

concrete¹⁹

WASA COMPANY MAGAZINE

London Crossrail Modern project planning methods

Production A look behind the processes and products

Insights Interviews with experts and the people at WASA

The Puskás Ferenc Stadium

When a vision comes to life

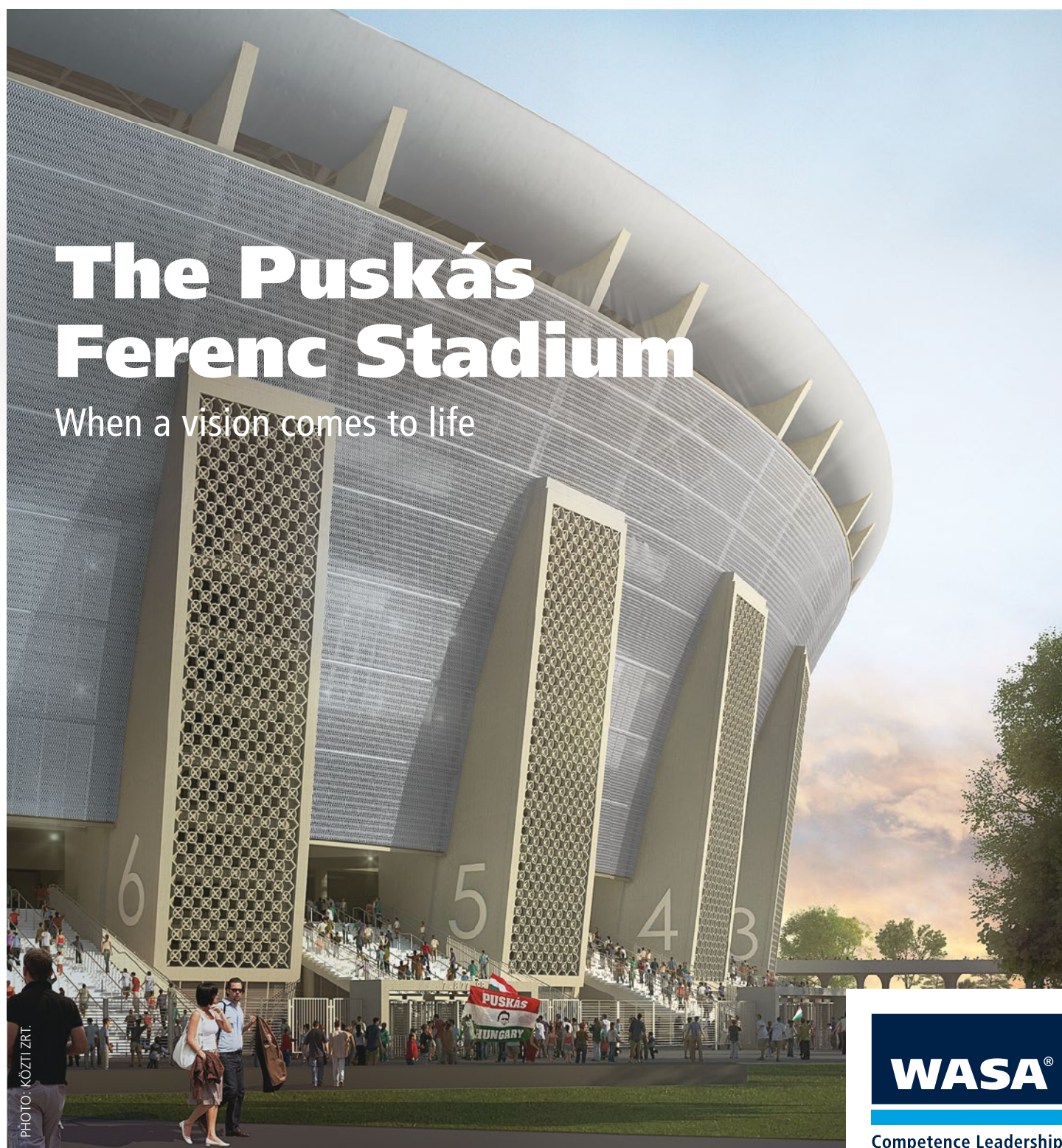


PHOTO: KÖZTI ZRT.

WASA®

Competence Leadership.

Greatness comes in all shapes and sizes



See them exclusively in this magazine and of course at the *bauma 2019* trade fair in Munich. Discover everything about WASA PRECAST – our new, large-format moulds and liners. We look forward to seeing you there!



WASA PRECAST

WASA-TECHNOLOGIES.COM



Matthias Bechtold
Chairman & CEO WASA AG

Dear readers,

Digitalisation is continually progressing – apps are in and print is out. Defying this trend, we present you with *concrete*¹⁹ the fresh off the press first issue of the new WASA company magazine.

Once a year, we will use this format to provide exciting, fascinating and interesting facts about our industry. The *bauma 2019* marks the starting point of this new format.

Every three years in April, all eyes in the construction and construction materials sector turn to Munich. As one of the largest trade fairs worldwide, the *bauma* has undoubtedly become the leading trade fair in our sector. Being here, whether as an exhibitor or visitor, is almost mandatory.

WASA has been a regular exhibitor in Munich for over 30 years. Since 1960, WASA stands for high-quality production boards, and we added polyurethane moulds for the wetcast industry to our product range in 2007. This year, we are

presenting our newest achievement: WASA PRECAST – large-frame form liners with which we are entering into the field of prefabricated components. The project reports on the Puskás Ferenc stadium in Budapest (page 24) and the Crossrail project in London (page 6) are an impressive testimony to our new business area.

We were also able to expand our market leadership position in production boards with the WASA UNIPLAST® ULTRA. Our compound board, WASA WOODPLAST®, has also become a staple. With 19,000 production boards leaving our factory every month and around-the-clock production, we had reached our previous limit. Therefore, it was time for the expansion of our production, which is presented on page 14.

Now, I wish you an enjoyable read of *concrete*¹⁹ and a successful and profitable season.

**Kind regards,
Matthias Bechtold**

**“The WASA name has
been synonymous with
quality since 1960.”**

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WASA PRECAST

Connected for the future.

London Crossrail: How modern project planning methods were the path to success for one of Europe's largest construction projects.

Times are good in the concrete industry. Demand for concrete products is booming and manufacturers are working at the limits of their production capacity. Given the limited resources available for new development, there is very little reason to change anything.

There is, however, an increasing trend towards individual and versatile concrete systems. Planners and architects have long ceased to view artificial stones in isolation. The design and haptics of concrete panels are fused together with facades and design elements through both enhancement and combination.

In order to meet these needs, we provide virtual and scaled 3D models as a comprehensive service for every new concrete product. Customers can also provide us with CAD model data that we seamlessly integrate into our CAD planning tool.

There is an increasing trend towards individual and versatile concrete systems.

Connecting standardised data makes it easier to quickly illustrate correlations on the screen and test them in virtual environments. As a result, we can clarify any questions in advance using the 3D model on a tablet or monitor. Last but not least, this way of working massively improves the quality of communication by reducing language barriers or tearing them down completely.

**Sharing knowledge –
to London via Arnstorf
and Neubrunn**

The Lindner Group has been a successful provider for interior construction, facades

and insulation technology for over 50 years. Founded by Hans Lindner in 1965 as a small assembly business for acoustic construction, the family-run business currently employs around 7,100 people in over 20 countries. Alongside its global production facilities and subsidiaries, the company produces its core products like ceilings, walls, flooring and premium facade components at its headquarters in Arnstorf in Lower Bavaria.

One of Europe's largest construction projects is currently kicking off in London: Known as Crossrail, this new rail network measures 118 kilometres in length and is intended to relieve the existing infrastructure. The project also calls for the construction of eight new tube stations. The Lindner Group is providing curtain wall facade panels made from fibreglass-reinforced concrete for the current section of construction at Bond Street station.

