ForeSite
The STRABAG Innovation Magazine 2019
Dear reader,

What you are holding in your hands is the brand new “ForeSite – The STRABAG Innovation Magazine”. This magazine – along with a newly designed website – replaces the Group’s “Research, Development & Innovation” brochure in which we have so far presented our major development work within the Group.

This new magazine is very close to our hearts and should clarify two things in particular. First of all, innovation is a matter of greatest importance for STRABAG. In the face of rapid technological change, we ourselves have to change. Not just a little, but profoundly. If not, we won’t be able to remain successful and live up to our responsibility to our fellow human beings and for nature. After all, our industry uses an enormous share of global resources and creates living space for the world’s population.

Secondly – and this is important too – we are not afraid of change, but are willing and able to shape our future with enthusiasm. Good communication is crucial on this path. We need to get the greatest possible overview. We need to make clear why we are initiating these transformations, which require much effort and are sometimes even painful, even though we are working very successfully in most areas and traditional routines today. We need to communicate the right aims, as change expert Kai Anderson tells us in our interview on p. 6. Every single one of us needs to know where we want to go. Together we can then discuss how best to achieve our aims. All of us – our employees, our external partners, our customers – can only be successful by walking this path together.

I have been on construction sites ever since I was fourteen years old. At first, I worked for a medium-sized construction company during the holidays to earn a little extra pocket money. I still remember one of the foremen, who truly loved his job. When he was there, everything went like clockwork. He had the gift of addressing people in a way that made them feel taken seriously, no matter whether he was talking to a client or a truck driver. Today, workplace coaches would call that “target-group-oriented communication”. Back then, I started to understand that successful communication means “understanding with head and heart”.

Today we need minds and know-how in our Group and among our partners and clients, but we also need hearts. We need their passion, their creativity and their willingness to meet challenges and to start building the future today, instead of just waiting for it to come.

This demand not only requires us to use new technologies, but will also have an impact on our corporate culture and our work practices in the future. We know that this is a hot topic for many of you already. There are many people in the Group who come up with innovative ideas on our construction sites every day, people like Rainer Knödler, who developed a simple but very useful dust collector for a circular table saw (p. 26). These types of change are as important as digital high-tech applications with which we for example intend to revolutionise our ground engineering business (p. 34).

There are many STRABAG projects where you can already experience the construction site of the future today. In Copenhagen (p. 24), digital planning is performed with state-of-the-art BIM models using in-detail data gathered by drones. We have strong partners for future-oriented projects, such as integrated data storage which is the subject of our nationally subsidised SCOPE project (p. 31).

And, of course, the topic of innovation is also right at the top of the Management Board’s agenda: “Digitalisation, Business Development and Innovation” will be added as a Management Board responsibility, assigned to Klemens Haselsteiner, who will become the sixth member of the Board effective 1 January 2020.

Nobody knows what exactly the future will look like. But we may rest assured that, however things turn out, it will be exciting. I trust that all of us will not shy away from the necessary efforts and that together we will build the world of tomorrow today.

A heartfelt thanks to you all!

Yours,

Alfred Watzl

STRABAG SE
Member of the Management Board
Kai Anderson walks into the STRABAG office in Munich at a brisk pace. The tall, lean man is wearing a dark jacket and a T-shirt. His hair is short; he wears dark-rimmed glasses and looks attentively at the world around him. As a Change Management Expert and one of the founding partners of Promerit AG, he supports organisations in their transformation processes, writes books and gives talks – so it wasn’t easy to find a slot for our talk in his tight schedule. Only a few moments after they have met, he and Norbert Pralle, Head of Development & Innovation at Zentrale Technik, the STRABAG Group’s technology competence centre, are already having an intense discussion about artificial intelligence. Anderson says that already as a child he had been a technophile, loved playing video games and learned programming.

So, why didn’t you study computer sciences, Mr. Anderson?

Kai Anderson: I wanted to combine economics and science, so I decided to study business administration and engineering and took an extra number of computer science courses.

You were still a student when you founded your first company?

That’s right, and it was a complete failure. I systematically did what amounted to what we would today describe as a “fast failure”. It was an experience that I hadn’t hoped for, though.

What were the lessons that you learned from this failure? That everyone can and is allowed to fail! Also, that having a good idea or a good product as such is not necessarily enough. You need market access, and you need to factor in scaling. Today, these things may have become matters of course, but they definitely weren’t back then.

But failing didn’t prevent you from trying again.

Yes, that was another important lesson: you always get a second chance. In my case, my second chance was Promerit AG, which I co-founded in 1999 and where I am still one of the partners and members of the board today, still putting a lot of blood, sweat and tears into my work there.

You advise companies in their transformation processes. How did you come up with this idea?

Back then, we had the feeling that most companies were not ready for change, in particular because company-internal communication used to be weak. In many companies, there was – and still is – only an insufficient answer to the very simple question, “Who knows what?” After we had realised that, we built our consulting offer on this insight – and I would say that, in the meantime, this topic has become more urgent than ever.

Why?

On the one hand, technological change, in particular digital innovation, requires more communication and cooperation – within departments, within companies, but also with competitors or partners from outside the industry. On the other hand, people are often not willing to share knowledge or lack the necessary processes to do so. This is a huge obstacle to an organisation’s ability to change. After having gained experience in the field for nearly two decades, we are convinced that technological innovation alone is not sufficient to achieve a successful transformation; the human element is at least as important.

Do you have an example?

Just think of a situation in which a new computer program, such as SAP, is introduced. What are the typical reactions?

Everyone will moan and groan. Exactly. Most of the employees will take a hostile stance. You will hardly find anyone who’ll say, “Cool, we’re getting new software. This will certainly help us make our work more efficient.”

But why is that so?

Because such change requires people to adapt their routines and their well-practised processes; they have to re-organise and even have to think differently – that’s strenuous.

Your example is taken from a very special field: IT. Does this also apply to other transformation processes?

We don’t distinguish here anymore. IT affects almost every aspect of our working lives. Digitalisation is an expression of this phenomenon. We have fragmented by far too often claiming that certain things weren’t our problem because the IT department would take care of it. This won’t work any longer today. More generally, we will have to stop thinking in departments and hierarchies, abandon our silo mentality in all areas of organisations to be able to develop new, collaborative, interdisciplinary and agile processes and business models.
“Instead of places where information is collected, we need places where information is distributed.”
The NaHiTAs research project involved not only TPA as project leader but also nine project partners: TU Berlin, TH Cologne, University of Kassel, F.C. Nüdling Betonelemente, Asphalt Testing and Research Laboratory, Ingenieurbüro Lohmeyer, Bomag, MOBA Mobile Automation, and Müller-BBM. The project ran for three years and was funded by the Federal Ministry of Education and Research (BMBF) and the Federal State of Brandenburg, who is convinced of the project and agreed to this trial with the new road surface. We are very interested in this subject. Geltow is a place with a high volume of traffic but also has a recreational area. Topics such as noise reduction and pollutants are highly relevant here,” the minister reports.

