

Formwork**Press**

Professional Formwork News

VII/2020



Fast, faster, StarTec XT

Systematic single-sided tying – Page 6

Contents

| | |
|---|----|
| Editorial | 3 |
| Information about MEVA | 4 |
| Cover story: Fast, faster, StarTec XT..... | 6 |
| EcoAs in continuous use | 8 |
| Safe climbing with MAC and MGC..... | 10 |
| Simply formed by hand..... | 12 |
| AluFix: Successful and economical | 13 |
| All-round precision with MEVA Radius | 14 |
| Bjørnegård Tunnel in Norway..... | 16 |
| Rapid construction progress down under | 18 |
| BIM ² – the digital future of building shell construction..... | 20 |
| With back-step method and bracing..... | 22 |

Imprint

Site photos show situations which do not always depict the final assembly of formwork with regard to safety regulations. Imprint: Edition VII/2020. Circulation: 2500 copies. Publisher: MEVA Schalungs-Systeme GmbH, Industriestr. 5, D-72221 Halterbach. Layout: MEVA. Print: C. Maurer Druck + Verlag, D-73312 Geislingen/Steige. Reprint and re-use of any editorial content only by copyright permission. We accept no liability for the content of external internet sites, nor for a violation of privacy or any other law arising from these.

“We all need firm and reliable partnerships.”

Dear Reader,

We are all in the same boat. That is perhaps the most important insight gained from the global Covid-19 pandemic and its repercussions.

The virus has seriously affected trade, travel and human interaction and does not respect borders. Covid-19 has revealed the extent to which people and companies are interdependent. It casts light on the fragility of the international relationships that were arduously built up in the past as well as the importance of friendships with other cultures and nations.

Unforeseeable events can occur at any time. Reliable forecasting and long-term planning now seem to be more difficult than ever. Absolute security, which is something we all desire, does not exist. At times like these, one thing becomes clear: We all need firm and reliable partnerships.

Businesses around the globe must now make a huge effort to adjust to the changed world of work. Thanks to MEVA's international networks

and decentralised structures, we have been able to safeguard our business and delivery operations worldwide despite the new business environment. We will continue to do so in future in order to provide our services to you, our customers and construction sites, without restrictions. With MEVA, you gain a firm and reliable partner.

In this issue of our customer magazine we present examples of what well-functioning partnerships are capable of achieving. We report on how our partners mastered certain challenges during concrete projects in which they relied on the safe, flexible and efficient formwork systems as well as on clever solutions from MEVA.

Enjoy your read.
Best regards



Florian F. Dinger,
Owner and Managing Director
of MEVA Schalungs-Systeme GmbH

News

Information about MEVA

Interactive formwork experiences

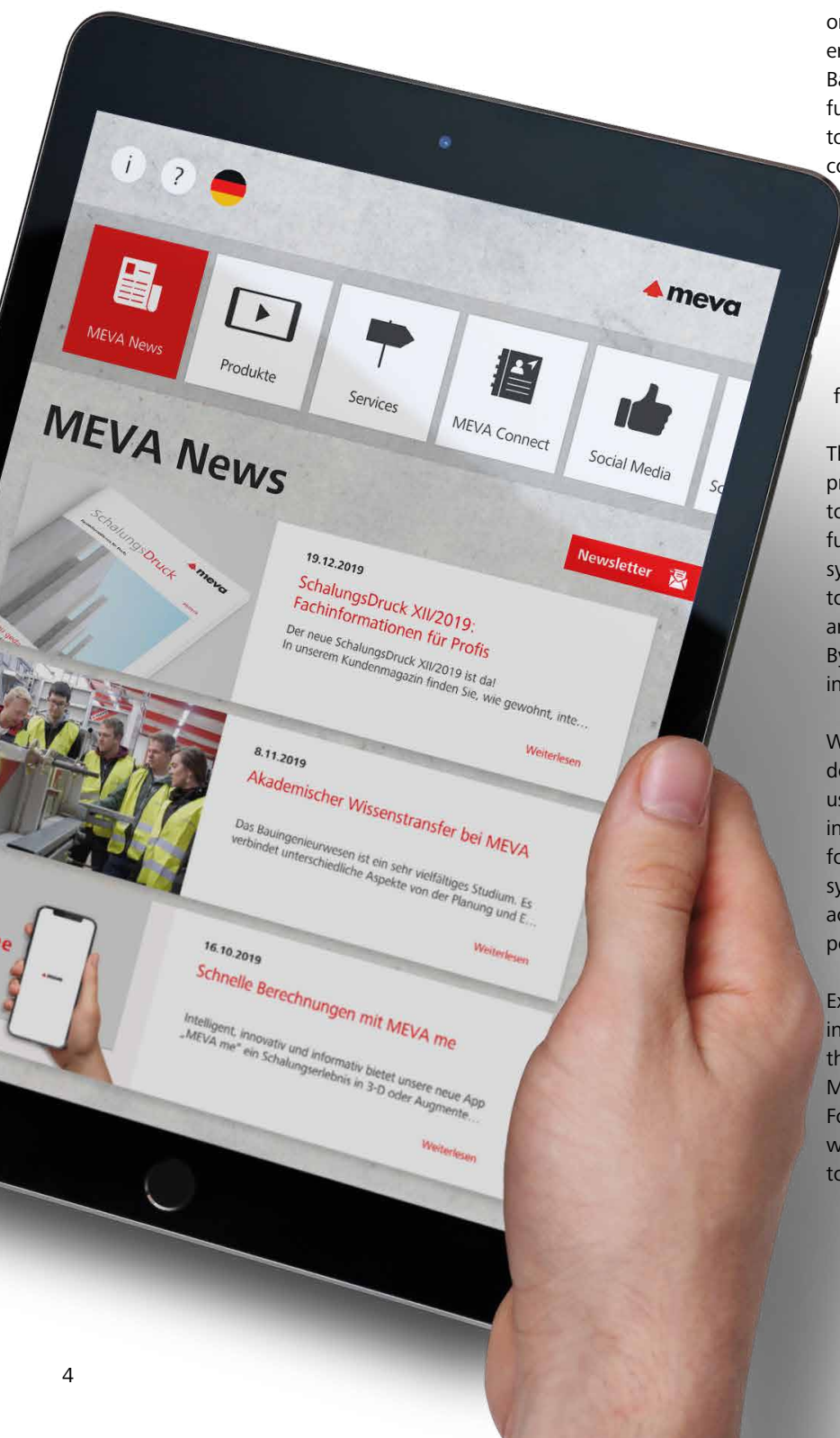
For MEVA digitalisation is more than a buzzword or a hashtag: MEVA me is the formwork experience in a new dimension. Since its presentation at Bauma 2019, the app has undergone continuous further development. Version 2.0 now allows users to discover additional functions and make more comfortable use of existing functions.

The tried-and-tested versatile options such as download of the digital FormworkPress, links to MEVA social media channels, and a wide range of services have been retained in full. As have the calculation tools, which have now been optimised. With the new user interface these functions are now even easier to use.

The core of the app consists of optimised product presentations in augmented reality and 3D. Thanks to the fascinating augmented-reality concept, the functions and potential applications of all MEVA systems – from the lightweight hand-set formwork to the complete climbing system – are visualised and explained in detail on a smartphone or tablet. By popular request, animations can now be viewed in full-screen mode.

Whether at the building site or in the office, MEVA documents can be downloaded comfortably and used offline. The Item Finder provides technical information on all MEVA products in a convenient form – also, for example, on the new formwork system StarTec XT. MEVA Connect provides quick access to your own competent MEVA contact person.

Exciting projects and new products are presented in digital form in the News section, which informs the reader about current issues from the world of MEVA and is a perfect supplement to the digital FormworkPress. Try it out and experience formwork in a new, digital dimension – downloadable to an Apple or Android smartphone.





MEVA Test Tower for climbing systems

The trend towards high-rise construction means that climbing systems need to be more efficient and flexible. In order to be able to drive further developments, perform tests, and train customers and staff, MEVA has erected a climbing system tower on the grounds of Factory IV in Haiterbach, which rises to a height of more than 15 meters.

The imposing structure combines several innovative MEVA systems for safe applications at great heights. For example, the enhanced versions of the rail-guided systems MGC-H and MGS-H for hydraulic climbing, also with shaft platform, or the MGC-JF for crane-supported climbing from the same modular system.

