

112 INNOVATIONS

>> Hennecke customer journal for technologies and trends on the PU market

COVERSTORY:
High pressure meets lightweight – the production of composite parts is booming in the automotive industry

ENGINEERING:
No experiments when it comes to test runs – LABFOAM system's technology for trials and laboratory purposes

HENNECKE GROUP:
ShreeMalani: Efficient slabstock production in India



Dear customers,
dear readers,

This year, one of the most versatile materials in the field of plastics processing celebrated its 75th anniversary: Polyurethane. Its importance is unquestioned today, but the growth rates of raw material consumption in recent years and the increasing number of areas of application show that this rightly celebrated anniversary is just one stage in the outstanding success story of polyurethane. The combination of tradition and future is also a key element in the history of the Hennecke Group: extremely broad based, at home in all areas of application and a traditional innovation driver. The close relationship between Hennecke and the triumphant success of polyurethane is also demonstrated in the current issue of our customer magazine INNOVATIONS (s. page 15). The material has not lost any of its fascination throughout the years – in fact, the opposite is true: The general efficiency discussion gives enormous scope for forward-looking applications. For example, when it comes to the automotive industry's demand for reducing the weight of car load floors (s. page 4). But because of its continuous efforts to improve and expand its product portfolio, Hennecke is also able to push the limits of traditional applications (s. page 8 and 10). The same is reflected in Hennecke's new website which is as broad based as its product range. Apart from a new design, the focus is on functionality and a structured flow of information (s. page 19). We invite you to visit us at www.hennecke.com and, for example, download your copy of our customer magazine. I hope you will enjoy reading it and find some interesting news.

Dates

FAKUMA

Friedrichshafen
16.10. - 20.10.2012

FEIPUR + FEIPLAR

Sao Paulo
06.11. - 08.11.2012

**TECHDAY HENNECKE
KOREA**

Seoul
16.11.2012

BIG FIVE

Dubai
19.11. - 22.11.2012

ACMA

Orlando
29.01. - 31.01.2013

INTERPLASTICA

Moscow
29.01. - 01.02.2013

As at October 2012

Rolf Trippler
Managing Director Sales



Efficient production process for composite parts



ShreeMalani: Efficient slabstock production in India



Relaunch: New Hennecke website



No experiments: LABFOAM systems technology

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High pressure meets lightweight – the production of composite parts is booming in the automotive industry

The use of fibre composites often starts when the characteristics of other materials no longer meet the customer's requirements. In the manufacture of car load floors, the specific properties of light composites combined with a polyurethane matrix completely meet the mark: complex geometries that are extremely stable and very light. Covering over 90 percent of the market, PUR-CSM technology (Polyurethane Composite Spray Moulding) makes full use of its unique selling points in this area of application and is known for providing reliable production conditions that are perfectly suited for large volumes.



Composites or composite materials in general describe a material that consists of at least two components. What is known as the matrix component guarantees that the compound's interior is coherent. A three-layer sandwich structure is often used in composites, especially in the field of automotive lightweight construction in which flat and shell-shaped panels have to resist high bending loads. The top and lower facings are made of a fibre reinforced composite that ensures the compound's flexural strength and resists the pressure and tension stress that arise. The fibres function as reinforcement components and are connected to each other by a fabric construction or a solid mat. In the automotive area, materials such

as carbon or glass are mainly used because of their extremely high strength values. For reasons of cost, carbon is usually applied in the high-end of the market whereas glass features in serial applications. The matrix component in the composite serves to fix the reinforcement component. It wraps the fibres and makes sure that the composite between the core and the facing is cohesive. It also allows for a consistent force distribution to the fibres as well as an efficient protection against outside influences. In the automotive industry, a short production cycle time is required to meet the demand for large quantities. For this reason, polyurethane (PU) is preferably used for fixing glass fibre mats because its controllable foaming properties facilitate lightweight

construction. Thanks to its fast reaction, it also meets the short cycle times required. In a sandwich construction, the PU matrix not only fixes the glass mat but also links the core, which is made out of a paper honeycomb structure, to the facings. The core itself can be composed of different geometries and materials. In serial automobile manufacture, paper honeycombs are often used as the core of sandwich structures. This is particularly because of their high strength as well as their low weight. Moreover, paper is very easy to recycle. This combination of materials allows for the manufacture of composites that exploit and boost the positive characteristics of the individual components while cancelling out unwanted features. End products thus benefit from high component strength and stability combined with low weight.



Efficient sandwich handling also in mass production applications: robot with gripper system

Efficient production process with PUR-CSM

Composites and sandwich constructions are often used to manufacture the load floors of car trunks in serial applications. Sandwich blanks form the point of departure for making these load floors. A paper honeycomb is wrapped in a glass mat. The „know-how“ in the production process, however, is focused on the PU application. For an efficient coating process, PUR-CSM technology is indispensable.



