THE MAGAZINE FOR
EMPLOYEES AND CUSTOMERS
OF MC-BAUCHEMIE
1-2017

MC aktiv

MC Report

Advancing technology:
MC tunnel construction expertise in demand globally

Page 8-10

MC Inside
Nicolaus Müller new Managing Director **Page 3**

MC News
Radiation protection concrete for Klinikum Darmstadt **Page 5**

MC News
Special project in Bergheim **Page 11**

MC Innovation
Universal anchor bonding system **Page 13**

Dear Reader,

Following the decision of the European Court of Justice in autumn 2014, the Federal Republic of Germany was obliged to amend its building regulations law by 16 October 2016. As this has not yet happened, the deadline was recently extended once more to the end of 2017. If you are uncertain of the current situation, make sure you are on the safe side by using product systems from MC. Our solutions not only satisfy the highest quality requirements, they also come with the necessary test certificates. That means that, whether you are a client, planning engineer or specialist applicator, you are completely covered when working with MC products.

I hope that you have had a good first few months in 2017 and that the New Year holds many positive developments for you. Apropos positive developments, I am delighted to say that, in addition to the new products and innovations featured within the following pages, you will also read that my son Nicolaus has joined the MC Board, now that he has returned to Germany after his six years of working abroad. With the new knowledge and expertise he brings to the table, he will be able to provide further impetus in driving forward the successful development of MC.

We are also generating new momentum in, for example, our Tunnelling FoE. As a stand-alone business unit offering comprehensive system solutions and decades of experience in all aspects of tunnel construction from heading to repair, this Field of Expertise serves to leverage the excellent advice available to our customers to even better effect. We highlight some of our competences in this domain in the MC Report included in this present issue.

Beyond that, we once again offer insights into current projects and activities of MC, closing as usual with personnel-related news.

Enjoy the read!

Yours,

Dr.-Ing. Claus-M. Müller

Contents

Cover Photo

Shaft breakthrough at Section 40 (BA40) of the Emscher project, which involves construction of the world's most advanced sewerage system (as previously reported). Concrete technologists from MC examine cutter tooling on the cutter wheel together with the soil conditioning agents used. The tunnel boring machines feature EPB shields with a diameter of 3.40 metres. They are also equipped with foam lances and generators from MC for ideal adaptation of the excavation process to the local geology. Using specially developed foaming agents and mechanical generators, a foam is created that is fed by four supply lines to the cutting face, into the excavation chamber and directly into the screw conveyor, enabling low-friction, low-settlement heading.

Photo: MC-Bauchemie, Bottrop

Credits

Publisher:
MC-Bauchemie Müller GmbH & Co. KG
Am Kruppwald 1–8
46238 Bottrop, Germany

Tel. +49 (0) 20 41/1 01-0
Fax +49 (0) 20 41/1 01-688

www.mc-bauchemie.com
info@mc-bauchemie.de

Managing editor/Conception
Saki Moysidis

Design:
iventos – Agentur für Marketing, Bochum

Nicolaus Müller new Managing Director

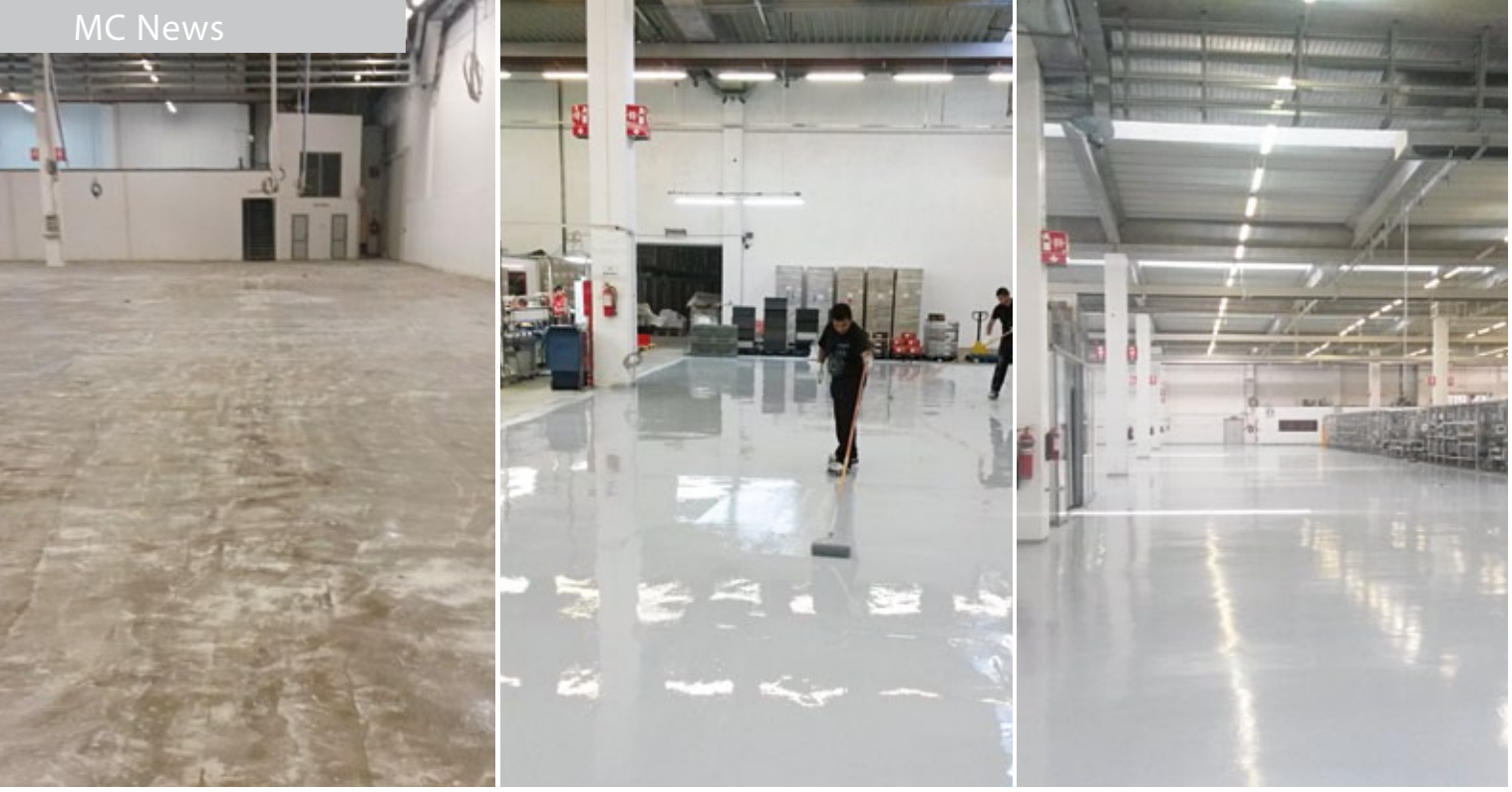
After spending several years with MC-Bauchemie in Brazil, Nicolaus Müller (31), son of Dr.-Ing. Claus-M. Müller, Managing Partner of MC-Bauchemie Müller GmbH & Co.KG, has returned to Germany and taken up the post of Managing Director of MC-Bauchemie Müller GmbH & Co. KG, Bottrop, Germany.

