EIFFAGE
SEH

www.seh-engineering.de

CONTENTS

COMPANY

STEEL CONSTRUCTION

SPECIAL CONSTRUCTIONS

PQ VOB

SEH Engineering GmbH is registered in the list of prequalified building companies of PQ-Verein.
Registration No.: 101.000756

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BRIDGE CONSTRUCTION

HYDRAULIC ENGINEERING

MATERIALS HANDLING

FUTURE TEC

FORWARD-LOOKING STEEL TECHNOLOGY

Our Philosophy

Today customers and markets expect companies in the steel construction industry to be heading in two different directions.

First of all, marketable steel products are created by developing a high degree of specialisation through dividing projects into specific areas.

The second direction is to enforce the overlap of manifold demands in the meaning of an integrative performance to combine all areas of engineering know-how leading to the product that shows the steel structure only as part of the fully coordinated solution.

At SEH Engineering GmbH we can happily head in both directions thanks to our product portfolio which includes

- Steel construction
- Special constructions
- Bridge construction
- Hydraulic engineering
- Materials Handling
- Future Tec

and through sensible expansion of our capabilities in

- Engineering
- Production
- Turnkey constructions

Our company has consequently taken the development from classic steel constructions to a service provider, putting the engineering service in the center of its value creation.

This competence is based on qualified, enthusiastic, young and experienced engineers and structures, allowing a high level of creativity.

The "thinktank" SEH Engineering GmbH is in the position to generate one or two patent applications every year.

The incorporation of the company into EIFFAGE Métal S.A.S, part of the EIFFAGE Group, enables us to exchange our resources in a structured manner and benefit from the synergy created by a large group of companies.

Performance moves. Performance connects.
You, us, the project.

Simply.More.Performance.

This is all part of a value system based on fair competition and ethical principles and standards.

We are your partners.

Uwe Heiland, Managing Director Meik Schücke, Managing Director

THE STORY OF **SEH ENGINEERING GMBH**

THE CHRONOLOGY

1808
Our roots go way back to the year 1808. The company started out as iron merchants, and in 1875 it began trading under the name Georg von Coelln. At the start of the last century the firm was taken over by Krupp.

1912
Fried. Krupp AG buys shares in iron merchants in Hanover.

from 1970
Major international construction projects
Centre Pompidou (Paris), Shanghai Bank (Hong Kong), track connections Transrapid (Shanghai), El-Ferdan swing bridge (Egypt), Stadium Durban (South Africa), World Cup stadia "Veltins-Arena" and "HDI-Arena Hannover", Berlin Brandenburg airport (Berlin), Climate House 8° East (Bremerhaven), Kennedy bridge (Bonn).

1995
Spin-off of steel construction activities from Krupp Foerdertechnik GmbH to form Krupp Stahlbau Hanover GmbH as division of Krupp Hoesch Industries GmbH.

2006
Renamed KSH Stahlbau Hanover.

2007
Acquisition by French group Eiffage. Renamed Eiffel Deutschland Stahltechnologie GmbH.

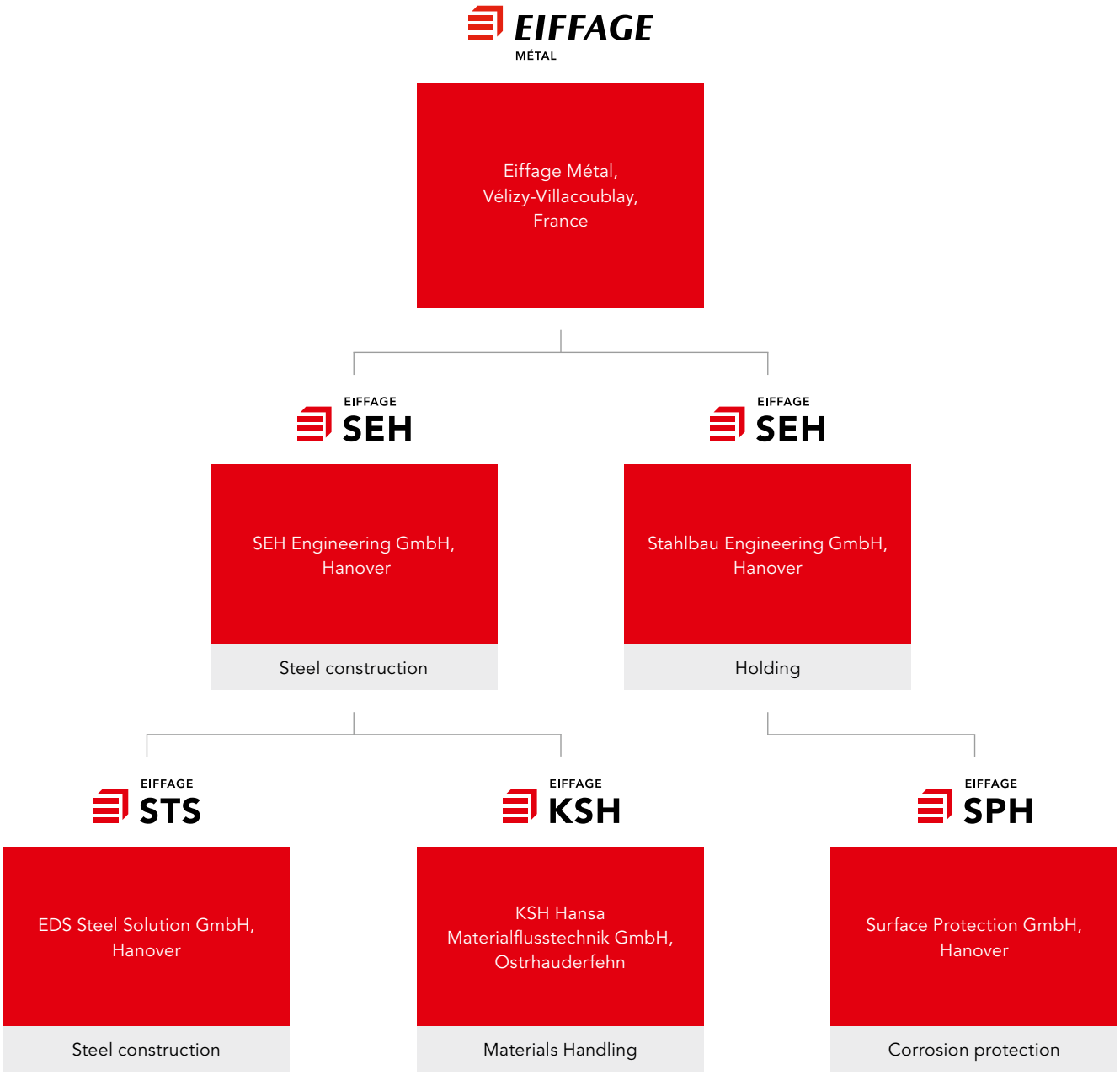
1945
After World War II the Hanover factory was to be closed as part of reparations. However jobs were saved thanks to the intervention of the works council. The company was renamed Krupp Eisenhandel GmbH and moved to its current site. Company moves away from trading and expands production of iron viaducts and bridges.

1950 to 1960
In the years of the "economic miracle" we were involved in construction and development projects at many industrial companies: Volkswagen works, Continental tyres works, Hanover Messe, etc.

1998 to 2005
Becomes division of ThyssenKrupp Technologies due to merger of Thyssen and Krupp and in 2002 is renamed ThyssenKrupp Stahlbau.

2005
Acquisition by Certina Group. Reverts to name Krupp Stahlbau Hanover.

2016
We have been based in Hanover for more than 200 years and have developed into an industrial company whose activities span the globe.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EIFFAGE SEH
SEH Engineering GmbH, Hanover
Steel construction
EIFFAGE SEH
Stahlbau Engineering GmbH, Hanover
Holding
EIFFAGE STS
EDS Steel Solution GmbH, Hanover
Steel construction
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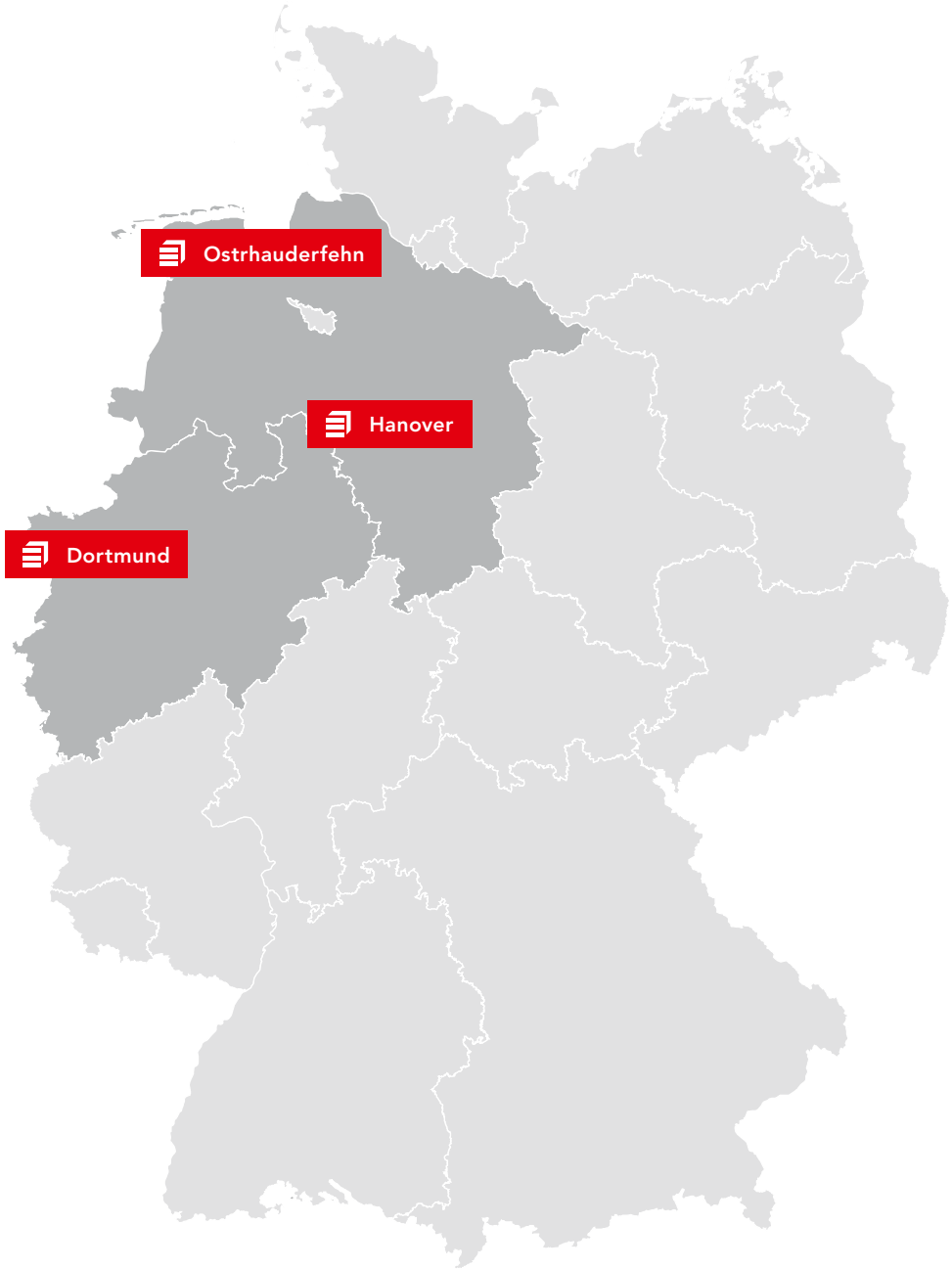
KSH Hansa Materialflusstechnik GmbH, Ostrhauderfehn
Materials Handling
EIFFAGE SPH
Surface Protection GmbH, Hanover
Corrosion protection



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KSF

STEEL CONSTRUCTION

Simply.More.Performance.

We are experts in steel, we know and love the material. This is how we work.

This is true in every area. Project management, consulting, construction, fabrication and erection – our teams are steel engineering specialists. We are global leaders in our field.

TWO **GLASS HIGH BAY STORAGE RACKS** – THE ARCHITECTURAL HIGHLIGHT OF AUTOSTADT

As general contractors for the project, we carried out the planning and construction of the car towers at the Volkswagen works in Wolfsburg. Each tower is 20 stories high and together they form the centrepiece of the "Autostadt" attraction which VW presented at Expo 2000. Two 50 metre-high glass cylinders measuring 28 m in diameter rise up from a man-made lake which has been created by flooding the sublevel. The foundations and infrastructure have also been laid for two further towers.

The towers' structure is constructed from prestressed steel. The storage areas are made of precast concrete. Each tower can hold 400 vehicles ready for delivery to the customer.

Fully-automated horizontal and vertical conveyor systems can carry up to 1,000 new cars per day from the shop floor to the glass "high bay storage racks" or transport them below-ground to the Customer Centre. The horizontal conveyors are electric pallet conveyors, the vertical conveyors are in the form of lifts (2 per tower).

State-of-the-art technical building systems, natural ventilation, electrical, sanitary and heating equipment, fire extinguishing systems and MSR equipment.

The glass cylinders have attractive lighting which makes them stand out against the Wolfsburg skyline.

FACTS

Client
Autostadt Wolfsburg

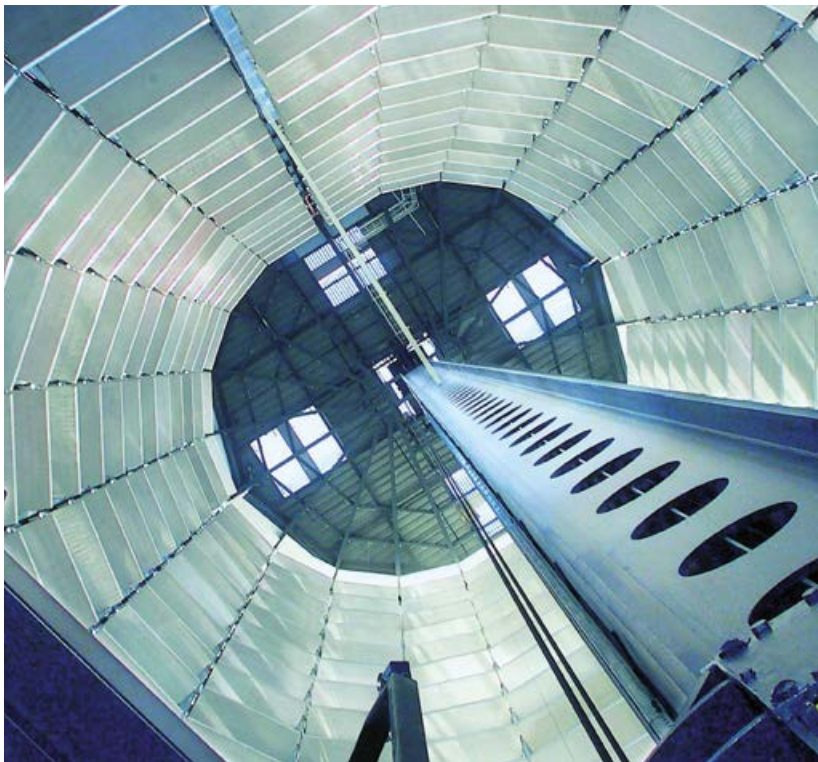
Technical data
50 m high glass cylinders;
Glass surface: 8,800 m²;
Diameter: 28 m;
Building volume: 99,300 m³;
Sublevel: Length: 244 m, Width: 44 m;
Footprint: 10,736 m²;
Prestressed steel supporting structure: 950 t;
Horizontal and vertical conveyor systems

Project timeframe
1999 – 2000

Our services
General contractor - turnkey construction of car towers incl. conveyor systems

Exterior view of car towers

Interior view of one of the towers



LIKE A LEAF IN THE LANDSCAPE

The CustomerCenter "Ausfahrt" at the Autostadt was redesigned from end 2012 to mid 2013.

Customers now have the opportunity to become familiar with their new car and driver assistance systems in a safe area.

The corresponding parking area is covered with the curved roof.

The form is a double curved saddle (hyperbolic paraboloid). According to the architectural idea it is harmonically integrated into the CustomerCenter 'Ausfahrt' like a leaf in the landscape.

The edge beam cross section consists of a variable pentagon and narrows from the base to the upper edges. The edge beam is clamped in two foundation blocks and its areas form curved surfaces due to the roof style.

The roof membrane of PTFE-covered fibreglass cloth is fixed on a cable net, grid 1.50 m / 1.50 m and guyed with the edge beam.

Roof and Service Pavilion were awarded with the International Architecture Award 2014.