Load floor of the VW POLO (type 6R) in sandwich design with crash grooves and add-on parts





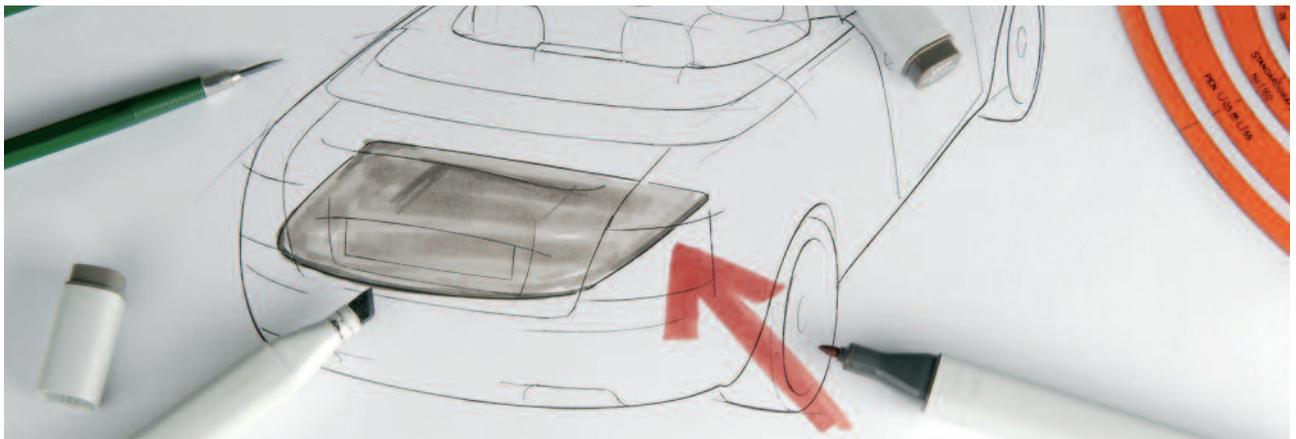
Design, component engineering and tailor-made production concepts from a single source: project management by Hennecke

The advantages consist above all in the very even and reproducible distribution of the polyurethane and the fibres, which, among other things, has a significant effect on the warpage behaviour and contributes to reducing the required amount of material and thus the weight of the component. CSM spray technology is used to wet the semi-finished fibre products on one or both sides with a thermally activated PU system. This enables the processor to go on spraying for a comparatively long and open amount of time. The focused output in certain areas of the

components (edges or areas where force is applied) makes it considerably easier to manufacture very large parts or use moulds with two or three cavities. On the other hand, if necessary curing can take place very rapidly (from 45 to 90 seconds) thanks to the thermal activation of a heated mould while the design of the finished part takes place through compression. Because one CSM spray unit can serve up to three mould carriers depending on the plant configuration, the use of PUR-CSM enables the manufacture of up to 2,000 parts per day. This is a novelty that has

been made possible by the unique self-cleaning function of CSM spray technology. Another reason why these parts are particularly appropriate for mass production is because PUR-CSM technology has every advantage necessary for realizing the customer needs of various OEMs when it comes to cost and technology efficiency.

than before such as hinge technology, parcel shelf hollows or even perfecting technologies. A load floor can thus be given a sophisticated velour surface or a „drip tray“ for transporting dirty objects.



A major selling point, for instance, is the possibility to interrupt the shot – a feature that customers already know from classic CSM technology and that remains unchanged in the present variant of CSM spray technology. It offers a distinct advantage particularly with regard to the time required for programming the spraying process and the very uniform material application, resulting in top component quality and reduced material consumption.

Manufacturing composites with complex geometries

When complex geometries are manufactured PUR-CSM can also make the most of its advantages in producing composites. Carmakers are more and more interested in variability when designing load floors, in the form of additional storage space. More 3-D hollows and parcel shelves are being integrated into the design to make this possible. Sandwich technology is the best suited to the task. Load floors are thus acquiring more functions

One-stop - turnkey systems technology made by Hennecke

The sum total of advantages means that the demand for light composites has risen steadily in the past years. Hennecke has put some 40 production systems for making load floors and roof modules on the market. The fact that the company enjoys over 90 percent of the market share speaks for itself and means that PUR-CSM is the standard technology when it comes to high stability and low weight of car load floors. The success does not rest entirely on the process technology. Hennecke presents itself as a generalist and can thus deliver everything along the process chain on a turnkey basis, from preform, robot technology, press and spray booth to safety technology. No problems are presented by special requirements such as ergonomic production either. Moreover, the experienced machine manufacturer is on hand at all phases of the project to serve the customer. Test runs and checks in Hennecke's in-house CSM technical laboratory can be conducted before any decision is made on an investment.

ELASTOLINE –

the success story goes on



The ELASTOLINE F, the latest type of the series, was launched only in 2010 at the Hennecke ELASTOLINE Days. After the ELASTOLINE V has been a success in the market for Vulkollan® applications for decades, the ELASTOLINE F can already boast a similar track record because many contracts have been awarded and the market shares are on the rise. In particular, there is a growing demand in the area of TDI and MDI prepolymer processing. Reason enough that this field of application will be the key factor in the continuous further development of the series.