**OPEN FOR NEW IDEAS**

Clients who are open to new technologies and who promote their implementation, as is the case here in Geltow, are an important component of the market success of a new development. “Equally important are competent partners,” says Sebastian Czaja, who, along with Martin Muschalla, has been leading the research project from the very beginning. Czaja reports: “The new system, called CIA® Asphalt, was created through the successful cooperation of companies and universities. Thanks to its special properties, CIA® Asphalt can contribute to a sustainable improvement in the quality of life on busy traffic routes. For this purpose, we have not only developed the recipe and the installation method, but have also optimised the machine and processing technology as well as the sensors for monitoring the temperature and distribution of the mix.”

All this is to prove itself in practice today. The test section in Geltow is the second of this kind, following the first-ever installation of the new system at Neckartor in Stuttgart. “We are giving the street a new function,” says Muschalla. Behind him the research paver moves. In the front part of the vehicle is a large box with the words “innovation bunker” on it.

The research paver with the “innovation bunker” gives the project a new, additional function. A high-tech asphalt research project. The company has developed a unique system for asphalt construction that can be used to break down toxic nitrogen oxides. This ensures clean air and less noise on the road.

In Geltow near Potsdam the street is steaming. Hot asphalt is distributed under the paver’s screed and lays down slowly over the carriageway. A paver-mounted spreader finishes the hot pavement with silver-grey granules. The rollers compact the layers. This is the usual way of creating a new road surface. But the new road in Geltow has an additional function.

A sustainable traffic route is being created in the heart of Brandenburg. The specially designed asphalt surface helps to reduce air and noise pollution. The idea comes from the “NaHiTAs” sustainable high-tech asphalt research project.

Today, theory is being put into practice in Geltow on a section of Germany’s federal highway B1.

The high-tech asphalt project is coordinated by the PSS team based in Bad Hersfeld, Germany. The employees at STRABAG’s TPA competence centre are focusing exclusively on research and further development in transportation infrastructures. Martin Muschalla is leading the development project. He knows every detail of the project and is currently reporting some of those details to Kathrin Schneider, Minister for Infrastructure and Spatial Planning for the Federal State of Brandenburg, who is convinced of the project and agreed to this trial with the new road surface. “We are very interested in this subject. Geltow is a place with a high volume of traffic but also has a recreational area. Topics such as noise reduction and pollutants are highly relevant here,” the minister reports.

**PHOTOCATALYTIC GRANULATE**

The installation brings a colourful team together. Project managers, road construction professionals and university employees – everyone is involved and observes exactly what happens when the CIA® asphalt comes onto the road. The STRABAG brand CIA® Asphalt stands for “clean air asphalt”. Nitrogen oxides in the air are broken down under the influence of UV light via the photocatalytic spreader material made of...
ultra high-strength concrete with titanium dioxide (TiO₂),” the engineer Sebastian Czaja explains as he checks the settings on the screed. Field tests have shown that the new system can reduce nitrogen oxide concentrations in the air by up to 26 %.

The need to be able to continuously fill the paver-mounted spreader (another STRABAG in-house innovation) with the innovative granulate led to the development of the “innovation bunker”. This large aluminium box contains the granulate and the minimum box contains the granulate and the。“innovation bunker”. This large aluminium box contains the granulate and the asphalt. Equipped with screw conveyor and conveyor belt, the materials are conveyed on the road in the right sequence via screed conveyor belt, the materials are conveyed as asphalt. Equipped with screw conveyor and conveyor belt, the materials are conveyed on the road in the right sequence via screed

At the end of the day, the team paved about 6,500 m² of CIAir® Asphalt. Some samples in silver buckets which a scientist from the Technical University of Darmstadt will take back to the laboratory. “The additional quality tests should further optimise the application process for CIAir® Asphalt,” says Sebastian Czaja. Bringing research into practice, literally onto the street, makes him very proud on days like these: “Such projects are often a long way off. We are still at the beginning but have really taken a big step today.”

At the roadside there are still some residual asphalt is still stuck to the shoes of the workers. Their hands are dyed black, and the heat has left beads of sweat on their foreheads. Everyone is satisfied. A brighter and quieter road now runs through Geltow, which will make life a bit better there.

The spreader distributes the granulate evenly and on-demand onto the road. We also installed temperature and level sensors in the bunker,” says Czaja, pointing to a small monitor on the paver. “At a glance, the employees can check the innovation bunker at any time to see if a value falls out of line.”

ONE BIG STEP

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“"These results will allow us to avoid expensive vertical decoupling measures in the future."
Our Colleague: a Machine

In the Robot Road Construction 4.0 project, STRABAG is evaluating an autonomous system for asphalt paving. We take a closer look at a field trial.

On the testing site of MOBA, a technology company in Limburg an der Lahn, an asphalt paver starts up its engine. Six men and one woman carefully inspect the entire machine. It is covered with more than 30 sensors and connections on the screed. The whole machine is equipped with measurement technology is still occupied by a person today, standing in the risk area between the paver and the highway. "You already have a queasy feeling when cars passing by at up to 100 km/h just a few metres away," he says, while excitedly watching the preparations for the test. In the future, machines will assist the workers there.

There is a great demand for autonomous technologies in the field of road construction. "The place where the machine is now equipped with measurement technology is still occupied by a person today, standing in the line of traffic and exposed to fumes, noise and vibrations," explains Sebastian Czaja, Project Engineer with TPA. In the future, the screed will work autonomously, so that no one will any longer have to work in the danger zone.

Thomas Wagener, a trained road builder who has been working for STRABAG paving roads all over Germany for the past 22 years, would benefit from this new technology. As foreman, he supervises the paving process directly on the screed, checking paving width and layer thickness, monitoring the material mix – and constantly standing in the risk area between the paver and the highway. "You already have a queasy feeling when cars passing by at up to 100 km/h just a few metres away," he says, while excitedly watching the preparations for the test. In the future, machines will assist Wagener’s work by autonomously monitoring and controlling the processes. Road builders like Thomas Wagener would then become process controllers supervising the work of their “colleague machine” from the air-conditioned and safe cab.