FACTS

Client
Autostadt Wolfsburg

Technical data
Edge beam: ca. 150 t;
Dimensions: L 55 m / W 35 m / H 15 m;
cable net with ropes: OSS d=20 mm und 24 mm, 680 nodes;
Membrane: 1,600 m² PTFE-covered fibreglass cloth, geometry: hyperbolic paraboloid

Project timeframe
January – July 2013

Our services
Construction design and installation planning; foundation, bored piles, base;
delivery of steel construction and assembly edge beam cables: delivery and assembly cable net
Membrane roof: delivery and assembly PTFE-membrane

Exterior view

A **LIVING, BREATHING STRUCTURE**

The Gondwanaland tropical enclosure is part of Leipzig's "Zoo of the Future".

The aim of Gondwanaland is to recreate the tropical climate zones of Asia, Africa and South America with their flora and fauna. The 13,000 m² enclosure has a triangular layout and a 400 metre long stretch of river, allowing visitors to enjoy unexpected sightings.

The roof construction is spectacular. A high-resolution, spherical framework of triangular sections covers the whole enclosure.

With a free span of 154 m, a construction height of just 1.40 m and a roof membrane made of foil cushions, a delicate structure has been created which allows the enclosure to be flooded with natural light. The bowl is supported by load-bearing articulated steel stanchions. They are anchored with wall bracing at the highest elevation of the curved facades. In this way the bowl can expand and contract under zero stress. It can "breathe".

FACTS

Client
Zoo Leipzig

Technical data
2,800 t steel used in construction,
span approx. 154 m;
Footprint shaped like a "Wankel" motor with edge length approx. 160 m;
Bowl constructed using large diameter steel tubes;
Footprint: 13,000 m²;
Crown height: 35 m

Project timeframe
2008 – 2010

Our services
Planning of construction and erection, supply and erection of primary and secondary construction incl. foil cushions in roof and wall facade

Exterior view

Interior view: roof structure under construction

A DRAMATIC **ARCH**

This award-winning design by architects gmp is one of the most beautiful new stadiums to be built for the 2010 World Cup in South Africa.

The 70,000-seater stadium is situated right next to the Indian Ocean on Durban's northern coast.

The stadium's roof has a cable-suspended membrane roof which hangs from a steel arch. The arch spans the stadium from north to south and is horizontally connected to an external pressure ring mounted on stanchions.

The roof membrane is serrated and shaped like a crown. The overall design of the stadium incorporates national symbols of South Africa.

The imposing steel arch is a distinctive feature with its span of 340 m between foundations and a height of 100 m above the centre spot on the pitch. The arch is Y-shaped like the South African flag, with one arch on the north side splitting at the apex to form two arches running towards the south.

FACTS

Client
Pfeifer Seil- und Hebetechnik GmbH, Memmingen

Project timeframe
2007 – 2008

Technical data
2,850 t steel used in construction;
Bolted, sectional construction without shims;
Mechanical processing of major components;
Arch measurements: height: 104 m, span: 340 m

Our services
Fabrication, pre-assembly, supply of steel arch

View of Moses-Mabhida-Stadium built for the World Cup

The arch during construction


KSF

AROUND THE WORLD IN 5 HOURS

Some extraordinary constructions have been springing up in Bremerhaven to attract tourism and strengthen the city's cultural offer. These include the German Emigration Centre, the Zoo by the Sea and the Climate House 8° East.

The Climate House has displays relating to climate, weather and landscape as basic elements of life. Visitors can experience different climatic conditions and see how they are connected to past, present and future problems.

The solid internal structure forms the nucleus of the Climate House. The roof and facades are steel constructions.

13 exhibition rooms were constructed +13.50 m to +20.50 m above roof level, once again using lightweight steel girders.

The facade structure for the rooms comprises vertical assemblies (vertical frames based on those used in shipbuilding) including horizontal circular facade purlins. It was created using the point cloud feature of cutting-edge 3D construction software.

The roof consists of trapezoidal sheet metal, thermal insulation and standing seam roofing, and the facade consists of stained, laminated glass panels.

FACTS

Client
STAEWOG Bremerhaven

Technical data
2,800 t steel used in construction;
L 125 m / W 80 m / H 30 m;
Roof and facade in "free form" geometry;
Approx. 1,700 different individual purlins

Project timeframe
2008 – 2009

Our services
Wide exhibition rooms, roof and facades under construction

Awarded the European Steel Award 2009

View during construction

Exterior view

MORE THAN JUST A STADIUM

The client, "FC Schalke 04-Stadion-Beteiligungs-gesellschaft mbH & Co. Immobilienverwaltungs-KG" commissioned us to build a roof for the 62,000-seater "AufSchalke" arena which has subsequently been renamed the Veltins-Arena.

The design: the roof components were pre-assembled on the pitch area into sections weighing up to 100 t and measuring 15 m in height and 50 m in length and welded to reinforcing bars. They were then positioned using a crawler crane. During this phase the sections rested on the upper edge of the stand and on eight supports. In order to allow for subsidence, the girders were supported by hinged columns around the outside of the oval. The base point was formed by a spherical bearing to ensure vertical and horizontal movement.

The movable part of the roof directly above the pitch can be opened or closed in 39 minutes. Around 3,600 t of steel were used in the fixed roof structure, and the movable roof section weighs 600 t.

The roof frame was fabricated from round tubes and covers the whole pitch and the stands with a span of 226 m x 186 m.

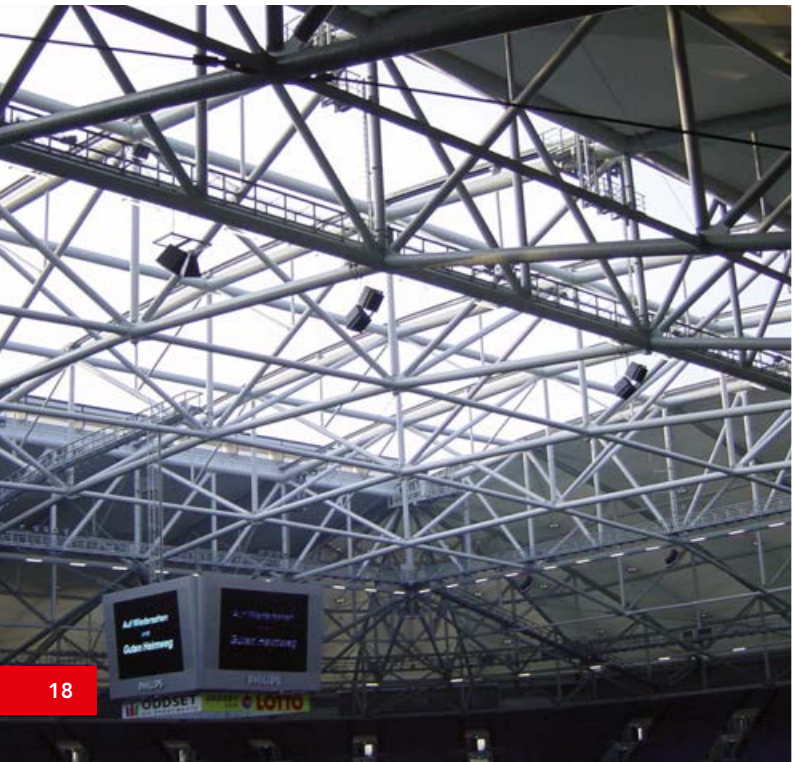
FACTS

Technical data
Frame construction using round tubes;
the roof covers the pitch and measures
226 m x 186 m;
PVDF-coated PVC membrane

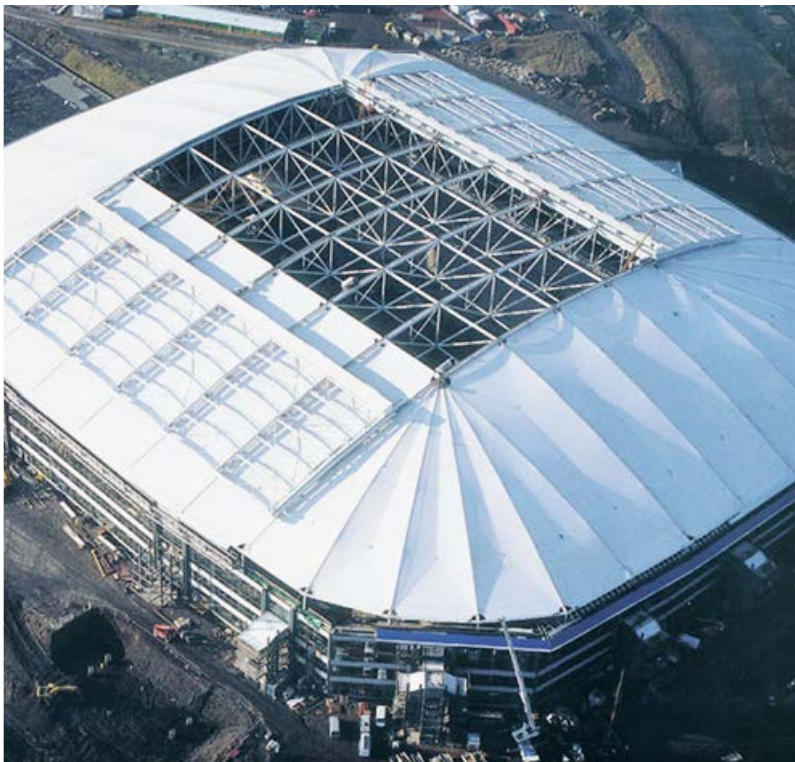
Project timeframe
1998 – 2000

Our services
3,600 t steel construction for the fixed roof and
600 t for the movable section

View of interior roof structure



The finished roof structure



ILLUMINATED **ROOF MEMBRANE**

We constructed the Volksbank Arena in Hamburg for ECE. The Volksbank Arena is located to the north of the Barclaycard Arena Hamburg, in the Altona People's Park. The client was the "Alexander Otto Sportstiftung", a non-profit organisation.

The 7,000 m² arena includes an ice rink and sports hall, along with two-storey rows of additional space. The Hamburg Freezers professional ice-hockey team and the HSV handball team have found a new home here for their offices and training facilities. The ice rink and sports hall are also open for public use. Modern event technology and special effects such as lighting and artificial snow ensure the arena's use for a variety of purposes.

We carried out complete planning and turnkey delivery including building services. The striking thing about this arena is its roof construction. It was built using lattice, curved frame girders weighing around 500 t. An illuminated roof membrane was attached to the upper side of the roof girders. This roof membrane is back-lit with 4,000 linear light fittings and has been called Northern Germany's biggest piece of illuminated art.

FACTS

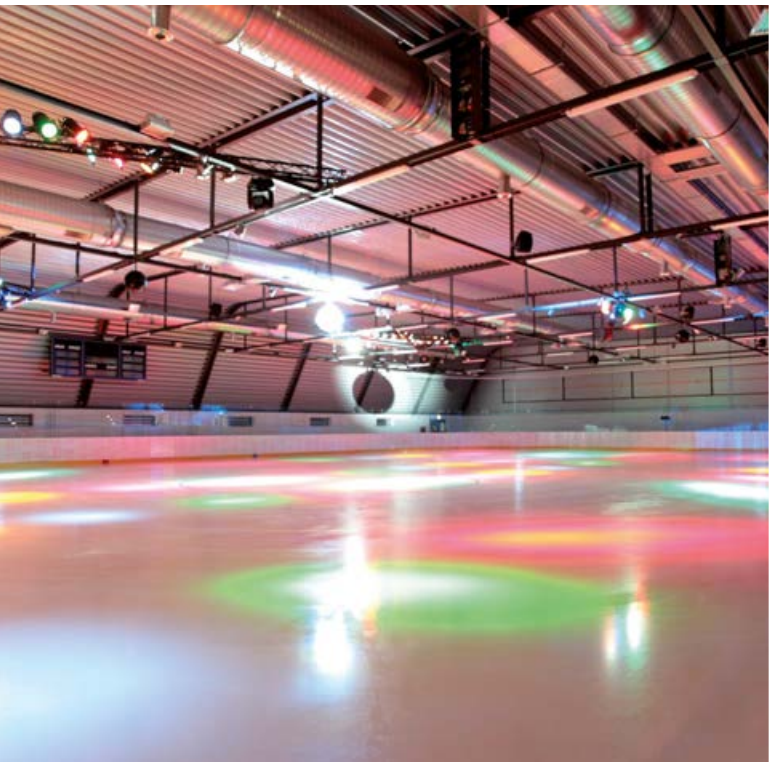
Client
ECE Projektmanagement GmbH, Hamburg

Technical data
Footprint: approx. 7,000 m²;
Ice rink - Hamburg Freezers: 65 m x 40 m;
Sports hall HSV Handball: 45.50 m x 26 m;
Two-storey linking building: 11 m x 98 m;
Equipment rooms, additional rooms: 2,000 m²;
Arch frame girders: 500 t;
Roof membrane back-lit by 4,000 linear light fittings

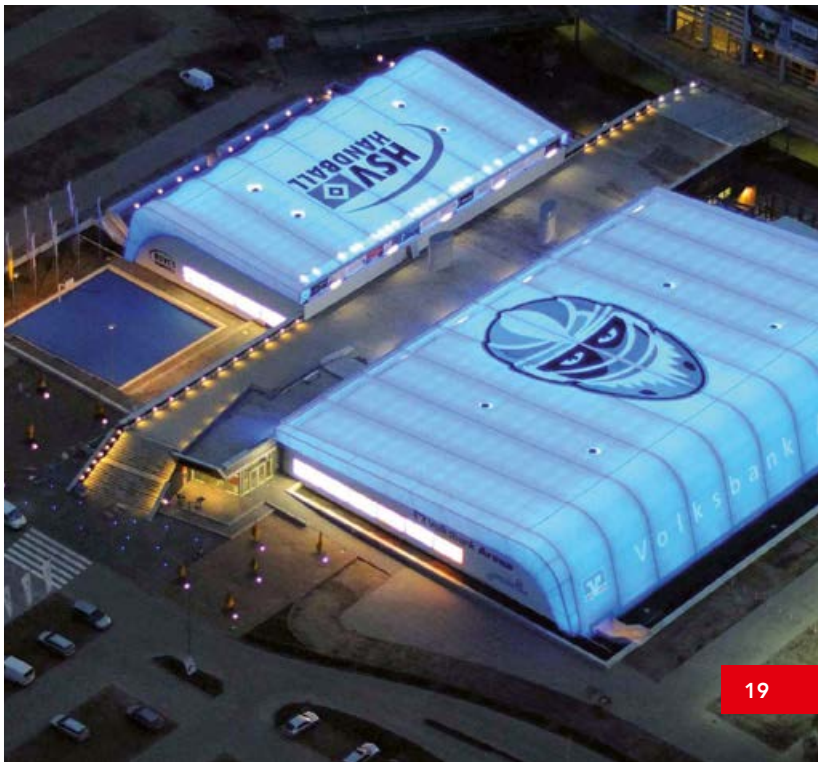
Project timeframe
2007 – 2008

Our services
General contractor, turnkey construction of ice rink and sports hall

Interior view



Aerial view



NEW ROOF FOR THE NIEDERSACHSEN STADIUM

We were commissioned by Wayss & Freytag Ingenieurbau Frankfurt – who we had already worked with very successfully on the Veltins-Arena project – to construct a new roof for the Niedersachsen stadium in Hanover. The arena was designed by architects Schulitz & Partner in Braunschweig and is the home of the long-established football club Hannover 96. It was also one of the World Cup stadiums in 2006.

Its asymmetrical design – necessary for geological reasons – and exclusive location on the Maschsee made it a real eye-catcher during the World Cup and a landmark on the Hanover skyline.

The roof space to be covered in this 47,000-seater stadium was approximately 20,000 m². 11,000 m² of fixed roofing was used around the edges and around 9,000 m² of translucent membrane on the inside section.

The lattice structure of the rim-like construction was achieved using 380 t of cables which were attached to the 2,600 t metal structure using casting joints.