If you ask Hennecke customers about the specific quality features of the ELASTOLINE F, you will get very different answers because of the machine's wide range of applications. Two properties, however, are appreciated by all satisfied processors throughout the world: excellent versatility and performance under very tough operating conditions. This systems advantage is demonstrated by the areas of application in which the solid machine system is preferably used, including the production of wear and spare parts for the global oil and mining industries. For example, such parts are used as wear protection for inside pipe linings, in elementary components of cleaning pigs for oil and gas pipelines or in the production of separators for the mining industry.

New process features for an increased range of applications

There is no doubt about it – the ELASTOLINE F has established itself in the market. But for Hennecke this is no reason to sit back and rest. In the model year 2012, new process features are successively added to enhance the specific possibilities of the state-of-the-art processing system.

Automatic melter

In the strong worldwide demand for TDI prepolymer processing, MBOCA (4,4'-Methylenebis[2-Chlororaniline]) is still the number one



*Automatic melter
for high-melting crosslinkers*

crosslinker because of its excellent product and processing properties and its optimal price-performance ratio. For processing MBOCA, Hennecke has developed an automatic melter that has been integrated into the ELASTOLINE F. This ensures a uniform melting performance combined with easy and largely automated handling. One major advantage is the careful treatment of MBOCA during the melting process, thus preventing excessive heating and quality losses of the crosslinker. This special type of melter has also been successfully launched for other high-melting crosslinkers such as HQE (Hydroquinone Bis [beta-hydroxyethyl] Ether). When it comes to processing high-melting crosslinkers, the ELASTOLINE F has proved extremely reliable. For example, cold bridges are avoided throughout the whole metering flow so that the necessary processing times from 110° to 130°Celsius can be kept at a constant level without any problems.

Big work tanks for larger products

The ELASTOLINE F can be equipped with a new type of 500 litre work tank. This provides the processor with sufficient homogenized material for producing especially large parts with high shot weights in a continuous casting process. For example, products such as maritime buoys or marine fenders with weights of over 200 kilograms can be manufactured on the machine in one casting operation. Compared to manual production, the customer also benefits from consistently homogeneous product qualities.



*500 litre tank for large
volume parts with high
shot weights*

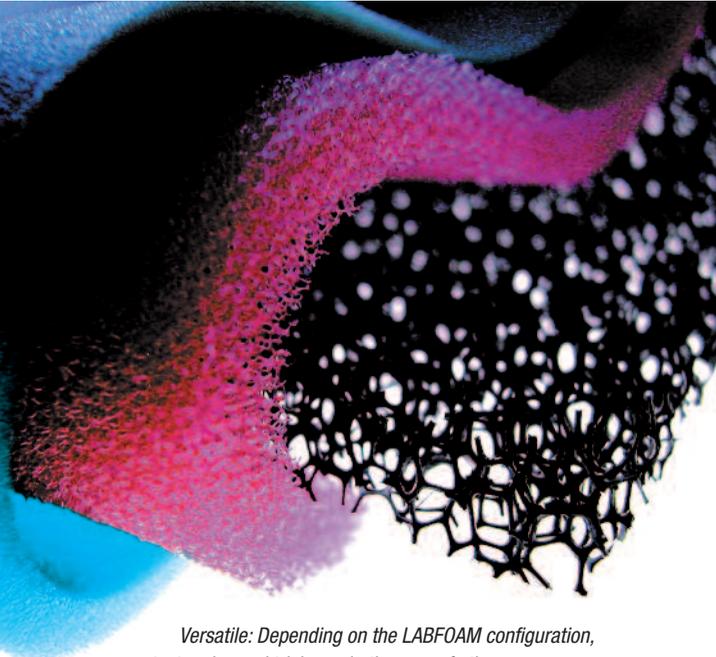
Online additive metering in the mixhead

The focus was not only on large, but also on very small processing quantities so that additives such as stabilizers or catalysts can also be processed directly. In cooperation with the customer, Hennecke has achieved the target of processing material quantities from as little as three grams per minute directly in the mixhead. For this purpose, the specific injector technology of the MEL series has been modified to ensure that small amounts can be safely controlled. Great importance was also attached to easy cleaning and reliable metering where clogged valves or the like are not an issue. The major customer benefit of the system is that common additives (Stabaxol; Dabko etc.) can be metered directly into the mixhead. This saves the customer the cost and time of premixing with a neutral substance.

Continuation of the success story

Matthias Klahr, Head of Sales of Elastomer Metering Machines at Hennecke, is very satisfied with the current state of the worldwide market launch of the ELASTOLINE F. The new developments described above demonstrate that Hennecke counts among the world's innovation leaders in the area of Elastomer processing. Hennecke customers especially appreciate the versatility, quality and effectiveness of the ELASTOLINE metering machine portfolio. Machines like the ELASTOLINE V and F are important components for processing more and more complex PU elastomer systems all over the world. It can therefore be assumed that the success story will continue.

