COMPOSITES ENHANCED BY GRAPHENE DISPERSIONS

Improving the properties of composites though the addition of fillers is an active field of research. Many publications reported a significant enhancement of the mechanical properties of composite materials through the addition of graphene as a filler. These works are often focused on the polymer matrices. It was shown that graphene addition considerably increases tear resistance and has a positive effect on the hardness of epoxy resin, even at low concentrations. Moreover, due to its high electrical conductivity, several studies have already proved the feasibility of using graphene-enriched polymers in the partial replacement of heavy metallic structures. In addition, graphene acts as an efficient gas adsorption barrier and is thus already used blended with polymers to lower water permeation.

Graphene brings very interesting properties but obtaining a correct homogeneity of the mix between graphene and the polymer matrix is primordial to achieve significant added value. Graphene’s dispersibility into the matrix needs to be controlled and the interaction between the matrix and graphene flakes has to be as high as possible.

Considering this, the use of Carbon Waters graphene dispersions is a real advantage. This homogeneously-dispersed graphene form is compatible with many matrices such as epoxy. In addition, the use of a liquid vector keeps the properties of graphene layers intact, avoiding reggregation. Carbon Waters will showcase its dispersions and graphene resin masterbatches at JEC World. www.carbon-waters.com

REACH-COMPLIANT BIO-BASED RESINS

Bitrez, a European manufacturer of specialist polymers and chemicals, will showcase its work around regulatory compliance at JEC World 2020, while also launching a new family of bio-based resins specifically designed for composite applications, including bio-epoxy and PFA (polyfurfuryl alcohol). The REACH regulations and European Chemicals Agency guidelines, together with the Global Harmonised System of Classification and Labelling of Chemicals, have led to many changes in chemical identification, re-classification and threshold limits. This has a serious impact on the chemistries that can be used in the formulation of resins, accelerating the change towards greater use of SVHC-free resins, curing agents and catalysts, as well as greater demand for sustainable, bio-based materials. The production of epoxy resins requires bisphenol A and epichlorohydrin. Through the use of “clever chemistry”, substitutes such as glycerol – a by-product of bio-diesel production – can be used as a bio-source for epichlorohydrin, while glucose, sorbitol and isosorbide can be used as bio-based precursors for bisphenol A. Together with phenalkamine-based curing agents, the bio-based content can be as high as 50-60% without affecting performance.

PFA is a thermosetting bio-resin derived from crop waste that is similar to a phenolic resin, but with lower VOC emissions. In addition to its environmental credentials, PFA has fire retardant properties equivalent to phenolics, plus excellent temperature and chemical resistance. www.bitrez.com

This year again, innovation will be in the spotlight at JEC World. Some innovations are highlighted in the following pages. Faced with the volume of new products and services exhibited this year, we decided to complete the presentation of innovations in this issue of JEC Composites Magazine with the release of three daily issues at the show. Happy reading and great discoveries!
Z-AXIS REINFORCED CARBON FIBRE
Boston Materials developed Supercomp, a material that solves the performance, cost and sustainability issues of today’s carbon fibre.

This higher performance carbon fibre material enables a 25% cost reduction by using 50% recycled carbon fibre content. Supercomp products provide part manufacturers with the following benefits:
- Higher performance: these products provide drastic performance enhancements (such as 150% enhancement in z-axis thermal conductivity and 30% increase in flexural modulus), enabling manufacturers to build failure-resistant, lighter weight products.
- Lower cost: 50% of expensive virgin carbon fibres are replaced with lower cost milled fibres, reducing the product’s overall cost by 25%.
- Better sustainability: recycled milled carbon fibres can be compounded with virgin carbon fibres (nearly 1:1 ratio) to produce high-performance Supercomp products, effectively “upcycling” carbon fibre waste streams back into the value stream. This circularity helps encourage mass adoption of carbon fibre, especially for automotive manufacturers and larger carbon fibre manufacturers.

Supercomp is the only commercially-available carbon fibre material that provides z-axis and interlaminar reinforcement in a form-factor (dry fabric, prepreg or thermoplastic tape) that can “plug and play” into conventional composite manufacturing methods for both thermoset and thermoplastic applications. www.bostonmaterials.co

SUSTAINABLE NONWOVENS BASED ON RECYCLED CARBON FIBRES
Tenowo produces nonwovens based on recycled carbon fibres (rCF). The fibres come from edge trim of woven and non-crimp fabric production (with original sizing) or from end-of-life components (without sizing or just freshly sized). The fibres used as precursor for the rCF nonwovens are provided by carbon fibre processing industries as edge trim residues from woven and non-crimp fabric production. Fibres from end-of-life components can also be processed into nonwovens. Tenowo uses two processes to bond carbon fibre nonwovens, which can be selected according to individual needs: needle punching and Maliwatt stitch bonding. In needle punching, several needles with notches punch through the fibre layers to strengthen the fibres. Needle-punched nonwovens can be draped very well. Fabric widths up to 2000 mm and grammages from 100 gsm to 600 gsm can be produced. In the field of technical textiles, the stitch-bonding process is already known for multiaxial fabrics. Stitching improves handling and increases the maximum tensile forces in the yarn direction of the nonwovens. Furthermore, the “needle channels” improve the infiltration of resin during the impregnation process. The yarn type, stitch length and pattern can be varied. In combination with this, additional textiles can be applied to the top and/or bottom side of the fabric. Widths here range up to 1500 mm with grammages from 100 gsm to 350 gsm. www.tenowo.com

LIGHTWEIGHT RESIN SPRAY SOLUTION FOR COMPLEX HONEYCOMB
Rimline HC+ resin technology is a new, two-component po-lyurethane resin system for spray application to fibreglass-reinforced honeycomb panels for automotive interior components.

Sprayed onto paper honeycomb covered with a glass fibre mat, the resin technology can be used to create a lightweight composite material that is strong, rigid, robust and long lasting.

Meeting industry needs for VOC and odour specifications, the resins can enable new design possibilities, delivering panels with intricate mould details and superior edge finishing. The use of this resin can also boost plant productivity. This new line of resins has a longer spray window of up to 100 seconds, enabling part producers to spray bigger panels or use the resin in projects where multi-cavity tools are used. The resin will cure in just 35 seconds for simple parts and in around 60 seconds for more complex components.

A high number of parts can be produced, without having to reapply external release agents and without the need for tool cleaning. The resin can help reduce waste. The technology is thixotropic enough to eliminate drips when a panel is sprayed on one side and subsequently flipped over. www.huntsman.com

FOAMING CORE TECHNOLOGY
Creating aesthetically appealing, lightweight, highly structural curved or three-dimensional foam core composites for the automotive, aerospace, truck and bus, rail, micro-mobility and sporting goods industries is both time-consuming and labour-intensive.

A conventional method of creating these parts is to start with a pre-cured foam, machine the foam to the desired shape and then bond a resin-impregnated structural fabric (prepreg) to the surface. This traditional process wastes both time and material.

Using L&L Products’ new XP-9008 foaming core technology and a new process utilizing an induction heated tool, contoured three-dimensional foam core structural parts can be manufactured in a one-step process, resulting in a very fast cycle time. Live demonstrations will be available on Booth R 27 in Hall 6. www.llproducts.com
Watersports look to the future with recyclable epoxy parts

COBRA International, the market leader in serial production of strong, light and beautiful composite materials, has been pioneering the introduction of more sustainable composite raw materials for more than a decade. With bio-based epoxy systems, natural fibre reinforcements and recycled content in foam core materials, COBRA has already made great progress. Working with partners Aditya Birla and Starboard, the company is now taking an even bigger leap forwards in sustainable development by incorporating the first recyclable epoxy thermoset systems into their production. By using Aditya Birla’s Epotec YDL5552-THR935 recyclable epoxy systems to infuse surfboard fins moulds and the Epotec YDL5540-THR9151 recyclable epoxy RTM system to produce components, COBRA and their partners have initiated a closed-loop recycling process that will significantly reduce composite material waste volumes. The company CNC machines their tooling from infused fibreglass mould blocks before laying up carbon and fibreglass fabric preforms for RTM injection. Aditya Birla’s unique resin technology can be easily broken down using a low-temperature recycling process, leaving a thermoplastic resin compound and the reinforcement fabrics recovered intact. This exciting development has massive potential for the thermoset composite markets as a whole and COBRA will be showing more details of their work, as well as fins, moulds and plastic components moulded from the recycled thermoplastic, at JEC World 2020. ■ www.cobrainter.com