Following in the footsteps of Heinrich-W. Müller who founded the company in 1961, Nicolaus Müller represents the third generation of the family to take on executive management duties at this world-leading manufacturer of building chemical products and technologies. Nicolaus Müller will assume global management responsibility for the target markets "Concrete" and "Building Distribution" (trade arm) together with the corporate divisions Marketing, Public Relations and Human Resources. He will also oversee some of the international territories in which the MC Group is active. The company's operational management is thus now in the hands of a triumvirate comprising Dr.-Ing. Claus-M. Müller, Dr. Ekkehard zur Mühlen and Nicolaus Müller. "I am delighted that, after several years of successful involvement in our companies in Ireland and Brazil, my son has joined the executive management," says Dr. Claus-M. Müller, Managing Partner of MC-Bauchemie. "With his knowledge of business administration, his sales and distribution expertise and his understanding of the particular features of our business, he is well placed to successfully drive MC's long-term growth strategy." Looking ahead, Nicolaus Müller says: "After a number of interesting and highly instructive years abroad, I have now returned to Germany full of energy and ready to begin my new duties. I intend to do everything possible in order to enable the strategic development of our group of companies and make our businesses fit for the future."

15 years of MC Brazil

MC Brazil celebrated its 15th anniversary on December 15, 2016, inviting customers, collaboration partners and employees from the management circle and Sales to the "Casa Manioca", a popular, traditional restaurant in São Paulo.

Managing Director Jaques Pinto (2nd picture, centre) welcomed the guests in a review of the past extending from establishment of the company and across its rapid and successful development to perspectives for the future. An especially produced video showed the milestones of MC Brazil's evolution and also a selection of reference projects. Nicolaus Müller thanked all employees for their hard work and commitment, and particularly Jaques Pinto for his extraordinary dedication and the contribution he has made to the success of MC Brazil. He likewise expressed his heart-felt gratitude to the numerous customers present for the constant confidence they have shown the company through the years. The official part was concluded with a mood video presenting the new positioning and the underlying values that MC stands for. The subsequent dinner provided plenty of time for the guests to converse. At the end of the celebration, each customer and collaboration partner received a beautifully packed gift: a special German Riesling wine – because, like German construction products, German wines enjoy an excellent reputation in Brazil.



Total renewal: The creation step by step of a visually attractive and highly resistant industrial floor.

Hard-wearing industrial floor

In the Romanian city of Orastie can be found the headquarters and main production site of Philips Orastie SRL, a subsidiary of the electronics group Philips, where they manufacture espresso machines for the international market. In need of an industrial floor solution for repairing its warehousing and distribution area, the company carried out numerous competitive tests before deciding on a proven system from MC.

The hall floor in the warehouse and distribution area had been subjected to heavy wear and tear in the past, due in particular to attrition from forklift truck operations. Orastie Philips therefore wanted a long-term, resilient repair solution – and one that could be implemented quickly. So it had a number of test surfaces prepared by various suppliers. The applicator KASE PROFESSIONAL laid a sample area using an industrial floor system from MC, and it was this that ultimately came out on top against specimen coatings from other providers. Although the MC-DUR system was not the cheapest option, it was found to be technically and qualitatively superior and was applied to rehabilitate the floor, covering a total area of 8,000 square metres.

View of the bright distribution area following the floor repair work.

Floor coating build-up – fast and reliable

A particular challenge imposed by Philips Orastie emanated from the need to minimise production downtime. The overall project was therefore divided into four phases, implemented by KASE PROFESSIONAL between 25 June and 30 December 2015 in shifts of up to 16 hours per session. To speed up the floor repair process, the substrate preparation phase was followed by application of MC-DUR rapid primer. Thanks to its fast-setting capability – even at low temperatures down to 2° C – the surface can be overcoated after just 12 hours following application. The primer was followed by the scratch and blowhole filler comprising a mixture of low-viscous, highly fillable epoxy resin MC-DUR 1390 VK and quartz sand. The floor was then provided with the resistant epoxy resin coating MC-DUR 1212 VB offering a convincing combination of high anti-abrasion values and good chemical resistance. Such properties make MC-DUR 1212 VB the ideal coating for industrial storage and production facilities. And to provide this MC-grey surface coating with an appealing appearance, M3 decorative chips were embedded into it.

The floor was then finished with a transparent, matt coating in the form of MC-DUR 2095 M, a speciality polyurethane sealant that exhibits very good adhesion combined with high surface hardness. Open to diffusion, the sealant offers outstanding cleanability and will, in future, significantly reduce the cost of cleaning the hall floors.

The MC-DUR system was not only able to meet the specifications of the client Philips Orastie, it also met the high demands and strict group guidelines of the parent company in every respect.

› codrut.belei@mc-bauchemie.ro

Heavy concrete: Profi-Beton and MC collaborated with great success in solving difficult technical and logistical challenges.

Radiation protection concrete for Klinikum Darmstadt

Built in 2016, the new central building of Darmstadt's "Klinikum" hospital contains two rooms for the radiology department. To protect the surrounding areas from radiation, the walls and ceilings had to be built with heavy concrete, a challenging construction and logistical task that was resolved thanks in part to admixtures from MC.

When contractor Leonhard Weiss from Satteldorf was awarded the contract for a new building at Darmstadt Klinikum, the requirements of the new radiology rooms were a major aspect of the project specifications. This construction phase not only required 8,000 m^3 of standard concrete but also – among other things – 300 m^3 of heavy concrete with a specified density of 4.2 t/m^3 (standard concrete usually has a weight of 2.3 t/m^3). The walls had to be 1.70 m and the ceilings 1.80 m thick. Lead plates with a total weight of 25 metric tons also had to be embedded in the ceilings – so all in all a taxing task for both the construction company and the ready-mix concrete manufacturer.

