SikaToolingNews

Issue 05 | 08

Magazine for Tooling & Composites

Content:

Enjoy the outstanding advantages

SikaBlock® M700 sets new standards

New model making board in the 0.7 density range with an excellent range of characteristics

SikaBlock® M700 sets new standards in modelmaking boards in the density range of 0.7 kg/l. It combines excellent characteristics that make it very easy to work and are very pleasing to the end user in one top-class all-in-one package. After the board has been machined, which is very easy to do and produces very little dust, extremely fine surfaces are achieved. Moreover, the low coefficient of thermal expansion and low warpage result in additional stability so that, for example, models and cubings of outstanding quality can be made also for harder conditions such as mould making for prototypes or small series, SikaBlock® M700 is very well suited.

Continued on page 2

EDITORIAL

Dear Reader,

this current issue concentrates in content on the both terms:

Experience and Innovation

In our life, we have to make decisions every day. For our decisions, we need certainty. There is no room for error, especially when it comes to decisions to buy the raw materials that will have a significant impact on the quality of our end products. The products must be good, possess the expected characteristics, and thus make a decisive contribution to the quality of the finished work. Sika has been gathering experience in the manufacture of resin systems made of polyurethane and epoxy resin since the middle of the 20th century. In this issue, we celebrate the anniversary of **Biresin® G30**, which, for 25 years, has been relied on by our customers who are involved in the production of manufacturing equipment. They have the certainty of being able to use reliable products.However, we cannot simply decide to rest on our laurels. Together, we must constantly strive to develop and improve our work and our products. As a result of our innovations, work processes are simplified or our products are endowed with characteristics that were not previously possible.

Sika is innovative. Experienced developers use the feedback from our customers and work with new raw materials and methods to design products for the future. In this issue, we therefore present yet more new innovative products from the Sika company.

SikaBlock® M700 is the new model board for high performance and high quality. Its characteristics give the end user the certainty that he can satisfy his demands for quality. The worker who actually processes the material can also depend on the fact that the different aspects of his work can be performed easily and reliably.

Another innovative product is **SikaBlock® M970**. This tooling board is primarily aimed at our customers in the foundry industry. From the prototype to series production, SikaBlock® M970 can cover everything. Thanks to its stability and the ease with which it can be milled, high precision core boxes can be manufactured. Because of its abrasion resistance, the user in the foundry industry can be sure of being able to manufacture dimensionally precise cores for a wide range of uses, including series production.

We combine experience with innovation in the area of composites as well. In conjunction with our customers, we develop systems for applications in series manufacture. These systems are matched to the individual needs of the components and production. We would be happy to give you some insight into these projects.

You can also be our partner for a future in which products based on experience and innovation will be needed.

Yours truly

Dr. Robert Mattmer
Head of Sales Tooling & Composites

Continued from page 1

Due to its high resistance to pressure and to its edge stability, light, low-pressure RIM moulds are possible. The good solvent resistance helps to keep the moulding life time high even in the event of frequent cleaning and separating. Vacuum forming moulds are also one of the many uses for the brown-coloured multi-talent due to its high heat distortion temperature.

Andreas Müller, Head of Market Field Management,
Tooling & Composites

Top overall package: high mechanical strength and temperature resistance plus excellent machinability and surface quality

Top aesthetics for models + cubings:
- Very fine surface
- Low coefficient of thermal expansion
- Low warping

Top resistance in mould making:
- Good compressive and edge strength
- High heat distortion temperature
- Good resistance to solvents

Convince yourself: Order your SikaBlock® M700 model board today and enjoy royal privileges.

(Tel.: +49 (0) 7125 / 940-492)

Matrix systems for composites

Sika – The Composite Specialist…

… for tailor-made customer solutions as well

The last three years when the composites segment has been considerably enhanced in the Tooling & Composites business unit, some interesting projects have been completed. Sika is particularly strong in the development of custom-made solutions with matrix materials based on EP and PU. Thanks to fast and flexible in-house research and development, Sika is able to adapt the matrix materials to our customers' requirements relating to their components and processes.

This expertise and capability are demonstrated by the following customer-specific development projects.

Project example I:

Sika has a very interesting project with a south-European yacht manufacturer where low-viscosity EP systems are required. In the past, the company that builds these high-quality yachts mainly used unsaturated polyester resins. This manufacturer has now decided to change over to EP resins in order to both improve the working conditions of their workers by reducing the styrene levels in the atmosphere as well as the excellent mechanical properties of the new material and the better results obtained when it is processed. This goal is being implemented in stages.

This spring, Sika managed to convince this company of the advantages of a Sika epoxy resin system by manufacturing a boat's hull by an infusion method. This demonstration and the test phase were supported by specialists from Sika and its export partners.