MACHINE LEARNS FROM MISTAKES

Ready to go: the wired paver applies the first steaming batch of hot asphalt onto the test section. The paving width and layer thickness are measured by the sensors, most of which originate from the project partners, who are currently all focusing on the process together. Among them is Alfons Horn, Vice President of Development of MOBA AG, a specialist in mobile automation solutions. "We are currently analysing the paver’s functioning during stopping and starting up phases to avoid any undesirable jolts or sudden movements. That’s important for obtaining a smooth surface”, Horn explains.

Another test controls the temperature of the mixture. “If a transport trough arrives too late and the mix has cooled down, the screed and the entire system behave differently,” explains Horn. Before the paver starts up again, the technicians lower the mixing temperature to a value at which the asphalt can no longer be applied. Such “mistakes” are deliberately tested to make the machine learn from them. “These test data will be used to optimise control circuits, define settings and further improve the paver’s autonomous behaviour.”

QUALITY MANAGEMENT

The Robot Road Construction 4.0 project has another objective: quality monitoring. If sensors in the autonomous systems check data on paving quality, such as smoothness and compactness, this data may then be assessed and documented directly during the paving process. Quality standards are thus verifiable and traceable in real time.

At the end of today’s field test, approx. 500 m² of asphalt have been paved onto two test sections. The machine has generated many gigabytes of data, with which the system now learns again. Soon individual autonomously working prototypes will be used on the construction sites in order to improve the working conditions of the workers there.

Partners of Robot Road Construction 4.0:

• TPA – Team “Process Stability in Road Construction” (PSS)
• MOBA Mobile Automation AG
• 3D-Mapping Solutions
• Technical University of Darmstadt
• Technical University of Cologne

Sponsored by the Federal Ministry of Transport and Digital Infrastructure, represented by the Federal Highway Research Institute.
Efficient supply transports thanks to the latest technology: during the construction of the Brenner Base Tunnel trackless, autonomous trains were used for the first time. We took a look inside the mountain.

It’s a warm day in June 2018 in the Tyrolean Alps. But there is little evidence of this in the exploratory tunnel for the Brenner Base Tunnel. The shotcrete walls, illuminated by lamps, emit a pleasant coolness. The moisture of the mountain collects on the concrete floor. Two cones of light appear in the dark: “Christl”, a train pulling five wagons, passes by at about 20 km/h. Its destination is the tunnel boring machine (TBM), which it supplies with prefabricated concrete segments – so-called “Tübbings”. Thanks to the autonomous VirtuRail® system, Christl doesn’t need any rail tracks. This makes it a world-first, which adds another innovation to tunnelling at STRABAG.

SMART TRAIN SYSTEM ENSURES NEW RECORDS

Today, Business Unit Manager Christian Kaiser and TBM Site Manager Sebastian Grüllich look back with satisfaction on their work with Christl. Together with their team, they have implemented the drive for the 15 km long exploratory tunnel as well as the other 30 km long tunnels for the Tulfes-Pfons tunnel section. The Multi Service Vehicle (MSV) developed by the STRABAG experts together with partner companies played an important role in this. “This is the first time that we used the approximately 55 m long, autonomous trains to provide uninterrupted supplies to the tunnel boring machine,” says Sebastian Grüllich. The vehicles supplied by logistics system specialist ROWA are rubber-tired – a practical approach that eliminates the need for track installation and operation.

The five coupled wagons can transport 95 tons of material from the tunnel portal to the TBM without reloading. For comparison: standard MSVs achieve a maximum payload of 55 tons. “The trains contributed greatly to the world tunnel propulsion record of 61.04 m in 24 hours,” says Grüllich proudly. Another special achievement is its ability to overcome a 12 % slope over a distance of more than 2 km. This was also a major goal behind the train’s development: the gradient made track-bound supply impossible. “The MSVs available on the market so far were out of the question due to their poor track-keeping behaviour and their small size.

“World tunnel propulsion record: 61.04 m in 24 hours.”

STRABAG and the Brenner Base Tunnel

The 45 km long Tulfes-Pfons section is a part of the construction project for the Brenner Base Tunnel (BBT), the longest underground railway in the world. Located at the northeast end of the tunnel, the section extends from the town of Tulfes to Pfons at the Brenner. In addition to the main tunnel and the connecting tunnel, the consortium of STRABAG and Salini-Impregilo is also building additional structures such as an exploratory tunnel and an emergency stop. The contract value for this project was around € 380 million.

More information: bbt-se.com

Perfect teamwork (from left to right): Adrian Fontana, Head of Construction Supervision; Andrea Lussu, BBT Project Manager ARGE Tulfes-Pfons; Christian Kaiser, Technical Managing Director ARGE Tulfes-Pfons; Konrad Bergmeister, CEO of RIF,EL; Sebastian Grüllich, STRABAG TBM Site Manager.
CRETE SEGMENTS – THE TRAIN CAN CARRY THEM ALL.

The team takes over the loading. Shotcrete, station for Christl is at the tunnel portal. Here spent four years working on the machine explains Christian Kaiser. Overall, the team says, "That's why a new solution was needed," summarises the Business for the future. "In the future, all material logistics could be carried out remotely via a central control station," says Christian Kaiser. "That would be a huge opportunity, especially on larger construction sites with several tunnel boring machines." The expert sees the next step in the development of Multi Service Vehicles in the conversion to an electric or hybrid driving system.

Christl has now reached the trailer of the tunnel boring machine. Here the vehicle has to enter exactly in the middle. Within 30 minutes, the team then uploads the heavy tunnel segments, using cranes. The empty shotcrete buckets are moved back into the wagons. Christl returns to the site mobilisation area. The next round can start – and soon, the next tunnel project.

FIRST AUTONOMOUS SUPPLY RUN IN THE WORLD

Can the autonomous vehicle operate completely without a driver? The proof was provided by an impressive demonstration in December 2018. For the first fully autonomous supply run, the train technology was complemented with electronic "traffic signs" in the Brenner Base Tunnel. The MSV read its location from these signs and then defined the parameters for the next leg of the trip.

"I was surprised at how smoothly the driverless train moves. The MSV also interacted perfectly with the other vehicles operating in the tunnel," Grüllich recalls. The experiment was a complete success and demonstrated the potential of autonomous operation. However, in the construction of the exploratory tunnel for the Brenner Base Tunnel, it didn't go beyond this one demonstration. "Since the end of the drive at 15 km came in sight so quickly, the move to autonomous driving in full operation would not have paid off in time," Grüllich explains.