No experiments when it comes to test runs – LABFOAM systems technology for trials and laboratory purposes



Versatile: Depending on the LABFOAM configuration, test series and trial runs in the area of ether, ester and CO₂-blown foams can be performed

In practical application, test series for producing small amounts of foam are often implemented under rather primitive conditions. To reduce the high costs of trials and raw materials, a combination of "drilling machine and cup" is frequently used. This method may seem to be elementary – to put it positively – but the effects of state-of-the-art machine technology on foam quality are greatly neglected. With its LABFOAM, Hennecke offers foamers a significant improvement in the development and testing conditions of high-pressure slabstock production. No matter whether you are already using Hennecke systems technology or not. The LABFOAM enables both process and technical machine features to be simulated very well, including the patented NOVAFLEX technology for producing CO₂-blown foams.





Thanks to its intensive research and development work, Hennecke GmbH has become a leading supplier of PU processing technology. This especially applies to machines and systems for manufacturing high-quality slabstock foams. To help producers and raw material suppliers develop innovative formulations and carry out production equivalent trials with top quality results even for small volumes, Hennecke offers a special laboratory plant.



*Pinhole-free
foam qualities:
stirrer mixer
of the LABFOAM*

Compared with real production conditions, the results achieved by using LABFOAM machines are almost the same. This is mainly due to the design of the LABFOAM which – in simple terms – is a miniature of the foaming portal of a production line. The logic of the plant control also offers comparable handling features with no loss of flexibility. To ensure the reliability of the results and their translation into real production conditions, LABFOAM is equipped with precise high-pressure metering pumps. Moreover, each individual metering line is designed for processing a customized and application-specific spectrum of raw materials so that a great variety of test samples is possible. The list of advantages is rounded off by extremely low trial costs. The running material costs, for example, are drastically reduced in comparison with test series on production machines and new formulations can be developed cost-effectively in the lab. This means that the use of the LABFOAM pays off in a very short period of time. Slabstock and raw material manufacturers including Otto Bock Schaumstoffwerke GmbH, SheelaFoam Pvt. Ltd, Evonik Industries AG, PCC Rokita SA and other well-known companies avoid cost-intensive experiments for their test runs by using Hennecke's proven LABFOAM systems technology.



Sowing trust, reaping growth –

Indian slabstock producer remains on course for success



India, in the year 2001 – the ShreeMalani company, in quest of professional PUR processing technology, gets in touch with Hennecke. Before the year is out, the manufacturer of foam mattresses orders a BLOCFOAMAT system and boosts its annual output decisively. Today, ShreeMalani produces more than 4,000 tonnes per year. A manufacturing business has evolved into a prospering industrial company noted for its high-quality product portfolio in its local markets. And efficient slabstock foaming technology made by Hennecke GmbH has been a key factor throughout.



Foaming portal with integrated bottom and top paper unwinding device and optimum accessibility

An observer of the history of the Indian ShreeMalani company might quickly be tempted to believe in a fairy tale: fast and continuous growth in a hotly contested market segment, an extensive expansion of production capacity and a more than 4,000 per cent rise in annual production performance – and all of this was achieved within a single decade. But the story is very real, and its main elements lie in the idea for a consistently quality-based production approach and in the purchase of Hennecke systems technology. In other words, it involves two ingredients which go together well anyway. Our first contact with ShreeMalani took place in May 2001. The proprietor-managed enterprise was in search of professional polyurethane processing technology that would enable it to process around 100 tonnes of foam p.a. in the manufacture of the coir mattresses which are so widespread in India. ShreeMalani was contacting us on recommendation at the time, and they were





MULTIFLEX: highly efficient raw material yield in the production of various types of slabstock foams

not disappointed. Not long afterwards, an order was placed for a discontinuous BLOCFOAMAT plant which enabled the company to raise its annual foam production to 800 tonnes. From the beginning, ShreeMalani had been attaching special importance to high foam quality. This commitment has been, and still is, the key to success in the local market and remains the cornerstone of ShreeMalani's continuous growth.

