

## Surface finishing now with more horse power

**To date, decorative parts made of precious wood used for vehicle interiors had to be sealed in a time and labour intensive process. Hennecke's ClearRIM technology represents a major breakthrough in this field.**



BMW cockpit featuring components with ClearRIM wood veneer surface

*Photo: BMW AG*

Horsepower and a high-gloss body are not the only things that matter when purchasing a car. Drivers, both men and women, do in fact also appreciate a fine interior design. Whilst traditionally only grand limousines were furnished with decorative trims, centre consoles, steering wheels and gear lever knobs made of real wood, many automotive manufacturers have now also started to enhance their medium sized models with such decorative parts.

Only a few people however know at what price such fine appearance comes: To achieve a surface quality that matches the automotive manufacturers' requirements in terms of gloss, mar resistance, resistance to ultraviolet rays and thermostability, these parts have to date been coated with special polyester varnishes. This requires up to six coating and drying procedures. But it doesn't end there. Another step is required to sand the parts until they have a uniform coat thickness. Even then the part is still not ready to be fitted in the vehicle. It must first be polished, milled and the edges need to be dyed. This extensive manufacturing process stretches over a period of several days and involves a high degree of manual labour. It is only natural then that for years experts in the automotive and sub-supplying industry have been under pressure to find alternative solutions.

Hennecke GmbH has managed to achieve the breakthrough by developing its ClearRIM technology. In combination with a clear polyurethane system this new process ensures that these types of parts can be sealed with a high-grade surface finish while the curing time amounts to merely two and a half to four minutes. At the same time, this technology drastically reduces the required amount of re-work while also lowering the parts' emission rate by 90 per cent in comparison to varnished parts.

The first production line of this type was commissioned in May 2001 at HIB, a company of the Dräxlmaier Group based in Bruchsal/Germany. The parts manufactured here will be supplied to DaimlerChrysler.

### **Clear surface – clear advantages**

ClearRIM technology is based on a RIM process which has been successfully used in the manufacture of vehicle body parts for many years. The new ClearRIM involves the following processing: The component with a precious wood veneer on its visible side is placed into a mould. The generated gap of typically 0.8 millimetres between the veneer surface and mould cavity is then filled based on high-pressure technology by a piston-cleaned and loss-free operating mixhead.



ClearRIM production line at HIB based in Bruchsal

*Photo: Hennecke GmbH*

In comparison to spray-coating the amount of re-finishing work is extremely low because the extensive sanding process is no longer required.

ClearRIM has also other (crystal-) clear advantages over varnishing. In addition to the above mentioned reduced emission rate of the built-in parts, discoloration during heat-proofing is also significantly lowered. And no so-called "overspray" can occur as it does in spray-coating polyester-based varnishes which entails an expensive, environmentally compatible disposal of the unused varnishes.

### **The need for know-how**

This may all sound very simple, but in practice it is indeed far more complex. There are only a handful of companies like Hennecke that can offer the required know-how and necessary precision technology. As Thomas Kirsten, Hennecke's manager Marketing-Communications, puts it: "ClearRIM technology makes maximum demands on the high-pressure pumps' metering accuracy and on the quality of the high-pressure mixing process because the output quantities are often so small they comprise merely a few grams".

The production line erected at HIB is fitted with an MT 5 recirculation mixhead which was developed in 1998 especially for processing minute quantities. Here, both of the liquid polyurethane components, i.e. polyol and isocyanate, are separately delivered through the mixhead's injectors before the actual shot is carried out. This ensures that the raw-materials are properly conditioned from the very first processing drop. Given a shot duration of 0.3 seconds and an output of 4 grams per component per second, shots as small as 2.4 grams are feasible.

The foaming machine, in HIB's case a special-design HK55, is furnished with an automatic metering output adjustment that works true to the formulation guaranteeing the optimum filling time in terms of laminar mould filling for each component. This is a very important aspect since slight

turbulence in filling can generate tiny air bubbles which means that the part has to be rejected. The required raw-material processing temperature in excess of 50 degrees Celsius represents another technical challenge.

As conventional RIM processes, ClearRIM can also operate with a mixhead that is permanently fixed to the mould with the reaction mixture being delivered via a mould film gate to the mould cavity. In such cases, the foaming machine is usually equipped with several mixheads.

The advantages of ClearRIM technology are more than clear in the truest sense of the word: a clear glossy surface with a top-quality finish; drastically reduced processing times; a minimum amount of re-work; small material losses and disposal costs, as well as a 90 per cent reduction of the emission generated by the parts fitted in the vehicle's interior. It is quite obvious that such immense impacts on economic efficiency can only be achieved if the scale of production is correspondingly large because the purchase costs for the moulds and foaming machine are relatively high.

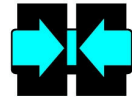
Hennecke has appointed a special team of experts currently working on solutions to apply ClearRIM technology also to other fields of application. Very promising results have already been achieved in coating parts for the furniture industry, optical industry and medical equipment.

	<b>Spray Coating</b>	<b>ClearRIM Technology</b>
<b>Raw material</b>	Polyester varnish.	Polyurethane.
<b>Process principle</b>	Several spray-coated layers involving up to six varnishing and drying steps.	A base part is coated/covered with a thinly cast PU layer.
<b>Curing time</b>	Up to three days.	Two and a half to four minutes
<b>Refinishing work</b>	Extensive: grinding, polishing, milling – mainly manual work.	Small amount of repolishing required.
<b>Emission rate</b>	90 per cent more than parts made with ClearRIM.	90 per cent lower than spray-coated parts
<b>Operating costs</b>	Substantial costs due to complex manual work and long processing times. Overspray causes material losses and additional disposal costs.	Low, based on a minimum extent of manual work and drastically reduced processing times.
<b>Invest</b>	Low, however with extremely high running costs.	Higher (moulds and foaming machine), however offset by very low running costs.

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