

# HENNECKE PRESS RELEASE

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## **PUR-CSM – Open to many applications**

**Under the name PUR-CSM Multitec® Hennecke GmbH is marketing a new variant of its polyurethane spray technology. This new processing technique in our CSM portfolio requires only one mould half and no mould carrier.**

When processing Multitec® – an innovative raw material developed by Bayer MaterialScience AG – using the PUR-CSM method, cut long fibres are combined with the PU mixture and injected into an open mould. The injection is done in multiple layers – compact or foamed, with or without reinforcement. The raw material system is then allowed to cure in the open mould at ambient temperature within moderate mould cycle times.

Due to the multi-layer spraying into the open mould and curing in the open air only one half of the mould is required which, given the low mechanical and thermal loads involved, may quite suitably consist of a synthetic resin. As a result, not even a mould carrier is necessary. The low mould costs and the elimination of the mould carrier make processing Multitec® with the CSM method particularly attractive for the production of larger mouldings and/or small-to-medium production runs, since they translate into a significantly reduced investment outlay.

### **Multitec® - the "multi-talent"**

Bayer MaterialScience developed the Multitec® reactive multi-component PUR spray system *inter alia* for producing large-surface mouldings made from polyurethane.

Multitec® consists of an isocyanate and two polyols (one fast, one slow reacting) which can be added in variable proportions. Depending on the application, diverse additives such as colorants, blowing agents (for producing foam-cored sandwich structures or shaping complex geometries) or chopped reinforcement fibres can likewise be metered into the mix.

The new spray system can be combined with a great variety of surface finishing technologies, from classic paint to back-spraying of gel coats (in-mould coating) or thermoplastic films.

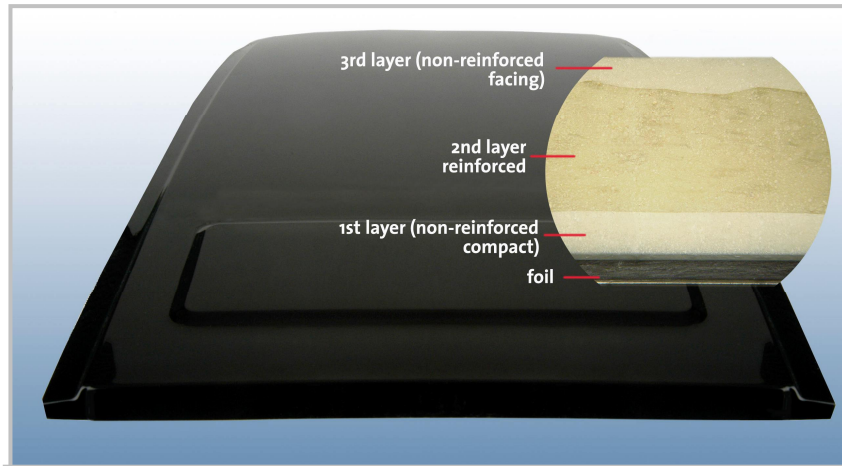
Unlike glass fibre reinforced (GRP) systems based on unsaturated polyesters (UP) and epoxide resins, Multitec® does not require the use of solvents such as styrene. This is more than a cost benefit. Recent legal changes impose reductions in workplace emission limits, and styrene as a basic hardening element of UP resins falls under these regulations.

## Made to measure

When processing Multitec® using the CSM method, the release agent is first applied to the mould. This is followed by the direct multi-layer spray application of the mix into the open mould, which may be varied at will depending on the application: compact or foamed layers with or without reinforcing fibres. By

selectively controlling the layer structure, it is possible to achieve exceptionally good surface properties.

The product is demoulded after curing. Optionally, a gel coat can be introduced or a preformed surface film can be placed in the mould before

