4th International Conference & Exhibition on Thermoplastic Composites

Conference Programme

30 – 31 October 2018
MESSE BREMEN, Germany

www.ithec.de

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TEN CATE
ADVANCED COMPOSITES
Dear Ladies and Gentlemen,

Welcome to the ITHEC 2018 4th International Conference & Exhibition on Thermoplastic Composites. This year you can experience a further growing ITHEC exhibition. A growth resulting from the second hype in thermoplastic composites in industry taking place, now.

First applications of thermoplastic composites (TPC) date back to the 1980’s – structural parts of the US-military jet F22 such as the landing-gear-door and weapon-by-door were composed of TPCs. In the 1990’s a first hype on TPC emerged starting with the development of a thermoplastic outer wing trailing edge skin for the FOKKER50 passenger aircraft. Although until then TPC structural parts have only been used for niche applications the automotive industry expressed interest and demands in the material. The idea was to achieve a material substitution from press-formed metal sheets to press-formed thermoplastic organo sheets, realising significant weight and service cost reduction. Companies like BASF set up development centres to support and speed up the introduction of TPCs in automotive. Nevertheless, no serial application in mass production had been launched.

The following decade focused on a broader use of thermoset composite systems until recently the aircraft industry decided to intensify the activities in the direction of TPCs again with a lot of new ideas and processes. Both, Boeing and Airbus are developing the second generation CFRP fuselage composed of TPCs.

In the future a key enabler will be the hybridisation of processes like the combination of press-forming and injection-moulding or tailored fibre placement. With new build concepts reaching a higher degree of integration it seems that a thermoplastic fuselage can be cost competitive with a metallic fuselage. Regarding the automotive industry, it has almost become common sense in the branch that the mass production of parts with today’s thermoset composites will not be cost competitive without changing the entire custom of the car. With new process approaches the use of thermoplastic composites seems to be the solution. Considering typical lead times of less than 1 min for mass-produced automotive components, TPCs are the only non-metallic alternative feasible.

The presentations at ITHEC provide a deep insight into the results of the latest projects and products and thus highlights the solutions for the second hype in thermoplastics. The conference will conclude with a panel discussion with experts and representatives from Boeing, Airbus and Toyota discussing the opportunities as well as the risks of the implementation of TPCs and the change from thermoset material systems.

Looking forward to having you with us in Bremen.

Best regards,

Axel Herrmann
Conference Chair
Universität Bremen

Hubert Borgmann
Project Manager ITHEC
MESSE BREMEN

The organisers would like to thank all the sponsors and media partners!

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F. Henning, Fraunhofer ICT, Pfinztal, DE  
M. Huisman, Brightlands Materials Center, Geleen, NL  
P. Mitschang, Institut für Verbundwerkstoffe GmbH, Kaiserslautern, DE  
T. Renault, Faurecia, Nanterre, FR  
F. Schemm, Victrex Europa GmbH, Hofheim / Taunus, DE  
B. Schwing, Airbus Operations GmbH, Bremen, DE  
K. Uzawa, Kanazawa Institute of Technology, Hakusan, JP  
B. Wohlmann, Teijin Carbon Europe GmbH, Wuppertal, DE  
M. Würtele, KraussMaffei Technologies GmbH, München, DE

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**Tuesday, 30 October 2018**

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<td>11:35 – 12:00 B3</td>
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**Wednesday, 31 October 2018**

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<td>15:45 – 16:10 E4</td>
<td>15:45 – 16:10 F4</td>
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<td>16:10 – 16:35 E5</td>
<td>16:10 – 16:35 F5</td>
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<td>16:45 – 17:15 Panel Discussion (Hanse Saal)</td>
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<td>17:15 – 17:30 Closing Remarks (Hanse Saal) / End of Conference</td>
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### Session A: Automotive I

**Keynote**
- **Keynote Automotive** (Hanse Saal)
  - The Current Situation and Issues of Thermoplastic Composite Use for Car Body
  - A. Mikuni, Toyota Motor Corporation, Toyota, JP

#### A1
- **Model-predictive Control for the Automated Production of Thermoplastic Composite Pressure Vessels**
  - M. Schäkel*, H. Janssen, C. Brecher
  - Fraunhofer IPT, Aachen, DE