FACTS

Client
ARGE Umbau Niedersachsenstadion Hannover

Technical data
The roof space to be covered in the 47,000-seater stadium was approximately 20,000 m²;
11,000 m² fixed roof;
9,000 m² translucent ETFE membrane covering

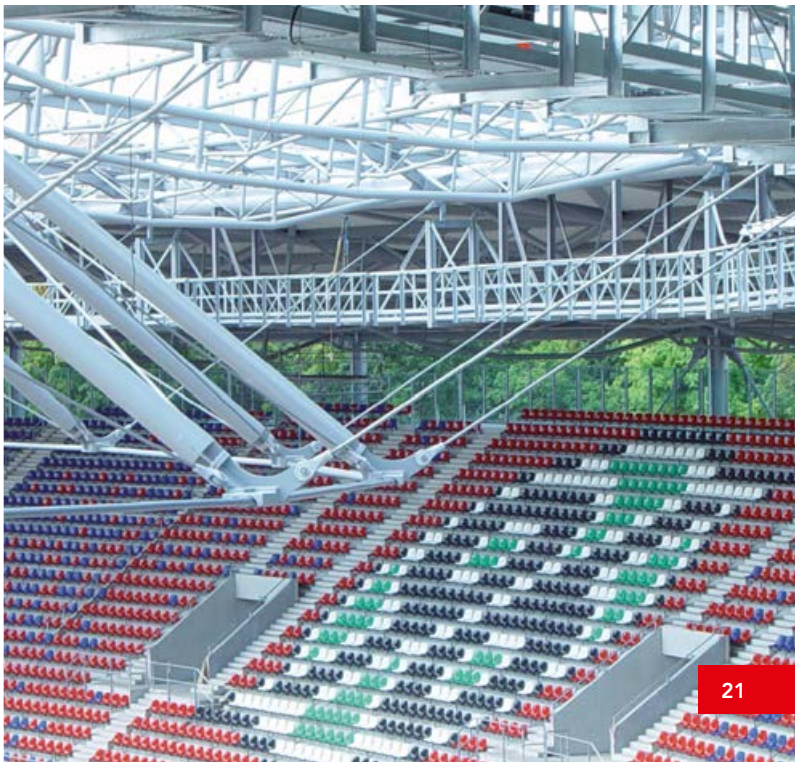
Project timeframe
2003 – 2004

Our services
Steel construction including tension rings, longitudinal girders, transverse girders, acoustic fixed roof and membrane covering

Awarded the Structural Engineering Prize 2006

Interior view

Supporting cables



EXTENSION OF **MEMBRANE ROOF**

During renovation of Mercedes-Benz Arena from an athletics stadium to a sole soccer stadium by lowering the field and enlarging the stand to the field, the existing roof had to be extended. Therefore the membrane roof was broadened between 6 and 15 m towards the inner side. This could be realized by a new circular cable structure including necessary membrane archs and air columns. Due to higher loads the existing pressure ring steel structure of 1993 had to be reinforced.

About 270 t steel components were necessary to reinforce pressure ring and construction of roof extension, 5,400 m fully locked spiral ropes (d=20 mm to 70 mm) as well as 5,800 m² prefabricated PES-PVC roof membrane.

The roof extension was carried out during playing season, being a great challenge for site logistics and public safety.

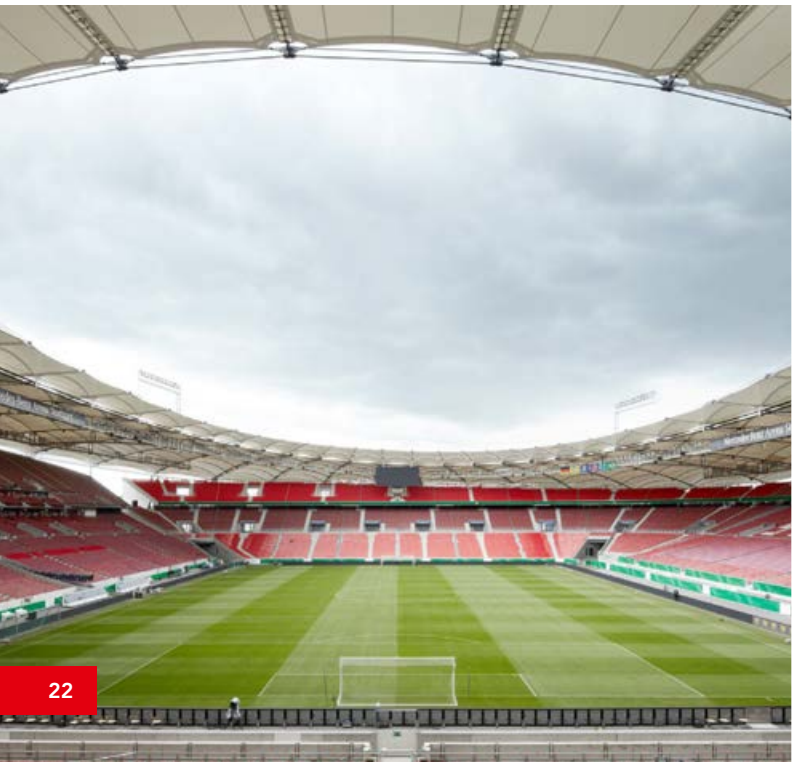
FACTS

Client
Stadion NeckarPark GmbH & Co. KG

Project timeframe
May 2010 – July 2011

Our services
Reinforcement of upper pressure ring, nodes and tower bolts of vertical bracings, replacing of fully locked spiral ropes of vertical bracings; steel construction of air columns, membrane archs and floodlight scaffolds as well as suspension, stabilizing and ring cables; membrane roofing

Interior view



Membrane roof

DEVELOPMENT OF SCHOENEFELD AIRPORT TO THE **BERLIN BRANDENBURG AIRPORT**

SEH Engineering GmbH was commissioned to design, construct, fabricate and erect the terminal roof, the main pier and the north and south piers.

The main challenges presented by this project were designing and fabricating a 10,000 t steel construction within 14 months and erecting it within 30 weeks.

The frame for the terminal roof is divided into primary, secondary, upper and lower tertiary framework constructed in a basic square pattern with an edge length of 43.75 m. The "floating" roof frame is supported with zero stress on 30 hinged columns.

Horizontal forces are dissipated by 2 fixed bearings in the terminal's reinforced concrete superstructure.

Huge amounts of labour and equipment were needed for the construction phase: large crawler cranes (2 LR 1750s, 3 LR 1300s), state-of-the art transportation equipment (4 SPMTs), various telescope cranes and up to 220 construction workers. Sections weighing up to 100 t were erected at a distance of up to 100 m.

FACTS

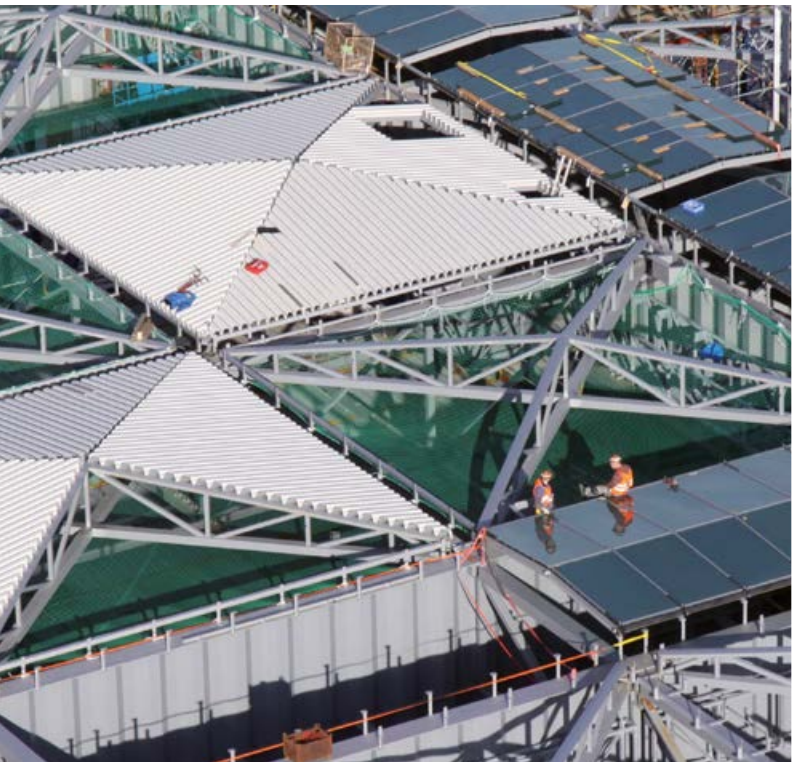
Client
Flughafen Berlin Schoenefeld

Technical data
Terminal roof: 250 m x 200 m;
9,500 t terminal roof;
500 t piers

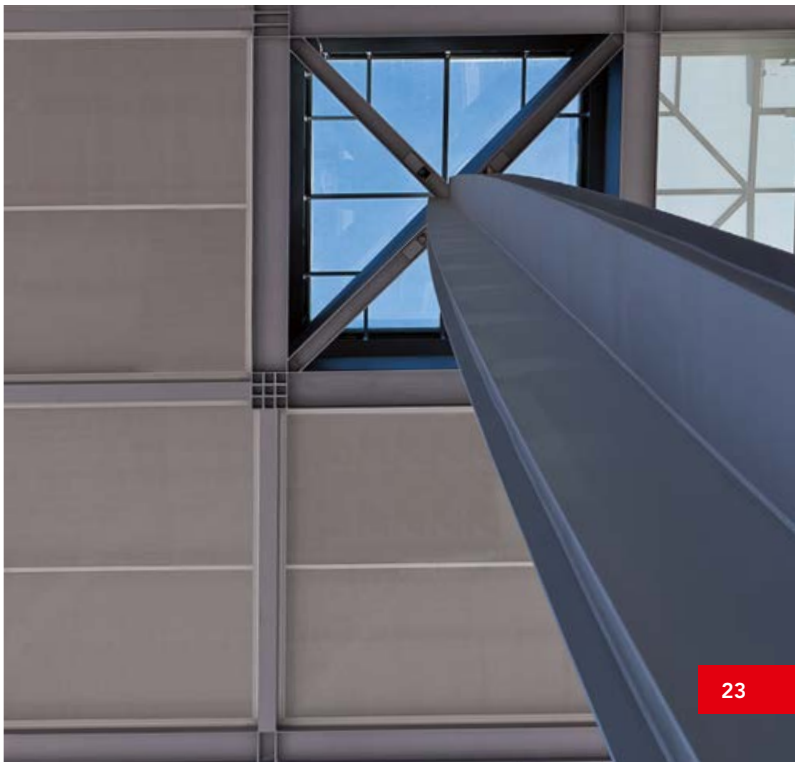
Project timeframe
2009 – 2010

Our services
Design, fabrication, supply and erection of 10,000 t steel construction

Aerial view of terminal roof under construction



Roof interior



BIGGEST CANTILEVERED EXHIBITION **HALL** IN EUROPE

Exhibition halls now have many more requirements from an architectural point of view. In its style of construction, hall 8/9 in Hanover displays the aesthetic transparency and lightness which can only be achieved using steel construction. The design and size of this hall is proof positive of our expertise in the area of modern steel construction.

The fine construction work and dimensions of the hall which had to be finished in a relatively short time are of the highest international standard.

The steel construction of exhibition hall 8/9 draws the eye with its garlandshaped structure running along the length of the hall. In the transverse direction the main framework has five girders which look like a suspension bridge. Each girder has two pylons, a pressure pipe and four cables.

FACTS

Technical data
2,400 t steel used in construction;
250 t cables;
300 t casting joints (weighing up to 6 t each);
Hall length: 238 m;
Hall width: 135 m;
Roof area: 32,000 m²

Project timeframe
1998

Our services
2,400 t steel construction;
250 t cables;
300 t casting joints

Steel/cable framework under construction

Side view

THE BIGGEST **DUCTILE IRON FOUNDRY** IN GERMANY

We planned and delivered a new turnkey iron foundry for SLR Elsterheide GmbH to house 450 employees. In less than one year the biggest ductile iron foundry in Germany was created. Installation of the production machinery was begun while the construction work was still in progress.

Pre-cast reinforced concrete supports with integral foundations and steel girders with spans up to 45 m were used for the supporting structure. Steel cassettes with trapezoidal sheets were used for the facade. A warm roof was constructed using trapezoidal sheets, vapour barriers, insulation and foil with integrated strip or dome lighting.

In the pits which were up to 5 m deep mounting parts were assembled with great precision to carry the load of the production machinery. Temperatures reaching 50 degrees Celsius had to be anticipated due to the production process.

FACTS

Technical data
Footprint: 23,800 m² on several levels;
External dimensions: 92 m x 330 m;
Hall dimensions: width 45 m, length 125 m;
Facade height: up to 25 m;
Steel construction: 1,000 t;
Facade surface area: 11,500 m²

Project timeframe
2008 – 2009

Interior view of production hall

Aerial view

SEVEN **AT ONE GO**

We built seven halls for the new Stuttgart exhibition centre. These seven standard, identical halls have a footprint of 155 m x 56 m and each have 8,500 m² of floor space.

The asymmetric suspended roof has gable heights of 14 m and 20 m. The lowest part of the roof is 12 m.

The building has four main structural components:

- Brace frames
- Belt girders
- Tension bands
- Roof membrane as roof panel

The long facades are made of facade shafts which slant up to +5 m vertically and from +5 m towards the gables. The cladding was carried out using steel cassettes and panels.

The shape of the suspended roof was created by bending the tension bands and stabilised with low-tension cables at the main axes. Between the main axes the roof covering panel – trapezoidal sheets with riveted sheet metal – serves to stabilise the roof.

The seven halls are connected by a bridge which we also supplied.

FACTS

Client
Projektgesellschaft Neue Messe GmbH & Co. KG, Stuttgart

Technical data
10,000 t steel used in construction;
Asymmetrical suspended roof, span 56 m;
approx. 10,000 m² gross exhibition space per hall

Project timeframe
2005 – 2007

Our services
7 standard halls, planning of construction and erection, supply and erection incl. corrosion protection/fire protection and roof sheet

View

Aerial view of exhibition site

PLANET M AT EXPO 2000 - THE CHALLENGE: **AMORPHOUS ROUND STRUCTURES**

The unconventional design of the Bertelsmann pavilion at Expo 2000 presented an interesting challenge to everyone involved in its planning and construction.

SEH Engineering GmbH fabricated, supplied and erected this ambitious steel construction. It was done along the lines of building a ship: basically the 950 t steel structure consisted of 14 longitudinal, transverse and horizontal struts.

Bound rigidly together at the intersections, they form a 3D grid which makes up the main supporting structure. 9 meters high, the planet "floats" on the six supports, each consisting of one vertical and two slanting hollow steel sections.

The 30 t steel mesh cladding is a first. In daylight it gives the appearance of being intransparent, while at night it becomes effectively transparent by being back-lit.

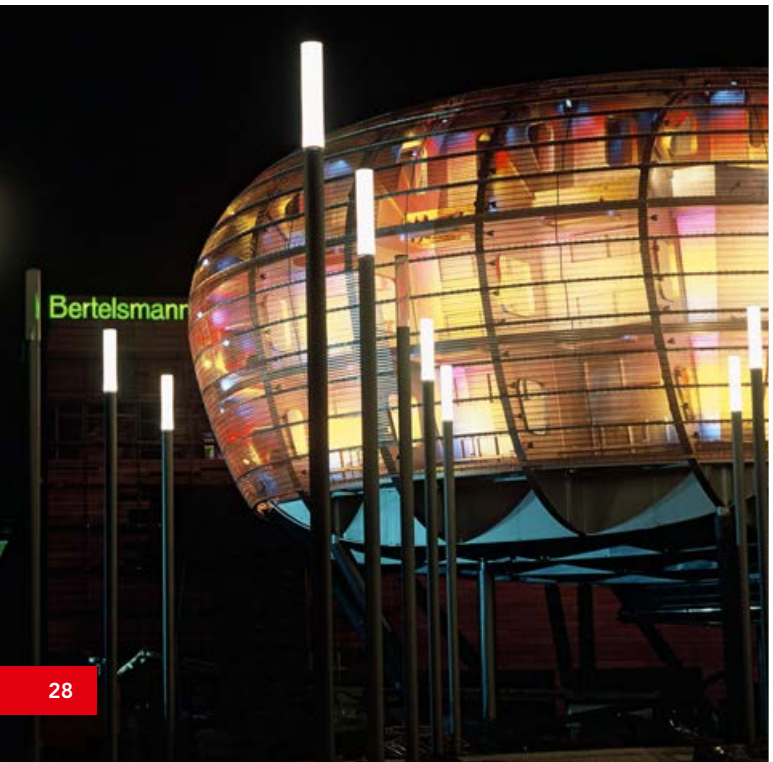
FACTS

Technical data
950 t steel structure;
30 t steel mesh as cladding;
L 46 m / W 36 m / H 24 m

Project timeframe
2000

Our services
Supply and erection of steel construction of round structures

The pavilion lit up at night



View

REDEVELOPMENT OF **STATION HALLS**

The redevelopment main tasks of the hall roof construction were renewing the glass facades on east and west side as well as the roof lights and the side hall glazings.

