adhesion between the two constituents. One of the biggest challenges for natural fibres is the ability for moisture repellence. Therefore, tests were conducted to study the moisture absorption behaviour of the epoxy resin and also the composites. Test results showed that sugar palm fibre epoxy composite absorbed about 0.93% moisture after being immersed in water for 33 days. Another challenge was to understand the degree of adhesion between the fibre and matrix. The surface properties of the sugar palm fibre were modified using 'biological' treatments. In this study sea water, fresh (pond) water and sewage water were used as treatment agents. This led to biological, chemical and water degradation to the sugar palm fibre. Interfacial shear strengths were studied using the single fibre pull out test and the results showed that the fibres treated with sea water exhibited the strongest fibre-matrix bonding. Morphological and structural changes of the fibres were investigated using scanning electron microscope (SEM). It was found that the biological treatments had modified the surface properties of the sugar palm fibre thus resulted in a better adhesion quality as compared to the untreated fibre. A series of mechanical tests namely tensile, flexural and impact were conducted on the composites with 10%, 15%, 20% and 30% (by volume) of randomly short chopped fibres. The results showed that the strengths increased with increased fibre loadings of up to 20% but the composite with 30% fibre content showed the opposite behaviour.

The use of cryogenic fuels (liquid oxygen and liquid hydrogen) in current space transportation vehicles, in combination with the proposed use of composite materials in such applications, requires an understanding of how such materials behave at cryogenic temperatures. In this investigation, tensile intralaminar shear tests were performed at room, dry ice, and liquid nitrogen temperatures to evaluate the effect of temperature on the mechanical response of the IM7/8551-7 carbon-fiber/epoxy-resin system. Quasi-isotropic lay-ups were also tested to represent a more realistic lay-up. It was found that the matrix became both increasingly resistant to microcracking and stiffer with decreasing temperature. A marginal increase in matrix shear strength with decreasing temperature was also observed. Temperature did not appear to affect the integrity of the fiber-matrix bond. Nettles, Alan T. and Biss, Emily J. Marshall Space Flight Center ...

Collection of selected, peer reviewed papers from the 2014 International Conference on Manufacturing Science and Technology (ICMST 2014), June 7-8, 2014, Sarawek, Malaysia. The 49 papers are grouped as follows: Chapter 1: Advanced Materials Engineering and Technological Processes, Chapter 2: Applied Mechanics and its Applications in Civil Engineering, Chapter 3: Modern Technologies for Modelling, Simulation and Automation, Instrumentation, Measurement and Control Technologies, Chapter 4: Product Design and Development, Industrial Engineering

Besluit van den 30sten Dec. 1933, houdende wijziging van het K.B. ... van 22 Aug. 1931 ..., tot vaststelling van voorschriften betreffende den rechtstoestand van het militair personeel der landmacht

SAMPE Symposium and Exhibition

Advanced Composite Materials and Technologies for Aerospace Applications

7th Workshop on Engineering Applications, WEA 2020, Bogota, Colombia, October 7–9, 2020, Proceedings

Mechanics of Biological Systems and Materials, Volume 4

Mechanical Testing of Advanced Fibre Composites

Presents a fully interdisciplinary approach with a stronger emphasis on polymers and composites than traditional materials books Materials science and engineering is an interdisciplinary field involving the properties of matter and its applications to various areas of science and engineering. Polymer materials are often mixed with inorganic materials to enhance their mechanical, electrical, thermal, and physical properties. Materials: Introduction and Applications addresses a gap in the existing textbooks on materials science. This book focuses on three Units. The first, Foundations, includes basic materials topics from Intermolecular Forces and Thermodynamics and Phase Diagrams to Crystalline and Non-Crystalline Structures. The second Units, Materials, goes into the details of many materials including Metals, Ceramics, Organic Raw Materials, Polymers, Composites, Biomaterials, and Liquid Crystals and Smart Materials. The third and final unit details Behavior and Properties including Rheological, Mechanical, Thermophysical, Color and Optical, Electrical and Dielectric, Magnetic, Surface Behavior and Tribology, Materials, Environment and Sustainability, and Testing of Materials. Materials: Introduction and Applications features: Basic and advanced Materials concepts Interdisciplinary information that is otherwise scattered consolidated into one work Links to everyday life application like electronics, airplanes, and dental materials Certain topics to be discussed in this textbook are more advanced. These will be presented in shaded gray boxes providing a two-level approach. Depending on whether you are a student of Mechanical Engineering, Electrical Engineering, Engineering Technology, MSE, Chemistry, Physics, etc., you can decide for yourself whether a topic presented on a more advanced level is not important for you—or else essential for you given your professional profile Witold Brostow is Regents Professor of Materials Science and Engineering at the University of North Texas. He is President of the International Council on Materials Education and President of the Scientific Committee of the POLYCHAR World Forum on Advanced Material (42 member countries). He has three honorary doctorates and is a Member of the European Academy of Sciences, Member of the National Academy of Engineering of Georgia in Tbilisi and Fellow of the Royal Society of Chemistry in London. His publications have been cited more than 7200 times. Haley Lobland is the Associate Director of LAPOM at the University of North Texas. She is a Member of the POLYCHAR Scientific Committeee. She has received awards for her research presented at conferences in: Buzios, Rio de Janeiro, Brazil; NIST, Frederick, Maryland; Rouen, France; and Lviv, Ukraine. She has lectured in a number of countries including Poland and Spain. Her publications include joint ones with colleagues in Egypt, Georgia, Germany, India, Israel, Mexico, Poland, Turkey and United Kingdom.