The heavy concrete challenge

Heavy concrete is made by adding dense aggregates such as magnetite, haematite or barite. Their iron-containing components give the concrete a red colour. Because heavy concrete mixtures are very seldom used in Germany, the production facilities and machines are rarely designed for the enormous weights involved. Moreover, the concrete flow rate is significantly slower. Consequently, it was necessary to reinforce all relevant technical facilities in advance and to develop an appropriate concrete formulation that guaranteed both uniform quality and a sufficiently wide application window. It also had to allow for the difficult transport conditions prevailing in Germany's Rhine-Main region around Frankfurt. Thus there were major technical and logistical challenges for the ready-mix concrete provider to tackle.

Optimum formulation

Given the radiation protection requirements and the technical capabilities needed in this regard, at the beginning of 2016 the highly qualified MHI Group with its subsidiary Profi-Beton was awarded the order of supplying the concrete for the construction project. Numerous preliminary trials were carried out in developing the formulation at MHI Naturstein & Baustoffservice GmbH, the group-internal test and surveillance unit serving Profi-Beton, in collaboration with all the project partners involved. As well as the other critical quality requirements, particular attention was given to adhering to the specified time window, even at high ambient temperatures, as construction was to take place in high summer. With MC-PowerFlow 5100, a superplasticiser based on MC's latest polycarboxylate ether technology, an optimum flow facilitator with no segregation problem was found that offered cost-efficient dosage quantities.

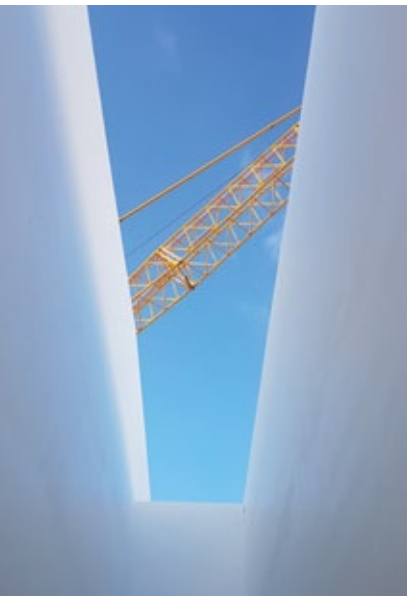
As a result of further formulation optimisations in relation to the haematite and FE-aggregate granulates, a density of 4.4 t/m^3 was ultimately achieved, thus significantly exceeding the requirements specified in the radiation protection regulations. Thus, an optimum formulation was developed that met the technical and logistical requirements of the job and has consistently proven to have been an excellent choice eve since the first concrete batches were laid in May 2016.

› stefan.hettwer@mc-bauchemie.de

The flagship Mlekovita II project: The walls and ceilings of this ultra-modern milk powder factory are protected with the high-performance coating Emcephob LE.

Dairy opts for hygiene coatings by MC

The dairy company Mlekovita from Wysokie Mazowieckie was founded in 1928 and is the second-largest milk processor in Poland. Aside from the old yet now updated core facility, an ultra-modern milk powder factory is currently being built under the name Mlekovita II. And products from MC were selected to ensure a hygienic and visually attractive coating of its wall and ceiling surfaces.



The white of the coated walls contrasted against the blue sky. The roof was only put in place after the coating work had been completed.

Exceptional hygiene thanks to Emcephob LE

Scheduled to go into service this year with a processing capacity of up to 2.5 million litres of milk and 1.5 million litres of whey, Mlekovita II will be the biggest facility of its kind in Central and Eastern Europe. This is a prestige project in which the highest hygiene standards apply and for which special requirements covering a broad range of aspects have been placed on the materials used in the construction. The demands covering the production areas were particularly strict, leading the project management to specify for the walls and ceilings an easy-to-apply and easy-to-clean surface protection coating with confirmed hygienic properties. The race was ultimately won by Emcephob LE, the high-performance coating from MC. Porosities, blowholes and other irregularities in the substrate and steel-reinforced concrete components were levelled using the filler compound MC-Powertop F fine.

Exceptionally flexible – extremely safe

Emcephob LE (Low Emission) met all the specified requirements. This high-performance hydrophobic coating system is universally suitable both for mineral substrates such as standard concrete, air-entrained concrete and render, and for polymer-modified internal plasters, as well as for many other substrate materials. It offers a combination of exceptional technical properties: Thanks to a new binding agent technology, it provides an extremely smooth and closed surface structure that is dirt-repelling, UV-resistant, scratch-proof, abrasion-resistant, water-repelling and water-impermeable, yet is still open to vapour diffusion.

Emcephob LE has been tested in accordance with the specifications of Germany's AgBB (Commission for Health Assessment of Construction Products) and has been passed as non-hazardous to health. This means it can be used without limitation for interior applications. The Hygiene Institute of the Ruhr District has also confirmed the product system as suitable for indirect contact with foods. The disinfectant resistance test performed by TÜV SÜD (German Technical Directorate) confirms excellent cleanability. The high-quality surface protection material is thus the ideal solution for the food industry – as it is for hospitals, doctors' practices, schools and much more.

Finished on time despite adverse circumstances

Despite the high pressure on time imposed by the investor and the resultant, occasionally difficult coordination of the trades involved, not to mention the adverse weather conditions ranging from high summer temperatures to cold snaps in the autumn, the entire 35,000 m^2 of wall and ceiling surface was ultimately coated with Emcephob LE within the specified timeframe. And success breeds success, with another project of a similar magnitude already in the pipeline.

› daroslaw.demski@mc-bauchemie.pl
› rafael.sass@mc-bauchemie.de

Oil tanks for a major project

Supported by international investors, a consortium managed by companies from Russia and Kazakhstan concluded a pipeline project last year (2016) which, with a total investment outlay of over 5 billion US dollars, counted among the largest capital projects ever undertaken in the energy sector of the Russian Federation. And concrete technology from MC was again part of the picture.

The pipeline conveys crude oil over a length of 1,500 kilometres from the Tengiz oilfield on the Caspian Sea in western Kazakhstan to the Russian shipping port of Novorossiysk on the Black Sea. Following the latest expansion work, the port now boasts six further oil tanks, each with a capacity of 100,000 metric tons. Their installation involved the placement of 30,000 cubic metres of concrete formulated with modifying admixtures from MC. With a capacity totalling 1 million metric tons, Novorossiysk has become one of the largest crude oil storage facilities in Russia.