Epoxy technology for high-volume leaf spring production

Composite leaf springs have been used in the automotive industry for a long time, for example in the GM Corvette, Daimler Sprinter and Volvo models from the new Scalable Product Architecture (SPA) platform. Significant weight savings of 65-80% can be achieved compared with steel equivalents, making composite leaf springs attractive solutions to comply with tightening environmental regulations. In addition, the weight reduction is realized in the unsprung mass, leading to better driving behaviour. Although different manufacturing methods can be used to mould composite leaf springs, high-pressure-RTM (HP-RTM) is most cost efficient at high build rates. The RTM technology has a proven robustness in commercial applications and is suitable due to the availability of fast-cure resin systems and compatible internal mould release agents and preform binders. The EPIKOTE Resin TRAC 06150/EPIKURE Curing Agent TRAC 06150/HELOXY Additive TRAC 06805 allow for fast conversion out of the mould, eliminating the need for post-cure. In a typical production setting with a multi-cavity tool, this translates into per-part cure times well below one minute. Binder-stabilized fabrics are easier to handle and position in the mould, which is particularly important when large ply stacks need to be handled like in the manufacturing of leaf springs. The reactive binder EPIKOTE Resin TRAC 06720-3 offers excellent ply adhesion and is fully compatible with the fast-cure epoxy system. ■ www.hexion.com

Low-CTE thermoplastic resin for large-scale 3D printing

Airtech’s new “Tooling of Tomorrow” initiative leverages the company’s 45 years of polymer extrusion and manufacturing expertise to address the needs of the large-scale thermoplastic composite 3D-printed tooling industry. Additional facilities, equipment, and staff with over 15 years of large-scale additive experience have been added to the global team to support this effort. The high-throughput and relatively low-cost FDM (Fused Deposition Modelling) manufacturing method is used to create large tooling structures and surfaces for low- to high-temperature lay-up moulds, trim or assembly fixtures, or masters. The structures and materials used for these demanding tooling applications have to be durable and dimensionally stable. Airtech developed a new series of innovative polymer composite resins, Dahltrim, for use in large-scale 3D printing that has addressed the need for lower CTE and a more robust service life when used at low or high temperatures, including use in an autoclave. These thermoplastic composite resins are designed for use in any pellet-fed FDM printing system. The company is utilizing its facilities in Springfield, TN (USA), and Differdange, Luxembourg, to house a pair of the largest commercially-available 3D printers (6x12m) in order to offer its Print-tech full-service tooling manufacturing solutions exclusively with Dahltrim resins, as well as support for continued research and development of future resin offerings for global customers. ■ www.airtechonline.com

White conductive fluoropolymer compounds – FLOMELT

In the field of fluoropolymer conductive compounds, one of the currently available solutions includes the addition of conductive carbon (or carbonaceous fillers) to polymer bases to make them conductive. The drawback is that the conductive carbon used as a filler turns the final product black in colour and, as such, is not accepted by the market, even considering the regulations limiting the amount of carbon allowed within compounds coming into direct contact with food. There is a strong need for fluoropolymer compounds with the chemical and thermal resistance required by the pharmaceutical/food fields, without the drawbacks associated with the use of fluoropolymer compounds comprising conductive carbon. Thanks to new developments, a category of white fillers has been identified that provides a new family of fluoropolymer compounds that can grant surface and volume resistivity values within 10E3-10E6 according to ASTM D4496-13. Fluoropolymer compounds are widely used as internal linings for pipes, fittings, valve bodies, pumps and containers in contact with fluids and powders where there is an accumulation of electrostatic charges. Such linings are required to meet specific field needs such as chemical resistance, thermal resistance and low porosity, as well as anti-static performance, preserving the safety, long life and FDA requirements of the products. The white and conductive fluoropolymer compounds also fulfill the ATEX regulation requirements. ■ www.formulance.com

Low-temperature recycled epoxy systems – TECO-ECO

TRAC 06720-3 offers excellent ply adhesion and is fully compatible with the fast-cure epoxy system. In addition, the weight reduction is realized in the unsprung mass, leading to better driving behaviour. Although different manufacturing methods can be used to mould composite leaf springs, high-pressure-RTM (HP-RTM) is most cost efficient at high build rates. The RTM technology has a proven robustness in commercial applications and is suitable due to the availability of fast-cure resin systems and compatible internal mould release agents and preform binders. The EPIKOTE Resin TRAC 06150/EPIKURE Curing Agent TRAC 06150/HELOXY Additive TRAC 06805 allow for fast conversion out of the mould, eliminating the need for post-cure. In a typical production setting with a multi-cavity tool, this translates into per-part cure times well below one minute. Binder-stabilized fabrics are easier to handle and position in the mould, which is particularly important when large ply stacks need to be handled like in the manufacturing of leaf springs. The reactive binder EPIKOTE Resin TRAC 06720-3 offers excellent ply adhesion and is fully compatible with the fast-cure epoxy system. ■ www.hexion.com
CHEMISTRY CHOICE FOR COMPOSITE SUSPENSIONS

Huntsman developed two high-performance resin families matching customer performance and processability requirements for dynamically-loaded automotive suspension elements: Araldite LY 3585/Aradur 3831 and Vitrox RTM 00379. The Araldite LY 3585/Aradur 3831 epoxy resin is responding to the market demand for improved productivity and long-term dynamic loading under severe hot/wet conditions over incumbent materials. With more than 90-second injection capability and a cure time as low as 5 minutes at 105°C, it is suitable for fast and robust HP-RTM processing, allowing the efficient production of high-thickness composite parts. The latter combined with high thermo-mechanical properties (glass transition of 125°C) and fatigue resistance allowed the new epoxy solution to complete a first qualification for leaf spring applications. The Vitrox RTM 00379 polyurethane resin brings processing and property advantages over existing PU resins. Featuring a viscosity below 100 mPa.s for a minimum of 55 seconds, it limits pressure build-up during impregnation and enables full wet-out of the dense fibre pack. Vitrox snap cure enables a short demoulding time and the built-in tacky surface to adhere to the mould tool for an efficient lay-up process, HexPly XF2 provides a high-quality pin-hole-free finish straight from the mould, reducing finishing and paint preparation time significantly. The component on display also features carbon fibre HexPly SuperFIT prepregs with reduced debulking steps to produce void contents below 1% irrespective of laminate thickness. The company will also demonstrate the exceptiona surface finish provided by the HexPly XF2 surfacing prepreg in Sunseeker’s superstructure component. Highly drapeable with a tacky surface to adhere to the mould tool for an efficient lay-up process, HexPly XF2 provides a high-quality pin-hole-free finish straight from the mould, reducing finishing and paint preparation time significantly. The component on display also features carbon fibre HexPly SuperFIT prepregs providing structural strength below the XF2 surface layer. Hexcel recommends the use of HexPly M79 SuperFIT prepregs, which allow rapid cure cycles at low temperatures and are easy to process in conjunction with conventional HexPly M79 prepregs.

BIO-BASED EPOXY SYSTEMS FOR WIND ENERGY AND AUTOMOTIVE

Sicomin’s SGi 128 is a new, innovative intumescent epoxy gelcoat that is particularly well suited to fire-retardant coating applications for critical components found in the wind energy and civil engineering markets. The gelcoat is produced with 38% of carbon content from non-oil sources and is a halogen-free gelcoat that provides outstanding fire protection for epoxy laminates and extremely low smoke toxicity. Available with both fast and slow hardeners, this easy-to-apply epoxy system forms a much tougher and waterproof part surface than traditional intumescent coatings. SGi 128 is available in industrial volumes with short lead times and has been successfully tested to EN 13501 (EUROCLASS B-S1-d0) and ASTM E84 (Class A). Sicomin’s new bio-resin specifically formulated for HP-RTM processing, SR GreenPoxy 28, is the sixth product in the company’s renowned GreenPoxy range. SR GreenPoxy 28 is a fast-cycle, low-toxicity, third-generation bio-based formulation aimed specifically at the HP-RTM moulding processes used for both high-performance automotive structural parts and aesthetic carbon fibre components. The new formulation has been optimized for fast production cycle times and superior mechanical performance and is a suitable alternative to traditional resins, providing exceptional performance and quality for high-volume programmes.