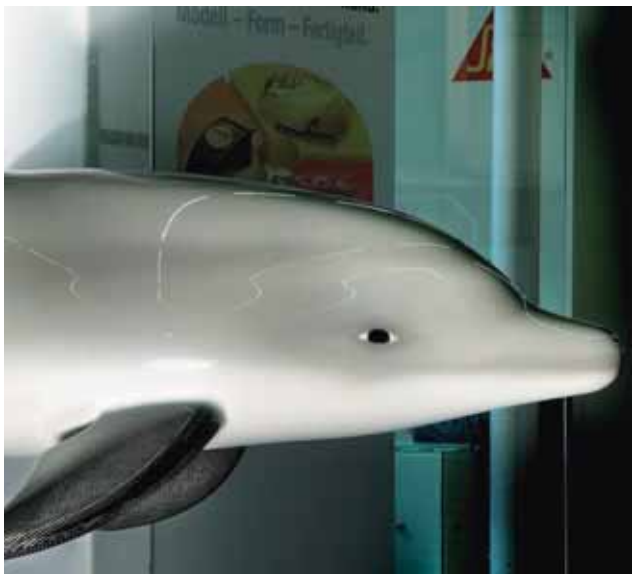
Due to the resin system, which has been adapted in terms of its viscosity, the fibre material is impregnated quickly and completely. The very good degassing properties resulted in a bubble-free hull surface and outstanding quality.

In just over an hour of infusion time, impregnation of the fibre materials was completed. For this component, EP resin was supplied via several linear gatings.

A special textile, which was also formed to promote flow, was used as the core material. The material was provided by a partner company and specialists for such applications. Another aim of this project was to make an outer skin with a carbon-fibre look. The manufacturer of the yacht wanted this due to the positive image enjoyed by carbon as a material.

Project example II:

In the workshops of many composite-processing companies, the temperature during the colder seasons of the year can often not be increased to more than 22 °C. Especially when large parts are manufactured and therefore large halls are needed; achieving the right temperature can be a great challenge for the manufacturer and can entail high investment and energy costs.



CRP-Dolphin as exhibit at EUROMOLD 2007

Due to precisely this problem, Sika developed Biresin® CR81. Initially created as a customer-specific solution, this system has now been incorporated in the portfolio as a standard product. It is characterized by very low viscosity, adapted reactivity and optimum processing qualities, even at temperatures below 22 °C. The very low mixing viscosity facilitates processing with the vacuum infusion method, which is frequently used for large components in the wind energy industry or marine sector.

Project example III:
For the company Carbo Tech Composites, located in Salzburg in Austria, the aim of developing the new matrix material was to shorten the previous cycle times.
Carbo Tech Composites mainly obtains its customers from the automotive and racing sport areas. Within this market segment, it is absolutely essential to continually increase productivity and at the same time reduce costs.
Large-volume parts are made by means of the RTM (Resin Transfer Moulding) process, whereby very fast, good fibre wetting must be ensured. Due to the high surface qualities required by the automotive industry, there must, of course, be a total absence of bubbles in the surface of the components. Moreover, the requirements in respect of the mechanical characteristics and the glass transition temperature (Tg) are correspondingly high.

Project example IV:
For a European customer that manufactures components made of composite material for different branches of industry, the objective for the development project was to improve surface quality. With the previous process and resin system used, the customer was burdened with enormous finishing costs. These costs urgently had to be reduced by means of an improved product.
Sika accepted this challenge and created a suitable system. After just a few trials on the customer's RTM equipment, the project was completed successfully. The components thus produced now have a surface which is completely free of bubbles and can be processed further for final painting without having to be reworked. In the meantime, Sika has succeeded in satisfying the requirements of other customers with the help of these systems and correspondingly small modifications in the formulations.

The fact that Sika is very active and agile in the composite area is also shown by the company's participation in different trade fairs and events.
In April this year, two trade fairs were on the agenda. Sika made an appearance at the JEC fair in Paris in the first week of April. This is regarded as the most important composite trade fair. On this platform, Sika engaged in many discussions with international specialists and also people new to the composites business. It was possible to pave the way for numerous new projects.

Sika exhibition stand at Hanover Industrial Fair

Sika also attended the Hanover industrial fair in April 2008, sharing a stand with companies that are members of CFK-Valley Stade e.V. Most visitors to the fair were customers and other interested parties from the area of machine building and automation systems. These branches of industry increasingly appreciate the advantages of these innovative composite materials for their particular requirements.