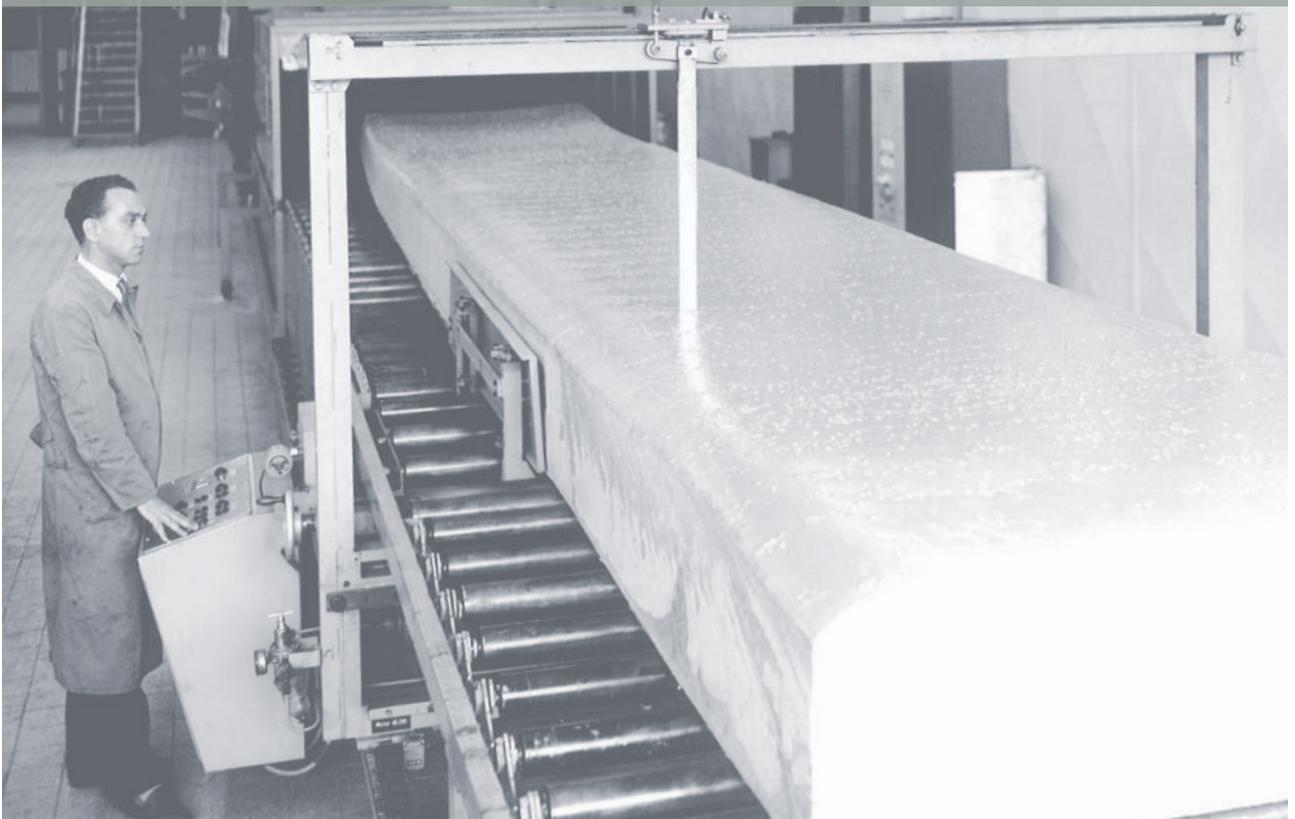
It was the latter which, in October 2007, prompted the company to expand its production capacity further by investing in a continuous-type Hennecke slabstock line. Given our trusting cooperation, the further increase in quality standards and the company's clear principles regarding market positioning of its high-grade foam products, ShreeMalani opted for a MULTIFLEX solution. This system's combination of high-pressure metering and liquid laydown provides MULTIFLEX users with a unique technology which minimizes pinholing while also scoring high in terms of raw materials efficiency. On the October 2008 inauguration date, the responsible Hennecke sales manager was able to plant a Persian silk tree at ShreeMalani's site. This ancient tradition is also an excellent allegory of the business relationship linking Hennecke and ShreeMalani, symbolizing, as it does, continuous growth on both sides. In reference to a proverbial phrase, one might conclude that "they that sow trust, can reap growth". And indeed, the tree has grown to a stately height by now and is already giving shade. Today, ShreeMalani produces over 4,000 tonnes of high-quality slabstock foam p.a. and hopes to be able to boost its overall output to as much as 10,000 tonnes within the next three years.



Symbol of continuous growth: Sales Manager Stephan Wester with the tree he planted at ShreeMalani's site

Definitely nothing to sneer at – the worldwide success story of polyurethane

Otto Bayer's discovery of polyurethane in 1937 might have been accidental but the substance's subsequent triumph and its universal application can be attributed clearly to the innovative powers of Hennecke GmbH.



In the beginning there was an experiment: The chemist Otto Bayer was looking for a process to manufacture synthetic fibres when something went wrong. Some small amounts of acid found their way into the mixture and the mass foamed up. A fellow chemist's sneering judgment after the first results was that the material was "at best good for making imitations of Emmental cheese." Otto Bayer and his team refused to be discouraged – they added some water to the reactive mix, causing the carbon dioxide to separate and small bubbles to form and the first polyurethane foam was born.

Pioneers of the first hour

On 1st November 1945, Karl Hennecke, a department head at Dynamit Nobel AG in Troisdorf who had decided to take his luck into his own hands, founded "Maschinenfabrik Karl Hennecke" in Sankt Augustin-Birlinghoven near Bonn. He did not yet know that he was laying the foundation stone for what would become one of the most successful companies for manufacturing polyurethane processing technology in the world – today's Hennecke GmbH.





1950: the rising number of Hennecke employees five years after the company was founded

From a machine factory with four workers to global player

Although the first innovations – laminating machines, textile washing systems, chocolate powder mills – still seemed very exotic, Karl Hennecke recognized the significance of polyurethane products and the growing demand for them at an early stage. This is why he readily agreed when Farbenfabriken Leverkusen was looking for a partner to build so-called polyurethane injection machines and thus the Maschinenfabrik Karl Hennecke started out in the polyurethane sector.