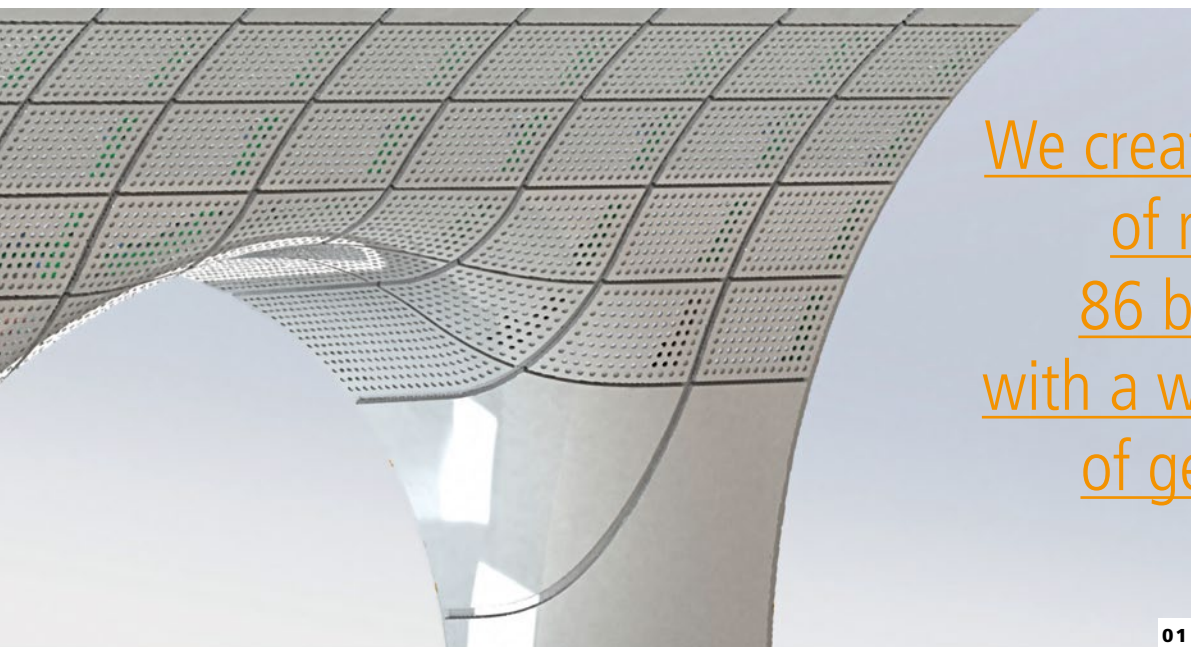
The company tasked us with producing the casting moulds in a variety of geometries for over 86 basic types of panels. The raw data for the categorised components was provided to us in a data cloud, allowing us to develop complex casting moulds to produce the artificial stone based on standardised project data.

All of our digital assemblies were connected to the 3D model. This meant we could virtually test the separation of the facade elements from the mould, for example.

**Early defect
detection
with 3D simulations**

Given the scope of the Crossrail project, it is essential to compare actual construction progress to specifications. To meet this requirement, the section at Bond Street was measured using 3D laser scanning for the subsequent installation of the concrete panels. This measurement data was then used as the basis for the BIM building model. Simulations allowed us to quickly detect changes in size or points where the individual concrete panels would collide, for instance. Potential changes were synchronised by connecting the categorised components with the BIM building model.

This prevented the information being lost in the communication chain and allowed us to detect and resolve defects effectively in the planning phase.



We create moulds
of more than
86 basic types
with a wide range
of geometries.

01

A win-win situation

Alongside the geometric visualisation, connecting the various project participants obviously entails further advantages.

- Planners and architects can design concrete elements and insert them directly into a virtual environment. They can do so using open-data templates or 3D building models.
- Companies that manufacture concrete products and elements are in direct contact with the planners and architects and simultaneously act as the direct connection to WASA. This is where all of the information related to the query is collected. What is possible and how can it be done?
- The 3D models are then handed over to WASA. Based on the raw data, we develop moulds and tools to produce the concrete elements. All of the 3D data is connected to an assembly.
- This assembly forms the basis for creating work plans and controlling additional interfaces like CNC milling units used to manufacture models and tools.

From resource savings and cost reductions to greater safety and significantly lower error rates, the benefits of using modern technology in project planning and in the workflow described

above are obvious. But this example of sharing data and knowledge is just a taste of what is already possible today.

01_View from the complete BIM 3D model. The BIM is based on the virtual model loaded with the data from planning, construction and facility management. Once the buildings and objects are completed, the compiled data is used for management and maintenance. The BIM project remains active and continues to be fed with data.

02_Among the things we are best at is visualising and creating 3D models. The assembly data is used to create work plans and control milling units to produce models. We manufacture the models using a 5-axis CNC portal milling machine.

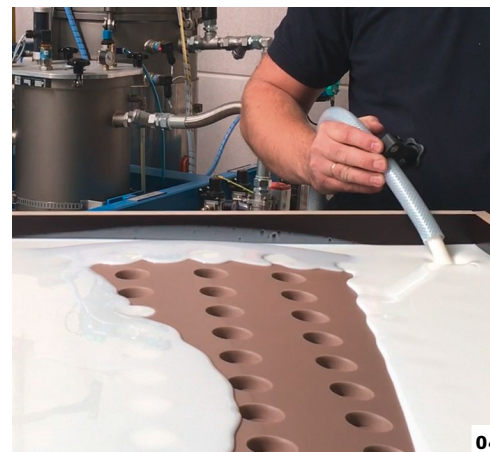
03_The surfaces of the models are sanded after CNC milling. They are given a microfine coating to achieve a smooth and non-porous surface.

04_Production of WASA PRECAST moulds using computer-controlled machinery. The WASA PUR polyurethane system was specially developed for large-format, self-standing moulds.

05_WASA PRECAST polyurethane moulds with Shore A-65 hardness have proven particularly well suited for three-dimensional components.



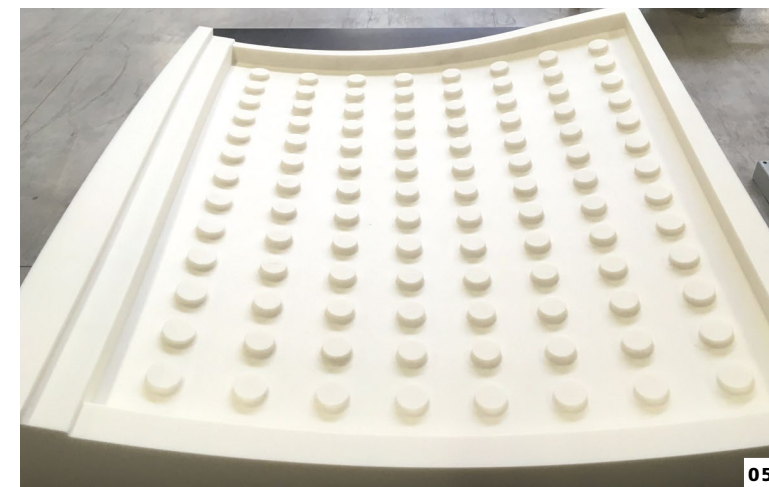
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WASA PUR

Creative concrete producers have long been faced with the challenge of producing Wetcast moulds for small batches or custom designs in a simple manner. With WASA PUR, they can rely on a tried and tested system. This thin, two-part casting resin is extremely easy to process in open manual casting thanks to its low viscosity and extended pot life of 30 minutes. This low viscosity also ensures fast deaeration, creating smooth surfaces and no air pockets. The resulting moulds faithfully capture the detail of the

model on the end product without discolourations. WASA PUR is also free from plasticizers and mercury and meets all the requirements of the European chemicals regulation REACH.





Nando Gross
particularly values the
friendly atmosphere
at WASA



The passionate craftsman.

The people at WASA form the basis of our success:
Nando Gross joined WASA as a shift worker in 2000 – today he manages
our wetcast production.

Employed at WASA at the production site in Neubrunn since 2000, Nando Gross started out as a shift worker after his occupational reorientation. Today, Nando is the department head of the Wetcast department and responsible for the development and construction of wetcast moulds and systems using CAD. His tasks also include organising, controlling and supervising production processes. Construction, creative thinking and the development and implementation of possible solutions

are his passion, making him the perfect fit for a position with growing technical demands and a diversifying field of tasks. His aspiration is to have happy and content customers. It goes without saying that Nando primarily values the friendly and respectful atmosphere at WASA alongside the development opportunities within the company.