ELECTRIC POWER AS THE NEXT STEP

Nevertheless, this result plays a pioneering role for the future. "In the future, all material logistics could be carried out remotely via a central control station," says Christian Kaiser. "That would be a huge opportunity, especially on larger construction sites with several tunnel boring machines." The expert sees the next step in the development of Multi Service Vehicles in the conversion to an electric or hybrid driving system.

FURTHER RESEARCH

In December 2018, the PRAGET Tulfes-Pfons/STRABAG AG took part in the "5th Waterline to Jerusalem" tunnel project. The autonomous train with gripper test took place in the "5th Waterline to Jerusalem" tunnel project.

Classification of steel-fibre concrete for tunnel segments

All over the world, many tunnels are built using prefabricated steel-fibre concrete segments ("Riblings"). If you do not need conventional reinforcement, this leads to more efficient work processes and cost savings. For efficient and economic planning in the case of pure steel-fibre concrete segments, the achievable performance class of the material, i.e., the characteristic achievable minimum residual tensile strength, must be determined at a very early stage. In a research project of the ZT, together with the Koralmtunnel (KAT2) construction site and the Technical Universities of Graz and Munich, various steel fibre types and proportions were studied. With the results, it is possible to quantitatively describe the application limits of steel fibre reinforced concrete segments and to understand their behaviour in a fractured condition.

STRABAG can rely on many creative people who develop new ideas. This enables us to make production and work processes even more efficient and safer. "At a Glance" presents some of the projects and research work. For more information, please visit innovation.strabag.com.

Learn more about these projects at innovation.strabag.com.
The project tested water permeability relying on the instructions for permeable traffic areas as issued by the German Road and Transportation Research Association (FGSV).

Field trials for the investigation of water-permeable base courses

The fulfillment of the technical specifications for the water permeability of unbound layers in the superstructure of traffic routes has so far only been proven with complex laboratory tests – for example, triaxial tests. An increasing number of expensive damage cases underlines the importance of an obligatory proof of self-monitoring on behalf of construction companies. TPA has developed a field test intended to make it easier in the future to check if the respective requirements are met.

Learn more about these projects at innovation.strabag.com

Counteracting the ageing of bitumen

Bitumen, which is produced from crude oils, is used in the construction and maintenance of asphalt roads. A challenge with bitumen is the varying ageing behaviour of bitumen of the same type through the influence of oxygen and UV radiation. Conventional bitumen testing usually covers time periods of insufficient duration. TPA has developed a new test system for the 70/100 road construction bitumen that will facilitate the selection of the appropriate bitumen in view of grain break-out and top-down cracking. This is particularly useful in cases of varying traffic loads and projects of varying complexity.

Regional influences on asphalt durability

TPA studied the impact of regional differences in asphalt mixes and raw materials on their durability. Basis for the tests were materials equally suited pursuant to the additional technical terms of contract and guidelines for the construction of road surfacing from asphalt as issued by the German Road and Transportation Research Association (FGSV). Standard asphalt base course mixes from four mixing plants in Germany were used as samples. The predicted durability values were then calculated and compared. The results could be used to optimise mixture compositions in the future.

New sealing system for steel bridges

With its sealing system for steel bridges pursuant to ZTV-ING part 7, section 4, STRABAG has established itself as one of only three approved suppliers in Germany. The sealing system has been registered as STRABATAN S by the German Federal Highway Research Institute (BASt) since 2018 and is therefore approved for use on federal highways. The system consists of a bitumen-containing base coat and a grit-containing tack coat mass. A mastic asphalt protection layer and a mastic asphalt surface layer are applied on top of the sealing system. In a subsequent step, the next construction measures are accompanied by tests and inspections.
Lightweight HBV element facade for timber high-rise building

A team of developers from the Central Technical Division (Zentrale Technik “ZT”) studied a promising construction for the facade of the HoHo skyscraper in Vienna. The client had asked for a timber wall with a concrete facade. A traditional facing element could not be used, as its weight would have been significantly higher than that of the timber wall. Instead, a facing element made of ultra-high-performance concrete (UHPC) was used. The use of such an element allows for the construction of a facade consisting of lightweight elements that also have the characteristics of a solid concrete facing: durability, robustness and creative freedom.

Concrete instead of steel for junction points between uprights and diagonal intersections

High-rise buildings increasingly tend to have irregular ground plans. The projections are usually realised as steel structure works. This approach has certain disadvantages: fire protection, force transmission and welding works required on prefabricated steel constructions often cause delays in the construction process. In addition, it is also costly, as the uprights must often be made from expensive steel. As an alternative, a team of the ZT has developed a holding structure of prefabricated concrete elements for high-rise buildings, with a special focus on the construction of the junctions.

Prefabricated buildings to make construction more cost-efficient

Modularity and a high degree of prefabrication are the key factors for optimised and cost-efficient construction processes. A research project of the ZT has laid the foundations for pursuing this approach. The goal is to prefabricate ceiling and wall elements for building construction to the greatest extent possible, in particular for the construction of office buildings. The team focused on integrating the work of all trades. After a market analysis, solid construction components were designed, the ideal thickness of the components were determined, and assembly techniques were developed. A follow-up project will then look at the results in detail.

New database for structural planning

Structural design processes are becoming increasingly digitalised and software-based. In particular, the quality control of model-based structural calculations is becoming an ever-greater challenge. In cooperation with the University of Wuppertal, a team of the ZT has developed a standardised database of examples for calculations in relation to support structures based on the VDI 6201 guideline. This database is available for structural engineers and software houses as an interactive tool for validating software results in the BIM-based, static-constructive planning process.

Textile concrete allows for construction of durable facades

Sandwich walls with textile-reinforced facings are not only lighter and require less space than traditional steel-concrete facades, but also save resources, as their non-corrosive reinforcement provides a durable solution. For a quick implementation of design, planning and execution procedures, a team of the ZT has developed a calculation tool and a guide for textile-reinforced sandwich wall. The reduced formwork thickness of three centimetres is associated with a reduction in the facade’s weight and in the amount of concrete used, with positive effects for transport, assembly and costs.