Because of the geographic and climatic conditions alone, the construction of the tanks was beset with significant challenges. The distance between the concrete factory and the construction site of 25 kilometres meant transportation through difficult, mountainous terrain. The concrete therefore had to exhibit an open time of at least three hours. The plasticiser Muraplast FK 19 was therefore chosen to significantly increase concrete flowability in combination with a reduced water requirement. The high temperatures of the region – these regularly lie around the 40° C mark – also had to be taken into account. And last but not least, the concrete also needed to exhibit an especially high degree of water resistance. MC therefore recommended a solution based on the PCE superplasticiser MC-PowerFlow 2695. Combined with the hardening retarder Centrament Retard 310, the result was an extremely strong high-performance concrete offering high resistance to thermal cracking. With these admixtures from MC, the concrete qualified for a W18 classification, which means that oil could only penetrate through it at pressures upwards of 18 bar. As a special side aspect improving cost-efficiency, the combination of additives also produced a 20% saving in cement consumption.

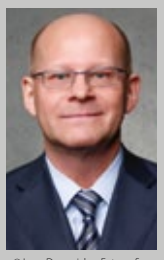
The huge satisfaction with these results as felt by the planning engineers and construction firms responsible was manifested by, among other things, a glowing testimonial which MC received from the company Chevron Neftegaz as one of the majority shareholders in the consortium.

› anna.pranova@mc-bauchemie.ru

The uncertainty continues

Commentary by Dr. Joachim Käppler on Germany's building regulations law and concrete repair directive

Over the last weeks, the delay in implementing decision C100/13 of the European Court of Justice by the German building authorities has continued to cause irritation. The European Commission informed the Federal Republic of Germany that it needed to revise its building regulations law and adapt it to European law by mid-October 2016. This still has not happened and now the deadline has again been extended, this time to the end of 2017. Until then, however, we will neither see any new regional building regulations (LBO) nor the long awaited VV-TB regulations which link the LBO to national standards and also Germany's DAfStb directive "Protection and Repair of Concrete Components". This is because the Commission has received serious objections to the VV-TB from EU member states and manufacturer associations that still need to be addressed. At their core, these relate to the declaration detailing the performance features of construction products. This impasse in building regulations law is also an obstacle to the DAfStb repair directive "IH-RL", the yellow paper of which has attracted more than 1,650 objections. Many terms and definitions differ from those given in EN 1504, which is binding across the European Union. In addition to this, construction products that have proven their worth for decades, such as swellable injection materials, are to be excluded. For these reasons, Germany's Industrial Association of Construction Chemicals (IDBC), which has around 130 corporate members, has ceased collaboration on the IH-RL repair directive until a second yellow paper has been presented. In this, the numerous errors and irregularities will need to be corrected and harmonisation with European law ensured. Whatever the outcome, however, you as clients, planners, specifiers and applicators can rely fully on the system solutions provided by MC-Bauchemie. These are held in the highest esteem worldwide because they not only satisfy relevant standards but are also aligned to ensuring the best professional performance by applicators, the greatest safety for the environment, and the longest service lifetime for clients and developers. That, at least, is certain. Be sure. Build sure.



© Ingo Dumreicher Fotografie

Advancing technology: MC tunnel construction expertise in demand globally

When, in 2016, the new Gotthard Tunnel on the railway route between Switzerland and Italy was opened after almost two decades of construction work, the subject of tunnel construction also came to the forefront of general public awareness. Given that the tunnel with its 57 kilometres in length is currently the longest in the world, this is hardly surprising. Nevertheless, there are far greater projects and challenges for tunnel constructors on the horizon, for which know-how from MC is also in ever-increasing demand.

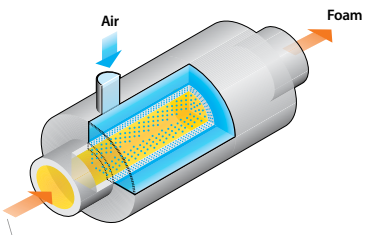


Diagram indicating the principles of an MC foam generator. With special foam concentrates, MC is able to produce a stable foam aligned to the characteristics of the job in hand.

Deeper, faster, further

Over recent years, there has been a global trend towards building complex transport routes and supply pipelines underground. And now we see projects at the planning stage that could have come straight off the pages of science fiction. There is a 130 kilometre long subterranean tunnel destined to join South Korea and Japan, a 123 kilometre long railway tunnel under the Yellow Sea between the Chinese business metropolises of Dalian und Yantai, and there is the 18 kilometre long Fehmarn Belt Fixed Link tunnel due to join the German island of Fehmarn with the Danish island of Lolland. Other major projects are already at the implementation stage – for example in Qatar where the 126 kilometre tunnel for the metro underground railway in Doha was driven in a record time of 26 months; or in Singapore where over 30 kilometres of utility tunnel are to be constructed by 2018 (as reported in MC aktiv 02/2016). And Germany also has a mega project of its own, with work on the various tunnels that make up "Stuttgart 21" already underway.

Heading for safety in tunnel construction

Most of these projects would be inconceivable without the rapidly advancing technological development that has taken place in mechanised tunnel boring technology. Here, efficient and cost-effective tunnel heading depends not only on meticulous planning and execution but also, in the truest sense of the word, advancing TBM (tunnel boring machine) technology in step with developments in speciality additives.

This field of endeavour is also of increasing significance for MC, with the company combining its competences in tunnel construction within its Tunnelling FoE (Field of Expertise). This pulls together comprehensive system solutions covering all fields of tunnel construction from galley driving to surface repair. The bandwidth encompasses soil conditioning, annular gap grouting and solutions for shotcrete and lining, not to mention product systems for the manufacture of tunnel segments. MC also offers systems for ancillary measures accompanying the tunnel boring operation, together with injection systems for rock consolidation and waterproofing. Crack, surface and joint sealing and cavity filling also have their place in the portfolio, as do solutions for concrete replacement and surface protection.

Rapid advancement: Mechanised driving with shield technology

The shield driving technique is given particular preference in loose rock conditions, as it offers numerous advantages in terms of speed, safety and cost-efficiency. Shield driving gets its name from the protective steel cylinder with which the tunnel boring machine is equipped. This has a cross section equivalent to the tunnel profile and is driven forward by hydraulic presses. These in turn are braced against the finished tunnel segment rings (tubbings). The tunnel tube is excavated by the rotating cutter wheel, with the follow-on systems

Cross section of a tunnel boring machine with an EPB shield. Soil conditioning agents from MC are applied to the rock, in the excavation chamber and in the screw conveyor.

consolidating the rock, placing the lining elements and possibly also sealing the tunnel.

