

JEC COMPOSITES CONNECT

Digital event series for
the composites community

Online | June 01-02, 2021



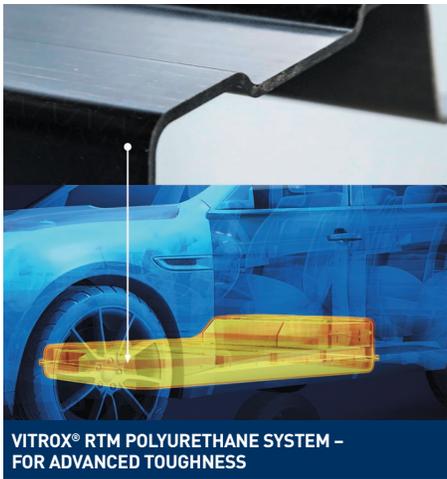
PREVIEW

www.jeccomposites-connect.events

#JECConnect

Polyurethanes support innovative multi-material options for battery casings

PU resin-based composites offer automotive designers new potential: reduced weight and properties that meet safety, mechanical and thermal standards.



As electric vehicles become more popular with drivers, automotive engineers are looking at new options for battery pack designs. For their next-generation casings, industrial designers have a range of materials to choose from – including lightweight metals and new composite materials.

The use of composites for automotive parts is growing as their characteristics become better known. In an effort to better understand how these materials can be used for battery casings, Huntsman Polyurethanes, together with 44 companies, is participating in a technical study by the Aachen Center for Integrative Lightweight Production (AZL). This research team has unique expertise in researching materials behavior and production processes for composite-based lightweight technologies.

The project aims to develop a variety of concepts for producing high-performance multi-material battery casings. When completed, it will present an overview of potential applications, including supply chain approaches and a market potential analysis.

Follow-up studies will investigate production aspects and aim to make 'demonstrator products'.

The study is looking at the known characteristics of a range of composites and how they add value to battery casings. For automotive components, composite materials typically offer: lower weight; thermal management – useful for battery operation and charging; fire and crash protection; corrosion resistance and a limitation of noise and vibration.

The Huntsman Polyurethanes team has developed a range of MDI-based formulations for high-performance composites that can be considered for battery case development.

VITROX® RTM polyurethane resins are used in panels and elements made with resin transfer moulding. Their high toughness provides impact protection and resists foreign object penetration, and resin snap cure abilities allow for rapid mass production. Their stretched low-viscosity injection properties limit process pressures, even at high fiber volume fractions.

Elements extruded with aluminium can be replaced by pultrusions, using a tough resin such as RIMLINE® PUL polyurethane resin system, offering toughness for crash elements. A RIMLINE® FC polyurethane system for rigid foam is a fully compatible partner for VITROX® resins and can be used in net shape moulding, to produce sandwich panels at high rate. It withstands high mechanical load levels, impact resistance, offers thermal insu-

lation and resists pressure in composite moulding.

Polyurethanes offer a world of possibilities for automotive design. Battery casings are one of the many innovations that the Huntsman Polyurethanes team is exploring. We look forward to partnering with you for your next battery development project.

Meet us at:

JEC COMPOSITES CONNECT Digital event series for the composites community
 Online June 01-02, 2021

or email us at:
polyurethanes_eu@huntsman.com



Enriching lives through innovation

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Huntsman Polyurethanes warrants only that its products meet the specifications agreed with the buyer. Typical properties, where stated, are to be considered as representative of current production and should not be treated as specifications.



ÉRIC PIERREJEAN
CEO, JEC GROUP

JEC COMPOSITES CONNECT

A BREAKTHROUGH DIGITAL EVENT TO BRING THE COMPOSITES COMMUNITY TOGETHER

As you know, JEC Group is the world's leading media and events company entirely dedicated to fostering the development of the composite materials industry.

We do this by creating platforms and services to enable and stimulate fruitful knowledge sharing, to facilitate business networking and to highlight innovation. This mission has become even more important within today's complex business environment. While the continued impact of the pandemic has made it necessary to postpone JEC World to 2022, we were determined to help the composites industry resume business and discover new opportunities for growth, and to maintain the momentum of our immensely popular innovation and networking programmes, such as the JEC Composites Innovation Awards, the Startup Booster competition and the Composites Challenge for PhD students.

A year without celebrating innovation, teamwork, entrepreneurship and research in composites was simply inconceivable for us.

This is why we decided to create our new online event, JEC Composites Connect, in June 2021, and to challenge ourselves to make it happen. This is our first 'Connect' event and we are looking forward to bringing together the whole composites community during 36 hours online and showing the world the resilience and dynamism of our industry.

I'd like to take this opportunity to thank all of our partners, speakers and exhibitors for their participation in JEC Composites Connect and for their continued engagement and support over the past months.

We invite you to take a deep breath of inspiration and join us at this breakthrough digital event to experience the infinite possibilities of composites.

**WE HOPE YOU WILL ENJOY THIS PREVIEW
AND LOOK FORWARD TO WELCOMING YOU VIRTUALLY
FROM 8:30AM ON JUNE 1st TO 8:30PM ON JUNE 2nd.**

SCHEDULE

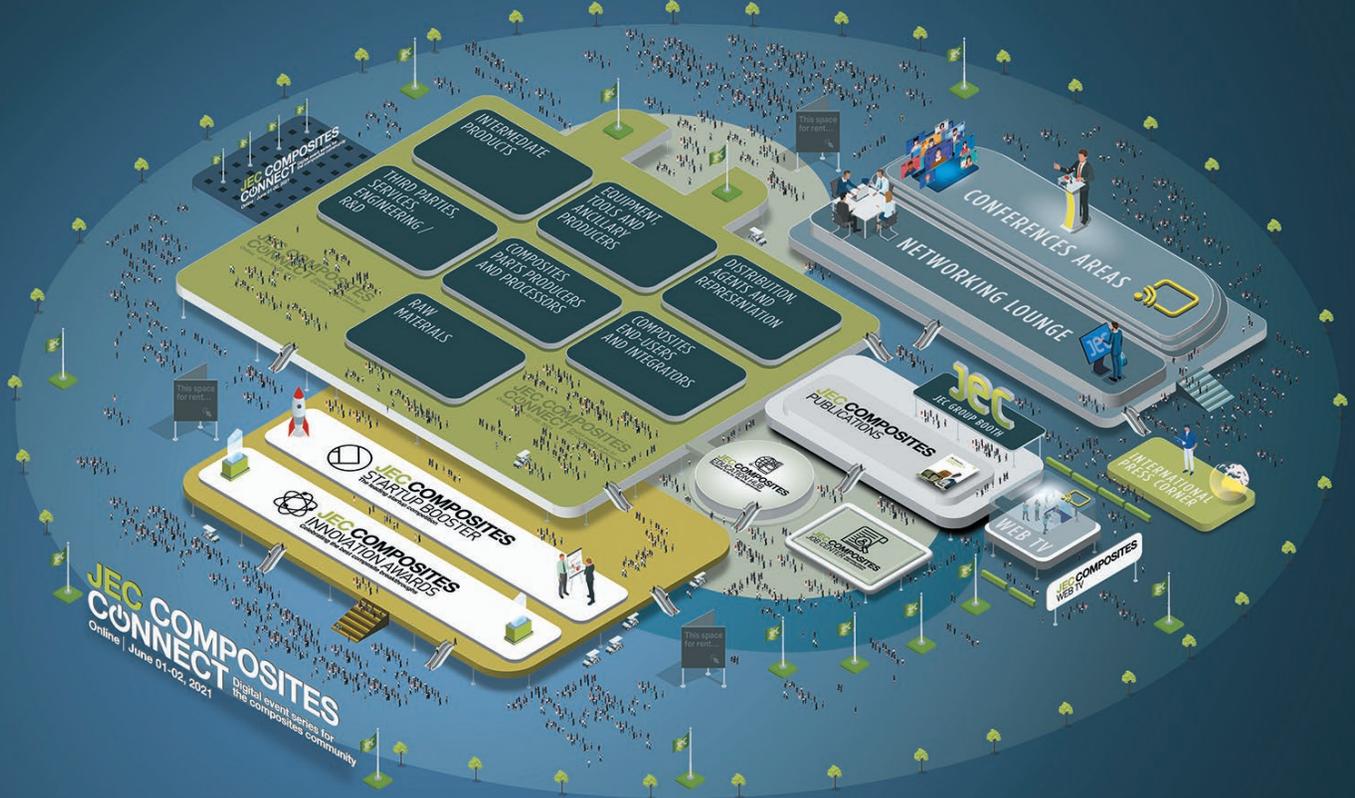
| | Tuesday 1 ST , June | Wednesday 2 nd , June |
|-----------|--------------------------------|--|
| Morning | 9:00AM - 10:15AM | AEROSPACE BUSINESS CONFERENCE |
| | 10:15AM - 10:30AM | |
| | 10:30AM - 11:30AM | STARTUP BOOSTER PITCH - Session 1 |
| | 11:30AM - 12:00PM | |
| Afternoon | 12:00PM - 1:15PM | |
| | 1:00PM - 2:30PM | ALTAIR CONFERENCE  A Complete Composites Workflow for All Industries |
| | 1:15AM - 2:00PM | |
| | 2:00PM - 2:30PM | |
| | 2:30PM - 3:30PM | COMPOSITES CHALLENGE PITCH OF THE PhD STUDENTS |
| | 3:00PM - 4:20PM | AUTOMOTIVE BUSINESS CONFERENCE  |
| | 5:00PM - 6:00PM | STARTUP BOOSTER PITCH - Session 2 |
| | | 6PM • End of session |

CONFERENCES FOCUS

| Tuesday 1 ST , June | | AEROSPACE • Towards a More Sustainable Strategy | |
|--------------------------------|---------|--|--|
| | | Moderator: Yannick WILLEMIN, Head of Marketing & Business Development, 9T Labs |  |
| Morning • 9:00AM to 10:15 AM | 9:00AM | ARIANEGROUP | Hervé GILIBERT, CTO  |
| | 9:30AM | VOLTAERO | Jean BOTTI, CEO  |
| | 9:45AM | GE AVIATION | Scott FINN, Chief Consulting Engineer for Composites  |
| | 10:00AM | CORIOLIS | Clémentine GALLET, CEO  |
| | | 10:15 AM • End of session | |

| Tuesday 1 ST , June | | AUTOMOTIVE • The Right Material in the Right Place | |
|--------------------------------|--------|---|---|
| | | Moderator: Dale BROSIUS, Chief Commercialization Officer, IACMI | SPONSORED BY  |
| Afternoon • 3:00PM to 4:20PM | 3:00PM | MEDC | TBC  |
| | 3:20PM | FORD MOTOR COMPANY | Alice SWALLOW, Senior Innovation Engineer  |
| | 3:40PM | VOLKSWAGEN PORSCHE | Christoph KÜHN, Senior Project Manager Dominik KLAIBER, Doctoral Candidate Body Advanced Engineering   |
| | 3:55PM | GRUPE RENAULT - ALLIANCE RENAULT NISSAN MITSUBISHI | Gérard LIRAUT, Expert Leader Polymers  |
| | 4:10PM | ROUNDTABLE DISCUSSION | |
| | | 4:20PM • End of session | |

All times are CEST



HOW TO JOIN US

Welcome to JEC Composites Connect: JEC Group's first non-stop digital event, open from 8:30AM (CEST) on June, 1st to 8:30PM (CEST) on June, 2nd, 2021.

The event is free to attend. Once registered, you will be able to enjoy all the services of our online trade show from your Personal Dashboard.

KNOWLEDGE

LIVESTREAMING CONFERENCES

JEC Composites Connect offers an exclusive conference programme featuring speakers, experts and decision makers from the global composites industry. From visionary discussions, to real-world case studies and enlightening workshops, you will benefit from insightful tips to grow your international business.

NETWORKING

VISIT THE EXHIBITORS' BOOTHS

Discover all the latest applications, products and technologies on the exhibitors' digital booths and connect with their team through a video chat to learn more.

PLAN YOUR MEETINGS

Take advantage of the meeting requests platform to find contacts, arrange appointments, and speak with exhibitors and other event participants via video calls and networking lounges throughout the event from June 1st to 2nd.

INNOVATION

BE INSPIRED

At JEC Composites Connect you will discover the latest innovative solutions made possible by the composites industry. In addition to the exhibition and conference platforms you will be able to explore the JEC Group Innovation Programmes – the Startup Booster and Composites Challenge competitions, as well as the JEC Composites Innovation Awards.

EASY ACCESS TO EVERYTHING YOU NEED

With your Personal Dashboard it's easy to access all that JEC Composites Connect has to offer. From your Personal Dashboard you can add your favourites, your appointments and conference planner, your contacts list and personal recommendations. Everything is at your disposal at any time.

PREVIEW

ZERO-EMISSION TECHNOLOGIES DRIVE NEW REQUIREMENTS

Jelle Bloemhof, Head of Composite Manufacturing Technologies at Airbus, tells us why innovation is a key enabler to improving aircraft manufacture and performance.

JEC Composites Magazine: Please tell us what market and technology trends are driving your business strategy?

Jelle Bloemhof: Airbus is a top performing global company with an ambitious product policy that will ensure we stay ahead of the competition with continuous improvement. To remain a world-class leader in manufacturing aircraft and to sustain competitiveness we need to maximise end-to-end effectiveness and efficiency in our value chain, that is to say minimise cost to produce and maintain our aircraft, but also to speed up our product development cycle to meet customers' expectations.

The Future Factory platform is the single biggest enabler for Airbus to continue to be a top performing global company. This vision is a potential game changer for the aeronautics field and our company and allows us to think differently about the way we produce and deliver, but also to shape how we can meet our customers' expectations in the future. The platform considers both Connectivity of machines and other means, and Digitalisation and Data Analytics, particularly in terms of developing apps for specific manufacturing process modelling and monitoring.

Has the Covid-19 crisis had an impact on this strategy?

J.B.: Our purpose to pioneer sustainable aerospace for a safe and united world remains unchanged.

How has the pandemic affected your innovation process?

J.B.: Innovation is a key enabler to improve aircraft performance and our ability to stay competitive. A high level of virtual communication has changed our ways of working while maintaining business continuity. The pandemic has allowed us to focus on the key enablers for our sustainability strategy,



JELLE BLOEMHOF

particularly in relation to decarbonisation with zero-emission technology.

In 2020 Airbus announced plans to develop a hydrogen aircraft range by 2035. Can you tell us how composites play a role in this new generation of airplanes?

J.B.: Composites technology will continue to contribute to our ability to reach our performance and cost objectives as it did in past programmes. Zero-emission technologies drive new requirements and the need for innovations which are new for our industry. The fundamental capability of composite materials – from the chemical formulation of both resins and fibres, through to processing, design and architecture solutions – presents a significant opportunity for our different ZEROe concept aircraft.

What changes in manufacturing and technology do you expect to see in the aerospace sector going forward?

J.B.: Digitalisation, digital connectivity and continuity, as well as online monitoring and control, will significantly change industrial systems, as well as robotisation and collaborative working. These are great advantages and will drive higher repeatability, resilience, effectiveness and efficiency. What we also expect are more sustainable solutions to convert composite waste into new products for the aviation industry or other sectors. ■

AIRBUS

More information:

www.airbus.com

A FOCUS ON E-MOBILITY DIGITALISATION AND SUSTAINABILITY

As he prepares to take his place on the Startup Booster jury again this year, Dr. Karl-Heinz Füller, Manager, Future Outside and Materials, at Mercedes-Benz AG, explains how material innovations continue to play an important role in the company's strategy.

JEC Composites Magazine: Please tell us what market and technology trends are driving your business strategy?

Karl-Heinz Füller: Well, at the moment, we are very much focused on E-mobility, Digitalisation and Sustainability. Within

DRIVING THE FUTURE OF MOBILITY

Brian Krull, Global Director of Innovation at Magna Exteriors, joins the Startup Booster jury this year. We asked him about the trends driving innovation in the automotive market.

JEC Composites Magazine: Please tell us what market and technology trends are driving your business strategy?

Brian Krull: There are a number of trends driving our future strategy. These include powertrain electrification, ADAS (Advanced Driver Assistance Systems) integration and increasing levels of autonomy, as well as, most recently, sustainability and the circular economy. Key areas of focus are lightweight materials, solutions to reduce tailpipe emissions, and increasing efficiency and range for electric vehicles. From a sustainability aspect, materials and processes to facilitate energy savings in our operations are another important focus.