Building dynamics: smartphones as measuring devices

From earthquake and wind loads to comfort: the natural frequencies play an important role in the structural design of vibration-prone high-rise buildings. Due to the real-life mass and stiffness distribution, however, frequencies measured at the building sometimes differ significantly from the mathematical values. A ZT research project was dedicated to this issue: With the aid of smartphones validated with calibrated measuring instruments, existing natural frequencies were determined on existing buildings, including the Rottweil test tower. A pool of data pairs of calculated/measured values will serve as the basis for more realistic structural calculations in the future.
The images that Tomas Miskinis creates out of many gigabytes of data on his laptop look like surreal artworks. Recognisable is the site of Carlsberg City District in Copenhagen, which looks like a huge gap between the surrounding brick buildings. Virtual structures in different colour can be recognised – future buildings, the subsoil or the course of pipes, as well as construction machinery such as cranes and excavators. But for Miskinis, as engineer and BIM designer at ZÜBLIN A/S in Denmark, his work is not about art. With these virtual building data models, he wants to improve the communication between the various project participants – and avoid collisions on the construction site.

Within a digital building model, you can see much of what will be built in stone at this site in a few years: where the world famous Carlsberg brewery had brewed beer for more than 150 years, a new city district will arise. Including, among other buildings, nine skyscrapers, two of them – the Dahlærup and Vogelius Tower – are being built by ZÜBLIN A/S. The contract also includes four adjacent buildings: Caroline House, Kjeldahl House, Forchhammer House and Djørup House.

**3D SCANS FROM 80 M HIGH UP**

This unique project was awarded to ZÜBLIN mainly because of the company’s early dedication to technologies for digital design and construction and its pioneering role in areas such as 3D surveying, BIM and digital working methods. The data, which, for example, enable the fascinating digital images of the houses under construction on Tomas Miskinis’ laptop, are supplied by drones that scan the entire construction site every week from a height of 80 m. These images are combined to three-dimensional models on the computer using a method called photogrammetry (see also p. 34: “Digital in depth”).

This data is used to regularly update the planning, visualise movements on the construction site and simulate upcoming activities. Miskinis says, “With the digital building model, the many team members are involved earlier and more specifically, change requests become visible to all participants, and adjustments are quickly calculated, implemented and shared.”

In this specific case, a BIM platform was used in conjunction with Navisworks to help solve a particular geotechnical challenge: at the Dahlærup Tower and Caroline House, ZÜBLIN is working in direct proximity to its Danish competitor Aarsleff. This company had already installed ground anchors in the direction of the ZÜBLIN construction site, in an area where numerous pipes run underground. To avoid any collisions, ZÜBLIN revised the original design on its construction site.

At the Carlsberg City District project in Copenhagen, ZÜBLIN shows what digital tools can already do today.

**Sharing data and benefit from a common model**

Drone-made 3D scans are transferred into a digital building model. The building model is the tool that supports the BIM working method and serves to manage information. This data is not just a few hours. The drones also document the construction progress. In this way, movements of construction machinery can be tracked, simulated and coordinated. This, too, can be achieved more efficiently among the various actors and trades when processes can be visualised and changes in the digital model are clearly understood by all participants. That’s why many more colourful artworks will be created on the computer of BIM designer Tomas Miskinis. Together with the project partners, ZÜBLIN can thus realise real buildings made of stone, steel and glass even faster, safer and more efficiently.
Circular table saw

Spotlessly Clean

Rainer Knödler has been at home on construction sites for nearly three decades. Almost every day, he looks for new ways to make the work even better. The most recent example is a collection container for circular table saws that he developed himself and which can be used as a standard in the future.

The invention

The newly developed container for circular table saws collects sawdust and wood waste that used to land on the ground and had to be laboriously swept up. The circular table saw is easy to move thanks to the attached wheels, and the containers can be effortlessly emptied as well.

The saw blade shrieks. Under the attentive gaze of Rainer Knödler, a construction worker cuts through a fairly long wooden board. The sawdust and woodchips land in a special collection container beneath the circular table saw. Innovations can also look like this: Not a high-tech miracle, but an extremely practical idea of great benefit.

Rainer Knödler remembers well what things used to look like on the construction site after a circular table saw was in use. “Dust, shavings and little bits of wood as far as the eye could see. We could spend the whole day just cleaning up after people. But that’s all a thing of the past. Today we have no more cleaning staff on the construction site.”

Lamfelden-Echtendingen near Stuttgart, the construction site for a new Daimler AG office building: Rainer Knödler is standing amidst concrete walls, formwork moulds and iron rods. He exudes serenity, has a sense of humour, speaks thoughtfully, brings thoughts to the point in just a few sentences. He is wearing a helmet, a yellow safety vest – and underneath it a suit, the trousers with ironed creases. After 28 years as foreman and general foreman, Rainer Knödler recently moved from the construction site to the office, heading the process planning and construction management department at ZÜBLIN’s Stuttgart branch. “I never thought I would enjoy an office job like this,” Knödler says. “Today he once again has an appointment “in the field”. He gives a brief glance into the office containers on the construction site, greets the colleagues, many of them old acquaintances with whom he gladly shares some quick banter. The general tone is familiar and friendly.

On the construction site, the huge arms of the cranes hover high above Rainer Knödler’s head, concrete floors are being poured, workers elsewhere are setting up steel rods, others are smoothing out the freshly applied floor with their imposing construction vehicles.

EXCHANGE AND ENCOURAGEMENT

Knödler can say exactly what it takes to work innovatively on the construction site: “Supervisors who support employees’ ideas, motivate them to consider and think things over, who sometimes even provide a budget to put an idea into action – and who make sure they can exchange ideas with each other.” One person can do little by him or herself, says Knödler, which is why he got together with other forepersons to launch a sort of idea workshop: “We meet regularly with like-minded people who also enjoy tinkering and coming up with new ideas. We tell each other what we are working on, support each other – that really helps.”

This is also how the collection container for the circular table saw found its way onto the construction sites. “It all started with a colleague who simply pushed a wooden box under the saw. I then wondered if we couldn’t do that better, namely with a permanent metal container on wheels so you can effortlessly roll the saw across the construction site. And a device to empty it had to be included too, of course.” Knödler now presents the highlight of his tinkering perfected together with STRABAG BMTI: a crane lets four steel cables float down from the sky. They are quickly hoisted to the saw, which moves up into the air and is lifted over a waste container where a construction worker releases a lock. The floor opens and the collected waste rumbles down into the container.

“Simply ingenious,” says Knödler, adding – not without pride – that ZÜBLIN is now starting to supply new circular table saws on its construction sites with the collection container. “More than 50 of them are already in use.” By this simple and helpful idea the expenditure for cleaning on the building sites can be minimised almost to zero.

