

Materials Services
Infrastructure

Pile and anchor equipment

An integrated program
for any construction project.



thyssenkrupp



Expansion of the Vianden pumped storage power station in Luxembourg.

The largest pumped storage power station in Europe is located in Vianden on the Our River. In 2011 the station was to be expanded by an eleventh turbine with an output of 200 megawatts. As part of this expansion it was also necessary to construct an inflow and outflow structure. A box cofferdam had to be erected in order to achieve this, and the construction firm executing the project called on our expertise to do this. A special challenge in this project was the tight timeframe of just 28 days.

We drew up the inspection-ready structural analyses for erecting the cofferdam and designed a driving plan, taking conditions on site into account. To implement the building works we delivered around 700 metric tons of LARS-SEN 716 steel sheet piling sections in lengths up to 18.75 meters and with a section width of 700 millimeters. We also took care of sealing 4,648 running meters of sheet piling interlocks with the HOESCH PU interlock sealing system.

The work on the 220-meter long, 11.50-meter wide, and over 16-meter high sheet piling structure was carried out after the dam reservoir was emptied in multi-shift operation. The natural run-off of the Our River was able to be maintained in the process. The structure was erected on time in four weeks, and the pumped storage power station was able to start up operations again.



20
Steel sheet piling is used with great success in water and marine engineering projects.

Contents

| | |
|----|--------------------------|
| 04 | Global expertise |
| 06 | We think holistically |
| 08 | Hot-rolled sheet piling |
| 18 | Cold-rolled sheet piling |
| 20 | Sealing systems |
| 26 | Anchor equipment |
| 36 | Special services |

Global expertise in infrastructure projects.

Whether it's about mobility, urbanization, climate change or resource efficiency: As a leading supplier of civil, marine and foundation engineering solutions, we cover the full range of services for global infrastructure projects. Our portfolio is organized into four divisions: steel sections (pile sections, anchor equipment, flood protection), machinery, trench shoring and scaffolding systems.

We see ourselves as a full-service supplier to the construction industry. We support and advise our customers all the way, developing solutions precisely tailored to the job in hand. For this we can rely on the expert support of our own consulting engineers.

We provide our customers with all the products they need to execute their projects. Most of these products come from our own production, such as müller pile driving and extracting equipment and thyssenkrupp cold-formed sections. We are the exclusive distributors of thyssenkrupp anchor equipment and e + s | krings trench shoring systems.

We place great emphasis on sustainability.

Our steel products meet the highest environmental performance standards: They are produced with minimum energy consumption, are eco-friendly in use, straightforward to dismantle and virtually 100% recyclable. Our driving and extracting equipment is quiet and low on CO₂ emissions.

With offices throughout the world we are present wherever our customers need us. We know the local markets and their requirements and can provide tailored advice in the field, a key advantage especially in after-sales service.

Project-specific advice

It's important in a construction project to choose the optimal equipment – and given the huge amount of options out there, this can sometimes be a challenge. That's why we offer our customers project-specific advice. The specialists in our Engineering Division take care of all aspects of project planning and execution, including, for example: application advice, drafting and calculations for projects, definition of product requirements, and advice on execution. We are also happy to offer solutions that are optimized for specific budgets.



Sheet piling and anchor equipment: we think holistically.



We offer our customers around the world an integrated range of system solutions. Central components of our offering are the sale and rental of sheet piling and anchor equipment. Here we have a wide range of products from many offering manufacturers, and we round off our offer with a comprehensive service package comprising advice, technical support, and logistics.

Sheet piling.

Als anspruchsvolles Stahlprodukt kann eine Stahlpundwand vielfältige und fein abgestufte Funktionen übernehmen. They are used all around the world in lots of different areas, from water, road, and civil engineering to trench shoring, landfills, and flood protection projects.

In the case of steel sheet piling that is not leak-tight, water and material can first be directed into the interlock area. In soils with significant mixtures of fines, this approach quickly leads to a blockage of the interlock system, facilitating a type of self-sealing.

Anchor equipment.

We provide a comprehensive range of anchors and accessories to meet a wide range of challenges, be those quay structures, onshore and offshore wind turbine foundations, tunnels, retaining walls, or slope stabilization.