DR. KARL-HEINZ FÜLLER

those trends we are working on many technologies which we want to bring to the market as soon as possible. Innovative material developments – especially in the composites sector – are one important piece in the puzzle.

Has the Covid-19 crisis had an impact on this strategy?

K.-H.F.: I think there has not been a big impact on our strategy. But it has helped us to find other ways of working together which we would never have thought of before.

How has the pandemic affected your innovation process?

K.-H.F.: Physical innovation trips stopped immediately when Covid started to spread extensively in April 2020, and so we shifted all our activities into virtual formats. Unexpectedly, this worked very well. However, the personal exchanges possible at fairs or company visits are missed.

In 2020 Daimler announced a range of hydrogen trucks. What is the role of composites in this new range?

K.-H.F.: Fuel cell applications are certainly an important upcoming market for carbon fibre structures. This is especially true for 700 bar fuel cell tanks as there is no way these can be made without carbon fibre. In general, we can expect various tank system approaches which will have different requirements for the applied material technologies.

DAIMLER

More information:

www.daimler.com

What are your objectives for the JEC Composites Connect 2021 Startup Booster competition?

K.-H.F.: Our focus at the moment is sustainability of composite materials. This is relevant for the resin systems but also for the various fibre materials. In future, we are also looking for luxury and functional effects. As a premium automotive manufacturer we think that we can add more value for our customers by introducing such new materials. ■



BRIAN KRULL

What is the role of composite materials in your strategy?

B.K.: They play a key role. We are constantly looking at the way we use composite materials. We use them as reinforcing solutions to enable lightweight options for both our existing components, such as liftgate modules, as well as for new products like composite battery enclosures and multi-material battery enclosures where they will play a key role. It really comes down to utilising the right material in the right place, and maximising that benefit of composites. We do that today in many structural and semi-structural applications and we have a lot of additional implementations planned for the future. We consider composites in every application.

What changes in manufacturing and technology do you expect to see in the automotive sector going forward?

B.K.: We'll see an increasing focus on sustainability, both in the processes that we use to manufacture our products as well as the materials that we employ. I also expect to see increased use of data generated from our manufacturing processes to introduce more manufacturing efficiencies, that could be to deliver cycle time improvement, or downtime reduction through predictive maintenance. Overall, from a higher level of manufacturing, we will look at increasing modularity as we already do with our liftgates. We offer whole liftgate modules that can be manufactured directly onto a vehicle, which takes complexity out of an OEM's plant. And powertrain electrification and feature integration are two drivers for the exterior of the vehicle we see moving forward from a mass reduction perspective as well as for integrating additional technology into our components and modules to provide electrical, lighting, or safety functions.

What are your objectives for the Startup Booster competition?

B.K.: First and foremost it's about supporting the startup community. Without trailblazers of new technology we would not be moving forward at such a rapid pace. We want to learn more about these emerging technologies, meet the teams that are behind them, and to network and create relationships with the startup community as a whole. More specifically, we are on the lookout for sustainable material solutions, as well as lightweight concepts that offer an effective price point. We need lightweighting solutions that are not only mass effective, but also cost effective – that is extremely important to our customers. ■

MAGNA

More information:

www.magna.com

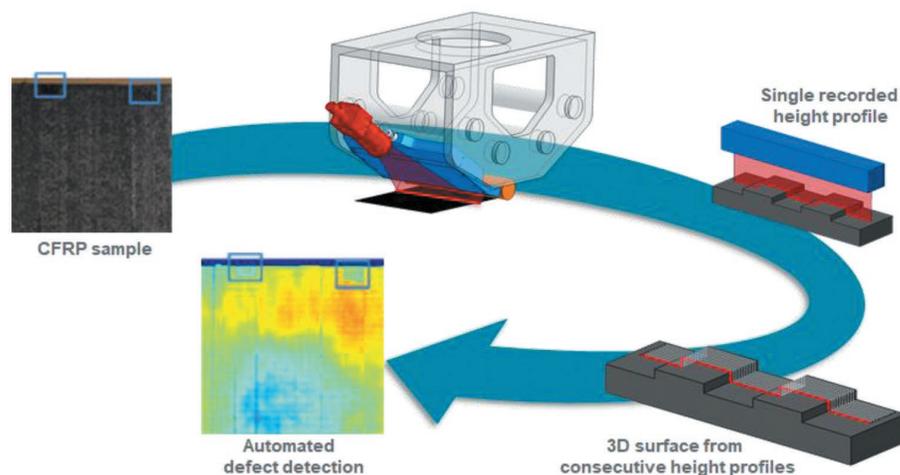
STARTUP BOOSTER

PREVIEW

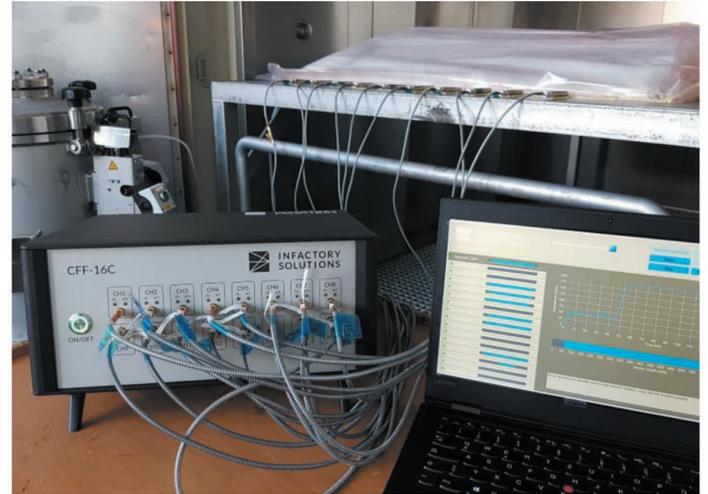
Online Process Monitoring for Advanced Composite Manufacturing

Automated Fiber Placement Monitoring

InFactory Solutions' laser triangulation sensor monitors the deposition of carbon tows during the AFP process and provides live feedback on the occurrence of non-conformities. Its high resolution in all spatial directions enables not only the recognition of the smallest gaps, but also fragments of carrier foil that were introduced beneath the deposited tows. Furthermore, the true location of each tow in 3D space can be obtained and used to create a digital twin of the part for further analysis in engineering tools, accelerating activities such as first part qualification. The sensor is part of our online monitoring platform, which allows for extracting process data such as compaction force and temperature simultaneously to the scan. This enables both a holistic analysis of the process and long-term monitoring of the AFP machine performance.



Cure and Flow Front Monitoring



InFactory Solutions' unique line sensor technology allows monitoring of resin flow and cure up to multiple meters of length. Depending on the customer's requirements the sensor types range from very thin (0.2mm) wire sensors to tooling integrated solutions for multiple use.

Key benefits

- Precise resin localization during liquid resin infusion or resin transfer molding processes.
- Target-performance comparison instead of long and costly trial & error based injection strategy definition
- Shortened development lead time through less iterations
- Operator intuitive result interpretation and enabler for process automation

AIRBUS

Point of Contact

Airbus
jelle.bloemhof@airbus.com

InFactory Solutions GmbH
mohamed.sayeh@infactory-solutions.net



**INFACTORY
SOLUTIONS**



Startup Booster is the leading startup competition in the world of composites and advanced materials. Supported by market-leading partners such as Airbus, Daimler and Magna, it is tailored to finding and assessing the best innovations, opening up new ways for composites to solve industry challenges.

INNOVATION THE INDISPENSABLE FUEL OF THE COMPOSITES INDUSTRY

The composites industry has always been highly entrepreneurial and innovative in nature as composite materials and processing technologies continue to evolve and find new applications. Now, market transformations such as Industry 4.0, the circular economy and the goal of using more sustainable and recyclable materials open up even more ways for composites to solve industry challenges.

Startup Booster is a unique competition designed to find and assess sources of innovation in composites and connect innovators and entrepreneurs with an audience of potential partners and investors.

Since its launch in 2017, Startup Booster has already fostered the emergence of more than 500 innovative projects from 50 countries and has celebrated the success of 60 finalists and 20 winners.

The competition is open to entrepreneurs with innovative projects, SMEs and academic spinoffs, in 2 categories:

1. PROCESS & MANUFACTURING:

- Design
- Manufacturing
- Digitalisation / Industry 4.0 / Smart Industry
- Non-Destructive Testing Solutions
- Sustainability & Recycling Solutions

2. PRODUCTS & MATERIALS:

- New composites materials including hybrid materials, bio-sourcing & intelligent composites, nano-based solutions, graphene solutions
- New applications & markets for composites (composites in new mobility applications i.e. fuel cell tanks, etc.)
- Intelligent surfaces & displays (glass transparency solutions), and smart textiles.

20 startups (an increase of 10 from the previous editions) selected through a call for entries will pitch their business plan in front of a jury of experts and investors during JEC Composites Connect. The jury will assess the proposals based on a number of factors, including the quality and clarity of the presentation, the project's originality and market potential, and the strength of the team behind it.

DO NOT MISS

Two pitch sessions, 10 startups for each, will be organised on the first day of JEC Composites Connect:
Tuesday 1st June from:
10.30am to 11.30am CEST
5.00pm to 6.00pm CEST

The three winners selected by the jury will be announced during a dedicated Startup Booster Ceremony:
Wednesday 2nd June
at 2.30pm CEST.

THE JURY

The jury for this edition of the Startup Booster competition includes:



Jelle BLOEMHOF
Head of Composites Manufacturing Technologies, Airbus



Karl-Heinz FUELLER
Head of Future Outside & Materials, Daimler



Brian KRULL
Global Director of Innovation, Magna Exteriors



Johannes GOETZELMANN
Director – Product and Process Development, Europe, Magna Exteriors



Thomas CANOVA
Head of Solvay Ventures, Solvay



Markus SOLIBIEDA
Managing Director, BASF Venture Capital

STARTUP
BOOSTER

PREVIEW

THE FINALISTS

The finalists for this edition of the Startup Booster competition include:



1. 9T LAB (SWITZERLAND)
www.9tlabs.com

We offer a manufacturing solution that leverages the latest developments in automation technology, software and materials to make performance parts easily accessible.



2. AIRLITE (UK)
www.airlite.com

Airlite is a revolutionary technology, 100% natural, that is applied like a normal paint on any kind of surface. Activated by light, it reduces air pollutants, unpleasant odours, prevents the growth of mould and bacteria and, if applied outdoors, by reflecting the warm component of sunlight, it keeps rooms cool helping to reduce energy consumption and CO₂ emissions.



3. ANISOPRINT (RUSSIA)
anisoprint.com

Anisoprinting is the technology for design and production of optimal composite structures through the new way of continuous fibre 3D printing — Composite Fibre Co-extrusion. We've developed 3D printers, materials (carbon, basalt) and software for manufacturing anisoprinted composite parts: stronger, lighter and cheaper than metal or non-optimised composites.



4. BCIRCULAR (SPAIN)
www.bcircular.com

BCIRCULAR produces advanced materials from all kinds of carbon fibre composites that have finished their useful life (aircraft, cars, wind blades, bicycles, etc.). Through the recycling technology developed by the company itself, BCIRCULAR offers a solution to the global problem arising from the management of composites.



5. BPREG COMPOSITES (TURKEY)
<http://www.bpreg.com>

BPREG is an advanced material company solely focused on natural fibre reinforced composite technologies. BPREG has developed natural fibre reinforced thermoplastic unidirectional prepreg with its patent-pending manufacturing technology. Our unidirectional and woven prepreps are ready-to-use; there is no need to use extra thermoplastic sheets.



6. CARBON AXIS (FRANCE)
www.carbon-axis.com

Carbon Axis is specialised in automating composites processes. Our vision is to make composites manufacturing more affordable and more repeatable through automation. Our range of products, hardware and software, along with our consulting services, enables us to provide tailored solutions to various industries.



7. COMPPAIR (SWITZERLAND)
comppair.ch

CompPair Technologies Ltd. brings the first commercially available healable and sustainable composite materials, reducing repair time from hours to minutes and improving circularity. Composite parts can be fully repaired in place, multiple times, simply with heat. We provide a range of unique prepreps compatible with existing production lines of structural composites. Our technology acts during the whole lifetime of products, helping manufacturers, consumers, and the planet.



8. CONTINUOUS COMPOSITES (USA)
www.continuouscomposites.com

**Continuous
Composites**

Continuous Composites is a disruptive startup with their patented composites manufacturing technology, Continuous Fibre 3D Printing (CF3D®). CF3D® combines high performance continuous fibre with rapid curing thermoset resins to enable affordable manufacturing of complex composite structures. CF3D® is an industry agnostic automated solution comprised of configurable hardware, proprietary software, and tailorable materials solutions for strong, lightweight applications.



**ELEMENTAL
COATINGS**

9. ELEMENTAL COATINGS (USA)
www.elementalcoatings.com

Elemental Coatings has developed advanced anti-icing technology that prevents the build-up of ice on a variety of materials. We formulate coatings that look, feel and function like normal paints, but have the remarkable property of making it very hard for ice to stick to surfaces. The coatings are highly customisable, leading to applications in aerospace, automotive, trucking, power transmission and generation, and the consumer space.



**10. ENDEAVOR COMPOSITES
(USA)**
endeavorcomposites.com

Endeavor Composites, Inc.'s unique patent allows the dispersion of long fibres (>2.5 cm), leading to mat formation with no defects. In addition, the system can disperse multiple fibres at high volume concentration in respect to the mixing tank, providing a unique system that generates commingled preforms with multiple functionality.

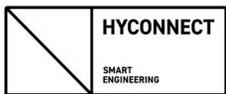


11. GREEN AXIS (NIGERIA)
greenaxisng.com

At green axis we believe that waste is an infinite resource. We invented a bio-composite material made out of our everyday trash, using a low cost technological process that converts plastic waste and organic material from different waste streams, whether it be leftover kitchen foods from unsorted household waste, plant residual or biomass from agro residual waste and industrial waste or wood and plastic from construction and demolition waste. We take the bio-composite materials and mould or extrude them into panels. We also created a sourcing platform that also serves as data intelligence platform to integrate informal waste aggregators into our supply chain.

HPCi **12. HPCI®-TRANSFER (GERMANY)**
www.iws.fraunhofer.de/en/centers/lightweight.html

HPCI®-Transfer is a project group at Fraunhofer IWS which intends to commercialise tools for high-speed joining of composites to metals by means of HPCI®-Technology. Unlike adhesive bonding or mechanical joining, additional materials like glue or rivets are unnecessary and the joints can be stressed right after joining.



13. HYCONNECT (GERMANY)
www.hyconnect.de/en/

Hyconnect aims to make the construction of lightweight structures easier. By avoiding adhesive bonding, the FAUSST-Technology enables a standardised method to join metal and fibre-reinforced plastics, one of the major lightweight material groups. Our vision is to boost the use of lightweight materials in all transport modes, where today production and joining issues are obstructing their usage.



14. ICOMAT (UK)
www.icomat.co.uk

iCOMAT is a University of Bristol spin-off that has developed the world's first tape placement system capable of placing wide tapes along curved paths (fibre-steering) without generating defects. Fibre-steering drastically improves structural and production performance and is set to revolutionise the use of composites.



15. MOLECULAR PLASMA GROUP (LUXEMBOURG)
www.molecularplasmagroup.com

Molecular Plasma Group's unique technology combines the advantages of atmospheric plasma surface activation with the

ability to graft specifically chosen functional groups to any surface in one single, solvent-free step. Typical applications are adhesion improvement on inert materials (MolecularGRIP™), silicone-free non-stick coatings (Leaf Technology™) and replacement of toxic primers. We offer customised application development, R&D equipment, pilot production and industrial systems.



16. RADISURF (DENMARK)
www.radisurf.com

RadiSurf is a pioneer in the use and large-scale industrial implementation of solutions based on the highly versatile polymer brush technology. Nanometre-thin polymer brush coatings bring transformative solutions to major industrial challenges, including unprecedented possibilities for joining of challenging materials, such as plastics to metals, glass and carbon fibre.



17. STEELHEAD COMPOSITES (USA)
steelheadcomposites.com

Steelhead Composites enables the next generation of space travel and decarbonising the earth with novel, lightweight, high-pressure composite pressure vessels for propulsion and hydrogen storage.



18. TERATONICS (FRANCE)
www.teratonics.com

See Through the Matter... This is the quality control solution proposed by Teratonics to reduce costs. Teratonics markets an innovative non-destructive testing solution based on ultrafast terahertz pulses to perform dimensional control and defect detection during the cycle time.



