

MC

aktiv

MC-BAUCHEMIE
MAGAZINE 3-2021

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Ladies and Gentlemen:

We are experiencing a price explosion in our primary inputs that is unprecedented in our 60-year corporate history. In addition to raw material costs, the prices for energy, packaging and transport have increased dramatically. These developments are being exacerbated by – in some cases – drastic shortages and even the complete absence of certain basestocks. Given these circumstances, we are proud of the fact that thanks to the special dedication of our employees, we have been able to maintain our delivery capability more effectively than many other companies.

We have always seen change as a challenge to find new technical solutions. Repeated increases in the cost of CO₂ certificates are leading to new product formulations coming out of the cement industry, and we intend to quickly respond to these with product developments of our own as we move forward.

You can read more about this in the current edition of MC aktiv, which once again offers you a fine mix of news, inspiration, innovations and project reports to engage your curiosity and attention.

In ending, allow me to wish all of you the very best of seasonal goodwill and a prosperous, successful and happy New Year!

Kind regards,

Dr.-Ing. Claus-M. Müller

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Credits and legal

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A SPECIAL 75TH BIRTHDAY GIFT

The countdown to the end of 2021 brought with it two special events for MC-Bauchemie. Dr. Claus-M. Müller, who has guided the fortunes of MC as Managing Director for some 50 years now, celebrated his 75th birthday in November 2021, while MC became 60 years old on 1 December 2021.

Nicolaus M. Müller, a Managing Director of MC from the third generation of the entrepreneurial Müller family, took the opportunity to surprise his father with a small celebration among MC's senior executives, complete with birthday cake and champagne.

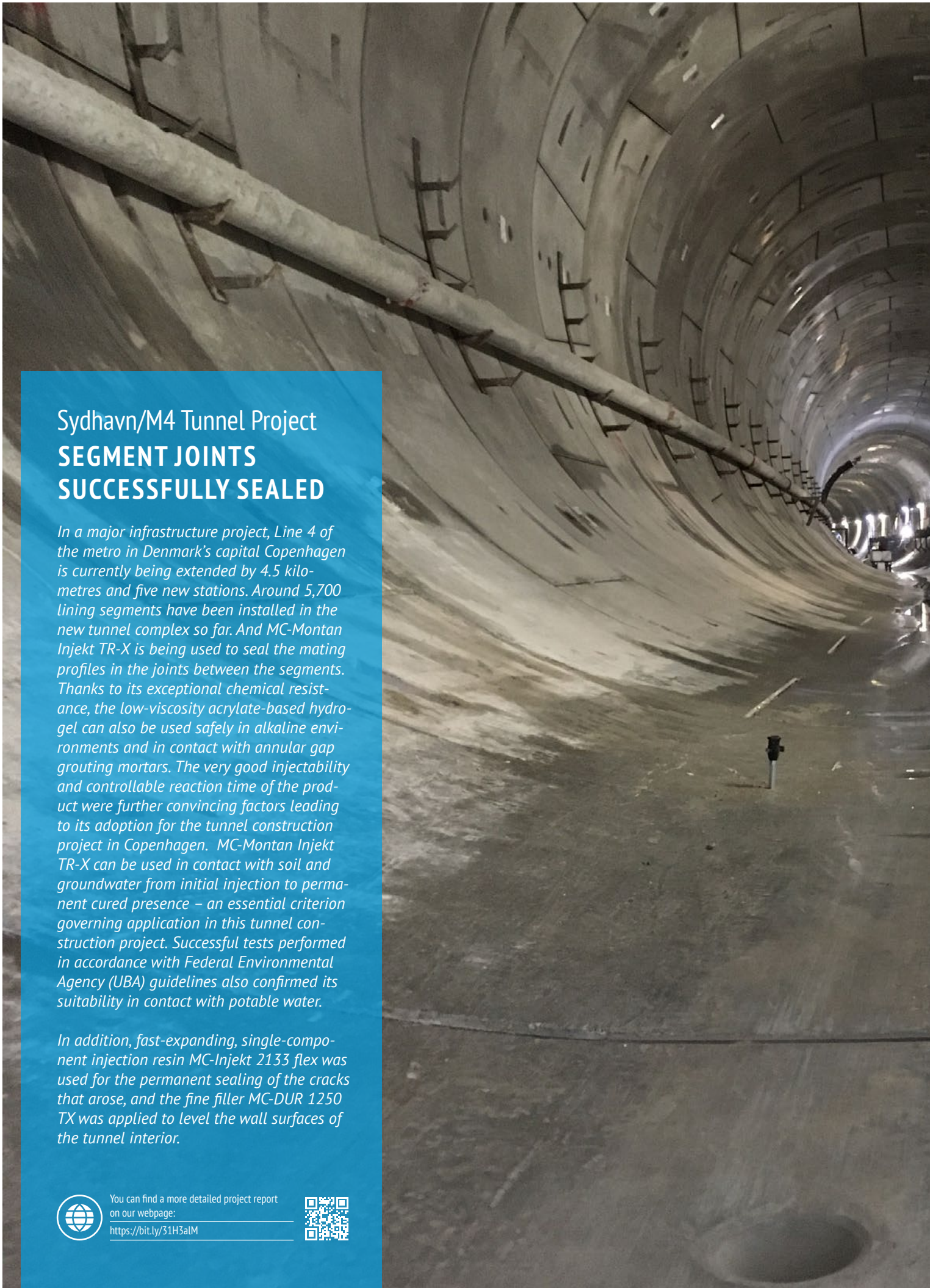
After the birthday serenade and a few words of appreciation delivered by Nicolaus M. Müller, the son presented the father with a special gift to the great delight of the latter. The item in question was the second volume of a company chronicle – the first was published some 16

years ago – this time spanning the period from 2005 to the present day over some 300-plus pages. Each chapter includes a dateline section that links important contemporary events with significant company developments, together with one or two special topics that are covered in more detail. The chapters are then each rounded off by a portrait of long-standing leading MC personalities. The book was kept secret until the big reveal – hence the huge surprise for the joyous recipient! The presentation volume is a one-off, with a hard-cover print run scheduled for next year.

JUDICIAL REVIEW OF GERMANY'S "TR MAINTENANCE" CODE OF PRACTICE

On 14 October 2021, MC together with two other manufacturers of maintenance and repair products for reinforced concrete instituted proceedings before the Bavarian Administrative Court and the Higher Administrative Court of North Rhine-Westphalia, requesting a judicial review of a "Technical Rules" (TR) code of practice. This was accompanied by an application to declare invalid the product-related parts of "TR Maintenance" – Technical Rules (DIBt): Maintenance of Concrete Structures – and those of the DAfStb Code of Practice – Protection and Repair of Concrete Structures ("Repair Guideline"). In the opinion of MC-Bauchemie and the other manufacturers, both codes violate the European Construction Products Regulation because they contain a large number of illegal national requirements for harmonized construction products. It is hoped that the judicial process put in train will lead to the courts finally settling the protracted disputes that have arisen in relation to the technical rules governing concrete maintenance and repair in Germany.





Sydhavn/M4 Tunnel Project SEGMENT JOINTS SUCCESSFULLY SEALED

In a major infrastructure project, Line 4 of the metro in Denmark's capital Copenhagen is currently being extended by 4.5 kilometres and five new stations. Around 5,700 lining segments have been installed in the new tunnel complex so far. And MC-Montan Injekt TR-X is being used to seal the mating profiles in the joints between the segments. Thanks to its exceptional chemical resistance, the low-viscosity acrylate-based hydrogel can also be used safely in alkaline environments and in contact with annular gap grouting mortars. The very good injectability and controllable reaction time of the product were further convincing factors leading to its adoption for the tunnel construction project in Copenhagen. MC-Montan Injekt TR-X can be used in contact with soil and groundwater from initial injection to permanent cured presence – an essential criterion governing application in this tunnel construction project. Successful tests performed in accordance with Federal Environmental Agency (UBA) guidelines also confirmed its suitability in contact with potable water.

In addition, fast-expanding, single-component injection resin MC-Injekt 2133 flex was used for the permanent sealing of the cracks that arose, and the fine filler MC-DUR 1250 TX was applied to level the wall surfaces of the tunnel interior.