NEW MARINE PRODUCTS ENABLE SHORT CYCLE TIMES

Hexcel will present the new HexBond 679 low-temperature film adhesive and new HexPly UD carbon tapes with air venting Grid Technology, both specifically tailored to offer cycle time reductions within the marine industry. HexBond 679 is a 250gsm epoxy adhesive film formulated to be fully compatible with the HexPly M79 prepreg range. Fully cured in only four hours at 80°C, this adhesive film system offers huge cycle time reductions, provides strong lap shear & peel strength performance and delivers outstanding mechanical properties in foam and honeycomb sandwich structures. When combined with Hexcel’s innovative air venting Grid Technology, HexPly M79 UD carbon tapes can be laminated with reduced debulking steps to produce void contents below 1% irrespective of laminate thickness. The company will also demonstrate the exceptional surface finish provided by the HexPly XF2 surfacing prepreg in Sunseeker’s superstructure component. Highly drapeable with a tacky surface to adhere to the mould tool for an efficient lay-up process, HexPly XF2 provides a high-quality pin-hole-free finish straight from the mould, reducing finishing and paint preparation time significantly. The component on display also features carbon fibre HexPly SuperFIT prepregs providing structural strength below the XF2 surface layer. Hexcel recommends the use of HexPly M79 SuperFIT prepregs, which allow rapid cure cycles at low temperatures and are easy to process in conjunction with conventional HexPly M79 prepregs.
INNOVATIONS FOR AUTOMOTIVE APPLICATIONS

Hexcel is supporting NaCa Systems, a Tier 1 specialist in automotive interior parts that combine natural materials with carbon fibre in composite parts, to produce a car seat back with a hybrid wood fibre and carbon fibre construction. The part on display at JEC World 2020 uses Hexcel’s HexPly M77 prepreg in a one-shot press moulding process with NaCa Systems’ thermostet wood fibre mats, derived from wood industry waste streams. HexPly M77 is a fast-curing epoxy prepreg that enables automotive components and sporting goods to be press-cured in two minutes at 150°C. HexPly woven carbon fibre is used as the outer surface of the seat back, reinforcing the wood fibre structure and providing a stunning aesthetic finish.

In addition, the new HexPly M901 offers improved long-term fatigue performance in automotive suspension parts. Having supplied heavyweight glass fibre prepregs for automotive leaf springs for more than 15 years, Hexcel will also present its latest development in prepreg technology at JEC World 2020. HexPly 901 has been optimized to provide faster cure cycles and enhanced fatigue performance in these critical suspension components. Taking a major step forwards from the company’s benchmark HexPly M9 system, HexPly M901 can be cured in as little as 15 minutes and delivers a 15% mechanical performance gain over standard prepregs. [www.hexcel.com]

NEOLAMINATES MADE FROM THERMOPластIC UD TAPES

W8SVR neolaminates from HUESKER Synthetic are made from thermoplastic UD tapes and have the potential to further improve the weight/perform-

ance ratio of thermoplastic composites, increase surface smoothness and reduce waste. In composite materials, stiffness and tensile strength are largely determined by fibre length and orientation. Optimum values can therefore be achieved by using continuous fibres that are completely stretched and lie straight in the intended load direc-
tion of the component, so that tensile and compression forces can be absorbed as directly as possible by the fibre. Exactly these properties can be found in UD tapes: the stretched continuous fibre is embedded in a thermoplastic matrix to which it has good adhesion. Depending on the field of application and the individual customer requirements, neolaminates can be produced either by weaving or automatic tape placement of UD tapes.

They can theoretically have “any” fibre/matrix combination, but glass/PP, glass/PA6, glass/PA66, or carbon/PP, C/PA6, C/PA66 or C/PA12, C/PC, C/PPS are the most commonly used materials. Compared to older generations, they have significantly improved mechanical prop-
ties at the same weight per unit, allowing for additional weight reduction and/or cost benefits from material savings. Due to the lower material input, the thermoplastic matrix can be heated and cooled even faster, so that even better cycle times can be achieved with conventional organosheets. [www.w8svr.com]

CARBON NANOTUBES FOR INNOVATIVE COMPOSITES AND ADESIVES

Miralon products are a new generation of ultra-long carbon nanotube-based materials. Unlike standard carbon nanotubes, Miralon is produced in the form of sheets or yams and also available in the form of tapes or pulp. While standard carbon nanotubes have impressive properties at the nanoscale, their translation to the macroscale has been challenging. Miralon materials improve this translation due to their outstanding level of entanglement and superior length of individual tubes. Thanks to unique mechanical, thermal and electrical conductivity properties, Miralon sheets and tapes offer diversified opportunities such as composite embedded heaters or ultra-lightweight fire barriers as well as heat-release reduction or vibration damping applications. Miralon yarn can be used as a stitching material in 3D structures or be included into composite structures delivering increased toughness through its unique balance of modulus and elongation. Demonstrated in conductive adhesive applications, the use of a Miralon pulp dispersed in various matrices provides lightweight electrical conductivity without compromising other thermo-mechanical properties. With regard to EHS, Miralon sheets and yams are classified as articles by the EPA because they consist of long, bundled, interwoven carbon nanotubes that are difficult to liberate as respirable particles. Conventional industrial hygiene and personal protective equipment (PPE) are sufficient for routine handling, storage and production. [www.huntsman.com]

THERMOPLASTIC SANDWICH PANEL TECHNOLOGY

Tri-Mack Plastics Manufacturing Corporation continues to innovate with the development of thermoplastic sandwich panel technology for aerospace and other weight-critical applications.

By combining UD thermoplastic composite laminates with traditional honeycomb materials such as Nomex, aluminium, Kevlar and PEI, the company’s sandwich panels provide lightweight stiffness without the use of adhesives. PEEK, PAEK, PEI, PPS and PA thermoplastic composites can be processed more cost-effectively than thermosets while providing improved performance, especially in the area of impact resistance. Tri-Mack’s automated thermoplastic composite process uses automated tape laying (ATL) to produce tailored blanks that are customized to best meet end-user requirements.

The company plans to combine sandwich panel technology with injection moulding to create hybrid assemblies, which reduce part count while optimizing performance. Using its vertically-integrated capabilities, such as multi-axis machining and bonding, Tri-Mack Plastics manufactures finished sandwich panel components and assemblies for OEMs and Tier suppliers to create a variety of stiff, lightweight structures and surfaces, including access panels, blocker doors, floor panels and fairings. Its latest thermoplastic composite innovations will be on display in the US Pavilion, Booth R37b. [www.trimack.com]
**PHTHALONITRILE ADHESIVE FOR APPLICATIONS UP TO 600°C**

APNA01 is Azista’s custom-formulated ultra-high temperature resistant structural adhesive, which can be cured at temperatures of ~250°C. This adhesive can withstand temperatures of up to 400°C for long durations and up to 600°C for short durations. This hot-melt adhesive is solid at room temperature and becomes a viscous liquid at 75°C. It complements Azista’s phthalonitrile RTM grade resins and phthalonitrile prepregs. The adhesive is developed for high strength retention at elevated temperatures. It can be used in metal-to-metal, composite-to-composite, and metal-to-composite bonding for producing components with superior fire, smoke and toxicity performance. No volatiles are released during the curing process, leading to a void-free adhesive. This single-part adhesive system has a long out-time of over three months at room temperature, with excellent tack properties and adhesion. This adhesive can withstand temperatures of up to 400°C for long durations and up to 600°C for short durations. This hot-melt adhesive is solid at room temperature and becomes a viscous liquid at 75°C. It complements Azista’s phthalonitrile RTM grade resins and phthalonitrile prepregs.

In comparison to fumed silica, Garamite-1958 provides many advantages for the user: less dusty, easier to dose, easy and faster to disperse, lower dosage especially in combination with Rheobyk-R 605, which means lower costs. Garamite may have a lower TI (thixotropy index), but shows better sag resistance and improved fibre wetting at the same time. Laminating resins including Garamite are known as “easy-wet-out” resins because when impregnating the fibre with a roller, viscosity drops very fast and disperse, lower dosage especially in combination with Rheobyk-R 605, which means lower dusting and less storage space required, greater efficiency and/or lower dosage.