Particularly in the case of soft, cohesive soils (spoil) with high clay or silt contents, earth pressure balance (EPB) boring is becoming increasingly important. Through the combination of innovative, modern machinery and the latest material technology, this likewise shield-based driving method constitutes a particularly economical process. EPB tunnel boring machines use the extracted spoil in as homogeneous a form as possible as a bracing medium in order to keep the support and cutting pressures evenly balanced. Success here ensures continuous, rapid and low-settlement driving progress. However, huge demands are placed on ensuring an optimal, even consistency in the extracted spoil.

The right drive

MC supports mechanized driving with a combination of innovative machinery and material technologies, including high-performance soil conditioning agents in the form of surfactants, polymers and other speciality additives. With these, the consistency and the flow behaviour of the extracted spoil can be positively influenced so as to ensure consistent support pressures. Water permeability and drainage resistance can also be specifically controlled and optimised in order to increase the speed and ease with which the spoil is excavated and removed from the rock face.

Working together with PORR Bau GmbH, MC has developed a new technology for this field. It involves the use of innovative foam lances combined with ideally adapted soil conditioning agents with which uniform monocellular foams can be generated. These foams improve the properties of the excavated spoil and should, in future, significantly extend the range of applications for which EPB tunnel boring is suitable. In addition, this process and the accompanying technical support offered by MC can significantly reduce the volumes

Continued on page 10

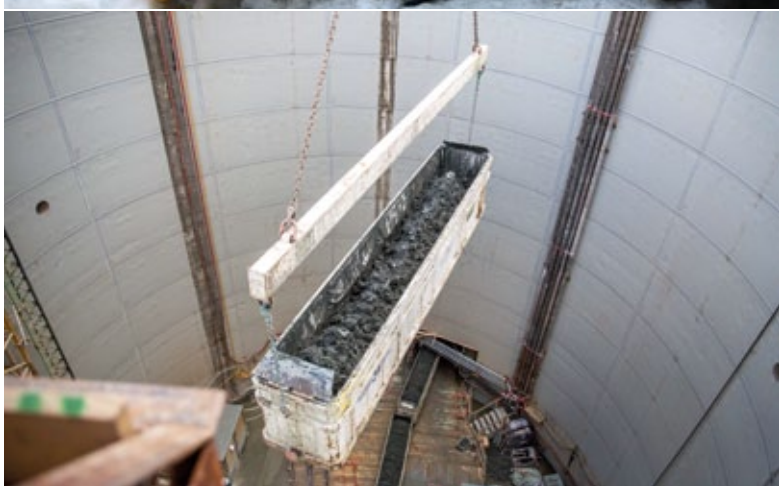


Photo above: Concrete technologists from MC check the foam consistency. Bottom photo: The excavated spoil has to be taken to the surface and then deposited at appropriate landfill sites.

Continued from page 9

of conditioning agents that need to be added to the slurry, with positive effects on both the environment and the client's budget. At the end of 2014, the Austrian National Committee of the International Tunnelling Association (ITA) recognised this significant advancement with its Innovation Award.

Emscher Renaturation Project

The innovation developed by MC and PORR Bau GmbH has already been applied since 2013 in the Ruhr region in the construction of the world's most advanced sewerage system for the once-in-a-generation Emscher Renaturation Project. The Emscher is a tributary of the Rhine running through the heart of the Ruhr region and once used as an open sewer. Now the area is to be renatured. At the core of the project is a sewerage system approximately 51 kilometres in length. This is being built at depths of up to 40 metres, with inside diameters averaging 2.80 metres. Once finished, the network will remove the sewage generated over an area of approximately 865 square kilometres, serving a population of some 2.4 million people.

During the tunnelling of Section 40 (BA 40) by PORR Bau GmbH, the initial heading work had to be carried out through chalk, with sand or sand-silt mixtures exhibiting cohesive properties also occurring in some areas. At the beginning of the work, MC carried out laboratory investigations in order to optimise the soil conditioning measures. For this, material from earlier, comparable tunnelling expeditions was analysed. Various trials, particularly in order to determine the degree of settlement, took place so as to reduce the foam injection ratio (FIR) during the tunnel boring operation. Eventually, two EPB shield machines with a diameter of 3.40 metres were used for the heading operation. Foam lances provided by MC were installed on the TBMs and then accurately adjusted . Four supply lines were fitted in order to inject the foam right at the rock face, in the excavation chamber and directly into the screw conveyor. This facilitated smooth heading operations with little settlement, meaning that the work is likely to be completed as planned by May 2017.

The logistics of spoil removal

The condition and consistency of the spoil are not only critical for the tunnel heading operations but also for the continuous removal of the excavated material. Its suitability for landfill disposal and the form of transport used depend significantly on what kind of spoil is produced. If the required properties are not favourable, transportation and disposal problems can occur, resulting in increasing expense. If a tunnel boring machine stands still, high costs are incurred which, in the case of major projects, can quickly add up to a six-figure sum per day. Such machine downtimes invariably occurred in the past where initial preparatory measures had to be taken for conditioning the spoil, where the material excavated during tunnel heading was of the wrong consistency or where removal was otherwise not possible. Thanks to the combination of advanced machine and material technology from MC, today these processes are largely synchronised with the ongoing heading operations – as is the case in the following application example.

Project Stuttgart 21

The redesign of Stuttgart railway junction features a link in the form of the Filder Tunnel between Filder station near Stuttgart Airport and the new central railway station. For this link, two parallel tunnel tubes had to be headed over a length of 9.4 kilometres. During the first 4 kilometres, the cutting operations were made through marl and sandstone. The machine used was an EPB shield TBM.

The first tunnel boring work began at the end of 2014. In order to ensure that the system operated at its optimum level, MC together with PORR Bau GmbH were again asked to plan and execute a preliminary investigation programme. Water and surfactant foam were used to reduce torque resistance at the screw conveyor. In the trials, the foam addition to the screw conveyor was varied in terms of both the injection points and the foam injection ratio. By optimally combining the foam addition and the arrangement of the injection points, the torque resistance of the screw conveyor was successfully decreased as required, and the quantity of conditioning agent used was also significantly reduced.