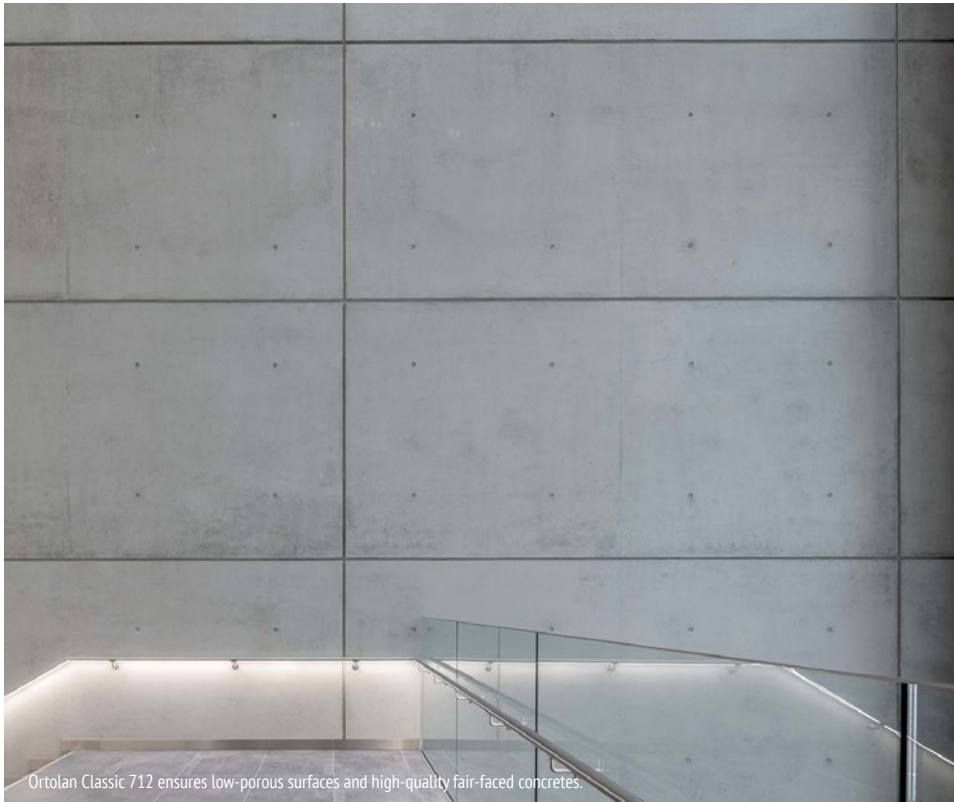


You can find a more detailed project report
on our webpage:

<https://bit.ly/31H3alM>







Ortolan Classic 712 ensures low-porous surfaces and high-quality fair-faced concretes.

NEW SOLVENT-FREE CONCRETE RELEASE AGENT

MC has expanded its Ortolan product line through inclusion of a new solvent-free concrete release agent. Ortolan Classic 712 meets high environmental standards, is biodegradable and is suitable for both absorbent and non-absorbent formwork. It ensures low-porous surfaces and high-quality fair-faced concretes, while also offering universal applicability both on the construction site and in the precast plant. Readily sprayable, extensively odourless and rapidly biodegradable, Ortolan Classic 712 is also an applicator-friendly and environmentally sound product.



For further information, please go to our webpage:
<https://bit.ly/3lzPLx4>



Dr. Jana Schütten
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NEW SEALING TAPE

MC has launched *MC-FastTape FD*, a new, permanently elastic, self-adhesive and quick-to-apply sealing tape that can be used to reliably connect floor-to-ceiling window elements to the plinth or base waterproofing membrane.

The sealing tape has been system-tested in conjunction with MC's Nafuflex and MC-Proof waterproofing products and thus meets the important window test standards EN 1026 and EN 1027. The three-layer sealing tape is waterproof yet open to water vapour diffusion, and is therefore also suitable for use in prefabricated timber construction.



For further information, please go to our webpage:
<https://bit.ly/3DAWKBV>

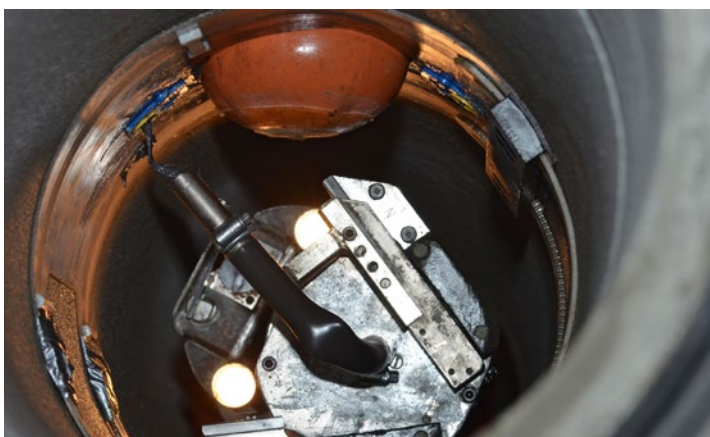


To access the video showing the window joint sealing procedure, please go to:
<https://bit.ly/3DyQXgo>



Patrick Kohley
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RAPID REHABILITATION OF NON-ACCESSIBLE SEWERS



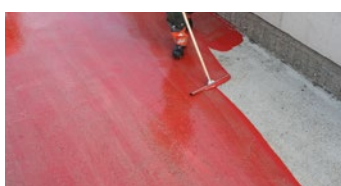
With *Konudur Robopox 10 fast*, MC has developed a new epoxy resin suitable for the rapid, rigid rehabilitation of non-accessible sewers using robot technology. As the name suggests, it quickly cures, even under water. *Konudur Robopox 10 fast* is also highly resistant to chemical attack, offering planners and contractors even more flexibility in implementing repair measures.



For further information, please go to our webpage:
<https://bit.ly/3IMH60b>



Kai Burcek
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Priming and sanding

Waiting time
90 min

Top seal

Waiting time
120 min

Application of the
bitumen sheeting

SECURE WATERPROOFING OF BRIDGES IN JUST ONE DAY – EVEN IN AUTUMN AND WINTER

In contrast to conventional epoxy resins with their sensitivity to air humidity and long curing times, MC-DUR LF 680 performs well at temperatures down to 2 °C and in high humidity, simultaneously serving as a primer, scratch coat and sealant. This means that bridges, trough structures or parking decks can be completely waterproofed reliably and quickly, even in the months of autumn and winter.

Bridge deck slabs and caps as well trough structures and parking decks need to be sealed in order to effectively protect the concrete and its steel reinforcement from surface water and de-icing salts – an essential prerequisite for longer service lifetimes. Waterproofing with bituminous membranes under an asphalt layer is regarded as highly effective in such applications. In order to create an intimate interface between membrane and substrate, substrate pre-treatment with a reactive resin is essential.

Application of MC-DUR LF 680 even in poor weather

MC's special red-transparent resin MC-DUR LF 680 has been tested as a primer, sealer and scratch filler for roadway slabs and parking decks in accordance with German code of practice TL/TP-BEL-EP and enables the complete waterproofing process to be carried out in just one day. In contrast to conventional epoxy- and PMMA-based resins, MC-DUR LF 680 cures quickly and reliably, with moisture and temperature exerting very little influence on the process. It can even be used on a slightly



Sealing layer with MC-DUR LF 680 on the A8 near Merzig, Germany.

moist substrate, yet still offers short reaction and overworking times. MC-DUR LF 680 has also been tested on young concrete. Going beyond the official test standard, this speciality resin fully meets the requirements stipulated after just five days rather than the seven days specified. It thus offers planners and applicators not only enormous time savings but also greater scheduling reliability and cost-effectiveness in respect of their waterproofing measures. MC-DUR LF 680 has an overworking time of just one hour at 20 °C and 50 percent relative humidity, while at 2 °C the waiting period is still only around two and a half hours. This enables very fast application of the waterproofing membranes,

even in the months of autumn and winter – a unique capability in this segment. And there is no formation of a weakening, low-adhesion carbamate layer, something that can occur with epoxy resins.