He also lives his passion as a craftsman in his free time, honing his creativity and skill for example by forging knives.

ADVERTISEMENT

WASA®

Competence Leadership.

Naturally inspired

For greater flexibility and creativity:
WASA WETCAST moulds and innovations.

With WASA WETCAST, we enable the automated and series manufacture of high-quality paving slabs in individual shapes and with unique surface structures. Our in-house model construction department will work with you to develop a prototype completely in accordance with your wishes, while our casting shop manufactures robust polyurethane resin moulds.

Contact us and learn more about WASA WETCAST.



WASA WETCAST

WASA-TECHNOLOGIES.COM



WASA WETCAST

Our process for stylish surfaces.

WASA STACKING

WASA CONSTRUCT offers a range of special products that provide new options when conventional concrete block machines meet their limits. A special carrier system is used when hardening the cast concrete in polyurethane moulds. Known as WASA STACKING, it allows users to stack multiple decks on top of each other. The support panels consist of polyurethane-based boards

with a pinewood core. This results in a light, stable and torsion-resistant board with minimal deflection – making our WASA WOODPLAST® boards perfect for Wetcast production.

We produce both the polyurethane casting resin moulds and the carrier systems ourselves.



Step 1_

DESIGNING THE SURFACE

The first step is looking for ideas and coordinating the motif with the customer or sales team. Natural products such as stone and wood usually serve as a template. Their surface structure is moulded with silicone; designs for abstract individual structures such as waves, ring designs, fine grooves or granulation are created using a computer.

Step 2_

CREATING A POSITIVE MODEL AS THE MASTER

The moulded silicone mats are fitted to the mould dimensions and receive a supporting frame. The supporting frame is then usually cast with epoxy resin. The CAD model created on the computer is transferred to the mechanical processing centre as a milling file and processed there.

Step 3_

FABRICATING THE MOULD

The cast or concrete mould acts as a negative form for the later concrete product. First the positive form is encased

by a supporting frame and poured out with silicone or a different elastomer. Once the moulding compound has hardened, the material properties of the elastomer determine the flexibility and stability of the mould or form liner.

Step 4_

USING THE MOULD FRAME

In wetcast production, a difference is made between stand-alone and frame-supported moulds. The stability of stand-alone moulds is ensured by reinforced outer walls. However, this requires a larger amount of elastomer and reduces the overall flexibility of the mould.

Using a wood or steel frame can prevent this and retain the flexibility needed for the demoulding process. Together with the mould this ensure the dimensional accuracy of the concrete components.

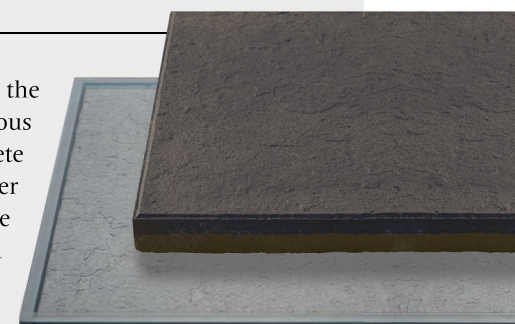
Providing a fixed frame also makes it easy to implement the positioning on a special carrier system.



WASA HERMETIC

From natural to abstract surfaces, WASA HERMETIC allows us to produce liners made from highly wear-resistant polyurethane in Shore A-70 hardness. A 2-millimetre-thick steel plate on the back of the liner ensures high dimensional stability. Along with reduced adhesion forces, this makes our liners perfect for any hermetic turn-table press. The result is a fine surface

that accurately reflects the detail of the model thanks to a closed, non-porous polyurethane layer. The closed concrete surface makes colours appear brighter and more vibrant. From design and size to haptics, there is nothing to stop you getting the end product you need.





01

Neubrunn is growing.

New machinery for reduced delivery times.

Solid plastic production boards have been manufactured at the production location in Neubrunn for 29 years now. Altogether, around 19,000 production boards made of wood, plastic and wood/plastic composite leave the plant in southern Thuringia every month. It is above all the capacities of the machines used to manufacture the WASA UNIPLAST® ULTRA solid plastic board that have now hit their limits, for which reason WASA has decided to extend its plant equipment.

“As pleasing as such a high workload is, delivery times of 11 to 12 months meet with little understanding on the part of our customers. And rightly so.” Matthias Bechtold, chairman of WASA AG, which is based in Darmstadt and is responsible for sales, summarises with this statement the reasons for the decision to increase the existing production capacities for the WASA UNIPLAST® ULTRA solid plastic board. Until now three machines have been used to manufacture the glass fibres reinforced solid plastic board. “They are running 24 hours a day, seven days a week. They were never switched off at all in 2018 – production continued around the clock even over

Easter and Christmas. There is no other way that we could or can cope with the current very good order situation”, says Matthias Bechtold.

The costs for the investment in the latest equipment will run to about 1.5 million euros. “Through the planned work we will achieve an increase in capacity of around 30 percent”, says Dr Arno Schimpf, who is responsible as technical managing director at the production plant in Thuringia for the production board and wetcast mould lines. “Apart from procuring 15 new moulds for the manufacture of the production boards, our order list also includes a completely new extruder unit with special screw geometry for the homogenisation of the thermoplastics employed”, Schimpf continues.

The forms in which the solid plastic boards are manufactured using the extrusion method are equipped with a sophisticated cooling system. This energy-efficient and innovative system with absorption cooling is rounded off by a heat recovery system.



02

01_ Around 19,000 production boards leave WASA's plant in Thuringia every month

02_ WASA UNIPLAST® ULTRA boards are produced in these moulds 24 hours a day, seven days a week

03_ Despite the high degree of automation, each individual board is measured and its quality checked by an employee after demoulding



03

As part of the reconstruction of the plant, the storage of the raw material and the transport of the plastics from the silos to the machine workshops will be completely revised. “The measures in this area will meet the highest demands for the reproducibility of the material batches and product mixtures and will enable an even more precise dosage of the raw materials employed”, says Dr Arno Schimpf. This rebuilding work will be supplemented by the installation of new mixing technology.

In the quality management area, quality assurance will be characterised by an even higher degree of automation in future. In order to do make allowances for digitisation, without which production and process engineering is no longer conceivable today – keyword Industry 4.0 – special process visualisations have been implemented. These make it possible to monitor the essential machine processes outside the production halls too. Production control can thus be significantly optimised.

The goal and the big challenge will be to coordinate the construction measures efficiently so as to ensure that the plant continues to run as well as possible.

WASA SMART FLAKES



When separating finished concrete products in layers, plastic inserts often lead to high disposal costs and a great deal of frustration. WASA SMART FLAKES can help. This organic granulate, based on cellulose and wood, is 100% biodegradable. It separates the concrete layers for a sufficient amount of time before

simply decomposing into the ground. In finished concrete products, it keeps the layers apart to enable air circulation. This allows moisture to escape and prevents efflorescence and blemishes on the concrete surface. Tests conducted by the Weimar Institute of Applied Construction Research confirmed that WASA SMART FLAKES meets all requirements for use.

TALKING TO DR STEFFEN MOTHES

“Colour and structure define the impression on the observer!”

The surfaces of concrete stones are what catches the eye. At the same time, they should also be easy to maintain and keep their attractive appearance for a long time. But how can all these requirements be met? And which innovations are there in this area? We talked to Dr Steffen Mothes, authorised signatory and head of production & technology at F. C. NÜDLING Betonelemente, and honorary vice chairman of the FIAB Weimar e. V. (association supporting the Weimar Institute of Applied Construction Research).

Dr Mothes, the porous structure that gives concrete its distinctive character also makes it vulnerable to various environmental and usage-related influences. There are several surface protection measures developed especially for the respective applications that ensure effective protection and make concrete more durable. Is the use of hydrophobic materials and acrylates still popular and are there any news in this area?

