Dear Reader,

The year is drawing to a close. In this edition of Dieffenbacher Composites we would like to take a retrospective look at the year in composites and give you a glimpse of – and whet your appetite for – what is still to come.

In the previous issue we presented our new Fiberpress. The press has been very well accepted on the market, with four orders received in a very short time. In keeping with our “Reduce to the max” motto, it combines multiple advantages in one system: compact design with more efficient processing at lower costs.

Hybrid lightweight construction is increasingly moving from concept and small series to the implementation of large-volume components. Dieffenbacher is again playing a key role in the composites sector. In this context, we are working with partners in the “MoPaHyb” funding project to implement a versatile production line that advances the production of tomorrow.

There is also news within the Composites Business Unit, as generation change is imminent. At the end of the year, I will hand over responsibility for the Composites Business Unit to my team of Mr. Manfred Reif, Mr. Sven Sattler and Mr. Alexander Ries, who will jointly manage the BU. To ease the transition, I will act in an advisory capacity for the Composites Business Unit until further notice. I would like to take this opportunity to thank the Composites customers who placed their trust in me.

We look forward to exciting challenges and projects with you. I hope you enjoy this issue, and I wish you all the best in the run-up to Christmas.

Yours,

Hans-Joachim Schwindenhammer
Managing Director Composites Business Unit
Reduce to the max –
CompressLite becomes Fiberpress

New generation – new name. Our proven CompressLite press series is now called Fiberpress.

In the most recent issue of Dieffenbacher Composites, we presented the smart product design of the new press generation. Today, we’ll show you how the Fiberpress series ensures high machine availability and energy efficiency. Dieffenbacher has made the core of its composites plants more efficient by optimizing the essential functions of the press series.

The new Fiberpress, with a reduced base area and low overall height but with proven and tested rigidity, is more compact and lighter. It can be more easily integrated into existing production halls or machinery. The new dimensions of the press also reduce transportation costs. The capability to adapt the tolerance between the pre-bending line of the ram and table promises a constant parallelism for precise component thicknesses and higher component quality. This is achieved through a special three-plate technique: The pressure builds up via a central main cylinder in combination with four additional parallel holding cylinders. The tool is stressed evenly, and the component can always be made with the same wall thickness. This achieves a clean component grade, and less reworking is required.

The new press concept also ensures high availability with optional integrated driving tables and fast and flexible tool change systems, and its high energy efficiency ensures low operating costs. The Fiberpress has a fail-safe, integrated position measuring system for high machine availability.

The travel range of the table adapts itself to the respective tool. This reduces the required drive power by approximately 30% compared to previously.

In addition to the functions of the press, the visualization was also fundamentally reconsidered and adapted. After numerous discussions with customers and internal workshops, a smart visualization was developed. Again, we focused on the essentials. The new visualization offers intelligent, intuitive operation and a tidy surface. It allows
The advantages of the compact Fiberpress have convinced us. Dieffenbacher has managed to keep its promise within an ambitious project planning and delivery time. The forward-looking, partnership-based and reliable cooperation with Dieffenbacher has always been an essential factor for us when deciding for a state-of-the-art SMC production line.

Josef Muxenender,
Head of Industrial Engineering at Fritzmeier Composite GmbH & Co. KG

The Fritzmeier group of companies is one of the world’s leading manufacturing specialists for the automotive industry. It manufactures cabins, components for body shell applications and structural components. At Fritzmeier, a Fiberpress is being integrated into an automated production environment for the production of SMC components.

the operator to determine the current machine status at a glance. To prevent machine downtime, clearly arranged function displays indicate deviations from the actual value.

Depending on customer requirements, the Fiberpress can be delivered with an adapted drive (fast, medium and slow) within eight months. Simplified assemblies enable faster installation and commissioning on site.

True to our motto “Reduce to the max,” the complete series is equipped with one pump type. Depending on the required cycle time or press size, only the number of pumps varies, which makes spare parts inventory or supply easier. The hydraulic accumulator group has a central hydraulic control block for the press functions. The guiding function of the ram is taken over by a regulated hydraulic system. As a result, the ram can be kept parallel in rapid feed even with a variable load. This means complex mechanical components can be dispensed with.
Industry 4.0 – a convertible production plant for hybrid components

Hybrid components based on continuous fiber-reinforced plastics offer a high level of lightweight construction potential. Hybridization can be in the form of metal inserts, the combination of continuous fibers with long fibers, or carbon fibers with glass fibers. Thanks to fiber-compatible design, functional integration, modern production processes with low material waste and the reduction of assembly installation costs, economically interesting applications arise. Carbon fibers do not necessarily have to be used. In many applications, it is possible to achieve a functionally optimized structure with glass fibers, which has an eye on costs and lightweight construction. The production processes are usually the same.

The future will bring us increasingly smaller lot sizes, shorter product life cycles and an increasing number of derivatives. In connection with the technical progress in process development for the production of hybrid components, adaptations to the production plants, e.g., through the inclusion of an additional process step, will be required more often. In addition to the physical integration of additional plant participants, a lot of conversion work is required, above all for the control and safety-related integration into the line control. The goal is no less than to realize an easily convertible production plant.