In future, customers will be able to make practical use of the climbing tower to perform assembly tests and provide training courses as well as to present innovative systems. The MEVA Test Tower is an important supplement to the MEVA Technikum exhibition and training facility given the increasing importance of high-rise construction work. It enables the latest systems to be integrated and can be updated or extended with functions and technologies.

Cooperation in Latin America

The Colombian supplier of formwork and scaffolding systems FORSA has signed a cooperation agreement with MEVA. This enables both companies to supplement their core competencies in order to achieve greater market access in Latin America. The common objective is to open up additional market segments and implement new projects.

FORSA has been established in South and Central America, in particular, for more than 25 years. One focus lies on formwork for monolithic construction, above all in residential construction. By selling MEVA formwork systems, FORSA is able to offer a broader product portfolio and will be able to handle more projects in future, from agricultural and commercial buildings right through to infrastructure projects. In addition, the cooperation will enable MEVA to expand its business in Latin America.

The two companies will contribute their profound technical and sales expertise as well as their commitment to quality in order to find the ideal solutions for their customers. "I am looking forward to opening up new and expanded market segments together with FORSA," explains Tarc Fröhlich, MEVA's regional director for the Americas.

Cover story

Fast, faster, StarTec XT.



StarTec XT in action: Thanks to single-sided tying there is no need for any accessories such as walkway brackets, work platforms, etc. on the initial formwork side.

Formwork time and personnel costs are cost factors that can be significantly reduced. This assumes that tasks on a construction site can be simplified – or that work steps can be eliminated completely. The new multi-purpose formwork StarTec XT with integrated MEVA combination tie hole sets a new standard in this regard by combining three tying methods on one element. This clever idea is already being employed successfully worldwide – with Mammut XT for large-format construction. In future, StarTec XT will also enable significant time savings to be achieved in the construction of residential and agricultural buildings.

Compatible and robust

StarTec XT is the systematic further development of the successful multi-purpose formwork StarTec. Panels are available in heights of 330, 270 and 135 cm as well as in eight widths from 270 to 30 cm. With only three outside corners and one inside, all 90° corners can be formed without any problems for any wall thickness. With its robust, closed hot-dip galvanised steel profile, StarTec XT can withstand a fresh-concrete pressure of 60 kN/m² – over the entire surface and the total system. It is compatible with the “performance-to-weight champion” AluStar and requires no adapters or additional connecting elements. This results in optimised material utilisation on the construction site.

Three options – one solution

StarTec XT and the integrated combination tie holes enable a high level of efficiency to be achieved on the construction site. Depending on the requirements and wall thickness, it is possible to tie from one side or from two sides – without time-consuming installation of additional parts on the panels. The rotating sphere of the fully integrated, flush tie hole in the frame can be switched from the sleeve position to the thread position and back again with a flick of the wrist. It is thus possible to select flexibly between three tying methods:

- Two-sided (conventional)
- Single-sided with XT tie rod DW 20 and plastic tube
- Single-sided with the practical XT taper tie without plastic tube

Details for a high level of functionality

Additional special features help make the organisation and work simpler. These include tie rod fixtures for space-saving and safe transport on the construction site, which can be used with both vertical and horizontal panels. They simplify the logistics and make it unnecessary to search for parts on the building site. MEVA multi-function profiles with welded-in Dywidag DW 15 nuts enable secure attachment of all accessories such as push-pull props, alignment rails or walkway brackets with only one

single part: the flange screw. The tried-and-tested MEVA AS assembly lock can be attached at any position on the frame with just a few blows with a hammer and produces a perfectly aligned and flush panel joint and a non-positive connection. Last but not least, bump notches at the corners of the panels with a width greater than 135 cm enable simple alignment and adjustment with a crowbar.

The MEVA StarTec XT is equipped as standard with the tried-and-tested alkus all-plastic facing. Its characteristics make all types of wooden facing look antiquated. It is extremely robust and durable, comes with a 7-year warranty and ensures consistent high-quality concrete surfaces even after being used hundreds of times. In addition, it requires only a small quantity of release agent and can be cleaned quickly and easily. Furthermore, the facing does not absorb water, and does not swell or shrink. However, it can be nailed just like wood, and the material is 100% recyclable.

Documented time savings

An evaluation of the guideline values for required working time in building construction ("Arbeitszeit-Richtwerte im Hochbau") by the independent "Institut für Zeitwirtschaft und Betriebsberatung" (izb) confirmed the advantages of single-sided tying with the combination tie hole. According to these guideline values, conventional assembly and stripping of walls in a floor plan, including cleaning and the application of cleaning agent, takes an average of 22 minutes (Manual on Work Organisation for Construction Projects – Forming Work, Frame Formwork, Walls 2019, page 77). Using Mammut XT, only 8.5 minutes are required for comparable applications. That is not even 40% of the time required for conventional tying. In other respects MEVA leads other single-sided tying systems, e.g. with formwork times up to

22% shorter than average, height-extended above 4.50 m throughout the floor plan. On the basis of shell construction work with a forming area of 1,000 m², the work time advantage adds up to 42 hours or 2.5 min/m² (pages 79-81). The reasons for this enormous time saving using StarTec XT are self-evident:

- No additional parts needed for single-sided tying
- Fewer accessories required than comparable systems
- Initial and final formwork identical – no risk of confusion