Dr Mothes: In the concrete products industry, the use of hydrophobic impregnations or acrylates is particularly well established for manufacturing premium products. Silanes and siloxanes are broadly used to bring out hydrophobic properties in concrete. Mixed in with wet concrete as a mass hydrophobic impregnation, they support the water-repellent effect both on the surface and from within. Wear and potential weathering do not weaken the hydrophobic properties of the surface. Hydrophobic impregnations applied to the surface of concrete reduce material consumption. But

wear and weathering cause the effect on the concrete surface to weaken over time.

Acrylates, whether rolled on or sprayed on, protect the concrete surface while also strengthening the colour intensity. Their effect on the worn and weathered concrete surface is limited, too. Therefore, specialist stores offer acrylic-based maintenance products that can be repeatedly applied to worn surfaces.

“Coating surfaces requires extensive investment and knowledge from the manufacturer.”

In terms of surface protection, manufacturers of concrete stones continuously come up with new methods and improvements to protect the stones from dirt and prevent the colour from washing out. Such stones with surface treatment, e.g. in form of a coating, are a wonderful invention. They easily fit into the garden design, but are considerably more expensive than concrete stone without such enhancements due to the high manufacturing cost. Which innovations are there in this field and do



PHOTO: IAB WEIMAR

Dr. Steffen Mothes
authorised signatory
and head of production
& technology at F. C.
NÜDLING Betonelemente

these additives fulfil the promises made by their manufacturers?

Dr Mothes: Coating surfaces requires extensive investment and knowledge from the manufacturer. The relatively limited tolerances regarding temperature, humidity and surface quality of the concrete stones must be strictly adhered to for the coating process to be successful.

Basically, there are two different coating systems on offer. On the one hand, there are thermosetting water-based coatings, which are set at temperatures between 80°C and 90°C after their application by exposing them to thermal energy in the form of infrared radiators. On the other hand, there are coating systems which set with exposure to only ultraviolet rays without additional thermal energy.

Water-based coatings create a permeable film on the concrete surface upon hardening. Since this film has thermoplastic properties, the settings on the packing machines and the type of packaging material need to be chosen accordingly. If this is not done to a sufficient extent, the coating may be damaged during storage or transportation of the finished products.

Coating systems set using ultraviolet rays create an impermeable film on the concrete surface. They have no measurable thermoplastic properties, which therefore simplifies the packaging of the products.

Both coating systems can protect concrete surfaces from things like red wine, coffee, mustard or ketchup. The quality and durability of the protective function is higher with impermeable systems than with permeable systems, but so are the costs.

With both systems, it is important to inform the customer about what the surface protection is truly capable of. Coated surfaces are usually much more vulnerable to hard and sharp objects and abrasive particles than customers expect. For this reason, manufacturers of coating systems are working on making the coated surfaces more durable by mixing in further mineral additives.

RFID technology (radio frequency identification) offers cutting-edge solutions for many industrial sectors. Some of the most interesting application possibilities for this promising technology are in the concrete industry. For example, RFID tags are moulded into production boards in the manufacturing process, enabling product information stored in the tags to be retrieved throughout the entire

life cycle. Do you think the use of this technology will catch on?

Dr Mothes: Simple tags that only contain basic and fixed information such as weight or the manufacturing date of the board will not become part of routine operations in concrete stone production. The added costs are currently at about 5 euros per board, with the added value being too low in comparison. Monitoring stone weight or height, for example, does not necessarily require the use of RFID tags. Furthermore, the stored board weight may change due to wear or breakage, which means the determined stone weight would be erroneous.

Tags which record and store complete board and cycle-related data sets, such as motion functions during moulding and compression or climatic data during hardening, are not yet available on the market. In addition, there is a lack of mathematical algorithms that map the correlation between the motion functions and the expected stone quality.

So extensive fundamental research is still needed in order to utilise the capabilities of RFID technology for quality assurance in concrete stone production on a broad scale.

Aggregates make it possible to achieve a diverse range of colour nuances in concrete, including excellent imitations of natural stone. At your institute, you most likely not only conduct studies in the field of stone production, but colouring and related issues as well. Can colour trends be derived from these contacts for the near future?

Dr Mothes: Colour trends revolve around architectural design and natural stone itself. Modern logistics systems for transport and feeding differently coloured concrete to block making machines enable easily reproducible and vivid colour transition on concrete surfaces. Having a wide variety of colours and various colour transition patterns in one's product portfolio is a must for modern concrete stone manufacturers. Striving for long-lasting colour brilliance and sharp contrast despite surface wear and weathering surface is also becoming more and more common. Here, the colours of the aggregate used are meticulously coordinated with the colouring of the cement mortar. Another trend is the harmonisation of structure and colour progressions on the surface. Here, structures can be imprinted during compression using moulded parts or generated through the design of the formulation. In the end, both the colour and structure of the surface influence the impression on the observer.

FREE TIME

Munich – a city with many faces.

Do you enjoy a relaxed breakfast, a quick excursion to a museum and an elegant dinner, or do you prefer dancing the night away? Here are some of our suggestions.

CAFÉ GLOCKENSPIEL

Marienplatz 28 – www.cafe-glockenspiel.de

Café Glockenspiel's name is no coincidence. With a perfect view of Munich's town hall, guests can enjoy a varied menu away from the crowds and admire the colourful figures as they dance to the melody of the bells. The café serves breakfast until 4 pm and offers a constantly changing variety of dishes on its daily menu at lunchtime. Cake is served in the afternoon, while the evening menu also offers delicious meals.

LIMONI

Amalienstrasse 38 – www.limoni-ristorante.com

Despite the name, this restaurant does not leave a sour taste in the mouth. The tastefulness of its sleek, black and white interior is reflected in the menu, which takes guests on a grand tour of Italian cuisine. Delving further into Italian culture, diners can also choose from a list of over 100 wines to accompany their meals. Limoni has long since become the place to go for lovers of Italian food in Munich.

SHOWROOM

Lilienstrasse 6 – www.showroom-restaurant.de

Showroom calls itself “the favourite spot of gourmet lovers in Munich”, and we wholeheartedly agree. The restaurant creates dishes made from selected ingredients and serves them with the utmost style and finesse, with taste and preparation at a consistently high level. It's therefore no surprise that Showroom was awarded a Michelin star in 2015.

RICKSHAW RIDE FROM MARIENPLATZ

Simply hop on: Marienplatz, by the Fischbrunnen

Feel like leaning back and relaxing while exploring the city? Then why not try a rickshaw ride? Passengers can enjoy a comfortable tour of the city's sights and hear exciting stories about each place. Ride across Odeonsplatz past the Munich Residence and through the Hofgarten to the English Garden, one of the world's largest city parks famous for the Monopteros, the Chinese Tower and the Eisbach Wave. Don't forget to take a break at the nearby beer garden, of course.

DAS MARIA

Klenzestrasse 97 – www.dasmaria.de

The oriental roots of Das Maria are reflected both in the café itself and on the menu. Guests can enjoy a wide range of eastern dishes at any time of day. Das Maria is also a mecca for breakfast lovers. Alongside the classics, some of the dishes on offer allow guests to start the day with a true culinary journey of discovery.

Museum Brandhorst:

36,000 ceramic rods
in 23 colours decorate the
impressive exterior facade

MUSEUM BRANDHORST

Theresienstrasse 35 – www.museum-brandhorst.de

Situated in the heart of Munich's Kunstareal art district, Museum Brandhorst showcases over 700 contemporary works of art. Alongside the artworks themselves, it also focuses on their creators. All well-known 20th and 21st century artists are on display here, from Cy Twombly and Damien Hirst to Pablo Picasso and Andy Warhol.

BMW MUSEUM

Am Olympiapark 2 – www.bmw-welt.com/de/locations/museum.html

A must-see for petrolheads. The BMW Museum presents the history of the world-famous car manufacturer, its brands and its products in a fascinating and innovative way. Visitors can admire around 125 items spread out across 5,000 square metres of exhibition space. These include some of the most valuable and attractive cars, motorbikes and engines from over 100 years of BMW history.

