

HIGH RISE SOLUTIONS

Safety & Efficiency



At Work For You

HÜNNEBECK 

BY BRAND > SAFWAY



Dear reader,

Today, 48 per cent of the world's population lives and works in metropolitan areas. By 2030, this number will have risen to 54 per cent. Unquestionably urbanization is a global trend, which shapes societies and businesses worldwide. Its effects on the construction industry are many. The ongoing urbanisation and ever denser cities change the way construction projects are planned, managed and executed. This creates a buoyant market for Hünnebeck expertise.

The construction industry's outlook in Europe is splendid. According to expert forecasts we can expect further growth in the medium term, still spurred on by low interest rates and the overall economic growth. The perspectives for high-rise construction and major projects are particularly promising. In the medium term, the market volume will reach an estimated €100 bn.

With branches and specialist partners in 20 European countries, Hünnebeck is more than well equipped to act as a partner for high-rise projects to contractors and developers alike. We have compiled a portfolio of high-performance, crane-independent solutions suited to the demands of major projects and have introduced a key account management organization with a dedicated team.

We also benefit from the expertise of our affiliate, Forming Concepts, which joined the BrandSafway family in December 2018. Formwork Concepts is a leading provider of concrete formwork solutions in the United States with more than 35 years of experience. The company delivers cost-effective and high-performing concrete forming solutions, especially for high-rise construction, engineered for the challenges of today's commercial construction industry. This international network in combination with our hands-on, can-do mentality put us in a perfect position to provide valuable support to our customers, starting as early as the bidding process.

This brochure gives you an overview of our proven expertise in high-rise construction and major projects. Find out what solutions we provide and why meticulous planning is key to your and our success. Enjoy your read!

Martin Hemberger
Managing Director Hünnebeck Group



Martin Hemberger
Managing Director Hünnebeck Group

Proof of Expertise

Creative Formwork Concepts

The Grand Tower Story –
Hünnebeck expertise for Germany's
highest residential building.



At Hünnebeck, we take construction personally – and with good reason. Our approach leads to optimal results. Our project and application teams consist of engineering specialists, each with profound onsite experience and a hands-on, can-do attitude to new challenges.

With this expertise we develop formwork concepts, which address economic targets and technical challenges simultaneously. One example of the efficiency of this approach is the Grand Tower, Germany's highest residential building (as of November 2018).

Where possible, we engineer bespoke solutions which utilize our extensive range of high-performance standard products to reduce the amount of custom formwork. When required, our international network of engineers have the experience and ability to create custom formwork solutions to meet the demands of even the most challenging shaped structures. As the Grand Tower project shows, creativity pays off when devising a formwork concept for unconventional geometries – for the contractor as much as for ourselves.

The Challenges

The project, situated in Frankfurt's densely populated European Quarter and designed for premium residential purposes, is an architectural landmark. However, it presented a number of challenges.

For one, the building's ambitious rhombic layout is characterized by changing floor plans. Rather than repeating the apartment layout on every level with the entrances situated on top of each other, the architects decided to change floor plans from level to level according to a defined pattern. The entrance situation to the apartment and the depth of its balcony varied according to the same pattern. This design carried serious implications as far as the tying of formwork was concerned.

Secondly, the project's location in the inner city was a challenge in itself. It was clear from the start that crane support would be extremely limited. Moreover, the location lacked a storage area. Following our proven four-step process, we started our thorough project analysis way before the bidding phase.

The Analysis

Our project and application experts reviewed all project aspects and discussed them with our customer in detail. Considering site location, geometries, schedule, crane usage, safety issues, and budget targets, they arrived at an ingenious scenario: to separate the construction of the building's core from the construction of the living quarters with its changing floor plans.

The building's core consists of staircases, elevator and supply shafts, plus a surrounding rhombic ring wall. Its construction was to take place three to four floors in



**Interview with Lee Davidson,
North-East Europe Key Account Sales Director,
United Kingdom**

Strong Working Relationships with Our Customers

Hünnebeck introduced a Key Account Management Organization for North-East Europe – why?