MoPaHyb research project

In our previous newsletter, we presented the topic “Hybrid lightweight construction at Dieffenbacher.” In this connection, today we are reporting about our cooperation in the MoPaHyb research project. The aim of the project is the development of a modular, configurable production plant for the production of hybrid components.

Together with a consortium of 14 project partners, Dieffenbacher has developed a new approach for the control of production lines and successfully carried out the reconfiguration from a process chain 1 to a modified process chain 2 on a reference plant. The demonstrator, the component for the first process chain, is a hybrid seat shell based on a locally, with unidirectional tapes reinforced organo sheet with two metal inlays, thread inserts and back-injected LFT rib structure. In the second process, an undertray based on a tape lay-up without inserts is back-pressed with a direct compounding produced LFT-based polymer melt and thus provided with a rib structure.

In the research project, the interface communication between the line control and the individual plant participants is based on the OPC-UA standard. This enables manufacturer-independent and platform-independent communication. The planning of the production plant as well as the subsequent reconfiguration are carried out with the help of a modular construction kit. The result is a PI sheet in the form of an AutomationML file (AML), which contains all the information about the planned production. This includes, for example, the object tree for the description of the plant,
the process flow, the required materials, component information and all process parameters for the plant participants. The AML file is read-in by the line control, where the automatic generation of the codes for the individual plant participants such as handling robots takes place, which are then controlled via standard interfaces. Thus, the essential prerequisites have been created for defining process parameters via a process simulation, e.g., a forming simulation in the future, and to use the data obtained directly to control the production plant. This considerably reduces the work required to change the program for the line control and to set up the new process on the machine. The duration and cost of the recommissioning process are minimized.

Example: Industry 4.0 using Fiberforge

This approach is fully implemented on the Fiberforge tape-laying plant. In the design process, a virtual plybook is created, in which the geometry of the tailored blank, the layer structure and the material are defined. The path planning for the taping process and the automatic code generation for the machine are carried out via a higher-level software. An adaptation of the parameters on the machine is no longer necessary. The machine only checks whether the right material is being applied and that the process is running as specified.
The Hongkong headquatered group HRC is opening a research and development center in Changshu, Jiangsu Province, China, for research into latest carbon-based materials processing technologies focusing on thermoset and thermoplastic area. The HF Advanced Composite Technology Center (ACTC) will drive the development of composites and test their processing in the automotive, aerospace and industrial applications. For this new center, Dieffenbacher is supplying a Tailored Blank Line with Fiberforge, Fibercon and Fiberpress technology for complete press automation.

Semi-structural applications such as

- Seat shells
- Trunk compartment trays
- Battery carrier systems
- Floor structures
- Structure reinforcement for door, engine hood, roof and tailgate
- General local reinforcements for semi-structural parts, e.g., underbodies
- Bumper brackets

“We believe that Dieffenbacher’s equipment offers great opportunities in such an advanced technology center.”

Erich Fries
Managing Director
HRC Germany
Louis Kaptur, Research and Development engineer, has been responsible for developing and marketing composites solutions for the North American market since 2012. He led projects concerning the development of new material solutions, including the introduction of carbon fiber into SMC and LFT-D technologies. Mr. Kaptur has been Head of Composites North America since October of this year. With this new appointment, Dieffenbacher wants to improve support for its composites customers in North America.

“I know the North American composites market very well and look forward to my new assignment. We will be able to offer our customers faster quotation processing and more efficient service operations, so this step will be directly beneficial to them,” said Mr. Kaptur.

Raimund Grimm will strengthen the Composites North America team led by Louis Kaptur. Mr. Grimm began his career with Dieffenbacher in 2012 as a student in the Industrial Engineering degree course at Baden-Wuerttemberg Cooperative State University. In 2015, he was hired as Sales Manager in the Composites Business Unit, where he is primarily responsible for looking after international customers.

From January 2019, he will support our colleagues at Dieffenbacher North America for three years in Canada.

Matthias Graf, Director of Technology and Business Development Composites at Dieffenbacher, completed his doctorate this year at the Karlsruhe Institute of Technology (KIT) in parallel with his full-time work.

Dr. Graf has worked for Dieffenbacher since 1991. He started his doctorate at KIT in 2012. His dissertation investigated the shear behavior of carbon fiber fabric as a function of the acting forming forces, the temperature and the visco-elastic friction of binding agents. In simple words, Mr. Graf explored the behavior of carbon fiber fabric as it transforms into a three-dimensional preform to better predict this behavior through computer simulation.
Accident prevention / safety inspection for presses – meeting obligations, obtaining added value

Within the framework of the Dieffenbacher Lifecycle Service, we are qualified to inspect all hydraulic presses and punch presses from any manufacturer in accordance with DIN EN 693 for metal presses and DIN EN 289 for composites presses. In the forming sector, Dieffenbacher also offers entire plant inspections. Upon completion of each inspection, the press operator receives a record of the result, which can be submitted to the Institution for Statutory Accident Insurance and Prevention to provide evidence of the accident prevention inspection.