You can apply MC-DUR LF 680 like a conventional epoxy resin, but without having to resort to the dosage of catalysts or other additives usually required. The speciality resin can be used with almost all known bitumen membranes and has impressively proven its compatibility and effectiveness in tests by Kiwa GmbH, as well as in many projects representing several 10,000 m².



For further information concerning this product, please go to:
<https://bit.ly/3y4LEq>



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After years of wrangling, the new cement standard EN 197-5 was finally published in July 2021. It defines framework conditions for a significant reduction of the clinker content in cements – an important step towards the goal of CO₂ neutrality in concrete construction. MC already offers a broad range of products enabling even low-clinker concretes to produce the results required.

Cement is the most important construction material in the world, one which is virtually indispensable to any new build. Its key reaction with water is what binds sand and gravel together to create concrete. As essential as the building material is, its impact on man-made climate change is equally unequivocal.

Each metric ton of Portland cement represents 800 kg of CO₂ released into the atmosphere

The combustion of the fossil fuels needed to heat a rotary kiln to more than 1,400 °C already gives rise to a fair amount of CO₂. But this process causes just one third of the greenhouse gas emissions that ensue; two thirds of the carbon footprint attributable to classic cement come from the

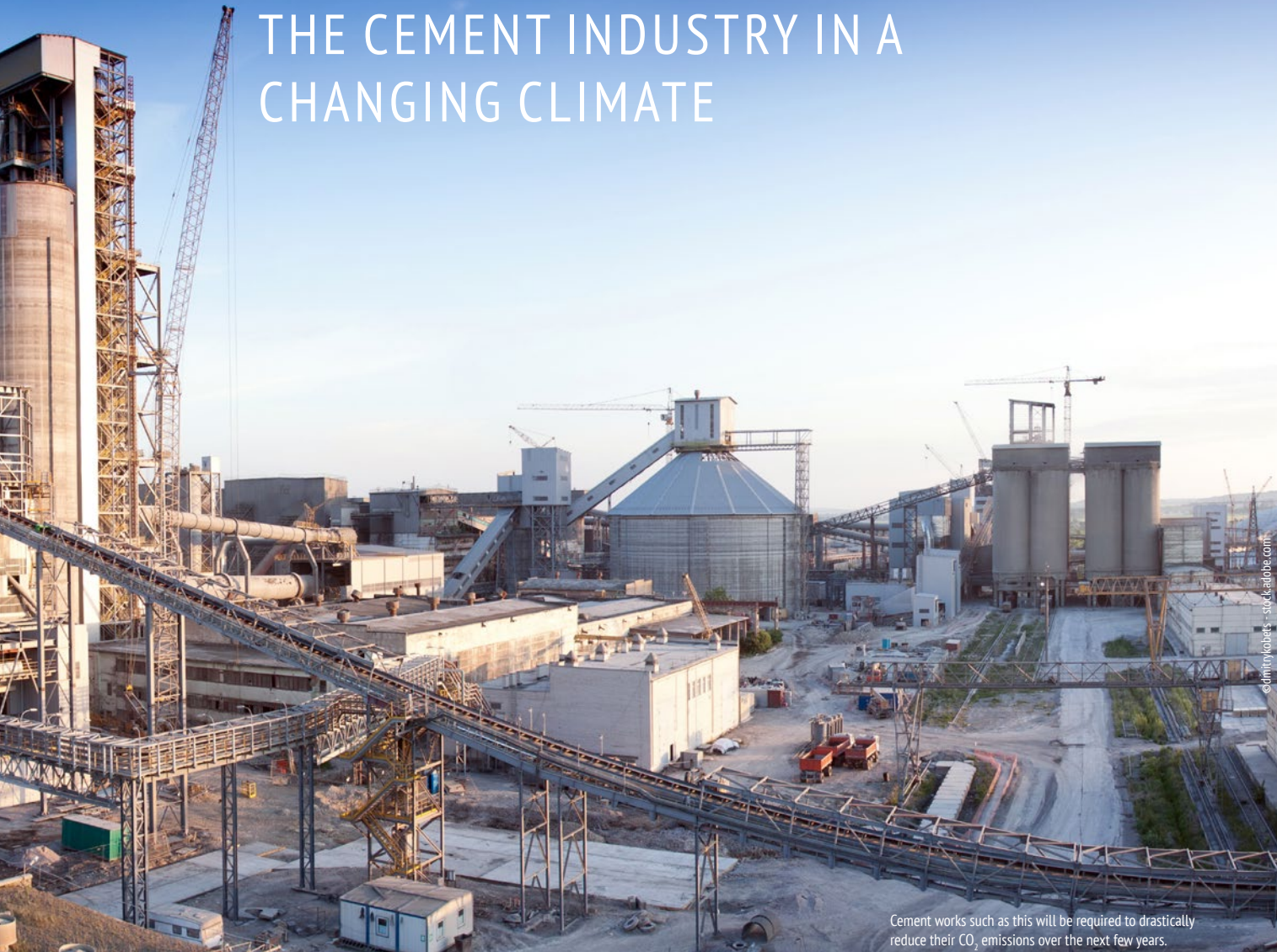
limestone or calcium carbonate that is burned as a raw material to make clinker. The chemical process behind this is called deacidification: The raw material calcium carbonate, CaCO₃, decomposes during combustion to form clinker, CaO, plus CO₂. If the two processes are taken together and the energy input of further processing, for example grinding the cement required into fine powder form, is added, the total of CO₂ released per saleable metric ton the Portland cement comes in at around 800 kg.

Four billion metric tons of cement per year

Four billion metric tons of cement are manufactured worldwide every year. During this period, a typical cement plant produces an average of

around one million metric tons of cement. Germany has more than 50 such facilities. But while there has been much discussion globally for years about climate-damaging aircraft flights, dirty coal-fired power plants or filthy diesel engines, the construction sector appears by comparison to have largely escaped public scrutiny. The primary reason: Currently, there are simply no alternatives to the use of cement in the construction industry. In Germany, for example, 30 million metric tons of cement was consumed in 2020 – causing the emission of around 24 million metric tons of CO₂. By comparison: China uses over 2.5 billion metric tons of cement each year. The CO₂ emissions arising from global cement production are so large that they are responsible for about eight percent of anthropomorphic green-

NEW CEMENT STANDARD EN 197-5: THE CEMENT INDUSTRY IN A CHANGING CLIMATE



Cement works such as this will be required to drastically reduce their CO₂ emissions over the next few years.

house gas emissions worldwide – and thus for a bigger carbon footprint than global air traffic and all the data centres of the world put together. Given the rising demand in emerging markets such as India, Asia and Africa, this figure is likely to burgeon further in the coming years.

Objective: To reduce construction's carbon footprint

Correspondingly huge efforts are being made to make the processes behind cement production more sustainable: The fossil fuels needed for firing have already been largely replaced by biomass-based alternatives with a lower CO₂ footprint, and the efficiency of the associated processes has also been further optimised. The trend is towards cements in which the Portland content, also known as clinker, is reduced through the introduction of reactive or inert substances. This has resulted in a reduction in the clinker content to an average of 70% of the figure prevailing ten years ago.

New low-clinker cement groups

Around the world, research is being conducted to identify a range of alternatives to cement as the go-to material in building construction. However, the problem in manufacturing the quantities required appears unsolvable for the foreseeable future. So the route most likely to be adopted is that of significantly reducing the percentage of clinker in the kinds of cements that already exist today. And this is the approach adopted in the new cement standard

EN 197-5. It describes two new cement classes, Portland-composite cements CEM II/C-M and composite cements of the grade CEM VI, which ensure the fitness for use of concrete structures despite their low clinker contents. The standard is the result of many years of research focusing specifically on the durability of low-clinker concretes. The idea behind their development is to grind the classic cement finer and “alloy” it with less reactive substances. Compared to classic Portland cement with its 95 % clinker content, the CEM II/C-M and CEM VI cements covered by



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View of a rotary kiln which is heated to more than 1,400 °C for the purpose of clinker production.

EN 197-5 should enable the wider use of more clinker-efficient options as a step towards the goal of CO₂ neutrality in concrete construction. For CEM II/C-M, the clinker content can be reduced to up to 50 % by mass and for composite cements in the CEM VI group to up to 35 % by mass.