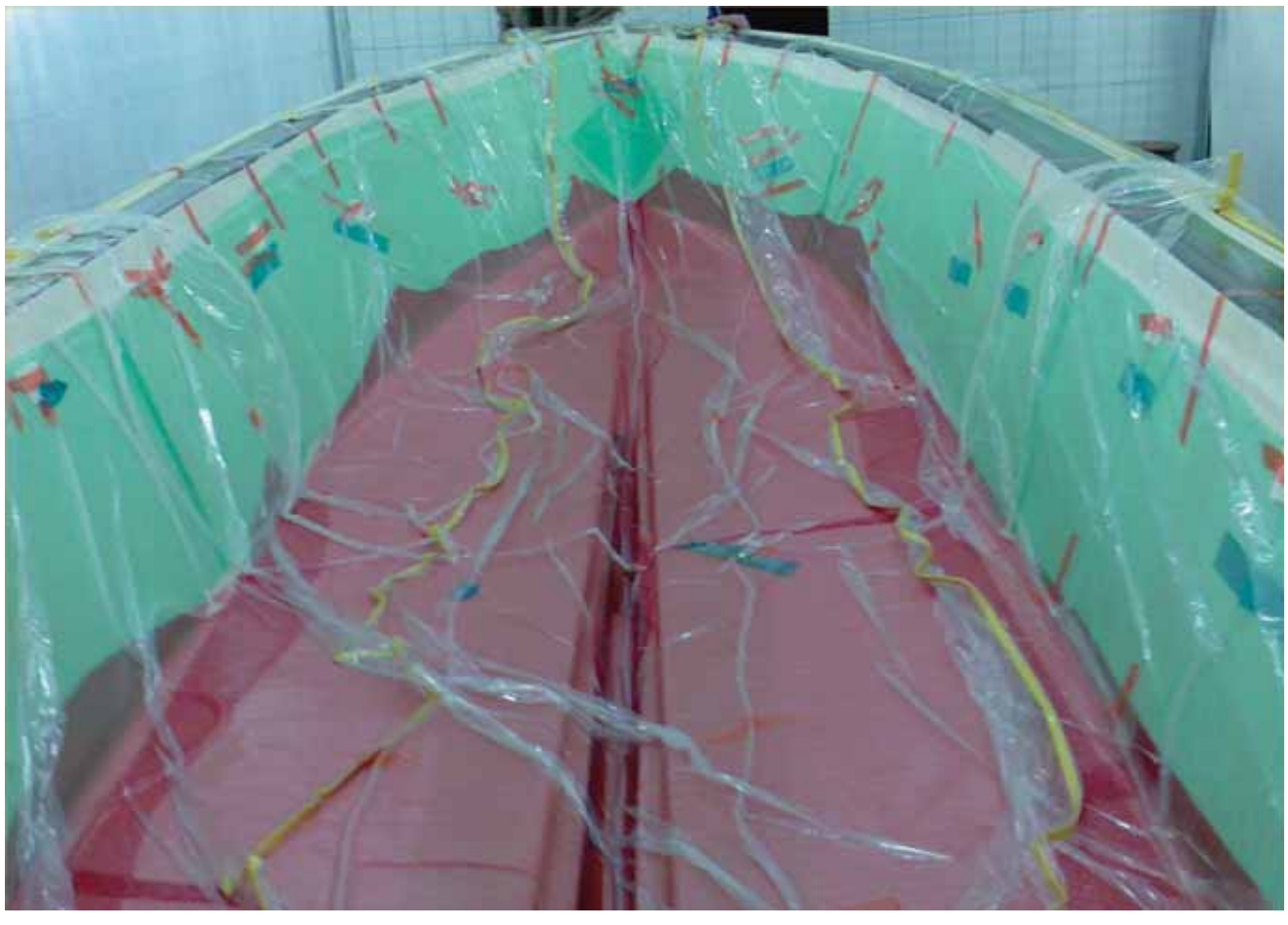
These users nearly always have the goal of reducing the moving masses in order to make handling devices and robots faster. Due to the use of lightweight materials, fast drives and electronic controllers can be utilized to the full for the first time.

Sika will be appearing at COMPOSITES EUROPE in Essen from 23 to 25 September. Our specialists will be happy to answer any questions on composite processing methods.