The fact that polyurethane boomed was closely linked to the history and innovative powers of Hennecke GmbH. The first machines for making flexible slabstock foams in boxes emerged in the early 1950s. Hennecke's global orientation and activities can largely be attributed to the worldwide demand for its machines. Right from the start, Hennecke's UBT plants for manufacturing slabstock in a continuous process enjoyed a very good reputation. Gradually, polyurethane machines replaced the company's other products and employee numbers rose alongside the expanding range of machines.



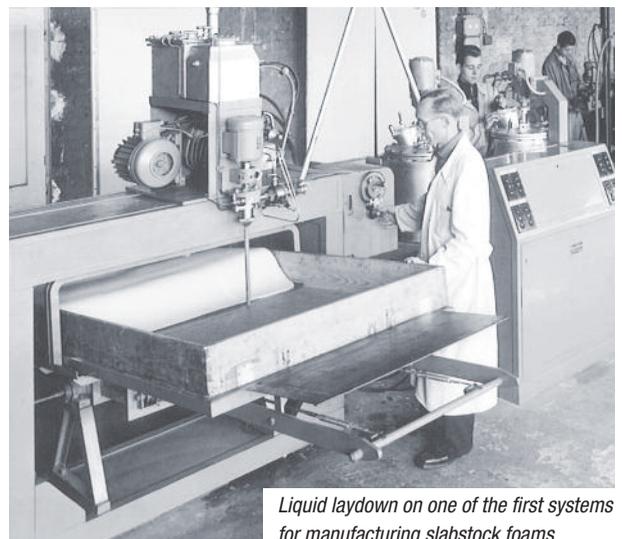
When Karl Hennecke died in 1962, there were 169 employees and the annual turnover was 6.5 million DM. The company's portfolio of PU machines continued to develop successfully and sales volumes increased steadily. High-pressure metering machines had been added to the product range in the late 1950s. The impingement mixing principle used in HK machines was completely new at the time, and this is still symbolized in Hennecke's company logo today as two arrows directed at each other. Hennecke had a monopoly on the technology until the patent ran out.

From 1966 onwards, double conveyors for the continuous manufacture of rigid polyurethane foam panels with a completely



new design were made – these were yet another example of the plant manufacturer's innovative powers and willingness to take risks. In order to securely supply the market with machines, Bayer became a major shareholder in Hennecke at the end of 1967 and the company was renamed "Maschinenfabrik Hennecke GmbH". Bayer AG acquired the company in 1975. Hennecke entered new ground at the beginning of the 1970s when it participated in big projects in Russia and Poland. It was still very early days for the manufacture of polyurethane machines and there was hardly any literature on the subject. However, Hennecke took on the challenge and mastered it. At the same time, Professor Menges at the Institute of Plastics Processing in Aachen laid the foundation stone for the scientific processing of polyurethane. Hennecke has always supported the institute.

Gradually, market relations changed and Hennecke began to meet with more and more competition. However, whereas many of its competitors only covered parts of the market, Hennecke provided a comprehensive programme of PU machines and equipment that expanded systematically in the 1970s to include, for example, moulded foam lines for making hot and cold cure foam, various refrigerator production lines, systems for making skis, window profiles, Baydur moulded foam lines and flat top equipment for rigid foam. In the 1980s, Hennecke drew a lot of attention with its RIM technology that helps the automotive industry manufacture large parts. Thus, the construction of RIMDOMATS and big clamping units became a firm part of the programme. Activity on the foreign market also increased significantly. In 1979, the German-Brazilian joint venture Hennecke Equipamentos was set up in Sao Paulo, and in 1980 the subsidiary Hennecke France was founded. In 1982, a licensing agreement was made with the Japanese company Meg Maruka, in which Hennecke took a share after 10 years of successful cooperation. Hennecke has been active in the United States since the 1960s and its sister firm Hennecke Inc. in Pittsburgh is still one of the most important foreign branches today.



Liquid laydown on one of the first systems for manufacturing slabstock foams

China's economic opening has also brought Hennecke more business. Hennecke started supplying PU systems to China in 1983. The company's activities also heralded the way for intensive work in other East Asian countries. The significance of this business is reflected by the branch in Singapore. The 1980s were marked by the trend towards automation. During this time, Hennecke built many highly-automated systems and delivered them across the world. Like many other companies, Hennecke was also hit by the worldwide economic crisis in the 1990s, but thanks to its innovative technologies – such as Pentane Processing Technology – it was able to ensure its position on the market. Since 1997, the company has been called “Hennecke GmbH” and since 2008, Hennecke has been a wholly-owned daughter company of the Adcuram Group.