For internal components and normal, classic external construction elements

It is clear that a cement with a full clinker content, i.e. Portland cement, performs differently from a cement in which the clinker content has been halved. This is reflected above all in early strength development and the rate of surface curing. The lower clinker content significantly slows down the hydration of the concrete.

Although the newer concretes can be adjusted to a normal 28-day strength by grinding the cement particularly finely, some properties such as frost resistance or impermeability of the structure to penetrating media may decline as a result. Accordingly, although these cements are suitable for interior components and the normal classic exterior building element exposed to precipitation, they are not unconditionally applicable for all exposure classes. Hence application rules are currently being developed, with building authority approvals being issued ad hoc on the basis of individual investigations. For the main application of interior components and exterior building elements exposed to moderate frost, which account for around 70 % of the concrete market, the durability performance of

clinker-reduced cements has already been proven, with considerable CO₂ reduction potential likewise apparent.

Longer site times

However, the ideal case of the construction site concreting at 10 a.m. and striking the formwork at 10 a.m. the next day will certainly become the exception rather than the rule with particularly low-clinker cements, especially in low temperatures. That means the formwork will need to be left longer, with the result that both the construction site and scheduling will have to be organised differently in the future.

The timeframe for achieving the climate goals is slowly becoming tighter in relation to cement production. Now the sector is starting to respond with more vigour due to cost pressures arising from CO₂ certificates and other impending regulations. With the pricing of CO₂ emissions now an established reality, the pressure on the cement industry to bring the new formulations to market is increasing; especially in Germany, where the new government elected in early autumn 2021 has, at least on paper, adopted a stricter climate policy and is also very likely to substantially force up future CO₂ pricing. The measures that the industry has in the pipeline are, in fact, many and varied: Not only are the new, lower-clinker cements on the agenda, but also and above all clinker alternatives, non-fossil fuels, better recycling

and, last but not least, recarbonisation, i.e. the reabsorption of CO₂ by the hardened, finished concrete itself.

MC know-how driving new standards

Research in the field of concrete additives is also now having to be refocused and scaled up. MC is well positioned to act in this respect – as demonstrated by its past research into climate-compatible building materials. The resulting development of a broad range of innovative products, such as cement-free annular gap grouting mortar or cement-free EFC concrete, is clear evidence of its innate capabilities. In addition, MC is currently working in the SABINE research project (more on this in the “Sustainability” section on page 12) with research institutions and other companies on the utilisation of steelworks slags as binding agents for geotechnical construction materials.

Ultimately, the brief for MC's experts is to compensate as far as possible with newly formulated additives for the properties missing from the new building materials. Because one thing is already certain: The new concretes are bound to require a significantly higher degree of intermediate and curing treatment. With formwork stripping strengths being reached later, curing accelerators such as the products of the MC-FastKick series, and also MC-PowerFlow high-performance superplasticisers based on the latest MC polymer technology, could become ever more essential as enhancing admixtures in the future.



CEMENT STANDARD A STEP TOWARDS CLIMATE PROTECTION

“Reduction of the clinker content will have a knock-on effect on building practices generally.”

The new cement standard EN 197-5 will, in the coming years, have a major impact on the cement and concrete industry as well as on construction itself. The clinker-reduced cements defined therein are intended to contribute to a decrease in CO₂ emissions. We spoke to Dr. Jürgen Krell, the publically appointed and sworn expert for concrete and mortar technology at IK-Bau NRW (the association of engineers of the state of North Rhine-Westphalia). An experienced concrete technologist, he was kind enough to share with us his views on the subject.

What value do you attach to the new cement standard?

I think that the cement standard is a development consistent with the aims of climate protection. Our politicians promised back in the early 1990s that Germany would commit to climate protection, with all industries actively participating in CO₂ reduction. Limit values of minus 30 to minus 40 % were envisaged and agreed in relation to a base date in 1990 – including for the cement industry. However, it was assumed that this would be achieved primarily by increasing the proportion of clean energy in the burning and grinding processes. Apparently, no one pointed out that, in the case of cement, the far greater proportion of CO₂ emitted comes not from the energy input, but from the deacidification of the raw material calcium carbonate for the production of clinker, for which there is simply no substitute in the quantities required – as yet.

Is the industry then heading in the right direction?

The proportion of clinker in cement has already been reduced to around 70 % over the last 10 years. And the cement industry has also produced a roadmap signposting how it intends to achieve its climate goals by 2050. Around 50 % of the savings are to be achieved through CCS, that is to say carbon capture

and storage, and CCU or carbon capture and usage. This is very ambitious as there are no large-scale solutions for such processes as yet – although the first pilot systems are now being set up.

So what kind of change can we expect to come from the new standard?

In order to significantly cut the carbon footprint of conventional, proven cements and therefore also of concrete, their clinker content has to be further reduced. There is no question of that, and the new standard should pave the way. But reduction of the clinker content in cement will have a knock-on effect on building practices generally. The way to explain this is as follows: When exposed to water, reaction products grow out of the clinker grains and agglomerate into strong bonds. If the number of reactive clinker grains is now reduced, it inevitably takes longer for the bonding structure to form and the concrete to harden. So I tend to refer to these as “lame concretes”.

What are the effects of this?

Much greater care has to be taken in their application. Once a conventional concrete surface, let's say a floor slab, has been trowelled level, after three or four hours it has a certain surface strength so that you can walk on it to smooth it or to put sheeting on

it for evaporation protection. If this walk-on strength is reached much later, let's say after eight hours, the water has longer to evaporate from the exposed surface – which means there is less water available for the cement reaction. Practitioners are aware of this, of course. They refer to the ensuing problem as surface “dusting”. This is because the surface tends to dry out and you can scrape together the fine cement mortar on top as a dust. So sprayable curing agents and similar treatments are bound to come into play. The use of curing accelerators is also useful in individual cases in order to facilitate early accessibility or to check on the concrete's strength prior to formwork stripping.

Are the new cements likely to gain traction?

They have to, because the pressure is there on the manufacturers to bring them to the marketplace – above all through the compensation levies charged for CO₂ emissions, which are sure to keep rising. So far, there has been no pressure from builders or clients; enquiries for CO₂-reduced concrete tend to relate to individual projects; but awareness of their necessity can definitely be expected to increase. According to information issued by Germany's newly formed three-way coalition government, a subsidy programme for housing depending on CO₂/m² is set to be introduced, and that should bring further pressure for change.



Under the spotlight

Dr.-Ing. Jürgen Krell

“In order to significantly cut the carbon footprint of cements and therefore also of concrete, their clinker content will need to be further reduced.”



STEELWORKS SLAG AS A BINDER FOR CONSTRUCTION MATERIALS

MC has long been engaged in research and development in relation to climate-compatible construction materials. This has resulted in a broad range of innovative products, such as cement-free annular gap grouting mortar or cement-free EFC concrete. MC is also involved together with research institutions and other companies in the SABINE research project looking into the utilisation of steelworks slag as a binding agent for geotechnical construction materials.

Resource-efficient circular economy

Keen to drive a more resource-efficient circular economy, the partners participating in "SABINE" are pursuing the goal of using secondary raw materials such as slag or ash – produced in other industries as mineral by-products – for the formulation of construction materials. The purpose is both to reduce the proportion of cement in building materials – and thus their carbon footprint – and to make sensible use of by-products in meeting the increasing demand for mineral raw materials in the construction industry. Alternative binders in which cement is partially or completely replaced – by slags, for example – are therefore becoming more and more important, as their carbon footprint is significantly smaller.

Useful by-products

Slags are produced as a by-product in the production of metals – examples include blast-furnace slag created during the production of pig iron, or electric furnace slag which arises in scrap-based steel production. These slags differ enormously in both their chemical and mineralogical properties. Blast-furnace slag, which is quenched with water and therefore solidifies as a glassy (vitreous) granular product, has already been used in cements for 140 years due to its latent hydraulic reaction. Crystalline steelworks slags, on the other hand, do not usually have this property and have so

far been used mainly as aggregate in road and railway construction. The purpose of the SABINE project is to investigate how steelworks slags can be treated, processed and activated in order to enable their use as an alternative binder in construction materials.