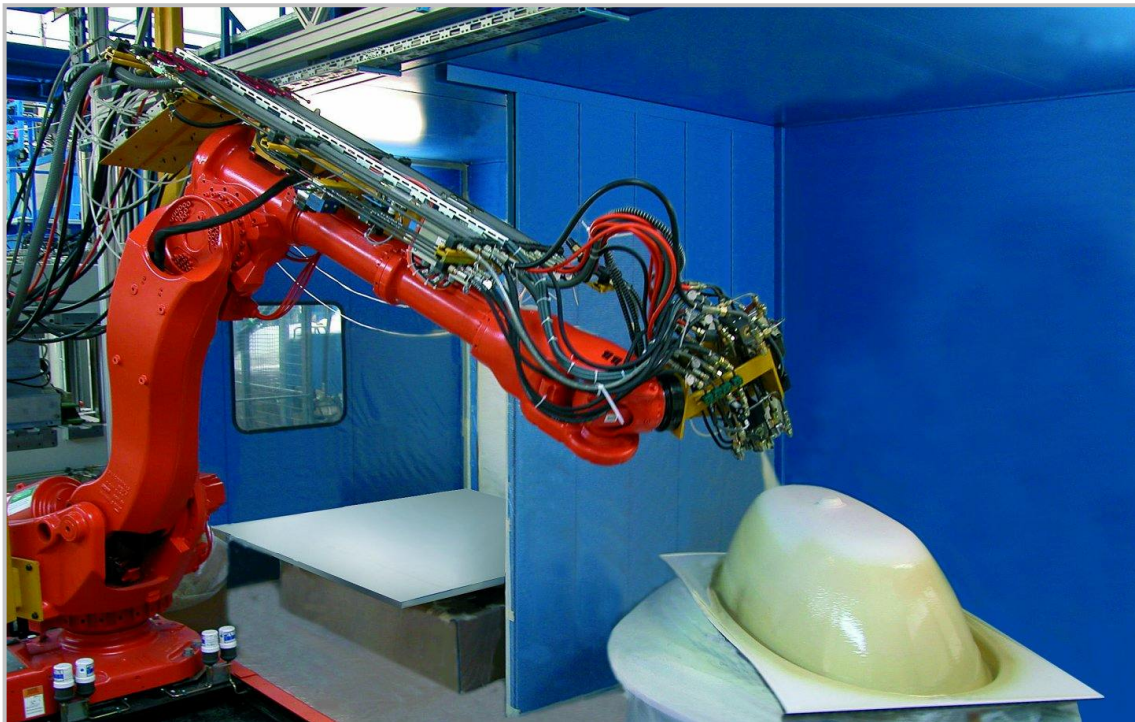


*Illustration 1: Film-laminated PUR-CSM Multitec® moulding  
Photo: Hennecke GmbH*

the spray application cycle; in these cases, no release agent is applied.

The process distinguishes itself by the fact that it supports fibre lengths of 5 - 12.5 mm at fibre concentrations of 10 - 25 %, as well as by the high uniformity and reproducibility of the PUR mix application. Via a patented pneumatic feeding unit the reinforcing fibres are wound off a glass roving reel and subsequently cut to the desired length by a special cutting device located near the mixhead.

CSM Multitec® can yield individual layers measuring less than 1 mm in thickness. No run-off will occur even when the system is sprayed on sloped surfaces. Automatic spraying can be implemented by robotizing the process. One main field of application for CSM Multitec® is the substitution of classic GRP mouldings with fibre spraying techniques. This technology was successfully pioneered by DECS Kunststoff- und Gerätetechnik GmbH, an East German company which uses the new PU spraying method to reinforce the underside of bathtubs. Other applications include mouldings that must meet more exacting surface quality standards, e.g., add-on parts for agricultural machinery and commercial vehicles.



### **PUR-Composite Spray Moulding (PUR-CSM)**

**PUR-CSM Multitec®** is the newest addition to a range of well-proven PU spraying techniques marketed by Hennecke under the heading of **PUR-CSM**. The name is an abbreviation of the term *composite* for fibre-reinforced or filled PU products, and *spray moulding* to denote the core processing step.

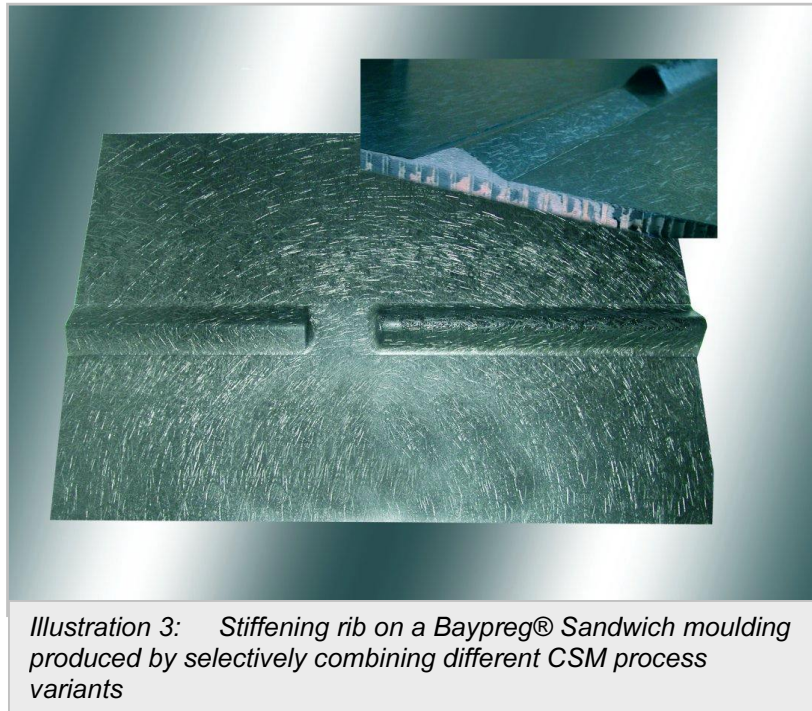
One example is the cost-efficient production of long glass fibre-reinforced automotive mouldings using the CSM method. Instead of using pre-fabricated fibre mats, glass rovings are dispensed from a reel and cut to length before processing them, for instance, together with the raw material Baydur® STR from Bayer MaterialScience (**PUR-CSM Baydur®**). In contrast to CSM Multitec®, this technique involves shaping of the material in a closed mould.