Hennecke – the driving force behind PU processing technology

Every year, the worldwide use of polyurethane rises by about 5 percent. With its universal applications the material can be found in all walks of life – in living rooms or cars for instance. It can be used to keep food fresh or to make energy-efficient insulation for walls and roofs in the private and industrial sectors. And the possibilities for using PU systems are far from exhausted. It is also convincing from an environmental point of view: Polyurethane consumes only 0.2. percent of the crude oil that is produced annually and yet it saves millions of tons of fuel because of its insulating properties. When used to make lightweight components for cars it minimises the consumption of petrol and diesel, whereas in refrigeration equipment it guarantees lower energy costs. Overall, it also saves valuable resources thanks to recycling technologies. Hennecke has played an important part in this development because the plant manufacturer provided the systems technology and thus the basis for the worldwide triumph of the versatile material and the resulting growth rates of the PU industry. The American Polyurethane Foam Association has therefore honoured Hennecke with a place in its Hall of Fame. Over 500 patent ideas have emerged since 1945 in cooperation with Bayer AG. Continuous manufacture of slabstock foam, the flat-top process for efficient block foaming, high-pressure mixing of PU components and the development of the first high-pressure metering machines, the NOVAFLEX® process for

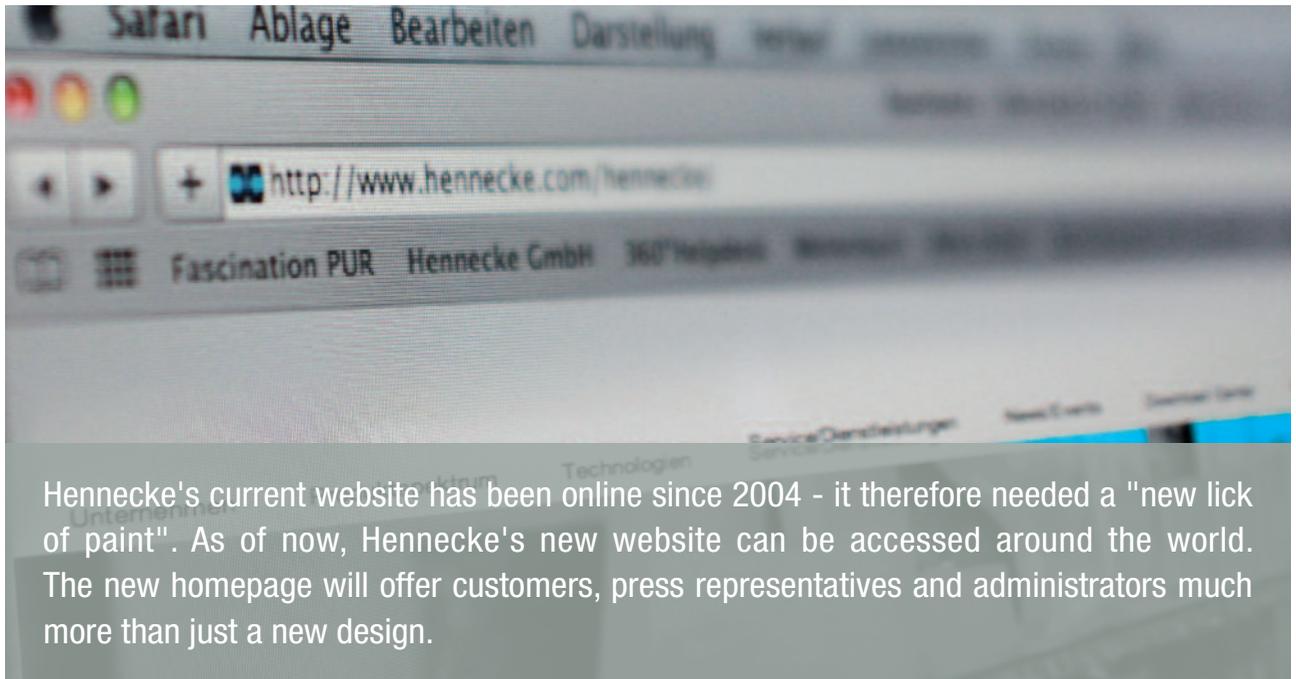


Fine tuning: old high-pressure injection machine in test operation

manufacturing flexible slabstock with natural CO₂ as a blowing agent, the expanded NOVAFLEX®-MULTIFILL technology for processing fillers in batch or online processes, the Pentane Processing Technology for making CFC-free foams for refrigeration equipment, CLEARRIM technology for coating high-grade surfaces, PUR-CSM spray technology for making lightweight and high load-bearing PU parts reinforced with glass or natural fibres as well as the HP-RTM technology for the production of fibre-reinforced structural components are just some of the highlights. Hennecke has also built the biggest slabstock plant in the world, the most efficient double conveyor and the largest fully-automated and flexible production line for foaming refrigeration equipment.

The company, which employs over 450 people worldwide, and has production sites in Germany, the USA, Japan and China, as well as branches in almost all countries, is one of the most important suppliers of PU technology today, and is considered the PU plant manufacturer with the widest range of products.

Elegant and informative – Hennecke's new website



Hennecke's current website has been online since 2004 - it therefore needed a "new lick of paint". As of now, Hennecke's new website can be accessed around the world. The new homepage will offer customers, press representatives and administrators much more than just a new design.

A part from a clearer and more elegant design, an easy, logical operation and the possibility to maintain comprehensive contents are the main focus in Hennecke's new website. Compared to the old site, there is a clearer structure for navigating between pages allowing users to search for specific information in a fast and uncomplicated manner. For all information related to products, service or press, visitors will find a dialogue system to the right of the contents area. Thus users can load additional information as interactive PDF catalogue in the browser or request the contact details of a particular expert by

filling out a form. New technical email addresses have been set up so that requests go directly to the respective contact or sales assistant. The new website will continue to be expanded and will also integrate Hennecke's other subsidiaries, as well as feature additional tools such as an online form for applications. We invite all readers of the Innovations to take a look at Hennecke's new website.