#### A2
- **Manufacturing of Load Optimized Structural Parts from Thermoplastic Tapes with Focus on Flexibility and Efficiency**
  - N. Müller, ENGEL Austria GmbH, St. Valentin, AU

#### A3
- **Temperature-dependent Failure Analysis of Fibre-reinforced Thermoplastics for Automotive Applications**
  - N. Schramm, L. Kroll
  - Technische Universität Chemnitz, Chemnitz, DE
  - T. Grätzl, BMW Group, Landshut, DE

#### A4
- **Thermoplastic Profiles as Part of the Thermoplastic Composite Toolbox by SGL Group**
  - V. Bühler*, A. Wöginger, S. Geh, J. Mögel
  - SGL Technologies GmbH, Meitingen, DE

#### A5
- **Process Oriented Optimization Methodology for Tailored Preform Composite Molding**
  - D. Espinassou, CETIM, Bouguenais, FR
  - F.-X. Irisarri, ONERA, Chatillon, FR
  - D. Guillon, CETIM, Bouguenais, FR

### Session B: Emerging Technologies I

#### B1
- **In Situ-polymerizing Thermoplastic Epoxy Resin Widely Applicable to Various Molding Processes for Thermoplastic Composites**
  - H. Nishida, K. Nunotani, K. Uzawa
  - Kanazawa Institute of Technology, Hakusan-shi, JP

#### B2
- **Organomodified Siloxanes – An Additive Technology as Enabler to Establish Novel and Improve Existing Processing Technologies of Thermoplastics Composites**
  - S. Heßner, K. Lehmann
  - Evonik Nutrition & Care GmbH, Essen, DE

#### B3
- **Additive Manufacturing of Endless Carbon Fiber Reinforced Thermoplastics**
  - M. Czasny, G. Terhedebrügge, O. Kaba, F. Schmidt
  - A. Gurlo, Technische Universität Berlin, Berlin, DE

#### B4
- **Optimizing the Thermoplastic Welding Properties in an FRPC Additive Manufacturing Process**
  - M. Eichenhofer, S. Arreguin
  - Eidgenössische Technische Hochschule Zürich, Zürich, CH
  - J.C.H. Wong, University of Calgary, Calgary, CA
  - P. Ermanni, ETH Zürich, Zürich, CH

#### B5
- **Manufacturing of Fiber Reinforced Thermoplastics via Automated Powder-towpreg Placement and Direct-impregnation**
  - F. Kühn, D. May, P. Mitschang
  - Institut für Verbundwerkstoffe GmbH, Kaiserslautern, DE
### Session C: Aerostructures I (Hanse Saal)
#### Session Chairs:
- A. Blom-Schieber
  - The Boeing Company, Seattle, WA, US
- I. Fernandez Villegas
  - Delft University of Technology, Delft, NL

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<tr>
<td>C1</td>
<td>14:50 – 15:15 Rapid Manufacturing of a Tailored Spar by AFP and Stamp Forming</td>
<td>T. Slange, Y. Buser, TPRC, Enschede, NL, and University of Twente, Enschede, NL</td>
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<td>S. Wijskamp, TPRC, Enschede, NL</td>
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<td>W. Grouve, R. Akkerman, University of Twente, Enschede, NL</td>
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<tr>
<td>C3</td>
<td>15:40 – 16:05 A Roadmap for Developing an Industrial Continuous Ultrasonic Welding Process for Thermoplastic Composites</td>
<td>F. Köhler, Composite Technology Center Stade, Stade, DE, and Delft University of Technology, Delft, NL</td>
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<td>B. Jongbloed, T. Filipe</td>
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<td>Delft University of Technology, Delft, NL</td>
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<td>A. Herrmann, Composite Technology Center Stade, Stade, DE</td>
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<td>I.F. Villegas, R. Benedictus</td>
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<td>Delft University of Technology, Delft, NL</td>
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<td>16:05 – 16:35 Coffee Break</td>
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<td>C4</td>
<td>16:35 – 17:00 Quality Assured Stiffened Skin Production Relying on Fully-automated Patch-preforming and Oven Vacuum Consolidation</td>
<td>A. Schuster, F. Fischer, C. Frommel, M. Willmeroth, A. Thellmann, R. Glück, M. Kupke, DLR e.V., Augsburg, DE</td>
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<tr>
<td>C5</td>
<td>17:00 – 17:25 Injection Forming of Gears on High-performance CF-PAEK Drive Shafts</td>
<td>D. Barfuss, C. Garthaus herone GmbH, Dresden, DE</td>
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<td>F. Schemm, Victrex Europa GmbH, Hofheim am Taunus, DE</td>
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<td>R. Kupfer, Technische Universität Dresden, Dresden, DE</td>
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<td>17:30 – 18:00 JEC Best Paper Award Ceremony (Hanse Saal)</td>
<td>F. Reux, JEC Group, Paris, FR</td>
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<td>A.S. Herrmann, Universität Bremen, Bremen, DE</td>
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<td>H. Borgmann, MESSE BREMEN, Bremen, DE</td>
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### Session D: Emerging Technologies II (Borgward Saal)
#### Session Chairs:
- P. Hansen
  - Haydale Composite Solutions, Loughborough, UK
- P. Ermanni
  - ETH Zürich, Zürich, CH