**ANCILLARY PRODUCTS**

**A UNIQUE RHEOLOGY ADDITIVE**

Garamite is a solid rheology additive based on a composition of organically-modified phyllosilicates. The combination of various morphological structures in the mineral components results in it being particularly easy to disperse and offering high efficiency in various unsaturated polyester and vinyl ester-based resins. BYK’s new additive, Garamite-1958, offers a whole bundle of benefits compared with conventional rheology additives: higher film thicknesses, high sag resistance, strong shear thinning effect, fast fibre wetting, very low shear forces required for incorporation, which reduces processing time by up to 50%, no heat needed for activation, higher bulk densities compared with pyrogenic silica, which means lower dusting and less storage space required, greater efficiency and/or lower dosage.

**COMPOSITE MAINTENANCE AND REPAIR IN EXTREME CONDITIONS**

Huntsman introduced the Araldite2050 acrylate adhesive focusing primarily on the wind energy, marine and outdoor assembly industries. In these industries, on-site maintenance and repairs can make a difference between profit and loss. They are time-consuming and consequently costly operations because they have to be carried out at low temperatures, with high humidity or in the presence of salt water. These jobs need to be completed all year round. With increasingly challenging weather conditions, there is even more demand for on-site repair. Araldite2050 is the only structural adhesive that can be applied at temperatures as low as -20°C, with no sensitivity to fresh or salt water, enabling a downtime reduction of up to 50%. Outstanding adhesion on thermostat, thermostoplastic composites and metals is achievable with virtually no surface preparation, even in the case of bonding under water (salty or fresh). A service temperature up to 120°C, resilience to vibrations, impact and dynamic loading as well as excellent weathering resistance are all benefits provided by this innovative adhesive technology. When conditions are becoming warm and Araldite2050 is too fast, Araldite2051 is the solution bringing similar benefits and performance. www.huntsman.com

**NEW INTUMESCENT PAINT FOR PROTECTING COMPOSITES IN A FIRE**

The fire behaviour of fibre-reinforced polymer composites in hot areas in the case of a hidden fire or post-accident is a key challenge. Intumescent paints bring effective fire protection by forming a char that reduces the transfer of heat and the spread of fire. The PTI 700 intumescent coating engineered by Rescoll specifically addresses the requirements for composites fire protection in the aeronautic sector. It presents an excellent temperature resistance, humidity resistance and resistance to chemically-aggressive environments. Tested by Safran Composites, PTI 700 combines a thermal insulation superior to 150°C between the exposed and the back side of the structure once activated. Its pot life and drying time were carefully tuned to allow optimised processing of the paint. PTI 700 intumescent coatings are available in a wide range of colours on request. Applications: fire protection in aircraft, watercraft, rail vehicles, and automotive (e.g. containment of high-energy batteries). www.rescoll.fr
**DEBONDING-ON-DEMAND SOLUTIONS FOR ECO-DESIGN**

Structural adhesives are widely used in many industries such as automotive, aerospace, microelectronics, shipbuilding, energy and sports & leisure. Strong efforts have been deployed to enhance the level of adhesion in structural assemblies. In a context of growing environmental concerns, the question now arises of how to dismantle structural-bonded joints for end-of-life recycling. Based on INDAR INSIDE technology (Innovative Disassembly Adhesives Research), the solutions developed by Rescoll make it possible to integrate environmental criteria in product design for bonded assemblies. Available as adhesives and primers, they can be thermally triggered on-demand to allow easy and clean disassembly, thus facilitating the sorting and recycling of bonded assemblies, or the recovery of parts for the second-hand market. INDAR INSIDE technology may be implemented in different families of adhesives. Apart from end-of-life scenarios, Rescoll’s solutions are relevant for other applications such as:

- Maintenance: replacement of worn parts, component upgrade;
- Temporary fixing: machining, release on command (e.g. in flight-space applications), proof tests, sensor bonding;
- Safety, e.g. panels with restricted access (instead of screwed panels).

**FUNCTIONAL FILLERS FOR E-MOBILITY**

The requirements for many electromobility applications have not yet been defined and can vary depending on the country, automobile manufacturer or supplier. At the heart of all developments, however, are materials for the electrification of automotive drive systems. The risk of fire due to technical defects will increase as the number of electrical and electronic components will increase drastically. Flame-retardant plastics will have the highest priority. But the plastics of the future will also have to offer properties such as high thermal conductivity and chemical resistance. For mechanically highly stressed components, the compounds or composites should have high toughness, stiffness and strength. The special challenge for material developers and designers will be to put together the perfect combination of materials with the required properties. In particular, thermostets and thermoplastics will increasingly replace steel, aluminium and cast iron. Higher mechanical strengths of plastics are also required.

This is where HPF Minerals’ high-performance fillers come in, because their use can have a targeted effect on the properties of polymer systems. The company’s product range includes: Silatherm for thermally-conductive plastics, Tremin for excellent dimensional stability, Silbond for increased weather and chemical resistance, and Kaolin as flame retardant additives. [www.hpfminerals.com](http://www.hpfminerals.com)

**A NEW POLYESTER-BASED COLOURANT LINES**

At the 2020 JEC World Composites show in Paris, Chromaflo Technologies will present additional colourants for its polyester-based Plasticolors GTS for gelcoats and Plasticolors CF for versatile polyester composite applications. The innovative Plasticolors GTS is a fully-integrated tinting system for colouring polyester gelcoats. For specific high-end applications, inorganic colourants are added to the base selection, such as a cobalt blue and a chrome oxide green-based colourant. For additional expansion of the colour space, a violet colourant has been developed. The final selection of 14 colourants in the GTS system provides gelcoat producers with an innovative solution to meet the increasing colour demand in the market without compromising performance. All GTS colourants are low-viscosity, highly-concentrated solutions suitable for volumetric and gravimetric use in automated dispensing machines. In addition, Chromaflo expanded its Plasticolors CF line for versatile polyester composite applications. Specialty colourants such as mettalic and fluorescent colourants were developed and added to the already broad selection. The growing demand to expand the colour space and the need to differentiate in colouring composites can be met with these new developments. [www.chromaflo.com](http://www.chromaflo.com)

**DEVELOPMENT OF COMPOSITE MATERIAL MODELS AS A SERVICE**

An accurate material model is the key for reliable prediction of composite mechanical behaviour through simulation, thus allowing design optimization as part of the development process and, finally, verification of the performance of the design without extensive physical testing. Multiscale material modelling proved to be a promising approach to accurately predict the behaviour of fibre-reinforced composites all the way to rupture. The multiscale material models developed with Altair Multiscale Designer can be used in common finite element solvers. Special multiscale knowledge is no longer needed to use the advanced material models in simulation. For the material model development, Altair has well-defined procedures and test matrices for standard composites, including unidirectional, weaves, and short-fibre composites. Nevertheless, developing the material model still requires a certain level of expertise and experience. Therefore, Altair is now offering multiscale material model development as a service. Starting with a review of the material characterization needs together with the customer, the required tests are defined. The test laminates produced by the customer with the in-house processing parameters are then sent to a test laboratory of choice. Based on the test results, a multiscale material model is developed by Altair experts and delivered to the customer, ready for use in simulations. [www.altair.com](http://www.altair.com)
Litzler Designs Equipment for the Composite Industry Worldwide

**DRIVEN BY RIGHT** is the commitment we make every day at Litzler. We engineer and deliver custom continuous process machinery that meets each customer’s specific needs and fuels their business success.

C A. Litzler Co., Inc. manufactures Oxidation Ovens used in carbon fiber production and Prepreg machines for structural composites. Litzler manufactures all major types of Prepreg machinery: Solution, Hot Melt and Thermoplastic Systems. Components include: OPTI-FLOW ovens, unwinds, precision metering rolls and filmers, compaction roll sets, winders, and accumulators. COM-PREG™ pilot machines for Solution, Hot Melt and Thermoplastic applications.