With CSM technology, natural fibre mats made from flax, sisal, hemp, etc., can be compressed into thin-walled, extremely lightweight automotive mouldings using Baypreg® F or similar raw material systems (**PUR-CSM Baypreg® Natural Fibre**). The products are noted for their high flexural modulus and elevated bending strength.

This group of raw materials can also be used to produce sandwich structures made of honeycomb or corrugated core layers faced with glass fibres in a polyurethane matrix on both sides. (**PUR-CSM Baypreg® Sandwich**). These composite mouldings possess a broad weight-specific range of characteristics and significant lightweighting potential.

Another possible application based on Hennecke PUR-CSM is the processing of barite-filled PUR systems such as Bayflex® SP, which has been successfully implemented in the vehicle construction sector to manufacture sound and vibration absorbing products (**PUR-CSM Bayflex®**). However, Hennecke's new spray mixhead MN10 is capable even of processing

other abrasive fillers like glass and mineral fibres, mica, stone powder, calcium carbonate or melamine, which are used to manufacture flame-resistant mouldings.



If necessary, the various production technologies can be selectively combined. Baypreg® Sandwich mouldings can thus be partially reinforced or provided with stiffening ribs by locally applying a larger amount of raw material and chopped fibres. This is the case, e.g., when processing Multitec® and Baydur® – users will need to invest only once to obtain the benefits of two spray application processes on the same machine.

### **Spraying does it**

A combination of different PUR-CSM technologies is made possible by the fact that all processes are based on the same machine concept. Depending on the application, the various "modules" of the CSM technology can thus be combined to a customized process to suit the field of application.

The key "module" is Hennecke's spray technology, which relies on operating-point-specific spray nozzle characteristics. The nozzle performance curve defines the effective spraying width as a function of output and spraying distance – a decisive prerequisite for selecting the right nozzle and determining the appropriate discharge flow rate and spraying distance. As a result, the spray pattern can be planned with precision for a specific requirement.

The bell-shaped spray profile with its decreasing PU mass distribution towards the edges is typical of Hennecke equipment. This design ensures a defined overlap area between paths without localized excess PU build-up. The mass distribution quality can be controlled over the path distance. Thus, a minimal reduction in path width will suffice to adapt the spray quality to exacting moulding standards.

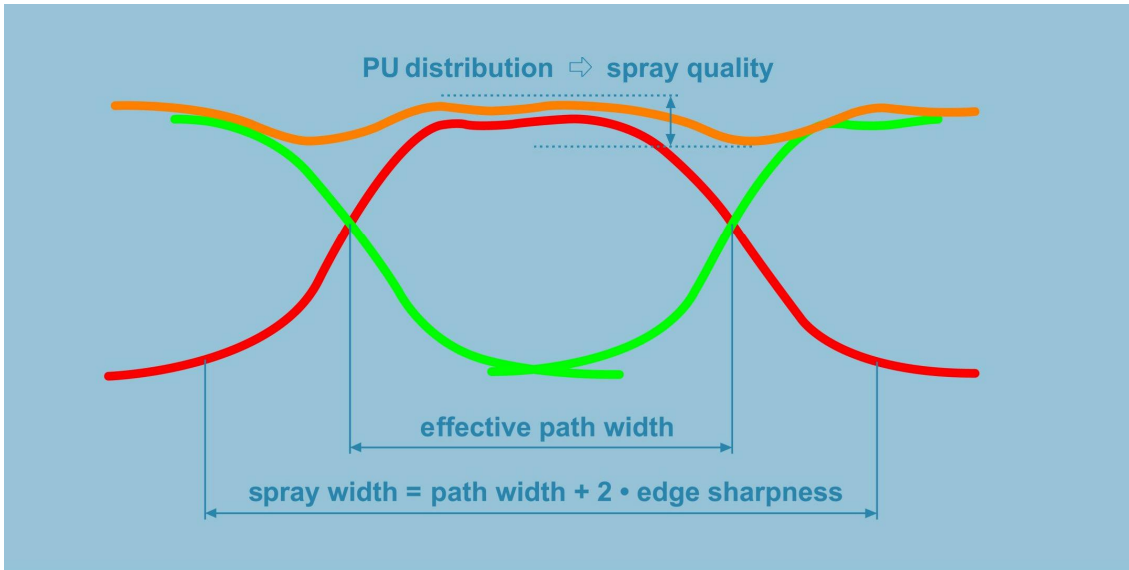


Illustration 4: Schematic view of a spray process design

Both parameters – i.e., the nozzle performance characteristic and the specific spraying profile – form the basis for a precise design of the spray process and a highly uniform PU distribution with area weight deviations of under 10%, for instance.

The output rate of the spray nozzles can be varied from locally focused to broadly spread, even during a production run. Since no nozzle cleaning is necessary between shots, maintenance is clearly reduced – another key benefit of Hennecke's PUR-CSM spray technology.

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