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<th>Time</th>
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<tr>
<td>D1</td>
<td>14:50 – 15:15 Industrialised and Digital Manufacturing of Thermoplastic Composites</td>
<td>M. Kremers, M. Muilwijk</td>
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<td>Airborne, The Hague, NL</td>
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<td>Fachhochschule Nordwestschweiz, Windisch, CH</td>
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<td>M. Rheme, G. Eckhard</td>
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<td>MM MultiMaterial-Welding GmbH, Schlieren, CH</td>
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<td>W. Pfister, KVT-Fastening AG, Dietikon, CH</td>
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<td></td>
<td>15:40 – 16:05 In-process and in-situ monitoring of process parameter in fusion bonding of thermoplastic composites</td>
<td>J. Pandher, M. Van Tooren</td>
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<td>University of South Carolina, Columbia, US</td>
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<td>16:05 – 16:35 Coffee Break</td>
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<td>D4</td>
<td>16:35 – 17:00 RecyCarb: Process Scale-up into Industrial Viable Scale for the Re-use of Carbon Fibre Waste in Sophisticated Fibre-reinforced Plastics.</td>
<td>M. Hofmann, Sächsisches Textilforschungsinstitut e.V., Chemnitz, DE</td>
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<td>H. Fischer, Faserinstitut Bremen e.V., Bremen, DE</td>
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<td>K. Heilos, Sächsisches Textilforschungsinstitut e.V., Chemnitz, DE</td>
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<td>A. Miene, Faserinstitut Bremen e.V., Bremen, DE</td>
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<td>17:00 – 17:25 Recycling Thermoplastic Composites Using Low-shear Mixing: an Experimental Study on Complex Geometries</td>
<td>G. Vincent*, University of Twente, Enschede, NL, and TPRC, Enschede, NL</td>
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<td>T.A. de Bruijn, Saxion University of Applied Sciences, Enschede, NL</td>
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<td>M.I. Abdul Rasheed, University of Twente, Enschede, NL</td>
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<td>S. Wijskamp, TPRC, Enschede, NL</td>
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Programme

31 October 2018

Keynote
9:00
9:45

Keynote Aerostructures II (Hanse Saal):
Thermoplastic Composites & Airplane Production
D. Trop, The Boeing Company, Seattle, US
T. Benson Tolle, The Boeing Company, Seattle, US

Keynote Emerging Technologies (Hanse Saal)
Developments in the Composites Industry:
New Markets and Emerging Technologies
E. Witten, AVK – Industrievereinigung Verstärkte Kunststoffe e.V., Frankfurt am Main, DE

Postersession (Foyer Hall 4.1),
see page 16 for details

10:30
12:00

31 October 2018

Session E: Aerostructures II
(Hanse Saal)
Session Chairs:
A. Blom-Schieber
The Boeing Company, Seattle, WA, US
I. Fernandez Villegas
Delft University of Technology, Delft, NL