Simultaneously the roof sealings were repaired together with the drainage technology. Considerable damages on supporting structure and hall construction have been discovered by regular inspections. These damages have been repaired by changing the steel construction and the protection against corrosion. At the same time the service facilities (inspection facilities, maintenance catwalks and safety cage ladders) were repaired, too.

Realizing the safety functions was the special challenge for the travellers. The central station is daily visited by approx. 450,000 people and is therewith the most frequented station in Germany. The safety functions used were safety nets as well as hanging scaffolds in the binders. We could reduce the rail operations impairment to a miminum by not using bulky scaffoldings.

FACTS

Client
DB Station & Service AG

Technical data
Main hall: L 155 m / W 75 m / H 28 m

Project timeframe
July 2010 – November 2011

Our services
Redevelopment of station main halls, side halls and south facade

Awarded the Structural Engineering Prize 2013

View Kirchenallee / Hachmannplatz

View Glockengiesserwall

RENEWAL **HALL ROOF**

The terminal, opened in 1906, was restructured since end 2010 as part of the second economic stimulus package of the Federal Government.

The existing roofs including light bands were dismantled down to the historic arched trusses. The steel structure was completed after corrosion protection repair of the remaining main steel structure. New roof light glazings as well as an insulated aluminium standing seam roof concluded the works.

To avoid interferences in rail traffic, an innovative scaffold platform was built up above the rail tracks, ensuring the safety of travellers on the one hand and being assembly platform for the roof repair on the other hand. After completion of one hall the platform was being moved to the next hall. Rail track closures and thus interferences in rail traffic could be reduced to a minimum.

Completion of works was planned for October 2014. Innovative ideas and concepts allowed the handover of the building to DB Station and Service already in December 2013.

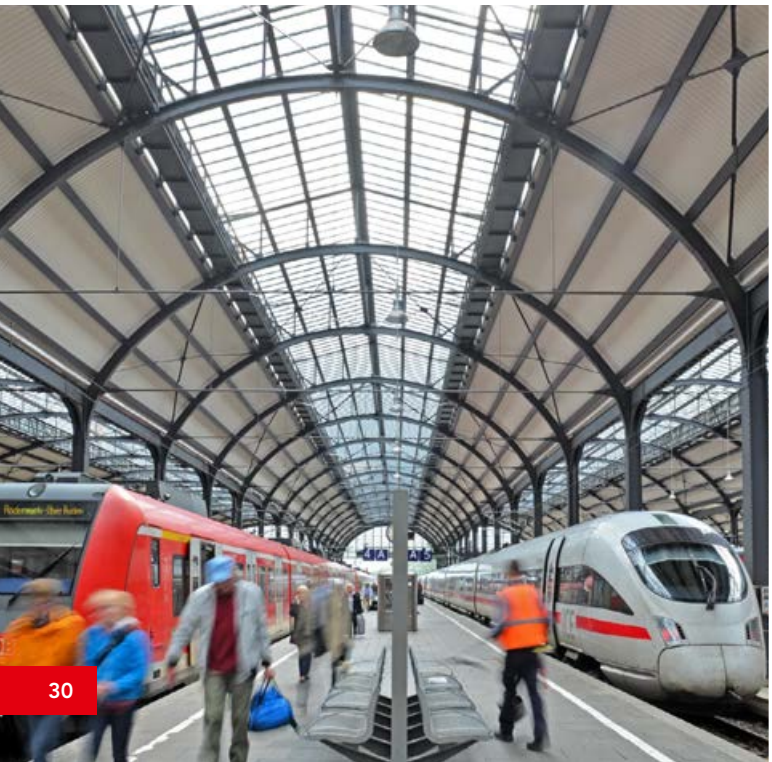
FACTS

Client
DB Projektbau, Regionalbereich Mitte, Frankfurt

Technical data
assembly of 1,400 t steel construction;
13,300 m² new roofing;
9,250 m² glazing

Project timeframe
2010 – 2013
realization of works in a JV

Central Station hall



View

POST-MODERN **CURVED STEEL ROOF CONSTRUCTION**

Kiel central station is designed as a terminal with three-bay concourse and U-shaped station building. The new concourse is 124 m long and 56 m wide. The construction of the bays was done using slanting steel girders (boxbowstring girders) which come together every 22 m to form a V-shaped base in the main axes. The slanting of the girders and the bow-shaped roof gives the concourse a complex geometry.

On the top side of the roof a sheet metal covering with standing seam cover was installed on a trapezoid sheet sub-structure. The underside of the roof was constructed with a suspended ceiling of bevelled, perforated metal cassettes with a good acoustic overlay.

The roof has lenticular overhead lighting. The large-scale lighting system and the glass facade ensure the concourse has a light and airy feeling.

We equipped the overall station area above the tracks with an erection and protective platform so that rail operations could continue without interruption. The platform was erected when the station was closed at night.

FACTS

Client
Deutsche Bahn AG, Hamburg

Technical data
Post-modern curved steel roof construction 1,700 t;
L 124 m / W 56 m / H 18 m

Project timeframe
2004 – 2006

Our services
Steel construction, building cladding, working platform, building services

Visualisation of station concourse

View of concourse interior

THE **NEW BERLIN CENTRAL STATION** IN THE RIGHT LIGHT

We were commissioned to fabricate and supply the pylons and truss bridges for the curved structures at Berlin central station.

The two curved structures span the east-west glass roof of the station like bridges. They are 12 stories high and have a total surface area of 50,000 m² and are designed to be used as offices. With a lattice metal and glass structure, the station is light and spacious and it is possible to see down to the lower tracks.

In order to avoid long-term disruption to the local train service, the truss bridges were first erected vertically with an overall height of 70 m each, then at weekends when no trains were running they were fastened across the concourse.

SEH Engineering GmbH as subcontractors supplied the 3,160 t steel construction consisting of 4 exterior shear frames and pylon supports. The shear frames measure 87 m x 15 m.

FACTS

Client
Donges Stahlbau GmbH, Darmstadt

Technical data
180 m long and 42 m wide station concourse;
Approx. 3,160 t steel construction consisting of 4 exterior shear frames and pylon supports

Our services
Steel construction

Preassembly of trusses in Hanover

Aerial view during construction

AIR FREIGHT TERMINAL RENOVATION
INCLUDING AWNINGS

During inspections of buildings made of hotdipped galvanized steel, cracks were found on load bearing structures of the freight terminal and its awnings; constructions manufactured from around July 2000.

The crack formation is caused by Liquid Metal Embrittlement, LME.

It was necessary to renovate the freight terminal including its awnings.

The basic planning was to replace sequentially the roof and load bearing construction, and while doing so guarantee to protect of contents and flooring of the terminal with a temporary protective roof.

SEH Engineering GmbH designed an alternative concept and also implemented this after confirmation by the parties involved.

Trapezoidal sheeting and roof beams remained in the building were supported temporarily and thus provided weather protection for the building.

Below this level the LME prone-trussed beams were exchanged (small, within the building) and above this level, the roof skin was exchanged.

The originally planned duration of renovation could be reduced from 12 months to eight months. It was even possible to use partial areas earlier than this. In hand with shortening the construction time, costs could also be reduced significantly.

In total 850 t of steel structure were exchanged and the roof skin, consisting of vapour barrier, insulation layer and roofing sheet, was renewed in the form of a standing seam roof.

The American client appraised the cooperation with SEH Engineering GmbH as a model for the future and has distinguished the company with a “Certificate of Appreciation” in an official ceremony.

FACTS

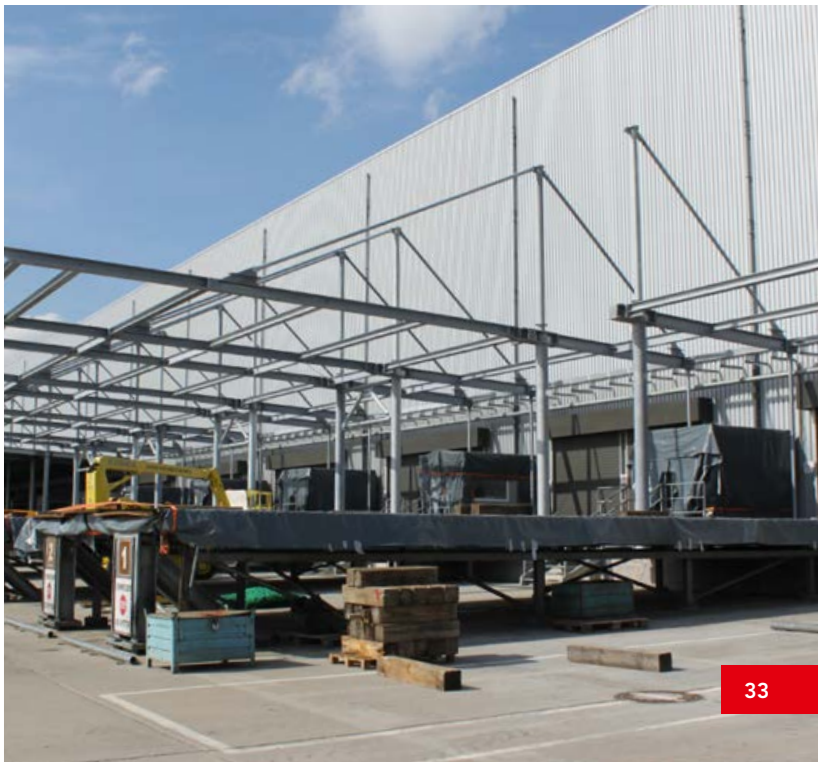
Client
LBB Landesbetrieb Liegenschafts- und Baubetreuung, NL Kaiserlautern

Project timeframe
2011 – 2012

Our services
Exchange of steel construction of freight terminal and awnings (850 t);
Renewal of standing seam roof (10,000 m²), dome lights and drainage facilities;
Renewal of roofing of awnings (7,200 m²)

Interior View

Exterior View




DB
REGIO

SPECIAL CONSTRUCTIONS

Simply.More.Performance.

For decades we are delivering modular bridge equipment for the German Ministry of transport (BMVI). With the experience in continuous use of our bridge equipment in public transportation we are able to optimize and adapt them to the needed application. The division special constructions is planning steel structures that have to follow specific requirements and that have to use new or atypical technologies for steel structures. These can be e.g. the supporting and guiding tasks with simultaneous elastic deformation of supporting structures for Transrapid track connections or using composite metal solutions (SPS) with special structurally engineered characteristics for the use as deck or pavement in bridge or steel construction.

WE ARE WORKING THE SWITCHES FOR CHINA

We constructed and supplied the eight piece movable track connections with actuators for the Pudong Airport - downtown Shanghai rail route.

The dimensional stability of the Transrapid track connections is 0.20 mm. This is a masterpiece of welding and engineering as it is a real breakthrough to achieve this level of precision with such large objects. The distortion-free connection of different strengths of material guarantees high accuracy of fit despite the lengths involved.

The safety aspect of this high-speed railway means that all components have to be fitted to the highest possible standard.

The steel movable transport connections each comprise sections measuring 27 m in length which were fitted together to make an 81 metre-long steel beam.

Its flexible curvature of 3.60 m is achieved by means of electro-mechanical actuators (three per track connection) and high-safety locks at the end position.

FACTS

Client
ThyssenKrupp Transrapid

Technical data
2,100 t steel construction and mechanical engineering;
1 x 3-way movable track connection;
7 x 2-way movable track connection (right/left);
incl. mechanical engineering and drive technology

Project timeframe
2001 – 2003

Our services
Track connection and actuator for the Pudong Airport route

Transrapid train

3-way movable track connection at the Shanghai Maintenance Center

RECONSTRUCTION OF DECK AND SUPPORTING STRUCTURE WITH **SPECIAL KNOW-HOW**

The deck of the 1951 built, listed suspension bridge crossing the Saar in Mettlach had to be reconstructed, otherwise the structure's load bearing capacity had to be reduced for reasons of abrasion, corrosion and high traffic volume.

For solving the problems at this structure, we used our composite metal solution (SPS-system) as ideal construction method. Using SPS we were able to reduce the deck weight from 500 t of concrete composite floor to 200 t of light-weight steel construction. Furthermore, additional structural-physical attributes, required for the bridge location in the inner city, could be guaranteed.

The isotropic panel construction of SPS is a composite material comprising of two metal plates bonded with a massive polyurethane elastomer core. This gives the plate characteristics as self-damping, sound absorbing and isolating. So the Mettlach bridge plate is light-weight, low noise and protected against black ice. The installation was made with traffic still running on a single lane and only minimal impact on the inner-city infrastructure.

FACTS

Client
Landesbetrieb fuer den Strassenbau, Saarland

Technical data
Span: 108 m;
reduction of deck weight from 500 t to 200 t

Project timeframe
2012 – 2013

Our services
Deck reconstruction with 104 innovative SPS deck plates

Awarded the Structural Engineering Prize 2015

Mettlach bridge with SPS deck plates

SPS cross section as hollow cell plate

SEH MOVES **THE FLAP**

The project “Hafenspange” gives the city of Elmshorn a new connection to drive around the inner city and the harbor area. This is to redirect a big part of the through traffic from the heavily loaded inner city area.

The center of the Hafenspange is the bascule bridge crossing the river Krueckau, built by SEH Engineering GmbH. The impressive balance beam, being formed bold curved by the architect, gives the structure a special touch.

We delivered structural steel and mechanical engineering as well as electrical and control technology. And we were also responsible for the substructures with the pedestrian tunnel.

The bridge is made of a fixed and a movable part with 20 m span each. The 100 t weight of the movable part is balanced by a counterweight of 100 t to minimize the drive power of the hydraulic drives when lifting.

The bridge is remote controlled and opened on demand of the skippers, who want to enter the Elmshorn harbor.

FACTS

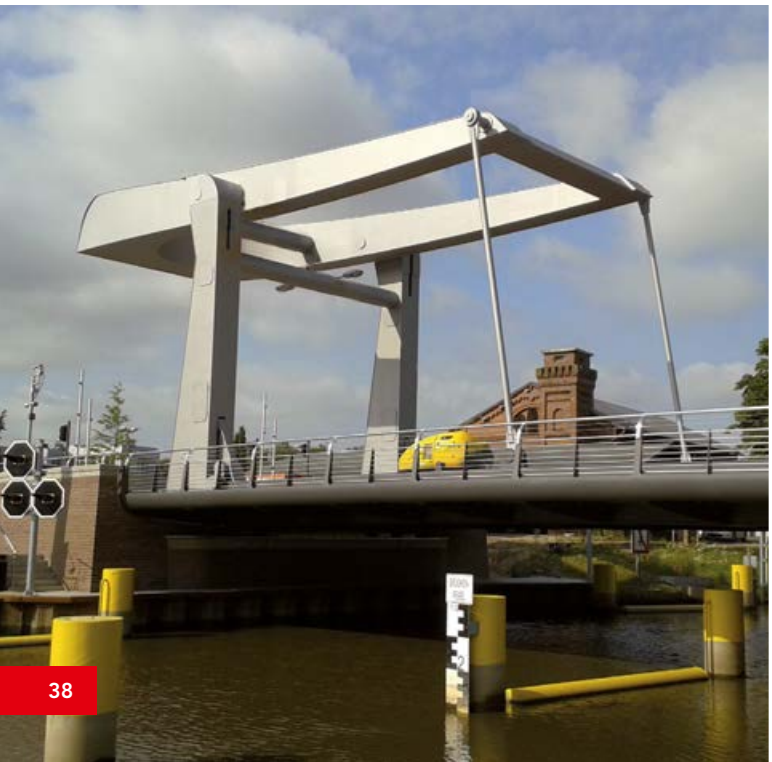
Client
Stadt Elmshorn

Technical data
Bascule bridge with counter balance beam,
one fixed and one movable part;
total bridge length: 40 m;
span movable bridge: 20 m;
335 t steel construction;
driven by hydraulic cylinders

Project timeframe
2011 – 2013

Our services
Structural steel and mechanical engineering drive and electric technology civil engineering

Free entrance to the Elmshorn harbor



Front view to the open bridge

OUR BASCULE BRIDGES GIVE **FREE PASSAGE**

In the years 2011 – 2012 we realized the replacement building of the bridge crossing the Peene at Loitz for the Strassenbauamt Guestrow. It was opened for traffic on 14.09.2012.

At this civil engineering structure we were responsible for structural steel and mechanical engineering and also for drive and electric technology.

The superstructure is made of four segments with spans up to 18.78 m. Three segments are designed as steel cross structure. The movable bascule is designed as orthotropic plate and stabilized by transversal as well as two longitudinal girders. It is driven by two hydraulic cylinders.

