

# APPLIED QUALITY SOLUTIONS



Composites Applications made by VOGEL - making the difference.



**Always keeping in mind the objective – this is what we are striving for. But finding out what our customers real needs are is the ultimate challenge.**

**Reaching this goal is - without doubt - a must for us, but to go even one step further by showing possible yet unseen optimizations means being the benefit that our customers value so much.**

VOGEL moulds and machines AG, based in Kaiseraugst, Switzerland, is a manufacturer of moulds, clamping units and dosing and mixing systems for thermoset processing, who has specialized in developing systems to uniquely fit customers specific needs.

VOGEL now transfers this know-how to the market for composites and wind energy applications. This is where VOGEL supplies turnkey production lines for complex components that are individually manufactured applying the vacuum infusion, compression moulding or resin transfer moulding (RTM) process.

More than 40 years of experience in the thermoset industry, several hundreds of successfully realized industrial projects, inhouse design and construction as well as top level technical manufacturing know-how, but most importantly though, abt. 200 highly dedicated specialists make VOGEL your partner of first choice.

**Norbert Maroldt**  
Executive Director VOGEL AG

# RESIN TRANSFER MOULDING (RTM) PRESSES

VOGEL moulds and machines AG develops and manufactures hydraulic presses in a wide range of sizes and configurations for the specific demands of each individual client.

Vertically operating presses in upstroke and downstroke configuration as well as horizontally working walk-in presses for specific applications in composite manufacturing are available in the VOGEL product line.

Clamping machines up to a clamping force of 10'000 kN to manufacture RTM parts are developed and produced according to customer needs. Presses with higher clamping forces are designed on request.

Moulds which are directly or indirectly heated are clamped onto the mould fixing plates of variable size.

Because of our innovative technical solutions VOGEL presses work with high precision, excellent energy efficiency and perfect parallelism.

The VOGEL Quick Mould Changing **QMCsystem** ensures an automated, quick and safe tool change in just a few minutes.

This QMC system is also fully customized and consists of a mould clamping system and a mould changing cart.

Moulds can be clamped manually or automatically with e.g. adaptive hydraulic clamping systems or newest magnetic clamping technology.

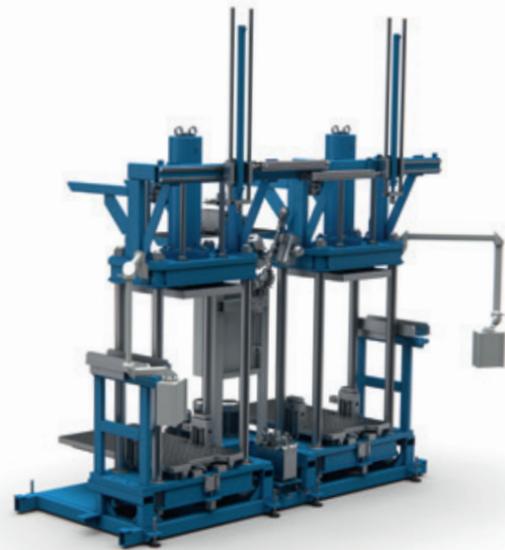
The mould changing cart is exactly geared to the customer's needs, from small manual operated carts and air cushioned floating carts to electrically driven automated guided vehicles AVG.

**Vacuum equipment** to run processes like RTM, Compression Molding and Compression RTM vacuum assisted

**Heating/cooling unit** for two heating zones with temperature range up to 240°C. Heating control unit integrated into the PLC

**Safety fully ensured** by safety fence, solid safety switches, safety laser grid and Sick laser

**Control unit** with programmable logic control (PLC), several modes of operation (manual, step by step & automatic) and interface to mixing & dosing equipment



RTM upstroke press in dual design with extendible tables for easy charging/discharging