Sealing is an age-old problem that dates back to our earliest attempts to create a more comfortable living environment. Prehistoric people used natural sealants such as earth, loam, grass, and reeds to protect the interior of their homes against the weather. Today's applications extend to a myriad of uses. The Handbook of Sealant Technology provide

Mechanics of Biological Systems and Materials, Volume 4: Proceedings of the 2013 Annual Conference on Experimental and Applied Mechanics, the fourth volume of eight from the Conference, brings together contributions to this important area of research and engineering. The collection presents early findings and case studies on a wide range of areas, including: Structure-Function & Design of Soft Biological Tissues Soft Tissue Biomechanics: Nanoscale to Physiological Control Bone Mechanics Biomimetic Materials Residual Stresses in Biological Materials Cells Cellulose Materials

This volume constitutes the refereed proceedings of the 7th Workshop on Engineering Applications, WEA 2020, held in Bogota, Colombia, in October 2020. The 32 revised full papers and 12 short papers presented in this volume were carefully reviewed and selected from 136 submissions. The papers are organized in the following topical sections: computational intelligence; computer science; optimization; bioengineering; military applications; simulation, IoT and networks; power applications.

Applied Computer Sciences in Engineering

Plastics. Epoxy Resins. Preparation of Test Specimens and Determination of Properties of Crosslinked Epoxy Resins

Applied Mechanics Reviews

Plastics. Epoxy Resins. Preparation of Test Specimens and Determination of Properties

Mechanical Testing and Evaluation of Epoxy Resins at Cryogenic Temperatures

Handbook of Sealant Technology

This report examines the different fibre types available and the current research. The authors have cited several hundred references to the latest work on properties, processing and applications. The different methods of fibre pretreatment are examined, together with fibre properties, chemistry and applications. This review is accompanied by summaries of papers from the Rapra Polymer Library database.

Experimental Mechanics of Composite, Hybrid, and Multifunctional Materials, Volume 7 of the Proceedings of the 2015SEM Annual Conference& Exposition on Experimental and Applied Mechanics, the seventh volume of nine from the Conference, brings together contributions to this important area of research and engineering. The collection presents early findings and case studies on a wide range of areas, including: Multifunctional Materials Hybrid Materials Novel Composites Nano- and Particle-Reinforced Composites Additive Manufacturing of Composites Digital Imaging of Composites Damage Detection Non-Destructive Evaluation Fatigue and Fracture of Composites Manufacturing and Joining of Composites Advanced Composites Applications

Volume is indexed by Thomson Reuters CPCI-S (WoS). The objective of this volume is to provide up-to-date information for researchers, educators, engineers, and government officials who are involved in the general area of Materials Science & Technology, mechatronics, robotics, automation, power and sensors. It will serve well in disseminating the latest research results and alternative views concerning the future research directions in these fields.

Experimental Mechanics of Composite, Hybrid, and Multifunctional Materials: Proceedings of the 2013 Annual Conference on Experimental and Applied Mechanics, the sixth volume of eight from the Conference, brings together contributions to this important area of research and engineering. The collection presents early findings and case studies on a wide range of areas, including: Characterization of Energy Storage Materials Microvascular & Natural Composites Nanocomposites for Multifunctional Performance Composite/Hybrid Characterization Using Digital Image Correlation Failure Behavior of Polymer Matrix Composites Non-Destructive Testing of Composites Composite Test Methods Joints/Bonded Composites

Proceedings of ICRAM 2021

Proceedings of the 4h Seminar, Sheffield, 1-2 September 1998

Limitations of Test Methods for Plastics

Physical Testing of Plastics

Experimental Techniques and Design in Composite Materials

Natural Fibre Composites

Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database.