Geotechnical applications

The basic effect of alkaline-activated binders in the form of slag, ash or even rock dust has been known for over 100 years. Depending on the type of substance, cross-linked silicate structures form, i.e. inorganic long-chain molecules known as geopolymers or the calcium silicate hydrates typical to cement hardening. Concretes with alkali-activated binders are already being used in isolated cases as sustainable building materials. With their lime and silicate fractions, steelworks slags also have the potential to be alkali-activated. However, previous research has shown that these are not as easy to activate as vitreous blast-furnace slag. Specifically, it has not yet proven possible to achieve comparable strength values, thus so far precluding their use in concretes. However, there are a number of geotechnical applications where even lower strengths are sufficient, such as annular gap grouting compounds for mechanised tunnel boring, liquid soils for backfilling pipeline trenches, and diaphragm wall compounds for underground retention and sealing structures. These construc-

tion materials form the focus of the SABINE project. Given that they are in contact with acidic or sulphate-containing groundwater, for example, their durability is also of critical importance. And here, alkali-activated binders have already been seen to sometimes even surpass the quality of cement-based building materials.



ABOUT SABINE

The partners in the SABINE joint project are Studiengesellschaft für Tunnel und Verkehrsanlagen e. V. (STUVA), Institut für Baustoff-Forschung (FehS), PORR GmbH & Co. KGaA, Georgsmarienhütte Holding GmbH and MC-Bauchemie. The project is funded by the Federal Ministry of Education and Research (BMBF) as part of the initiative "Resource-Efficient Circular Economy – Construction and Mineral Material Cycles (ReMin)" as part of the framework programme "Research for Sustainable Development - FONAZ" 2021 to 2024.

CERTIFIED TO ISO 14001



MC has once again participated in the EMAS Eco-Management and Audit Scheme according to the European verification standard and has additionally achieved certification according to ISO 14001. The latest environmental statement provides information on site-specific eco-indicators, environmental goals and the measures put in train to achieve them. The aim of MC's quality and environmental management approach is to secure continuous improvement in the company's performance and sustainable corporate growth by driving quality, environmental protection and occupational health and safety in harness and in harmony with economic efficiency and profitability.

Resources saved in 2020

**THE WEIGHT OF
4,997 APPLE TREES**

**281
METRIC TONS**

Reduction in greenhouse
gas emissions in 2020



Certificate resources SAVED 2020 der MC

ENVIRONMENTAL AND CLIMATE PROTECTION THROUGH RECYCLING AT MC

By returning plastics, paper, cardboard, wood and kraft paper bags to the recycling process in 2020, MC-Bauchemie in Germany was able to save a calculated 2,119 metric tons of resources, that is to say primary raw materials taken from nature to produce the above-mentioned materials, and cut its greenhouse gas emissions by more than 281 metric tons. In this way, MC is also making an important contribution to environmental and climate protection.*

*Source: Resources SAVED certificate for 2020 / Calculation methodology: Fraunhofer UMSICHT based on data for 2019

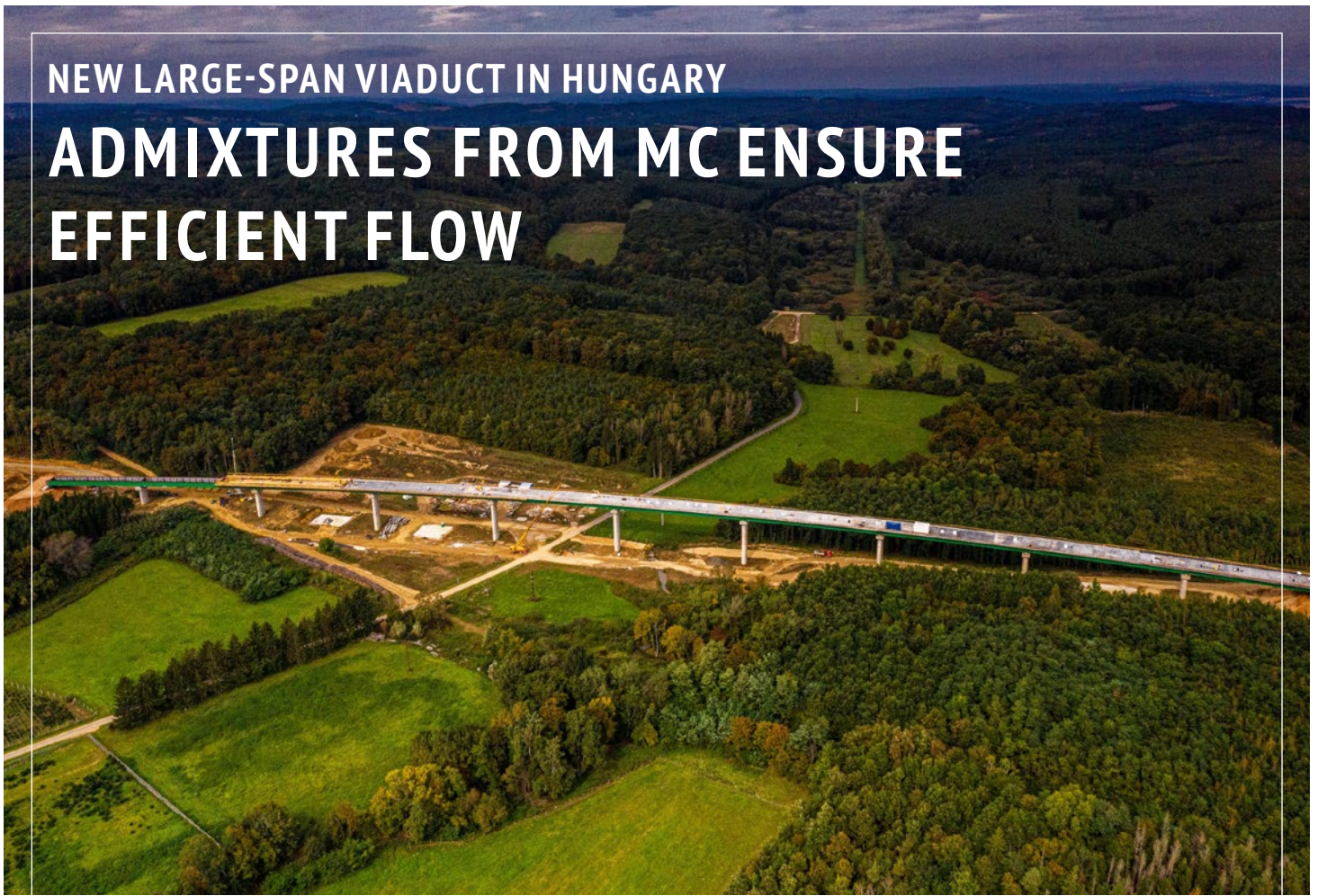


2020

We saved 2,119 metric tons
of resources by recycling
with Interseroh.

NEW LARGE-SPAN VIADUCT IN HUNGARY

ADMIXTURES FROM MC ENSURE EFFICIENT FLOW



The M80 motorway is part of the large-scale Hungarian infrastructure project known as “Autópálya M8”. During the construction of the 570 m long viaduct near Vasszentmihály – as with around 40 other road construction projects in Hungary – high-performance superplasticisers from the MC PowerFlow range helped ensure smooth construction progress.

The M8 motorway begins in the west of Hungary at the state border with Austria, and will form part of Europe’s “Route 66” leading to Szolnok, south-east of Budapest. A section of some thirty kilometres from Szentgotthárd to Körmend will initially be constructed as the M80 motorway based on one lane per direction, with plans to expand it to two lanes per direction in the future. As part of the route, one of the longest viaducts in Hungary – measuring 570 metres in length – had to be built near Vasszentmihály. The construction work began in spring 2018. The National Infrastructure Development Company (Nemzeti Infrastruktúra Fejlesztő Zrt.) entrusted construction of the viaduct to the companies Duna Aszfalt Kft. and Mészáros és Mészáros Kft. The ready-mixed concrete came from Danucem Magyarország Kft., one of Hungary’s leading concrete companies and a long-standing customer of MC Hungary.