19. WEAV3D (USA)
weav3d.com

WEAV3D's patent pending process produces next-generation composite lattice structures from fibre-reinforced thermoplastic tapes that offer a tunable balance of stiffness, strength, weight and cost. Our Rebar for Plastics® approach is compatible with all high-volume plastic manufacturing methods. The resulting parts can cost up to 75% less than traditionally manufactured composites.



20. YUYO (FRANCE)
yuyo.surf

Thanks to large format 3D printing and biocomposite materials, we have totally rethought the way surfboards are made to offer surfers a sustainable alternative to traditional boards, in line with their environmental convictions: local production, zero waste, recycled plastic, natural basalt fibre and plant based bioresin.

FRANKY ZAPATA NEVER STOP DREAMING

French innovator and entrepreneur Franky Zapata, better known as 'the Flying Man' famous for crossing the English Channel on his Flyboard® Air in August 2019, will deliver the keynote presentation at the JEC Composites Connect Innovation Awards ceremony on Wednesday, June 2, at 2PM CEST. Here we find out about the progress of his latest project – a flying car.



Franky Zapata, CEO & Founder, Zapata Company

JEC Composites Magazine: Please could you briefly introduce yourself and your company?

Franky Zapata: I am a French inventor and CEO of ZAPATA, a company dedicated to the creation and development of hydro- and jet-propelled products, such as Flyboard®, Flyboard® Air and JetRacer®. We are designing and developing new, higher performing products, with the aim of pushing the limits of what is possible and changing the mobility of the future. All R&D and product testing is carried out in-house. I am always on the lookout for new challenges and better performance – I never stop dreaming.

You seem to be very engaged with sustainability issues; can you give us more details?

F.Z.: For the moment we are only creating prototypes, we are not focused on the ecology of our products in the short term. But obviously, in the medium and long term, we are concerned about it. We are already working on hybrid propulsion systems and other confidential projects.

How are composites materials integrated into your innovations?

F.Z.: Approximately 80% of the entire structure and bodywork of our products is

made of composite (for example, pre-impregnated carbon), and even the chassis itself. Composite materials are essentials in the development of our products today.

How have you continued to innovate during the Covid-19 pandemic? Has your strategy changed?

F.Z.: Of course, the situation has affected our income a lot, it necessarily slowed us down because in our development it is complicated to have the three parameters which are fast, good and affordable. To continue our activity, we had to slow down one of those parameters, which was fast.

“ I AM ALWAYS ON THE
LOOKOUT FOR NEW CHALLENGES
AND BETTER PERFORMANCE.
I NEVER STOP DREAMING. ”

We have slowed down our pace of development, but we will continue to do things well and to invest money in what we are doing.

We have heard that you are working on a new flying machine. What can you tell us about it?

F.Z.: The project for the moment is what we call JetRacer®. It is an autonomous, stabilised vehicle which looks like a car,

in the same way that the Flyboard® Air looks like a skateboard. The aim is to make it possible for people be able to fly without having to spend hundreds of hours in training, as they would have to if they wanted to fly a plane or a helicopter, or even a Flyboard® Air. It is really about a fun experience, like driving supercars in circuits. In this case, people will be able to do flying car laps in a Red Bull Air Race kind of circuit.

The technology developed for JetRacer® provides speed and agility that gives it an unmatched potential. It will therefore be able to meet many needs. We are expecting it will be possible to reach an altitude of 3000 metres and achieve speeds of up to 300 kilometres per hour.

What are your plans for the remainder of 2021 going into 2022?

F.Z.: Our roadmap is to finalise our flying car, start demonstrating and presenting it to the public, and from the end of 2021 and beginning of 2022 to make it available to the public. In the meantime, we are moving to new premises and we are finalising our turbojet engines. We have many other projects which are more confidential but still revolve around the same technologies, which are vertical take-off and landing flying machines. ■



ZAPATA



Keynote presentation at the
JEC Composites Connect
Innovation Awards ceremony
on Wednesday, June 2,
at 2PM (CEST)



INNOVATION
AWARDS

BACK TO THE FUTURE: FLYING MAN BECOMING REAL – HOW I BUILT FLYBOARD AIR AND JET RACER

Franky “Flying Man” Zapata is CEO of Zapata Company and the inventor of Flyboard Air, a kind of jetpack/hoverboard powered by turbo jets. Zapata participated in the 2019 Bastille Day military parade riding his invention and successfully crossed the English Channel from France to England a few weeks

later. Franky is now working on building a flying car, Jet Racer, that he hopes to introduce very soon. Discover the journey of Franky Zapata and how his company delivers innovative engineering concepts, especially in the field of materials, with the aim of democratising personal air mobility.

PREVIEW



Seamless integration. Seamless possibilities.

A leader in lightweighting and composites, Magna researches, develops and implements new materials to help automakers lower emissions and improve fuel economy without sacrificing styling and performance.

Seamless possibilities, through material science





JEC COMPOSITES INNOVATION AWARDS

Celebrating the best collaborative achievements

Main Innovation Partner



The JEC Composites Innovation Awards identify, promote and reward the most innovative composites projects worldwide. They celebrate fruitful cooperations between the different segments of the composites supply chain. Over the past 15 years, 1,900 companies worldwide have taken part in the Innovation Awards, and 203 companies and 499 partners have been rewarded for the excellence of their composite innovations.

CELEBRATING THE BEST COMPOSITES INNOVATIVE PROJECTS

The competition is open to any company or R&D Centre with a strong collaborative innovation or concept to present. The success of each competitor is closely linked to the partnerships and collective intelligence involved. The categories cover all markets: Automotive and Road Transportation, Aerospace, Defense, Security & Ballistics, Renewable Energy, Building & Construction, Infrastructure & Civil Engineering, Oil and Gas, Medical & Prosthetics, Electronics, Industrial Equipment, Furniture & Appliances, Sports & Leisure and Marine.

Recognized as an institution all over the world, the JEC Composites Innovation Awards allow the winners and their partners to gain:

- International recognition
- Enhanced exposure during the show and all year long
- Business opportunities
- Customer trust



Innovation Awards winners at JEC World 2019

And the winners will be named during the livestreamed JEC Innovation Awards ceremony on June 2nd, starting at 2:30PM CEST during the JEC Composites Connect event.



Innovation Awards winners at JEC World 2019

For this 2021 JEC Composites Innovation Awards edition we received numerous entries, coming from more than 16 countries.

The finalists will be revealed on the JEC Composites Connect website on May 19th, 2021, for the following categories:

- Aerospace
- Automotive & road transportation - structural
- Automotive & road transportation - exterior
- Building, Construction & Infrastructure
- Design
- Equipment & Machinery
- Sustainability



INNOVATION
AWARDS

PREVIEW

CELEBRATING AN INDUSTRY WHICH CONTINUES TO INNOVATE

Murat Oğuz Arcan, Chief Operating Officer, Composites, at Kordsa, tells us about some of the innovative technologies the company is developing.

Main Innovation Partner



MURAT OĞUZ ARCAN, CHIEF OPERATING OFFICER, COMPOSITES, KORDSA

JEC COMPOSITES MAGAZINE: What is your business strategy as a composite materials producer?

Murat Oğuz Arcan: As Kordsa, we provide high quality service and end-to-end solutions with a high level of technical competency in composite technologies as well as in the tyre and construction reinforcement industries. Our main objective is to “progress with innovative, sustainable products, services and solutions” by working closely with our customers and suppliers. Kordsa will become an advanced materials company in the near future.

Kordsa currently serves the European and US markets, and we hope to expand our reach to the Asia Pacific soon.

Our Composite Technologies Centre of Excellence, one of the best examples of university-industry cooperation in the world, is located in Istanbul, Turkey, and serves as an innovation hub mainly to the automotive, aerospace and defence and industrial applications industries. Our four US-based companies supply to leading global companies, primarily in the aerospace sector.

Thanks to our advanced R&D capabilities, we serve as a solution partner, providing services such as design, analysis, a material library for CAE, prototype production, fabric and resin development, as well as tailor-made and cost-effective composite intermediate materials to meet our customers' needs. Our R&D efforts also include collaboration, as we are a keen supporter of open innovation. We build partnerships and work collaboratively with people, institutions, organisations and companies as a team to meet shared objectives and contribute to the future of mobility.

Which technologies are Kordsa's composites facilities focused on?

M.O.A.: The Composite Technologies Centre of Excellence has capabilities for

material characterisation, tensile measurements, 3D printing, additive manufacturing and automated fibre placement, and develops customised, cost efficient, innovative and unique intermediate products and applications for a variety of industries. It serves customers at every stage of the research and development cycle, beginning with basic research, continuing with prototyping, and ending with mass production. Our aim is to scale our business journey to establish the Centre as the innovation hub of the future.

Among our US-based companies, Fabric Development Inc. and Textile Products Inc. produce structural materials requiring high engineering. They manufacture custom fabrics and are a critical partner for many companies, mainly in the aerospace and automotive industries. For instance, Fabric Development Inc. is now producing fabrics for NASA's multi-purpose Orion spacecraft, which will carry astronauts into deep space and then ensure a safe return. Advanced Honeycomb produces cabin interior parts, while Axiom Materials is the only worldwide qualified manufacturer of high temperature resistant oxide-oxide ceramic matrix composites used in aircraft engines. In our journey to becoming an advanced material company we now reinforce the wings, hulls and interior components of aircraft, in addition to their tyres.

How has the pandemic affected your innovation process?

M.O.A.: During the very challenging Covid 19 pandemic our far-sighted “inspired to reinforce life” vision enabled us to adapt to the changing world in the business areas in which we operate. We continued to work with a team spirit empowered by open communication and made the health and safety of our people the top priority. Our R&D and technology investments

continued during the pandemic as well. Our agenda was mainly “sustainability, circular economy, open innovation, and environmental concerns,” as they are also the hot topics in mobility. We now supply British company TRB Lightweight Structures with carbon fibre fabrics for the mass production of EV battery enclosures, which make it possible to reduce vehicle weight without compromising performance. We also expanded our CMC line of oxide-oxide materials with carbon/SiC and SiC/SiC aerospace and industrial prepregs for applications with service temperatures of 1400°C ranging from aircraft jet engine power systems to combustion plants.

What do you expect from the JEC Composites Connect Innovation Awards in 2021?

M.O.A.: It's no wonder that the pandemic has affected all areas of life. However, regardless of the challenges, some companies continued to innovate. Let's not forget that we are in this together as an industry. We aim to bring more sustainable and lightweight solutions to many markets. This year is special as we will learn about and recognise our candidates and winners on an online platform. Nothing shall stop the innovation mindset of our industry and we will applaud all the nominees and winners in this extremely difficult year. We have utmost respect for an industry which does not give up and continues to innovate. The JEC Innovation Awards is the platform to celebrate not only the winners, but the whole composites industry's efforts to bring innovation. We are all doing inspirational work for a better future and, as always, those projects that have exceptional impact and performance will be awarded. We will once again see groundbreaking solutions pushing the limits of the composites industry. ■



JEC COMPOSITES CHALLENGE 2021

Creating the link from research to industry

JOIN US ON JUNE 2ND TO SEE WHO RISES TO THE COMPOSITES CHALLENGE:

12.00 – 1.15pm CEST: Pitch of the 10 PhD finalists
2.30pm – 3.30pm CEST : Composites Challenge Awards Ceremony (with Startup Booster and Innovation Awards)

JEC Group is launching the third edition of the Composites Challenge, where 10 PhD students from around the world will present their research in front of leading industrial manufacturers in the composites industry.

A PROGRAM FROM BRILLIANT MINDS FOR A BRILLIANT INDUSTRY

Be first to hear about some of the most promising research projects and meet the talented teams behind them at the Composites Challenge. This competition for PhD students is a unique opportunity

to consider new ideas and maybe source bright minds to join your business. The 10 PhD students have been selected for the quality of their research work in the field of composites.

AND THE CHALLENGE?

Each student has only 5 minutes to present their project, using only ONE slide, to a jury of industrial manufacturers and academics.

THE JURY

The jury for this edition of the Composites Challenge includes:



Christophe BINETRUY
Professor,
Centrale Nantes



Christian-Andre KEUN
Former President of SAMPE Europe & CEO,
CompriseTec



Lucien FIORE
Asia Pacific Business Development Director,
Hexcel



Véronique MICHAUD
Head of Laboratory for Processing of Advanced Composites (LPAC),
EPFL



Jean-Marc SENECOT
Global Head of R&D,
Porcher Industries

COMPOSITES CHALLENGE

PREVIEW

THE FINALISTS

The finalists for this edition of the Composites Challenge include:



SIMONE BANCORA

École Centrale Nantes

Title: From Compaction Pressure to 3D Geometry: a scalable method for preform characterisation

Description: We propose a method to determine the local features of a dry preform based on simple data acquisition. By analysing its preforming pressure field, a large-scale digital skeleton of the preform is generated. The skeleton twin is used to numerically characterize properties of the preform at an affordable computational cost.



CALLUM BRANFOOT

University of Bristol

Title: CANs: Reversibly Crosslinked Polymers and the Future of Composites

Description: Covalent adaptable networks (CANs) are crosslinked polymers comprising a dynamic chemistry which allows their selective and reversible de-crosslinking. In this research, all aspects of CANs are investigated, ranging from their synthesis to their use as recyclable and repairable composite matrices.

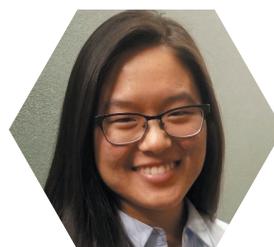


KARL BOUTON

KTH University

Title: Structural power composites for massless energy storage

Description: Structural power composites are a new kind of multifunctional composites. Among them, structural batteries consist in light structural CFRP composites capable of storing electrochemical energy. These new materials could improve the efficiency of future aircraft by turning the airframe into an energy storage system.



KELLY CHANG

University of Illinois at Urbana-Champaign

Title: Autonomous healing and indication of cracks in fibre-reinforced composites

Description: We introduce an elegant pathway to reducing high maintenance costs by dispersing microcapsules containing a dye and liquid healing agent in our composites. These capsules can extend the lifespan of composites while alleviating the challenges associated with locating damage.



GEARÓID CLANCY

University of Limerick

Title: Spreading of carbon fibre/thermoplastic prepreg tapes

Description: Varying the width of prepreg tapes can eliminate defects in complex composite structures. Current methods struggle to produce doubly curved surfaces such as aircraft noses without gaps or overlaps. An improved method, utilised with automated tape placement, can spread prepreg tapes eliminating gaps and overlaps, boosting the efficiency of complex structures.



CHRISTOPHER HUNT

University of Bristol

Title: WrapToR composite truss structures

Description: Wrapped Tow Reinforced (WrapToR) trusses combine the structurally favourable geometry of trusses with the impressive material properties of composites to form ultra-efficient structural members. The research is focused on developing the technology through understanding and improvement of the manufacturing process and the establishment of analytical techniques to predict structural behaviour.



KU LEUVEN

MARIA MORISSA LU

KU Leuven

Title: Improving the water durability of flax fibre composites by using non-dry fibre

Description: Water sorption of natural fibre composites leads to the swelling and shrinkage of the fibre, which results in a reduction of the mechanical properties and dimensional stability of the composites. Water durability of composites is enhanced by using non-dry flax fibre and resins that have low sensitivity to moisture.



ANDREAS KLINGLER

Technical University of Kaiserslautern / Institut für Verbundwerkstoffe

Title: From Brittle to Tough - Damage Tolerance of Core-Shell Rubber and Block Copolymer Toughened CFRP

Description: The research project aims at increasing the understanding of toughness enhancements of a brittle thermosetting matrix by self-assembling block copolymers and core-shell rubber nanoparticles, and how the microstructure and respective properties translate from the matrix level to a fibre reinforced composite. Subsequently, the gained knowledge is transferred to application-oriented impact tests of thin CFRP panels.



AMIRMOHAMMAD RAHIMIZADEH

McGill University

Title: Used wind turbines: A recycling solution

Description: Our goal is to create an efficient recycling scheme to extract glass fibres from used wind turbine blades and reuse them in new added value products. Through micromechanical characterisation, the optimum design parameters for an efficient composite from the recycled fibres are obtained and used to develop recycled composite pellets and 3D printing filaments with exceptional properties.



NICOLAS LAVALETTE

Technical University of Delft

Title: Design and Optimisation of Hybrid Truss Structures

Description: This research focuses on the design and optimization of truss structures made of pultruded CFRP members. For this purpose, an aluminium-CFRP adhesive joint is designed to efficiently connect the truss members. The strength and weight of the joints are then taken into account within the truss optimisation algorithm.