This volume contains the revised versions of papers presented at the 4th Seminar on Experimental Techniques and Design in Composite Materials. The papers have been divided into five sections: fatigue, test methods, design, impact and modelling.

Featuring new techniques of physicochemical analysis and broader coverage of textile applications,the thoroughly rewritten and enlarged Second Edition provides hands-on assistance inthe use, formulation, synthesis, processing, and handling of epoxy resins.Epoxy Resins, Second Edition, Revised and Expanded documents available commercialproducts, including rarer species of epoxides ... shows how to achieve qualityassurance through analytical methods ... discusses toxicity, hazards, and safe handling ...looks closely at elastomer modification of resins as well as adhesives, coatings, electrical andelectronic applications, fiber-reinforced composites, and the use of epoxy resins in thestabilization of polymers, plasticizers, and textiles ... and assists in the more efficientselection and application of epoxy resins.Complete with nearly 300 pages of tables for quick references, plus over 300 diagrams andphotographs, and more than 4,400 bibliographic references, this volume will proveindispensable to polymer, physical, and organic chemists, rheologists, materials scientists andengineers, and chemical, plastics, aerospace, automotive, and electrical and electronicsengineers.

Tapping mode AFM measures a polymer's mechanical response in the millisecond range. Due to the viscoelastic nature of epoxy, the mechanical response of epoxy in much greater time scales is very different. As a result, the mechanical properties of epoxy used in adhesive anchors for load bearing structures can't be simply obtained through modulus measurement. We performed both long term and short term creep tests on two different commercially available resins and found it is possible to predicate the long term creep behavior from short term tests for both of the resins. One of the adhesive resins showed nonlinear creep behavior. Its creep speed was shown to be dependent both on the stress level and the apparent compliance in a straightforward relationship.

Scientific and Technical Aerospace Reports

Filament Winding Epoxy Resins for Elevated Temperature Service

Materials, Processes and Properties

For Young Scientists From Academia and Industry August 28th – 30th, 2019 University of Kassel, Germany

Experimental Mechanics of Composite, Hybrid, and Multifunctional Materials, Volume 6

This book discusses the physical rather than the chemical examination of the properties of polymers on the basis of the type of equipment used, examples of the applications of these techniques are given. Techniques examined include thermal analysis (thermogravimetric analysis and evolved gas analysis), dynamic mechanical analysis and thermomechanical analysis, dielectric thermal analysis, ESR, MALDI, luminescence testing, photocalorimetry testing and the full range of equipment for mechanical, thermal, electrical, rheological, particle size, molecular weight.

Testing of composite materials can present complex problems but is essential in order to ensure the reliable, safe and cost-effective performance of any engineering structure. This essentially practical book, complied from the contributions of leading professionals in the field, describes a wide range of test methods which can be applied to various types of advanced fibre composites. The book focuses on high modulus, high strength fibre/plastic composites and also covers highly anisotrpoic materials such as carbon, aramid and glass. Engineers and designers specifying the use of materials in structures will find this book an invaluable guide to best practice throughout the range of industrial sectors where FRCs are employed.

The objective of this research is to develop a test methodology to be used in determining which material properties affect the ultimate performance of a composite overwrapped pressure vessel (COPV) at liquid nitrogen (LN2) temperatures. The test methodology being evaluated is based on that used for ambient performance of COPVs and includes: resin properties, resin/fiber interface and COPV burst data. The suitability of these tests at LN2 temperatures will be evaluated. The resin properties are investigated by use of tensile tests to determine: strain to failure (%â), failure stress (óys), and elastic modulus (E). The objective of this research is to develop a test methodology to be used in determining which material properties affect the ultimate performance of a composite overwrapped pressure vessel (COPV) at liquid nitrogen (LN2) temperatures. The test methodology being evaluated is based on that used for ambient performance of COPVs and includes: resin properties, resin/fiber interface and COPV burst data. The suitability of these tests at LN2 temperatures will be evaluated. The resin properties are investigated by use of tensile tests to determine: strain to failure (%â), failure stress (óys), and elastic modulus (E). The resin/fiber interface is evaluated using short beam shear tests to determine the interlaminar shear strength (ILSS). These properties are compared with actual COPV burst pressures performed at ambient and LN2 temperatures. If a correlation can be found, this research lays the foundation for a method to quickly and efficiently screen candidate material systems for composite overwrapped pressure vessel (COPV) fabrication.he resin/fiber interface is evaluated using short beam shear tests to determine the interlaminar shear strength (ILSS). These properties are compared with actual COPV burst pressures performed at ambient and LN2 temperatures. If a correlation can be found, this research lays the foundation for a method to quickly and efficiently screen candidate material systems for composite overwrapped pressure vessel (COPV) fabrication.