Thermoplastics PrePreg:
- Fiber Saturation and Impregnation
- Stainless steel, recirculating slurry dip tanks
- Mixing and distribution manifolds
- Submerged rollers to encourage wetting
- Water/solvent removal and resin pre-heating
- Infrared ovens are used because they do not disturb the resin distribution
- Heated Die
- Precision machined to maintain/improve resin distribution
- Uniform temperature distribution across and along the web for uniform penetration and wetting.

Carben Fiber Lines:
As part of a complete carbon fiber line, Litzler supplies highly engineered Roll Stands with large diameter rolls to minimize deflection, Sizing Stations and Dryers, Tension Stands, Litzler Automation Control Systems and the Computreater CF for development and testing of new fibers. Litzler also integrates furnaces, pollution control, surface treatment, creels and winders.

Visit Litzler in booth R31a to learn more about Litzler and our 67 years of experience designing and building equipment for the composite industry.

Contact: R31a Area
C. A. Litzler Co., Inc.
4800 W. 160th Street Cleveland, OH 44135 USA
www.calitzler.com
sales@calitzler.com
HEATED TOOL-CURED INTEGRATED WING SKIN

Spirit AeroSystems combined its patented self-heated tooling and resin infusion technology to produce the world’s first lower wing cover (LWC) demonstrator with no autoclave or oven. Utilizing its design for manufacturing and infusion expertise, Spirit achieved complete integration of the LWC skin, stringers and fuselage fittings into a single component. Combining Saertex’s HTS40 non-crimp fabric, Solvay’s 890 resin and a low-cost semi-rigid bag for dimensional control, the company attained a consistent fibre volume fraction and part tolerances. Saertex’s HTS40 also features a thermoplastic veil that improves damage tolerance and enables weight and material savings. Heat for infusion and cure is delivered through a composite tool with embedded heated zones, each monitored and controlled independently. Heating the part directly with the tool reduces processing times and equipment costs. The tool also incorporates a patented resin delivery system, with infusion port locations optimized through resin flow simulations, further minimizing processing times. An automated stringer cell advances high-rate manufacture by accepting raw material, consolidating, dynamically forming and trimming on-the-fly to produce tool-ready fabric preforms. Finally, a newly-developed combined inspection and metrology cell streamlines validation. These combined design, material, simulation, fabrication, and automation innovations significantly reduce costs and enable higher rate composite manufacturing. 

www.spiritiaero.com

A SIX-AXIS PICK & PLACE ROBOT FOR LARGE AEROSTRUCTURES

Cevotec expands its service portfolio for manufacturers of aerostructures with the addition of SAMBA Step L in its high-tech lab near Munich, Germany. The new R&D system expands the range and size of components that can be processed as part of the company’s development services. SAMBA Step L features a six-axis pick&place robot mounted on a linear axis. The increased range allows to deal with larger part sizes common to complex aerostructures such as fairings, nacelles, panels and radomes. Accordingly, the patch grippers are scaled for patches up to 200 mm x 300 mm. To enable maximum flexibility in the development process, predefined patches of different sizes and materials can be fed individually to designated pick-up positions. A smooth deposition of large patches on curved surfaces is realized by a special roll-placement feature. Cevotec’s service offering for aerostucture application development now includes complex components with larger sizes up to 2 m x 3 m. SAMBA Step L processes many different fibre materials: carbon, glass, aramid, adhesives, and others. As all SAMBA systems, it features self-corrective real-time process control, which ensures constant laminate quality and the highest precision as well as repeatability of the placement process. SAMBA Step L will be ready for customer R&D projects as of spring 2020. Switching manual lay-up to fibre patch placement saves 20-60% in production cost and time for manufacturers. 

www.cevotec.com

NEW PNP SERIES PNEUMATIC PRESSES FOR A WIDE VARIETY OF APPLICATIONS

There is a growing need in composite development for a machine that has highly-accurate force, temperature and cooling control. The capabilities of Wabash MPI and Carver, Inc.’s new line of pneumatic presses for a wide variety of applications – the PNP Series – fill that void. Standard models are available in 0.5-, 2- and 5-ton capacities and feature a table-top, four-post construction. The maximum operating temperature is 260°C with no 3-phase power needed. Other standard features include low-friction seals and bearings, an infinite-life framework, interchangeable cylinders along with a 90 PSIG design pressure and five-micron particulate air filters. Optional features range from CE and clean room designs to platen cooling, heat tubes and 426°C operation, among others. These presses excel in many applications including composites moulding, laminating, rubber moulding, plastics testing, fluid/resin extraction, destructive testing, bonding, cell disruption and sample preparation. This press series features a quiet operation with no hydraulics to deal with. Minimal maintenance requirements also make it an excellent addition for companies that are focused on a green initiative. 

www.wabashmpi.com

ULTRASONIC CUTTING AND SURFACE MACHINING EFFECTOR

The Soniblade L ultrasonic cutting and surface machining effector is dedicated to Nomex and aluminium honeycomb. The cutting knife can cut Nomex and aluminium honeycomb up to 80 mm thick and presents many advantages. It offers a very clean cut without fraying, no materiel residue and a considerably increased blade lifetime.

The rotary disc can surface Nomex and aluminium honeycomb and provides a clean cut without fraying, with no material residue, offering the possibility of working in open environments without a dust collection system. The cutting and surfaceing tools are mounted at the end of the effector. This effector is suitable for cutting tables, 5-8 axis machines and robotized cells. It has manual or automated connections and interchangeable tool holding systems for blades (30, 40, 50 and 80mm) and discs (Ø 15, 18.3, 50 and 63 mm). The cutting effector can cut monolithic or multi-ply composite materials up to 30mm in thickness and raw materials such as carbon, Kevlar, aramid, glass and honeycomb (aluminium/Nomex). This equipment is mainly used for raw material preparation in the aeronautics sector and by raw material producers.

www.sonimat-et.com
NEW LARGE SCALE ADDITIVE MANUFACTURING MACHINE

Thermwood recently introduced an all-new LSAM additive manufacturing machine model, called the LSAM MT. This new machine offers an all-new configuration and significant advantages in certain applications. Unlike standard LSAM systems, which feature dual gantries operating over a large fixed table, the MT (which stands for “Moving Table”) features a single fixed gantry mounted over a moving table. Available with either a 3x1.5m or a 3x3m table, this configuration offers several significant advantages, not the least of which is a dramatically lower price. Despite the lower price, the LSAM MT is still a massive, robust industrial production machine capable of reliable, day in and day out production. Unlike standard LSAM systems, the MT can be configured as a “print only” machine. The logic for this is simple. Near-net-shape printed tools dramatically reduce machining times for many companies currently machining tools from solid blocks of material. This frees up significant machining capacity that is already purchased and installed. For these companies, it makes no sense to purchase additional machining capacity purchased and installed. For these companies, the change to additive frees up more than enough existing capacity to handle everything they can print. With this in mind, Thermwood decided to offer both “print and trim” and “print only” versions of the MT. The MT is available in two table sizes, 3m wide by 1.5m deep, and 10m by 10m.

www.thermwood.com

CURING OVENS FOR COMPOSITE MATERIALS

SAT Thermique offers a range of standardized and tailored-made ovens for the cure and post-cure of composite materials. These ovens can heat parts faster with the best temperature distribution throughout the work chamber. They are designed for a temperature uniformity up to +/- 2°C and comply with the most stringent standards: BAC 5621, AMS 2750 and Nadcap. SAT’s advanced-design oven insulation reduces energy consumption. The ovens benefit from a reliable, high-quality construction for low maintenance and are equipped with a vacuum and air pressure system for optimised production, from 20°C to 450°C.

www.sat-thermique.com

EUROPEAN LAUNCH ADVANCED COMPOSITE PLATE SAW

The PCR 600 router is a natural addition to Sharp & Tappin’s Compcut range of advanced composite plate saws and is capable of tackling the challenges of machining complex geometries across a wide range of advanced composite materials. The router is the result of a “proof-of-concept” development and extensive cutting trial programme run over the last three years in conjunction with the prestigious National Composites Centre based in Bristol, England. The end result of this comprehensive development pathway is essentially a hybrid machining solution incorporating elements from CNC routers such as a high-speed spindle, large working bed and easy flat laminate compatibility together with the precision, flood coolant and fully-enclosed structure common to a vertical machining centre. The PCR 600 is therefore a unique machine tool, tailored to the cutting of complex geometries from the most challenging, contemporary composites, such as the ever-increasing variety of complex materials that include thermoplastics, ceramics and aluminium matrixes. Sharp & Tappin have applied the same market approach to the PCR router, which underpins the versatile Compcut 200 plate saw – whereby they have successfully created a compact, easy-to-use machine that provides access to a high-quality composite cutting solution that can represent a tangible return on investment.