Special requirements for fabrication and erection were necessary to guarantee the accuracy for a trouble-free combination of structural steel, mechanical engineering, hydraulics and electric technology at this bascule bridge with counter balance beam.

FACTS

Client
JV Johann Bunte / Hentschke Bau

Technical data
Bascule bridge with counter balance beam,
three fixed and one movable part;
total bridge length: 70 m;
span movable bridge: 17 m;
250 t steel construction;
driven by hydraulic cylinders

Project timeframe
2011 – 2012

Our services
Structural steel and mechanical engineering;
drive and electric technology

View to city of Loitz

Open bridge – view upstream

MAHATMA-GANDHI-BRIDGE

The Mahatma-Gandhi-Bridge is a three-bay superstructure with bascule bridge. The bridge spans Sandtorhafen (traditional ship port) in a north-south direction and connects the Elbphilharmonie (EPHH) and the newly developed areas of HafenCity with the City of Hamburg. It therefore fulfils an important infrastructure role for the entire Kaiserkai.

The total length of the structure is approx. 75 m and consists of an approx. 30 m long drawbridge with subjacent counter weights and lateral superstructures at both sides of the drawbridge.

The lengths of these lateral superstructures total approx. 22 m (lateral superstructure, north) and 23 m (lateral superstructure, south). The effective span of the drawbridge component totals approx. 28.90 m. The effective spans of the lateral superstructures both total approx. 18.60 m. The overall height in the middle of the bridge reaches approx. 1.20 m. The carriageway is an orthotropic deck with lateral strips in a hollow trapezoid profile in the vehicle area and flat steel in the pedestrian area. SEH Engineering GmbH was responsible for the structural steelwork, the mechanical engineering and the drive system of the drawbridge component.

FACTS

Client
Freie Hansestadt Hamburg, Landesbetrieb Strassen, Bruecken und Gewaesser (LSBG)

Technical data
All-steel bridge
Total length: 69.47 m between end bearings;
Usable width: 16.60 m;
2 vehicle carriageways: each 4.30 m;
Pedestrian/cycle path, east: 3 m;
Pedestrian/cycle path, west: 5 m;
Steel tonnage: 790 t

Project timeframe
2014 – 2015

Our services
Steelwork, mechanical engineering, drive system, control system

Sideview

STEEL-PLASTIC STRUCTURAL ELEMENTS REINFORCE THE DECK OF THE RED BRIDGE

As part of infrastructure developments in the capital of the Duchy of Luxembourg, a tramway is being constructed for the urban public transport network. Built in 1965, the Pont Grande Duchesse Charlotte carries traffic over the Alzette valley, from the centre of Luxembourg City to the EU administrative quarter at Kirchberg. This change in use also requires re-development of the protected structures which make up the City's landmarks. The deck of the bridge is being extended by approx. 1.80 m in width to accommodate an additional cycle path. In addition, of the six vehicle lanes, two are being converted to tramways and the remaining four will be reinforced to satisfy the new eurocode loads.

The use of our steel-plastic structural elements on the side cantilevers, as well as the carriageway reinforcements using SPS overlay, will permit the structure of the 50 year old bridge to be adapted to the new EC3 requirements, as well as the weight of the tram system, without having to remove the existing carriageway deck.

The work on the carriageway will be carried out without blocking the route to traffic. In addition to the 7,800 m² of carriageway reinforcements, 900 t of reinforcing structures, consisting of additional ribs, additional booms and close tolerance boltings are being integrated into the existing structure.

Afterwards, the bridge is receiving a new coat of paint, which will revive the old, faded red. After all the structure known locally as "Rout Breck" or Red Bridge, should live up to its name in terms of appearance.

Finally the project will be completed by replacing the bridge railings with anti-climbing protection using a new barrier construction, with a modern architectural design.

FACTS

Client
Fonds du Kirchberg, Luxembourg

Technical data
Length: 355 m;
Width after redevelopment: 26.60 m;
Bridge area: 9,443 m²;
Construction weight before redevelopment: 4,800 t

Project timeframe
June 2015 – November 2018

Our services
Modification of vehicle carriageway with SPS technology, installation of 900 t of reinforcing structures, installation of 6,000 m steel piping for transporting materials, bearing points, bridge renewal, renewal of railings, 32,500 m² of anti-corrosion protection

Pont Grande Duchesse Charlotte

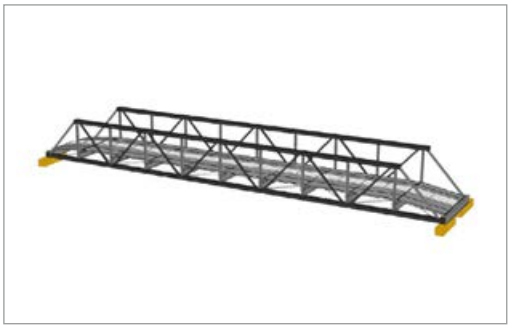
Roadworks without blocking traffic

ALL-PURPOSE **MODULAR BRIDGES**

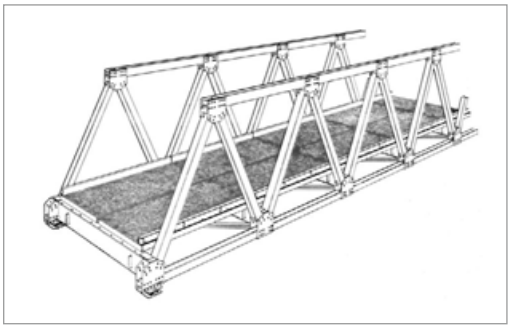
We have developed SEH modular bridges for temporary use during construction or in the event of natural catastrophes such as earthquakes, floods, etc.

These robust constructions can be used time and again and are easy and quick to erect and dismantle. They have a modular design and construction and can be stored ready for use.

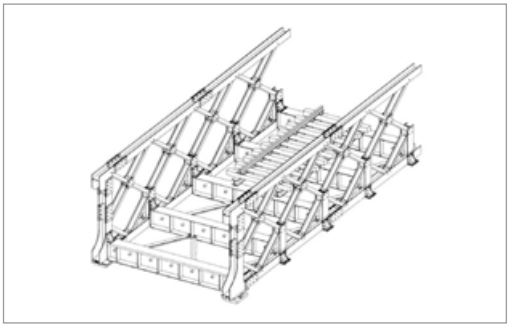
Thanks to the flexibility of their construction these bridges can be adjusted to suit the prevailing terrain or different traffic conditions.



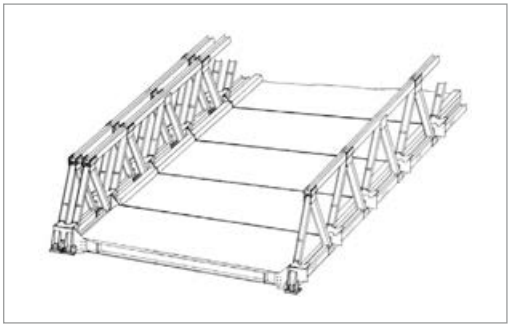
Light
LBB lightweight bridge: 21 m span, one lane, can be transported by helicopter



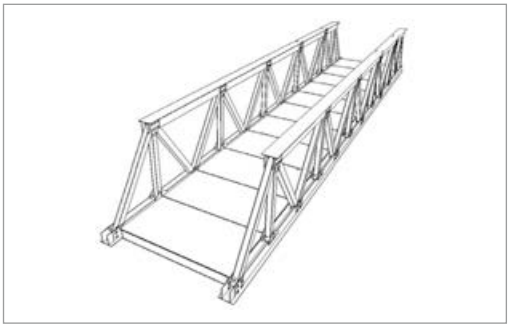
Medium
E bridge: One and two-lane road bridge, single spans up to 56 m, frame structure



Medium
SE bridge: Lattice frame bridge for rail and road traffic with single spans up to 70 m



Medium
D bridge: One and two lane road bridge, single span up to 73 m, frame structure



Heavy
SS 80: Two-lane heavy-duty road bridge for single spans up to 80 m, Frame structure

Heavy
SKB: Railway bridge with single spans up to 120 m, installation of deck panels between the tracks allows for road traffic

BRIDGE CONSTRUCTION

Simply.More.Performance.

We have been building steel bridges since 1908.

The first Rhine bridge was opened to traffic in 1912 – by us. So it is no coincidence that we then went on to build almost every bridge over the Rhine. It may be old, but the bridge-building technology of that time continues to have an influence today. We will find the best-possible solutions which are tailored to your needs for every span and type of construction, whether you need fixed or movable bridges.

We use the most modern fabrication procedures to build bridge structures in optimal workshop sizes and using all construction methods (incremental launching, cantilever and floating assembly).

A **SPECTACULAR STRUCTURE** LINKING TWO COUNTRIES

In 1999 the governments of Sweden and Norway decided to build the E6 motorway between Gothenburg and Oslo and to open a new bridge over the Svinesund fjord to celebrate the 100-year anniversary of Norwegian independence.

The Svinesund bridge has a slim climbing through arch with a span of almost 250 m (top of the arch 90 m) and two steel box-girder bridge decks with orthotropic deck for two lanes in each direction which run laterally to the arch and are attached in the central area by six pairs of vertical hangers.

The bridge has a total length of 704 m with four pillars on the Swedish side and one pillar on the Norwegian side.

The single spans between pillars are 68 m – 3 x 75 m – 70.23 m – 188.46 m – 70.23 m – 72 m.

At 188.46 m, the widest span of the arch is additionally supported by hangers at distances of 30.48 m – 5 x 25.5 m – 30.48 m.

From the abutment on the Swedish side the roadway first runs in an arc and then through a double spiral into a straight.

FACTS

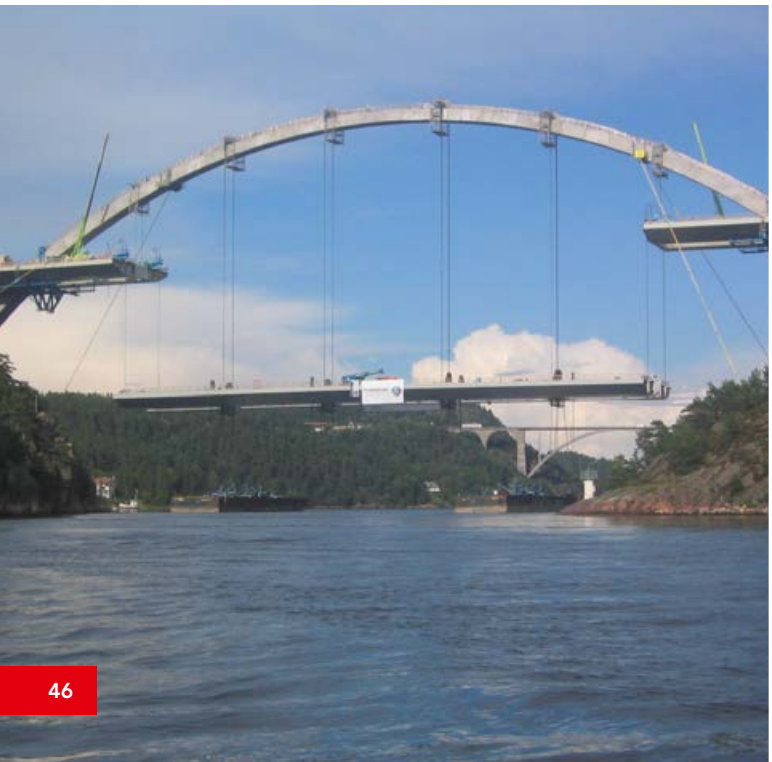
Client
Governments of Sweden and Norway

Technical data
Design: arch bridge;
Total length: 704 m;
Number of spans: 7;
Traffic routing: dual carriageway;
Bridge classification: LM1-LM5 (load model), 60/30

Project timeframe
2003 – 2005

Our services
Steel structure

Lifting using strand jacks



Lifting using strand jacks

SOARING OVER THE HASEL VALLEY

845 m long, the Haseltal bridge spans the Hasel valley in the centre of Suhl. With a total steel weight of 9,500 t, it is one of the major bridges on the A73 motorway in the Thuringian forest.

The superstructure has a constant radius of 260.5 m with a connecting 200 metre long double spiral. The remaining 384.50 metres of the bridge is straight.

The height of the pillars varies between 18 m and 58.7 m and the central valley pillars are 78 m high.

For technical reasons and because of the possible need to change the carriageway decks in future, the superstructure was designed as a composite structure with a central closed steel box girder.

The span widths of the 8-span superstructure vary between 70 m and 175 m.

In the middle span above an industrial estate the superstructure was designed as a frame with adjacent half-frames. The weight of the V-shaped valley pillar stanchions required is around 1,200 t.

Erection of the superstructure was carried out using a two-sided incremental launching method. The central joint was aligned in the middle of the bridge where the arch turned into a straight. The carriage-way was paved with two formwork carriages moving forwards and backwards.

FACTS

Client
DEGES GmbH, Berlin

Technical data
Total length: 845 m;
Width: 28.5 m;
9,500 t steel construction;
175 m span

Project timeframe
2003 – 2005

Our services
Fabrication, supply and erection of steel construction

Awarded the Structural Engineering Prize 2006

Bridge being slid in from 2 sides

STRUCTURAL ENGINEERING PRIZE 2010: MODEL SOLUTION FOR RENOVATING, STRENGTHENING AND WIDENING

The Kennedy bridge is located in the centre of Bonn and crosses the Rhine as an arched construction with 3 single spans measuring 99.22 m – 195.86 m - 99.22 m. The height at the arch area is around 11.50 m and around 4 m in the centre of the bridge. The bridge was built as a riveted construction in 1948/49.

We carried out the following works:

- Strengthening of the existing structure and complete renewal of corrosion protection
- Supply and erection of two new main girders (upstream and downstream sides)

Erection was carried out using a floating crane, whereby the 450 t middle section was installed in a tandem lifting process while the bridge was closed for 6 hours. In order to achieve the current load level, the central section of the existing structure was joined by two crossbeams to the new main girders and unloaded by seating it on the new main girder. The existing structure was then joined to the new construction, the horizontal bracing was completed, walkways and cable ducts installed along with anti-pigeon netting across the whole bridge. The project resulted in the bridge being widened from 18 m to 26.80 m. All the work was carried out without halting traffic flow.

FACTS

Client
Stadt Bonn, Tiefbauamt Bonn

Technical data
3,600 t steel construction;
195 m support span;
Widening of bridge from 18 m to 26.80 m

Project timeframe
2008 – 2010

Our services
Rebuilding;
widening existing bridge using longitudinal girders

Awarded the Structural Engineering Prize 2010

View of bridge

Erection using floating crane

A **NEW ARCH**

The renovation of the Gablenz bridge in Kiel replaced the old bridge construction dating from 1908 – 1910 and was broken down as follows:

- North access ramp, approx. 175.4 m
- South access ramp, approx. 187 m
- Arch bridge over the rail lines, approx. 66 m

The new construction was designed as a modern composite bridge. A special feature of this project is the use of precast slabs as "lost" formwork when constructing the carriageway deck. An important design criterion of the new bridge was to retain the appearance of the existing structure. The arch bridge is designed to have a single span girder and runs in a straight line.

The access ramps are continuous beams with span widths of 22.5 m to 32 m. They change the outline of the last third from a straight line to an arc. During the whole construction period it was necessary to avoid disruption to inner-city traffic flow.

Erection of the access ramps was carried out directly from the truck using crane and hoist. Local conditions meant that the arch bridge had to be assembled on a flat pre-assembly area parallel to the rail tracks. The arch bridge, weighing 1,700 t (i.e. with part-concreting of the cantilever), was then lifted to around 6 m and transported to the pre-assembly area on a flat car in the launch position (and turned 90°). The road was then closed for two 5 hour periods while the bridge was put in place over the rail tracks. Another road closure was required in September 2008 to carry out the lateral launching of the 3,200 t arch bridge.

FACTS

Client
Landeshauptstadt Kiel, Tiefbauamt Kiel

Technical data
Length: 338.45 m;
1,820 t steel construction;
66 m span

Project timeframe
2006 – 2009

Our services
Fabrication, supply and erection steel construction

Erection of the arch bridge using SPMTs

The finished arch crosses the railway lines

SPEEDING UP THE JOURNEY TO THE **COAST** WITH THE NEW STOER BRIDGES

The replacement of the Stoer bridges at Itzehoe was the central construction in the A 23 link project. It was necessary due to the structures's bad condition, its high maintenance costs and the short remaining life of this existing bridge which dated from the year 1967.

The replacement consists of two separate superstructures as steel composite construction with one carriageway for each direction. By keeping up the traffic on the old bridge, the replacement for the direction "Heide" was built in the first construction phase (2006 – 2010) and opened to traffic.