SPEZLWIRTSCHAFT

Ledererstrasse 3 – www.spezwirtschaft.me/altstadt.html

The Spezwirtschaft's wooden sign hangs high enough to avoid unwanted attention. Upon arrival, guests are welcomed into an environment that has an unpretentious industrial style. The drinks menu is a mix of modern and traditional, but guests can also dine in what is believed to be the city's second-oldest building. We recommend making a reservation to grab a spot at normal dinner times.

PIMPERNEL

Müllerstrasse 56 – www.pimpernel.de

Hardly any club in Munich has as colourful a past as Pimpernel. It was a high-end establishment in the 1930s, then a brothel, and after that a gay bar where stars like Freddy Mercury are believed to have thrown wild parties. Although things have calmed down a little since, Pimpernel is still the place to come when other bars call time. It offers a daily mix of DJs playing disco and house sounds, along with projections for a trendy atmosphere.



01

Lithonplus relies on WASA.

Successful change to coated production boards with solid wooden core.

Lithonplus produces very high quality concrete products at its Hohen Wangelin plant in the west of the district of Mecklenburgische Seenplatte. With a total of 16 locations and around 600 employees, the Lithonplus Group is one of the most significant manufacturers of concrete products in Germany. As a subsidiary of HeidelbergCementAG and Schwenk KG, Lithonplus has been bundling their activities in the concrete products sector since 2004. The Hohen Wangelin plant was founded in the early 1990s and ran until the beginning of 2017 with softwood boards. In late 2016 the management of Lithonplus decided to use high-quality coated wooden boards at the Mecklenburg plant. The WASA WOODPLAST® was chosen. 4,200 of these polyurethane coated production boards have now been in use very successfully since April 2017.

Production takes place on a Hess plant, which went into production in 2016. The Hohen Wangelin plant offers a very wide range of products, which places particularly high demands on the production board. The production boards measuring 1,400 x 1,150 x 50 mm must therefore also carry very high loads without bending noticeably.

This is ensured by the WASA WOODPLAST®'s solid wooden core of certified renewable pine wood, plus a very high e-modulus of 11,000 to 12,000 N/mm². Lithonplus now regards this solid wooden core as an elementary advantage of the WASA WOODPLAST®, like the C-profile fitted by WASA that protects the short sides of the board against damage during circulation and above all in the board magazine.

"A coated wooden board – regardless of its manufacturer – is always susceptible to damage caused by pawls or the circulation. You can't avoid that with this type of board. However, protecting the sensitive parts of the board against damage with steel profiles is the best protection one can give a composite board", says Dr. Arno Schimpf, who as managing director is jointly responsible at WASA for development and production. If the polyurethane coating should be damaged on the upper or lower side of the board, for example due to stones or loose screws from the vibrating table being pressed in or due to jamming in the circulation, this damage can easily be repaired with a special repair kit from WASA AG. The customer can carry out this repair himself – quickly, simply and inexpensively.



02



03



04

01 The production boards measuring 1,400 x 1,150 x 50 mm must also be able to carry very high loads

02 4,200 WASA WOOD-PLAST boards have been in use very successfully since April 2017

03 In addition to the production boards, WASA also supplies feeding pawls made of polyurethane with an interior steel core for the circulation

04 C-profiles made of steel protect the PU coating during transport in the circulation

In addition to the production boards, WASA also supplies feeding pawls made of polyurethane with an interior steel core for the circulation. These enable a much gentler handling of the boards than conventional steel pawls during transport on the accumulation pawl conveyor. The pushers have a long lifetime due to the highly wear-resistant polyurethane that coats the steel pawl. If they are worn they can easily be encapsulated in PU again. WASA added this service and other polyurethane wearing parts to its range in 2017.

"More and more customers all over the world are valuing the advantages of the WASA WOODPLAST®. Numerous plants in Germany, the USA, England, Indonesia, Russia, Australia, Poland and Spain, to name just a few countries, have been equipped with these production boards since their market

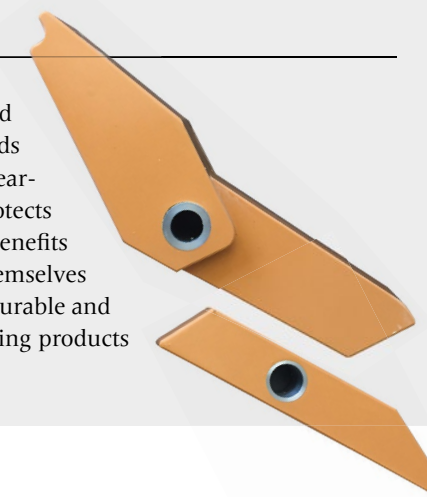
introduction at the bauma 2010. The customers are convinced by the jointless flat surfaces and the C-profile, the low weight of the boards and the very good vibration transmission, which has a decisive influence on the quality of the concrete products", says Matthias Bechthold, chairman of the executive board of the Darmstadt-based WASA AG, describing the very successful market introduction of the polyurethane-coated production boards.

Lithonplus is well aware of how important the right choice of production board is in achieving high quality standards. The coated board from WASA used at Lithonplus was so convincing that 8,000 WASA WOODPLAST® boards were also purchased for the plant in Eggenstein, Baden Württemberg in addition to Hohen Wangelin. The trend towards coated production boards thus continues consistently for Lithonplus.

WASA LATCHES

Both plastic and wooden boards suffer as the result of transport latches being repeatedly moved back. Our special latches counteract this problem with a steel core and a polyurethane sheath measuring a centimetre in thickness. With no sharp edges and less friction compared to steel latches, they significantly reduce the amount of scratches on surfaces. This prevents

moisture from penetrating and keeps the layered wood boards from swelling. But the wear-resistant polyurethane also protects the latches themselves. The benefits are clear: Both the latches themselves and the boards become more durable and you can benefit from long-lasting products thanks to WASA.



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“It brings joy to contribute to WASA’s success.”



Susanne Anding enjoys the variety of her daily tasks that come with her job

The kind soul.

The people at WASA form the basis of our success:
Working as a management assistant since 2012, Susanne Anding has kept everything running smoothly.

Working as a management assistant since 2012, Susanne Anding has kept things running smoothly with her versatile skills and positive spirit. Be it managing applicants, analysing statistics, supporting personal accounts and customers or organising and coordinating meetings, trade fairs, marketing campaigns and many things more, Susanne regards her many tasks as a challenge. She values the variety of her daily tasks as well as the modern working environment,

the pleasant atmosphere and innovative outlook for the future. Looking back, Susanne came to WASA upon recommendation while Matthias Bechtold was urgently looking for an assistant. So she initially moved to the rural Mossautal area before WASA found its new home in Darmstadt.

Today, Susanne is drawn to quieter regions to go hiking, but also finds relaxation by jogging, reading, going to the cinema or spending time with her grandchildren.

WASA PRECAST

A vision comes to life.

PHOTO: KÖZTI ZRT.

WASA PRECAST: The new business unit

WASA Unterlagsplatten GmbH was founded in 1980 and began its success story producing and selling production boards for the concrete industry. In 2007, the company began production of Wetcast moulds made from polyurethane. 10 years later, as an established player in Wetcast production and with the new name of WASA AG, the mould production business unit was expanded to include large-format liners. The WASA PRECAST brand was born.

Today, we are able to produce even large-format liners in high-quality polyurethane. These include the impressive 7 x 2 meter liners used in the following project. Here, you can read all about our WASA PRECAST project for the new Puskás Ferenc Stadium in Budapest.

The project: A new look

The aim of our PRECAST project is to partially re-clad the legendary Puskás Ferenc Stadium. The conversion project began in 2016 and the stadium is scheduled to reopen on 25 November 2019. Costing 610 million euros, the renovated stadium will have a capacity of 67,000 visitors.

"We produce liners with impressive dimensions of seven by two metres for the Puskás Ferenc Stadium."

Legendary:
The Puskás Ferenc Stadium
in Budapest

Budapest is due to host four games of the 2020 European Football Championship. Alongside sporting events, the stadium will also be used for concerts and conferences, during which its total capacity will be expanded to 78,000 visitors. There will also be dedicated spaces for smaller sporting events like table tennis, gymnastics or wrestling.