AEROSPACE TOWARDS A MORE SUSTAINABLE STRATEGY

The aerospace industry is a major source of innovation and technological advancements that often originates inspiration across a wide variety of other industries. Nowadays, in a context where environmental constraints are becoming increasingly stringent, especially when it comes to air mobility, OEMs are constantly in search



Chairman:
Yannick WILLEMEN
Head of Marketing
& Business
Development,
9T Labs

Date: Tuesday, June 1st
Hours: From 9AM to 10:15AM
(CEST)

of innovative answers and solutions that will allow them to create a 'greener' future. The need for light-weighting, reduced maintenance and waste, and repurposing aerospace-grade CFRP towards other applications, are expected to drive demand and adoption of composites in aerospace applications.

- **Competitiveness through Innovative Materials for Space Launchers**
- **Cassio, an Airplane to Help Resolve the Environmental Equation and Improve Safety**
- **Composite Applications in GE Aviation Engines**

Featuring contributions from:



Jean BOTTI
CEO,
Voltaero



Scott FINN
Chief Consulting Engineer
for Composites,
GE Aviation



Clémentine GALLET
CEO,
Coriolis



Hervé GILIBERT
CTO,
ArianeGroup

JEC TV Podcast Interview featuring Eastman Machine Company

The cutting machine manufacturer Eastman Machine Company is the focus of our latest JEC TV Podcast Interview available on jeccomposites.tv. This 130+ years-old American company based in Buffalo, New York, USA provides customized engineered solutions and innovative technologies for a variety of industries.

The guests of this JEC TV Podcast Interview are Robert Stevenson is President and CEO of Eastman Machine Company and his son Trevor Stevenson, Vice President of Eastman. Robert answers our questions about the company and Trevor about the technical aspects.

They tell us how their company went through several major crises reinventing itself through innovation.



Robert and Trevor are proud to run the family business and share the idea behind their new plant expansion and their demonstration facility where every prospect can bring any sample to cut.

Innovation as DNA

No surprise, you must innovate to stay in Business for 130+ years. Robert Stevenson, the 4th generation owner of the company says that Eastman Machine Company is old but agile. As

a matter of fact, 80 per cent of Eastman's products didn't exist 20 years ago. Nowadays, Eastman works with robotics company to provide fully automated solution and is also very open minded on the software side for easier integration.

Watch the podcast: jeccomposites.tv

Sponsored by



MICHIGAN ECONOMIC
DEVELOPMENT CORPORATION

AUTOMOTIVE THE RIGHT MATERIAL AT THE RIGHT PLACE



Chairman :
Dale BROSIUS
CCO,
IACMI

Date: Tuesday, June 1st
Hours: From 3PM to 4:20PM
(CEST)

Among the many challenges facing the automotive industry, reducing vehicle mass and therefore emissions, while maintaining safety and cost-efficiency, remain key. Lighter materials implying higher costs can limit mass production. Therefore, a combination of materials, albeit hybrid solutions, would help solve this issue and are

becoming increasingly attractive for manufacturers. These Business Conferences consist of industry presentations and a panel discussion involving major OEMs and Tier1s from around the world. They cover the challenges and opportunities of using composites materials in the automotive field.

- **Composite Hybrid Automotive Suspension System Innovative Structures (CHASSIS)**
- **Cost-Efficient Lightweight Body Structures – Combining the Right Materials at the Right Place with the Right Process**
- **Are Composite Materials the Right Materials for Automotive Applications?**

Featuring contributions from:



Dominik KLAIBER
Doctoral Candidate,
Body Advanced
Engineering,
Porsche



Christoph KÜHN
Senior Project Manager -
Composites & Hybrid
Components,
Volkswagen



Gerard LIRAUT
Expert Leader Polymers,
**Groupe Renault -
Alliance Renault
Nissan Mitsubishi**



Alice SWALLOW
Senior Innovation
Engineer,
Ford Motor Company

AEROSPACE
& AUTOMOTIVE

PREVIEW

We are inspired to reinforce life

We develop a great variety of innovations in reinforcement technologies inspired by the unique emotions in life. We are working passionately toward creating various technologies to keep the innovations sustainable.



CENTER OF EXCELLENCE



FABRIC
DEVELOPMENT
INC.



TEXTILE
PRODUCTS
INC.



ADVANCED
HONEYCOMB
TECHNOLOGIES



INNOVATION REPORT

Raw materials, intermediate products, ancillary products, equipment, applications... innovation is in the spotlight at JEC Composites Connect

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 for JEC Composites Connect, we decided to complete the presentation of innovations in this issue of JEC Composites Magazine with an Innovation Report File you will find on our website.

RAW MATERIALS

Multi-sector

ECONCORE UPSCALING TO RPET AND HPT HONEYCOMB PRODUCTION

EconCore is investing in a new industrial line for large-scale development and production of recycled PET (RPET) and high-performance thermoplastic (HPT) honeycombs. The company further developed the production technology to make honeycomb materials from RPET waste streams and made progress in the next generation of HPT honeycomb materials. The success of the patented production technology was taken as a baseline to further enhance the development towards the next generation of the ThermHex process, which can convert recycled and engineered polymers into RPET and HPT honeycomb cores and panels. With the RPET honeycomb core, EconCore sees opportunities in many applications such as the cost-sensitive automotive market.

The use of RPET honeycomb cores offers greener solutions with a good LCA and low carbon footprint that fit worldwide sustainability targets. The HPT honeycomb core can be a sustainable solution regarding thermoplastic composites in high-end applications within the automotive, aerospace and mass transportation markets. HPT honeycombs meet the demand for cost-effective, high-end thermoplastic composites that are lightweight, strong, fatigue and heat resistant, FST qualified and recyclable. The ThermHex technology focuses on production excellence that enables a flexible switch between different polymers. With this scale up, EconCore can provide new solutions for the world's transition towards sustainable products, processes and high-end applications. ■ www.econcore.com

Multi-sector

CONVERTING PLASTIC WASTE INTO HIGH-VALUE APPLICATIONS

Ineos' approach to doing business drives efficiency and sustainability across the group, helping them stay competitive while creating new opportunities to reduce energy and waste. As a global chemical business, the group has an important role to play in addressing the challenges our planet is facing. As millions of tons of plastic litter are ending up in the oceans every year, Ineos developed a revolutionary family of recycled PET-based resins to help create viable markets for used plastic bottles. For every drum of Ineos PET-based resin, approximately 1,800 PET plastic bottles are diverted from landfills and oceans. On an annual basis, this means almost sixty million bottles saved. Moreover, thanks to the outstanding properties of PET, the composite parts made with these "green" resins are typically stronger, lighter and more durable than if they were made with conventional resins. This sustainability-driven initiative is providing a new life for millions of used plastic bottles by converting them into high-value composite materials. From FRP pipes, tanks and polymer concrete drain systems for our cities' infrastructures to wall panels, shower trays and wash basins for our residential and commercial buildings, through many other kinds of industry applications... this is the group's contribution to helping save our environment and promoting sustainable development. ■ www.ineoscomposites.com

Wind energy

SICOMIN GREENPOXY® RESINS FOR WIND ENERGY

Sicomín's range of GreenPoxy® bio-resins has now extended to wind energy, having most recently been used by Greenboats to help deliver the first ever natural fibre composite (NFC) nacelle for an offshore wind turbine. Not only is the new nacelle a first for the wind energy industry, but it is also the world's largest NFC structure to date. In 2020, Greenboats was commissioned by a leading wind energy technology developer to design and manufacture a sustainable NFC nacelle. The resulting 7.3m-long structure has a surface area of approximately 100m² and was engineered by Greenboats to satisfy all DNV-GL load cases required for an offshore turbine nacelle, including 200km/h maximum wind loads and 2kN loads on the guard rails. Sicomin's DNV-GL type approved Infugreen 810 bio-based epoxy was used to infuse flax fibre reinforcements and balsa cores, with the SGi 128 intumescent weatherproof gelcoat applied on the outer surface. Cured panels were cut to shape, formed over a male plug and bonded together, before flax reinforcement plies, hand laminated with GreenPoxy 33 and vacuum bagged, were added along all the panel joints lines. Finally, Sicomin's highly UV resistant Top Clear clear coating product was used to protect and enhance the finish of the flax fibre feature stripe details. The company recently expanded its manufacturing capability to match the potential supply volumes required by wind turbine manufacturers.

■ www.sicomin.com



Aerospace

HIGH-PERFORMANCE RESINS FOR AEROSPACE APPLICATIONS

RAMPF is presenting a new line of liquid resin systems for the aerospace sector and other industries requiring superior structural properties. The room-temperature RTM and infusion resin systems developed by the group offer exceptional structural properties matching and exceeding those of common prepreg and one-component systems, high glass transition temperatures (210°C) and excellent processing characteristic at low temperatures. This enables the cost-effective manufacturing of structural components without the need for expensive tooling and infrastructure. With the increasing requirements for FST-compliant composite structures, RAMPF also developed a family of FST resin systems that cover all standard OEM and regulatory requirements for use in interior components and secondary structural parts. A fast-cure option for high-volume interior components is available to offer a solution for RTM and infusion processing of high-end components. Furthermore, a high-Tg variant is best suited for applications exposed to higher service temperatures up to 150°C and extreme humidity conditions. All resin systems are formulated and optimized for RTM and infusion processing with a focus on low processing temperatures to achieve low processing and infrastructure costs and to enable maximum flexibility in the manufacturing environment. RAMPF now also offers full technical and engineering support for all composite processing and component development needs. ■ www.rampf-group.com



Multi-sector

CONDUCTIVITY AND REINFORCEMENT WITH GRAPHENE NANOTUBES

TUBALL™ MATRIX is a line of pre-dispersed graphene nanotube concentrates that make it possible to produce thermoset and thermoplastic products with a unique combination of stable, uniform conductivity with improved mechanical performance. Electrically-conductive gelcoats and mould coats; conductive and reinforced fibreglass pipes, tanks, gratings, and cable trays; various products made by filament winding, pultrusion, hand lay-up, SMC/BMC and spraying methods – these are only a few examples of products with significantly improved properties thanks to graphene nanotubes. Ultra-conductive, strong and flexible graphene nanotubes create a robust 3D conductive network inside polymers at very low concentrations, starting from 0.01% of the total compound weight. Such low loadings do not affect the compound's rheology or the final colour of the product. The TUBALL™ MATRIX concentrates available for epoxy, acrylic, polyester, phenolic, polyurethane, and vinyl-ester resins are designed to simplify nanotube handling with minimal changes in formulation or processing.



Demonstrating a clear set of benefits in comparison with standard agents, graphene nanotubes have already been widely adopted by industry as an anti-static agent. Also, graphene nanotube solutions for the reinforcement of composites are in the development and industry validation stage; the first products will be the lightest high-pressure cylinders in the world and reinforced bicycles. ■ www.tuball.com

Multi-sector

THERMHEX HONEYCOMB CORES WITH A SMALL CELL SIZE

ThermHex produces thermoplastic honeycomb cores for low-cost sandwich panels and parts. The product range was recently enlarged with a core that has a 20mm height and a smaller cell size of 5mm, which is half the size of the former product. A smaller cell size leads to much better surface quality, e.g. for visible interior and exterior surfaces in automotive applications, as it achieves Class A surface quality depending on the skin layer. Furthermore, it enables the use of honeycomb cores in even more applications. Soon the range of standard honeycomb core with a 10mm height will be available with the smaller cell size of 5mm, enabling the core material to be used in an even wider variety of applications. ThermHex polypropylene honeycomb cores are used wherever high-quality products with an optimum strength-to-weight ratio are required. This includes automotive, boat, yacht, and shipbuilding, interior and furniture, building and construction, wind and solar energy, swimming pool and prefabricated bathroom applications. By reducing the weight in structural parts of many products, the improved, lower-cost lightweight sandwich panels and parts help to lessen environmental impact, contribute to sustainability and also save costs. All honeycomb cores are recyclable, resistant to moisture, acids and bases (reducing replacement costs), and are produced with a very small CO₂ footprint using green power. ■ www.thermhex.com

Multi-sector

A REACH INTO THE GREEN FUTURE OF SPECIALITY POLYMERS

Bitrez Ltd., Europe's leading designer and manufacturer of speciality polymers and chemicals, will showcase further work around regulatory compliance at JEC Composites Connect 2021. New products that are being offered include CMR- and SVHC-free grades designed to offer a future-proof alternative to existing hazardous petrochemical derivatives while maintaining or enhancing desirable performance properties. New products were formulated for REACH compliance, including EU-REACH, UK-REACH, and even K-REACH, with increased molecular weight variants formulated and processed to exceed the 1000 Da polymeric threshold.



This enables the formulation of products that can truly be supplied to a global market. In addition to meeting worldwide regulatory requirements, they are designed to be robust and tolerant of a variety of climatic conditions. Among these products are some new bio-based materials including the new chemistry, coined Furalkamine, the latest series of innovative bio-based epoxy curing agents obtained by the hydrogenation of pentosane-rich biomass, such as corn cobs, sugar cane bagasse and rice hulls.

Poly-Mannich base grades provide enhanced performance and cure over a broad range of temperatures, with a reduced safety rating. These products complement the existing portfolio that is already rich in high-performance regulatory-compliant bio-based products, providing outstanding performance and longevity in a myriad of lightweight composite applications. ■ www.bitrez.com

Multi-sector

GREEN-CHEMISTRY HONEYCOMB

Advanced Honeycomb Technologies (AHT) produces a honeycomb product that combines an aramid core with low fire smoke and toxicity (FST) characteristics with phenolic resin, the material of choice for interior applications due to its low FST.

Traditionally, phenolic resins have been solvent based. The most common solvents used are ethanol, methanol, isopropyl alcohol, and acetone. These solvents cause volatile organic compound (VOC) emissions. For example, most of the solvent-based phenolic resins for honeycomb production contain 35-40% ethanol, 35-40% isopropanol, and other mixtures. AHT's use of water-based phenolic resin, as opposed to alcohol-based solvents, eliminates most fire risks associated with honeycomb manufacturing. Using a water-based resin also eliminates the exposure of personnel to these solvents. The reduction or elimination of volatile organic solvent emissions has provided new commercial opportunities for the application of resins with low levels of volatile organic compounds. Due to the reduced fire risk and the low occupational safety risk of using water-based phenolic honeycombs, the company enjoys the advantage of more sustainable production than other counterparts using solvent-borne chemistry in the USA and the EU. Producing honeycomb products with a water-based phenolic thermosetting resin instead of a solvent-based resin is clearly a significant benefit from an environmental point of view. ■

www.ahtinc.com

Multi-sector

NEW INTERFACIAL BONDING TECHNOLOGY FOR CFRP STRENGTH

F200 is a 121°C-curable epoxy resin system that makes it possible to achieve excellent compressive performance of prepregs with

only a matrix change, without carbon fibre treatment. Prepregs impregnated with F200 show up to 45% improved compressive and flexural properties compared to conventional prepregs.

This is a significant result of the improved interfacial bonding technology between the carbon fibre and the matrix. The mechanical properties of prepregs, such as tensile, compressive, flexural, shear, and fracture toughness, are very important for composite material design. In general, it is possible to improve the flexural and shear properties by adjusting the composition ratio of the matrix resin backbone. As for compressive properties, it is very difficult to improve them with matrix modifications only and improving interfacial bonding between the matrix and carbon fibre has to be considered as well.