It helps us to partner with our clients, in particular with large, multi-national contractors. The idea is to build strong and ultra-efficient working relationships with our customers. Our key account managers act as the point of contact, providing continuous support from the bidding phase and channeling the input of our specialist teams to achieve profitability for both partners.

What other teams are involved?

There are, for example our project analysts. They are involved at a very early project stage to analyze the project plan, time schedule, conditions due to location, etc. They provide suggestions proactively to facilitate project decisions and planning, which leads to more productivity, improved safety and greater efficiency. Secondly, there is our project engineering team, a group of specialists with a proven track record in providing innovative time and labor saving solutions. They devise the formwork concept, including plans for the construction process and pouring cycles. And then, of course, there are the logistics, service, and safety experts, who are involved in onsite processes.

Are all these teams involved in project decisions?

Most definitely! Thanks to their know-how they are able to identify crucial aspects early and suggest efficient solutions. This increases the productivity of both partners.



**GERMANY'S HIGHEST
RESIDENTIAL BUILDING*
INCLUDES**

- ▶ 47 apartment levels
- ▶ 1 ground floor + 1 basement
- ▶ 3 service levels

*as of November 2018

advance of the living quarters' construction. This scenario offered many advantages. Firstly, the time delay permitted two different, yet simultaneous construction processes. Secondly, it reduced crane time to an absolute minimum. Many construction steps could proceed without crane support. And most importantly, it allowed our application specialists to develop a comprehensive formwork and safety concept, which was based on our high-rise portfolio plus a customized safety solution based on SAFESCREEN®. The concept also included an innovative, specifically designed tying system suited to the changing floor plans.

The Solution

In general, our choice of formwork was based on our top quality, highly flexible MANTO® products to shutter the walls. For the inner core's construction, the MANTO frames were combined with catch platforms. As a result, only one crane lift was needed to move the formwork together with the platforms from level to level.

Our SCF self-climbing formwork system in combination with MANTO formwork was employed on the outer side on the rhombic ring wall in order to allow for crane independent lifting. Moreover, this solution contributed to the wind protection of the inner core platforms.

The construction of the living quarters with slabs and walls followed in a parallel rhythm. TOPMAX® and TOPEC® were

used for the slabs. Thanks to the time lag, it was possible to pour concrete on the top floor, while large prefabricated reinforcements were prepared on the ground, before being lifted to the core walls. In summary, our construction schedule permitted a rapid, highly efficient progress with a weekly pouring cycle in both processes.

The Anchoring System

For the building's core, the team developed a variety of anchoring solutions plus a detailed plan for every floor. Depending on where the catch platforms for the MANTO formwork were positioned, we used steel tube support to divert vertical loads onto the lintel beam below the door opening.

Since floor plans in the living quarters change from level to level, door openings and other apertures change, too. This made it impossible to use the same anchoring point on each floor. Instead, our specialists created a system consisting of three solutions.

Our team designed an anchor to be installed above doors. It consisted of a bracket tie plus steel beams. For wall openings, we used a climbing shoe attached to a cone-shaped steel case.

Due to the precise planning and the good communication with the customer, the project was realized on time and in line with the budget.

processes, particularly in inner city locations. If there is only room for one crane and you need five minutes to lift one piece from the ground and place it on the desired level, you need to think of alternatives to manage your project efficiently.

What alternatives are there?

If you find ways to separate processes, you can introduce more efficiency and save overall time. For example, if you separate core construction from floor construction, they grow independently from each other. Additionally, you can perform different processes simultaneously. At the Grand Tower project we were able to pour concrete on top of the floor and prefabricate large reinforcement units on the ground, which were then lifted to the required level.

And how do you use crane time best?

First of all, we deploy our SCF self-climbing system. It can be tailored to almost any geometry and any demand. If you can't employ SCF, you should think of ways to move formwork plus platform in one lift. To construct the core of the Grand Tower project, we attached our MANTO formwork to a steel frame and placed it on a catch platform. The two were moved together in one lift.



Interview with Sebastian Riegel,
Application Specialist, Germany

Separating Processes Improves Efficiency

What is the most important factor to consider when planning for high-rise construction?