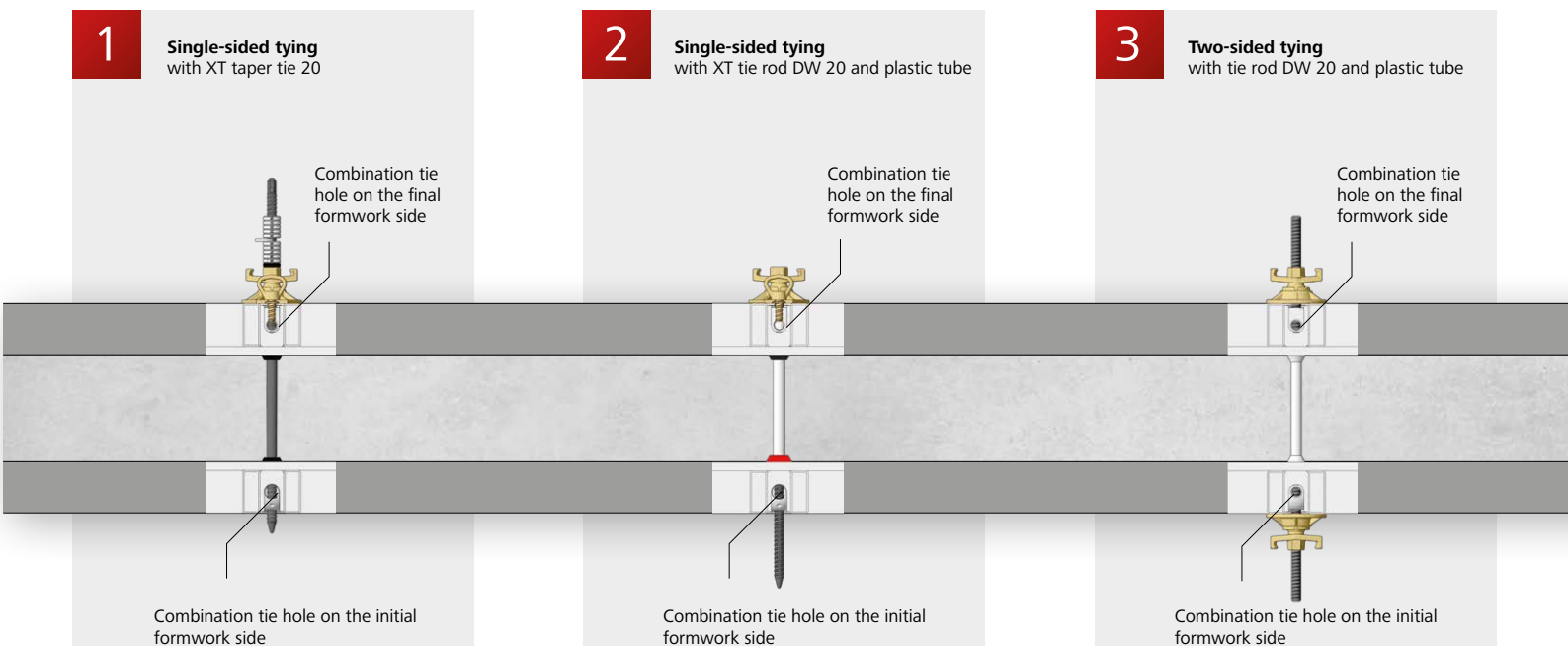
Less is more

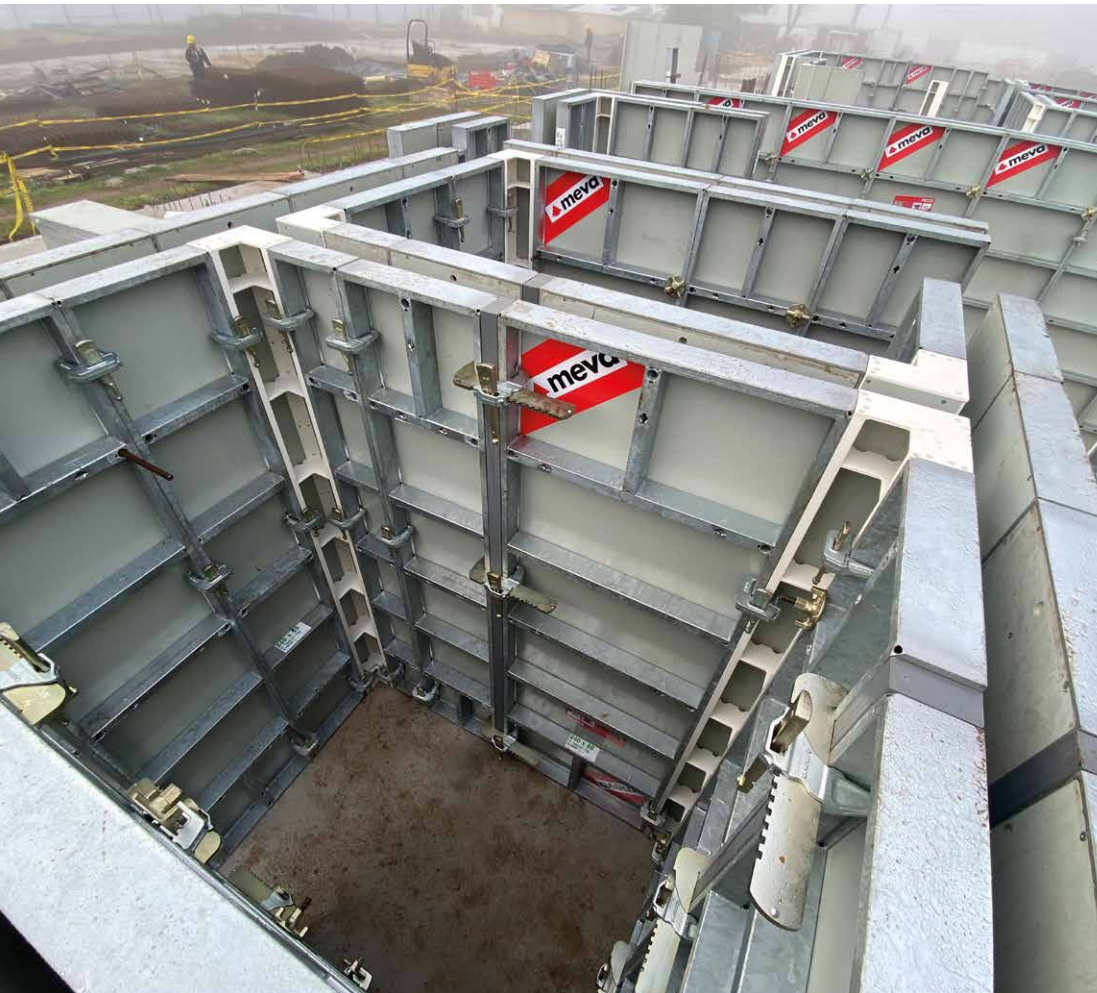
The XT taper tie is a key factor for the large time advantage when using StarTec XT, as wall thickness adjustment, installation and removal can be performed entirely by one person. Other workers can perform additional tasks at the same time, e.g. removal of assembly locks or of panels by crane.

The XT taper tie in the StarTec XT system makes the following work steps superfluous:

- Preassembly of articulated flange nuts on conventional tie rods
- Prior insertion of conventional tie rods in the initial formwork
- Cutting plastic tubes to size to define wall thicknesses
- Mounting the plastic tubes and cones for plastic tubes on conventional tie rods
- Installation and removal of articulated flange nuts on the final-formwork side during formwork assembly and stripping

On construction sites the new StarTec XT confirms all the benefits and strengths of Mammut XT.





EcoAs in continuous use

Eight-storey residential complex under construction in Colombia – cast in one piece

At the beginning of 2020 work commenced on a new building with 96 residential units on eight storeys. The challenges: a tight schedule and stringent requirements on the concrete finish. The robust, crane-independent EcoAs formwork from MEVA is proving to be the ideal choice.

In an up-and-coming small town north of Bogotá, a residential complex is under construction. Here, the construction company responsible is erecting an eight-storey building with twelve apartments per floor and using the MEVA wall formwork system EcoAs. For good reasons: the robust hand-set formwork is ideally suited for residential development projects without the use of a crane due to its ease of use, high level of flexibility and its cost-effectiveness.

Cost-effective construction

The apartments are being built out of high-quality ready-mixed concrete with floor heights of 2.30 m. All floor plans are more or less identical with parapet walls and windows between 60 and 110 cm high. On the building site the Colombian construction company is employing 430 m² of panels of the easy-to-handle EcoAs wall formwork. The quantity of material is sufficient to build two apartments per cycle. This enables one storey with a surface area of 800 m² and twelve apartments to be completed in only six days.

For the construction company the uniform cycles are an important factor with regard to economic feasibility, planning security and material stockage. Because the individual steps and work processes during assembly and stripping are constantly repeated, the construction work is making much faster progress. The compact and ergonomic design of



the EcoAs panels, which can be moved easily and quickly by hand, also plays a significant role here.

This economical and flexible system masters irregular floor plans and geometries thanks to its well-thought-out modular design principle. With panel sizes from 300 to 80 cm high and 100 to 25 cm wide as well as a selection of inside, outside and steplessly adjustable hinged corners, trouble-free corners can be created for all wall thicknesses in just a few steps and with just a few individual parts.

Robust and easy to clean

The walls and parapet walls of the residential complex are each poured in one form. Using the alkus all-plastic facing, the construction company fulfils the stringent requirements on the quality of the concrete with aplomb. The flatness tolerances of the walls are easily complied with thanks to

the closed, robust and torsionally rigid steel frame profiles for fresh-concrete pressure loads of 50 kN/m². During the numerous assembly and stripping cycles, the reduced concrete adhesion and the ease with which the alkus facing and the hot-dip galvanised frames can be cleaned pays off.

Just a few hammer blows on the MEVA assembly locks enable quick and secure connection of the formwork panels and window box-outs. The clever multi-function profile with welded-in Dywidag nuts for attaching all accessories (e.g. scaffold brackets, push-pull props and alignment rails using the MEVA flange screw) is used in multiple ways and ensures a tidy construction site as well as routine processes.



Safe climbing on “Wall Street”

MAC and MGC ensure rapid progress of construction work on One Ayala Avenue

A new mixed-use development on 2.8 hectares with a total usable area of 390,000 m² is enlarging the splendid ensemble of buildings on Ayala Avenue that connects the Philippine financial centre Makati with Manila. The automatic MAC climbing system, the rail-guided MGC climbing system and the MGS all-round enclosure are ensuring safe and rapid construction progress.

The metropolitan region of Manila, with 16 large cities surrounding the capital, is constantly growing – also upwards. Ayala Avenue is one of the largest arteries in the financial centre Makati, aka the “Wall Street of the Philippines”. Here, an increasing number of skyscrapers dominate the view. The driving force behind the changes to the skyline is MDCI Construction Corporation (a joint venture between

Makati Development Corporation and Bouygues Batiment International), which relies on various MEVA systems. After the monumental Ayala Triangle Garden Diamond and the Garden Towers, the next “flagship” is now being erected: One Ayala Avenue, which was named after its address, is enlarging the glamorous ensemble of buildings.