F200 has been tested by many companies in various fields, especially for marine, bike frame, golf shaft and fishing rod applications. Recently, a fishing rod company confirmed a strength improvement of 20% for standard-modulus carbon fibre, 30% for intermediate-modulus carbon fibre, and 45% for high-modulus carbon fibre. ■

www.hcarbon.com

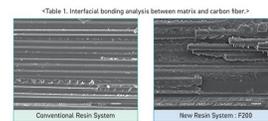


Table 1. Interfacial bonding analysis between matrix and carbon fiber.

| PROPERTY | Conventional E-5400 | New Resin System : F200 | | | METHOD |
|----------------------------|------------------------|-------------------------|--------|-------|-------------|
| | 2400 | E-7000 | TS 900 | F-900 | |
| Tensile Strength (MPa) | 156 | 144 | 147 | 142 | ASTM D 3039 |
| Compressive Strength (MPa) | 1375 | 1777 | 1763 | 1702 | ASTM D 645 |
| Compressive Modulus (GPa) | 123 | 131 | 136 | 142 | ASTM D 70 |
| Flexural Strength (MPa) | 188 | 1900 | 2108 | 1849 | |
| Flexural Modulus (GPa) | 112 | 122 | 141 | 142 | |
| ILSS (MPa) | 84 | 101 | 104 | 98 | SACM-BH-14 |

Table 2. Comparison of new resin system F200 and conventional mechanical properties



Automotive

LIQUID IMPACT MODIFIER FOR CFRP CAR WHEELS

Kane Ace™ MX, a liquid impact modifier based on core-shell rubber (CSR) technology, is utilized to improve the toughness and fatigue resistance of mainly epoxy-based resin systems. These toughened systems are used in a wide range of applications such as adhesives, composites, coatings, and electrical and electronic applications. In the automotive industry, there is growing demand for carbon fibre-reinforced polymers (CFRP) in combination with epoxy-based resin systems. CFRP offer great perspectives for weight reduction while providing additional advantages such as stiffness, toughness, and corrosion

resistance. Moreover, CFRP are increasingly used in more complex structures such as car wheels. Kaneka studied the toughening effect of CSR in CFRP for car wheel applications. In order to demonstrate the efficacy of CSR, formulations based on cycloaliphatic epoxy resin with and without CSR were studied and the company attempted producing car wheels with both systems. As Kane Ace™ MX has CSR pre-dispersed in primary particles (100-300nm) in the epoxy resin, no issue was found when being processed by RTM and the car wheel was successfully made. In this study, the car wheel with CSR clearly showed superior performance in the 13° impact test according to AK-LH 08 and the rotating bending test, compared to the wheel without CSR. This technology is also expected to be used for other CFRP parts. ■ www.kaneka.be



Wind energy

HEXPly® XF SURFACING PREPREG TECHNOLOGY

HexPly® XF technology is a surfacing prepreg that produces a superior surface finish for composite parts, with no pinholes or visible overlaps, providing excellent out-of-mould surface quality that greatly reduces sanding and finishing operations, saving time and labour costs.

Developed to address the limitations of current wind turbine blade shell surfacing techniques whereby pinholes and other surface defects have to be repaired by hand to achieve the perfectly smooth surface required for painting, HexPly XF increases overall blade manufacturing efficiency by reducing time in the mould by up to two hours and by banishing surface defects that require rework before painting.



This lightweight, easy-to-handle, non-woven semi-preg material is supplied in roll form that can be co-cured with standard epoxy infusion systems or used in prepreg production processes. After curing, the component is de-moulded with the manufacturer benefitting from a pinhole-free surface that needs minimal preparation before painting. The material is less than half the weight of a typical gelcoat per square metre, reducing the overall weight of the blade.

The consistent areal weight and thickness of the prepreg film provide a completely uniform surface coating, ensuring blade weight distribution and balance are maintained. With no need to handle or mix liquid chemicals as in the gelcoat process, HexPly® XF also improves the health and safety working conditions on the shop floor. ■ www.hexcel.com

INTERMEDIATES

Technology for maximum Performance

- Turn-key systems for composites cutting
- Maximum material yield
- Highest level of productivity
- Individually configurable



Multi-sector

HEALABLE COMPOSITE MATERIALS: HEALTECH PREPREGS

HealTech prepreg semi-products are used to manufacture the first commercially-available healable and sustainable composite material solutions, reducing repair time from hours to minutes and improving circularity.

Products made with HealTech prepregs have the capability to repair themselves in one minute only, while keeping benchmark mechanical properties. Full healing can be done multiple times at the same location and is simply triggered by heating the damaged region in a range between 100°C and 150°C, without any external pressure.



This unique feature allows faster repair, on site, without affecting the fibres' integrity nor the profile of the parts, but also provides many advantages during production. Indeed, the healing capability can prevent machining defects, minimise the exothermal reaction during curing, and ensures a low porosity level in the final laminate. Coupled with a single-side impregnation to reduce the need for debulking and a work life at 20°C of 60 days, these prepregs can ease the work of composite manufacturers.

HealTech can be used for any products made with prepregs, from thin to thick monolithic laminates, and has also shown great potential for easily repairing dents on foam sandwich structures. ■ www.comppair.ch

Multi-sector

SAERTEX LEO® WITH HYCONNECT HYBRID CONNECTOR

The globally-operating non-crimp fabric manufacturer SAERTEX and its partner Hyconnect GmbH joined forces to develop a fireproof composite metal hybrid structure. The innovative combination is a SAERTEX LEO® fire protection sandwich with an integrated Hyconnect steel-glass hybrid connector. The 3D-reinforced SAERfoam composite sandwich structure has structural properties and SAERTEX LEO fire protection layers that are integrated into the component. In addition, a hybrid glass-metal structure is integrated into the process by means of vacuum infusion, which enables welding with classic metal components. By avoiding adhesive bonding, the FAUSST-Technology by Hyconnect enables a standardised method to join fibre-reinforced polymers and metal. This produces an innovative fireproof connection. Unlike classic metal composites, the product weight can be reduced by up to 55%. This generates an innovative fireproof connection. Possible fields of application are, for example, shipbuilding, the railway vehicle sector and the automotive industry. ■ www.saertex.com

Multi-sector

STRENGTH, LIGHTNESS AND RECYCLABILITY WITH SRP MATERIALS

Compared with conventional fibre-reinforced composite materials, SRPs offer exceptional impact resistance and are fully recyclable and lightweight at the same time. Applications can be found in



sports, personal protection, luggage and consumer products. The automotive industry is showing an increasing interest as well. The processing of SRPs not only requires specific know-how but also specific hardware, as the temperature operating window is quite a bit smaller than for glass or carbon fibre-reinforced materials. For example, the polymer fibres in the SRP material will want to shrink during (pre)heating, which means that – among other things – clamping technology is needed in order to produce high-quality parts.

Cato Composites developed a specific processing technology for producing SRP parts and components, as well as in-house technologies for customizing SRP parts through the use of printing technologies and/or surface modifications. ■ www.cato-composites.com

Multi-sector

NANOLITE N125L – AN INNOVATIVE NANO-STRUCTURED PREPREG

Nano-Tech SpA developed the Nano-Lite N125L, an innovative nano-structured carbon fibre epoxy prepreg that is up to 12% lighter than a standard epoxy prepreg, and up to 25% tougher. With a Tg of 125°C, it is ideal for structural applications



and lightweight body panels in the automotive and marine industries. The prepreg is available in a number of different carbon fibre fabrics and areal weights (up to 630 g/sqm). It is ideal for structural and semi-structural applications both in monolithic and sandwich components, where it ensures optimal adhesion with the most common types of core. The N125L is produced using a hot melt manufacturing process and does not include any volatile components. Hence, it has a good tack and guarantees a high-quality surface finish of the component with very low porosity and no white resin excess. This allows an easy and fast finishing and painting process with outstanding results. The N125L is the first of a family of nano-structured lightweight prepregs under development. ■ www.italnanotech.com

Multi-sector

BIDIRECTIONAL HYBRID FABRIC FROM RECYCLED CARBON FIBRES

Blackfabric is committed to the environment and is betting for a change in the composite world through replacing thermoset resins, as they involve high energy costs in storage and transport, in addition to long forming processes. Thermoset resins cannot be easily recycled, so that a huge amount of waste is generated at the end of the useful life of composite products. As a solution to all these problems, Blackfabric opted for thermoplastic polymers and started designing and developing a bidirectional fabric where 100% of the carbon fibres are recycled.

The result is a hybrid fabric ready to be shaped through a thermal process. The fabric is a completely flexible design, which adapts well to complex geometries and is very easy to handle and cut. In this way, processing times and layer placement are greatly reduced, while making it easier to prevent mistakes in production.

This fabric is designed for a wide range of applications that do not require high mechanical performance, while enhancing the importance of recyclability, the circular economy and providing added value to the product. ■ www.blackfabric.eu

Multi-sector

PARABEAM® 3D GLASS FABRICS



Parabeam BV is the manufacturer of Parabeam® 3D glass fabrics, which are woven out of 100% E-glass yarn and consist of two decklayers bonded together by vertical piles. These piles are woven into the decklayers, thus forming an integral sandwich structure. When Parabeam® is impregnated with a thermoset resin in a hand lay-up process, the fabric absorbs the resin and, due to the capillary forces of the piles, the fabric rises independently and automatically to the preset height. Standard fabric thicknesses are available from 3 to 22

mm but Parabeam BV also offers the unique opportunity for engineered fabrics. The technical ingenuity of these glass fabrics makes them the smartest, most flexible and most durable sandwich products for all applications. Main benefits: all-in-one sandwich, hollow, adaptable, reduced weight and FST properties. ■ www.parabeam.com

Multi-sector

HIGH TEMPERATURE PHTHALONITRILE PREPREGS

Azista Industries is introducing a phthalonitrile resin-based prepreg. Composite materials made with these prepregs perform exceptionally well at extreme temperatures in excess of 250°C. The composites are thermally stable and display excellent hot/wet mechanical properties suitable for long-duration applications at 250°C-350°C and for short durations between 350°C-450°C.

Azista's phthalonitrile prepreg offers best-in-class shelf life when stored below 35°C and in a moisture-free environment, for up to 1 year. These prepregs exhibit excellent tack and drape properties while providing easy handling with minimal moisture absorption.

Phthalonitrile prepregs are cured through additional polymerization leading to void-free components. They display superior fire, smoke, and toxicity performance and are developed based on non-toxic chemistries.

Composites fabricated using phthalonitrile prepregs can replace titanium alloys in many applications and offer increased design flexibility and substantial weight savings. Phthalonitrile resin has a high glass transition temperature of ~425°C. Typical applications include jet engine components, missile parts, heat shields, and thermal protection systems. ■ www.azistaerospace.com

ANCILLARY PRODUCTS

Multi-sector

MASTER-PLATE® RS: USING LESS ADHESIVE WHILE INCREASING PERFORMANCE

An evolution of the bonding fastener technology has been achieved by Specialinsert. The well-known application of bonding elements, composed of a flat plate of larger dimension and the fastener welded on it, has been improved by the RS (Round Spacer) base.

A spacer on the base plate ensures that with every kind of pressure applied during the installation, a film of minimum 0.5 mm, constantly covering the whole area, is applied to ensure correct bonding. With this technology, users can save up to 72% of the adhesive with an impressive cost saving, along with a pull-out strength increase of about 27%.

This new product line will be included in the existing Master-Plate standard range. Specialinsert is a qualified partner for all OEMs and Tiers 1s in the automotive sector as acknowledged with the IATF 16949 certification. Involved in the development and production of fastener systems for all types of applications for the past 40 years, the company, through its international sales department located in the Turin headquarters, is currently exporting to over 82 foreign markets. ■ www.specialinsert.it/en

Multi-sector

EVOLUTIONAL FIRE RESISTANCE SYSTEM: VERSATILE, LIGHTWEIGHT AND ECO-FRIENDLY

Vaber Industriale S.p.A. is an Italian chemicals manufacturing company operating since 1957. The experience and know-how gained over 60 years of activity have led to the creation of solutions to improve the fire resistance properties of components used mainly in the transportation market.

The Evolutional Fire Resistance System is the ultimate result of combining three of the company's innovative highly technical products:

- Shield Paint sprayable intumescent coating;
- Advantseal FR one-component intumescent adhesive;
- Shield Sheet, the newest innovative product that combines the features of an intumescent paint with the ease of use of a ready-to-apply product.

Shield Paint and Shield Sheet are protective intumescent coatings especially designed for the passive fire protection of aluminium, steel and composite structures. In addition to protecting structural parts from collapsing in the event of a fire thanks to their intumescent properties, they reduce the total weight of the whole car body, resulting in a reduced impact in terms of energy needs. Shield Paint is a one-component product applied with a spray-gun on the surfaces to be protected. Shield Sheet is supplied in foils that can be easily cut in the desired shape and dimensions, with or without a self-adhesive tape on its back side. Advantseal FR can be used in combination with Shield Sheet. ■ www.vaber.it

Litzler Designs Equipment for the Composite Industry Worldwide



MATT LITZLER
PRESIDENT

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.



HOT MELT
PREPREG
SYSTEM

CA. 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 PrePrep :
 ■ 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.

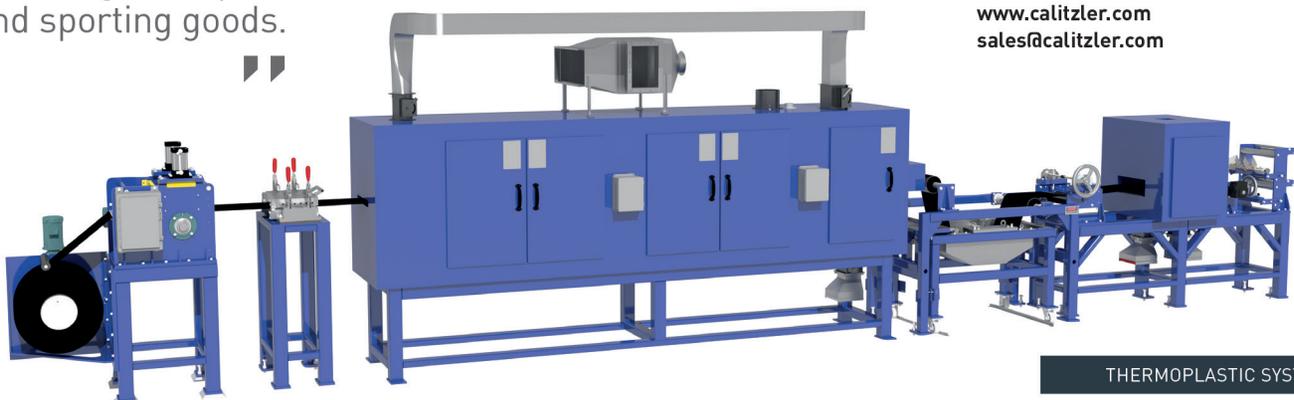
Carbon Fiber Lines :
 As part of a complete carbon fiber line, Litzler supplies highly engineered Roll Stands with large diameter rolls to minimize deflection, Sizing Stations and Dryers, Tension Stands, Litzler Automation Control Systems and the Computreater CF for development and testing of new fibers. Litzler also integrates furnaces, pollution control, surface treatment, creels and winders. Contact Litzler to learn more about Litzler and our 68 years of experience designing and building equipment for the composite industry.

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Industry is moving to Thermoplastic Tape for new applications. Litzler Tape Lines are proven across multiple sectors including aerospace and sporting goods.

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THERMOPLASTIC SYSTEM

PHOTOS DR

Multi-sector **L-9060 FST EDGE FILLER FOR EASY AND CLEAN APPLICATION**

Traditional fire, smoke and toxicity (FST) ambient-curing edge fillers for aerospace applications are heavily filled to provide lightness (syntactic foam) and FAR/JAR 25 853 compliance. Consequently, the materials are pasty, dry, and the two components are difficult to mix. The compounds are then difficult to apply properly on the edges of a sandwich panel.

L&L Products developed L-9060, a new FST edge filler with a 0.55 density available in dual-barrel cartridges. This packaging can be used with a standard 400ml gun and the two components are blended automatically in a nozzle, minimizing the risk of mistakes. The material can be easily applied to the panel's edges. After being smoothed, it is hard enough after three hours' curing at room temperature to be milled or sanded for a perfect finish before paint. The unfinished cartridge can be stored at room temperature for further use. This product can be used for finishing all types of interior sandwich panels. It helps to improve safety as operators are not in direct contact with the material. The material is REACH compliant, has a low odour and does not contain CMR substances. Thanks to its waste-reducing packaging, the buy-to-fly ratio is optimized. This new product is also suitable for use with a metering pump when the volume justifies using pails. Its low density helps to reduce the fuel consumption and CO₂ emissions of aircraft, while its FST properties improve safety on board. A version is being developed for rail applications. ■ www.llproducts.com

Multi-sector **RTV2 SILICONE RUBBERS FOR REUSABLE MEMBRANES**

Zhermack SpA. developed the RTV2 silicone rubbers for reusable membranes used in the vacuum infusion process. These materials offer high mechanical characteristics, high dimensional stability, self-bonding properties (a second layer can be cast within 24 hours after casting the first layer) and good chemical resistance against polyester, vinylester, etc. Their mixing ratio is 1:1 mainly, but also 10:1. The company also produces RTV2 addition silicones that cure with platinum, RTV2 condensation silicones that cure with tin, and body casting alginate. ■ www.zhermack.com

Multi-sector **COMPLETING COMPOSITES WITH RED FIRE PROTECTION COATINGS**

In 2020, Finnester Coatings introduced their innovative fire protection coating technology to



the whole composites market, along with the opening of a new fire testing laboratory to support this activity. Marketed as the RED product range, these coatings protect all

types of composites (and some thermoplastics), utilising a combination of novel ceramification technology with controlled intumescence. They provide surface fire protection, as well as heat and smoke emission control, which is particularly important to ensure compliance with the regulations required by the transport and construction sectors. The thermal insulation properties of RED are also showing considerable promise for applications such as pressure vessels, battery casings and for offshore uses.