The task: Bigger and more beautiful

Part of the new planning covers the outer facades of the stadium's 30 stairwells, which are to be given a special surface structure. We used the current stadium elements, characterised by striking, protruding rings, as a guide for the new structure. We were required to deliver the polyurethane mould, measuring around 7.5 metres in width and 30 metres in height, for producing the outer facade cladding elements, each consisting of 13 finished concrete parts (2.2 x 7.0 x 0.24 metres). At the same time, we had to find a way to integrate the circular rings into the finished concrete part, in order to both minimise the assembly workload and make the finished parts as stable as possible. The plan was to produce separate rings on site in order to mask the lines separating the individual concrete parts. A further challenge on site was adjusting the individual dimensional tolerances of the outer flanks in width and height.

Due to these complex requirements, we chose flexible moulds made from polyurethane (PU) to produce the concrete parts, as used previously with great success in Wetcast production. The moulds had unusual dimensions, with the result that each one weighed around 1,800 kilograms. All in all, this was a major challenge in terms of model construction, raw materials and handling, especially given the estimated budget.

Producing the model and PU mould

Right at the beginning, we had to decide on which raw material to use for both the model and the PU moulds. When designing the moulds, we were able to adopt a constructional approach, focusing on the geometry and design of the wall thicknesses and the use of displacement

bodies to directly influence the overall mass and manufacturing costs. By contrast, the geometry of the model was already specified by the finished concrete part. The only way to reduce costs here was through the choice of material and the resulting processing workload.

Pros and cons in model construction

After careful considerations, we decided to use multi-layer wood for the model.

ADVANTAGES

- ▶ Low raw material costs
- ▶ Fast availability
- ▶ Production of precise contours through the bonding of pre-sawn panel sections
- ▶ Easy to mill
- ▶ Short milling times thanks to high feed rates
- ▶ Proven application in the production of large-volume models
- ▶ Sustainable material

DISADVANTAGES

- ▶ Vulnerable to hairline cracks in the event of temperature fluctuations
- ▶ Achieving the necessary surface quality requires intensive finishing
- ▶ Build-up of gas in the polyurethane in the event of contact with hairline cracks
- ▶ Risk of imperfections during bonding

A custom PU system

In order to prevent casting mistakes and therefore additional costs, we cooperated with one of the leading providers of casting resins to produce a polyurethane system specially designed for use with our wooden model. The necessary quantity of casting resin required a high pot life. The plan called for the mould to be cast in multiple layers, but without visible contours between them. Physical shrinkage also had to be kept to a minimum due to the model's length of 7 metres. An unfilled system had to be used in order to prevent changes in the PU mould. Finally, the viscosity of the casting resin needed to ensure even levelling and therefore the best-possible filling of the individual ring cavities.

All of the properties were analysed in advance and subjected to a practical test. We specifically

used a metering system with an output of 22 kg/min to fill the sample mould and ensure that the mould could be filled within the set pot life.

Clean work: the casting table

The number of displacement bodies and steel anchors within the casting mould meant that we needed a specially developed steel frame. Produced in house, our frame enabled assembly work beneath the model as well. A movable work platform was installed above the model to enable easy and contactless access to all areas. This was because all surfaces had to be carefully treated with a separating agent before pouring the casting resin. Even the tiniest imperfections in the separating layer would inevitably damage the mould and the model, leading to a defective cast. In order to make both these construction measures and the handling of such large moulds possible, we used a recently produced, twin-bay hall with a total floor space of 2,400 square metres.

Precision needed: The separation system

What is the best way to safely separate the PU mould from the casting model? We solved this challenge by attaching a special ventilation valve to all ring cavities. This removed the risk of vacuums and adhesion forces between the polyurethane and the smooth surface of the model. To achieve this, we first removed all displacement bodies and cores using a special pulling device, before screwing a steel panel to the PU mould. In the next step, we had to evenly separate the polyurethane from the individual cavities and raise the frame together with the casting mould using a crane. This is a highly precise process that can quickly cause the mould and model to jam and therefore prevent separation.

The same but different: The finished concrete part

The specification called for the facade structure of the stairwells to be modelled after that of



01



02



03

01_Milling the mould model

02_The finished wooden model

03_David Werning (Project Manager) and Dr Arno Schimpf (CEO) on the construction site in Budapest

the old stadium. At the same time, however, it had to ensure the transmission of radio, television and mobile telephone signals into and out of the stadium with as little interference as possible.

This was achieved by using a highly flexible PU mould to create a glass-fibre-reinforced finished concrete part that had both the desired structure and high strength. By using individual inserts, we were able to compensate the tolerances to the outer flanks and the upper and lower end components of the stairwells in the PU mould. This created precisely matching individual elements that fitted seamlessly in the stairwells. The joints between the elements were covered using concrete rings that also held them together.

This combination of flexible moulds and high-performance concrete plays a decisive role in the architecture of the stairwells and the appearance of the stadium.

Conclusion: The Puskás Ferenc Stadium – a complex project

Such a detailed but strong outer facade would not be possible without the use of suitable PU moulds. Given the present undercuts, a flexible casting mould is essential. Using BIM building models gives us immediate access to the data needed to construct the moulds, which means we can quickly implement any special features. In this example, the project was implemented within three months from the initial request to the delivery of the PU moulds.

The project was a significant highlight in the PRECAST industry that showcased our expertise. When the matches in the new Puskás Ferenc Stadium kick off in 2020, we will be admiring both the action on the pitch and the outer facade of the stadium.

More information on WASA PRECAST

If you would like to find out more about WASA PRECAST and our exciting projects, then read our project report on the London Crossrail line on page 6–9 of this magazine.

WASA UNIPLAST® ULTRA

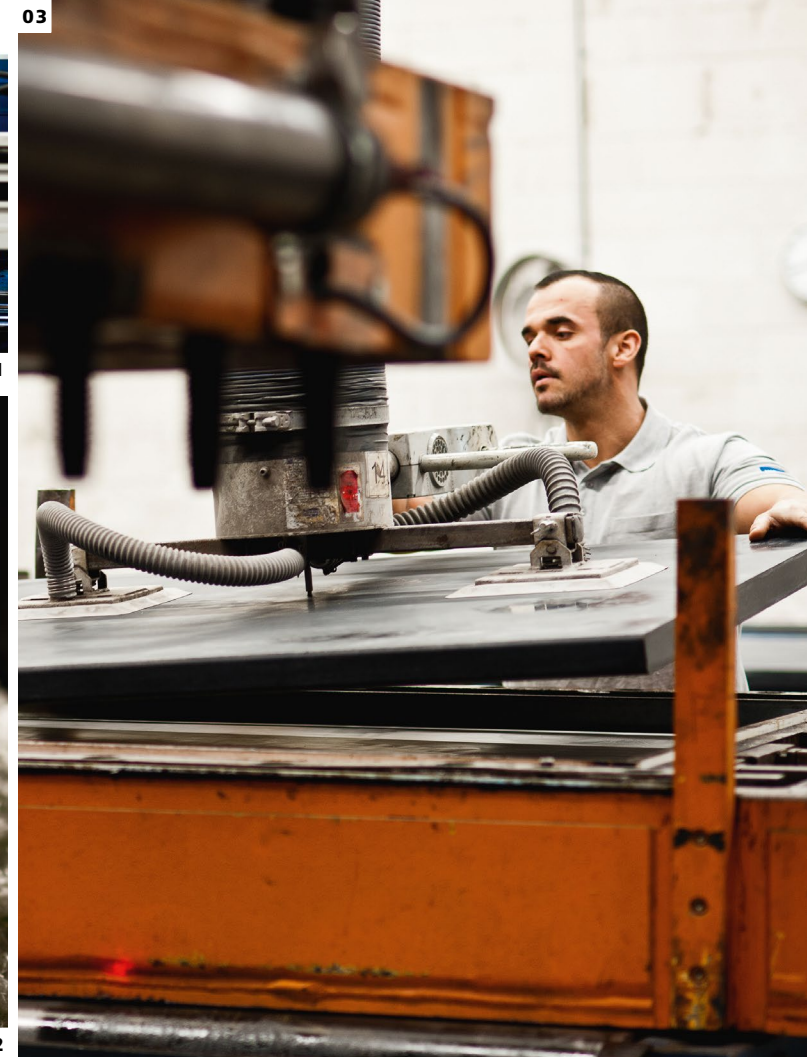
How we make our premium boards.