Safety above all! It's our number one priority to ensure safe working conditions and provide protection from wind and weather. As regards the formwork concept, everything hinges on crane time. It affects the overall construction

CUSTOMIZED SAFETY APPLICATION

At the Grand Tower project in Frankfurt, SAFESCREEN® premiered successfully in Germany. There, rentable perforated sheets were employed as enclosures. The platforms had been preassembled before being delivered to the site. Additionally, working platforms were installed on each ceiling level to allow a better accessibility of the slab edge, where balconies made of preassembled parts had to be mounted.

► For more details on SAFESCREEN please see the next page.



Safety

SAFESCREEN®: Safety, our No. 1 Priority

Safety is a fundamental right and therefore has top priority for us at Hünnebeck. Our EHS commitment includes dedicated safety solutions.

Our framework of Environmental Health and Safety (EHS) is based on our zero-accident strategy, which defines dedicated responsibilities and includes our customers and contractors, too. Our EHS commitment is carried out on each and every construction site we are involved in.

Moreover, we believe that safety drives efficiency and productivity. Accordingly, we have introduced a number of safety measures into our planning process. These include site hazard assessments, site hazard plans and job hazard analysis.

High-rise construction projects require enhanced safety systems that improve the working conditions of the site operatives. The personnel need more than fall protection. They also need protection from wind and other adverse weather conditions.

Designed explicitly for construction projects with more than ten levels, our innovative SAFESCREEN system provides exactly these benefits. Moreover, it supports smooth construction processes in limited inner city locations, because its units can be lifted without the assistance of a crane.

SAFESCREEN is a perimeter climbing screen system designed to enclose the work floor. It safeguards site personnel against falls from height and from