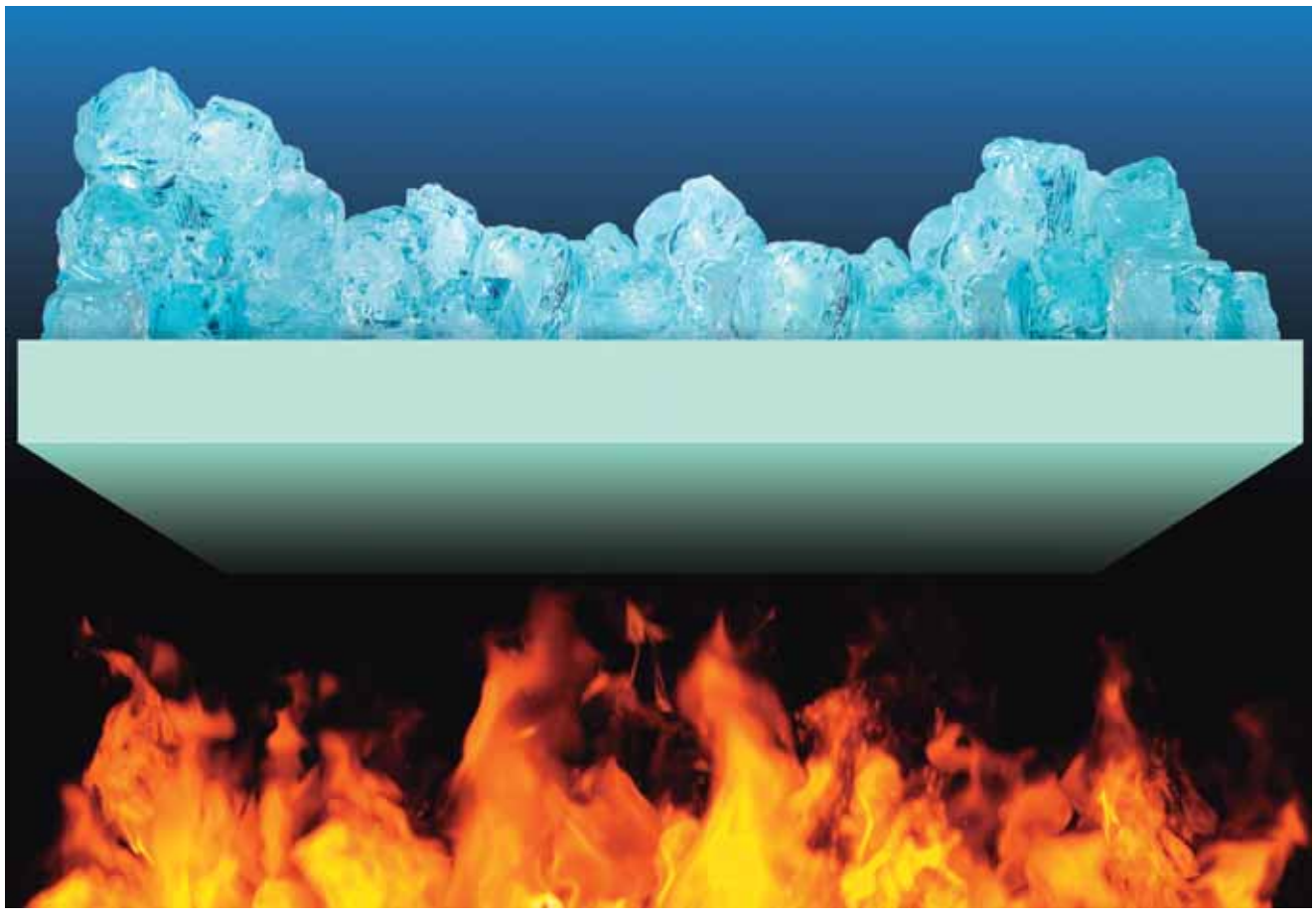
But, apart from this event, we are also there to help you in word and deed at any other time.
Please get in touch with us directly.

You can be sure that Ms. Lucic (Tel.: +49 (0) 7125 / 940 – 492 or by e-mail: Lucic.Katharina@de.sika.com) will find the right person for you to talk to.

Holger Giese, Market Development Manager
Composites



Production of CRP boat hull with infusion process



SikaBlock® M2010

High-Temperature Resistant EP Board

Applications:

- Prepreg and laminating tools
- Thermoforming tools
- High-quality master patterns, DCMs and cubings
- Dimensionally exact gauges

Main advantages of SikaBlock® M2010:

- High heat distortion temperature (Tg 120°C)
- Very low thermal expansion
- Highly resistant to pressure with stable edges
- High-quality dense surface
- Low density

Temperature-resistant and dimensionally exact

Staying cool – in any situation

SikaBlock® M2010 – New high-temperature board with top surface

The new EP board is excellently suited for all applications where temperature resistance, dimensional accuracy and high strength are required.

Using the prepreg method, very good results in terms of mechanical properties can be achieved for composite parts and moulds. The prepreg mats, which are preimpregnated with resin, are placed in a mould and hardened in autoclaves under pressure, in a vacuum and at high temperatures.