Further Information about this topic

Click here for accompanying documents in the PDF-format

Contact one of our experts

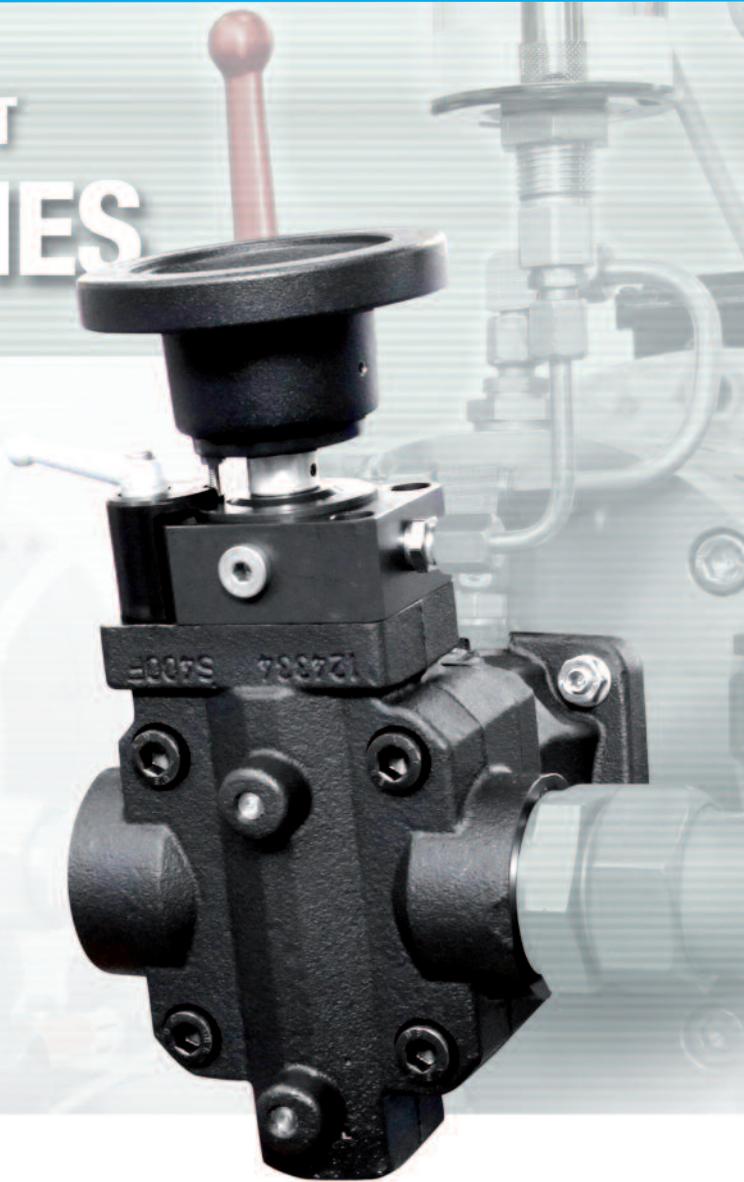
Broad based: the information provided on Hennecke's new website



360° SERVICE

Innovation for 360° RETROFIT HQ PUMP SERIES

- » Exact and reliable production results for new machines and existing lines with the new HQ pump generation in bent-axis design
- **Convincing production results** because HQ pumps provide high efficiency and make for an excellent and reproducible foam quality.
- **High metering accuracy** because the displacement volume is continuously variable using a handwheel with high-precision adjustment indicator.
- **Better work conditions** because HQ pumps reduce operating noise in many cases of application.
- **Easy to service** because HQ pumps consist of fewer parts, meaning less weight and a compact design for better handling.
- **Cost-efficient and reliable** because old pumps no longer need to be repaired and spare parts are available on a long-term basis.



e.g.

3.890⁰⁰
EUR

for replacing an
HL28 pump



	Sales price**	Sales price incl. retrofitting kit**
HL28	4.145,00 EUR	-255,00 EUR
HL12	4.027,00 EUR	savings
HQ28	3.450,00 EUR	3.890,00 EUR
HQ12	3.350,00 EUR	3.790,00 EUR

* Guide price for one retrofitting kit excl. VAT. The retrofitting kit consists of an HQ pump for standard coupling, a sealing liquid system and the adjustment or adaptation for using the existing pipes. The retrofitting kit is available for HL12 and HL 28 axial piston pumps (with or without magnetic coupling). The substitution of series piston pumps depends on the individual case.

** Extract from the current 360° SPAREPARTS price list as of 10/2012.

Available pump sizes		
Type or size	12	28
Nominal pressure	250 bar	250 bar
Maximum pressure	315 bar	315 bar
Substitution of HL series	HL12	HL28

For information about further attractive retrofit offers, please see

www.hennecke.com/360