During boring in the rock formation, the variously and partially cohesive strata of sandstone and marl gave rise to clogging at the cutter wheel and in the extraction chamber. Here again, MC carried out investigations with the purpose of reducing the tendency towards cohesion. The results of the second drive indicated an improvement in performance with a reduction in both clogging and clump formation. Thus, MC was able to contribute to the trouble-free continuation of the tunnel project not only with individually coordinated product systems but also with a significant degree of support expertise.

High benefit –
also for the environment

Strict consistency requirements have to be adhered to, not only to ensure safe and efficient tunnel heading but also the disposal suitability and recyclability of the conditioned spoil. The conditioning agents supplied by MC are environmentally compatible and readily biodegradable. This not only benefits the environment but also helps to reduce landfill costs, thus doubling the payout derived from MC know-how.

› eugen.kleen@mc-bauchemie.de
› markus.treinen@mc-bauchemie.de

Determining the slump-flow value in the slump test: With the aid of the soil conditioning agents of MC, sandy soils can be stabilised so as to also absorb high water contents. This protects the tunnel boring machine from water penetration and helps to generate an optimum slurry, both for the tunnel boring operations and for subsequent transportation to the surface.

The concrete structures of the biogas production plant in Bergheim benefit from comprehensive protection against aggressive media. Photo right: Special MC protection for the concrete floor and joints of the clamp silo.

Special project in Bergheim

Between 2015 and 2016, the energy utility innogy SE constructed a modern plant for the production of biogas near Bergheim, west of Cologne in Germany's Rhine-Erft district. With a capacity of 7.4 megawatts, it has since been feeding 700 cubic metres per hour of treated biomethane into the natural gas network – enough to provide around 3,300 households with heat and electricity. MC made an important contribution to protecting those surfaces of the plant exposed to a high level of chemical attack.

Biogas production in Bergheim relies on a mix of raw materials from the region's agriculture. These are stored in silage chambers on site and then gradually fed into the fermentation process. The challenge in this system lies primarily in protecting the concrete of the clamp silo and the biogas production plant from media aggressive to concrete. The planning engineers GKE Consult International from Herne in Germany therefore put their faith in high-resistance product systems from MC.

An aggressive challenge

Organic acids which form in the digester vessel substrate as a result of the largely anaerobic fermentation process represent a problem for the durability of concrete. In the gas space, biogenic sulphuric acid (BSA) corrosion can occur, eventually leading to heavy corrosion of both the steel and the concrete components. Subcontracted by the construction company, the Essen-based firm of Massenberg GmbH used the duroelastic coating system MC-PowerPro HCR to protect the inside walls of the plant's receiving hopper. This protects concrete from liquid manure, slurry and silage liquor while at the same time increasing its resistance to carbonation. Moreover, the coated surfaces are also resistant to BSA. A further useful side effect is the fact that the silage is less likely to adhere to the coated concrete surfaces, thus enabling it to slide more effectively down through the outlet of the receiving hopper.

All-round resistance

Another raw material with special properties used in the plant is dried chicken dung, which is kept in its own storage facility. This is also very aggressive in contact with concrete, so that durable, highly effective protection of the concrete walls and also the concrete floor plate of the storage building must be ensured. GKE Consult International decided here on the surface coating MC-RIM PROTECT-H, which was applied by ATil GmbH of Düren near Cologne. MC-RIM PROTECT-H is highly sulphate resistant and is particularly suitable for applying to horizontal surfaces. It is resistant to media with pH values from 14 down to 3.5 and also to temperature fluctuations, and it is water-impermeable. It likewise withstands even the heaviest mechanical wear and tear such as can occur during drive-on operations with a wheeled loader.

Tight joints

The clamp silo was exposed to damage to its joints due to a level of beet content in the silage that had not been envisaged at the planning stage. Hence the old jointing compound had to be removed and replaced by a more resilient technology. The emergency was averted through application of the jointing system Mycoflex Resyst from MC. This enables expansion joints and vertical joints in the wall area to be reliably resealed against even aggressive environments. Mycoflex Resyst consists of prefabricated mouldings made from a special polymer foam. These effectively protect joints from aggressive chemicals with a more resilient seal. A series of tests was carried out which served to fully convince the site management, the VAwS* inspectorate and the planning engineers on site of the excellent merits of Mycoflex Resyst. Thus, chemical-resistant coating and jointing systems from MC continue to reliably and sustainably protect both the biogas plant in Bergheim and the environment.

* German industrial regulations governing substances hazardous to water

› luzian.haida@mc-bauchemie.de
› patricia.steffen@mc-bauchemie.de
› rafael.sass@mc-bauchemie.de

Application video
Link to the video:
http://bit.ly/2o1F8wk

Synagogue radiates in new splendour

Before-and-after comparison: The impressive transformation of the synagogue in Lucenec.

Ever since its completion in 1926, the synagogue in the Slovakian town of Lucenec has been regarded as a classic example of Hungarian art nouveau from the pen of architect Lipot Baumhorn. After several failed initiatives, this place of worship was extensively restored in the period 2014 to 2016, with EXZELLENT, the moisture regulating render system from MC, playing an important role.

After its partial destruction in the Second World War, the synagogue was used by the local agricultural cooperative in the then communist Czechoslovakia as a grain store. From 1980, the building was left to decay until finally, in 2014, a start could be made on extensively repairing it with the support of EU funds. The firm responsible for planning and overseeing the upgrade was that of architect Ing. Z. Papp. After trials on sample surfaces carried out during the tendering phase, EXZELLENT was able to win through against four product systems of other manufacturers.

Dilapidated state

The initial state of the synagogue was anything but promising: After years of disuse, its walls were in a dilapidated state. Not only had the masonry become saturated in moisture and salts, it had also been heavily contaminated with bat dung. Only EXZELLENT was able to meet the requirements specified by the planning engineers in every respect, and was thus chosen for refurbishing the walls and columns.