Very high requirements in respect of thermal behaviour and stability are placed on the tool or the mould. The quality of the surface is also a very important factor, the reason being that it determines the surface quality of the part to be made. These requirements are satisfied completely by our new high-temperature board SikaBlock® M2010. With a density of 0.7 kg/l, this board is characterized by its high thermoforming resistance, low thermal expansion and, at the same time, its high resistance to pressure and its edge stability. It was specially developed for the prepreg method. Due to its superior qualities, the board can cope with difficult autoclave conditions and easily withstand temperatures of 120°C at a pressure of 6 bar.

Due to its high resistance to thermoforming and very low thermal expansion, however, the board is also suitable for other high-temperature applications. For example, for vacuum forming or other laminating applications where the mould is subjected to additional thermal stress during or after the application.

Sika also supplies an adhesive called Biresin® HT Adhesive which is resistant to high temperatures and was specially developed for the board and its applications. Based on the same chemicals, the adhesive is an ideal match for the board in terms of density, colour and mechanical properties. This means that the best possible result is achieved in every respect.

Apart from the high-temperature applications, however, the board is also ideal for other areas of use, where dimensional precision and stability are primary requirements. Due to the low coefficient of thermal expansion and the good surface quality, the board can be used to manufacture especially high-quality master patterns, DCMs, cubings and gauges.

Consisting of board and adhesive, the package stands out due to its reliability and the outstanding results achieved during the tests conducted by the customer. In addition to our high-performance epoxy resin systems for composites, it will be a further highlight at our next trade fair.

Do you have a similar or special application and are you thinking about an initial test? All you have to do is get in touch with us. Ms. Lucic will find the right person for you to talk to (Tel. No.: +49 (0) 7125 / 940-492).

Timo Kitzmann, Market Field Manager,
Tooling & Composites

Outstanding quality is always a winner

Biresin® G30 Casting Resin

A 25-year success story in manufacturing-equipment production

The appearance of a newly formulated product on the market signifies the conclusion of a long or not so long development process. Here, an important role is played by models, moulds and tools as well as parts for prototypes or pre-series.

The technology of such processes develops in leaps such as those seen in recent decades with the introduction of computers to control measuring and processing machines that can handle huge quantities of numbers in continuous processing mode. The followers of Pythagoras recognized the number as the principle of the shape as early as 2 ½ thousand years ago and thus had a foresight of what today is the basis of modern techniques.

Comparable technical progress was made in model and mould making in the last 1950s and 1960s through the introduction of the synthetic resin method. A series of Biresin® synthetic resins originated at that time. They have been developed consistently and continually improved. This also includes the tried and tested EP casting resin Biresin® G30, which, as it is today, has been used as a versatile, reliable and high-quality product in manufacturing-equipment production for 25 years.

The specially formulated synthetic resins were a new class of material for model and mould makers and advantageously complemented the previously usual materials such as wood, plaster and metal. Its advantages are fluid consistency, rapid hardening, high surface quality and good strength qualities. For more than a quarter of a century, Biresin® G30 has been the ideal embodiment of these qualities. Due to its flow characteristics, solid castings with a thickness of several mm to several cm can be made or large face layers can be cast onto correspondingly under-dimensioned supporting constructions.
In a negative mould, for example, several castings can be made quickly in succession as longterm models for match plates or complete match plates can be made by casting process in a highly rationalised manner. Due to ingenious filling with metallic and non-abrasive mineral powders, shrinkage behaviour and strength are optimized in the case of Biresin® G30 without any reduction of machining capability, e.g. by milling.

From the very beginning, Biresin® G30 was formulated without any toxic substances or problematic reactive thinners. This means that the people using it have a resin system that is ideal from a physiological point of view as well. One of the factors for the success of Biresin® G30 was that it came on the scene in the boom phase of automobile construction, which turned out to be the driving force of the economy and the largest customer for production moulding. The high quality requirements of this sector and the increasing variety of models boosted the use of synthetic resins for manufacturing equipment both in engine development and in body development. The technology of synthetic resins had arrived at the right moment for production moulding.

Apart from the EP casting resin Biresin® G30, other specially formulated types of synthetic resin profit from this, such as matrix resins for fibre-reinforced structures (Biresin® L80, L84), high-quality surface resins (Biresin® S12, S15) and fast casting resins (Biresin® G21, G24).

Kurt Reimann, Product Manager Sika retd.

Match plates for suction pipe (boat industry)

Please make a note!