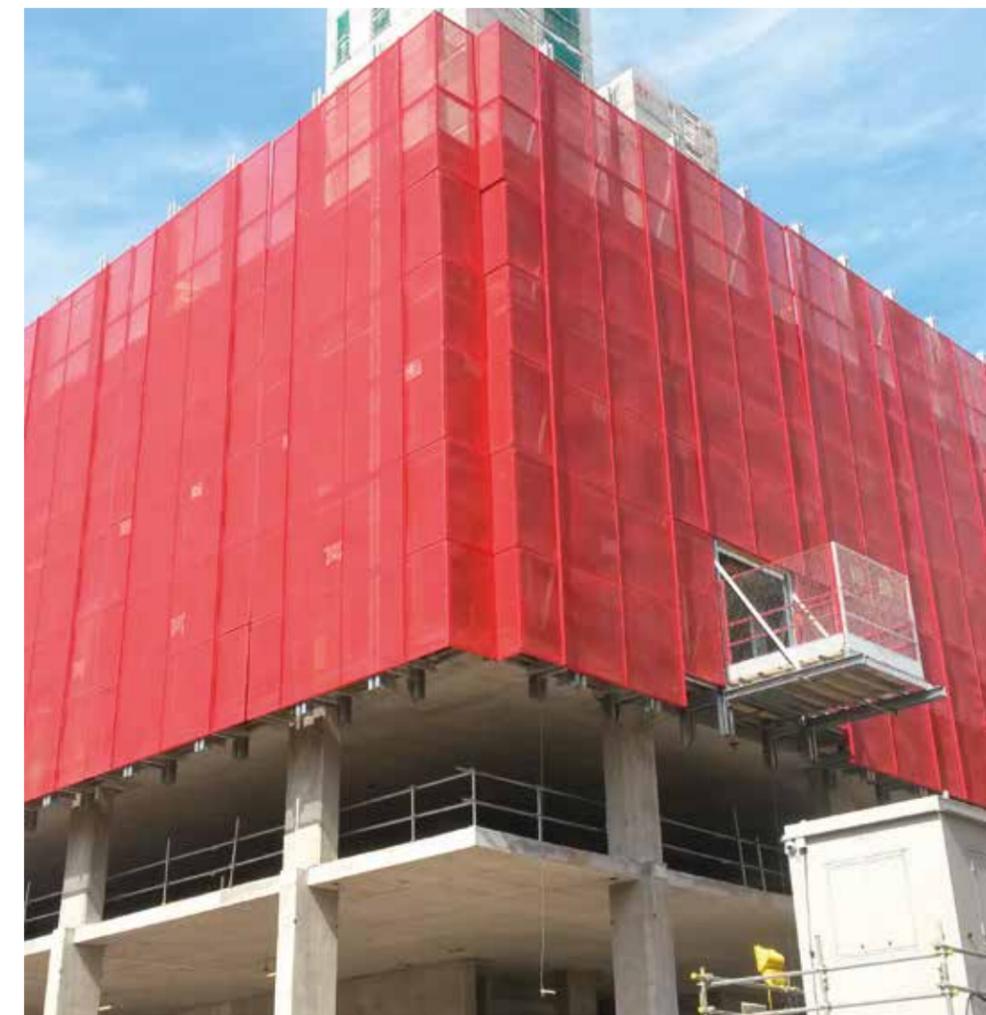
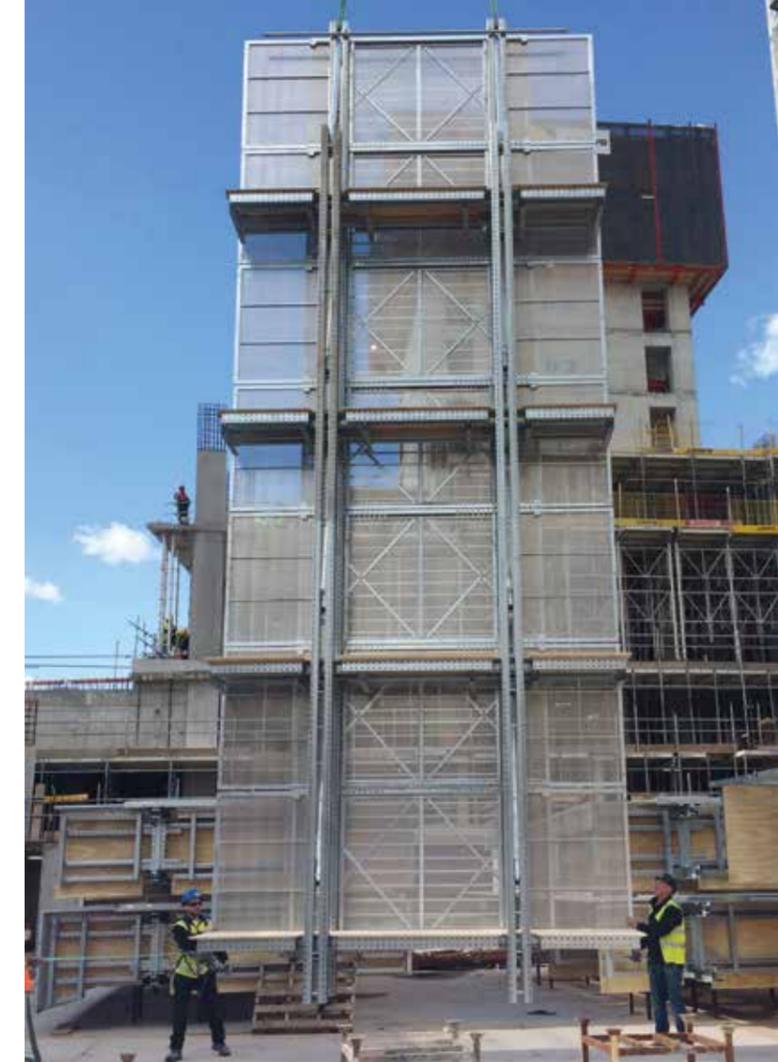
weather. With screened protection over four floors it simultaneously shields previously poured floors during the recycling of equipment as well as new floors while they are being cast. The individual units are lifted hydraulically to the next level.

Highly Adjustable and Easy to Assemble

In summary, our SAFESCREEN system provides transparent and adjustable panels. The smaller standard adjustable built screen units measuring 4.6 m x 9 m have an overall weight of less than 1.5 tonnes each. In recent years, the increased demand for enhanced protection over multiple floors now typically creates screen unit heights ranging from 12 m to 15 m.

The system is highly adjustable and can be complemented by additional parts for more flexibility. It does not require a lot of storage room. The parts are easy to assemble and dismantle onsite. Alternatively, if there are working area restrictions, it can be delivered preassembled. For the enclosures, different materials can be used. SAFESCREEN provides the flexibility to work with a range of fascia materials to meet the customer's specific safety and commercial expectations.

