High Pressure Resin Transfer Molding

Turnkey production line for high-volume mass production

Why is our HP-RTM line so efficient:

- Comprehensive, product-oriented process and line concept
- Completely automated production
- Short cycle times
- Use of highly reactive resins
- Components with a high fiber content by volume
- High process stability
- Excellent component properties
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Preform-Center
Made-to-measure manufacture of preforms with a stable shape, from dry fabrics made from carbon, glass or aramide fibers.

Features
- CNC cutting system without additional ancillaries
- Simple programming of CNC data from CAD section data reversible
- Safe handling of flexible semi-finished textile parts
- Compact design of the preform center
- Automated draping station for manufacturing dry textile preforms
- Bonding of preformed carbon sheets for preforms with shape stability
- Optimum utilisation of material
- Automated, multi-layer stacking of individual layers

Press peripherals
Approved individual components for rationalizing production sequences improve the efficiency of the HP-RTM production line and ensure reproducibility

Features
- Robot and gripper technology for loading and unloading
- Gripper change systems
- Automated mold cleaning
- Component charge carrier systems
- Mold temperature control systems
- Vacuum systems

Press technology
Modern and flexible press concepts for high-volume mass production

Features
- High-precision and fast parallel motion control
- Bending line of table and slide with precise overlap
- Production moving bolster for increasing productivity
- Special press operating programs for RTM and IMC
- Interfaces for line automation, integration of the dosing system
- All-round accessibility
- Energy-efficient presses
Mold technology
Mold design and development from simulation to the component

Features
- Mold temperature-control
- Special sealing systems for HP-RTM
- Integrated vacuum system
- Integrated sensors for monitor mold filling
- Mold design based on simulation

Finishing
High-precision routing for flexibility in processing the end product

Features
- Resin injection at up to 100 bar cavity pressure
- Closed loop control of resin injection for optimum mold filling
- High-precision/repeatable admixture of internal release agent to the high-pressure mixing head
- Self-cleaning mixing head system

Metering system
Innovative metering system to process highly reactive resins

Features
- Special vacuum-aided component-storage tanks
- Steady, precise temperature regulation with constant operating point
- Energy-efficient heating concept
- Optimized, corrosion-resistant pumps
- Direct heating of component feed lines and all other elements in contact with resin
The three cooperation partners, Dieffenbacher, KraussMaffei and the Fraunhofer ICT, have pooled their expertise and set themselves the goal of working together on product-oriented developments for the global marketing of turnkey systems for the high-pressure resin transfer molding (HP-RTM) process. Together, the partners are capable of delivering the entire process sequence from unwinding the textile semi-finished product (e.g. CFRP fabric) through to final processing of the finished composite fiber component, by means of turnkey machinery with high system competence.

Machines in production status have been set up at the Fraunhofer Institute for Chemical Technology using the latest Dieffenbacher press and system technology as well as a KraussMaffei HP-RTM injection machine. By using the extensive materials competence that is available on site, it is possible to advance the development of machines and process technology comprehensively. In this way, the technological leadership enjoyed by the cooperative venture is being strengthened in the long term and indeed boosted even further.

The cooperation stands for:
- Machine, mold and process innovations from a single source
- Combined expertise along the entire HP-RTM production sequence
- Independent development center with production capability
- Process-oriented component design and development
- Benchmarking and comprehensive evaluation of the press technology compared to alternative technologies