Important dates in 2008

Sika-Tooling & Composites

September 23 - 25
Composites Europe, European Trade Fair & Forum for Composites, Technology and Applications, Essen
www.composites-europe.com

Oktober 3 - 11
Autumn music days in Bad Urach
www.herbstliche-musiktage.de

November 18 - 20
Mets marine equipment trade show, Amsterdam
www.mets.nl

December 3 - 6
EuroMold-World Fair for Moldmaking and Tooling, Design and Application Development, Frankfurt a. M.
www.euromold.com

The new tourquoise-coloured high abrasion resistant foundry board

SikaBlock® M970 – When more is required

Core boxes from the prototype phase to series production with only one material

The new unfilled casting foundry board SikaBlock® M970 is mainly used for model making in foundry pattern making. Thanks to its outstanding characteristics, it opens up a completely new market segment in this field. The main advantages of SikaBlock® M970 are as follows:

- Very high abrasion resistance
- Excellent milling behavior and surface finish
- High dimensional stability due to very low coefficient of thermal expansion

Whereas approximately up to 5,000 moulds from core boxes – milled from conventional foundry pattern board materials – can be assumed, many times this quantity can be expected when SikaBlock® M970 is used. Whether this is five or ten times depends on the particular application, of course. According to our in-house abrasion measurements (ISO 4649), this target range can be regarded as assured. Initial practical tests also confirm these demoulding quantities.

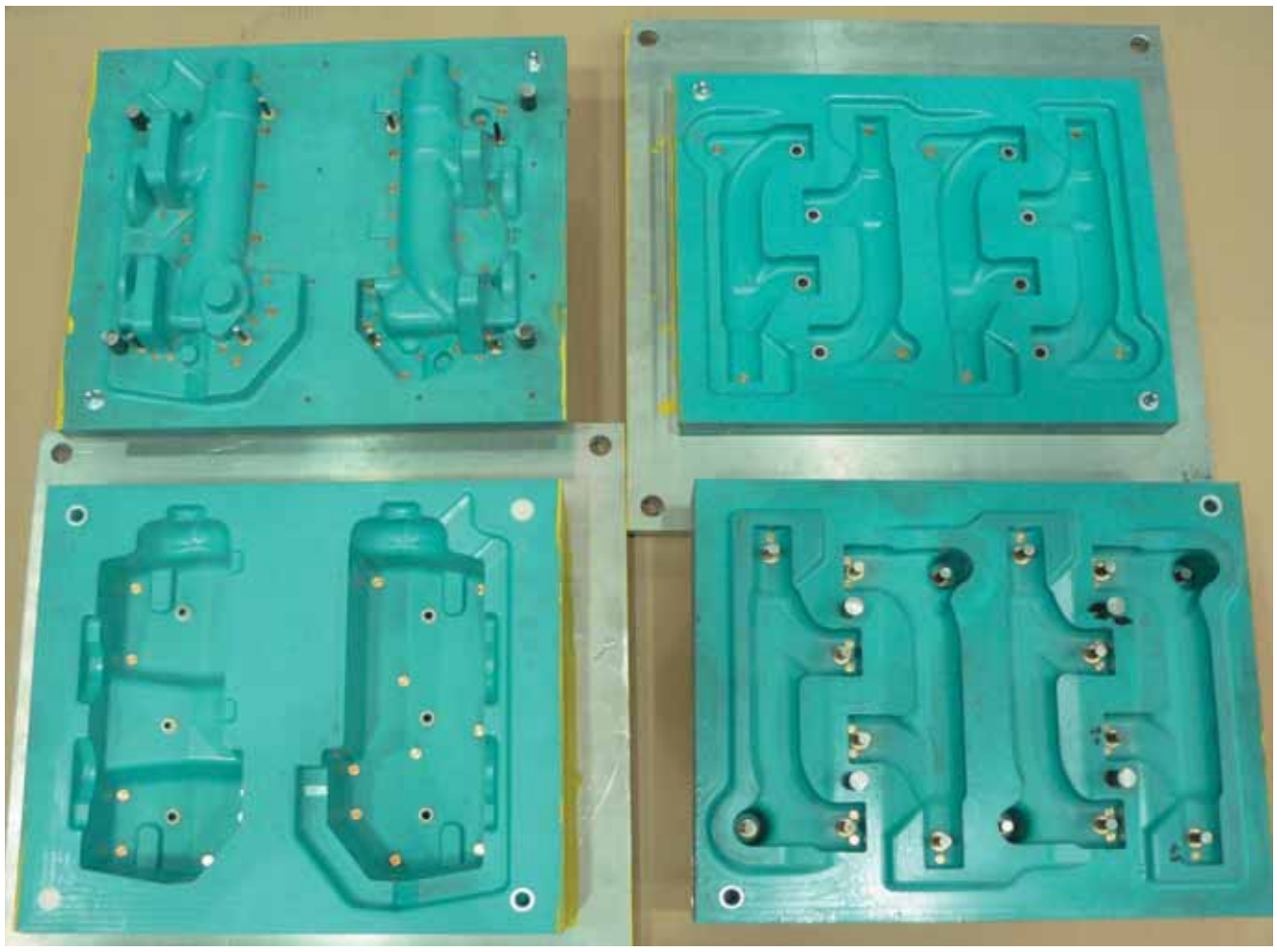
The edge/rib stability and flexural strength are more than 40 % greater than in the case of most generally available core box materials made of synthetic resin. Nevertheless, the milling quality is as good as that of SikaBlock® M940, for example. With an appropriate milling strategy, glossy smooth surfaces can be produced that require no additional finishing work at all.