www.sharpondtappin.com - www.compcutacm.com

5-AXIS CNC MACHINING CENTRE FOR COMPOSITES AND ALUMINIUM

LaborMac is a 5-axis machining centre specifically developed to optimize the machining of aluminium and composite moulds and parts. The extreme rigidity provided by the monolithic structure with a gantry-type mobile portal on the Y axis significantly limits vibrations. The machine is of the mobile bridge type, with displacement of the portal along the Y axis and a fixed working table. The machine’s structures and components are designed according to FEM dynamic principles, to ensure the best resistance even under the most severe working conditions. The basement is made of high-thickness electro-welded steel and the main structure is stabilized by a heat treatment. The machine structure is designed as a “closed cell” to offer the best safety conditions to the operator. All the machine axis displacements (X, Y and Z) are on LM sliding guides. The guide rails are hardened and grounded completed with pre-charged double-type roller bearings for the best displacement and lowest friction. Main features: Linear motors, very high speed and acceleration; Dual drive on a rotary axis, high-precision interpolation; Monolithic structure, improved vibration damping; Double guides in the Y axis, increased rigidity; Ultrasonic device for cutting honeycomb panels.

www.comispa.it

LARGE AND COMPLEX TOOLING THROUGH 5-AXIS MACHINING

Dutch-Shape is well equipped to fulfil the aim of being the best in aerospace and automotive tooling. With its large 5-axis machines, the company can shape tooling up to 26 x 6 x 3 metres to the nearest tolerance, be it for wing surfaces, stringers, support structures, body panels or engine nacelles. To comply with the highest tooling standards, Dutch-Shape has its own engineering (CATIA) department, extensive experience with 3D forming and welding techniques, a state-of-the-art production facility, a highly-accurate quality control department and thoroughly-trained mechanics who can also work on site.

www.dutch-shape.nl
ROBOTIZED ACOUSTIC DRILLING FOR COMPOSITES

GEBE2 developed an acoustic drilling solution for aircraft nacelle composite panels. The holes are made by drilling effectors equipped with multiple spindles such as cutters or drills. This proven process can be applied to composites (monolithic skin or sandwich panels). The effectors can access areas on complex parts. The objective is to reduce the noise level of aircraft engines: the cold air vein is covered with acoustic panels that absorb sound waves. These in-between panels consist of a honeycomb core and pierced skin. Each hole opening into a cell plays the role of a Helmholtz resonator. To increase hole drilling productivity, it is possible to set up several spindles on one effector. The composition of the effector is an important step that requires a techno-economic analysis, thus optimizing the part cost in accordance with the client’s needs. The distribution of holes requires dividing the drilling process step by step in order to reduce the number of drill bits during production. This acoustic drilling solution provides greater flexibility than special machines, and is more cost-effective than solutions based on conventional CNC machines. [www.gebe2-et.com]

COLLABORATIVE SANDING ROBOT

In collaboration with the French manufacturer ISYBOT, GEBE2 is developing a collaborative sanding application based on the SYB 3 robot. This new robot provides a solution for use cases with low production rates or a large variety of parts. It is also a response to musculoskeletal disorders increasingly seen in production workshops.

This unique robot design is easy to program in four operating modes:
- Assistance: The operator controls the toolpath, the robot applies the desired force.
- Playback: The operator performs the first toolpath, the robot repeats the trajectory by applying the desired force and forward speed. The operator can take control of the robot at any time.
- Parallelisation: The operator teaches four points on a flat or curved surface, the robot sands this area automatically.
- Remote operation (optional): The robot works in hostile environments controlled, via a joystick, by an operator who remains in a safe environment.

For each operating mode, the operator can choose the forward speed of the robot, the applied force, and the rotation speed of the sander via a user-friendly interface. This new robot provides a solution for use cases with low production rates or a large variety of parts. It is also a response to musculoskeletal disorders increasingly seen in production workshops. GEBE2’s standard sanding effector is installed on the cobot and provides the same performance as fully-automated cells. [www.gebe2-et.com]

FURNACES FOR CARBON COMPOSITE MATERIALS

Carbon composite materials are currently used in many industries such as automotive, aerospace, wind power, agriculture, etc. Different materials and manufacturing processes require different heat-treatment processes to cure composite materials. Some processes take place in autoclaves, while other materials are heat-treated in chamber dryers or furnaces with air circulation. In this case, the composite materials are frequently evacuated in vacuum bags. For this purpose, the furnace is equipped with suitable connections for the evacuation of the air bags.

Nabertherm offers different furnace ranges for the tempering and curing of plastics. For example, the chamber ovens from the KTR product line can be prepared for these special requirements. For bigger workpieces, forced convection chamber furnaces with more than 560 litres in volume are a good choice to cure composites. The picture shows a forced convection chamber furnace with a 140,000 litre volume, including the pump and necessary connections. Due to their robust and solid design, even heavy loads can be heat treated. The high-performance air circulation enables optimum temperature uniformity throughout the workspace. With more than 70 years of experience in developing and producing industrial furnaces, Nabertherm produces complete customized systems. [www.nabertherm.com]

DEVELOPMENT OF A NEW ON-LINE INSPECTION SYSTEM

Building on 35 years of experience in the inspection sector, Edixia Automation developed a range of solutions tailored to meet today’s new demands from the industry. Coriolis Composites designs, develops and manufactures automated equipment and software for the production of composite material structures. The quality and traceability of composite materials are currently determined by human intervention. The constant development of composite materials in the aeronautic and automotive industries has given rise to a great need to step up the productivity and reliability of these inspections with an automated solution.

Edixia and Coriolis Composites established a partnership to develop an automatic on-line inspection system. The sensor developed by Edixia is directly built into the placement head of Coriolis Composites’ AFP machines. The benefits of this vision inspection system for composite materials include:
- Real-time analysis and performance calculation;
- Small footprint, inspection speed up to 1.5 m/s;
- All production inspected during continuous operation on complex parts;
EMISSION ABATEMENT LOWERS FIBRE FABRICATION COST BY 20%

Carbon fibre manufacturing requires custom-designed air pollution control solutions for oven and furnace emission control, which only adds to the cost of fibre production. Anguil Environmental developed technologies that not only keep manufacturers in compliance but also reduce the cost of fibre processing. Anguil provides fully-integrated systems for air pollution abatement at carbon fibre operations located throughout the world. The company is intimately familiar with the capture, control and compliance hurdles that processing plants face with regard to volatile organic compounds, hydrogen cyanide (HCN), ammonia, silicone, nitrogen oxides (NOx) and odorous emissions. Anguil designs, manufactures, services and installs energy-efficient regenerative thermal oxidizers (RTOs) as well as direct-fired thermal oxidizers (DFTOs) that are specifically designed for carbon fibre ovens and furnaces. The company offers the best environmental performance documented in this industry with increased uptime and limited downtime. Its systems reduce the total plant operating costs by supplying nearly 20% of the energy required for manufacturing. Abatement devices also incorporate features that reduce maintenance and increase process up-time. www.anguil.com

MULTIMATERIAL-WELDING FASTENING COMPOSITE MATERIALS

MultiMaterial-Welding is an ultra-fast, versatile and resilient fixation method for lightweight substrates and multi-material combinations. Using ultrasonic technology to heat solid bodies in precisely defined geometric regions, MultiMaterial-Welding creates a strong mechanical form-lock connection between different materials. This allows for several new operations such as creating a connection between materials, curing adhesives in short times, or other innovative applications that improve current equivalent processes. The LiteWWeight technology embraces different technologies for specific applications:

- LiteWWeight Pin for sandwich structures with a honeycomb or foamed core;
- LiteWWeight Lotus for fibrous components and surface connection;
- LiteWWeight Slide for metallic insert connection into sandwich panels;
- LiteWWeight ZEPP for fast and strong fixation in foamed materials;
- LiteWWeight Wings for fixation in foams via a "MM-Welded" screw.