“We believe that safety is key. Plus, it drives efficiency and productivity.”



Superb Selection of High-Performance Products

Hünnebeck is a full service provider to the high-rise construction market and our products and services portfolio includes an extensive range of formwork, shoring and self climbing formwork and self climbing Screen systems. All of our products and services are designed to support safe, efficient and time-saving on-site processes.

Slab Formwork

We offer two types of slab formwork for high-rise construction. Where crane usage is not a concern, we recommend the TOPMAX system. For a crane independent, manhandled system the premium choice is TOPEC.



TOPMAX®

As the first steel-frame table form, TOPMAX is designed to shutter large slab surfaces efficiently. The strong, maintenance-free tables are suited to regular floor plans and repetitive geometries. The steel frame's multifunctional connection points permit combination with other systems, e.g. RASTO-TAKKO formwork. Straightforward preassembly permits efficient processes. With the TOPMAX transfer fork, 26 m² of table form can be moved in a single crane lift. As an alternative, the TOPMAX lift can be used to transfer the tables to the next pour on the same level.



TOPEC®

Thanks to its aluminum design, the TOPEC slab formwork has a low weight and can be employed independent from cranes. It consists of just two parts, panel and prop, permitting uncomplicated erection and dismantling. Panels measure up to 1.8 m x 1.8 m. All its properties make the TOPEC system much faster and demonstrably more economical than conventional systems.



Supporting Systems

Our aluminum based lightweight shoring system GASS® meets current demands of the industry. Comprising just three components, inner leg, outer leg, and ledger frame, the high-performance system allows fast and easy assembly on residential and commercial projects. GASS is versatile enough to be applied to table forms as well as to fix & strike solutions.

Wall Formwork

To shutter walls, our customers can choose between a variety of systems, depending on the project's geometry and on crane deployment.



MANTO®

Due to quality, functionality, and flexibility MANTO® is the No. 1 choice when shuttering large wall surfaces. The rugged and adaptable system can withstand concrete pressures of up to 80 kN/m² in its height extended state. Panels are available in sizes ranging from 1.2 m up to 3.3 m. The system includes a range of components for internal and external corners, stand-alone columns, and internal lift shaft applications.



PLATINUM 100

For construction projects with crane usage, our innovative PLATINUM 100 wall formwork combines a number of benefits. Thanks to a one-man tie operation it generates lower labor and life-cycle costs than traditional formwork, while delivering excellent concrete surfaces and supporting fast processes. It permits pouring of up to a height of 3.6 m and allows quick pouring without restrictions, due to a load capacity of 100 kN/m² throughout the process.



RASTO-TAKKO®

This highly versatile panel formwork can be operated without a crane. Its low weight permits swift handling and a manual transfer. The aligning clamps provide strong, tight, and flush panel connection in just one working step, supporting efficient onsite processes.



Traditional H 20 / Steel Waler

The traditional H 20 beam / steel waler formwork is a versatile timber beam formwork for walls and columns, tailor-made for big challenges. The user can freely determine the element dimensions, main beams, location of tying points and the type of form sheets.



Our SCF Self-Climbing Formwork

TRU-LIFT is a self lifting, core forming system. It has been designed for speed, forming up to nearly 5 m in a single lift. TRU-LIFT's fully boarded top platform is designed to carry the concrete boom and any additional materials required.



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Tailored Formwork to Realize Ambitious Designs

With growing market expectations, high-rise designs become more ambitious and more demanding. Customized formwork by Hünnebeck offers efficient solutions.

Architects often employ unconventional geometries, unusual surfaces, or special materials, e.g. exposed concrete, to distinguish the building. This is particularly true for premium residential high-rises and presents exciting challenges to formwork specialists, as these features cannot be shuttered with standard products.

To construct customized formwork solutions, we established a dedicated team at Hünnebeck. It includes experts with extensive onsite and formwork expertise at every business in Europe. Guided by our principles of economic efficiency, they design bespoke solutions, which are then manufactured for our customers.