**High-spec concrete required**

The remarkable topographical complexity of the area around Vasszentmihály and the associated transport routes to the construction site placed special demands on the properties of the concrete. The formulation originally chosen by the construction companies had to be modified before the start of construction due to a change in the cement used. The experts from MC Hungary were then called in to counter the change in the material mix by providing appropriate admixtures. After a series of trials and final tests, MC-PowerFlow 2274 and MC-PowerFlow 5632, two high-performance superplasticisers specially developed for use in ready-mixed concrete, were applied. Both admixtures are based on the very latest polymer technology developed by MC. In addition, Centrament Retard 310, a retarder with a liquefying effect, was chosen to further extend processing time and slow hydration and heat development.

Fast and efficient concrete production with MC-PowerFlow

MC-PowerFlow 2274 can be mixed evenly into the concrete in a very short time to provide an excellent, durable consistency with a working time of up to three hours. An admixture specifically designed for ready-mixed concrete, MC-PowerFlow 5632 creates concretes of high flowability as well as being ideal for self-compacting concretes (SCC), especially in combination with composite cement.

With economical dosages and high water savings, both products ensure fast and cost-efficient concrete production together with excellent performance properties. A total of 10,000 m³ of concrete and 40 metric tons of MC admixtures were used in the construction of the Vasszentmihály viaduct. The 9.45 kilometre section of the M80 between Vasszentmihály and Rábafüzes had already been completed by June 2021. The remaining section was opened to traffic on 21 October 2021.



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OPTIMUM SURFACE PROTECTION FOR ZUARI BRIDGE

BRIDGE CONSTRUCTION IN INDIA

In the Indian state of Goa, a 640 m long cable-stayed bridge over the Zuari River is nearing completion as a vital link in the new coastal road under construction from Panaji to Mangalore. And MC surface protection products are to be used to ensure that the structure's concrete remains sound for many years to come.



Goa is an Indian state in the west of the country. Between the cities of Panaji in the north and Mangalore in the south runs the NH 66 trunk road, an essential arterial for the transport of goods across the Zuari River. Due to its poor condition, the previous bridge was no longer suitable for heavy goods traffic. The Indian Ministry of Road Transport and Highways therefore decided to build a new bridge at the same location.

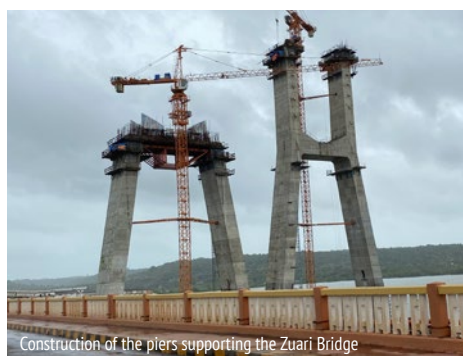
Second longest and widest cable-stayed bridge in India

The decision was made in favour of a 640 m long cable-stayed bridge with an average span of 360 m and a final span of 140 m at both ends. It is the second longest and widest of its kind in India. The bridge has eight lanes and a 110 m high tower on which a viewpoint for tourists and a restaurant are due to be installed. The bridge deck consists of a composite construction of steel and concrete.

Good experience with MC-Color flex

Selected as the construction contractor, Dilip Buildcon Ltd. of Bhopal formed a joint venture with the Ukrainian company Mostobudivnyi Zahin Limited (MBZ) to carry out the work. MBZ has experience in the construction of bridges and

provides support in planning, technical issues and in the course of works execution. Due to the excellent experience Dilip Buildcon Ltd. had already accumulated with MC-Bauchemie's MC-Color flex* during the construction of the 660 m long bridge over the Mandovi river in Panaji, Goa, which was completed in 2018, the company again decided to use this surface protection system. MC-Color flex has set quality standards throughout India thanks to many reference projects in which its carbonation-blocking properties have come to the fore. And it is as a result of this track record that MC-Color flex is listed in the approvals of both the Ministry of Road Transport and Highways and the Indian Road Congress.



Surface protection with superior crack-bridging properties

Offering superior crack-bridging and low dirt pick-up, MC-Color flex is a pigmented, flexible, UV-resistant coating designed for the protection of concrete surfaces exposed to weathering. In addition to its excellent protective properties, the product line is characterised by impressive cost-efficiency. It further offers high resistance to the diffusion of carbon dioxide, giving it notable carbonation-blocking properties. After the concrete surfaces had been treated and levelled in a first step with MC's fine universal filler Nafuquick, an MC proprietary primer was applied. Finally MC-Color flex was applied by airless spraying, a process that greatly simplified the coating work. In total, around 650,000 m² of concrete surface will be protected with MC products. The work is scheduled to continue until 2022.

* Also known in India under the name EmceColor-flex.



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FAST REPAIRS WITH NAFUFILL GTS-HS RAPID

Bremen-Burg railway bridge



View of the Bremen-Burg railway bridge, where the central pier has been repaired.

At almost 150 years old, the Bremen-Burg railway bridge is considered one of the oldest operational traffic bridges in Germany. Age-related deterioration was detected in the structure, and Deutsche Bahn (German Railways) decided to carry out repairs. These included refurbishing and strengthening the central bridge pier with Nafufill GTS-HS rapid from MC.

The Bremen-Bremerhaven railway line runs over the Bremen-Burg railway bridge. The route, which crosses the River Lesum – a tributary of the Weser – on the double-track truss bridge, is not only important for regional rail traffic, but especially for the transport of goods to and from the port of Bremerhaven. Every day some 80 freight trains and 50 passenger trains travel across it.

Narrow timeframe for rehabilitation work

The 80 m long bridge with a passage height for ships of three metres at normal high water was built in 1872 on huge concrete piers. Local politicians began voicing fears in 2015 that the ageing railway bridge might no longer be sufficiently stable. Earlier, passers-by had reported damage to the massive pier structures on which the construction with its steel superstructures rests. At low tide, it became apparent that the lower section of the central bridge pier had been eroded by the waters of the Lesum, which flows very fast at this point. Deutsche Bahn reported that the stability of the bridge, which is regularly inspected, was not at risk. Nevertheless, they decided to institute timely concrete repairs to the central pier so as to ensure the full long-term availability of the bridge. This turned out to be

a particularly demanding task: Due to the high tidal range of three metres, the bridge pier could only be strengthened when the river was at low tide – a very narrow timeframe.

A safe solution for tidal concrete structures

The Oldenburg-based company Ludwig Freytag GmbH & Co. KG was selected to carry out the work. And it began the rehabilitation procedure in July 2021. Due to the tidal range and the high flow velocity of the water, the use of standard products would have resulted in considerable additional expense arising from the necessary installation of sheet piles and provision of a special dewatering arrangement. So the decision was made in favour of the fast-hardening speciality concrete replacement Nafufill GTS-HS rapid from MC. This polymer-modified, low-shrinkage concrete replacement product is highly sulphate-resistant, chloride-proof and resistant to temperature, frost and de-icing salts. And it can be applied by dry spraying. Nafufill GTS-HS rapid fulfils the requirements for mortar class R4 laid down in EN 1504 Part 3 and is thus also approved for concrete strengthening in structurally relevant areas. The concrete replacement product not only hardens very quickly, it also develops resistance to attack and can withstand



Nafufill GTS-HS rapid was applied using the dry spray process.

permanent water exposure after just one hour. These properties make Nafufill GTS-HS rapid a fast, but also a safe and sustainable solution for the repair of saltwater- and fresh-water-exposed tidal concrete structures. Repair of the bridge pier concrete was thus implemented in the shortest of times, upgrading the structure for trouble-free train travel in the coming decades.