E1
14:00
14:25

Manufacture and Characterization of a Variable Stiffness, Unitized, Integrated-stiffener Thermoplastic Wingbox
D. Peeters, G. Clancy, V. Oliveri, G. Zucco
R. Telford, A. Bandaru, M. Rouhi, R. O’Higgins
T. Young, P.M. Weaver
University of Limerick, Limerick, IE

E2
14:25
14:50

A New Generation of Thermoplastic Lining Panels for Aerospace Application
T. Joppich, Fraunhofer ICT, Pfinztal, DE
V. Wippo, Laser Zentrum Hannover e.V., Hannover, DE
A. Menrath, Fraunhofer ICT, Pfinztal, DE
P. Jäschke, Laser Zentrum Hannover e.V., Hannover, DE
F. Henning, Fraunhofer ICT, Pfinztal, DE

E3
14:50
15:15

Processing of Thermoplastic Composites,
Developments & Future Challenges
H. Luinge, TenCate Advanced Composites, Nijverdal, NL

E4
15:15
15:45

Coffee Break

E5
15:45
16:10

Suitable Coupon Design for Assessment of Interface Strength in Overmoulded Structures Made from Fibre Reinforced High-Performance Thermoplastics
R. Gaitzsch, M. Koerdt
Faserinstitut Bremen, Bremen, DE

E6
16:10
16:35

Trends, Development and Qualification of the Thermoplastic Induction Welding Process in Aerospace Applications
M. Labordus, KVE Composites Group, The Hague, NL

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### Session F: Automotive II
(Borgward Saal)
Session Chairs: M. Würtele
KraussMaffei Technologies GmbH, München, DE,
F. Henning
Fraunhofer ICT, Pfinztal, DE

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<td>Continuous Production of Thermoplastic Sandwich Structures and their Functionalization via Hybrid Injection Molding Technology&lt;br&gt;T. Gläßer; A. Geyer, Fraunhofer IMWS, Halle, DE&lt;br&gt;J. Pflug, ThermHex Waben GmbH, Halle, DE&lt;br&gt;R. Schlipper; M. Zscheyge, Fraunhofer IMWS, Halle, DE</td>
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<td>15:15</td>
<td>Coffee Break</td>
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<td>15:45</td>
<td>Manipulating Glass Fibre Architecture for the Efficient Manufacturing of Thermoplastic Composites&lt;br&gt;N. Aegerter, C. Schneeberger, S. Arreguin&lt;br&gt;Eidgenössische Technische Hochschule Zürich, Zürich, CH&lt;br&gt;J.C.H. Wong, University of Calgary, Calgary, CA&lt;br&gt;P. Ermanni, Eidgenössische Technische Hochschule Zürich, Zürich, CH</td>
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<tr>
<td>16:10</td>
<td>SAFEMIUM: Multifunctional Security Parts for Premium Vehicles&lt;br&gt;G. Hoyos, N. Márkaide, A. Rekondo&lt;br&gt;CIDETEC, Donostia, ES</td>
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### Panel Discussion (Hanse Saal)
Thermoplastic Composites – The Solution for Cost-effective Mass Production in Aircraft, Automotive and other Industries?
Discussion Partners

Hosted by M. Effing, Composites Germany, Frankfurt am Main, DE and AVK, Frankfurt am Main, DE and AMAC GmbH, Aachen, DE
Invested in Your Success

The result of over 30 years of continuous investment and innovation, TenCate's Cetex® is the proven thermoplastic material of choice for high volume production of advanced composite structures.

TenCate’s Cetex® thermoplastics have demonstrated flawless performance in the most demanding environments, and meet a wide range of OEM qualification requirements across many industries.