Merging design challenges with economic considerations, our customized formwork solutions help to construct unusual geometries or to achieve outstanding concrete surfaces

with visible tie points, for example. Additionally, we design formwork for constructions with exposed concrete. Depending on the mechanical loads they have to bear, our customized solutions are made of timber or steel. Ultimately, our goal is to save time and improve efficiency. To support this goal, we make sure to design formwork that can be prefabricated in parts before shipment, reducing onsite efforts as a result.

We offer a range of services to accompany our customized formwork solutions. They support onsite processes optimally. Services include logistics and delivery according to the construction schedule as well as onsite instructions for use. If desired, we also provide onsite project support.



Interview Gerald Schönthaler,
Managing Director Hünnebeck Austria & Romania

Our Solutions Save Time and Money

What's the idea behind developing customized formwork solutions?

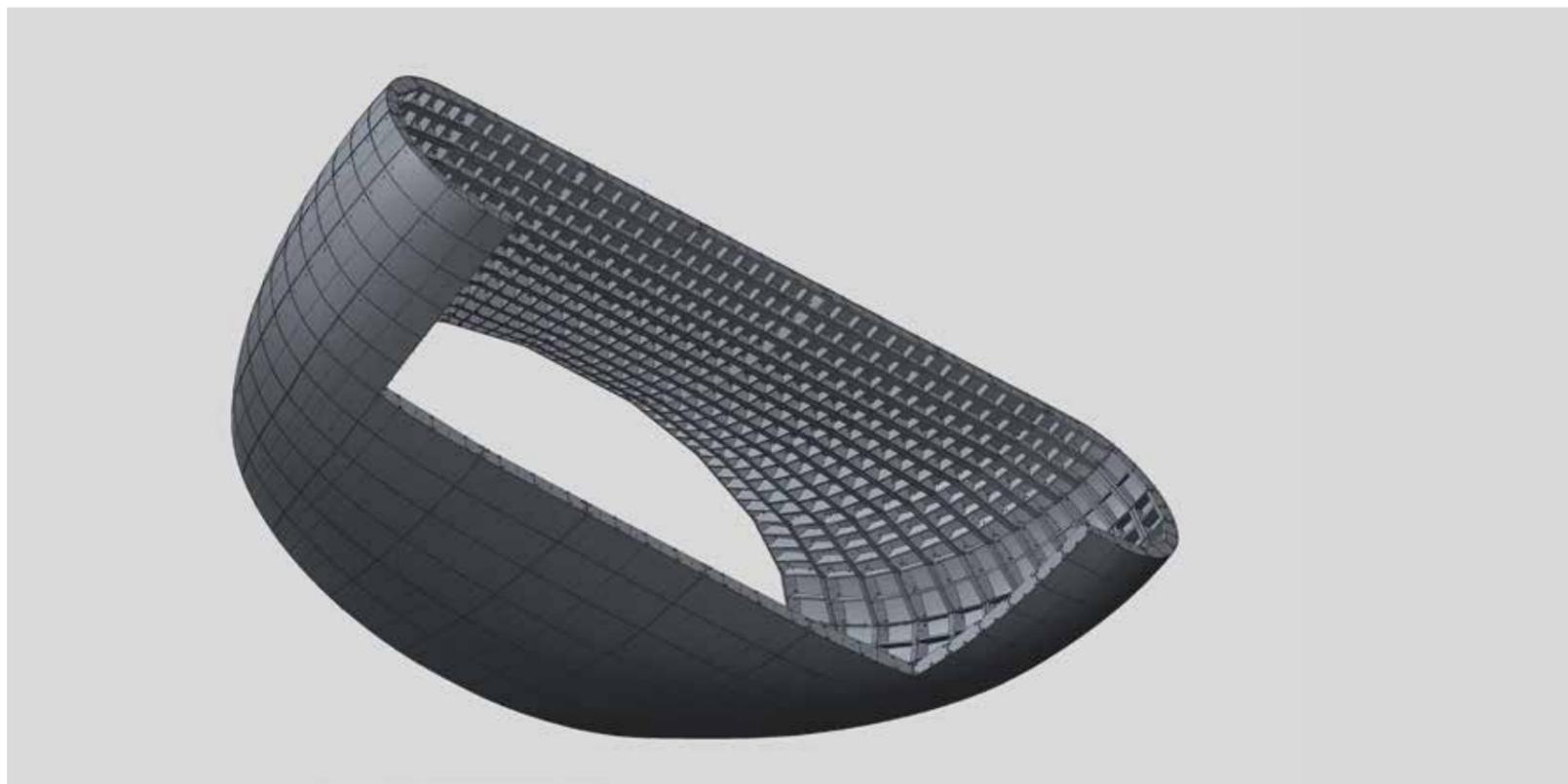
For one, customized formwork is needed when unusual geometries or special surfaces are planned. In premium residential high-rises this is often the case, because exceptional architectural design emphasizes the building's classy quality. In situations like these, standard formwork products have their limits and it is best to design bespoke solutions. But there is another aspect to customizing solutions.