The second construction phase (2011 – 2015) was to erect the bridge for the second carriageway for the direction "Hamburg" to replace the old, dismantled prestressed concrete bridge.

The 60 million euro project was placed in two separate orders to consortia with the participation of SEH Engineering GmbH. Each carriageway comprises of the south flood plain bridges (approx. 452 m), the river bridges (approx. 120 m) and the north flood plain bridges (approx. 583 m).

The river bridges were preassembled on the north side and transported across the Stoer by pontoon. Adequate lifting equipment was used to lift the structures on the pillars and set them down on the bearing points.

The flood plain bridges were preassembled and put in place using giant cranes.

FACTS

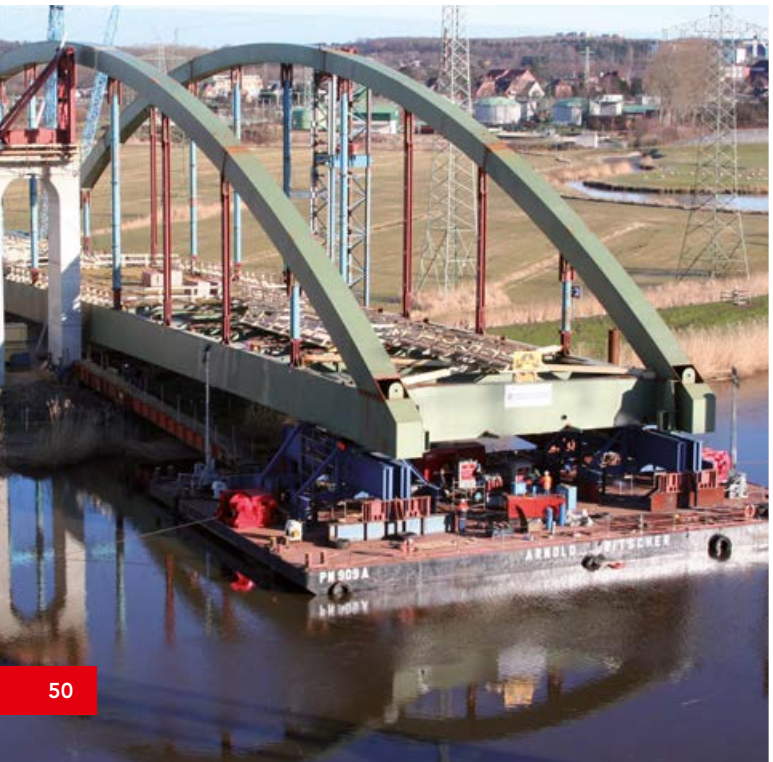
Client
Landesbetrieb Strassenbau und Verkehr
Schleswig-Holstein, Itzehoe

Technical data
5,500 t steel construction;
120 m span river bridges;
455 m flood plain bridges south;
586 m flood plain bridges north;
spans up to 65 m of flood plain bridges

Project timeframe
1. Construction phase: 2006 – 2011
2. Construction phase: 2011 – 2015

Our services
Fabrication, supply and erection of steel construction

Floating the arch bridge



View of bridge

CABLE-STAY CONSTRUCTION ALLOWS **SAFE CROSSING OF THE MULDE**, EVEN WHEN THE RIVER IS IN SPATE

After the 100-year flood in August 2002 the old Mulde bridge was badly damaged and a new structure was urgently needed. The design process was speeded up and works began very quickly, so that the Bennewitz by-pass and new Mulde Bridge were officially opened to traffic on 25.05.2007.

The by-pass was planned to be as far as possible from residential areas and built in conjunction with the flood-control dam. The new by-pass has resulted in significant reductions in noise and pollution for Bennewitz.

It is also much safer for pedestrians and cyclists to cross the former B6 and the separation of the historic old town to the north of the road and the residential areas of the south caused by the road has been reduced.

The new bridge provides much better flood protection than the old one because of its streamlined pillars, large spans and higher superstructure. The 523 metre long structure consists of a 210 metre long river bridge and a 313 metre long flood plain bridge, with a separating pillar marking the transition from one structure to the other. The river bridge is constructed as a cable-stay bridge with an overhead support structure which creates a landmark for miles around. It crosses the river section without any pillars.

The works were realized in a JV with PORR Deutschland GmbH, Berlin

FACTS

Client
DEGES GmbH, Berlin

Technical data
Length: 210.50 m;
Width: 23.65 m;
2,000 t steel construction;
100 m span

Project timeframe
2005 – 2007

Our services
Fabrication, supply and erection of steel construction

View

HAMBURG GETS **4 NEW TIED-ARCH BRIDGES**

For reasons of age the four superstructures from the years 1914 – 1916 and 1974 of the Niedernfelder passage crossing the Saale harbor with spans of approx. 75 m had to be replaced. The constructions 13a and 13b lead across the tracks of the dock railway. The constructions 182 and 13c span the Saale harbor for both carriageways of the road Veddeler Damm.

The old steel truss bridges were replaced by steel tied-arch bridges with identic spans of approx. 60 m and continuous 45° obliqueness. The old superstructures were replaced step by step by the new; the new substructures were placed in front of the old.

Welded on a preassembly area, located to the southeast, the new superstructures were driven to the extended bridge axis by platform trailer and floated with a pontoon by using the tidal range, to be then set down on the bearing points.

After the assembly of bearings and temporary constructions the superstructures could be completed with handrails, asphalt resp. road bed and taken into operation again successively.

FACTS

Client
HPA – Hamburg Port Authority, Hamburg

Technical data
Type of construction: tied-arch superstructures;
total length: 60.97 m;
number of spans: 1;
spans: 58.97 m;
steel construction: 1,800 t

Project timeframe
2008 – 2011

Our services
Fabrication, supply and erection of steel construction

Aerial view

Street view

RENOVATION OF THE **OBERHAFEN BRIDGE** IN HAMBURG

For more than 100 years the trains have run on 4 tracks from Hamburg central station over a series of bridges towards the south, Bremen and Hanover. From Hamburg central station the 8-lane Amsinckstrasse is crossed, then Deichtorstrasse and finally the city dike road, the Oberhafen canal and Stockmeyerstrasse. The structure needed to be renovated because of its age.

In 2006 we were awarded the contract to renovate the structure over Deichtorstrasse, city dike, Oberhafen and Stockmeyerstrasse. The central steel superstructure of the bridge, the Oberhafen bridge, is a 5-span frame continuous beam with combined rail and road bridge.

Rail traffic is carried on the upper deck with road traffic on the lower deck between the frame walls.

We had 14 months to carry out statics, design, fabrication and erection of the bridge. The end of construction was determined by the closure of the track and parts of Hamburg central station between 24.12.2007 and 31.12.2007, which had been planned well in advance. The old superstructures had to be exchanged for the new ones during this period.

FACTS

Client
DB Projektbau GmbH, Hamburg

Technical data
4,000 t steel construction;
27 m span

Project timeframe
2006 – 2008

Our services
Renewal of the railway bridges: city dike, Oberhafen and Stockmeyerstrasse structures

Bridge before being opened

View along the bridge


Botlek

NEW CONSTRUCTION OF **BOTLEK BRIDGE** ROTTERDAM

Due to the expansion of the port of Maasvlakte, as well as the new Maasvlakte II port development, it became necessary to modify the most important infrastructure route to the two ports, the A15, to cope with the increase in traffic from land and from sea. Between the outer area of Maasvlakte port and the Vaanplein motorway junction, new road lanes and approx. 50 bridges were extended or built, as well as a new movable bridge over the River Maas.

A key structure, the Botlek bridge was designed by Rotterdam architect Paul Wintermans. The greatest design challenges associated with the two-bay vertical lift bridge were posed by its width and the required raising and lowering times. Within a very narrow construction area, with just 15 m between the foundations of the new bridge and a motorway tunnel on the one side, and the old existing Botlek Bridge built in 1956 just 29 m away on the other side, the new structure, with its two steel superstructures, will span the River Maas. The two superstructures are designed to take a four lane motorway, two railway tracks and a combined pedestrian and cycle path.

Both superstructures will be welded together at a pre-assembly site about 1 km away from the actual construction site.

The steel structure of a bridge consists of three parallel frame levels (A, B, C) with orthotropic decks positioned in between. The bridge's system dimensions are 92 m along the length and 47.45 m widthwise. The width between the A and B axes measures 19.05 m and 28.40 m between B and C. The standard cross-section is 48.95 m wide. In the end sections, the width is being increased by 56.35 m by installing cantilevers, which carry the cable mount points. The frames each consist of upper and lower booms, diagonal struts and root points. The lower frame boom has been designed as a box girder with a cross-section of 1.50 m x 2.50 m. A 3.80 m x 4.30 m x 7.70 m and approx. 46 t root point is connected to both ends of the lower boom. They are made from S460ML materials. The carriageway structure consists of trapezoidal lateral strips and 31 crossbeams. The end crossbeams are 4.25 m high, 1.40 m wide and 56.35 m long. The thickness of the sheet metal varies between 25 and 40 mm for the stays and 40 and 90 mm for the upper and lower booms. One particularly interesting feature of the structure is the "small end crossbeam" (SECT), which permits decoupled movement between the carriageway and the end crossbeam. After finishing off the superstructures with walkways, curbs and barriers, the completed steel superstructures were each repositioned on four auxiliary construction towers. Two platform trucks travelling parallel to each other transported the entire structure on two pontoons lying side-by-side. In order to be able to pass the existing bridge, the superstructures were floated at a height of +14 m above the water level and then set on the bearing points on the pylons.

FACTS

Client
Consortium "A-Lanes A-15",
consisting of:
John Laing, British bank;
Strabag, Austrian construction group;
Stukton, Dutch construction company;
Ballast Nedam, Dutch construction company

Technical data
2 identical superstructures, each:
L 92 m / W 50 m / H 14 m;
Weight per superstructure: approx. 3,700 t of steel (approx. 5,000 t incl. additional load);
Lifting distance + lifting time: 31 m + 109 sec

Project timeframe
Steelwork: 2012 – 2014
Bridge equipment: 2014 – 2015

Our services
Steelwork:
Manufacture, delivery and assembly of superstructures;
Bridge equipment:
Assembly of bearings, crossovers, inspection trolleys

RED ARCHES SPAN THE LECH NEAR AUGSBURG, **SAFE FROM HIGHWATER**

The BAB 8A/West Munich - Ulm crosses the river Lech at road marker 52 km + 051 and river marker 37.843 km. The existing Lech bridge at Gersthofen was completely replaced. A superstructure was conceived for each direction of travel on the new river bridge.

The superstructures were designed as single-bay structures with an effective span of 109 m with a supporting structure of two steel arches over the carriageway, without wind bracing, and stiffening girders made of steel support grids with a carriageway deck made of reinforced concrete within a static structure. A 3 m wide public pedestrian and cycle path is attached to the south side of the south superstructure, outside the arch level.

Assembly/installation: the south superstructure was assembled at the pre-assembly site, pushed lengthwise on two auxiliary supports and then opened to traffic temporarily. Afterwards the north superstructure was pre-assembled in the final position and introduced lengthwise. The north superstructure was then opened for traffic and the south superstructure was closed. The south superstructure was then pushed horizontally into its final position and also opened permanently to traffic.

FACTS

Client
Autobahndirektion Suedbayern, Muenchen

Technical data
Three-lane, arched motorway bridge;
Total length: 109 m;
Width: 2 x 23.58 m;
Weight per superstructure: 1,050 t

Project timeframe
2004 – 2008

Our services
Manufacture, delivery and assembly of steelwork

View of the bridge

View of the bridge

PARTIAL RENEWAL OF THE BRIDGE CROSSING MUENGSTEN – RAILWAY BRIDGE

The iron Muengsten bridge was built in 1897 and even today still represents one of the most important German railway bridges due to its size and the use of pioneering assembly techniques. At the same time, it is also a tourist attraction of national importance. The combination of technology and natural surroundings encouraged the development of the valley into a local leisure area with additional attractions such as the Bridge Park, the transporter bridge etc.

As a result of 115 years of daily rail transport use by the railway company, damage was evident on the structure. This situation required repair work in order to safeguard the security of transportation and rail operations, as well as of the bridge itself.

These repairs consisted of demolition and reconstruction of the railway bridge, as well as replacement of the roller bearings between the gantries and the abutments or pylons.

FACTS

Client
Deutsche Bahn Netz AG, Regionalbereich West

Project timeframe
2013 – 2015

Technical data
Two-tracked railway bridge;
Total length: 465 m;
Width: 8.50 m;
Steel tonnage of repairs: approx. 750 t

Our services
Planning, construction, material finishing and assembly:
Demolition of existing construction, reconstruction of the railway bridge (L 465 m), repair to existing anti-corrosion protection, replacement of track bed, strengthening the existing construction, replacement of roller bearings, gantries

View of the bridge

Rails under construction

HYDRAULIC ENGINEERING

Simply.More.Performance.

We are dealing with steel constructions which meet functional requirements by combining structural framework with mechanical engineering and drive components and their attendant control and automation technology.

For our clients these constructions are ready for operation.

IMPROVED SERVICE BY FLOATING BOLLARDS

The Kachlet barrage is situated at the Danube above Passau. It consists of a double sluice gate, a power station and a weir area. Both sluice chambers have a usable length of approx. 230 m each and a width of 24 m.

For reasons of age both sluice chambers had to be overhauled. As part of these works we were charged with the retrofitting of the middle pier with 6 floating bollards for each chamber.

By placing floating bollards the sluice gate should be modernized and the service for shipping should be improved.

SEH Engineering GmbH delivers and assembles the floating bollards with the related fixed components in two construction phases.

FACTS

Client
Wasser- und Schifffahrtsamt Regensburg

Technical data
110 t steel construction;
height edge protection: 13.50 m

Project timeframe
2012 – 2015

Our services
supply and erection of 12 floating bollards and related fixed components

Adapter fitting at middle pier

Guidance for floating bollards at middle pier

Sluice Gate Feudenheim Mannheim

NEW STANDARDIZED **MITRE GATES**

The sluice gate Feudenheim in Mannheim is the entrance from the free-flowing Rhine to the impounded Neckar.

Besides the upgrade to the latest technological standard the aim was to ensure a high level of identical Neckar sluice gates.

SEH Engineering GmbH delivered and assembled mitre gates at head and aft gate with integrated push radial gates and hydraulic drives. During the course of these works we also renewed the sealing stops.

FACTS

Client
Amt fuer Neckarausbau Heidelberg

Technical data
170 t steel construction; height gates: 6.23 and 16.20 m; inner width chamber: 12 m; lifting height: 6 – 11 m; (depends on Rhine water level)

Project timeframe
2011 – 2012

Our services
replacement of old mitre gates at head and aft gate

Sluice Gate Fankel II Bruttig-Fankel

THE MOSELLE **HAS GROWN**

The new second sluice gate along the Moselle will take the rising traffic volume and the increasing use of bigger freight vessels into account.

Our services ensure also in the summer period that nearly 4,000 passenger ships can pass through the sluice gate Fankel additional to the freight vessels.

FACTS

Client
Wasser- und Schifffahrtsamt Trier

Technical data
450 t steel construction;
lifting height: 7 m;
inner width chamber: 12.60 m

Project timeframe
2006 – 2013

Our services
head gate as push section gate, aft gate as mitre gate, longitudinal channel sealing as slide gates, longitudinal and channel inspection sealing as stop logs, emergency walkway, concrete and finishing concrete for hydraulic engineering parts

Sluice gate Feudenheim: Mitre gate at aft gate

Sluice gate Fankel II: Aerial view of sluice gate

THE **PROTOTYPE**

The steel structure used in the Uelzen II sluice gate will now be the prototype for all future new construction projects commissioned by Wasser- und Schifffahrtsdirektion Mitte.

Two new types of overstowed folding floodgates were built in the lower head with a newly-developed water barrier.

For the upper head a pull section door with two-sided motor was fitted. The filling and emptying of the sluice chamber occurs via the axial canal economizing basin locks which are constructed as pull sections and/or as a pull and push section.

A particular consideration was the high pressure level and very high-speed current.

All gates and locks are powered by electric lift cylinders.