The benefits of this innovative technology include:

- Fast: Assembly time reduced to a fraction of a second, faster than other methods;
- Efficient: Material joints without predrilling. Processing steps and time saved;
- Reliable: Proven technology for streamlined, high-quality serial production;
- Flexible: Possibility to install asymmetric/angular joining elements;
- Clean: Disassembly/mechanical destruction allows for material separation and recycling. www.bossard.com

NDT OF CARBON FIBRE NCFS WITH HIGH-FREQUENCY DEVICE

When manufacturing multiaxial carbon fibre fabrics with more than two layers, companies increasingly require online inspection and recording of quality directly during production to avoid waste and minimize costs. Especially in high-performance applications for which only low tolerances are allowed for semi-finished products, an inspection of the fabrics on lanes, correct fibre angles, foreign material contamination and fibre volume measurement of non-visible layers is becoming more important.

Therefore, Fraunhofer IKTS developed a novel array sensor demonstrator and the new high-frequency device generation EddyCus Pro II, which can detect all defects non-destructively at speeds up to 5 m/min, even in non-inspectable layers. The modular system can be adapted flexibly to the required width. It can also be used for incoming goods inspection and sample inspection using a hand-held device. The demonstrator will be presented by Fraunhofer IKTS at the jointbooth of the Saxony Economic Development Corporation. www.ikts.fraunhofer.de

AUTOMATED SURFACE QUALITY CONTROL TO REDUCE WASTE

Surface Analyst XA is an automated solution for evaluating material surfaces to reduce waste, rework, and recalls when poorly prepared substrate surfaces result in bonding, coating, sealing, painting or printing failures. The XA delivers real-time surface condition feedback to manufacturers in industries as diverse as aerospace, medical devices, automotive, electronics, and more, to ensure adhesion processes will be successful. The XA deposits a highly-purified drop of water on a surface and then measures the contact angle. By automating this process, the XA increases the speed and efficiency required to evaluate surfaces by completing inspections on multiple surface points on a material surface at rates of up to 5,000 inspections per hour. As a result, the XA maps a surface across multiple points, ensuring the consistency and uniformity of surface quality on products ranging from silicon wafers, electronic displays, critical medical device components to cast or machined metal parts and glass surfaces. The XA measurement process is completely non-destructive. Using highly-purified HPLC-grade water and a state-of-the-art ballistic deposition method of deploying the droplet, the measurements are touchless, eliminating potential transfer of contamination from point to point on a surface. Being automated, the XA limits operator error or variation between inspections. Data capture and transfer to MES is automatic, providing statistical process control and a long-term trend analysis that monitors process drift. www.btglabs.com
A REVOLUTIONARY DRY ICE BLASTER

Cold Jet – the global leader in dry ice technology – reinvented dry ice blasting with the release of the PCS 60, featuring the company’s patented Particle Control System (PCS). The PCS precisely cuts dry ice into diamond-shaped particles in the exact dimensions chosen by the operator (0.3 to 3mm and 28 sizes in-between). This gives composite part manufacturers a greater degree of versatility in their cleaning applications. Composite part manufacturers not only face a variety of contaminants to be removed (mould release agents, carbon, epoxy, Teflon or tacky tape, phenolics, etc.), but also a variety of mould surfaces that need to be cleaned: steel, aluminium, epoxy, urethane, moulds coated with Teflon or gelcoats and even composite moulds. With the PCS, a composite processor can use a single machine to clean all these contaminants from a variety of mould surfaces. The machine can also be used to deflash or deburr composite parts and clean them prior to painting or bonding. Previously, a facility would need multiple machines with different aggression level capabilities to clean each. Manufacturers never before had a single smart machine with the ability to adapt the cleaning process to so many different applications in the world of composites. With a 7” LCD colour screen and digital controls, the PCS 60 provides an intuitive display that allows the user to easily view and adjust blasting parameters and machine settings. ■ www.coldjet.com

HIGHLY FLEXIBLE, SCALABLE AND PLUG & PLAY PROCESS CONTROL

With its innovative MultiMode system, Dienes sets new standards in process control. Laboratory and prototype lines need to be varied for every new experiment. Dienes followed this need and established intelligent modules that can be flexibly combined to a prototype line and re-combined without re-programming the control. All Dienes modules have an independent local control. The system’s modular design allows a high degree of flexibility and can adapt to the customized processes at any time. The system – that has already fully integrated the Industry 4.0 concept – establishes smart communication with the individual modules and makes it easy to control all the parameters. The process control system automatically generates itself from the individual controls in the modules. It can analyze inter-dependent parameters at the control system level using a high-performance personal computer for industrial use. The MultiMode control hierarchy allows a variety of settings and variations in the process world: Each unit has its own SPS called MultiMode Slave. The units can be operated with a MultiMode interface directly or with the MultiMode Master over the Ethernet. Additionally, the MultiMode Explorer offers a line overview for perfect process monitoring. Process-relevant data can be set and controlled by mobile devices, such as a tablet or mobile phone. ■ www.dienes.net

THE FUTURE OF COMPOSITES IS ADHESIVE-FREE

Emitting ultraviolet rays at an ideal 172 nm, USHIO’s research into vacuum-ultraviolet (VUV) excimer technology is leading the way to safe treatment of sensitive composite films, curing of new nanocomposite coatings, and plays a significant role in the production of carbon nanotube-reinforced composites. Excimer technology has begun generating significant interest from aerospace and automotive firms who wish to explore the weight reduction possibilities of photobonding and the elimination of adhesives. Dielectric barrier discharge excimer lamps hold a unique ability to bond materials, such as polymers and glass, without epoxy or other chemicals. By pressing two non-identical substrates together during treatment, a permanent bond is formed at a low pressure and temperature. VUV light also enjoys a rather shallow penetration depth, which leaves a thin polymerised film on the upper layer of UV-curable coatings. This effect leaves deeper layers unaffected, yet the resulting shrinkage results in a homogenously-matted finish and brings scratch resistance to composite coatings. Now, excimer has been deployed into lab and industrial environments with modules suitable for the treatment of composites on any scale. The application of excimer lamps has already extended to the following composite material treatment processes: surface activation, surface cleaning, surface modification, adhesive-free photobonding, UV-reactive curing & matting, and disinfection & removal of contaminants. ■ www.ushio.eu

NEW ECO-FRIENDLY CARTRIDGES FOR COMPOSITES

Sulzer developed a next-generation primary packaging for adhesive applications: the ecopaCC collapsible cartridges. This solution replaces conventional, rigid, side-by-side two-component cartridges with flexible, leakproof, high-tech multilayer films. The foils are inserted into a reusable, rigid support sleeve to ensure that the system will be able to withstand extrusion forces.

During use, the cartridges compress as the contents are dispensed. Once empty, the thin collapsed foils can be removed and disposed of. As a result, end users can reduce plastic waste by up to 82% and lower disposal costs, compared to conventional products. In addition, if the system is not empty after use, the outlet nozzle is resealable to allow subsequent uses while avoiding contamination and adhesive hardening, further minimizing cartridge waste. Adhesive manufacturers can lower the environmental impact and costs of freight, transportation and storage, as ecopaCC is lighter and smaller. Most savings are obtained when filling ecopaCC from the front, as the empty cartridges can be shipped, distributed and stored in a collapsed state. Only when the adhesive manufacturers introduce their product do the films turn into cylindrical structures. When back-filling is preferred, adhesive producers can still benefit from a lightweight packaging that reduces the overall packaging material volume. Sulzer can easily customize ecopaCC’s films to suit various formulations as well as specific application needs. ■ www.sulzer.com
EXPANDING AERONAUTICS SERVICE IN EUROPE