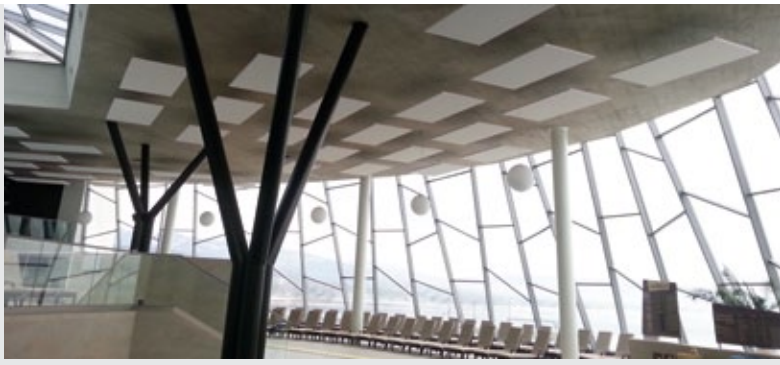
The system is based on a unique pore geometry comprising micro and macro pores that are interconnected and effectively utilise the laws of capillary action and diffusion. They absorb the masonry moisture and salts that are present and convey them to the render surface without damaging the structure of the render itself.

EXZELLENT can be directly applied to moist masonry, even where the degree of damp penetration is as high as 95 percent.

Thanks to EXZELLENT, the Lucenec synagogue has been returned to its original splendour – and also to its original purpose as a place of worship.

› robert.kovacik@mc-bauchemie.sk

Perfect in form and function



The Sirava Thermal Park near the Slovakian town of Michalovce offers a great example of how fair-faced concrete can combine functional excellence with a visually attractive appearance – thanks in no small measure to MC's admixture expertise.

A visual highlight of the Sirava Thermal Park, which comprises four different pool landscapes arranged below its avant-garde roof, is the enormous ceiling of fair-faced concrete set off by a glass "eye" serving as a natural light entry point at its centre. Here, the architect has deliberately exploited the optical effect produced by the formwork originally used for concrete placement. The result: a fair-faced concrete surface broken down into a great many individual structures. Rather than monolithic, the visual impression is one of playful patterns of light and shade, bringing the ceiling to life and providing a fascinating contrast to the water of the pools below.

MC was brought into the team at the request of concrete supplier Zapa beton SK. In developing the concrete formulations, the concrete technologists of Zapa beton and MC turned to plasticisers of the product families Muraplast and MC-TechniFlow, plus an air-entraining agent from the Centrament Air product range. Aside from improved fluidity, this gave rise to a robust, compliant concrete. The significant reduction in the water requirement also led to a substantial improvement in early and final strength, as well as a denser and visually more attractive surface appearance.

The project offers a good example of how proven MC admixtures can enhance not only the functional aspects of such builds but also their aesthetic charm.

› martin.struk@mc-bauchemie.sk

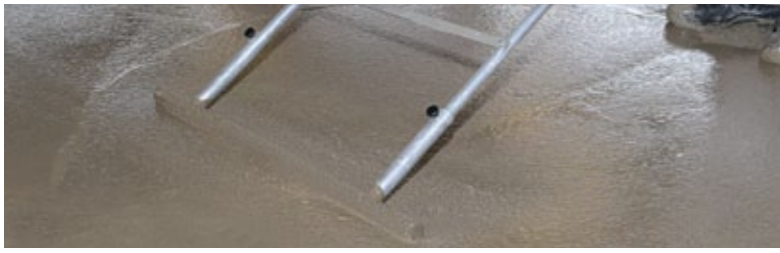
Universal anchor bonding system

With MC-AnchorSolid, MC-Bauchemie has developed a new, universal, integrated system with which a solid, positive bond can be made reliably and easily between rebar or threaded rods and any crack-free concrete base.

There are many construction jobs that involve the fixing of brackets, railings, shelving, canopies, awnings, scaffolding and similar to new and old concrete components. As a rule, rebar or threaded rods are used as bonded mechanical anchors. The MC-AnchorSolid kit comprises a new, highly reactive epoxy resin-based anchor adhesive, MC-AnchorSolid E820, the pneumatically powered delivery unit, MC-Fastpack Power-Tool, and standard commercial threaded rods (M8 to M20) or concrete rebar steel (Ø8 to Ø20). The threaded rods or rebar are simply inserted into drilled holes filled with MC-AnchorSolid E820, which then sets, providing a solid bond between the steel component and the concrete. MC-AnchorSolid is approved in accordance with European Technical Assessment ETA-15/0506 as a bonded anchor system for static and quasi-permanent loads attached to crack-free concrete of the grades C20/25 to C50/60.

› markus.treinen@mc-bauchemie.de

For weekend job sites



With MC-Floor Screed, industrial and warehousing floors can be repaired in just one day and are ready for full pedestrian and wheeled traffic usage after just two days more.

MC-Floor Screed 10 is the new rapid-hardening, high-strength industrial floor covering from MC for self-levelling layer thicknesses between 10 and 30 mm. The easy-flowing, single-component, cement-bound industrial floor is easy to apply and exhibits high load capacities even at low layer thicknesses. It hardens virtually free of shrinkage and stress, can be walked on after just two hours and, after 24 hours, coated with products from the MC-DUR range. The fast-curing speciality compound MC-Floor Screed 25 is mixed with 0-8 mm grain screed sand and applied in its earth-damp state. It is suitable for repairing areas with layer thicknesses between 25 and 70 mm and likewise hardens quickly and shrinkage-free. It can be walked on after approximately four hours and overcoated or covered after just two days.

› christian.noecker@mc-bauchemie.de

For further information...
... go to
www.mc-bauchemie.com

New approval certificates

MC-Color comes with a new set of test and approval certificates confirming its protective properties, its unique crack-bridging capability and its excellent fire behaviour.

An independent approval authority has tested the crack-bridging properties of MC-Color Flex vision, the high-end variant of the MC-Color Flex product line, in accordance with EN 1062-7:2004-08, and certified it with crack-bridging class B4.1 (determined at -20 °C). This is unique for pigmented coatings in this field – there are no other products in the marketplace capable of matching this performance.

First transparent concrete protection in BASt list

The Bundesanstalt für Strassenwesen (BASt – Germany's Highways Authority) has included MC-Color Proof pro and MC-Color Proof vision in its list of certified materials and material systems compliant with the German civil engineering code of practice ZTV-ING, Part 3, Section 4 (SIB) Surface Protection Systems (OS-B). This means it is approved for use on structures and building components on federal highways – a novel development in this market segment.

Excellent fire behaviour

All the surface coatings of the pigmented product lines MC-Color Flair and MC-Color Flex have been certified in combination with fine fillers in accordance with the DAfStb (German Commission for Reinforced Concrete) concrete repair guidelines and the ZTV-ING code as grade OS-4/OS C and OS 5a/OS DII systems. They have achieved outstanding results in fire tests to EN 13501-1. The fire behaviour of all systems has been classified with A2-s1, d0, i.e. they are non-combustible and do not produce burning droplets, burning debris, smoke or fumes.