FACTS

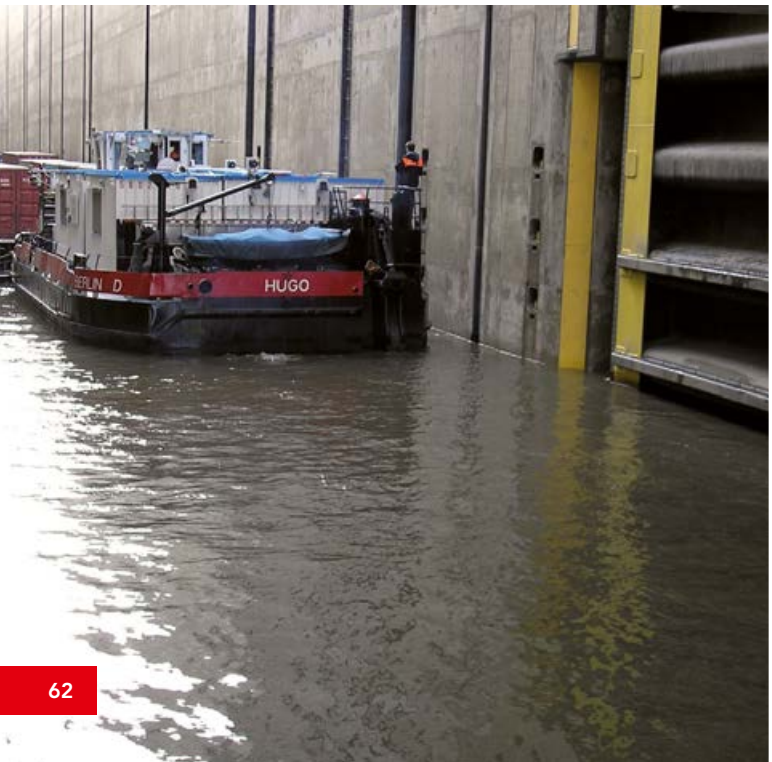
Clients
Neubauamt fuer den Ausbau des Mittellandkanals in Hannover

Technical data
1,400 t steel and mechanical construction;
Lifting height: 23 m;
Width clearance gate chamber: 12.50 m

Project timeframe
1998 – 2006

Our services
New construction of upper and lower gate;
16 economizing basin locks;
4 axial canal locks complete with electro-mechanical drive;
Floating bollards;
Economizing basin locks Inspection locks;
Cable protector

Open lower gate



Lower gate being lifted

COMPLETE NEW CONSTRUCTION ON PREVIOUS SITE

The steel structure of the Duisburg-Meiderich sluice gate on the Rhein-Herne canal dated from 1979 and needed to be replaced because of damage to its operational stability. We won the contract to overhaul and modernise the complete all the sluice gate equipment.

Our services included the engineering, supply and erection of components for the sluice gate's structure and mechanical components such as:

- A 2-section lower gate as lifting gate with electro-mechanical lift drive via strand jacks and counter-weights
- An upper gate as lowering gate with electro-mechanical lift drive via rack and pinion and counterweights
- 4 rolling guards in the axial canal cavern with drive via electric lift cylinders
- Buffering beams at the lower head with electro-mechanical lift drive via strand jacks.
- Safety net at the upper head

We also provided all electronic and control technology including a connection to the Ruhr sluice gate and the Raffelberg sluice gate by remote control, 2 air jet systems, site security and concrete repair work.

FACTS

Client
Wasserstrassen-Neubauamt Datteln

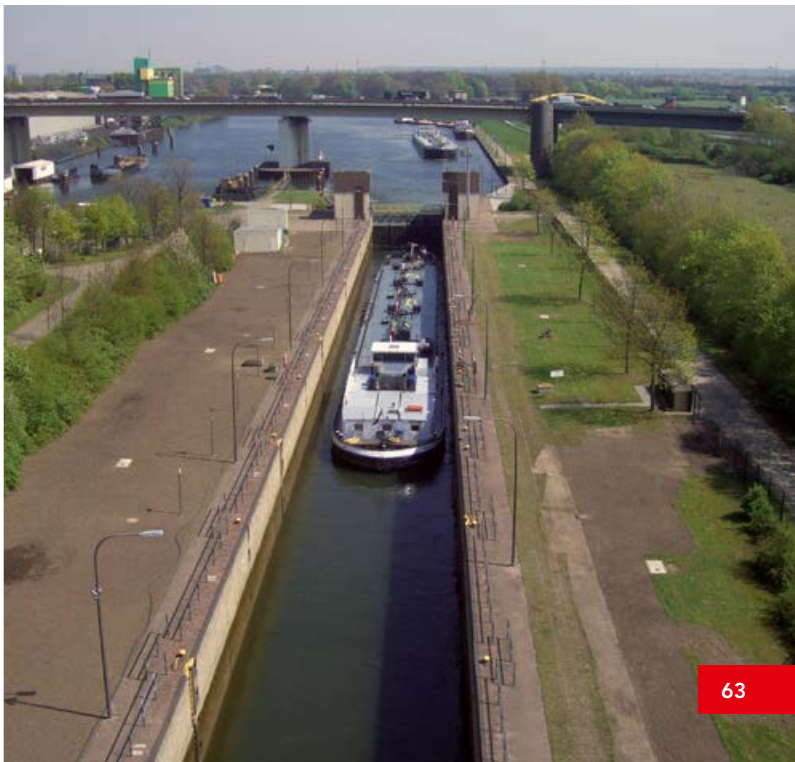
Technical data
200 t steel construction;
Clearance width gate chamber 12 m;
Lifting height 10.18 m

Project timeframe
2007 – 2010

Our services
Structural analysis;
Supply and erection of components for the sluice gate's structure and mechanical components

Lower gate 1 and 2 with buffer beams

Upper gate (lowering gate)



SECTOR GATES AND SWING BRIDGES / VERTICAL ROTATION

The Neuer Hafen sluice gate in Bremerhaven was fitted with sector gates in the outer and inner heads and with swing bridges for vehicles.

We supplied and erected the sector gates at the inner head and the swing bridges at the outer and inner heads.

The sluice gate at the inner head consists of two sector-shaped doors.

Filling and emptying the sluice chamber is done by the filling and emptying valves integrated in the gate near the turning column.

FACTS

Client
ARGE Neue Schleuse Bremerhaven (BEAN)

Technical data
2 sector gates (inner head), each weighing 74 t;
Retaining wall radius: 7.50 m;
Total gate width: 11.15 m;
Total gate height: 7.50 m;
4 swing bridges (outer and inner head), each weighing 20 t;
Dimensions: 14.35 m x 5.10 m

Project timeframe
2005

Our services
Total supply of 480 t steel construction incl. fixed components, bracing and emergency locks

Transporting the two sector gates

Sector gates ready for use

Sluice Gate Dettelbach Dettelbach

RIVER MAIN AGAIN

It took only 17 days during lock stoppage to replace the old construction of the 50s with our new construction. Within this lock stoppage the old pressure plate girders were broken free and replaced, concrete works included.

FACTS

Client
Wasser- und Schifffahrtsamt Schweinfurt

Project timeframe
March 2013 – April 2015

Technical data
170 t steel structure and bearing constructions;
lifting height: 5.50 m
clear width gate chamber: 12 m

Our services
replacement of mitre gates and pressure plate girders at upper, lower and middle head, supply of 260 t in total including fixed components

Sluice Gate Offenbach Offenbach am Main

FOLDING GATE DOORS WITH FILL PROTECTION

Edged sheet metal plate are welded together with butt welds to form a folding structure.

The folding structure makes it possible to provide high levels of corrosion protection and it also acts as the retaining wall and the main girder.

FACTS

Client
Wasserstrassen-Neubauamt Aschaffenburg

Project timeframe
2006 – 2007

Technical data
2 upper gates 5.8 x 7.5 x 1.5 m (each 28 t);
2 middle gates 8.3 x 7.5 x 1.5 m (each 31 t);
2 aft gates 8.3 x 7.5 x 1.5 m (each 31 t);
clearance width gate chamber: 12 m

Our services
Overhaul of Offenbach south sluice gate, replacement of gates at upper, middle and lower head, total supply 260 t incl. fixed components and braces

Sluice gate Dettelbach

Sluice gate Offenbach: upper head gate

NEW GATES FOR AN OLD CHAMBER

As part of an overhaul of the new sluice gate on the Dortmund-Ems canal, the Bollingerfaehr and Varloh sluice gates were adapted to meet operational and transportation requirements for the next 40 years.

Our services included engineering, supply and erection of steel structures and mechanical components including:

- A lower and upper gate as sliding gates on an undercarriage driven by electromechanical motor (pinion/goad) on the upper carriage. 4 fill guards and 2 electric lift cylinder motors are fitted in each gate.
- A buffering beam at the upper head with an electromechanical vertical motor with lift of 4.90 mm

Our services also included a complete overhaul of the steel structure and mechanical systems of the lift bridge at the lower head.

New water jet equipment was fitted at the lower head.

FACTS

Client
Wasser- und Schifffahrtsamt Bremen

Technical data
160 t steel construction at Bollingerfaehr;
155 t steel construction at Varloh;
Clearance width gate chamber: 12.20 m lift;
Lifting height: 1.80 m at Bollingerfaehr;
Lifting height: 3.67 m at Varloh

Project timeframe
2006 – 2007

Sliding gate upper carriage

Sliding door being lifted

THE TWINS - NEW SLUICE GATES MUENSTER 1 + 2

The twin sluice gates have two sluice chambers which work together intelligently.

The two sluice gates are operated as a pair, being filled and emptied using the independently-controlled connection canals and axial canals.

Water economizing is achieved by operating the chambers with different water levels and "swapping" the water between them.

So during operation of the sluice part of the water is released from the chamber to be emptied into the chamber to be filled.

The first sluice gate came on stream in 2009. At the beginning of 2014 Germany's most modern double sluice gate was completed with the commissioning of the second sluice gate.

FACTS

Client
Wasserstrassen-Neubauamt Datteln

Technical data
400 t and 450 t steel structure and mechanical engineering;
Lifting height: 6.20 m;
Clearance width gate chamber: 12.50 m

Project timeframe
Sluice gate 1: 2004 – 2009
Sluice gate 2: 2009 – 2014

Our services (in the ARGE)
New construction lower gate;
Axial canal locks and connection canal locks complete with hydraulic motors;
Inspection locks;
Impact protection

Buffering beam with lower gate

View from the upper head towards the lower head

WE SCORED – AT THE LINKING CANAL OF **MITTELLAND CANAL – DIRECTION HILDESHEIM**

The linking canal to Hildesheim branches off the Mittelland canal east of Hanover. Giving big freight vessels up to a length of 135 m the opportunity to use this canal made the new building necessary. The new sluice gate is a single lock without watersaving basins. Every filling needs a water volume of 16,300 m³. This happens in approx. 18 minutes via upper gate, the time for emptying takes 10 minutes.

The push section gate at the head gate has a structural weight of 45 t and is driven by electric lift cylinders on both sides. The aft gate is a mitre gate in a folding structure with a structural weight of 60 t per wing and driven by one electric lift cylinder on each side.

FACTS

Client
Neubauamt fuer den Ausbau des Mittellandkanals in Hannover

Technical data
200 t steel construction;
drop/lifting height: 8.50 m;
inner width chamber: 12.50 m;
usable length chamber: 139 m

Project timeframe
2007 – 2012

Our services
technical engineering;
supply and erection of hydraulic and mechanical engineering components and tubular casing pumps for the pumping station

Head gate as push section gate

Mitre gates at aft gate

WE KEEP THE **AIRBUS SITE** DRY

The flood barrier is a gate which raises and lowers with an open, accessible box girder. The retaining wall of the 44 metre-long gate is stiffened with longitudinal trapezoidal stiffeners and the vehicle-accessible upper side of the gate is stiffened with a track plate with diagonal flat stiffeners.

The gate is controlled by spring-loaded operational, side and opposing guide pulleys and the load is carried by round cleats.

The gate is driven by hydraulic traction cylinders (two of which are redundant) which are attached to the consoles on the side of the gate.

The gate is sealed by two inflatable elastomer seals fixed to the gate, one on the land side and one on the water side. The seals are activated by two air compressors.

FACTS

Client
ARGE HWS-Tor (Realisierungsgesellschaft Hamburg)

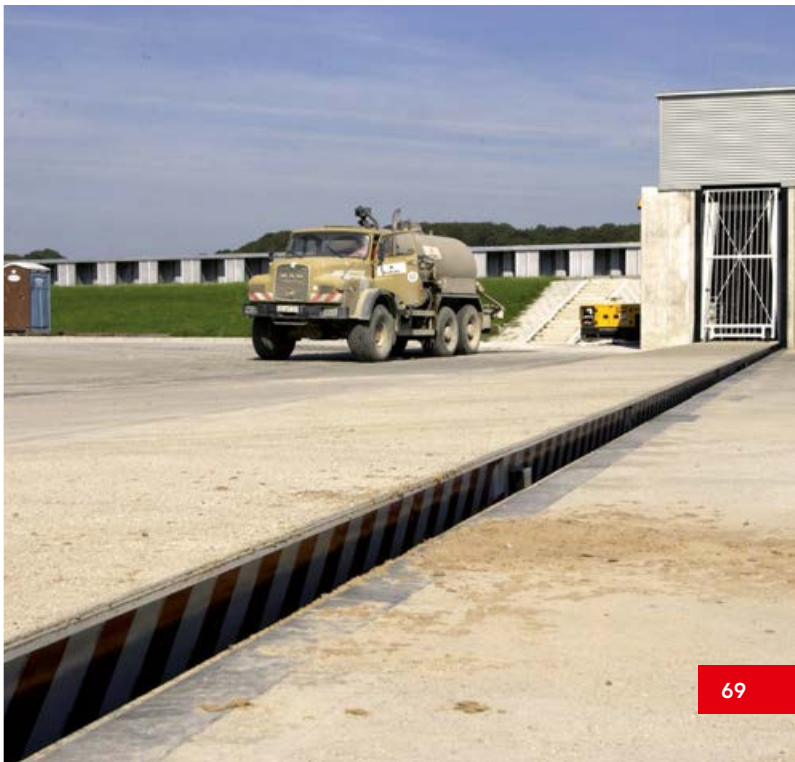
Technical data
175 t steel construction and mechanical engineering;
Barrier width/section: 44.10 m;
Barrier height/section: 4.40 m;
Barrier depth/section: 1.50 m

Project timeframe
2003 – 2004

Our services
Overall scope of supply 175 t steel construction; raising/lowering barrier incl. fixed components; Stays; Hydraulic motor and electrics

Flood barriers in operation

Flood barriers in down position



THE CHALLENGE: **5 SLUICE GATES IN 7 WEEKS**

The overhaul of the 5 large sluice gates on the Dortmund-Ems Canal included complete fabrication of the steel components, 5 upper flap gates and 5 lower floodgates each with 2 floodgate doors and the attendant drives. The mechanical drives of all components comprised modern electric lift cylinders.

The floodgate doors are operated by a two-sided drive and the upper gates have a one-sided drive.

The five large sluice gates (Bevergern, Rodde, Venhaus, Hesselte and Gleesen) have identical upper gates and the lower gates only differ in their height.

FACTS

Client
Wasser- und Schifffahrtsamt Rheine

Technical data
5 upper gates: weight 14 t, dimensions 5 m x 10.50 m;
5 lower gates: weight 55 t, 43 t and 3 x 32 t per pair of floodgates, max. dimensions 12.50 m x 6 m

Project timeframe
June 2008 – December 2009

Our services
Replacement of 5 upper gates as flap gates;
5 lower gates as pair of floodgate doors;
Replacement of old recess bollards;
Replacement of flow locks at the Bevergern sluice gate

Flap gate at upper head

Floodgate at lower head

HYDRAULIC ENGINEERING TURNS TO **SHIP BUILDING**

The Kiel Canal (NOK) minor locks must regularly be revised and maintained to guarantee operational readiness. The existing closing pontoons could not be used since the 90s and had to be replaced.

Two hulls, by controlled water supply and floating stable, that are able to sink to the bottom of the lock and close one end, should be designed and built.

By pumping up the sluice chamber the locks are pressed on the sealing surface and tighten the sluice gate. To fill the sluice gate and to prepare the removal, valves are used that are situated in the locks and operated from the upper deck. The locks are filled with fresh water. The pumping out is made by bilge pumps.

Our services contained design, technical engineering, workshop and dock assembly, equipment as well as a test run.

The special challenge was the simultaneous consideration of ship building and hydraulic engineering regulations and standards during planning and implementation besides the hulls realized dimensions in domestic manufacturing.