## PRODUCT EXAMPLE



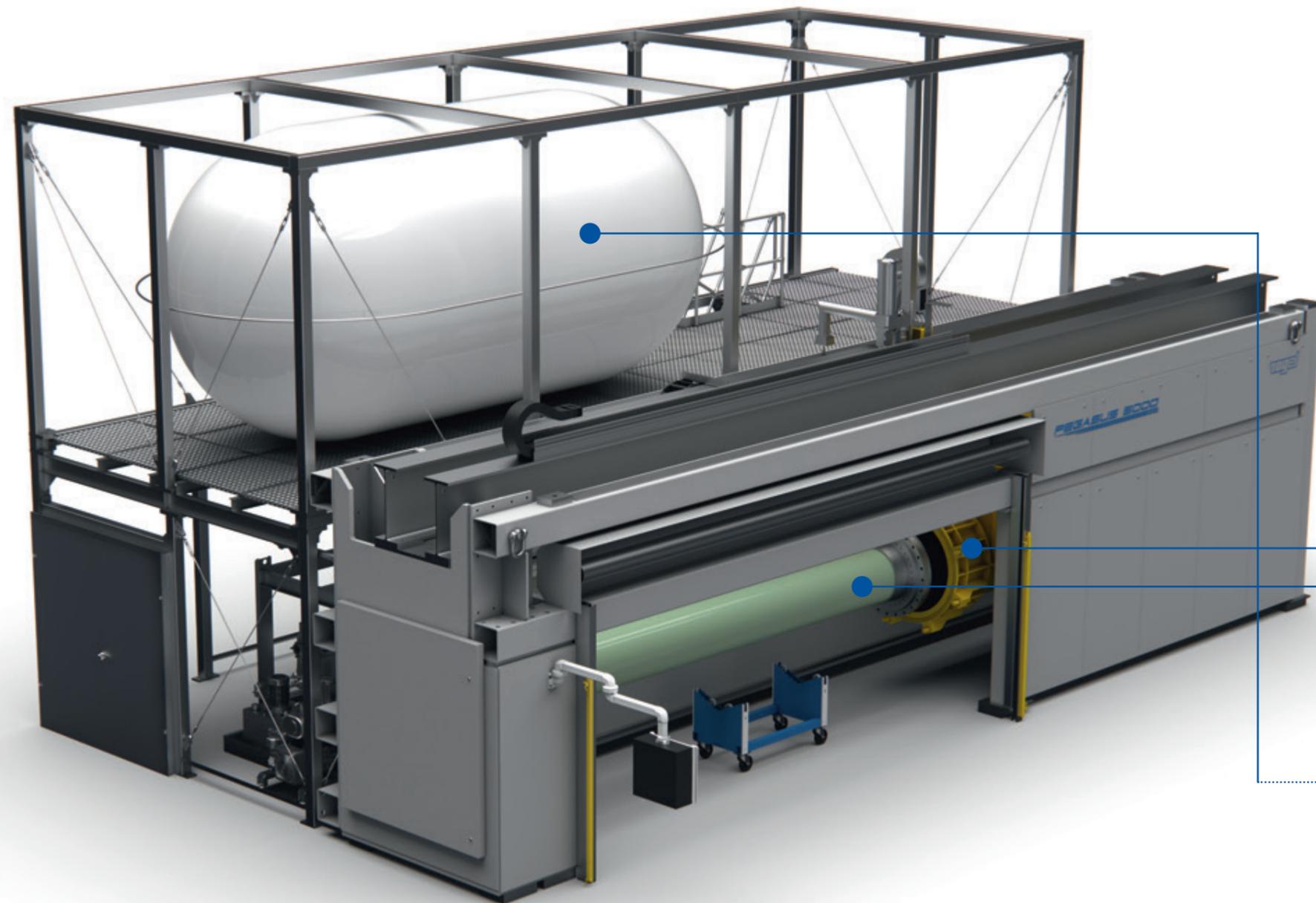
### HIGH PERFORMANCE

Carbon spoiler from the motor sports – as just one out of many possible applications.

## ADVANTAGES

- Vertically operating presses in upstroke and downstroke configuration
- Horizontally working presses
- Clamping force of 10'000 kN and higher
- Quick Mould Changing system QMC
- Directly or indirectly heated moulds
- Mould fixing plates of variable size
- High precision presses with excellent energy efficiency

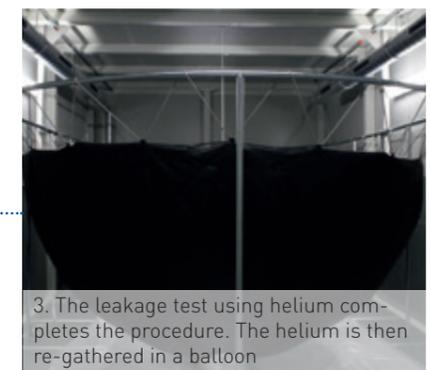




1. A bending die is used to test the rigidity of the GFK tubes



2. The pressure resistance of the component is checked in the vacuum chamber



3. The leakage test using helium completes the procedure. The helium is then re-gathered in a balloon

## PEGASUS 5000 TESTING SYSTEM

The Pegasus 5000 batch testing system represents a multifunctional equipment that has been developed according to the customers individual needs for the quality assurance of GFK tubes for hollow insulators of most various types.