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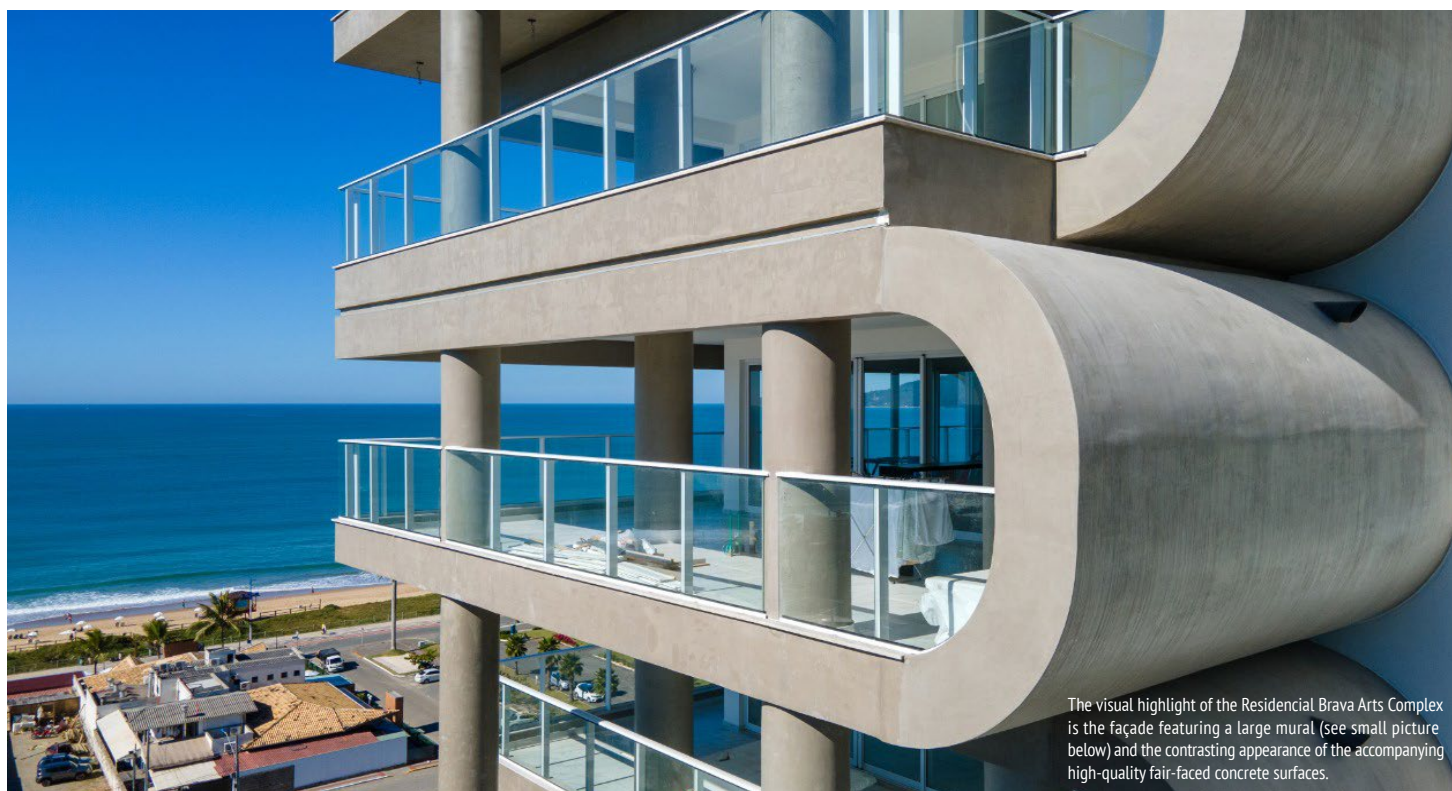


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ARTISTIC FAÇADE ENHANCED WITH MC CONCRETE COSMETICS

BRAVA ARTS BUILDING COMPLEX IN BRAZIL



The visual highlight of the Residencial Brava Arts Complex is the façade featuring a large mural (see small picture below) and the contrasting appearance of the accompanying high-quality fair-faced concrete surfaces.

Located in Praia Brava de Itajaí, in the south of Brazil, the “Residencial Brava Arts” complex, a high-end residential building with great visual appeal, was completed in 2021. MC’s concrete cosmetics provided the finishing touches to the fair-faced surfaces of the exceptionally artistic façade.

The Residencial Brava Arts complex is a high-spec condominium and apartment ensemble located in the bustling coastal town of Praia Brava de Itajaí in Santa Catarina, a state in southern Brazil. It offers occupants of the generously appointed, superior-class residencies not only excellent use of space and unobstructed sea views, but also comfort, convenience and style at the highest level. Inside, great emphasis has been placed on optimal quality of workmanship, and the exterior of the building is designed to be no less spectacular. A highlight is the façade, designed with a large mural of which the bright colours provide a fascinating contrast with the high-grade exposed concrete surfaces. Created by Romero Britto, one of the most important pop artists of our time, the Brava Arts presents itself as a work of urban high art, introducing pop culture into the special coastal atmosphere of Praia Brava.



Highlighting and optimising unique aesthetics

Due to the high quality standards demanded by the client, Construtora Iluminato, in collaboration with the applicator company, i9 Contractor, MC-Brazil was chosen to provide an optimal finish to the fair-faced concrete of this gigantic artwork. The biggest challenge with the exposed concrete façade was to maintain the visual quality of the curved structures in such a way that the result met the client’s very precise expectations. The aim was not to change the existing concrete surface too much, but to emphasise and optimise its unique aesthetics. After analysing all the technical requirements of the residential building, MC therefore recommended a high-quality concrete cosmetics solution with fine

filler Emcefix-Spachtel F lang* and subsequent concrete protection with the transparent impregnation coating MC-Color Proof pure.

Refinement and protection of exposed concrete surfaces

Emcefix-Spachtel F lang filler is available in seven different shades with colour-fast and light-resistant pigmentation. The fine filler is optimised for both local patching and the wide-area filling of concrete and fair-faced concrete, as well as for fine filling and repairs on precast concrete elements. A ready-to-use, transparent copolymer dispersion, MC-Color Proof pure is ideally suited for impregnating building component surfaces, has a substrate-strengthening effect and reduces water absorption. It is open to water vapour diffusion, inhibits carbonation and is both UV-stable and weather-resistant. Ultimately, a total façade area of 2,600 m² was finished and protected with the two MC products mentioned. The client was impressed not just with the application efficiency and excellent workmanship of a job well done, but also and above all with the visual appearance of the exposed concrete surface that was finally achieved. The effective support provided by MC both before and during implementation of the refinement works was also singled out for special client praise.

* Also known in many countries as MC-PowerTop F



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ROLF CREMER

RETIREMENT AFTER 55 YEARS WITH MC

PORTRAIT



Rolf Cremer posing in front of the MC's "Wall of Fame" in the new building in Bottrop (left), in conversation with company founder Heinrich W. Müller in February 1976 (top right), and playing golf, one of his several hobbies.

Dateline 1 October 1966 (!), and 20-year-old Rolf Cremer starts work as an industrial administrator at MC. At this time, MC has around 60 employees. One year later he switches to field sales, a role in which he is destined to remain until the end of September 2021. After 55 years, he finally takes well-deserved retirement at the age of 75, ten years after his official pensionable age – taking with him the record as MC's longest-serving employee!

After graduating from secondary school and completing an apprenticeship as an industrial administrator at Krupp-Dolberg in Essen, Rolf Cremer applied to MC at the tender age of 20 and, following a successful interview with, among others, company founder Heinrich W. Müller, was hired in 1966 as – in his words – a “jack-of-all-trades”. He was responsible for purchasing, order processing, customer consultations on the phone, set up an archive for all print documents, labels, etc., and also provided back office support for reps out in the field.

Years of success

In 1969, he saw the chance to switch to field sales with responsibility for the Münsterland region and parts of the Lower Rhine. After some teething problems he began making real headway. The years that followed saw his hard work rewarded with exciting experiences and true success. Wishing to live close to his customers, he and his wife moved to Bocholt, located within his sales territory. In the first few years of his work in sales there was no product-based segmentation within the company such as exists today – hence he was responsible for selling the entire MC portfolio. And that remained the case right up to the end of his professional career. “Countless car parks, sewage treatment plants, bridges and industrial floors have been protected or renewed

with MC products in my region,” Rolf recounts. Things have remained good for him throughout the decades, with a steady stream of successes, including during the economic crises that occurred along the way. Year for year, Rolf Cremer continued to count among the top field reps – those that brought in the most revenue and the most margin for MC – even at the age of 65.