Centre stage is taken by a 54,700 m² retail centre with three shopping levels and a 17.5 m high atrium, which also comprises cultural amenities, food service areas and a sports centre. Below this, spread over three storeys, tens of thousands of commuters will reach the city centre via a 20,000 m² transport hub with bus termini, a rail link and bicycle-parking spaces. Above the shopping centre, four towers reach up into the sky: two office towers (85,000 m²), a residential building

with more than 100 apartments and a four-star hotel with more than 600 rooms.

Safe and rapid growth

One Ayala Avenue will provide a lot of people with living space and jobs. The building's four differently shaped wings are currently under parallel construction. MDBI will move some of the formwork systems from one tower to another. The current shell construction work with standard storey heights of four metres is characterised by safe and – in the truest sense of the word – rapid growth.

Eight instead of 18 days for each storey

It is precisely these characteristics that rescued the time schedule two years ago during the construction of the neighbouring skyscraper Garden Tower II. In the middle of the shell construction phase, the MEVA Automatic Climbing (MAC) took over from an existing climbing system, which was unable to cope with the planned high speed of construction. At short notice, the MAC was prepared for the prevailing conditions on the construction site of Garden Tower II and assembled on the 27th floor. From there it reliably secured the building shell up to the topmost 63rd floor and reduced the time required for each storey from 18 to eight days. The MAC system and additional MEVA solutions also demonstrated their prowess during the challenging construction of the Ayala Triangle Garden Diamond with its complex geometry, curved lateral faces and sharply rounded-off ends.

Climbing four meters in one hour

In such a challenging environment the automatic climbing system plays to its strengths. MAC climbs hydraulically, ensures speed and efficiency, especially at great heights, and does not require the assistance of a crane. Fully integrated platforms and ladders ensure a high level of workplace safety. The high-performance hydraulic system, which can be operated by a small team, enables a lift height of 4 metres with a load of 20 metric tons per cylinder, which can be achieved in only 60 minutes. The complete unit, including the fully enclosed working platform that enables the work to be carried out in all weathers and screens off outside views, is raised to the next-highest level. The rail-guided MEVA Guided Screens (MGS) system provides all-round enclosure of the slab edges on the outside of the building for optimum occupational safety and efficient construction progress.

MGC and MGS for safe working

Work safety at all heights is also guaranteed by the rail-guided, hydraulic or crane-assisted MEVA Guided Climbing (MGC) system used on the building cores. As sufficient crane capacity is available at One Ayala Avenue, MDBI chose this option. The use of the freely positionable guide rails of

up to 4.50 metres in length ensures that the unit comprising the working platform and the wall formwork remains firmly anchored to the building, even under windy conditions. In some cases, use is made of the option to attach trailing platforms to the guide rails of the MGC system in order to safely perform follow-up work. Weight-optimised components facilitate ergonomic work, and fully integrated access ladders with safety cages ensure a high level of safety. The MGC is used on the outer walls of the building cores. MAC was used to build a shaft platform in order to climb the internal face of cores.

Tight schedule comfortably met

On this building, MEVA's Mammut 350 wall formwork system and column panels are also in use on this building. Together with the MAC and MGC climbing systems and the MGS screen system, they ensure that the work at One Ayala Avenue is progressing fast. Structural works are due to be completed in mid-2020 for the office towers and mid-2021 for the hotel and residential towers.

"One Ayala Avenue is one of the largest-scale projects carried out by MEVA in Asia. The successful and continuous collaboration with contractor MDBI has allowed the project to implement efficient, safe and cost-effective solutions and to show clear leadership in construction practices in the Philippines," says MEVA Managing Director Mark Rose.



Project data

- **Project**
 - One Ayala Avenue, Makati, Philippines
- **Contractor**
 - MDBI Construction Corporation
- **MEVA systems**
 - MAC automatic climbing system
 - Rail-guided MGC climbing system
 - Rail-guided MGS screen system
 - Mammut 350 wall formwork system
- **Engineering and support**
 - MEVA Schalungs-Systeme Haiterbach, Asia Pacific Far East

Simply formed by hand

AluFix enables rapid construction progress during crane-independent house construction

The construction of a holiday home in the German town of Bamberg illustrates why MEVA's simple and economical AluFix formwork system is such a huge success on small construction sites.

Building a house can be so easy – even without the help of a crane or lifting equipment. This was the situation at the building site in Franconian Bamberg, which was inaccessible for heavy equipment due its location on the slope of a hill and the closely spaced surrounding buildings. It was thus necessary to erect the house using in-situ concrete without a crane or other lifting gear. The formwork for the concrete building shell was erected by the workers from Korczynski-Bau.

The young construction company relied on MEVA's lightweight, modular AluFix wall formwork system for the first time. Formwork panels with a total area of 228 m² were required for this building shell. Korczynski-Bau obtained the material via the local MEVA partner Karl GmbH.

Lightweight and economical

Robert Korczynski, the construction company's managing director, is convinced by the all-round talent AluFix: "The simple handling made the work on the construction site a lot easier. We remained on schedule at all times." Korczynski-Bau is a prime example of a next-generation construction company. "We don't want to reinvent the wheel with regard to the formwork, but rather rely on innovative, tried-and-tested and easy-to-handle systems such as AluFix," explains Robert Korczynski.

The lightweight hand-set formwork offers a high degree of flexibility with regard to wall and slab sizes. There is a choice of six panel heights and six panel widths. A further advantage is the low weight of the formwork panels. On the construction site in Bamberg panels with a height of 270 cm were used. With a width of 90 cm they weigh only 44.4 kg, making them easy to handle. Thus, the workmen literally had an easy job of it when erecting the formwork and the house construction proceeded accordingly: without a hitch and on time.



i

Project data

- **Project**
 - Holiday home in Bamberg, Germany
- **Contractor**
 - Korczynski-Bau GmbH & Co. KG
- **MEVA systems**
 - AluFix wall formwork
- **Engineering and support**
 - MEVA Schalungs-Systeme GmbH, Munich office, Germany

Successful all-round talent

Economical hand-set formwork AluFix used worldwide



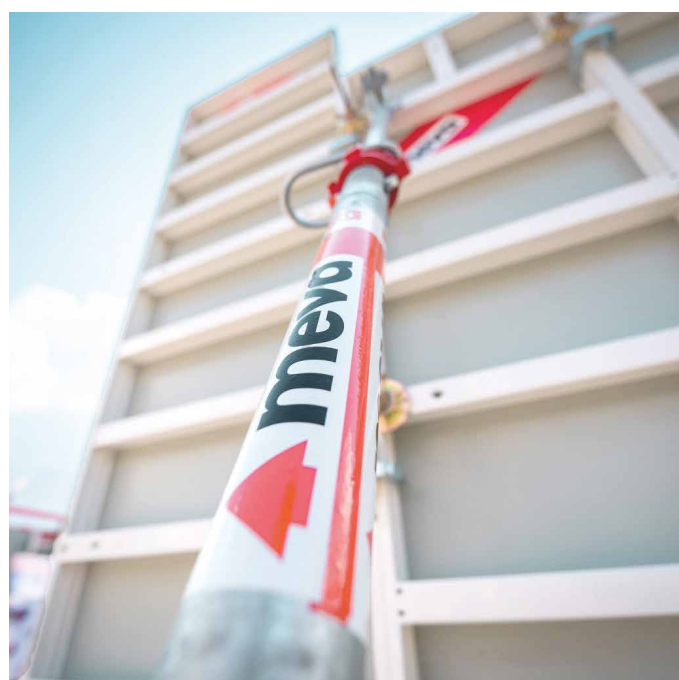
The modular system MEVA AluFix is the lightweight hand-set formwork for walls and slabs – and always the first choice if the goal is to produce high-quality concreting results without using a crane. Whether high-rise or hotel construction in India, a support wall in Colombia, residential housing construction in the Philippines, an enclosing wall in Germany or a stadium construction in Qatar, AluFix has established itself as a successful all-round talent worldwide thanks to its product features and high quality of workmanship. The aluminium panels for the wall formwork can be handled safely and easily. When combined with MEVA's AluFix prop head and EuMax props, the system can also be used flexibly as slab formwork.