This unique technology allows to fully automatically combine all quality checks. This means, the Pegasus 5000 does a bending, pressure and leak test all in one go. A bending die is used to test the flexibility of the GFK tubes in a first instance, the next step is to check the pressure resistance of the component in a vacuum chamber.

Finally, a leakage test using helium completes the procedure. This „all-in-one“ solution contributes to reducing the time and work efforts involved significantly.

### INNOVATIVE MULTI-TESTING SYSTEM

- Combined bending, pressure and leak test for most various GFK tubes (regarding their length, diameter, flange geometry)
- Quality check on the flange bonding
- Quality check on the coiled GFK tube
- Combination of checks considerably reducing the time needed
- Complex pressure- and vacuum-tight construction
- Customized development
- Successfully used at Reinhausen Power Composites RPC



## MOULDS

Moulds made by VOGEL have been designed and built to provide maximum precision and reliability. Each mould is adapted exactly to the individual machine, allowing to manufacture top quality components right from the start. The moulds are designed and developed using most advanced 3D CAD systems. They comply with the production demands, which have become more and more complex and faster with time.

Modern mould arrangement enables to produce dimensionally accurate parts right from the first shot. Every mould uniquely fits the customers needs and offers convenient and easy handling in perfect interaction with the press. Not least thanks to high-quality materials and high-tech thermal treatments, the moulds nowadays have become very long lasting.

Exchange kits or variable mould modules can be used flexibly as per individual needs – independently moving mould core pullers are possible too. The modular mould design as common today allows a short, easy retrofitting.

All moulds can be provided with direct heating or be heated indirectly by means of heating plates of the press. The moulds can be heated up to the desired temperature either electrically via heating cartridges or by means of heat/cool bores and external heating/cooling units.

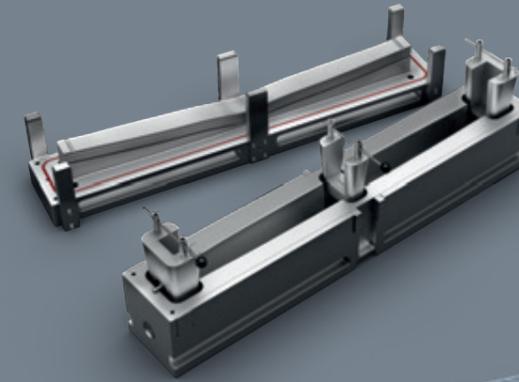
In order to avoid product rejects due to dry spots, fibre wash, shrink holes, incomplete curing or exothermic temperature overload (to name but a few), Vogel's mould design takes into account the characteristic features of thermoset processing.

Pressure sensors and dielectric sensors to determine the degree of curing as well as flow rate sensors are used in our moulds to capture in-situ the essential factors for process optimization and production monitoring and control (e.g. to close vacuum valves, control increases and overruns resp. regulate the holding pressure). Process phases like evacuation, filling and curing are thus registered by measuring instruments.