What do you have in mind?

Efficiency! As a formwork provider the most important question you want to answer is this: What can you do to help customers save time and money? If a customized solution, for example, reduces crane lifts, crane time, or labor, it pays off in the long run, even considering the extra efforts for the planning and production of the parts.

Can you give an example?

Recently, we had to plan the formwork for conic columns made of exposed concrete. In total, there were 37 columns, each one almost eight meters high. They support a floating roof of 4000 m² of a motorway restaurant. Instead of timber, we suggested a steel solution, made of two height adjustable parts. They could be moved in just one lift and needed neither sheeting change nor repair. Based on this design, our customer was able to construct two columns every three days, finishing the project way before schedule! That's our concept of efficient formwork.



► Double curvature draft tube custom formwork

Our Case Studies

Stunning Solutions for Metropolitan Skylines

Our selection of case studies from Europe demonstrates the multitude of possibilities our formwork and services offer.

Bavaria Towers

Munich, Germany

The ensemble, consisting of four towers, will house offices and a hotel. It is an unusual addition to the low Munich Skyline. A team of Hünnebeck specialists from Germany, the Netherlands and the United Kingdom developed the formwork concept for the Sky Tower and Star Tower.

Height: 83.6 meters (Sky Tower), 46.1 meters (Star Tower)

Number of Levels: 20 (Sky Tower), 9 (Star Tower)

The Challenge: To shutter a sloped roof, starting at a height of nine meters on a pentagonal floor plan.

Our Solution: We developed a customized head to join two TOPMAX® tables, tilted at an angle of 11 degrees, with the GASS® system as support. With two joined tables we moved 26 m² of slab formwork in one crane lift. Thus we helped to accelerate processes.

Customer: Implenia Hochhaus Bau, Frankfurt



Belvedere Towers

Vienna, Austria

The ensemble, designed by Renzo Piano Building Workshop, consists of five towers. It is located opposite the baroque Palais Belvedere, south of the inner city. Three towers house 346 apartments of varying size, the other two serve as a boutique hotel.

Height: 60 meters

Number of Levels: 18

The Challenge: Unusual geometries due to interlaced bridges, which link the towers; varying and complex floor plans, high safety standards.

Our Solution: Employing TOPMAX®, TOPEC® and MANTO® products skillfully, we were able to rely solely on system formworks, rather than devising customized solutions. Our concept supported a rapid construction progress.

Customer: Consortium of ÖSTU-STETTIN Hoch- und Tiefbau GmbH and HABAU Hoch- und Tiefbaugesellschaft m.b.H.



Tour D2

La Défense, Paris, France

The extraordinary office tower, designed by Anthony Bechu and Tom Sheehan, received the Emporis Skyscraper Award in 2014 for its outstanding design. The construction was certified according to the French environmental standard, HQE (Haute Qualité Environnementale).

Height: 180 meters

Number of Levels: 37

The Challenge: Unusual geometry with rounded, organic forms, concrete elliptic core plus glass façade, which carried parts of the loads; limited space, due to location within business district.

Our Solution: We used SCF self-climbing platforms plus customized steel solutions to shutter walls and slabs. This concept permitted shuttering of large surfaces and allowed construction to progress in a five-day rhythm.

Customer: Vinci Construction





Tour Granite

La Défense, Paris, France

The iconic skyscraper, designed by Christian de Portzamparc, was constructed on a triangular plot of land in the business district of La Défense. It forms a connection between the twin towers of Société Générale.