RED coatings are easy to apply by standard spray-coating techniques or may also be integrated into composite production (e.g. as gelcoats or in the filament winding process). They give a high-quality finish, meeting the customer's colour, gloss and surface requirements. They are already in commercial use for outdoor applications in extreme environments, including uses on commercial shipping and for bridges and utility poles.

A key advantage to RED coatings is that they protect composites against fire without sacrificing the composite's characteristics. Composite manufacturers can continue to use their own perfected composite structures, and effectively complete them by applying RED in order to meet fire protection requirements. ■

www.finnester.fi

Wind energy **CARBO4POWER: A NEW GENERATION OF OFFSHORE TURBINE BLADES**

According to the Offshore Renewable Energy Strategy published this year, EU's ambition is to build 300GW of offshore wind turbines by 2050 to meet the requirements for a climate-neutral energy sector. To increase power production, more sophisticated materials and processes are required for the development of better-performing wind and tidal blades in terms of size, efficiency and end-of-life. Carbo4Power aims to produce a new generation of lightweight, high-strength, multifunctional digitalized materials for offshore wind and tidal turbine blades by decreasing costs and introducing novel materials aiming at recycling up to 95% of the blade. The innovative concept is based on the use of nano-engineered hybrid (multi) materials and their intelligent architectures to improve blade repairability, re-processability and recyclability. In addition, developments in lightning, de-icing and biofouling strategies are currently under evaluation to improve the properties of blades in both above and underwater environments. Manufacturing optimisation, segmentation and structural health monitoring (SHM) to create pathways for the future development of modular blades and to tackle current limitations in logistics and maintenance are considered, including design and finite element analysis from the nanomaterial level to full-scale modelling. This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 953192. ■

www.nanolab.chemeng.ntua.gr

R&D

Multi-sector

RECYCLING THERMOSETTING PLASTICS

Used in a wide variety of everyday applications including electricity meters, car dashboards, household appliances and wind turbines, thermosetting plastics are usually not reused when they reach the end of their lifespans, they are just buried.

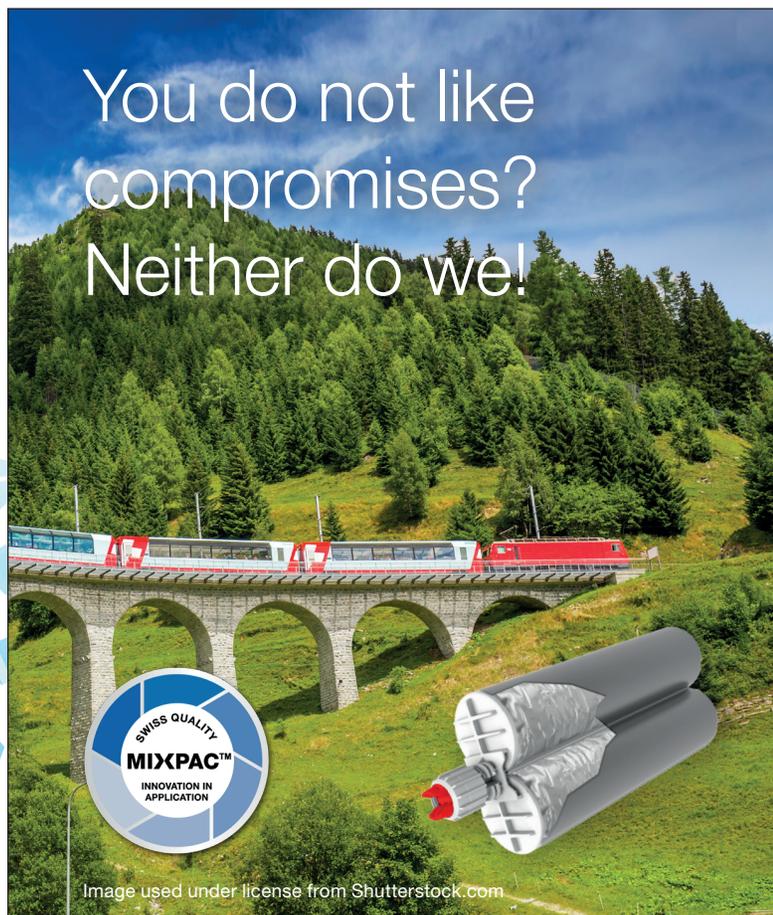
Thanks to an innovative, patented process developed in collaboration with several research centres, Reprocover can now granulate this collected waste and use a very-high-pressure compaction process to turn it into a new material – RTS

A battery of tests carried out at certified laboratories showed that RTS is both extremely resistant to physical stresses (weight, impact, etc.) and to heat, fire and electrical discharges. Its plastic properties also allow it to be moulded and take on new life in different forms. ■ <https://reprocover.eu/>

Multi-sector

HELICOID™ – DISRUPTIVE IMPACT-RESISTANT COMPOSITES

Helicoid™ technology is a transformational biomimetic composite design strategy to enhance the impact toughness of composite parts with estimated 20-40% weight savings. The technology is inspired by one of the toughest impact-resistant biological structures found in Nature, the mantis shrimp's dactyl club. Plies are laid up in a helicoidal fashion, with smooth inter-ply (pitch) angles between plies. Pitch angles can vary between 2 to 30°, depending on the fibre/resin, ply and overall laminate thickness. Structures can be designed to be fully isotropic as well as directional. Under impact, Helicoid™ results in extensive sub-critical damage diffusion (helicoid matrix cracks and delaminations), leading to high energy dissipation (+97% for conventional CFRP), delayed failure (+74% for conventional CFRP), and increased structural integrity. This technology applies to any type of FRPs (fibre/resin). It does not require the use of toughening agents to improve performance and can be readily implemented with raw materials (UD, NCF, 3D preforms, dry, prepreg) and manufacturing processes currently used in industry (RI, AFP, RTM, wet lay-up, autoclave, etc.). In 2020/2021, Helicoid Ind. launched FEA simulation services (customer support) and several technology demonstrators: the Helicoid™ natural-fibre skid plates and battery casing for automotive applications, the Helicoid™ LEP for wind turbine blades, and the ultra-lightweight Helicoid™ sandwich for helmets and sporting goods. ■ www.helicoidind.com



ecopaCC™ **SULZER**

Our collapsible and sustainable ecopaCC™ has a proven performance in a wide range of applications. In addition to reducing waste, it also saves space.



100% leak proof
due to new proprietary overmolding technology and no more sealing pistons



High tech multilayer film
up to 7 high-tech films with dedicated attributes guarantee for enhanced barrier properties and improved shelf life – co-extruded foil also available



Pre-collapsed cartridge
saves costs due to remarkable reduction of storage and transportation space needed – cartridge also available not pre-collapsed



Reusable support sleeve
used with the ecopaCC for dispensing, it is made of resistive materials like aluminum and can be customized to your needs

www.sulzer.com/ecopacc

Multi-sector

BREAKTHROUGH MICROENCAPSULATION TECHNOLOGY

Calyxia has developed a unique process to produce the first perfectly-sealed, process-resistant, and customizable microcapsules.

These microcapsules can protect reactive, functional and optical additives even in extreme temperature and shear processing conditions (extrusion, injection, compression moulding, film casting, etc.) and deliver them at the right time and site for performance.

- Reactive additives (catalysts, accelerators, curing agents, etc.): The Calyxia technology can protect process additives from premature reaction during processing, and then deliver the additive on command during curing. This provides a significant advancement in terms of process and performance control.

- Functional additives (anti-wear additives, anti-abrasion additives, etc.): This technology can protect functional additives against degradation, cross-reaction or instability during processing. Anti-wear/abrasion additives are then delivered only in the event of wear or abrasion. Functional additives enhance both the performance and lifetime of the final product.

- Optical additives (pigments, liquid crystals, dyes, etc.): This technology can fully protect optical additives throughout the lifetime of the product.

This technology has been successfully validated with many large players in high-performance plastics, electronics materials and adhesives & coatings to provide new features to their materials or improve the performance of their current materials. ■ www.montalvo.com

EQUIPMENTS

Multi-sector

THERMWOOD ANNOUNCES LOWER-COST LSAM ADDITIVE SYSTEMS

LSAM additive printers are “print only” systems built around Thermwood’s 30mm



LSAM print head offering relatively large, highly-capable machines at an attractive price point. The 30-mm LSAM print head can process most polymers at a print rate of up to 45 kg per hour. As with all LSAM systems, they can process at temperatures up to 450°C, which works with virtually all composite polymers available today. These systems are a single-gantry, moving-table configuration and are available in two table sizes, 1.5x1.5 m and 1.5x3 m. The 1.5x3-m table is available in two configurations, 1.5-m-wide with 3 m of front to back motion and 3-m-wide with 1.5 m of front to back motion. The choice of configuration depends on several factors, including fitting it in the existing factory floor space. The weight of the heaviest part to print may be another factor. Systems come standard with a single servo table drive that can accommodate parts that weigh up to about 455 kg. The 3-m-wide table can be equipped with an optional second table drive increasing the maximum weight capacity to 910 kg. The final factor is vertical layer printing. All LSAM additive printers can print parts up to 1.2 m tall. If taller parts are needed, they can be printed by lying the part down and printing vertically. The only additive printer that supports vertical layer printing is the 1.5-m-wide 3-m-deep version. It can print parts up to 3 m tall. ■ www.thermwood.com

Multi-sector

DTEC-PRO CAMERA SYSTEM FOR ENHANCED QUALITY ASSURANCE

LAP has enhanced the features of its DTEC-PRO camera system for process optimization and quality assurance in composite manufacturing. The system offers ideal process support, especially



in highly-variable production environments where many different workpieces of small to medium size are processed on mobile tables at the production stations. The DTEC-PRO camera system accelerates set-up processes thanks to quick and automatic calibration. The time expenditure in the

product process is reduced immensely. At a rate of five individual images per second, it also continuously checks the position of the workpiece and sends it to the PRO-SOFT software. If there is a position deviation, a calibration of the CAD-PRO laser projector is automatically initiated and the projection adjusted if necessary. This prevents positioning errors and increases process reliability. LAP’s PRO-SOFT software supports the camera functions, from work preparation to visual process control, to storage of camera images for quality assurance. New features added include camera live image to check the correct tool position during production, layup control for each projection step, and the automatic storage of high-contrast camera images in the database. DTEC-PRO is suitable for all new or existing CAD-PRO laser projection systems. For existing installations with CAD-PRO laser projectors, a software update is sufficient. ■ www.lap-laser.com

Multi-sector

MONTALVO’S VANGUARD SYSTEM

Montalvo unveils the newest innovation in composites manufacturing – The Vanguard System – that offers cost-effective, production-level integration of closed-loop tension control for individual tows. The Vanguard System is comprised of the three primary elements required for a closed-loop tension control system: the VTC Vanguard Tension Controller, the VLC Vanguard Load Cell, and the VCB Vanguard Creel Brake. These three components create a continuous loop of direct material tension measurement, feedback, and adjustment to continuously maintain the tension required for the material being processed. Providing individual position control, the system ensures each tow/end is at the same consistent and uniform tension from start to finish while also allowing manufacturers to run different materials within the same process (for example, 3k and 12k tows), or different materials on the same machine with the same components as a result of the wider operating ranges. The Vanguard System offers the higher-quality, higher-performing tension control that production machines need to reduce waste and further their production capabilities. In addition to repeatable, reliable, continuous tension control, it reduces operator dependency and process knowledge silos. The system makes it possible to obtain consistent production, run to run, operator to operator, while spending less time manually adjusting throughout the process. ■ www.montalvo.com



Multi-sector

LASER SOLUTION TO AID IN STREAMLINING COMPONENT ASSEMBLY PROCESSES

Virtek's newest software IRIS ActiveTrack provides precise positioning guidance on mobile parts and components.



Complete inspection and assembly tasks effortlessly on moving parts. IRIS ActiveTrack is able to project a stable, accurate laser line directly onto any surface to provide operators with the information needed to get the job done more efficiently.

No need to measure, apply templates or refer to paperwork. The projected laser image remains constant and accurate even when the part is not. This technology can be applied to a wide variety of industries and applications such as: mandrel assembly, paint masking, welded assembly, or interior aircraft assembly. Whether you are new to the benefits laser technology provides or you are familiar with laser technology, this is something completely different, and game changing for streamlining the assembly process. ■ www.virtekvision.com

Multi-sector

WORLD'S FIRST AUTOMATED KITTING SOLUTION WITH INTEGRATED NESTING

Automated kitting reduces labour and material waste, while ensuring that the process is easy to manage and error free. Airborne developed the world's first turnkey, plug-and-play kitting solution with integrated nesting and will deliver its first commercial system to an aerospace customer in 2021. It is an automated end-to-end, material roll to ply kits process. The integrated cutting machine cuts plies according to a nest file. The cut plies are automatically transferred to the picking area via a conveyor belt and automatically kitted. The solution has a seamlessly integrated conveyerised ply cutter to accurately cut plies to the required shape. It also features a manual loading system for ply input with a camera system that detects the shape of the plies and instantly adapts the picking by the robot. The solution can be enhanced with automated roll changing and inspection capabilities to further increase productivity. This ply handling system comprises an industrial robot and a proprietary pick-and-place end effector to separate plies from the nest, capable of handling thermoset prepreg, thermoplastic prepreg, dry fibres and consumable plies. ■ www.airborne.com

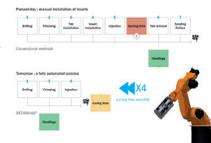


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Multi-sector

SECAMNIDA® – AUTOMATED POTTED-IN INSERT FIXING

The transportation industry is facing a weight reduction challenge, which is intensified by the need to reduce energy consumption. New materials have appeared in the field of composites but the assembly technologies for these materials, and in particular for "sandwich panel" composites, have not evolved significantly. Therefore, Secam Fixing Solutions and GEBE2 are collaborating to develop a fully-automated fastening solution for honeycomb and metal sandwich panels. The objective is to provide the market with a robotized process for the preparation and installation of the SECAMnida® inserts. The principles are 1) a crimping process to maintain the insert on the upper skin; 2) the injection of a two-component potting compound; and 3) a visual inspection of the filling process via the second vent hole. No additional finishing operations are required. The main advantage of this solution is the reduced number of steps, time and downtime required for automated insert installation. It also simplifies the design of structures (no extra reinforcement) and provides an equivalent or higher mechanical strength in regards to standards. Moreover, it decreases the weight of metal inserts, reduces installation time by 4 and requires 50% fewer steps compared to conventional methods. Finally, it reduces production downtimes and allows immediate handling after crimping. In the future, this robotized fixing solution could also be used in automotive, building, rolling stock, boat and space equipment applications. ■ www.gebe2-et.com



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Multi-sector

SAURER'S GLASS WINDING MACHINE: CAKEFORMINGWINDER

Saurer's latest machine in the field of glass filament processing has been conquering the market since the beginning of 2021. Customers where the CakeFormingWinder has been installed are highly satisfied with the new product. Despite difficult conditions due to the Covid-19 pandemic, it was possible to launch an innovative high-quality product, which covers a further production area in glass filament processing. With the CakeFormingWinder – a glass yarn filament winding machine that is new in many respects – Saurer can satisfy the specific desires and requirements of its customers relying on innovative technologies.



Especially for an upcoming market field with super-fine glass filaments, the company's new product can offer completely new technology, thanks to patents and innovations. Thus the machine, with for instance the aid of the new rotor technology and by integration of a high-speed traversing system, is able to achieve efficient production of high-quality glass filament packages. Due to the new and innovative rotor design technology, it can work with constant entry angles into the flyer design. The product is impressive with its rotor technology, high-speed traversing and special patented bearings for the collets, water-cooled control unit and automatic lubrication system. In addition to the CakeFormingWinder, Saurer offers an attractive portfolio of services to meet the requirements of customers engaged in glass fibre production. ■ www.saurer.com

Multi-sector

SYABOT 6-AXIS ABRASIVE WATERJET MACHINING ROBOT

Composite parts usually require manual machining processes because of their complexity and geometric variability. Indeed, applications such as repair machining, paint removal or surface preparation are often achieved by hand sanding, which implies highly skilled operators.