His invention thus fits perfectly into the 5S methodology currently being introduced on the building construction sites. The five S process steps stand for sort, set in order, shine, standardise and sustain. “With 5S, we have less search and travel times for materials and tools, we reduce the risk of accidents because the risk of tripping is lower, increase crane utilisation and create order on the construction sites,” says Knödler. His invention assures that order is now restored around the circular table saw.

LEAN.Construction with 5S

The 5S elements:

• Sort
• Systematise
• Shine
• Standardise
• Self-discipline

5S is a tool from LEAN.Construction and has recently gained importance in the construction industry. It is already an integral part in Division UB2C as part of ZÜBLIN’s “Production 2022” strategy. In all new projects, the 5S elements should lead to orderly and structured construction sites. This will allow wasted time (e.g., search and travel times) to be reduced and added value to be increased by about 10 %. The process from introduction through implementation to follow-up is supported by the Production Systems Staff Division.
Inner City Road Tolling: an old Town meets the Future

For reducing traffic congestion or climate protection, toll collection systems are becoming increasingly important in the urban context. Thanks to a pioneering solution, EFKON has now conquered the Norwegian market in this field. The special thing about it is a flexible toll box that blends into the cityscape.

There’s a lot to see on a stroll through Bergen’s picturesque fish market. Traders hawking fresh lobster and oysters, sailing ships anchored in the harbour, and wooden buildings over 1,000 years old, which make the district a UNESCO World Heritage Site. Not recognisable at first glance is the new tolling station, which is discreetly integrated into the street scene nearby. With the all-in-one box, EFKON has developed a pioneering solution for equipping even historic cities with intelligent toll collection systems. This made the Styrian STRABAG subsidiary the market leader in Norway.

CAMERA WITH MACHINE-LEARNING-ALGORITHMS

The ground-breaking thing about the new system is the concentrated technology in a slim design. “Conventional toll collection systems are large steel structures packed with lots of equipment from laser to radar. This seriously impacts the cityscape,” says Heimo Haub, Head of Sales, Marketing & Business Development at EFKON. “Our system needs only a single component and can be integrated into the urban space in an excellent way.” The centrepiece is a high-quality camera that simultaneously identifies and classifies vehicles – across two lanes and at speeds of up to 160 km/h. Thanks to machine-learning algorithms, the system is constantly learning in order to deliver even more accurate results in detecting vehicle number plates.

This was just what the Norwegian Public Roads Administration (NPRA) was looking for. EFKON was commissioned by the state agency to set up around 100 toll collection stations in Bergen and Oslo since the beginning of 2019. In the middle of the year, additional orders followed in the regions of Nordhordland and Damåsen.

“The requirement was to equip historic cities with old buildings and large usable areas with new systems that fit harmoniously into the cityscape,” said Haub. “We meet these requirements 100 %.” The compact box can be mounted on masts in the city centre as well as on freestanding single toll bridges in the suburbs. It is an easy-to-install solution that also saves costs.

FUTURE SOLUTION FOR CLEAN CITIES

What drives a Styrian company to expand into northern Europe? “Toll collection systems will be increasingly in demand in cities, also to curb traffic in urban areas, for example with the help of environmental zones,” says Haub. “Norway has a leading role here and is therefore one of the most exciting future markets for us.” Already in 1985 Bergen was one of the first cities in Europe to introduce a city toll for entering the city centre. To this day, investments in modern infrastructure projects are being made with great enthusiasm.

EFKON, with its 600 employees, is a successful international provider of toll collection solutions. From its headquarters in Austria, the company develops its products for distribution in Europe, Asia and Africa. Upon customer request, EFKON also offers the installation and operation of the systems.

FULL SERVICE INCLUDING MAINTENANCE

The latest EFKON solution includes much more than the box visible from the outside. Around a dozen experts developed a comprehensive and complete system in one and a half years. “Our camera takes 30 pictures per second, evaluates them and chooses the best for further processing. We also have developed a back-end that provides the customer with the data in real time,” says Haub.

The cooperation includes an eight-year maintenance contract with an option to extend to 17 years. The basic concept
is quite simple; swivelling poles allow the maintenance team to repair any damage within four hours without having to completely block the roads. When the camera at the Bergen fish market is dirty and needs to be cleaned, for example. This guarantees that the new EFKON toll system will work smoothly at all locations.

Houb sees great potential for the future – not only on the Norwegian road network with its more than 250 checkpoints. “We are currently converting all our systems to the new solution and are applying for promising tenders in this regard,” he says. Exciting projects all over Europe are in the works.

A smart camera

Precise and lean: with its N-FORCE AVT100, EFKON has developed a pioneering toll solution. The facts about the sensor box at a glance.

- Camera
  - with a state-of-the-art CMOS image sensor; high dynamic range and infrared flash, capable of capturing 30 frames per second
  - Embedded machine vision engine
  - powerful image analysis directly in the box
- Performance
  - identification, classification and automatic number plate recognition (ANPR) of vehicles across two lanes and at speeds of up to 160 km/h
- Security
  - secure data access with integrated SAM (secure access module)

- Global player from Styria

From Graz into the world: EFKON has been a part of the STRABAG Group since 2008. The Styrian company is one of the world’s leading providers of intelligent traffic systems, electronic toll collection systems, toll enforcement systems and traffic telematic systems. Around 600 employees work for EFKON in about 20 countries. These include Austria, Belgium, Germany, Ireland and Norway, as well as India, Malaysia and South Africa outside of Europe.
Cross laminated timber is given a double-sided surface of gypsum fibreboard. The three layers are glued crosswise to give them additional stability. The surface can be easily painted, papered and tiled. A patented vacuum bonding process makes it possible to automatically produce individual sizes.

Plan C was the idea of a triple-layer cross laminated timber panel with two outer layers of gypsum fibre. For this, Amorth created a new material from two tried and tested building materials: “Bathroom walls are usually made of plasterboard. The surface is easy to paint, paper or tile. For a prefabricated bathroom module, however, they don’t have the necessary stability. Although this is guaranteed by wood, wood is not so easy to work on with paint or tiles. So it only made sense to combine both materials.”

Amorth describes the search for such solutions as a great challenge. “Daily routine business exerts an unbelievable pressure on us, and usually everyone is involved in several projects at once. Nobody has the time to develop or come up with something new.” Amorth sees the construction industry as having a certain need to catch up to the innovative power of other industries, but also sees positive developments: “You can increasingly observe the future of construction on our construction sites.”