Unbeatable arguments

Despite its lightweight and easy-to-handle design, AluFix is nevertheless resilient. With a fresh-concrete pressure capacity of 50 kN/m², the system is able to master numerous challenges. The height increments are optimised for efficient forming without height extensions: panel heights of 350,

300, 270, 250, 150 and 135 cm as well as six panel widths (90 to 25 cm) enable corner solutions to be formed for all wall thicknesses. AluFix was designed for numerous tasks and for construction work on existing buildings, whether with or without a crane and lifting equipment. It can be combined with EcoAs, the crane-independent MEVA system made of steel.

Clever multi-function profiles with welded-in Dywidag nuts enable accessories to be attached quickly (scaffold brackets, tie rod fixtures, alignment rails) with only one single part, the flange screw. This simplifies transport on the construction site. The MEVA assembly locks provide a non-positive connection with only a few blow with a hammer. Equipped with the durable alkus all-plastic facing, AluFix fulfils the highest architectural concrete requirements. The robust facing with its smooth surface and a 7-year warranty guarantees top-class concrete quality even after many applications.





All-round precision

Envelope for centrifuge built in Delft with help from MEVA Radius

A somewhat unusual construction site in the Dutch city of Delft required absolutely precise formwork: the single-story rotunda for a centrifuge must be able to withstand large forces. The MEVA formwork system Radius deployed its qualities to the full to guarantee precise construction of the concrete shell.

With the new centrifuge at the Deltares Institute for applied research in the field of water and subsurface movements, processes are simulated to scale that can take months in reality. This is done by applying high gravitational forces, which represents an acceleration in time for the processes involved in geo-engineering. For example, the failure behaviour of dykes can be optimised and the ageing processes of pile foundations slowed down.

In a container with a volume of two cubic metres, the Deltares Geocentrifuge accelerates research material to a maximum of 300 g. The measured data are converted, validated and enable a wide range of tests to be performed. The customers are

government agencies, engineering offices, companies and scientific institutes.

The centrepiece of the system is the centrifuge with an arm length of 5.5 metres. It achieves a speed of 456 km/h and thus up to 3.7 revolutions per second. The building's concrete shell must be able to withstand the extraordinary forces that act on it. For this reason, the construction company De Hilster Betonwerken had to tackle additional challenges besides creating the building's unusual shape. For example, stringent requirements were placed on the surface smoothness in order to reduce friction to a minimum and avoid unwanted air turbulences.

This also meant that the wall had to be perfectly round and have exactly the same radius over its entire height, from the ground to the 4.25 m high ceiling of the single-story rotunda. To avoid unevenness, the concrete was poured in one cycle. To provide the 40 cm thick concrete walls with the necessary stability, particularly strong two-row



Perfectly round and with a constant radius from the ground to the ceiling: the research centrifuge required perfect formwork.

reinforcement was required consisting of 20 mm rods in a 10 cm grid. It was thus necessary to erect formwork with as few tie connections as possible. "Erecting round formwork with such large dimensions was a huge challenge for De Hilster Betonwerken. With the help of MEVA's expertise, everything went successfully," reports civil engineer Roy Wubben. 330 m² of the formwork system Radius were used.

The other concreting work on the construction site was also carried out without any problems at all. First of all, it was necessary to build an air duct under the foundations of the centrifuge equipment using AluStar wall formwork panels. The Mammut 350 system was used to build a right-angled support wall and, in addition, 45 MEP shoring towers were used up to a height of 4.50 m. Roy Wubben: "De Hilster Betonwerken has been working with MEVA for years and has always been absolutely satisfied."

i

Project data

- **Project**
 - Deltares Geocentrifuge, Delft (Netherlands)
- **Contractor**
 - De Hilster Betonwerken, Netherlands
- **MEVA systems**
 - Mammut 350 wall formwork
 - AluStar wall formwork
 - Radius circular formwork
 - MEP shoring tower
- **Engineering and support**
 - MEVA Formwork Systems Benelux B.V., Gouda, Netherlands



Bjørnegård Tunnel in Norway

AluFix and Mammut 350 overcome all challenges

When equipment rooms have to be integrated into new tunnel tubes as well, the available space is inevitably confined. Hence, when pouring corresponding walls in a Norwegian road tunnel, simple handling and ease of use were important factors – and the strengths of the MEVA's AluFix system. The heavy work was tackled using Mammut 350.

The construction of the new Bjørnegård Tunnel, to the west of Oslo, took three-and-a-half years. The wait and the work were worthwhile: The motorists on the E16 motorway between Oslo and Bergen now make good time at this former traffic junction, and the inhabitants of the municipality of Bærum

no longer suffer from the noise and traffic jams. The construction company NCC Infrastructure built a 2.3 km long tunnel with two parallel, two-lane tubes on behalf of the Norwegian road construction authority Statens Vegvesen. Maxbo Teknikk, MEVA's Norwegian sales partner, delivered 705 m² of robust Mammut 350 frame formwork as well as 300 m² of lightweight, easy-to-handle AluFix panels.

Mammut 350 for the retaining walls

Using the modular Mammut 350 wall formwork, lateral retaining walls were poured over a length of 600 m leading up to the tunnel entrances. Maxbo Teknikk's engineers calculated the work involved in

advance and selected the strong Mammut 350 wall formwork system due to the large surface area of the walls and the fresh-concrete pressure expected. The work was performed concurrently from the north and the south ends, and the concrete was poured in 12 cycles, each with a length of about 24 m. The permissible fresh-concrete pressure load of 100 kN/m² and the robust frame design of the Mammut 350 wall formwork panels enabled the large retaining walls at the sides of the tunnel approaches to be poured quickly.

The advantages of the globally tried-and-tested system came into their own during this project: it was quick and easy to assemble, and due to the large surface area of the panels of up to 8.75 m², the construction work progressed rapidly. Furthermore, the desired attractive surface finish was achieved, not least due to the symmetrical tie hole and joint pattern and the use of the alkus all-plastic facing. Stripping and reassembly were also carried out smoothly and swiftly thanks to the system's ease of cleaning and the practical bump notches for simple alignment and adjustment with a crowbar.

AluFix: the specialist for very confined spaces

In the tunnels themselves, the available space was significantly more restricted than in front of the entrance areas. In the tubes it was necessary to build equipment rooms with a ceiling height of 5.50 m, which house, for example, drainage tanks for mountain water as well as filtration equipment. It was not possible to use lifting gear or cranes, and the low tunnels made it difficult to position the formwork and pour the concrete. Hence, NCC Infrastructure relied on the AluFix panels recommended by Maxbo Teknikk. Due to the cramped conditions, it was all the more important to be able to flexibly move the wall formwork panels by hand. The ability to produce trouble-free corner solutions for all wall thicknesses using only six panel widths and six panel heights (up to 350 cm) proved to be a huge advantage.

The lightweight modular hand-set formwork AluFix is able to withstand a fresh-concrete pressure of 50 kN/m². The ergonomic grip profile and the low weight of the nevertheless robust aluminium profiles made the handling easier. The power-coated profile surface is easy to clean and – not unimportant in such a confined space – impact- and scratch-resistant. For fire prevention reasons, special, fire-resistant concrete had to be used in the entire tunnel area. The result was just as good and the surface just as smooth as usual thanks to the alkus all-plastic facing.



The simple handling of the AluFix formwork paid off in the confined space in the tunnel (left). In front of the tunnel entrances (top), Mammut 350 ensured rapid construction progress.

“The Mammut 350 formwork system has proven it worth during many a large project in Norway. In this case, during the construction of the Bjørnegård tunnel, AluFix emphatically proved that this lightweight hand-set formwork is very well suited for concrete construction in confined spaces in technical buildings and in infrastructure”, says Pål Kjustad, sales manager at Maxbo Teknikk.

i

Project data

- **Project**
 - Bjørnegård Tunnel, Norway
- **Principal**
 - Statens Vegvesen, Norway
- **Contractor**
 - NCC Infrastructure, Oslo (Norway)
- **MEVA systems**
 - Wall formwork systems AluFix and Mammut 350
- **Engineering and support**
 - Maxbo Teknikk, Norway



Rapid construction progress down under MEVA's wall formwork and climbing systems at Parallel Riverfront Apartments

The Parallel Riverfront Apartments are presently under construction in the green belt on the banks of the Swan River with a view over the skyline of Perth. The showcase project is striking, growing in height safely and swiftly with the aid of MEVA's wall formwork and climbing systems.