Gradual transition

When he reached pensionable age in 2011, Rolf handed over his clients from the IN sector to his colleague Jost Reichenberg, who until then had been working in back office support. “I did not want to go at 65. That would have been boring for me – I have always relished working and particularly my engagement with customers and specifiers. I still felt fit and really wanted to carry on,” explains Cremer, who still today cuts a fine, athletic figure with his height of 1.95 metres. In 2017, he handed over the construction companies from the CI area, and in 2020, Daniel Wienen left his role in back office support to take over Rolf's remaining CI clientele at the latter's suggestion. However, Rolf continued to look after a few personal contacts right up to his retirement on 30 September 2021. It was clear to him that he had to leave at some point, not least because there were ever fewer contemporaries among his client contacts, with the older generation retiring from professional life and new blood coming

in. “Letting go gradually was, however, good for me, because now I really am ready to throw myself into retirement. It's as if I have slowly grown into my own personal pensionable age,” says MC's legendary sales rep, adding: “I have no regrets and am grateful for my 55 years with MC – and very thankful that Dr. Claus-M. Müller allowed me to carry on for so long beyond my 65th birthday.”

Happy memories and an active retirement

Rolf was made for a career in field sales. “I was able to work independently, enjoyed a great deal of freedom, forged and developed contacts with customers and was able to produce a string of successes. Things got steadily better with the good times well outweighing the bad,” says the retiree. Beaming, Rolf thinks back to the many happy memories that he has in the bank. “But now I have time for my family, my three grandchildren and my hobbies.” And those include: tennis, swimming, hiking, cycling, gardening and reading – good ingredients for an active life beyond work, to be sure. Consistency was always important to Rolf Cremer. He has been married for 52 years, an active member of his skittles club for 42 years, has been attending a dance club with his wife for the last 30 years and has been a tennis club member for over 40 years – with his 55 years at MC to top it all! So we take our hat off to you, Rolf Cremer! Huge thanks for your many years of dedication to MC and all the very best for a long and enjoyable retirement!



A UNIQUE SUCCESS STORY

Heinrich W. Müller officially established MC-Bauchemie in Essen on 1 December 1961. The full entry in the commercial register read “Müller & Co., MC-Bauchemie, Fabrik chemischer Baustoffe” (factory for chemical construction materials), later changed to “MC-Bauchemie Müller GmbH & Co. KG”.

With the third generation of the entrepreneurial Müller family having taken over the reins, the company has since written a unique success story: Having started in 1961 with 25 employees, MC now employs over 2,500 people in more than 40 countries around the world. And it has established

itself as one of the leading international producers of construction chemical products and associated technologies. For 60 years, MC has stood for pioneering solutions in concrete treatment and the protection and maintenance of structures, forging a reputation also for high-quality, reliable and safe building materials that clients, planners, architects, applicators and processors can depend on.

And the story in the coming decades is set to remain the same. MC's success is built on a foundation of comprehensive know-how in research & development together with deep-dive market knowledge, well-trained employees, many years of experience, and strong international growth. The logo above is to appear in MC's communications throughout its anniversary year. And there are numerous campaigns and activities in the pipeline.



LONG-SERVICE CELEBRATIONS POSTPONED

MC-Bauchemie's long-service awards celebration traditionally takes place on the first Thursday in December, invariably held at the restaurant Gasthof Berger in Bottrop-Feldhausen. The gala is organised to honour and congratulate colleagues who have reached a round number of years with the company. We would love to have presented to you this year's awardees with the traditional group photo on this page. Unfortunately, this was not possible due to the coronavirus pandemic and the surge in the number of infections forcing us to cancel the anniversary celebrations. We very much regret this and hope to be able to make up for the gala cancellations of the last two years, once the pandemic is behind us. However, we would still like to take this opportunity to congratulate all those celebrating a long-service anniversary, thank them for their loyalty and commitment and wish them continued success!

INTRODUCING: MICHAEL SCHILF

PRODUCTION SUPREMO AND HORSE WHISPER

Michael Schilf (54) joined MC as Technical Production Manager on 1 July 2004 and was promoted to Head of Production & Technology at the beginning of 2012. Measuring almost two metres in height, he was made to oversee all MC's manufacturing plants in Germany, ensuring with his team that production is kept on track and as smooth as possible. A keen horseman, he has cleared high hurdles in the eventing as well as the professional arena, representing his equestrian sports club Reitgemeinschaft Buchholz Hof until 2011. Since 2014, he has reduced his involvement to “just” coaching his daughter and her horse and regularly accompanying her to shows where he also officiates.



*Keep up
the good work!*

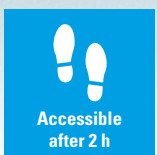
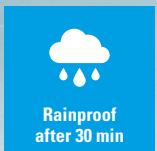
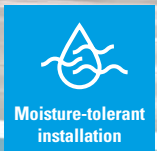
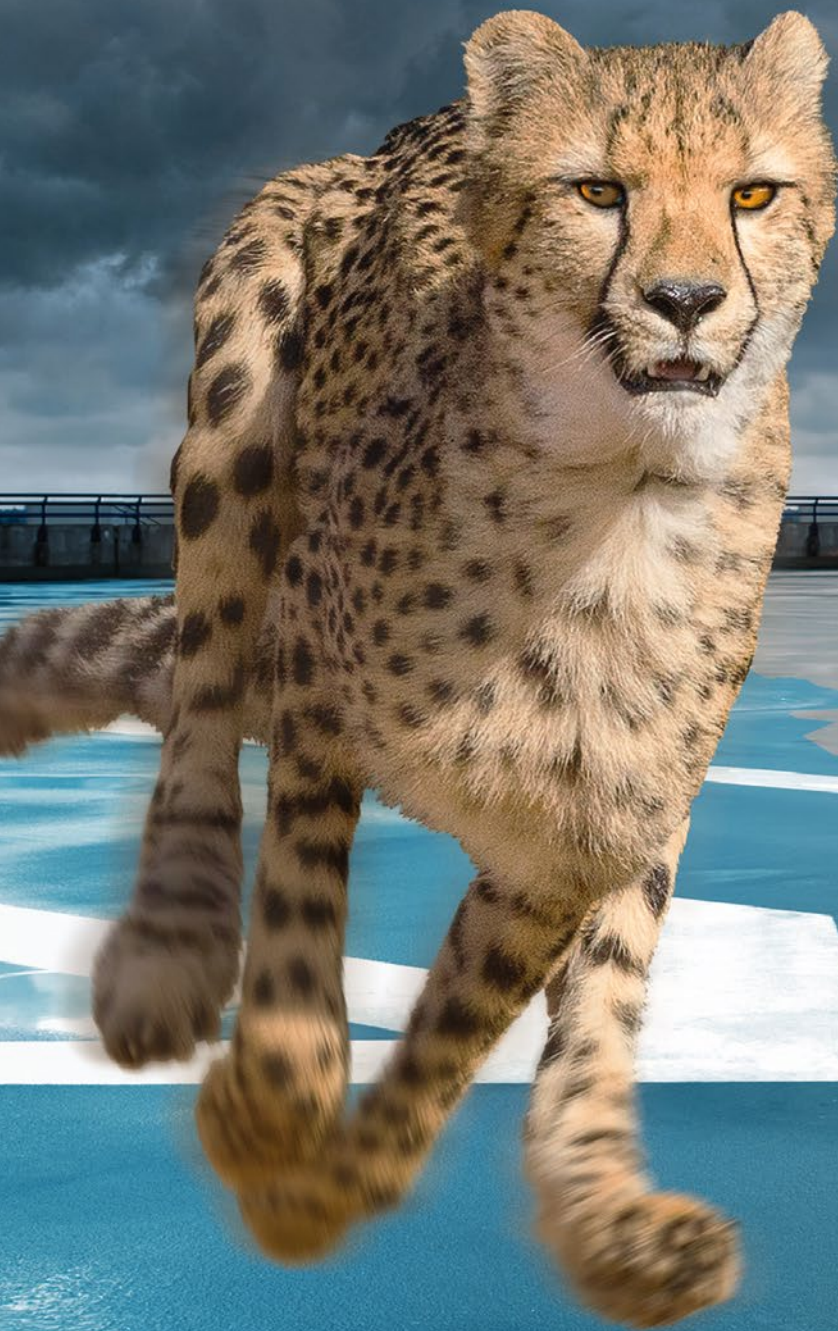


Michael Schilf takes yet another high hurdle.

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