The Dieffenbacher accident prevention inspection includes an assessment of the workplace as well as a mechanical and hydraulic safety inspection of the press.

Please scan the QR code or continue reading under the URL www.dieffenbacher.de/uvv
Vogel conference, Wuhu, China

The 6th International Conference on Automotive Technology held by the Vogel publishing house took place in Wuhu, Anhui, China on June 29. Dieffenbacher participated with a lecture by Guo Zhiwei, Sales Manager at Dieffenbacher SWPM, on the subject of wet pressing processes for the economic production of carbon components.

ACCE, Novi, USA

On September 5 – 7, Dieffenbacher participated in the world’s leading forum for automotive composites, the ACCE in Novi, Michigan. The lecture by Louis Kaptur, Head of Composites North America, on the production of continuous fiber-reinforced tailored blanks based on a thermoplastic matrix, attracted considerable interest among the participants.

Dieffenbacher SWPM Symposium, Shanghai, China

Prior to the China Composites Expo, Dieffenbacher SWPM held a customer symposium on September 4. Customers, industry partners, research institutes and Dieffenbacher experts gave lectures on the subject of composite technologies.
China Composites Expo, Shanghai, China

Dieffenbacher presented itself at the China Composites Expo in Shanghai in early September as a supplier of efficient, economical plants for composite components. Under the motto “MORE TECHNOLOGIES,” visitors learned about the entire spectrum of composite technologies for mass production. The fact that China is now regarded as an important market for lightweight construction was reflected in the interesting discussions and the number of specific inquiries.

SMILE closing event at the Audi Forum, Neckarsulm, Germany

The successful research project SMILE (System Integrative Multi-Material Lightweight Construction) concluded with a lecture event on September 12 after more than three years of joint cooperation. Dr. Matthias Graf, Director of Technology and Business Development Composites at Dieffenbacher, and the other project partners presented their results to an interested audience from the automotive industry. The SMILE project focused on the development of a new lightweight construction concept for the special requirements of electromobility.
# PROJECTS 2017–2018

<table>
<thead>
<tr>
<th>Performance range</th>
<th>Country</th>
<th>Process</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>CompressEco</td>
<td>Czech Republic</td>
<td>SMC</td>
<td>Automotive</td>
</tr>
<tr>
<td>CompressLite</td>
<td>USA</td>
<td>LFT</td>
<td>Automotive</td>
</tr>
<tr>
<td>CompressEco</td>
<td>Germany</td>
<td>SMC</td>
<td>Automotive</td>
</tr>
<tr>
<td>CompressEco</td>
<td>Germany</td>
<td>SMC</td>
<td>Automotive</td>
</tr>
<tr>
<td>CompressLite</td>
<td>Germany</td>
<td>HP-RTM, WM</td>
<td>Automotive</td>
</tr>
<tr>
<td>CompressPlus</td>
<td>China</td>
<td>LFT-D</td>
<td>Automotive</td>
</tr>
<tr>
<td>CompressPlus</td>
<td>USA</td>
<td>LFT-D/GMT</td>
<td>Automotive</td>
</tr>
<tr>
<td>CompressEco</td>
<td>Great Britain</td>
<td>SMC</td>
<td>Automotive</td>
</tr>
<tr>
<td>Fiberforge</td>
<td>USA</td>
<td>Tailored Blank Line</td>
<td>Aerospace</td>
</tr>
<tr>
<td>Fiberforge, Fibercon</td>
<td>China</td>
<td>Tailored Blank Line</td>
<td>Research &amp; Development</td>
</tr>
<tr>
<td>Fiberpress</td>
<td>China</td>
<td>Tailored Blank Line</td>
<td>Research &amp; Development</td>
</tr>
<tr>
<td>CompressEco</td>
<td>Germany</td>
<td>SMC</td>
<td>Automotive</td>
</tr>
<tr>
<td>Fiberpress</td>
<td>Germany</td>
<td>SMC</td>
<td>Automotive</td>
</tr>
<tr>
<td>CompressEco</td>
<td>Great Britain</td>
<td>SMC</td>
<td>Automotive</td>
</tr>
<tr>
<td>CompressEco</td>
<td>Germany</td>
<td>SMC</td>
<td>Automotive</td>
</tr>
<tr>
<td>Fiberpress</td>
<td>Germany</td>
<td>SMC</td>
<td>Automotive</td>
</tr>
<tr>
<td>Fiberforge, Fibercon</td>
<td>USA</td>
<td>Tailored Blank Line</td>
<td>Automotive</td>
</tr>
<tr>
<td>Fiberforge, Fibercon</td>
<td>Europe</td>
<td>Tailored Blank Line</td>
<td>Leisure</td>
</tr>
</tbody>
</table>

DIEFFENBACHER GMBH
Maschinen- und Anlagenbau
Heilbronner Straße 20
75031 Eppingen, Germany
Phone: +49 7262 65-335
Fax: +49 7262 65-297
composites@dieffenbacher.de
www.dieffenbacher.com