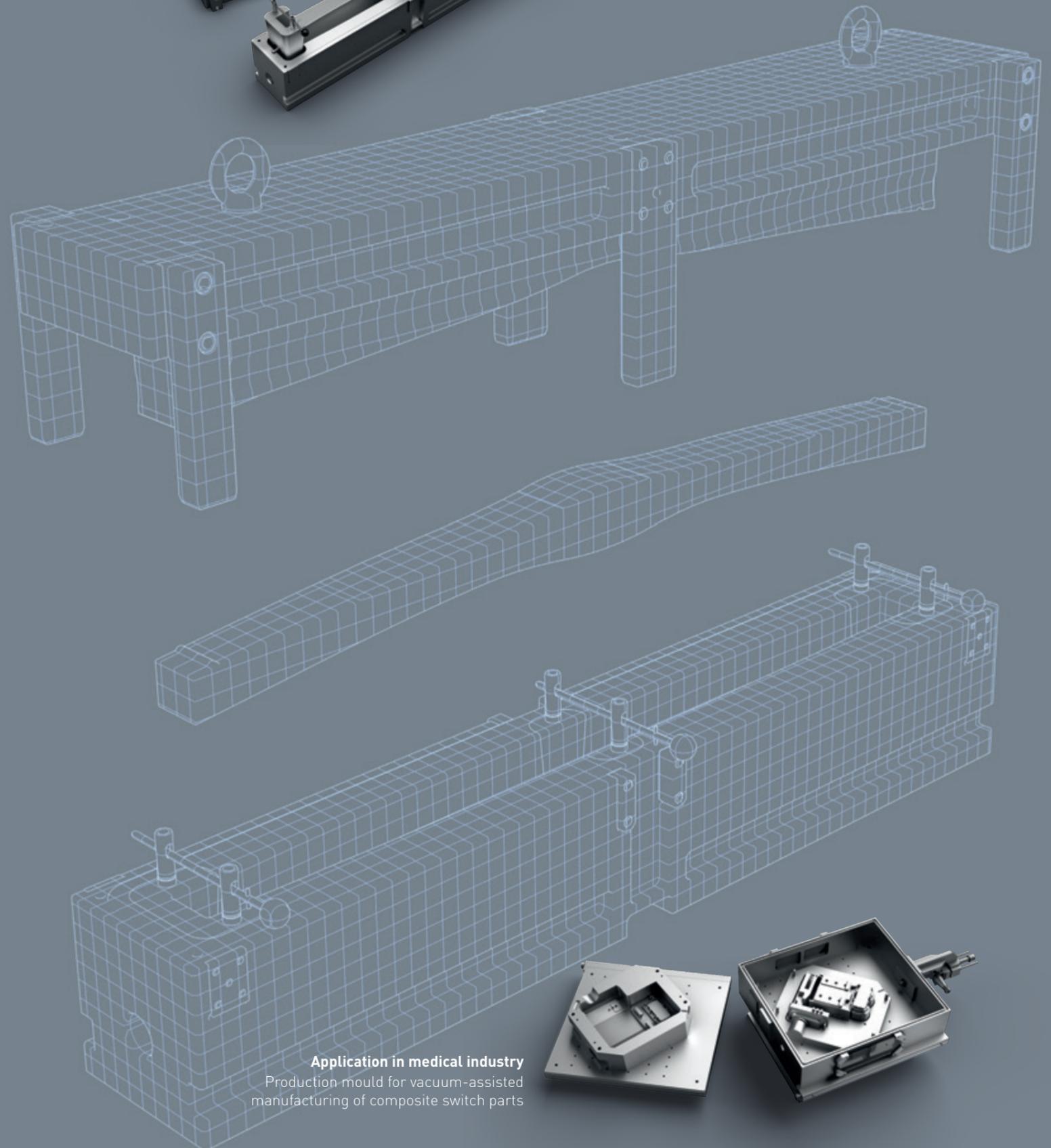


### APPLICATION RANGES OF THE COMPOSITES MOULDS

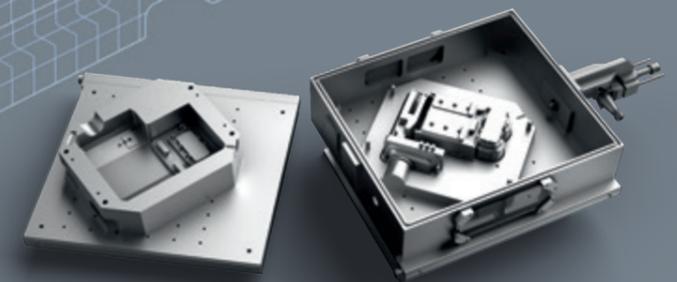
- Resin Transfer Moulding RTM
- Compression Moulding
- Compression RTM
- Vacuum-assisted Variations of the mentioned processes
- Vacuum Infusion



**Automotive application**  
GFK leaf spring for commercial vehicles



**Application in medical industry**  
Production mould for vacuum-assisted manufacturing of composite switch parts



## MIXING AND DOSING EQUIPMENT TYPE DOSKOCOMPOSITES

The VOGEL mixing and dosing equipment type **DoskoComposites** covers all composites applications, from the Resin Transfer Moulding (RTM), the Vacuum Infusion process to the Filament Winding and Pultrusion process. The systems can - after appropriate adaptation - also handle bonding and sealing purposes.