In a few weeks time the first occupants will be moving into the impressive building complex. Above the four basement levels with underground garages and storage rooms, 14 storeys have been erected – a spectacular residential tower with 123 residential units and high-class facilities including a pool deck, an entrance hall and a coffee shop. An absolute eye-catcher is the spectacular architecture and façade, which is dominated by complexly shaped overhanging slabs and vertical support webs on each of the 3 m-high storeys.

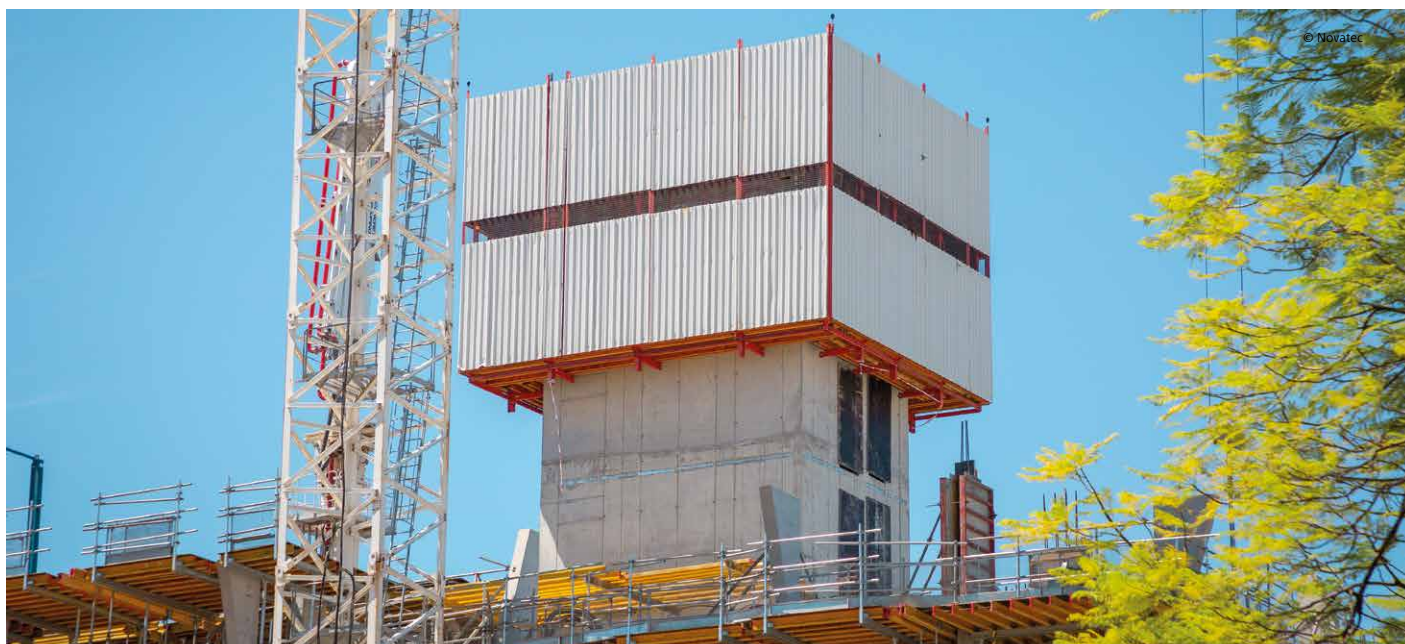
ACC Group in Western Australia has already successfully completed a number of projects down under together with Novatec Formwork Systems. ACC also relied on the service quality and formwork systems provided by MEVA's partner Novatec during the concrete work on Parallel that began in May 2019. This time, they had to overcome the challenges posed by the complex formwork planning of different wall thicknesses in the core and the restricted space on the Riverfront construction site.

Simple handling of AluFix

During the construction of the walls and columns in the basement levels, the lightweight and easy-to-handle AluFix panels showed their strengths. The hand-set formwork allows high-quality results to be achieved on construction sites without assistance from a crane. With a wide range of panels, AluFix is an ideal solution for bespoke requirements and applications. The ergonomic grip profile and the practical multi-function profile with welded-in DW 15 nuts for quick, non-positive attachment of accessories are made of closed, robust and durable aluminium profile with a high-quality cured powder-coated finish. Ease of cleaning and reduced concrete adhesion are the convincing features of these panels. The alkus all-plastic facing guarantees top-class concrete quality, even after many applications, as it does not absorb water and does not swell or shrink.

StarTec, the all-round talent

StarTec has been established in commercial and residential housing construction for many years. During construction of the Parallel Riverside Apartments approximately 300 m² of StarTec was used in the basement as well as for the lift and stair shaft below the podium level in conjunction with the guided climbing system MGC with six scaffold brackets. The combination of wall formwork panels and working platforms ensured uncomplicated



The geometric facade with overhangs and vertical support webs is easily recognisable (left-hand photo). Top: The MEVA climbing system in use during shaft construction.

work and rapid construction progress despite the prevailing high safety standards.

Valuable time-saving while climbing

Since the start of this year, 230 m² of large-format modular Mammut 350 frame formwork panels with a fresh-concrete pressure capacity up to 100 kN/m² have been used to rapidly grow the core of the Riverfront complex. Without a crane and using a high-performance hydraulic system, the automatic MAC climbing system raises the units, made up of formwork panels and working platforms, floor by floor. MAC guarantees high speed and efficiency, especially at great heights. As only one day can be scheduled for stripping, climbing and reassembly, the cycles are performed quickly and safely. Also on this construction site, MAC guarantees valuable time-savings due to its partial pre-installation.

“Thanks to the excellent service provided by Novatec and the MEVA formwork and safety systems, the work on the construction site has progressed according to plan and without difficulties,” reports John Twinch, project manager at the construction company JAXON.

i

Project data

- **Project**
 - Parallel Riverfront Apartments, Perth (AUS)
- **Contractor**
 - JAXON Group Holding (builder)
 - ACC Group (construction)
- **MEVA systems**
 - Mammut 350 wall formwork
 - AluFix wall formwork
 - StarTec wall formwork
 - MAC automatic climbing system
 - MGC rail-guided climbing system
- **Engineering and support**
 - Novatec Formwork Systems, Australia
 - MEVA Formwork Systems Pte Ltd, Singapore

The future of building shell construction

With mevit BIM² offers value added through digitalisation

Construction sites require hard work and craftsmanship. However, why shouldn't digitalisation be able to provide for greater efficiency and planning reliability in this industry as well? mevit, an add-in for Autodesk Revit, provides clever semi-automated solutions for formwork planning using MEVA systems.

Previously, digitalisation played only a marginal role in the construction industry. Today, however, construction companies are calling for increased productivity. Thus, the time is ripe to rouse digital networking and support from its deep slumber: whether through efficient building shell and formwork planning with improved information flow, the simulation of construction processes, or the rapid availability of relevant data. This is where the mevit add-in for Autodesk Revit (a building information modelling software used by many architects and structural engineers) comes into play. It offers a new level of efficiency during the model-oriented planning of temporary construction aids in the form of a single continuous BIM workflow.

Modules and open innovation

The mevit add-in was developed by MEVA's partner BIM², whose civil engineers and IT specialists employed the necessary specialist knowledge

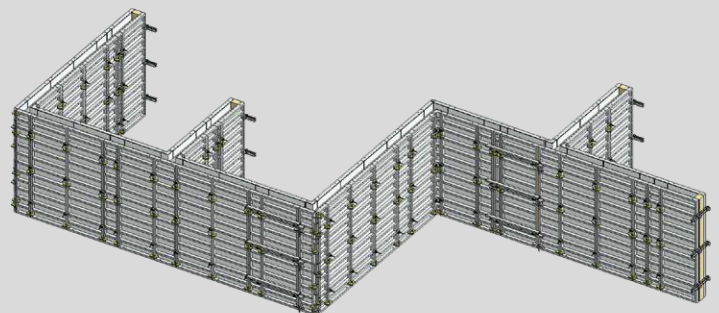
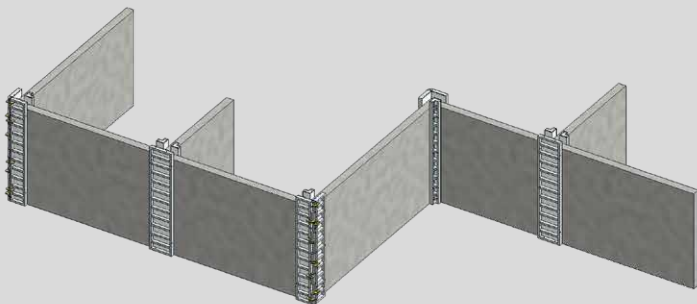
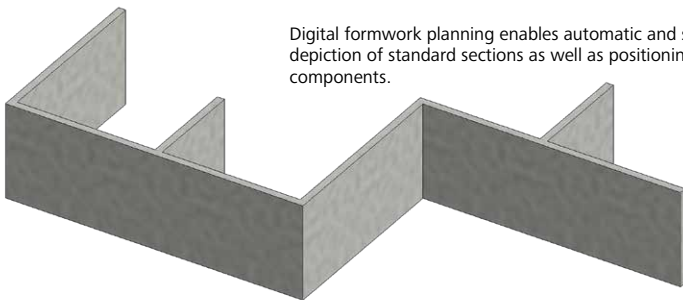
from the construction site on their computers. In other words, mevit was developed by engineers for engineers, is designed to meet the needs and requirements of building planners and is built up intuitively. mevit follows the open-innovation approach: Individual requirements and wishes can already be integrated during the application phase, enabling the development processes to be actively influenced. Transparency and continuous dialogue between end users and development engineers help to avoid design errors through practice-related input and promote the creation and optimisation of useful functions.