A special feature is the very low coefficient of linear thermal expansion, which is only 68 x 10^{-6} 1/K. As a consequence of this low value, it is easier to keep dimensional changes due to fluctuating temperatures within the tolerance range. This can be the case when length shrinkage occurs due to core boxes being stored in cold rooms or when undesirable length increases occur due to warming of the material when it is being used.

MAN Nutzfahrzeuge AG is already using SikaBlock® M970 successfully. When a set of core boxes was being milled for an exhaust manifold to be used on this company's trucks, the material's very good machining qualities became apparent immediately. After being unclamped from the milling table, the surfaces look as if they have been polished. Thanks to the high edge stability, very sharp edges can also be created. This is not possible with every material. In future, SikaBlock® M970 is to be used whenever its use is possible beyond the prototype phase. This provides a feeling of certainty and eliminates the need to mill one or more replacement core boxes, depending on how many cores are actually required.

Are you interested in this new high-performance material? We will be happy to send you a sample for initial tests (Tel. No.: +49 (0) 7125 / 940-492).

Andreas Müller, Head of Market Field Management, Marketing Tooling & Composites



MAN Nutzfahrzeuge AG uses core boxes made of SikaBlock® M970 for an exhaust manifold shortly before series production.

Prize-winners in the “Milling SikaBlock® M940” competition

On the occasion of EUROMOLD 2007, invitations to take part in a competition were sent out with the aim of familiarizing our customers with the outstanding qualities of SikaBlock® M940.
To this end, a mailing campaign was conducted, during which small board samples were sent out to participants who were asked to make a € symbol from the board. On the basis of the samples submitted for EUROMOLD, four daily prize-winners and one overall prize-winner were chosen.

The following daily prize-winners received an MP3 player:

- Ulrike Baierl, Porzellanfabrik Weiden Gebr. Bauscher, Weiden
- Corinna Wiedemann, Teufel Prototypen GmbH, Nersingen-Unterfahlheim
- Julia Robl, AUDI AG, Ingolstadt
- Vincenzo Déliz, WEIHBRECHT Lasertechnik GmbH, Gerabronn

The main prize, a Casio Exilim EX S770 camera, went to Ohorn:

- Matthias Haase, Modellbau Haase GbR, Ohorn

New EP adhesive for all SikaBlock® tooling boards

Biresin® Power Adhesive Thix – Simple, reliable and fast

Simply glue in the afternoon and mill reliably the next morning

The thixotropy of Biresin® Power Adhesive Thix (left half of picture) is much higher than its predecessor.

Biresin® Power Adhesive Thix has been enjoying success on the market for some months now. This newly developed EP-based product joins all SikaBlock® tooling boards together faster and with a more reliable adhesive bond. Our users profit from its three main advantages, which are as follows:

- Easy to use
- Safe and powerful adhesion
- Hardens very quickly

Above all, its consistency compared to its predecessor has changed. As its name suggests, the thixotropy of Biresin® Power Adhesive Thix is much higher. This means that it does not run off, even on vertical surfaces. This is additionally enhanced by improved adhesive qualities, which, in turn, have a very positive effect on its adhesive strength. The more paste-like nature of the adhesive also helps to compensate for small unevenness in the surface to be glued. Last but not least, the danger that excessive tightening of the clamps can reduce the space between the boards to zero so that all the adhesive flows out of the joint is reduced. All these factors help to ensure the reliability of the adhesive bond and result in very high adhesive strength for all SikaBlock® tooling boards.
In addition to its excellent mechanical properties, heat distortion temperature is increased considerably when Biresin® Power Adhesive Thix is used. After corresponding post-curing, the 100° C limit is reached. It is therefore especially suitable in combination with SikaBlock® M1050 for use as a heat-resistant vacuum forming mould.
A substantial improvement was also achieved in respect of the hardening speed.
If Biresin® Power Adhesive Thix is used, milling is possible as early as the next morning, even if the boards were glued only the afternoon before.