VOGEL mixing and dosing equipment type **DoskoComposites** processes materials of different viscosities. The standard equipment is capable of feeding material out of 20 and 200 liter barrels as well as IBCs. The components are transported by means of independently powered pumps, that allow their function to be adapted to the technical demand, and eventually filled into the mould through a mixing element.

The dynamic material degassing system is the optimum solution for degassing low- and high-viscous liquid components. On grounds of the special design, the material is distributed in thin, steadily renewing layers, and is degassed.

Individually equipped with the optimum type of pump, all VOGEL mixing and dosing systems type **DoskoComposites** entail a uniform flow of material, constant mixing ratio as well as precise filling speeds and volumes for materials and components of different viscosities.

An automatic bleeding of the follower plates and automatic purging of the pumps grant a complete venting after changing a barrel when discharged by means of barrel follower pumps, with only a minimum level of material consumption and without any bad influence by operator faults. This reduces both rejection rate and material waste.

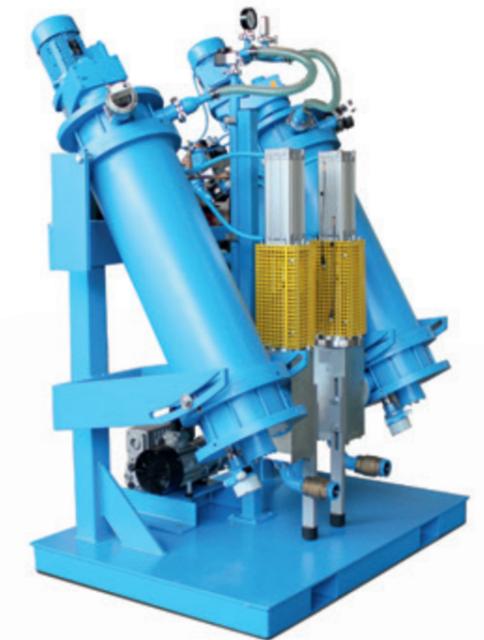
The specifically developed **DoskoComposites** control and software system offers highest flexibility in selecting the filling profile. Up to 30 predefined filling processes can be freely programmed and supply several consumers at the same time. Various interfaces of the integrated control enable a communication with the press or the mould carrier.

For all kinds of processing methods applying reactive resin systems, the modular arrangement allows to combine the modules: barrel discharge, preparation/degassing, mixing and dosing, adding up to the optimum of an equipment solution.

In close cooperation with users, material suppliers and testing labs, The company VOGEL has kept developing and perfecting his mixing and dosing systems over and over.

The innovative equipment for the application of fixing resp. bonding agent for fibre positioning in Preform manufacturing has already been gathering a lot of attraction in various industrial ranges.

For highly viscous filled materials (e.g. 2K adhesives) as well as highly diversifying viscosities of components, VOGEL grants a homogeneous mixing ratio by means of the metering via dosing piston. Continuous circulation of the delicate hardener component under vacuum prevents filler sedimentation and ensures a constantly perfect mixing quality at the adhesion point.



Dynamic Material Degasser

The Sticky Spray application now allows to take the bonding agent directly out of a 25kg Hobbock and apply it to the fibres to be fixed.

This innovation has especially been develop-ed for customers from the wind energy and automotive sectors.

### ADVANTAGES OF THE VOGEL MIXING AND DOSING EQUIPMENT TYPE DOSKOCOMPOSITES



- Dynamic degassing system for highest efficiency
- Highest precision even at different viscosities
- Compact and space-saving arrangement
- Venting of follower plates and pumps after a barrel change
- Management of up to 30 filling profiles
- Easy disassembly and cleaning of mixing element
- Low residual quantity in the barrels
- High precision of the mixing ratio
- High precision of the absolute filling quantity
- Shutting-down possible via pressure sensor in the mould
- Energy efficient by standby mode of the hydraulic system
- Remote access and service possible
- Low maintenance
- Corresponding to machinery directive 2006/42/E



DOSKOBOND 2K-bonding machine



StickySpray Application



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