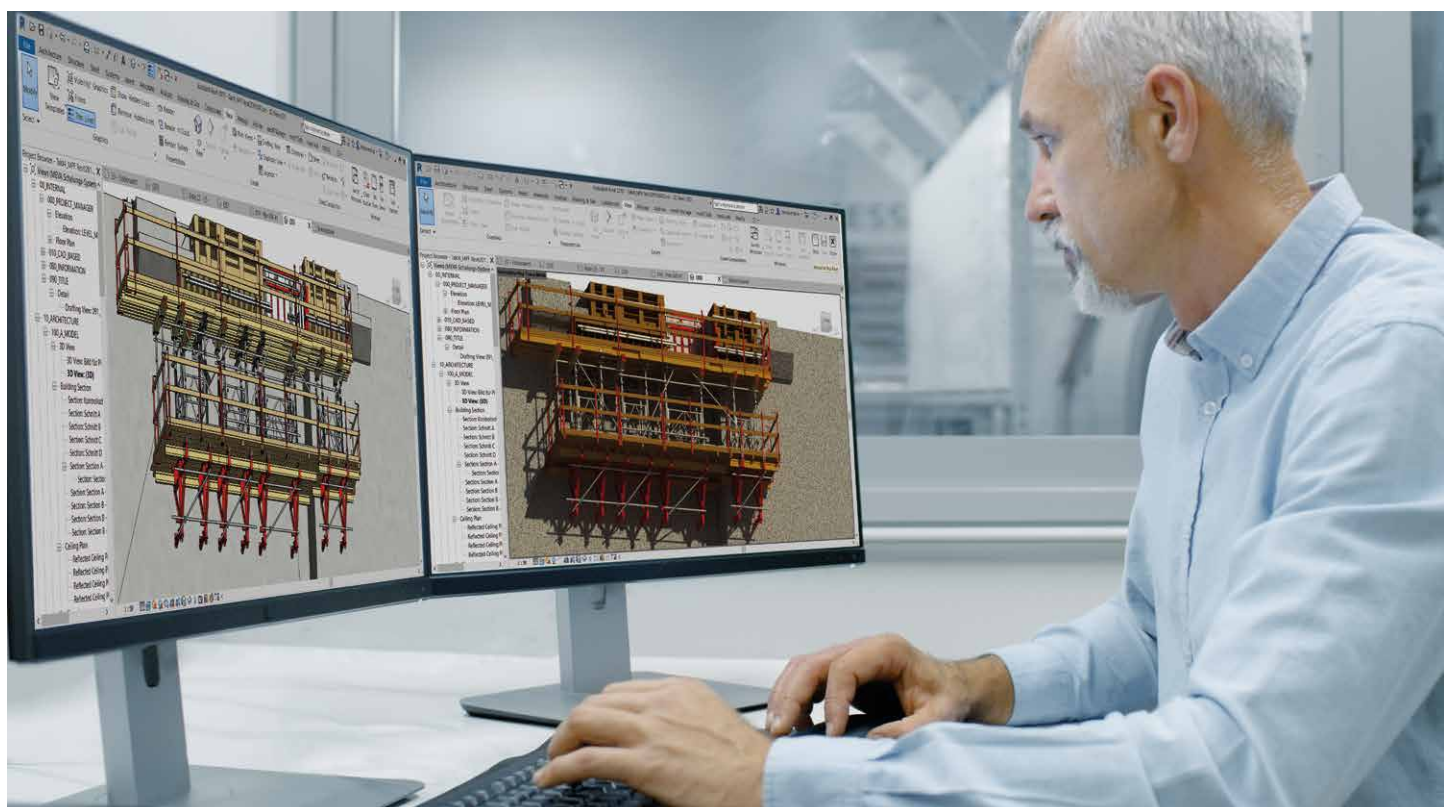
As a formwork and scaffolding tool for building information modelling, mevit paves the way for digital modelling of the construction site. It enables users of MEVA formwork systems to use different modules to suit individual requirements. The modules mevit.Wall and mevit.Slab enable semi-automated formwork planning of walls, slabs and shoring towers. As a general support function to make working with Revit more efficient, mevit.Manage, for example, enables bills of material to be exported to Excel or on-site material requirements that are common to all cycles to be determined. The sum of these three modules forms the full version, mevit.Pro.

Digital formwork planning

The advantage of digital formwork planning lies in the quick automatic depiction of standard sections in substeps, including positioning of all accessories. mevit supports users and formwork engineers during their daily work by automatically depicting wall sections in substeps. Here, the program system-

Digital formwork planning enables automatic and step-by-step depiction of standard sections as well as positioning of the components.



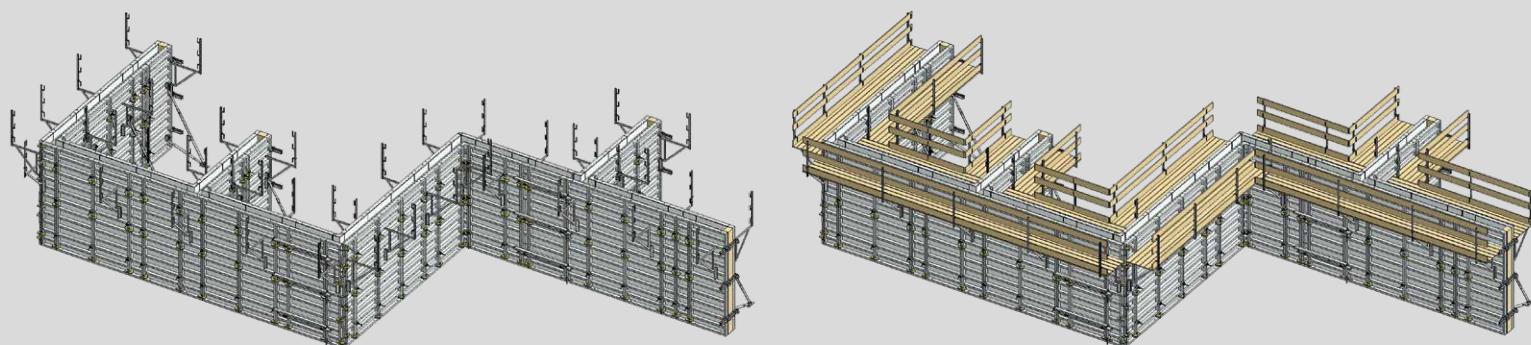


atically follows the approach adopted by experienced formwork planners. First of all, key wall elements, e.g. T-walls or corners, are positioned, and the formwork is then positioned automatically. The combination of automation of complete wall sections and semi-automation of accessories during manual processing enables formwork engineers to focus on the value-creating activities.

End users can manage their projects easily and can just as easily export bills of material or the maximum on-site material requirements to Excel. The parametric content in mevit is suitable for the derivation of building layouts and views for both building information modelling and for traditional plan creation.

Transparency on the construction site

The idea behind BIM is also simple and ingenious. All information regarding the construction project, including a three-dimensional model, is collected, coordinated and agreed in a database. This information is transferred to the construction site in line with individual requirements and can then be called up on a tablet. Every cycle is presented in a separate view and is sent in this form directly to the construction site by the planner. Relevant data can be accessed quickly and simply. This increases transparency on the construction site, helps to prevent design-related errors in advance, enables a detailed simulation visualisation of the construction process on-site and ensures that the data is available where it is required.