These critical but time-consuming operations might be automated. To address these issues, BAYAB Industries presents SYABOT, a 6-axis abrasion robot that enables accurate and adaptable machining of large and complex parts through simple 2D drawing. Abrasive waterjet blind machining is a new promising process recently qualified by Airbus for A350 fuselage composite repair machining using a simple 2-axis portable machine REPLY.5. For more complex and larger parts, BAYAB generalized this process on a 6-axis robot. To enhance flexibility, accuracy and ease of use, SYABOT includes an automated detection and 3D scan system to adapt the machining path to the real part despite deformation caused by wear or stress relaxation. A dedicated CAD-CAM system enables 3D drawing for accurate 3D programming so that the sanding operator is free to drive the 6-axis robot. ■ www.bayab.fr

Multi-sector

COLD JET'S REVOLUTIONARY DRY ICE BLASTER – PCS® 60

Cold Jet, a global leader in dry ice technology, has reinvented dry ice blasting with the PCS 60, which features 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, such as steel, aluminium, epoxy, urethane, moulds coated with Teflon or gelcoat and even composite moulds. With the PCS, a composites processor can use one 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 also clean them prior to painting or bonding. Previously, a facility would need multiple machines with different abrasion level capabilities to clean each. Manufacturers have never had one 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 enables the user to easily view and adjust the blasting parameters and machine settings. ■ www.coldjet.com

Multi-sector

RED300 SMART HOT BONDER FOR INDUCTIVE HEATING

The msquare Red300 is the world's first smart hot bonder based on the FlexIn Heat induction technology. It is a mobile device specifically designed for composite repairs. Based on induction technology, the operators can define exactly at which points heat is transferred into the material – a great tool for precise heating e.g. in aerospace.



The hot bonder can be used in two ways. Either the carbon fibre is heated directly, which means a faster heat input and several layers can also be heated at once. The other option is the heating of thin metal foils, which are adjusted directly to the repair contour and only there is heat generated. This way, repair spots can be treated more efficiently and in a targeted manner. Another advantage is that, thanks to the precise heating, you no longer

have to strip large areas of paint or remove attachments.

The Red300 provides heating rates from 1 to 100°C/min and heating temperatures up to 400°C, which is an interesting feature for treating high-performance thermoplastics such as PEEK.

Thanks to an internal Wi-Fi connection, the hot bonder can be operated remotely via any smart device (phone, tablet or laptop). Parameters such as the heating ramp can be set automatically but operators also benefit from live temperature tracking during the heating phase from any location in the workshop and automated generation of a graphical temperature profile and a PDF report for quality documentation. ■ www.msquare.de

Multi-sector

E-FORM: A NEW ELECTRIC FORMING EXPERIENCE

E-Form presses are the result of Meccatronica's constant diligence in research and development to offer customers a reliable alternative to traditional hydraulic presses.

Their competitiveness is based on six advantages:

- Flexibility: an E-Form press is easily adaptable to all types of products and all the different production requirements of small and large batches;
- Precision: perfect part repeatability, excellent for prototyping;
- Simplicity: easy to use thanks to a touch screen and intuitive interface software;
- Safety: because it is protected by a lightweight safety screen and housing;
- Energy saver: under pressure, the powerful motor absorbs only a minimal amount of energy;
- Low maintenance: the electric system requires low maintenance and therefore less production downtime compared to traditional hydraulic systems.

E-Form presses are available in four models in order to satisfy all production requirements. Moreover, the solution can be customized to meet the different needs of customers from all sectors: automotive, aerospace, marine, transport, fashion, medical and sports. ■ www.thermhexas.com



Multi-sector

COMPACT AND ACCESSIBLE AUTOMATED FIBRE PLACEMENT

In late 2020, Carbon Axis launched the commercialisation of its Xcell compact and accessible Automated Fibre Placement (AFP) machine. Dedicated and optimized for the preforming of small parts (up to 1m x 0.5m x 0.5m), the XCell comprises an insulated and temperature-regulated cell in which a small-payload 6-axis robot carries a proprietary AFP head. The machine uses industry-standard 3" core bobbins of raw material, stored in a creel system that is tension controlled and can be set up through the human machine interface. This flexible preforming cell can handle both thermoset towpregs and dry stabilized tapes.

The unique advantage of the XCell is the size of the turnkey solution. The whole machine only needs 2m x 2m of floor space and can be easily integrated in any shop floor. This opens new markets and opportunities for AFP as it is no longer exclusive to the aeronautical industry.

Carbon Axis' patented AFP head design incorporates an innovative feature called "angle cut", enabling the manufacturing of net-shape preforms by eliminating the stepped contour traditionally found with AFP. This technology sees particular potential applications in automated aircraft repair. The machine has already found customers in the sports industry and R&D centres and is looking to expand to other markets such as motor sports, e-mobility and new aerospace applications. ■ www.carbon-axis.com



Multi-sector

SHELF-LIFE MANAGER

The Freezer Management software application tracks throughout production materials that are time and temperature sensitive, such as composites, prepregs and resins, ensuring optimal material selection for each job based on properties, status and AI quality data, while eliminating re-work and waste, by preventing the usage of expired materials or materials likely to expire by the time the work order is completed.

Shelf-Life Manager enables complete traceability through the entire manufacturing process as the digital twin records every aspect of an assets cycle from raw material to end product. The application provides enhanced visibility and real-time tracking of time-sensitive factory inventory, while managing material quantities, shelf life and exposure time, to improve quality, increase yields and improve production visibility. Plataine's Industry 4.0 suite of solutions is cloud-based, allowing remote deployments with zero disruption to production, coinciding with Covid-19 travel limitations that made traditional implementation practices challenging. ■ www.plataine.com

Multi-sector

EMISSION ABATEMENT LOWERS FIBRE FABRICATION COST BY 20%

Carbon fibre manufacturing requires custom-designed air pollution control solutions for oven and furnace emission abatement, which only adds to the overall cost of fibre production. Anguil Environmental has 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 regards to volatile organic compounds (VOC), hydrogen cyanide (HCN), ammonia, silicone, nitrogen oxides (NOX) and odorous emissions. It 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, offering the best environmental performance documented in this industry with increased uptime and limited downtime. Anguil systems reduce the total plant operating costs by supplying nearly 20% of the energy required for manufacturing. Abatement devices also incorporate features that decrease maintenance and increase process up-time. ■ www.anguil.com



Multi-sector

ADVANCED FIBRE PROCESSING TECHNOLOGY FOR BIO-COMPOSITES

Tatham has developed new decortication and cleaning systems for bast fibre processing. The modular line can process round bales at up to 4000kg per hour, yielding approximately 1200kg/hr of fibre that is 95% clean and 2400kg/hr of hurd (shiv).

For certain bio-composite applications where clean fibre is required, an innovative finishing line can be integrated to the system, resulting in fibre that is 98% clean.

Another innovation is a total cleaning solution that removes 100% of the hurd so the fibre can be used for other applications demanding a totally-clean fibre.

The fibre can then be processed into a non-woven mat so it is suitable for composites.

The fibre yield depends on both the stalk yield per acre and the fibre content of the stalk. For textile applications, it is important that the hemp plant is cut prior to the early flowering stage (or while pollen is being shed) and definitely before the seed sets. Fibre cut after seed harvest will be considerably lignified and is only really suitable for certain non-woven matting applications. ■

www.tatham-uk.com





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Multi-sector

HITECO METALTECH MX SPINDLES WITH IM SMART SENSOR

For the first time, Hiteco enters the world of “other materials”, and in particular metal and light alloys, with the MX electrospindles. The advantages of this new Metaltech range include:

- Suitable for machining metal, aluminium and light alloys;
- Power up to 42 kW and high torques up to 67 Nm;
- Front bearings cooling circuit;
- Available with on-board encoder, air tool, MQL (minimum quantity lubrication), oil mist and CTS (coolant through spindle);
- Synchronous spindles with HSK 63A and on-board encoder.

Hiteco’s other new development, the iM Smart Sensor, can also be installed on the Metaltech spindles. This intelligent sensor constantly monitors the machining conditions of the spindle it is installed on. It can support the whole production process, monitoring the main parameters that the spindle works on: vibration and temperature. This process monitoring instrument lets users easily identify malfunctions and consequently reduce unexpected machine down times. ■ www.hiteco.net



Multi-sector

TEMCO ULR/ULW: LIGHT, PRECISE AND DURABLE INTO THE FUTURE

The ULR and ULW deflection rollers from Saurer Technologies Engineered Bearing Solutions (EBS) are high-precision components made in Germany. These products from the Temco

line are characterized not only by a variety of sizes, but also by different materials – such as carbon or aluminium. They are mainly used in the textile, hygiene, printing, tobacco and packaging industries. The rollers and rolls from Saurer EBS are particularly suitable for the production of round or prismatic cells

in the manufacturing process of lithium-ion batteries. They can guide and divert the foils extremely precisely and guarantee reliable production thanks to exact concentricity, precise cylinder shapes and squareness. Long service life and lifetime lubrication of the components not only save maintenance costs, but also minimize machine downtime. Temco components impress with the highest performance, especially in demanding start-stop processes such as the winding process of round or prismatic cells. In addition to winding, the rolls and rollers also cover complex process steps such as coating, drying and calendaring. With the products from Saurer EBS, the battery industry is not only well equipped now, but they also guarantee maximum performance on the production lines for future developments, such as the production of the all-solid-state or lithium-air battery variants. ■ www.saurer.com



Multi-sector

CONTACT-FREE ULTRASONIC TESTING SYSTEM

XARION Laser Acoustics developed an integrated solution for contact-free ultrasonic testing of composite parts based on its Laser-Excited Acoustics (LEA) technology. In LEA, a short laser pulse generates a

broadband ultrasonic waveform directly in the part. For detection, the company’s proprietary optical microphone measures the ultrasound signal in air with a very broad frequency detection bandwidth of 2 MHz.

The combination of excitation laser and optical microphone leads to several advantages:

- Measurements on composite parts can be performed with sub-mm resolution and high sensitivity without using a coupling liquid;
- The technology is immune to surface conditions such as reflectivity and roughness;
- It is robust against off-normal misalignment of up to 5° with respect to the sample surface;
- The LEA probe is very compact because both excitation laser and optical microphone are fibre-coupled.

These features make LEA a flexible solution for contact-free ultrasonic testing of a large variety of monolithic composite parts as well as honeycomb sandwich structures. The probe can be mounted on an industrial robot for scanning large parts with complex geometries, and for very high scanning speeds, it can also be configured as an array. ■ www.xarion.com



Multi-sector

XTREME-D, A NEW GENERATION OF CARBIDE TOOL COATING

N-POL has been testing different carbide grades for years, resulting in the use of a unique composition of sintered carbide that significantly increases tool life when machining difficult-to-machine materials. Cemented carbide tools for composite material machining applications require special geometries and, above all, protective coatings as all machining is done dry, which results in increased friction and temperature.

XD is a new coating based on diamond-like carbon (DLC) with additional layers increasing the hardness to almost 6000 HV. It is a combination of a basic protective coating and additional nano-layers of other components to obtain a durable and strong structure resistant to abrasion and a wide variety of chemicals contained in composites that have a negative impact on the bonding of the carbide. XD is a micro-thin coating that allows the tool blade to maintain the cutting edge sharpness and provide a high degree of slip during machining. It provides long tool life, low cost and maximum cutting performance. Above all, the coating protects against high temperatures and carbide oxidation, which have the most negative impact on cutting tool performance. XD has twice the temperature resistance during operation compared to basic coatings, which gives it an advantage over tools with earlier generation versions of the DLC coating. ■ www.npol.com.pl



Multi-sector

C-BLOCK 160

Microtex Composites presents C-Block 160, a composite block made of recycled carbon fibre and epoxy resin that is suitable for a variety of structural, thermal or even aesthetic applications.

The whole block (dimensions 75 (L) x 50 (W) x 5 (H)) can be worked to realize carbon moulds or carbon tools. It is especially suited for the motorsport market, where a reduced lead time from design to part is required.

The first advantage is the fast processing, which means quick milling and no need for lengthy surface finishing. Moreover, the block features high strength, durability (up to 15 to 20 cycles)



and has unrivalled dimensional stability. Finally, it is easily repairable. C-Block 160 is also very versatile. For the production of larger tools, it is possible to glue different blocks.

Since the block is made of recycled carbon fibre, it allows reduced impact on the environment by abating production waste and reusing raw materials.

Advantages compared to resin tools:

- Direct mould production and lower working time;
- CTE (coefficient of thermal expansion) reduced on X-Y;
- Possibility to produce more tools with the same mould;
- Low weight.

Advantages compared to aluminium moulds:

- Lower thermal inertia of tool;
- Low weight and easy repair;
- Low thermal expansion of tool during cure.

Advantages compared to carbon tools:

- Lower cost compared to any alternative carbon fibre tool.

■ www.microtexcomposites.com

Multi-sector

LOW-COST, SUSTAINABLE T-RTM THERMOPLASTIC COMPOSITES

The specific T-RTM technology developed by Tecnia is based on in situ anionic polymerization of polyamide (APA6) starting with a caprolactam monomer and a



liquid catalytic system. Main characteristics and advantages:

- In situ 3K caprolactam polymerization process;
- Matrix cost <2€/kg

(caprolactam);

- Low viscosity;
- Injection time: approximately 5 sec;
- Cycle time: approximately 2-3 min;
- Sustainable, easy-to-recycle thermoplastic composite;
- One-shot process integrating highly-reinforced areas with complex geometrical details such as complex ribs.

This specific 3K T-RTM APA6 technology has major advantages in comparison to the more conventional 2K T-RTM APA6:

- Low-cost raw materials;
- Liquid catalytic system at room temperature;
- No premixes: long life of the chemicals in the machine;
- Easy dosing: possibility to adjust the reactivity for faster or slower processes depending on the application.

Developed and validated at different prototype levels mainly with automotive companies, the technology is now being scaled up for industrial exploitation. ■ www.tecnalia.com

Multi-sector

DIRECT MELT IMPREGNATION THERMOPLASTIC LINE

Cygnat Texkimp launches the world's first commercially-available thermoplastic manufacturing line using standard polymers, from polypropylene to PEEK, to create high-grade thermoplastic prepregs on an industrial scale.

Thermoplastic composites are light, strong, chemically stable, sustainable, and recyclable. Cygnat Texkimp's technology is designed to make them viable in mainstream markets including high-volume automotive and construction, where adoption has so far been low. The company – whose

thermoset technology is already well-established – aims to remove barriers to the adoption of thermoplastic composites and enable manufacturers to create strong, lightweight, durable and recyclable car parts and building materials quickly and reliably.

This technology transforms the way thermoplastic composites are manufactured in a way that is reliable, cost-efficient, user-friendly, cleaner and more environmentally friendly compared with conventional approaches. It is original and innovative because it uses standard polymers in pellet form as the raw material. Standard pellets are considerably more convenient, less expensive, safer and easier to source than the finely-powdered polymers or solvent-based slurries commonly used in current manufacturing practices.

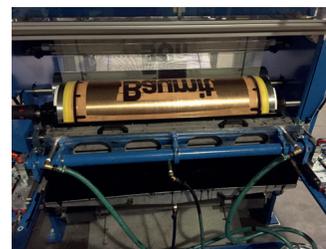
The machine is a complete solution with a small footprint that can easily be accommodated within a relatively small manufacturing facility and does not require any particular specialist knowledge to operate. ■ www.cygnat-texkimp.com



Multi-sector

PRINTING/SPLITTING LINE FOR GLASS FIBRE MESH

GF Machinery (GFM) introduces a high-speed flexographic printing/splitting line for printing logos on glass fibre mesh. The high-speed line (up to 100m/min) uses a specially-designed "doctor blade chamber" printing part. The line consists of an unwinding, printing, drier, winding unit + a slitting unit with different numbers of slitting knives as an option. ■ www.gfm.cz



Multi-sector

SINGLE PROCESS, SINGLE STRUCTURE, INTEGRATED JOINTS

Over the last year, Compo Tech has made progress in developing a fibre placement technology termed ILT, Integrated Loop Technology.

The concept is to join wound tubes or parts to each other while reducing machining and hand lamination steps and increasing the joint's efficiency and strength. The main innovation comes through highly-developed automated winding machinery and programming and the intricate tooling design produced with 3D printing. This allows fibre, used in the tube structure, to be continually placed around a functional form that becomes part of the joint or connection, resulting in a fully-optimal single composite system with a continual loop around a joint in one automated process.