FACTS

Client
Wasser- und Schifffahrtsamt Kiel-Holtenau

Technical data
outer lock
L 30 m / W 8 m / H 16 m;
335 t steel construction;
16 t reinforcement;
350 t concrete (composite);
inner lock
L 30 m / W 8 m / H 15 m;
250 t steel construction;
8 t reinforcement;
200 t concrete (composite)

Project timeframe
2011 – 2013

Our services
design;
technical engineering;
workshop and dock assembly;
technical equipment (jacks, pipes, sealings etc.);
test run (installation, leak test, removal)

Assembling two sections

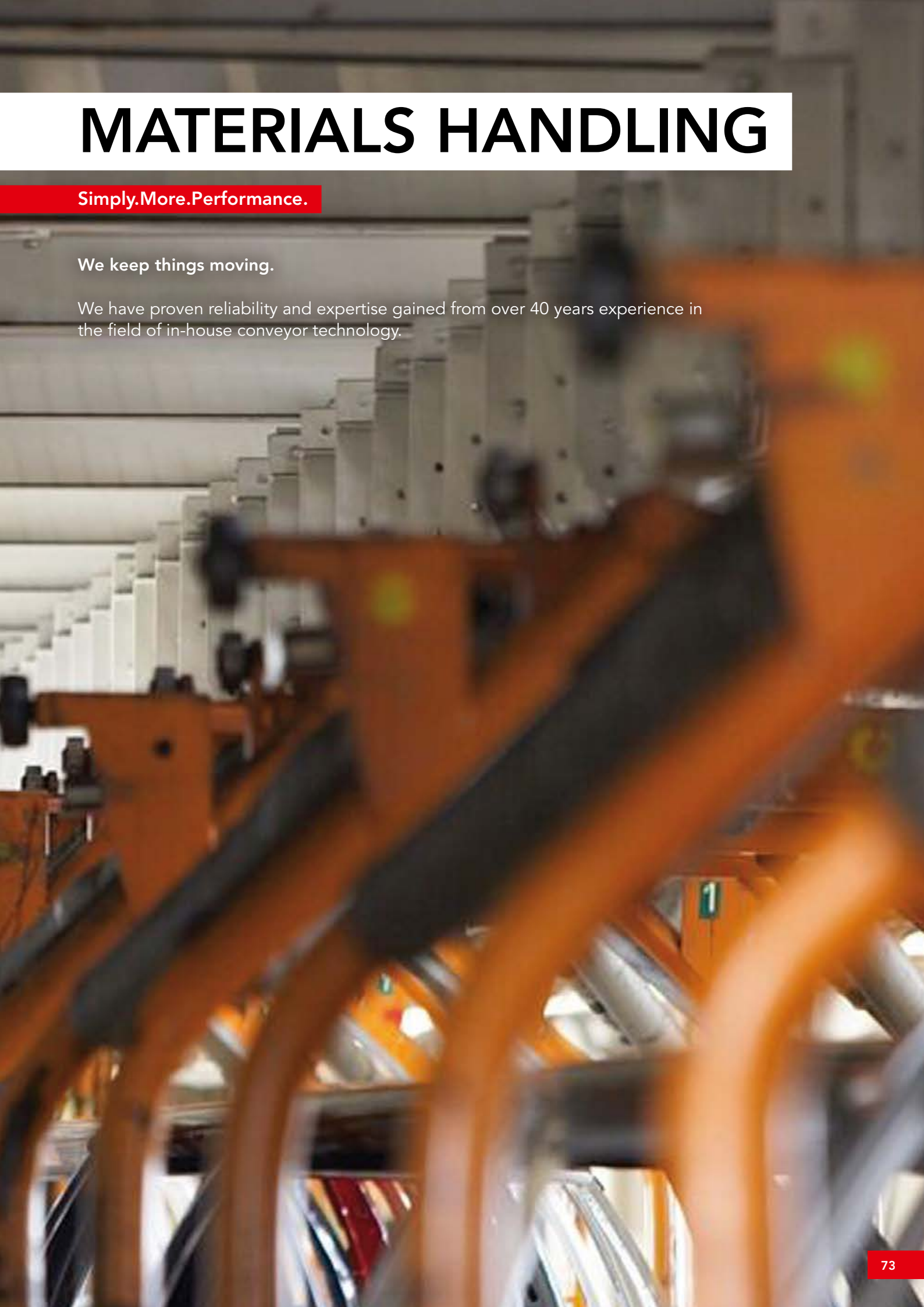
Undocking the locks

MATERIALS HANDLING

Simply.More.Performance.

We keep things moving.

We have proven reliability and expertise gained from over 40 years experience in the field of in-house conveyor technology.



CHAIN CONVEYOR SYSTEMS

- Power and free conveyors
- Circular conveyors
- Spiral conveyors
- Cardan chain conveyors

SKID CONVEYOR SYSTEMS

- Roller conveyors
- Rotary and swivel tables
- Eccentric lifting tables
- Vertical conveyors
- Carrying conveyors
- Slat conveyors
- Belt conveyors
- Plastic chain conveyors
- Moving walkways
- Special designs

ELECTRIC OVERHEAD CONVEYOR SYSTEMS

- Single track
- Double track
- Load capacity from 50 kg to approx. 4,000 kg

ONE CONVEYOR SYSTEM - **MANY OPTIONS**

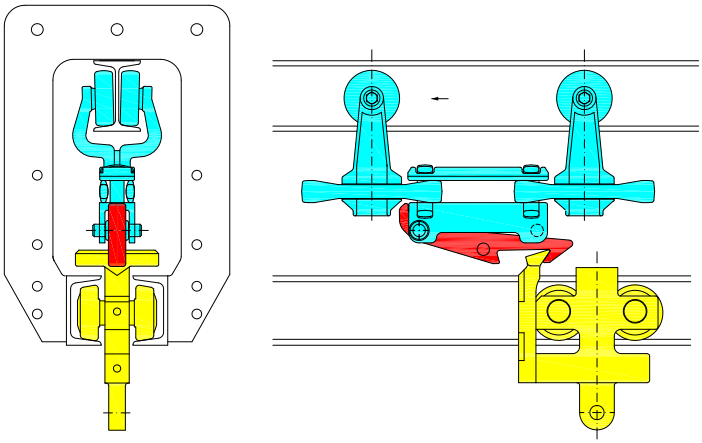
This system consists of two rails, one on top of the other, the upper chain rail and the lower feed rail. A wrought-iron X100, 4" or 6" insertion chain runs in the chain rail.

Trolleys weighing 250 kg to 5,000 kg can be transported on the corresponding rail. The chain runs continuously (blue), allowing the trolleys (yellow) to stop and buffer up by deactivating the corresponding actuator (red) either at the chain or the trolley. P & F systems have particular advantages on the assembly line as there is no need for equipment parts which get in the way on the floor.

Height differences can be handled using special bridges with appropriate transfer. If there is not enough room for these then combinations with vertical conveyors (lifters) may be used.

FACTS

Client
Volkswagen AG



T5 Transporter

Golf V storage level

HORIZONTAL AND VERTICAL **MATERIALS TRANSFER SYSTEM**

Skid conveyor systems offer the user a tailored space-saving conveyor system through its range of single conveyors. The main components of a system are roller conveyors, transfer carriages, swivel devices, eccentric lifting devices and combinations of them all such as buffer chain, buffer belt, cross chain, carrier chain and carrier belt conveyors.

At interfaces with other conveyor systems vertical conveyors or transfer devices are used. As all components are modular, existing equipment can be extended or amended without long downtimes.

FACTS

Client
Left: Volkswagen AG, Wolfsburg
Right: Daimler AG

Inspection area

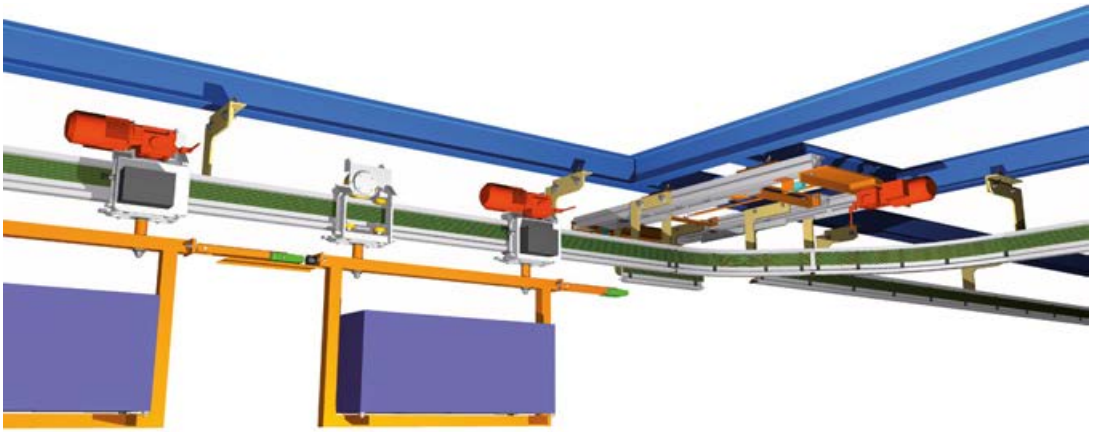
Body in white on vertical conveyor

OVERHEAD **MATERIAL FLOW**

Electric overhead conveyor systems consist of an aluminium rail system with individually-powered vehicles whose load is carried by special hangers. Each vehicle has its own control and can be buffered without contact to decouple manufacturing segments. It can be routed to different places by means of 2 or 3-way switches.

Advantages of electric overhead conveyor systems:

- Quiet, clean and easy-maintenance conveyor system in single or double track construction
- Variable and flexible box girder system
- High speed, reverse operation possible
- Suitable for slow, continual operation on assembly lines
- Can also be used on upward and downward slopes, depending on load with or without drag
- 2 sizes, load capacity up to 500 kg or up to 2,000 kg per trolley
- Choice of feeding line and control panel designs.



We manufacture in two sizes with load capacity up to 500 kg or up to 2,000 kg per trolley

Electric overhead conveyor system with transporter body in vertical conveyor

Electric overhead conveyor system for module preassembly

FUTURE TEC

Simply.More.Performance.

Large power plants.

A special challenge for steel construction.

NEURATH POWER PLANT - **THE WORLD'S BIGGEST LIGNITE POWER PLANT**

As technical lead managers of the Neurath power plant consortium, together with our partners we supplied and erected the steel construction for the two power plant units F + G.

The erection concept
Boiler scaffolding and boiler supporting beams were erected with a stationary double-mast crane. Raising the boiler supporting beams was particularly complex (5 pieces per unit). These components (full wall beams with a span of 36.50 m, a height of 10.20 m and a weight of 230 t) had to be lifted by the crane to a height of +162 m. Because of the limited reach of the crane the boiler supporting beams could not be lifted to their final position. So the "rear" 3 beams were connected after lifting and at 162 m pushed around 15 m to the rear.

The two "front" beams could then be lifted directly to their final position by the crane. The boiler house upper components (3 pieces, at a height of +107 m to +170 m) were assembled on the ground and then placed in position using strand jacks. The vertical travel was 107 m, the lifting weight 3,000 t per piece. Boiler house lower components (+0 m to +107 m) and air preheating building (+0 m to +107 m) and bunker house (+0 m to +62 m) were erected conventionally using crawler and truck-mounted cranes.

FACTS

Client
Konsortium Hitachi Power Europe GmbH / Alstom Power Systems GmbH

Technical data
Total height 170 m;
(Lifting boiler house by 100 m,
lift weight approx. 3,000 t)

Project timeframe
2006 – 2013

Our services
Steel construction for 2 units (boiler scaffolding, boiler house, preheating and bunker house)

Boiler scaffolding with boiler support beam of unit F, bottom of picture: erection of boiler house upper components, left: drawing the waste gas flue

Erection of boiler house upper component, centre of picture: anchor beam for strand jacks to lift boiler house upper component

POWER PLANT DATTELN

Together with our consortium partners SEH Engineering GmbH supplied and erected the steel construction for the Datteln coal power plant. We built unit 4 with a capacity of 800 MW.

The erection concept
Boiler scaffolding, boiler house and preheating building were built conventionally (beginning at 0 m) using truck-mounted and crawler cranes.

Strand jacks were used to lift the boiler supporting beams to their final position at +113 m inside the boiler scaffolding, with the help of auxiliary constructions. The vertical travel was 95 m.

FACTS

Clients
Hitachi Power Europe GmbH

Technical data
Height of the boiler scaffolding: 113.5 m;
Total height including roof: 120 m;
Base of boiler scaffolding: 27.50 m x 31.25 m;
Cross section of boiler scaffolding columns:
0 m to +81.50 m x 2.50 m x 2.50 m +81.50 m to +113.50 m x 1.80 m x 2.50 m;
Boiler supporting beams (span/height): 31.25 m / 6.20 m;
Boiler supporting beams unit weight: 75 t

Boiler supporting beams at final position at +113.5 m

Lower area of boiler scaffolding between the solid stairwell structures

FULL SERVICE **PACKAGE**

From engineering to assembly

Design, planning, engineering, statics, construction, fabrication, erection.

We are a creative team of specialists in many different fields of construction.

Our services are available either individually or as a complete package:

- Architectural design and project planning
- Engineering, statics, construction and implementation planning
- Fabrication on our own premises with ongoing quality control
- Logistics and transport planning
- Assembly planning and assembly on site

Talk to us about your requirements.

Fabrication

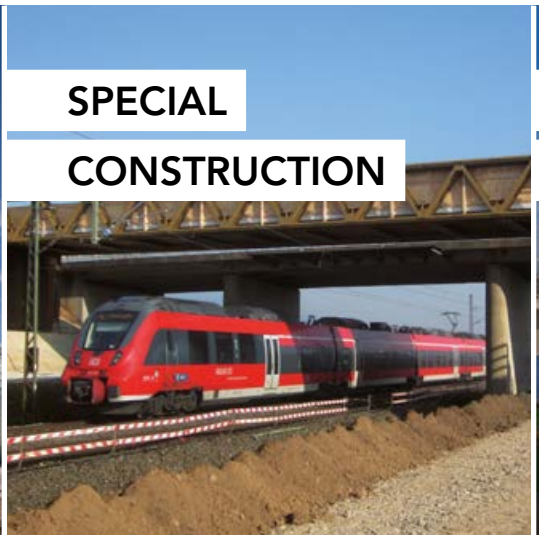
From design to quality control.

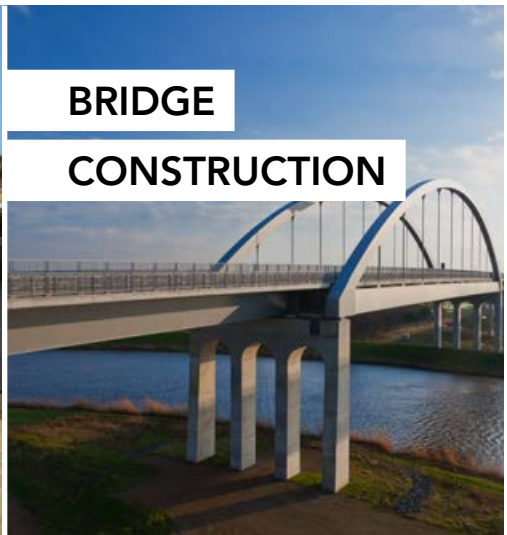
We manufacture components and modules up to a unit weight of 100 t for our products in our 22,000 m² of covered production space.

Design, layout, preparation, assembly/welding, corrosion protection, packing and quality control are all carried out in-house. We can quickly react to any changes required for the construction and implement them in a cost-effective way. In the production area we employ around 110 workers who bring a wide range of experience and expertise to our products. We also use high-performance cranes and lifting gear in the manufacture of our steel structures.

We create the necessary space for the production of steel constructions in combination with high-capacity crane facilities.

With a modern manufacturing structure, a proved technology and established know-how we fulfill our clients' demands by guaranteeing deliveries in time and trouble-free assemblies.





Assembly

From assembly planning to client handover.

Nothing is too big. Nothing is too heavy. Nothing is too difficult.

Whether in Germany, at the Suez Canal in Egypt or the Transrapid in Shanghai, we are always on the spot to offer expert advice. We can handle any situation thanks to our flexibility, focus and awareness of cost issues.

Our engineering expertise and the specialised equipment which we have at our disposal means that we can resolve even the most difficult problems within the time available and to our clients' full satisfaction.

Our assembly department supervises the construction of the product every step of the way until it is handed over to the client.

Rental of modular bridges

Temporary bridges for public highways with and without footways.

We can supply you with temporary bridge sections for rental or purchase from our warehouse in Hanover. We stock around 800 t of temporary bridges for rental purposes. Get in touch using our request form at www.seh-engineering.de or e-mail us at systembruecken@seh.eiffage.de. Our full service package of course includes consultation, supply, erection and maintenance.

The structural components of the temporary bridges have been pared down to two main modules:

- Main girder framework consisting of triangular sections and flanges
- Transverse structures consisting of orthotropic decks

SIMPLY.MORE.PERFORMANCE.

www.seh-engineering.de