Web Industries will showcase services available through its newest acquisition, Omega Systemes, which consists of Omega Systemes Atlantique, in Nantes and Omega Systemes Aquitaine, in Bordeaux. The facilities serve the needs of Web’s international aerospace customers and feature an autoclave, clean room space and cold storage areas. With its existing manufacturing facility in Stade, Germany, this acquisition gives Web three European production plants and positions the company as an emerging international leader in the precision converting and outsource manufacturing of thermoset and thermoplastic materials used in aerospace, defense and industrial applications. In related news, the company deepened its involvement less than a year ago with the UK-based National Composites Centre (NCC) by upgrading from associate to Tier 2 membership. This enhanced status enables Web to take greater advantage of NCC’s formidable design and manufacturing capabilities and to collaborate more actively with other NCC members in early-stage development of new composite formatting solutions. At JEC, Web will exhibit samples of formatted thermoset and thermoplastic materials, and have on hand engineers to field questions from booth visitors. The company encourages aerospace managers and engineers to bring with them their most challenging precision formatting and outsource manufacturing challenges for review and potential solutions. ■ www.webindustries.com

COMPOSITE LEAF SPRINGS – A SLENDER ALTERNATIVE TO STEEL

Leaf springs made of fibre-reinforced plastics are taking over the automotive industry – they save space, reduce weight and do not corrode, even if a lot of salt is present. In the Composite Leaf Spring project, Krauss-Maffei’s Reaction Process Machinery business unit puts its system expertise on full display. The experts in reaction technology brought it all together to develop a leaf spring for cars, trucks and vans for the customer Hengrui. Manufactured with the HP-RTM process (high-pressure resin transfer moulding), the leaf spring is 60% lighter than the previous steel product. Its strength can be specifically increased in sections where this is required and the material’s corrosion resistance offers further added value. A high-pressure metering machine with a mixing head and a mould carrier with a pressing force of 800 metric tons are the most important system components in the production of the leaf spring. Krauss-Maffei is a RTM leader in all sectors, with over 100 machines in the market and the largest pool of process-related expertise. The leaf spring prototype was developed in the company’s TechCenter, involving its large network of partners as appropriate: Engenuity developed the component, Huntsman supplied the epoxy matrix system, Johns Manville supplied the glass fibres, Chomarat created the fabrics, Schmidt & Heinzmann manufactured the preforms, Alpex designed the RTM mould and Hufschmied took charge of post-mould processing of the component. ■ www.kraussmaffei.com

FLEXIBLE CFRP TENSION MEMBER

CL RESTRAP is a flexible CFRP tension member made of continuous unidirectional carbon tapes. The member is manufactured using bespoke production processes engineered by Carbo-Link, using tapes with a tightly controlled width and thickness. Due to the thin individual tape thicknesses and the subsequent build up in a continuous loop, CL RESTRAP is highly flexible and features all the well-known advantages of CFRP tension members. Flexibility means it can be wound and tensioned around various structure shapes and sizes, much like a traditional ratchet strap. The applications are limitless. For example, CL RESTRAP can be used to reinforce concrete girders, increase load capacity and expand the use of existing structures and/or for seismic strengthening in the civil engineering sector. The advantages of CFRP in this application are clear: no fatigue, no corrosion, no creep and no thermal expansion, plus significantly higher pre-tension loads, combined with simplicity of installation – low self-weight, no bonding required, minimal to no heavy machinery. CL RESTRAP thus contributes to fast, efficient and low-cost reinforcement solutions. Another significant advance is service life: once installed the straps require minimal to no service. This CFRP tension member’s easy handling due to its low self-weight and simple, cost-effective installation, combined with far superior material properties, means CL RESTRAP is becoming the preferred product for structural reinforcements. ■ www.carbo-link.com

DRY CARBON TAPES IMPROVE CROSS-COUNTRY RACING SKIES

Hexcel is collaborating with Madshus, a leading innovator in the world of cross-country skiing, on the engineering of a range of next-generation dry carbon fibre tapes for cross-country racing skies. Hexcel’s new HiTape dry carbon tapes improve the performance, manufacturing efficiency and surface finish of Madshus skis. Hexcel was asked to deliver competitively-priced carbon fibre tape products that would produce less fuzz in production as well as meeting tight tolerances for areal weight and width. The company is now delivering nearly 500,000m of HiTape per year with strong customer demand forecast to increase volumes in the very near future. Hexcel supplies Madshus with three different HiTape dry carbon fibre UD tape products based on the specific design parameters of different cross-country ski types. The clean-cut edges and fuzz-free attributes of the precision-width tapes have improved the efficiency of the automated high-pressure epoxy RTM moulding process at Madshus. HiTape materials represent the ultimate in dry carbon fibre UD tape technology. They provide a cost and production rate optimized tape solution, producing prepreg-like mechanical properties without an autoclave. These products are well suited to automated production in a wide range of winter sports, automotive, aerospace and industrial applications. ■ www.hexcel.com

Sports & Leisure

Sports & Leisure
NEW SHAPE-MEMORY RIVETS FOR THE AERONAUTICS INDUSTRY

In the aeronautics sector, weight is a key parameter and has to be continuously reduced. To help reduce the total weight of an aircraft, PolymerExpert suggests replacing metal rivets with composite shape-memory rivets. The shape-memory property is based on the deformation of the material at high temperature, followed by quenching and freezing it in its glassy state. The material will return to its original shape on request, through heating, thus reverting from the glassy state to the rubber state and releasing the stresses stored during deformation.

The use of composite shape-memory rivets provides several advantages:

- Reduced maintenance costs: the rivet can be removed without any stress on the structure
- Reduced assembly time
- Reduced management costs: generic dimensions can be provided to reduce the number of rivet references

Characteristics of shape-memory rivets:

- Blind rivet
- Rivet size adjustable from 0.5mm to more than 100mm
- Rivet material: polyacrylate resin
- Tensile (N): 300N to 700N
- Double shear (N): 1600N to 2400N
- Grip range: adaptable from 0.5mm to 1 metre
- Temperature range: -20 to 130°C.  ■ www.polymerexpert.fr

BIG GAINS FOR SMALL SPACECRAFT USING HIGH-STRAIN COMPOSITES

Opterus Research and Development, Inc. is changing the way spacecraft design is traditionally approached, particularly for smallsats and extremely large aperture instruments. After years of material development, a new ground-breaking composite material and manufacturing process are being leveraged by Opterus to enable the next generation of spacecraft. The company achieves this utilizing novel “high-strain composites” (HSC) to fabricate deployable spacecraft structures. The high-strain composites utilized by Opterus offer a 2x increase in strength, 8x increase in stiffness, 5x decrease in mass, and 20x increase in dimensional stability when compared to metals. High-strain composites have been integrated deeply into the company’s product portfolio and widely accepted by the greater aerospace community. The main products consist of collapsible and rollable composite booms that are widely applied to a variety of spacecraft deployment mechanisms such as solar arrays, solar sails/shades, precision-tensioned structures, various antenna architectures, on-orbit servicing systems, and debris capture systems. Additionally, HSCs are ideally applied to solar array hinges that are easily integrated into deployable solar panel arrays, deployable radiators, and any system where a traditional metal hinge would be used. Opterus’ HSC hinges can be passively deployed and do not require actuators to initiate the deployment sequence, reducing part counts, costs and mitigating mission risks.  ■ www.opterusrd.com

PRODUCTS AND SOLUTIONS FOR DELICATE DESIGNS

The Svismold concept comes in at the point where monolithic materials reach their limits (weight, performance). Performance- and cost-optimised uni/multi-directional endless fibre reinforcements combined with proven, high-performance polymers, which are bonded using series-capable, rational injection moulding technology – that’s Svismold, stronger together. The Svismold approach comes into its own where component thickness is limited and static requirements are high. The company’s solution for components with delicate designs that need to meet the highest requirements consists of unidirectional fibre reinforcements, composite injection moulding manufacture with design freedom and rational injection moulding production. Thanks to suitable polymer/fibre combinations, composite design and the Svismold production concept, substantial E-modulus increases are achieved compared to monolithic materials, as well as steel-like length expansion coefficients. Compared to metal solutions, for instance, the component weight can be reduced by up to 50% without affecting performance. The approach includes three steps, from product idea to product implementation:

- Step 1: Pre-selection of suitable polymer/fibre reinforcement combinations.
- Step 2: Component layout and optimisation using FEM methodology, taking into account the composite-specific conditions.
- Step 3: Realistic trials using prototypes.  ■ www.svismold.ch