› werner.baumgart@mc-bauchemie.de

MC-Forum marathon

Specialist technical and legal seminars held by the Infrastructure, Industry & Buildings division at MC take place every two years, informing clients and developers, planners and specifiers, and installers and applicators about new technologies and products, together with the latest legal requirements in related fields. Much appreciated within the construction industry, the event series this year began in Frankfurt on 31 January and, following further forums in Esslingen, Munich, Karlsruhe, Hamburg, Berlin and Leipzig, concluded on 14 and 15 February in Duisburg's Schauinsland-Reisen-Arena (the football stadium and home of MSV Duisburg, see adjacent photos), thus completing the German leg.

More than 700 participants took the opportunity to get a comprehensive technical update and meet with colleagues. The MC-Forum then moved to the Austrian capital of Vienna for 21 and 22 February, attracting a similar audience of some 60 clients and stakeholders.

18th Bottrop Concrete Conference showcases new developments

Held in the MC Training Centre in Müllerstrasse, Bottrop, the Bottrop Concrete Conference – now in its 18th year – took place on 2 and 3 February 2017 with presentations from MC's Concrete Industry division. Around 100 participants from the ready-mix, precast and concrete goods segments as well as from science and academia accepted the MC invitation to update themselves on the latest knowledge, developments and products available in the field of concrete technology.

They were treated to a feast of facts in an agenda that included dark colorations for fair-faced concrete surfaces, new admixtures for early-strength formulations, high-performance architectural concrete for façades, technological challenges for concrete in the current year, environmentally friendly concrete with no cement, and – not least – concrete designed to protect against explosion and fire.

MC as the go-to company for manhole refurbishment

Around 90 participants from repair companies, planning engineering firms and contracting sewerage operators attended this year's series of seminars. They were held in February 2017 under the title "CROM" (Certified Rehabilitation of Manholes) with the purpose of training attendees on the refurbishment of manhole shafts and shaft structures. This annual course, held for the 7th time in succession by Kaiserslautern University of Science and Technology in collaboration with MC-Bauchemie, is becoming increasingly popular within the manhole rehabilitation community.

All the participants successfully completed the written examination, enabling them to conclude their training with a CROM certificate. This evidences their ability to carry out shaft rehabilitation work in the German-speaking market to a high standard of quality and in accordance with sustainability criteria.

Welcome to the team

New employees at MC

Anna Kaja (38) joined MC on 1 March 2017 as an HR manager in the Human Resources department. With a Masters degree in psychology majoring in personnel economics and human resource management, she has taken up a part-time position with responsibility for projects in recruitment and MC's university marketing activities. Anna Kaja previously spent six years as an HR manager with a mechanical engineering company, prior to which she worked for five years as a recruiter with a management consultancy.

Jens Köhler-Ferreira (46) took up the post of Target Manager Sewage Water at MC on 1 March 2017, assuming responsibility for expanding our market activities in the associated Field of Expertise within the D-A-CH region. He gained a Masters in disposal engineering at Gelsenkirchen Polytechnic University, majoring in wastewater & waste management. Latterly, he spent four years working as a sales manager with a leading manufacturer of compact sewage treatment facilities in Germany, having already spent several years in a number of managerial functions within the same company.

Nick Varley (55) began tackling the task of Regional Manager for the Far East as of 14 March 2017. He assumes responsibility for MC's country organisations in Malaysia, Singapore and Taiwan, taking over from Christoph Hemming who will be focusing more closely on the regions Africa, Middle East, India, Australia and New Zealand. A materials engineer, Varley already has a successful international track record in the building chemicals sector, with the last nine years having been spent in the management of an internationally active speciality chemicals manufacturer.

From school to the world of work under MC guidance

How likely is it for high school students to get a chance to talk to the senior directors of an internationally active mid-sized company? Negligibly small, we would suggest. However, there is an exception in the form of the "Dialogue with Youth" programme run by the Ruhr region's industrial community "Initiativkreis Ruhr". An event of this kind takes place every year, providing students in the region with a unique possibility of gaining first-hand experience and insights into the corporate world by talking to industry's movers and shakers. And so it was, on 7 February 2017, for over 80 students from Essen, Gelsenkirchen and Dinslaken (all major hubs in the Ruhr conurbation) who took the opportunity to get out of the school room and into the business world of MC! After a guided tour of MC's production site in Bottrop, the students had a chance to put their questions relating to working life at MC to Dr.-Ing. Claus-M. Müller and Nicolaus Müller.

Dr. Seltmann takes retirement

Dr. Hans-Günter Seltmann (66) took retirement at the end of last year after 28 years in the service of MC. His successor, Dr. Carsten Zilg, who has been with MC since 1 April 2016, made the most of the last few months of Dr. Seltmann's tenure to ensure a smooth transfer and has now fully taken over his responsibilities.

Dr. Seltmann joined MC as its Head of Research & Development on 1 October 1988. He had previously spent eight years as a development chemist with Henkel KGaA in Düsseldorf, where he was responsible for developing adhesive technologies. Before his time at Henkel, he studied chemistry at the University of Hamburg, gaining his doctorate there in 1980. Born in Thuringia, but having grown up in Hamburg from the age of 4, he eventually found himself leading a team of 40 employees.

Speaking at Dr. Seltmann's farewell dinner, Dr. Claus-M. Müller, Managing Partner of MC, gave a rundown of Dr. Seltmann's career and achievements over the last three decades, with heartfelt thanks for all that he has contributed: "MC-Bauchemie has a great deal to be grateful to Dr. Hans-Günter Seltmann for. As a result of his many years of untiring dedication, he has served as a key driver in the development of MC," said Dr. Müller who, in addition to the engineering competence of Dr. Seltmann, also highlighted his thoroughness, reliability, single-minded perseverance and, not least, his exceptional loyalty.

We Bring Downtimes Down

MC-Floor Screed

Fast Industrial Floor System for the Weekend Job Site

Floors repaired within a day and ready for a full working load of wheeled traffic after just two further days – that is what MC-Floor Screed can offer you! This new industrial floor system is characterised by fast hardening and high resistance values, making it ideal not just for weekend job sites but as a time-saving solution for repairing heavily worn industrial floors of all kinds.

Talk to us about how our systems can minimise your downtime.

EXPERTISE
FLOOR COATINGS

IN@mc-bauchemie.com

MC
BE SURE. BUILD SURE.