Composites based on epoxy resin have been applied in many industry sectors, such as construction, aerospace and transportation. However, rather poor fire performance of epoxy composites can limit their applications, especially in the recent years when the strict fire safety regulations have become mandatory. Therefore, it is important to enhance the flame resistance of the composites and understand their behaviour after incorporation of flame retardant additives at room and elevated temperatures. Among all flame retardants, the intumescent additives have gained substantial attention due to their high efficacy and low toxicity. In this research, the effects of flame retardant additives based on intumescent ammonium polyphosphate (APP) and talc on the thermal and mechanical properties of epoxy resin and its glass fibre composites have been investigated by conducting a comprehensive set of fire and mechanical tests. In addition, the performance characteristics of two additive systems, APP/halloysite nanotube (HNT) and APP/layered double hydroxide (LDH), with regards to fire and mechanical properties of epoxy and epoxy/glass fibre composites have been compared. Furthermore, a customised method has been explored to determine the tensile properties of glass and flax fibre epoxy composites (with and without APP) at elevated temperatures. The effects of heat-induced damage and APP on the impact properties of glass and flax fibre reinforced composites have also been evaluated and compared. The cone calorimeter results have shown that the combination of APP and talc, compared to APP alone, can enhance the flame retardancy of epoxy/glass fibre composites. However, the combination of the additives may adversely affect the fire reaction properties of the epoxy resin. On the other hand, the decomposition of talc particles by the application of flame in the vertical burn test could not provide any rating for the glass fibre composites. In addition, the combined effects of APP and nano-clays, layered double hydroxide or halloysite nano-tube, significantly improve the flame retardant properties of epoxy and its glass fibre composites. ii The incorporation of the additives (APP, APP/talc and APP/nano-clays) generally tends to reduce the tensile and flexural strengths of the resin but enhances both tensile and flexural moduli; whereas the mechanical properties of epoxy/glass fibre composite are not significantly affected by the incorporation of the additives. Furthermore, the tensile tests of glass and flax fibre composites at elevated temperatures have demonstrated the significant reductions in the tensile properties of both composites at 100 oC. However, the glass fibre composites could retain the tensile properties at the same reduced level when exposed to temperatures between 100 and 300 oC before a slight reduction at 400 oC. The flax fibre composites, on the other hand, lose most of their tensile properties during the temperature rise up to 250 oC. An addition of APP further degrades the tensile properties of the composites in the temperature range of 250 to 400 oC, even though it has been effective to improve the fire properties of the composites. The glass and flax fibre composites have also shown different drop-weight impact properties after being exposed to heat (at 300 oC). The absorbed energy by the glass fibre composite as well as the maximum deflection increase but the maximum impact force of the composite reduces due to the heat exposure. However, the energy absorption, maximum deflection and impact force of the flax fibre composite decrease after the heat exposure. Furthermore, the impact energy absorptions of both heatexposed composites have improved in the presence of APP. Overall, it can be concluded that the incorporation of suitable flame retardant additives can improve the flame retardancy of fibre reinforced composites without significantly affecting their mechanical properties. Furthermore, in spite of higher flammability of natural fibre composites compared to that of the synthetic fibre composites, they show comparable flame retardant properties by incorporating the intumescent additives. Moreover, the differences between the mechanical performances of synthetic and natural fibre composites during and after heat exposure should be considered for the potential replacements of the synthetic fibre reinforced composites by their natural fibre counterparts.

Proceedings of the 2013 Annual Conference on Experimental and Applied Mechanics

Recent Developments in Epoxy Resins

Mechanics of Composite and Multi-functional Materials, Volume 7

Proceedings of 8th GACM Colloquium on Computational Mechanics

Introduction and Applications

Mechanical Tests on Epoxy Resin Nanoscale Modulus Measurement and Long Term Creep Behavior