The current applications are:

- Lightweight ladder production, significantly reducing rung machining and bonding time;
- Functional battery cradle structures that also integrate cooling and wiring;
- Automation handling structures with bearings, motors and actuators integrated into the wound loop structure;
- Bicycle frames, with integrated joining of the front triangle tube structure and rear suspension pivot bearing.

The evolution and demand for this technology have led to Compo Tech's investment in the production and design of a new robot-assisted fibre placement/winding machine to focus on these structures and optimise production efficiency. ■ www.compotech.com

Multi-sector

ACCOTEX GLASS FORMING APRONS FOR COARSE TO ULTRA-FINE FILAMENTS

The Accotex glass forming aprons from Saurer Technologies Elastomer Components (EC) are tailor-made to match customer requirements. The aprons combine perfect wetting characteristics with exceptional lifetime due to high-valued elastomers along with an optimized surface finish. The characteristics of the glass forming apron directly affect the quality of the sizing transport. As a result, it has a major impact on most quality-relevant parameters of the filament: loss on ignition, dancing fibres and hairiness. To comply with all conditions of a wide spectrum of glass filaments, the glass forming aprons are offered in a variety of material compositions and surface roughnesses. In close cooperation with the customers, the company developed a product range with optimal characteristics for each individual application and offers the whole spectrum of glass fibre yarns, from coarse (G type) to ultra-fine filaments (D-BC type). In addition to the roughness spectrum, glass fibre aprons offer different properties in terms of wettability, sandability and abrasion resistance. This enables a wide range of adaptation possibilities. With the Accotex products, one of today's most important construction materials is manufactured to ensure resistance to ageing and weathering. In this way, the aprons guarantee optimum properties for different areas of application. ■ www.saurer.com

APPLICATIONS

Construction

CL RESTRAP: UNIDIRECTIONAL CFRP SHEAR REINFORCEMENT LOOP



CL Restrap is a flexible CFRP tension member made up of continuous unidirectional carbon tapes. Due to the thin individual tape thicknesses and the subsequent build-up in the continuous loop, CL Restrap is both highly flexible and features all the well-known advantages of CFRP tension members: no fatigue, no corrosion, no creep and no thermal expansion plus incomparable pretension loads. Flexibility means it can be wound and tensioned around varying structure

shapes and sizes, much like a traditional ratchet strap. Consequently, the applications are limitless. For example, the member can be used to reinforce concrete girders, increase load capacity, allow the repurposing of existing structures, and/or seismic strengthening. Combined with the simplicity of installation – low self-weight, no bonding required, no heavy machinery – CL Restrap contributes to fast, efficient and low-cost structural reinforcement. Another significant advance is an infinite service life. Once installed, the straps require no maintenance or replacement.

The lifespan and minimal installation requirements contribute to increased sustainability of the solution compared to heavy machinery-intensive, high-maintenance and frequent replacement demands of traditional materials. In summary, ease of handling due to low self-weight and simple, cost-effective installation combined with superior material properties result in CL Restrap becoming a preferred solution for structural reinforcement. ■

www.carbo-link.com

Sports & leisure

COBRA COLLABORATES WITH RADINN ELECTRIC JETBOARDS

Cobra is collaborating with Radinn to mass produce its range of electric-powered surfboards. Radinn produces some of the fastest jetboards today, offering three models, each with market-leading battery technology and high-performance waterjets, that can be configured to match the rider's style. Cobra proposed a switch to a lower-density EPS foam core and moulded glass fibre skins. This lighter construction provides 25% weight savings while maintaining the durability required by riders. Another benefit is the removal of the edge seam around the board's rails, with the new seamless moulded boards having a cleaner look and improved performance. Key to the Radinn design concept is its modular approach. With battery Powerpacks dropping into the deck, and a Jetpack propulsion unit fitting into the base, the precision of the moulded shape is critical. Using the company's CAD data, master board plugs were produced, before test assembly and final sign-off for production was agreed. Cobra was able to scale up rapidly, producing multiple sets of composite board moulds to match Radinn's demand forecasts. With tooling in place, production details were defined. The boards use a laminate made from several plies of woven and stitched biaxial fibreglass fabrics, moulded with epoxy resins to produce a tough monolithic shell. The demoulded boards then proceed to painting. With Cobra following its lean manufacturing principles, the group delivers a target rate of 300 boards per month. ■ www.cobrainter.com



Automotive

H₂ TANK DOILY REINFORCEMENT WITH FIBRE PATCH PLACEMENT



Type 4 composite pressure vessels are used to store hydrogen for H₂-powered fuel cell electric vehicles (FCEV). One of the greatest challenges when using traditional filament winding for production is the material consumption needed for the high working pressure the tank must withstand. Up to 700 bar translates into approximately 10 kg of carbon fibre for 1 kg of H₂ storage. Fibre patch placement (FPP) offers a promising approach to reduce the amount of fibres needed by reinforcing the dome areas with carbon fibre patches. The patches, designed to exactly cover the areas causing problems in filament winding, are applied directly on the liner using an automated process. As these doilies reduce the stiffness discontinuity between the cylinder and the dome sections, they also reduce the amount of high-angle helical layers needed to achieve the same stress ratio as without the reinforcement. Thus, the adjusted filament winding process, followed by the normal production procedure, will save considerable material around the hoop area, that is basically not necessary to ensure its mechanical performance. By also adapting the hoop winding angle, the load from the inner layers can be partially transferred to the outer layers. This results in a more uniform stress distribution across the thickness of the composite and a material (and time) saving of approximately 15%. The entire reinforcement can be designed and optimized using FPP-specific Artist Studio software. Different designs can be explored and adjusted to different types of vessels. ■ www.cevotec.com

Wind energy

SUSTAINABLE WIND POWER? MEET THE WORLD'S LARGEST NATURAL COMPOSITE STRUCTURE

Swiss cleantech firm, Bcomp, and French epoxy system specialist, Sicomin, supported German company Greenboats in the development and production of the "green nacelle" – the world's largest natural composite structure to date. Using natural fibres and bio-based resins, the team at Greenboats built a 7.3-metre-long nacelle for an offshore wind turbine. With the first generations of wind turbines about to reach the end of their service life, there is a distinct lack of fibreglass composite recycling facilities – could a natural fibre solution be the ideal replacement? Wind turbines are a valuable contributor to emission reduction and sustainability, but their reliance on fibreglass highlights a shortcoming. With equivalent mechanical properties to a conventional nacelle and lower energy consumption during manufacture, the green nacelle is an innovative and effective demonstration of natural fibre composites. Given that flax fibres are carbon neutral cradle-to-gate and offer viable end-of-life options, natural composites can further improve the sustainability credentials of renewable power generation. consistent and performs well, even for large-scale components, illustrating that natural fibre composites have reached technological maturity and are ready to meet industrial-scale demand. ■ www.bcomp.ch



Aerospace

EFW'S CARGO-IN-CABIN SOLUTION

The air freight market is currently in a dynamic phase of upheaval. In addition to the growing demand for freight capacity, the need for flexible operation is increasing due to peak loads caused by seasonal effects and crises. For this reason, EFW and its partners are developing a solution for a cargo-in-cabin approach that will be available to aircraft operators via a permanent STC approval and strategically supplements the classic freighter conversion business. Since no significant changes need to be made to the aircraft structure, the solution can be installed in the cabin after removing the equipment for passenger operation.

The special advantage is that this temporary or seasonal conversion is reversible as required.

Therefore, it is particularly interesting for operators who have experience with both passenger and freight operations. The loading and unloading processes take place simply through the passenger door using a non-electrified loading system to move the container into the cabin. Since the container has to meet safety requirements for the cargo compartment, the classic Unit Load Device (ULD) metallic construction cannot be used. Therefore, EFW is developing an adapted ULD.

Compared to previous methods of transporting freight in the cabin such as freight pallets, the adapted ULDs will offer customers improved benefits in terms of operating efficiency, cargo volume and payload. ■ www.efw.aero

Diamscope

Revolutionary Fibre Diameter and Length Measurement Technology

Measures: Carbon fibre, Ceramic fibre, Glass fibre, Rock wool, Flax, Cotton, Polyester, Chemical fibres and more

Up to 20,000 fibre snippets per minute using image analysis

Diameter mean and distribution 0.2 to 150 µm
Curvature and length

Send up to 5 samples
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www.diamscope.com

Aerospace COMPOSITE MATERIALS IN AIRCRAFT LANDING GEARS

Every single aircraft part has very high requirements of strength and durability as well as the smallest possible weight. The use of composite materials in this case allows to meet all requirements at once.

Using carbon fibre for the suspension damper body drastically reduces the assembly's weight and, due to the combination with aerospace-grade aluminium, the body is within the necessary physical property tolerances and the required safety factor is reached.

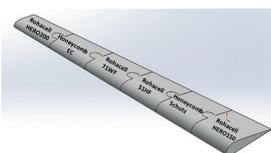
This product can be coupled with a lift/retract system as a ready-to-use system for ultralight aircraft main landing gear.

■ www.facebook.com/DGComposites/



Aerospace HYBRID WING FLAP CORE

Pronat will display a hybrid wing flap core typically used on a UAV. The challenge was to produce an airframe section that would showcase the different materials that can be used in this application.



The wing was divided into six sections, each incorporating different grades of Nomex honeycomb and high-density foam. The construction illustrates the different surface quality levels that

are possible when machining these lightweight, yet extremely strong, sections.

This innovative wing flap enables composite design engineers to have a feel for the various materials that could be used in their design construction.

Materials used:

Rohacell high-density foam: HERO200, 71WF, 51HF, HERO150

Nomex honeycomb: Euro Composite ECA-R-4.8-48, Schutz C1-3.2-64

■ www.pronatindustries.com

Design WOODOO JASPR: INNOVATIVE GIANT WOODEN SCREENS

Imagine a screen made out of authentic wood... The JASPR wood panelling is a LED display unit covered with Woodoo's patented translucent wood that is ideal for assembling custom screen walls or making partitions with integrated screens.



This elegant and innovative product is perfect for the layout and digitalization of sales areas, shopping centres and stores, airports and train stations, cultural venues or places open to the public... or at the back of the stage in a performance hall or a theatre.

This wood panelling is recommended for indoor use with a fixed installation. It is composed of LED displays in different sizes and pitch variations (1.9 mm, 2.5 mm, etc.) and allows the creation of custom screens with total dimensions corresponding to a multiple of the size of its basic modules.

JASPR has a unique characteristic: it reveals all the beauty and naturalness of the wood fibre when it is on standby or switched off, or while showing images on portions of its surface. And when images are displayed over its entire surface, it offers remarkable and unprecedented visual rendering and chromatic quality. ■ www.woodoo.com

Design WOODOO SWITCHR: A REVOLUTIONARY WOODEN CONTROL PANEL

Imagine the future of digital interfaces... on authentic wood!

The SWITCHR control panel technology features both tactile and gesture control capacities on a beautiful translucent wooden screen made with Woodoo Slim, an unprecedented translucent sheet of augmented wood.

SWITCHR's interface technology is very flexible and can be used for many applications inside vehicles, homes and electronics (dashboards, switches, door panels, ceilings, etc.), and in any size (up to 2m wide+) and any form (it can even be thermoformed).

SWITCHR has a unique characteristic: it reveals all the beauty and naturalness of the wood fibre when it is on standby or switched off, or while showing images on portions of its surface. And when images are broadcast over its entire surface, it offers remarkable and unprecedented visual rendering and chromatic quality. ■ www.woodoo.com



Aerospace CO-CURED WING USING DRY CARBON FIBRE, RTM AND SMART TOOLS

Hawthorn Composites produced a co-cured wing structure using dry carbon fibre braids and sleeveings, combined with resin transfer moulding (RTM) and smart tooling, creating a complex composite part without prepreg or the use of an autoclave. The control surface achieves structural equivalency, weight neutrality and 20% or greater cost savings versus traditional processes. Traditionally, aerospace manufacturers have steered away from RTM processing due to expected repeatability issues and lower fibre volumes. Recent advancements in automation and tooling technologies now make it possible for RTM-

infused and oven-cured composite parts to be a viable possibility for the aerospace sector. ■ www.hawthorncomposites.com



Aerospace REUSING COMPOSITE FIBRE SCRAP FOR A CIRCULAR ECONOMY

Enrico Raimondo uses pure Italian manufacturing techniques to create unique objects thanks to the reuse of composite fibre lamination scrap, giving a second life to materials that should be disposed of as special waste, to produce designer articles based on a pure circular economy and eco-sustainability. Through its eight patents, the company produces wine bottles, plates, glasses, magnetic induction pans and many other objects for the food and beverage world, while for the fashion world it produces bags, accessories and shoes. Even used leather is reused in full compliance with the basics of sustainability. All objects are

handmade in Italy. ■ www.enricoraimondo.it



SIMULATION

Multi-sector 6D MIMIC PROGRAMMING SOLUTION FOR PAINTING ROBOTS

The 6D Mimic is an innovative technology that enables robots to quickly and intuitively imitate the actions of humans painting objects.

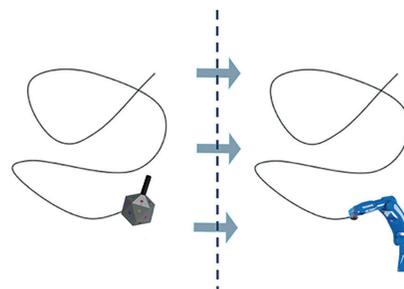
Through the detection, tracking and indexing of complex movements (3D) performed by the human operator, the robot will learn the trajectory performed by him.

The movement is captured by a work tool based on stereoscopic artificial vision and a pseudo-code is automatically generated and passed to the robot.

The goals are to improve the interface between manipulators and humans, avoid traditional programming methods that are too time-consuming and tedious, increase the productivity of robotic cells, retain know-how perfected by technicians specialized in the process over several years and free operators for more noble tasks while improving their quality of life.

Advantages

- On-the-fly robot programming;
- Robust system suitable for industrial environments;
- User focuses on the task and not on programming;
- Enables human-robot skill transfer in technical applications;
- Resistant to different temperatures;
- Automatic three-dimensional recognition of object geometry;
- Tool fully adaptable to the process;
- Accuracy and repeatability can be adjusted to fit customers' needs;
- Can be used to program the robot directly or to create an editable base program in a matter of seconds;
- Non-programmers can easily interact with the robot via simplified HMI. ■ www.roboplan.pt



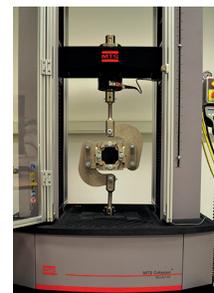
SERVICE

Multi-sector COMPLETE MATERIAL CHARACTERISATION OF COMPOSITES

The test laboratory of Grasse Zur Composite Testing has been accredited to ISO/IEC 17025 since 2018. In recent years, the company successively expanded its range of tests to enable the most complete possible characterisation of fibre-reinforced plastics.

The following tests were added to the portfolio recently:

- thermo-analytical tests according to ISO 11357 and ASTM D3418 (DSC tests) and ISO 6721 (DMA tests);
- sandwich material tests according to ISO 844 and ASTM D1621 (compression tests), DIN EN 12090 (shear tests), DIN 53292 (tensile tests) and DIN 53293 (bending tests);
- adhesive tests according to DIN EN 1465 (single-lap shear test), ASTM D3528 (double-lap shear test) and ISO 11339 (T-peel test).



The company's unique selling point continues to include testing by a picture frame to determine shear properties according to ISO 20337. The procedure has now been approved for testing rotor blades in accordance with DNVGL St and is becoming increasingly popular in the aviation sector. The main advantages of this test method compared to all other methods, such as the rail-shear test according to ASTM D7078 or the tensile shear test according to ISO 14129, include the determination of significantly higher strengths, the determination of better stiffnesses and the reduction of standard deviations.

■ www.grassezur.de

Multi-sector ENVIRONMENTALLY- FRIENDLY, ORIGINAL AND RATIONAL SOLUTIONS

Mitaş Group now provides composite solutions to the global markets it has been active in since 1955, including energy, telecommunications, lighting, chemistry, military defence and IT equipment. With an Environmental Product Declaration (EPD) certificate in compliance with ISO 14025 and EN 15804:2012+A2:2019, the group is now providing environmentally-friendly GFRP composite products such as lighting poles, flag poles, utility poles, rooftop poles, masts, profiles and pipes.

In addition to low-carbon-emission manufacturing, the products also have high UV and flame resistance.

They are easy to handle and assemble while offering high mechanical strength and corrosion resistance. ■ www.mitascomposites.com



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