The resin components were optimised as well and the good physiological qualities were retained at the same time. The transparent colour also remains an advantage, as a result of which the glued joints are translucent, irrespective of the board colour, and are therefore very unobtrusive. The name and container of the hardener also remain unchanged. Biresin® Power Adhesive Thix is supplied as usual in a work pack. The new mixing ratio is 100:33, enabling easy to calculate dosing. The amount of resin component needed is taken into account accordingly in the 0.9 kg container.

Have you already tried out our new adhesive or do you have any questions about it? (Tel. No.: +49 (0) 7125 / 940-492).

Andreas Müller, Head of Market Field Management, Marketing Tooling & Composites

Biresin® Power Adhesive Thix

Highly reliable adhesive bonding for all SikaBlock® tooling boards

Application:

- Large-scale board bonding of SikaBlock® M940, M960, M970, M1000, M1050

Description:

- Chemical basis: EP
- Colour: Yellowish transparent
- Pot life: 30 min and milling on following day
- Available immediately in work pack (6 x 0.9 kg A and 6 x 0.3 kg B)

Main advantages:

- **Thixotropic consistency**
  - Does not run off on vertical surfaces
  - Compensates for slight level differences
- **Strong adhesive bonding**
  - Best adhesion
  - Outstanding mechanical properties
  - Highly resistant to heat (100° C)
- **Rapid hardening**
  - Milling as early as the next morning
  - Less sensitive at low temperatures

Land Rover LRX project

CNC dispensing with Biresin® M72 paste

Paul Kelly, Design Factory & Show Car Program Manager at Jaguar Land Rover Design, reports on collaboration with our English partner John Burn

The virtues of Biresin® M72 when used in automotive development:

- Fluid, pumpable A and B components ensure air-free filling
- Optimisation of paste stiffness by means of discharge rate and hose length
- Perfect join-up of applied beads of paste
- Outstanding adhesion to EPS
- Less corrective work due to minimisation of trapped air
- Rapid hardening enables milling after only 6 to 8 hours
- High elasticity of the milled surface
- No cracks in the material, even under extreme climatic conditions due to a change of climate
- Good price/performance ratio

Together with our English partner and tooling specialist John Burn, we teamed up with Concept Group International (CGI) to create a Land Rover LRX Show Car.
The LRX concept demonstrates Land Rover´s seriousness about sustainability with new technologies, lightweight design and environmentally-responsible materials, making it an ideal project for Biresin® M72 polyurethane (PU) modelling paste.

“The LRX program demanded a one piece show car model to support PR activities whilst the core Show car was being manufactured.
The timing was extremely tight for such a high profile model and there were also constraints in terms of weight. Using the M72 PU paste system we were able to undercut a low density foam core buck and deposit a layer of paste that was finally milled. This then progressed through a full show car paint process with better quality of surface without joint lines. The final result was an extremely credible model produced in a very short time that toured a number of venues to raise awareness of the program.

In line with our company sustainability initiatives , by using the M72 PU paste system we were able to reduce waste to land fill by machining less waste than using a traditional tooling board process.”

Paul Kelly, Design Factory & Show Car Program Manager
Jaguar Land Rover Design

Concept Group International (CGI)

CGI now offer a paste application service to compliment their already unrivalled expertise in the design & production of large scale models & tooling. Using the M72 PU paste CGI are able to produce high quality, low cost, seamless models. CGI was launched with a single aim – to streamline and integrate the staggered process of automotive design and engineering into a seamless, rapid development of idea through to production part.

CGI eradicates the traditional boundaries between design and engineering. Instead of the conventional linear approach, designers and engineers work closely and concurrently to develop projects to the highest standards – within short time frames. The approach is unique. The early implementation of advanced computerised design and engineering tools alongside proven design methods gives their projects and concepts real-world credibility.

www.concept-group.com

If you have any questions regarding model making paste, please get in touch with our paste specialist Peter Soff, who will be happy to help you.
Tel.: +49 (0) 173 67747 88
E-mail: soff.peter@de.sika.com

Peter Soff, Market Development Manager
Tooling & Composites

IMPRESSUM

Published by: Sika Deutschland GmbH • Stuttgarter Str. 139 • 72574 Bad Urach
Tel: +49 7125 940-492 • Fax: +49 7125 940-401 • tooling@de.sika.com • www.sika-tooling.com

Edited by: Sika Deutschland GmbH • Tooling & Composites

Concept and design: AIKELE WERBEAGENTUR Reutlingen • www.aikele.de