The Forum Composite Technology is made up of nine VDMA associations bringing together machinery manufacturers’ skills in the conversion of fibre composites. As central contact point for the industry, the forum is the interface to all firms, associations and institutes involved in the manufacturing or conversion process and the application of composites, offering all partners a platform for cross-technology exchanges.

The Forum is chiefly concerned with:

- Markets and customers: cooperation and exchange between associations, clusters and other customer industry organisations
- Exhibitions policy: as patron of the COMPOSITES EUROPE trade fair, the forum is establishing an important trade fair hub in Germany
- Understanding the process: fostering innovative ability based on a common understanding of the process along the entire supply chain
- Research: networking of research and industry to promote pre-competitive research
- Public relations: joint articulation of interests and concerns of public relations activities
- Sourcing service: the forum’s member companies present their range of products and the services they offer in the Composite Arena

Further flyers available on these topics:

- Resin transfer moulding (RTM)
- Processing of thermosetting semi-finished products
- Understanding the process: fostering innovative ability
- Public relations: joint articulation of interests and concerns of public relations activities
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The cycle time for thermoplastic compression moulding is determined primarily by the heating and cooling time of the thermoplastic. All other processes can be accelerated e.g. using appropriate forms of automation.

Process characteristics:

- Complex three-dimensional components possible
- Semi-finished products can be stored indefinitely at room temperature
- Relatively short cycle times
- Geometry limited by feasibility of the semi-finished product
- Good surface quality on both sides (depending on tool)
- Finishing (cutting, edge processing) required, but some may be integrated into the press
- Components easy to weld
- Conversion of high temperature thermoplastics (e.g. PEEK) for high operating temperatures relatively expensive
- Sophisticated plant technology (even sheet warming, handling of warmed sheet, moulding press, etc.)
- Manufacturing may be automated
- High investment costs for high level of automation
Machines for the production of textile structures are prepared for use in organic sheets.

Accessories

- Weaving machines
- Warp knitting machines
- Flat knitting machines
- Fibre placement lines
- Machines for the production of nonwovens
- Preparatory machines for natural fibres
- Drafting systems for filaments and tapes
- Drafting systems for animal fibres
- Other processes for impregnating the textile are spreading thermoplastic powder and then melting it with infrared radiation, dissolving the thermoplastic in solvents and impregnating the textiles by dipping, or impregnating the textiles with caprolactam and polymerising them to polyamide.

The next step is to make a flat, planarised semi-finished product from the fibres and thermoplastic.

In the case of long fibres reinforced thermoplastics (SFT), cut fibres are added to the plastic direct or granulated and converted into sheets using an extruder.

For glass mat, preformed glass mat is impregnated with molten thermoplastic. This is normally done while applying heat and pressure, in double-belt processes for example.

For the purpose of manufacturing semi-finished products with fully impregnated and consolidated filament structures called “organic sheets”, since they have similar working properties to sheet metal, the reinforcement textile is pressed with extruded plastic and/or separately prepared films in discontinuous, semi-continuous or continuous plants.

For glass-mat-reinforced thermoplastics (GMT), the mats are impregnated with molten thermoplastic. This is normally done while applying heat and pressure, in double-belt processes for example.

The next step is to make a flat, planarised semi-finished product from the fibres and thermoplastic.

In the case of long fibres reinforced thermoplastics (SFT), cut fibres are added to the plastic direct or granulated and converted into sheets using an extruder.

In order to mould the fibre composite sheets, they are heated by radiation either inside or outside the press. They are then formed using temperature-controlled tools. The tools used may be two-sided or single-sided with vacuum. The raw component can be removed after cooling.

For finishing with high-precision machine tools, a distinction is made between the introduction of functional geometries and fine surface finishing. For functional geometries, methods such as drilling, milling or laser beam and water jet cutting are used, while fine surface finishing is normally done by grinding and polishing.

Unlike metallic materials, the properties of composites are determined chiefly by the direction of the fibres in the component. This means that fibre composite materials cannot be machined equally well in all directions.

If the composite consists of layers with the fibres in different directions or composite layers are combined with layers of metal, the machining process is even more complex.

Joining technology for composites

Robots + automation covers the three fields of robotics, integrated assembly solutions (virtual and real) and automation and industrial image processing. These technologies are important building blocks for the economic series manufacture of filament-reinforced products. The positioning and alignment of non-crimp fabrics, the handling of semi-finished products and the robotic finishing of components are examples of how they can be applied. Image processing provides reliable monitoring to ensure that all important manufacturing parameters are maintained and that quality is reproducible and assured.

Quality assurance is an essential aspect of measurement and testing technology. Quality assurance systems in the production process have many advantages for the user, such as lower production costs resulting from the better utilisation of resources. A high level of process reliability means less waste and hence ultimately lower costs arising from guarantee commitments and more satisfied end users.

Relevant machine groups

Machining processes (machining)

- Coating machines
- Heating and cooling technology
- Forming machines
- Cutting and splitting machines
- Machines for surface treatment
- Drilling and milling machines
- Precision tools for composites
- Cutting tools
- Clamping tools
- Joining technology for composites

Machines for the production of textile structures

- Machines for the production of carbon fibres
- Machines for the production of glass fibres
- Machines for the production of aramid fibres
- Drafting systems for filaments and tapes
- Cutting converters, stretch-breaking machines
- Preparing machines for natural fibres

Relevant machine groups

Machines for the production of semifinished products

- Handling technology
- Robots
- Other handling equipment
- Equipment for linking and transport

Measurement and test systems

- Test systems for fibres, yarns, fabrics, on-line
- Test devices for fibres and filaments, off-line
- Test devices for staple fibres and filament yarns, off-line
- Test devices for composites and fabrics, off-line
- Gages and precision measuring equipment
- Measuring machines
- Machine vision and optical sensors
- Test devices for contaminants

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