With back-step method and bracing

Great precision required in construction of new warehouse next to existing building



During the construction of a new warehouse in Switzerland, the erection of the initial formwork directly next to the adjacent building was performed without a hitch. The Mammut XT wall formwork system with single-sided tying did an excellent job.

In Münchenbuchsee near Bern, Marti AG was commissioned by the building materials supplier kiener + wittlin AG with the construction of a large, 15-meter-high warehouse with an area of approximately 2,500 m². The high wall sections were no problem for Mammut XT's high-performance formwork panels with a fresh-concrete pressure capacity of 100 kN/m². However, special precautionary measures had to be taken, as the walls of the new warehouse were situated directly adjacent to an existing warehouse.

700 m² of Mammut XT panels and the modular safety system SecuritBasic were used on the construction site between November 2019 and February 2020. The team led by the senior construction foreman Reto Kiener decided to build the walls using the back-step method, in which, after pouring each wall section, the next section is skipped, and when the adjacent sections have hardened, the resulting gaps are reinforced and then filled in with concrete. The advantage of this method is the efficient use of formwork material and thus the reduction of the formwork costs.

138 meters in 24 stages

Two separate concreting sections with a width of 5.75 m and a height of 14.74 m were created in twelve stages. A total of three walls that were connected to form an h-shape had to be poured using double-sided formwork over a length of 138 m, partly alongside the existing building. The upper section of the adjacent warehouse's façade is made up of not particularly robust fibre-cement sheets and overhangs by up to 25 cm.

"The gap of only 60 to 80 cm between the walls of the existing warehouse and our formwork was a challenge," explains MEVA's Raphael Klauser. "It was, of course, not possible to support the initial formwork from the rear, which meant we had to secure the initial and final formwork in the new floor slab using bracing." This bracing was created using reinforced alignment rails attached to the Mammut XT panels.

The simple and quick single-sided tying option provided by MEVA's integrated combination tie hole was a huge advantage during construction of the large-format concrete walls in conjunction with the lack of space in which to work behind the initial formwork. This enabled the formwork to be erected approximately 20% faster than comparable competitors' systems – as confirmed by an independent authority (Manual on Work Organisation for Construction Projects – Forming Work, Frame Formwork, Walls 2019).

Firmly attached with multi-function profiles

The SecuritBasic safety system with non-slip aluminium checkered sheeting ensured safety when working at heights. The modular system meets stringent statutory safety requirements, such as the accident prevention regulations issued by Suva, the Swiss national accident insurance fund. The walkway bracket on the working platform – like all MEVA accessories – is simply attached to the multi-function profiles of the Mammut XT panels with the flange screw. It can be installed quickly and easily on the ground, and the complete units are then moved into position by crane. The multi-function profiles were frequently required at the construction site in Münchenbuchsee, as they ensured that both SecuritBasic and the alignment rails were firmly attached to provide the bracing.

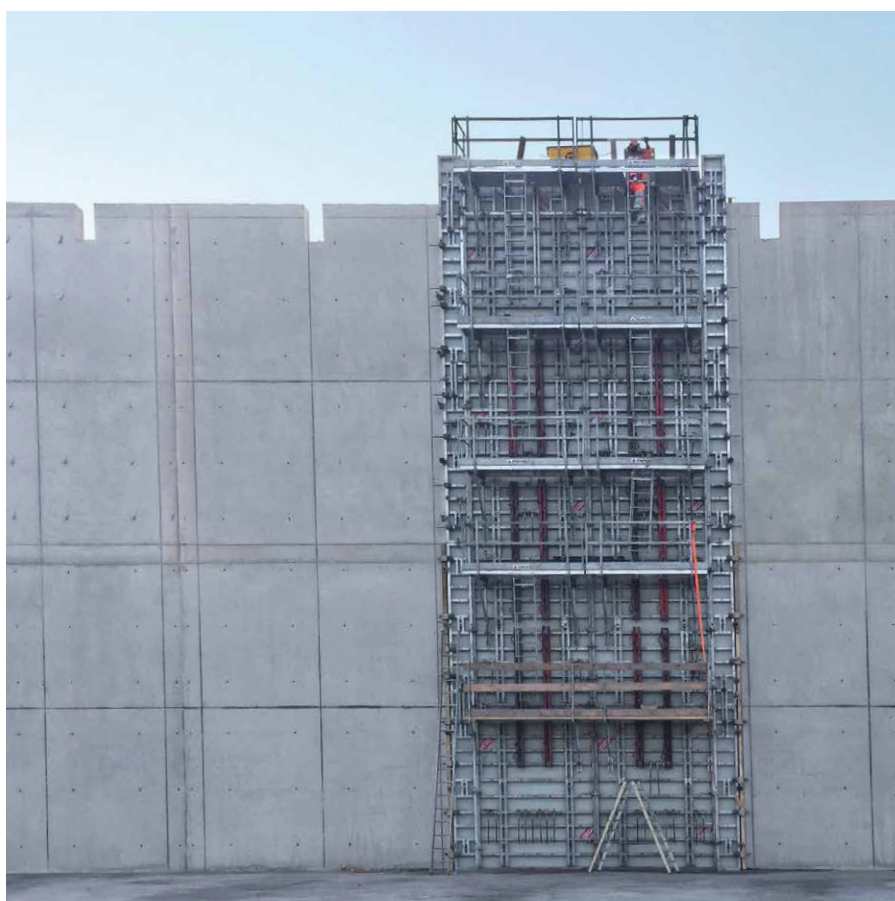
“The construction work proceeded safely and according to plan,” reports the senior construction foreman Reto Kiener. The last of the twelve back-step stages were poured at the start of February 2020. Just a few weeks later the new warehouse was officially opened.

The new warehouse was built directly adjacent to the existing building (left-hand photo, back of the building). The high walls were constructed using the Mammut XT formwork system (right-hand photo); the SecuritBasic safety system was installed on the ground beforehand.

i

Project data

- **Project**
 - New warehouse in Münchenbuchsee, Switzerland
- **Principal**
 - Kiener und Wittlin AG
- **Contractor**
 - Marti AG, Bern, Switzerland
- **MEVA systems**
 - Mammut XT wall formwork
 - SecuritBasic safety system
- **Engineering and support**
 - MEVA Schalungs-Systeme AG, Seon, Switzerland



You can rely on us wherever you are.

With 40 offices on 5 continents, we are
on the spot wherever you need us.

Headquarters (Germany)

MEVA Schalungs-Systeme GmbH
Industriestrasse 5
D-72221 Haiterbach
Tel. +49 7456 692-01
Fax +49 7456 692-66

info@meva.net
www.meva.net

Subsidiaries/international bases

| | | | |
|-----------------|-----------------------|-----------------|----------------------|
| A-Pfaffstätten | Tel. +43 2252 20900-0 | LATAM | latam@meva.net |
| AUS-Adelaide | Tel. +61 8 82634377 | MA-Casablanca | Tel. +212 684-602243 |
| Benelux, Gouda | Tel. +31 182 570770 | MAL-Perak | Tel. +60 12 5209337 |
| BH-Riffa | Tel. +973 3322 4290 | N-Oslo | Tel. +47 67 154200 |
| CDN-Toronto | Tel. +1 416 8278714 | PA-Panama City | Tel. +507 2372222 |
| CH-Seon | Tel. +41 62 7697100 | PH-Manila | Tel. +63 998 5416975 |
| DK-Køge | Tel. +45 56 311855 | QA-Doha | Tel. +974 4006 8485 |
| F-Sarreguemines | Tel. +33 387 959938 | SGP-Singapore | Tel. +65 67354459 |
| GB-Tamworth | Tel. +44 1827 60217 | UAE-Dubai | Tel. +971 4 3411180 |
| H-Budapest | Tel. +36 1 2722222 | USA-Springfield | Tel. +1 937 3280022 |
| IND-Mumbai | Tel. +91 22 27563430 | | |



MEVA Schalungs-Systeme GmbH

Industriestrasse 5 Tel. +49 7456 692-01
72221 Haiterbach Fax +49 7456 692-66
Germany info@meva.net
 www.meva.net