Shift supervisor Peter Geiss performing a quality inspection



03



01_Laser-assisted three-point measurement of exact planarity

02_Added glass fibres reinforce the board and minimise deflection

03_Extraction of a freshly produced WASA UNIPLAST® ULTRA using a vacuum lifter



02

All the necessary raw materials are delivered to our production facility in Neubrunn. We then prepare the customised plastic mixtures according to our customers' individual requirements. The mixture is then fed into our injection moulding systems and plasticized.

The injection mould, specially created for the respective board, is attached to the plasticizing unit and locked into place. The number of steel moulds used depends on the order size. The plasticized mass is then injected into the steel mould. This process can take a few minutes depending on the size of the board. The interior

of the moulds can also be adjusted to the custom board size.

After the filling process, the mould is detached from the injection moulding machine. It then passes through several cooling stations to cool the plastic down to room temperature. Next, the plastic boards are removed from the moulds. They then undergo a quality inspection checking the weight, planarity and dimensional accuracy of every board. After passing the quality inspection, we add further customer-specific elements like chamfers and edges. Finally, the boards are packed onto pallets and prepared for transport by truck or ship.

"Training, employment contract and now at WASA for over 20 years."



Sandra Baum
enjoys new challenges

Well organised.

The people at WASA form the basis of our success:
Sandra Baum started working at WASA as an apprentice over 20 years ago,
now she has everything under control as our authorized signatory.

Of course, the right support structures are needed behind our Board, wetcast and Precast moulds: Sandra Baum started out as a trainee at WASA in Neubrunn over 20 years ago. Today she is the authorized signatory for payroll and financial accounting, contact regarding personnel issues and she serves as a Management Assistant. She does not regret completing her training instead of studying business administration. She values the good collaboration, whether with the team or

with the management, to this day and it is one of her reasons for staying loyal to WASA all this time. Another reason is the good combination of regular tasks and new challenges, such as the regulatory changes and requirements, that go along with her work for us.

In her free time, she finds the necessary balance by spending time with her friends and family.

May we introduce: your new colleagues



Admittedly, our products will not do the work for you. But they will help you in satisfying, or even surpassing, your demands. After all, where other materials are merely a means to an end, it is our aspiration to provide you with reliable materials: durable, of lasting value and of the highest quality – for years to come.





01

25 years of loyalty.

Phoenix Concrete Products in Dubai has relied on WASA for 25 years.

Phoenix Concrete Products, a concrete product manufacturer based in Dubai, outputs 150,000 concrete blocks each day on a production and office area totalling 50,000 m². To achieve this, three systems are employed with a total of 9,000 production boards. Since 1994, only WASA UNIPLAST® and WASA UNIPLAST® ULTRA solid plastic boards have been utilised.

Phoenix Concrete Products, with its headquarters in Dubai's Al Quoz Industrial Zone, is one of a total 32 concrete block production facilities in this Arab Emirate. From this location, Phoenix Concrete Products supplies its customers in Dubai and all other Emirates to the north. Up until recently, concrete blocks were also supplied to Qatar using the company's own trailers. Phoenix Concrete Products possesses 36 such vehicles, all of which are equipped with stationary mounted overhead cranes so that they can be loaded and unloaded independently.

The company's 65 year old managing director, Nadim Hobeika, was born in Lebanon and has already been domiciled in Dubai for 40 years. Before beginning his activities at his current employer, Hobeika was engaged as plant manager at Consent, a firm located in the vicinity. It was here that he came to know WASA UNIPLAST® solid plastic boards from the German manufacturer, WASA, which were also a

success in production at Consent. Nadim Hobeika now heads Phoenix Concrete Products and its 175 employees together with his brother Nabil Hobeika, who, as production manager, is responsible for its smooth running and the consistent, uniform quality of its block products. The production lines run seven days a week 24 hours a day. A total of 19 forklifts are in operation day and night bringing finished blocks from the production halls to the yard or straight onto the trailers. Gone are the days when Dubai suffered the worst crisis in its history, even if the prices and numbers of blocks sold in the boom times can no longer be attained. In the times of booming economy, Phoenix Concrete Products employed a workforce of 215 persons.

"But there is no reason to complain at the moment," says Nadim Hobeika. The company is more than satisfied with the sales figures. According to his own admission, the company has been market leader in the areas of lightweight, hollow and solid blocks. These are produced on three Vibrobloc machines, one of which the Hobeika brothers had re-designed and modified to suit Phoenix's special needs and requirements. The business with their well-known sandwich structure blocks, furnished with polystyrene for insulation, is operating very successfully.

Phoenix Concrete Products was also issued a so-called "Conformity Certificate" some time ago. It now allows the



02



03

01_The total capacity of the curing chambers, which function with intrinsic heat, is 9,000 rack places

02_Phoenix Concrete Products produces 150,000 concrete blocks each day on a production and office area totalling 50,000 m²

03_All Phoenix Concrete Products transport vehicles are equipped with stationary mounted overhead cranes so that they can be loaded and unloaded independently

company to certify its own products in its in-house laboratory. Before this authorisation was granted, it was only possible to do so via the relevant administration in Dubai. Together with an ISO 9001 certification, this makes Phoenix Concrete Products ideally prepared for the future.

The total capacity of the curing chambers, which function with intrinsic heat, is 9,000 rack places. These are all fitted out with WASA UNIPLAST® or WASA UNIPLAST® ULTRA boards without exception. Up to the present time, Hobeika has never for one moment been sorry he purchased solid plastic boards, of which the WASA UNIPLAST® ULTRA type is reinforced with fibre glass. Questioned about the advantages of these boards, his answer is this: "For us there are particularly three aspects that spoke – and still speak – in favour of solid plastic boards: in the first place they are half the weight of steel, which means that solid plastic boards can be handled much more easily, secondly the boards' long service life, and last but not least lower wear on the machines and our stock of moulds." One further benefit that Phoenix Concrete Products much appreciates is that solid plastic boards can never have problems with corrosion.

So it is hardly surprising that Phoenix Concrete Products has just lately again decided on purchasing such production boards from WASA: 4,160 WASA UNIPLAST® ULTRA with the dimensions 1,400 x 900 x 55 mm were commissioned for operations in February 2017. These have replaced a corresponding part of the board stock that was exchanged after more than 15 years of service life.

Yet, it does not mean that the old plastic boards have to be disposed of. "A fully-fledged market for used plastic boards has developed," says Matthias Bechtold, chairman of the board at WASA AG in Darmstadt, Germany. "Particularly on the African continent, there is great demand for good but inexpensive boards. They want to move away from wooden boards to boards that are better technically. In this case, our used plastic boards offer the perfect solution. They are cheap to purchase but still provide optimum production characteristics because the plastic has not changed throughout their entire previous service life."

"This is also the reason why new and old solid plastic boards can be mixed without problem in production facilities. This could come about, for example, when a factory does not start off at full capacity due to cost factors after commissioning. Production boards with varying lengths of service life can still be utilised together in production without generating different block qualities because the transfer of vibration remains unchanged for solid plastic boards during their entire working life. With wooden and composite wooden/plastic boards, which WASA also carries in its range, this is not the case," explains Matthias Bechtold. The latter have been ruled out by Hobeika. He swears by boards made from fibre glass/plastic. "Phoenix Concrete Products supplies one of the best block qualities on the market not least because of the outstanding compaction with solid plastic boards. Why should we start thinking about changing the board type?"

TALKING TO JÜRGEN MARTIN

“Individual needs determine which board is suitable.”