For Andreas Amorth, innovation is mainly about problem-solving. And he takes a very strategic approach: “I first mentally disassemble a module or a component into its individual parts and consider what function they have. Then I assign properties to the components and to the system and if a function remains, I think about where we have to start.” This creative thinking and experimenting is a lot of fun for him.

When it comes to finding an idea or solving a problem, I quickly get a grin on my face. I start to think and if there’s an idea, I head to production and try it out together with my colleagues.”

And even if, as with the LENO®-GF, the end result is sometimes different than expected, the main thing is that the problem was successfully solved and a suitable material found.

The megatrend of prefabrication

Prefabrication allows for more precise construction and shifts activities from the construction site to the factory, reducing the dependence on external factors such as weather and logistics. In times of lower capacity utilisation, manufacturers could produce for reserves, thereby compensating for business cycles. In addition to the bathroom module, ZÜBLIN Timber is also working on more module solutions.

Real-life examples

SKAO, Neckarburg Heilbronn. Three bathroom modules from ZÜBLIN Timber have already been installed in SKAO. Germany’s first and to date highest timber high-rise building, which was completed on the BUGA site (federal garden show area) in Heilbronn in March 2019. The client is property developer Stadtsiedlung Heilbronn GmbH.

The next development stage for the bathroom module is automated series production. LENO®-GF can only be competitively marketed as a scalable and standardised industrial product. It is therefore necessary to decide which components ZÜBLIN Timber will produce itself and which will be outsourced to third-party suppliers.
Digital in Depth

Expert teams from ZÜBLIN Ground Engineering are researching digital solutions to make designing and building even more efficient and safer.

In modern ground engineering, proven experts operate today with extremely powerful machines, highly complex methods and special equipment. This results in fascinating construction possibilities – but also major challenges: machines and people often work in highly confined areas on the construction sites; furthermore time schedules are often very tight for the construction works. In many cases, the activities overlap with those of other construction sites, not infrequently even with neighbouring projects being worked by competitors or with public transport infrastructure.

Under these conditions, planning and construction site design play a decisive role, for example in order to calculate the costs as realistically as possible, to organise the procedures efficiently and, above all, to ensure the occupational safety for all involved. The complexity of this challenge is often not fully clear at the time of negotiations with the client or during project planning. Unexpected events are a reality on a construction site, affecting costs, scheduling and safety. The need for as realistic a planning as possible, but also for an effective real-time monitoring during the work, is correspondingly large.

Against this background, ZÜBLIN Ground Engineering’s team of experts is investigating the use of new digital technologies and solutions, which make it possible, for example, to collect data and information from the terrain and the existing infrastructure and transfer them into 3D BIM models. The diversity of these data ranges from the geological nature of the soil to the construction of machinery on the construction site. These visualisations help the different project participants to get a realistic and always up-to-date picture of the current situation, but also of simulated conditions in the future. Another trend has emerged from the advances in sensor technology that will allow construction machines to collect and gather data in the future. Four of these promising research approaches are presented here:

1) FROM THE OFFICE TO THE POINT CLOUDS

To date, 3D models have been based on physical on-site measurements or drone-generated images. With the aid of photogrammetry (image measurement), the BIM experts from ZÜBLIN Ground Engineering for the first time created 3D visualisations of so-called point clouds from 360° views of mapping services. The corresponding 2D screenshots were converted into a condensed 3D model using the Pix4D software. The point cloud was converted into a 3D mesh and then imported into a 4D simulation software such as Synchro-PRD. This approach showed a high degree of reliability and precision. For projects in which drone filming accuracy is not yet needed or where drones are not allowed, for example at airports, this approach offers a promising alternative.

2) SUCCESSFUL CLASH MANAGEMENT THROUGH VISUALISATION

4D flow simulations reveal unforeseen conflicts between current activities, drilling or safety issues at specific stages of construction. Each machine can also be assigned a unique path to simulate the likely movements on the site.

In an experiment it was then tested to predict possible accidents of construction machinery in their working areas already in the tender phase of a construction project by means of a 4D simulation. 3D models of construction equipment such as containers, silos, drilling rigs, crawler cranes or excavators were imported and – correctly scaled – brought into their respective position in the simulation.

In an automatically generated PDF report, the planning team used these informative visualisations to report conceivable collisions in advance. These dynamic construction site models, along with visualisations of the activities there, increase efficiency and occupational safety because risk factors are identified early on.

3) AUTOMATICALLY CREATED 3D MODELS FROM DATA SOURCES

3D models can also be created automatically. Autodesk Dynamo scripts are used to detect parameters associated with different Autodesk Revit families and arrange them in a predefined order in a spreadsheet. The script selects the relevant Revit family and draws the corresponding examples in the Revit environment at the specified location and with the resultant attributes.

As a next step, ZÜBLIN Ground Engineering wants to develop more general solutions that are less dependent on Revit, using software that interacts with Revit via a ZÜBLIN-programmed application programming interface (API) instead of the Dynamo script. This would allow design parameters to be stored directly in a well-structured database for different stakeholders. A unified system that combines geometric data and production information can significantly improve the management and control of construction activities in the future.

4) EVALUATION OF BUILDING PHASES FROM DRILLING DATA

Sensors installed on borehole drilling rigs can measure data such as drilling depth, installation times, feed force, drilling pressure and speed. However, a precise evaluation is often extremely time-consuming. In a study of the Kombilösung infrastructure project (KASIG) in Karlsruhe, ZÜBLIN Ground Engineering investigated how this drilling data can be processed faster and more easily. At the construction site for a 1,850 m long car tunnel, several pile boreholes are being drilled to depths of up to 23 m. The automatic detection of drilling phases and shutdowns made it easier for the engineers to more accurately determine the actual net and gross performance of the drill. In addition, correlations were shown between initial geotechnical data and the specific energy needed to drill one cubic metre of soil.

In addition, correlations between the data of the initial geotechnical investigations and the specific energy required to drill a cubic meter of soil were shown. In the meantime, drilling data is also linked to various data collected manually to account for downtime or unexpectedly slow drilling progress, for example.

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BIM concept of ZÜBLIN Ground Engineering: creation of a 3D model based on parameters stored in a database system.