Height: 184 meters

Number of Levels: 45 levels above ground

The Challenge: The tower's façade tilts at an angle of eight degrees, in order to minimize its effects on neighboring buildings regarding light and view.

Our Solution: To shutter the construction, we decided to combine protected SCF self-climbing platforms with vertical tail lifts plus other adjustable and movable elements, permitting construction of one level per week. Due to their unusual depth of 3.25 meters, the platform offered safe working conditions. They were designed to carry a load of 5.0 kN/m² without formwork and to withstand wind pressure of 208 km/h.

Customer: Vinci Construction



Resorts World

Las Vegas, Nevada,
United States of America

Resorts World Las Vegas is a casino and resort currently under construction on the Las Vegas strip.

Height: 205 meters

Number of Levels: 57 levels above ground

The Challenge: This structure had been the previous site of the Echelon Place project. In 2008, Boyd Gaming halted construction due to economic conditions. Formwork needed to be designed for three elevator cores. The application was further complicated by the fact that one atypical core and two shear walls were already 10 floors up.

Our Solution: Forming Concepts worked with the customer to design and build accurate custom forms that fit into the existing structure and existing insert locations. We supplied high capacity jacks to maintain large grid beam spans. Four levels of grid beams allowed us to have wider grid beam spacing and support the placing boom.

Customer: MJ Dean Construction

Rely on Hünnebeck's Expertise

With Hünnebeck at your side you can plan and manage a seamless and efficient construction process – smooth-running operations included.

1

We analyze the situation.

2

We develop the technical drawings and calculate the costs.

3

We plan and implement the realization.

4

We assist with project finalization.



Challenges Galore for Our Industry

High-rise and major project construction faces a number of exciting challenges these days. Besides expectations regarding economic efficiency and often extremely tight schedules, most projects are confronted with simple space problems due to their location. Many high-rises are built in metropolitan environments, where traffic and limited space create significant constraints on the building schedule and, ultimately, on the entire workflow and its execution. This includes usage of cranes, choice of formwork, concrete pouring cycles, resource allocation, and logistics. Moreover, when prestigious residential building is concerned, architects often resort to unconventional geometries to underline the high-end, premium character of the building. As a rule, these geometries preclude standard formwork products and call for customized solutions, adding further challenges to the project.

Last but not least, health and safety demands rise with the number of levels in the building or project. Workers need more than just fall protection. Efficient solutions to shield onsite personnel from wind and weather become just as necessary. They enhance working conditions.

For all these challenges, expertise is vital. Ours is based on our long-standing experience providing formwork and shoring solutions for ambitious construction projects. It combines economic efficiency with flexibility, and innovation with a hands-on, can-do attitude.

Suiting Your High-Rise Demands

We support our customers with high-performance products, services, and expertise, and in doing so we help them to grow their businesses.

Our key account managers partner with our customers, providing assistance exactly when and how it is needed. Our support starts well before the bidding phase with a thorough project analysis carried out by our engineering specialists and project analysts. It defines specifications and schedules based on the data provided by our customers. This analysis is followed by our schedule for construction progress and pouring cycles. The schedule depends on the choice of formwork and shoring systems our application engineers drew up for the project. It also includes our calculation for the bidding price.

For the construction phase, we provide schedules for the use of formwork, for assembly, for deployment and resource management before delivering the equipment. If needed, this is complemented by onsite instruction and site consultations. Once the project is completed, we organize the return of the equipment and assist with the accounting and the project review.

► See for yourself how our expertise supports efficient construction processes. Just get in touch with us!

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Hünnebeck is a proud member of the BrandSafway Companies. Large enough to leverage economies of scale to safely increase productivity, BrandSafway is also nimble and responsive, delivering unmatched service with local labor and management.

Hünnebeck (Europe), Aluma Systems (North and Latin America) and SGB (MEA/SEA), represent the Forming & Shoring Division of BrandSafway. With branch locations worldwide, and over 240 years of combined history and experience, we are ready to deliver innovative Forming and Shoring solutions anywhere around the world. Our main contacts outside of Europe are:

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