Jürgen Martin is a research associate and deputy head of the Machine Technology department of the FIAB Weimar e. V. (association supporting the Weimar Institute of Applied Construction Research). We spoke to him about the increasingly complex requirements for the concrete stone industry and what these mean for the specification profile for production boards.

“Stones and boards should look appealing but also have the right inner values.”

Mr Martin, production boards that are currently on the market not only differ in regard to their service life but also in terms of their capability of transmitting vibrations. This changes especially over the course of their service life when they are used timber products. How important is consistent vibration transmission in production boards?

Martin: The quality of concrete products has long been the centre of attention. Stones and boards should look appealing but also have the right inner values. As part of the vibratory subassembly of concrete block machines, the production board has great influence on the

compression result. The vibration transmission determines how much impact energy is passed on to the concrete to be compressed. High-energy impacts are needed to achieve a high level of compression efficiently. Therefore, consistent vibration transmission is a decisive quality criterion. Changes that occur as service life increases have a significant effect on process safety.

Are softwood boards disappearing as a product?

Martin: Softwood boards will continue to have a purpose. A large share of users in gardening and landscaping opt for low-cost concrete products in standard quality to achieve high market shares by offering value for money. Manufacturers of concrete products that offer their products in the low-cost market segment will therefore continue to rely on softwood boards.

In the past, several scientific studies were conducted on the properties of the various types of production boards. The IAB in Weimar also authored various publications on this topic. Do you believe that a general requirements profile for production boards can be derived from these studies?

Martin: The key process-related requirements for production boards include high long-term rigidity and impact resistance together with a low net weight. They must also resist the effects of abrasion, impact, humidity and fluctuating temperatures. In the end, there is no production board that meets all requirements and is available at a low price. The individual needs of concrete product manufacturers determine which board is suitable for them.



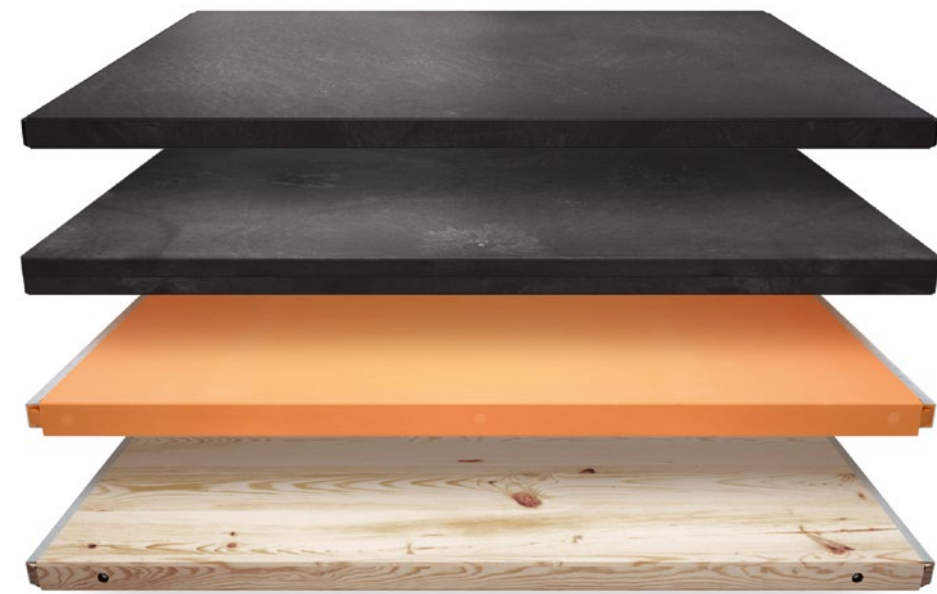
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Peter Geiss
is nowhere close to quitting

“I was there
through all the ups
and downs.”



A true original.

The people at WASA form the basis of our success:
As our very first employee, Peter Geiss has been loyal to our plastic boards
production as a shift supervisor to this day.

A successful product like our WASA UNIPLAST® ULTRA requires the right people: Peter Geiss is the shift supervisor of our plastic sheet production in Neubrunn.

Working at WASA since 1991, he was one of our very first employees and started out doing virtually everything. Being a trained mechanical engineer, he had to do repair work himself as a shift worker. Today our own maintenance and electronics department takes care of that for him, allowing

Peter to concentrate on his three production lines, his employees and the quality assurance and raw materials supply. In his opinion, automation will continue to take hold in future, but the range of supervisory activities will grow along with it.

Although his own house, yard and garden and especially his grandchildren could keep him occupied, Peter hasn't been thinking about retirement. He simply has too much fun working with his colleagues and high ambitions to continue improving our production.



THE ART OF TRAVEL

by Alain de Botton

Having the travel bug is not enough, travelling can also take a bit of luck. In his relaxed but charming style, cosmopolitan flaneur Alain de Botton describes the ups and downs of travel from the minute we head out into the unknown to the moment we return home, helping us to gain a new appreciation of its beauty.

THE SECRET WORLD OF DOING NOTHING

by Billy Ehn, Orvar Löfgren

Doing nothing can be difficult to contemplate. In this cultural analysis, Billy Ehn and Orvar Löfgren illustrate what is happening when, to all appearances, absolutely nothing is happening. In a world that prioritises efficiency, doing nothing can harbour subversive potential.

THE BOOK THIEF

by Markus Zusak

1939, Nazi Germany. Standing next to her little brother's grave, Liesel steals her first book and learns to read. She discovers her love of books and looks on as the world around her turns to ashes. She experiences the nights of bombing in Munich but survives, as it appears that death has a special place for her in his heart.

THE SEA

by Wolfram Fleischhauer

A story of good and evil, life and death. Three men on a desperate search, two women in fear of their life and between them the brutal machine of the global fishing mafia, a public that doesn't care and politicians whose hands are tied.

A CENTURY OF WAR: ANGLO-AMERICAN OIL POLITICS AND THE NEW WORLD ORDER

by F. William Engdahl

Nothing has had greater influence on the history of the last century than the fight for control of the world's oil reserves. William Engdahl delivers an astonishing look behind the scenes of global politics and exposes the true reasons behind wars, economic crises, assassinations and murders.

BOOK RECOMMENDATIONS

Our favourite page-turners.

Nothing is better than relaxing with a good book. There is even something almost magical about it. We asked our colleagues about the last books that had them hooked. Here you can find some of their recommendations, from extraordinary cultural analyses to moving novels.



Michelle Voigt
is giving it her all as
an apprentice



“Regional attachment
and international activity
– that is WASA.”

Apprentice with ambition.

The people at WASA form the basis of our success:
**Michelle Voigt is a business administration apprentice in Neubrunn and
already holds large responsibilities.**

Being autonomous and working independently is not a matter of course for trainees at every company. At WASA it is – and it is exactly what Michelle Voigt likes about her job here.

Making coffee for the boss? Buying food for the team? Certainly not: As a trainee in business administration since 2017, she has been primarily occupied with creating delivery

slips, quotations, invoices and order confirmations, in short with everything revolving around the goods management system for our Wetcast department in Neubrunn. She particularly enjoys acquiring new knowledge on business administration as well as technical knowledge during her training. That a regional attachment and an export-oriented, international field of work do not have to be mutually exclusive is the icing on the cake for Michelle in our sector.



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Thank you for reading!

We hope this magazine was able to provide exciting insights into our industry and our work, as well as giving you a glimpse behind the scenes.

If you would like to find out more about us or our services, please visit our website at www.wasa-technologies.com

Maximum performance – every minute of every hour of every day.

Our production runs 24 hours a day, seven days a week, and at the highest level. Benefit from production boards which enable the creation of excellent concrete products. Whether in terms of load-bearing capacity, precision or value retention, our broad portfolio has the perfect product for your application – whatever you need.

✓ **WASA UNIPLAST® ULTRA**

The high-performance board made from all-plastic, glass-fibre reinforced material for the most demanding applications.

✓ **WASA WOODPLAST®**

The best of both worlds: the composite board made from polyurethane and a strong wood core.

✓ **WASA SOFTWOOD**

The proven softwood board with impressive production characteristics at low investment costs.



WASA BOARDS