Depth and drilling pressure profile over time to define drilling phases.
FAST, MORE EFFICIENT, MORE AGILE: THIS CLAIM DETERMINES THE WORLD OF WORK. BUT HOW CAN THIS BE IMPLEMENTED IN THE CONSTRUCTION INDUSTRY? THE BMS (BUILDING MATERIAL SOLUTIONS) TEAM AT STRABAG IS DEVELOPING A DATA CENTRE FOR THE GROUP’S BUILDING MATERIALS BUSINESS UNIT, TO BE USED BY THE MAJORITY OF THE 555 BUILDING MATERIAL PRODUCTION OPERATIONS – FROM QUARRIES TO LANDFILLS TO ASPHALT AND CONCRETE MIXING PLANTS. THE FIRST MODULES WENT ON-LINE IN JUNE 2019 – MADE POSSIBLE BY MANY COMMITTED MINDS AND AN AGILE PROJECT MANAGEMENT METHOD.

ACCESSING DATA ANYTIME ON MOBILE DEVICES

The heart of the data centre is a practical web cockpit where all relevant information is processed and visualised. Access is possible at anytime from anywhere, including via smartphone or tablet. The result is more transparency: for example, for the Plant Manager, who can monitor the figures on production, storage and transport of their products at anytime, as well as for the Management, which benefits from reports on approval processes. Thanks to the flexible dashboard, users can decide for themselves what can be seen on their start screen.

The 14 employees of the BMS team work in different countries and know the requirements from actual practice. “Our production operations use different software programs. So far, it has been quite complicated to merge all the information,” explains Gero Mosser, who heads the project together with Günther Zweibrot. “With the new data centre, we are creating a common pool that is automatically fed with data from the programs. This data is now available with a simple mouse click.”

SCRAUM METHOD IN THE FIELD OF CONSTRUCTION MATERIALS

In addition to the BMS team, colleagues from different building material units and countries, the in-house IT department and an external software partner are working on the development of the data centre. The special thing about this project is that this is the first time that the scrum process in software development is being used on a large scale in the field of building materials. This method, which has hardly ever been used in the construction industry, provides the framework for project management based on agile principles. “Scrum means development in small, repetitive steps working intensively with the users. That makes it just the right approach to develop a modern web application,” explains Günther Zweibrot.

Implementation is made gradually in so-called sprints. Based on the requirements of the participating users from the operating units, the development team produces a ready-to-use product every three weeks that is evaluated and improved upon.

ENTHUSIASTIC DEVELOPER TEAMS AND MANY IDEAS

How to successfully implement the scrum methodology at STRABAG was determined in advance in a research project (see interview at right). “The first project using the scrum approach required a lot of coordination effort,” says Gero Mosser. But he is fully convinced of the method: “We have many colleagues on board who all contribute their ideas. Above all, the international networking brings a great added value to the project.” And the implementation of all the requirements raised is progressing in great strides – naturally agile and with the prospect of still more to come.

“SCRUM IS A CULTURAL CHANGE.”

How can agile project management be implemented at STRABAG? Leopold Leonhartsberger on dual operating systems, courage and an open error culture.

You have conducted research into the topic of scrum. What was your motivation? I asked myself a central question: how can scrum agile project management be implemented in the best possible way in a large company like STRABAG? Successful web projects today are handled almost exclusively with this method, which is characterised by values such as self-responsibility, courage, focus and openness – and these are not easy to realise in a hierarchical group with established structures.

For scrum to work in a company like STRABAG, you suggest a “dual operating system” in your research. What is that exactly? One thing is clear: Hierarchical structures also have their advantages. They guarantee stability and efficiency – that makes it easier to handle the daily business. But they are less suited for an innovative culture with scrum. What is needed is a network structure. To combine both, the systems must be led in parallel. The key to this are managers at the interfaces that can work with both models.

The BMS project has been working on scrum since 2015. What has surprised you the most so far? It has created an incredible enthusiasm. Scrum enables employees to fully realise their potential. It should be noted that this has also presented the project team with great challenges. It sometimes happened that colleagues put too much pressure on themselves to deliver quick results. Here, too, it was necessary to act in line with the virtues of scrum – talking about it openly and seeking solutions together.
Manuela Jungmann and Franz Klager from the STRABAG Innovation Management team talk about grand visions and how to achieve them.

A High-Rise in Two Weeks!

You're Innovation Managers. Why of all places did you decide to go into the construction industry?

Klager: I'm fascinated by the chance to change things. Considering the impact that the construction industry has on the environment and on people’s lives, innovation in construction can make a big difference. And besides, there's still enormous potential for innovation in the construction industry. Jungmann: Exactly! That's also evident from the still very low level of R&D in construction as compared to other R&D-intensive and innovative industries. These industries also access funds provided for R&D purposes by the EU or by the federal government much more systematically than the construction industry.

So there is truth to the impression that the construction industry is lagging behind in this respect?

Jungmann: Innovations are certainly present, but often not visible. A construction site today looks pretty much the way it always has, even if the use of BIM has changed the planning processes. To outsiders, even an innovation like ClAir® Asphalt looks like a normal road surface, despite the fact that there is much more behind it. All in all, one must admit: the really big transformations are still missing.

What's the reason for that?

Klager: Transformations need big, bold visions and goals. If you only have vague and small goals, you shouldn't be surprised if the innovation fails. Kennedy didn't say back in 1961, “We want to make it into space someday,” but “Before this decade is out, we want to land an American on the moon”. That's a clear message, and incredibly motivating. We need these kinds of visions in the construction industry if we really want to revolutionise something.

What could a vision like that be for the construction industry?

Klager: We will build a high-rise in two weeks.

Isn’t that just wishful thinking?

Jungmann: A great deal is possible if we rethink our structures and processes from scratch. But that'll certainly be associated with enormous R&D expenditure. We're talking about completely different dimensions than those that have been usual in our industry so far. With proper financial backing, revolutionary innovations are also possible in construction – as can be seen by the example of Katerra, an American start-up company that covers the entire process chain and is making a name for itself through standardisation, prefabrication and modularity.

What role does Innovation Management play in all this?

Klager: We in Innovation Management don't develop innovations ourselves, but we create the framework in which ideas and innovations can emerge and later be utilised. On the one hand, you need some space away from the daily routine to develop something new; on the other hand, this shouldn't happen arbitrarily or by chance. We therefore make sure that the right people from inside and outside our large group get together. The aim is to avoid having several teams working on the same problem without knowing about each other, because that would create redundancies and unnecessarily consume resources.

What would have to happen to make you say, “That really made the whole job worth while…”?

Klager [laughs]: Ideally, that we built the first high-rise in two weeks.

Jungmann: That people from outside the company – and from outside the construction industry – approach me to say how extremely innovative STRABAG is.

Thank you for the interview!
More details about the latest innovations at STRABAG can be found on our website innovation.strabag.com.

Get to know the people behind the big ideas, find out what motivates them and their team and how innovations can change the way we work.