Together with our valued technology partners, TenCate continues to innovate and push the boundaries of material science to deliver the composite solutions of tomorrow, more affordably and efficiently than ever before.
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## Poster Session 10:30 – 12:00 (Foyer Hall 4.1)

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<td>P 15</td>
<td>VICTREX AE-250 – A Novel Polyaryletherketone Polymer Suited to Automated Tape Placement and Out of Autoclave Processing</td>
<td>S. Green, Victrex plc, Thornton Cleveleys, UK, M. Sullivan, Victrex, West Conshohocken, US</td>
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<td>P 16</td>
<td>In-situ Automated Fiber Placement of Thermoplastic Composite Aerospace Structures</td>
<td>D. Hauber, J. Michasiow, Automated Dynamics, Niskayuna, US</td>
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<td>P 18</td>
<td>Quality Assured UD Tape Production Enables Digital Linking with Downstream Processes</td>
<td>C. Hopmann, E. Wilms*, C. Beste, K. Fischer, RWTH Aachen, Aachen, DE</td>
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<td>P 19</td>
<td>Adhesive-bonded Multiaxial Non-crimp Fabrics with Adjustable Draping Properties</td>
<td>J. Steinberg, S. Rittner, C. Cherif, Technische Universität Dresden, Dresden, DE</td>
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<td>P 21</td>
<td>Carbon Fiber Meets Polypropylene – Improving Performance and Compatibility for Composite Solutions</td>
<td>C. Karatzias, Mitsui Chemicals Europe GmbH, Düsseldorf, DE</td>
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<td>Industrialisation of Thermoplastic Composite Overmoulding via Simulation, Structural Performance and Manufacturing Development</td>
<td>N. Chapman, S. Cooper, M. Herath, T. Wu, P. Giddings, National Composites Centre, Bristol, UK</td>
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</table>

TPRC provides models and tools based on the required thorough understanding of thermoplastic composite materials and processes to optimize existing and new manufacturing processes in terms of quality and productivity. The R&D results enable viable use of thermoplastic composites by eliminating technological barriers which are identified together with the TPRC member companies and universities.

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**ITHEC 2018, 4th International Conference and Exhibition on Thermoplastic Composites**, will take place in Bremen, Germany, on 30–31 October 2018.

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Pre-fabricated rental stands are available. In case of interest please contact the organiser for detailed information.

**Opening Hours of the Exhibition**
- **Tuesday, 30 October 2018** 9:00 – 18:00
- **Wednesday, 31 October 2018** 9:00 – 17:00

The exhibition will take place at the Exhibition Hall 4.1. close to the lecture halls. Exhibitors and visitors will find an excellent environment for networking.
9T Labs, Zürich, CH
ASANO LABORATORIES CO., LTD, Aichi, JP
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Barrday Composite Solutions, Millbury, US
Boikon B.V., Leek, NL
Carbon Fibre Recycle Industry Co. Ltd., Gifu-shi, JP
Cetex Institut für Textil- und Verarbeitungsmaschinen gemeinnützige GmbH, Chemnitz, DE
CompositesWorld/Gardner Business Media, Inc., Cincinnati, US
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DAIDO KOGYO Co., LTD., Kaga-shi, JP
DLR e. V./German Aerospace Center/Institut für Bauweisen und Strukturtechnologie, Stuttgart, DE
Dutch Thermoplastic Components BV, Almere, NL
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Pinette Emidecau Industries, Chalônsur-Saône, FR
Reinforced Plastics/Elsevier Ltd., Oxford, UK
SAMPE Europe, Oerlingen, CH
Suncorona Oda Co., Ltd., Sumatsu-shi, JP
Suprem SA, Yverdon-les-Bains, CH
Technische Universität Chemnitz/ MERGE, Chemnitz, DE
Teijin Carbon Europe GmbH, Wuppertal, DE
TenCate Advanced Composites, Nijverdal, NL
TPRC, Enschede, NL
Tsudakoma Corp., Kanazawa-shi, JP
Victrex Europa GmbH, Hofheim am Taunus, DE
Web Industries, Marlborough, US
Wickert Maschinenbau GmbH, Landau, DE
YUHO Co. Ltd., Oksaka-shi, JP
JEC Best Paper Award

For the first time, the Programme Committee will select the best manuscript submitted for ITHEC 2018 in close cooperation with our media partner JEC Group, Paris. The ceremony will be held in the Hanse Saal of the Congress Center Bremen on 30 October 2018 at 17:30. The award will include a publication of the selected manuscript in the JEC COMPOSITES MAGAZINE. All delegates are invited to join this ceremony.
The organiser would like to thank all the sponsors and media partners!

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