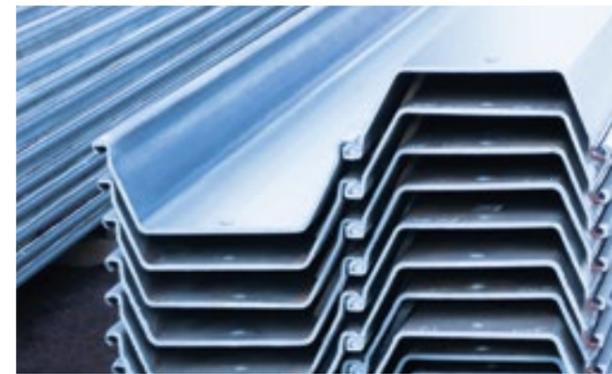
Overview of our services

- Sale and rental of our products
- Drafting and calculation of projects and product requirements
- Project consulting
- Corrosion protection
- Quality assurance
- Interlock sealing
- Welding constructions
- Signal transmitters
- Knife-edge bearing system



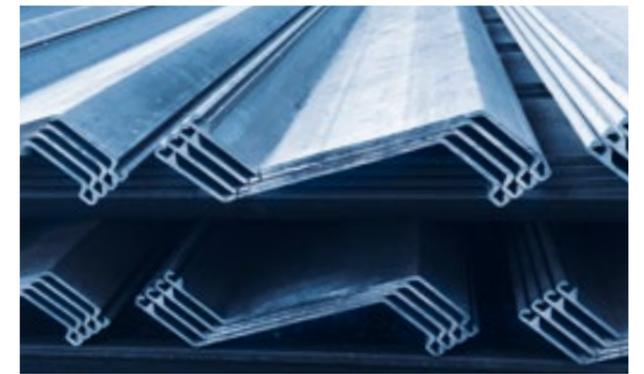
Due to their excellent properties, our hot-rolled sheet piling is primarily used in water, road, and civil engineering applications. Hot-rolled pile sections are made from a primary material that is heated to over 1,200 degrees. Different section shapes are possible thanks to the high plasticity of the steel.

High construction rigidity,
very good drive properties,
high section modulus:
hot-rolled sheet piling.



U-sections.

Our U-sections have excellent structural properties. These high-quality pile sections drive in extremely well. The wide range of available sections allows for use in so many different areas, such as marine engineering, embankment protection, and road engineering, and even in trench shoring.



Z-sections.

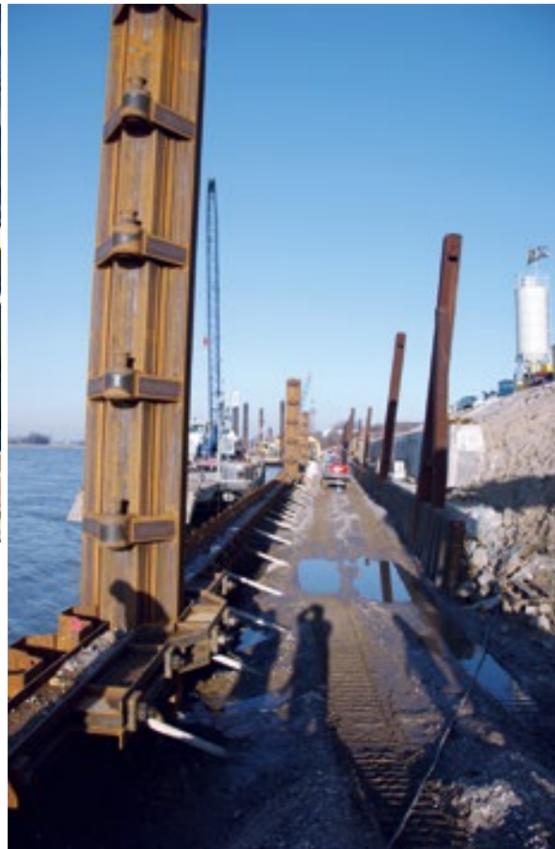
The continuous web in the sheet piling and the external interlocks are the key features of Z-sections. Both factors have a positive effect on the section modulus in the sheet pile – at relatively low weight. That results in high cost efficiency.

Advantages

- Wide range of sections for various different application areas
- Excellent structural properties
- Optimal reusability
- Excellent quality and drivability
- Easy installation of anchor systems and articulated connections even under water

Advantages

- The interlock connection is positioned in the area with the lowest shear forces
- The external LARSEN lock facilitates an extremely favorable weight–section modulus ratio
- The tall installation heights of the sections lead to high rigidity values, which limit deflection and allow for higher steel products to be selected



LARSEN steel piles.

LARSEN steel piles or dolphins are systems for shipping routes and ports. There are different types depending on their use:

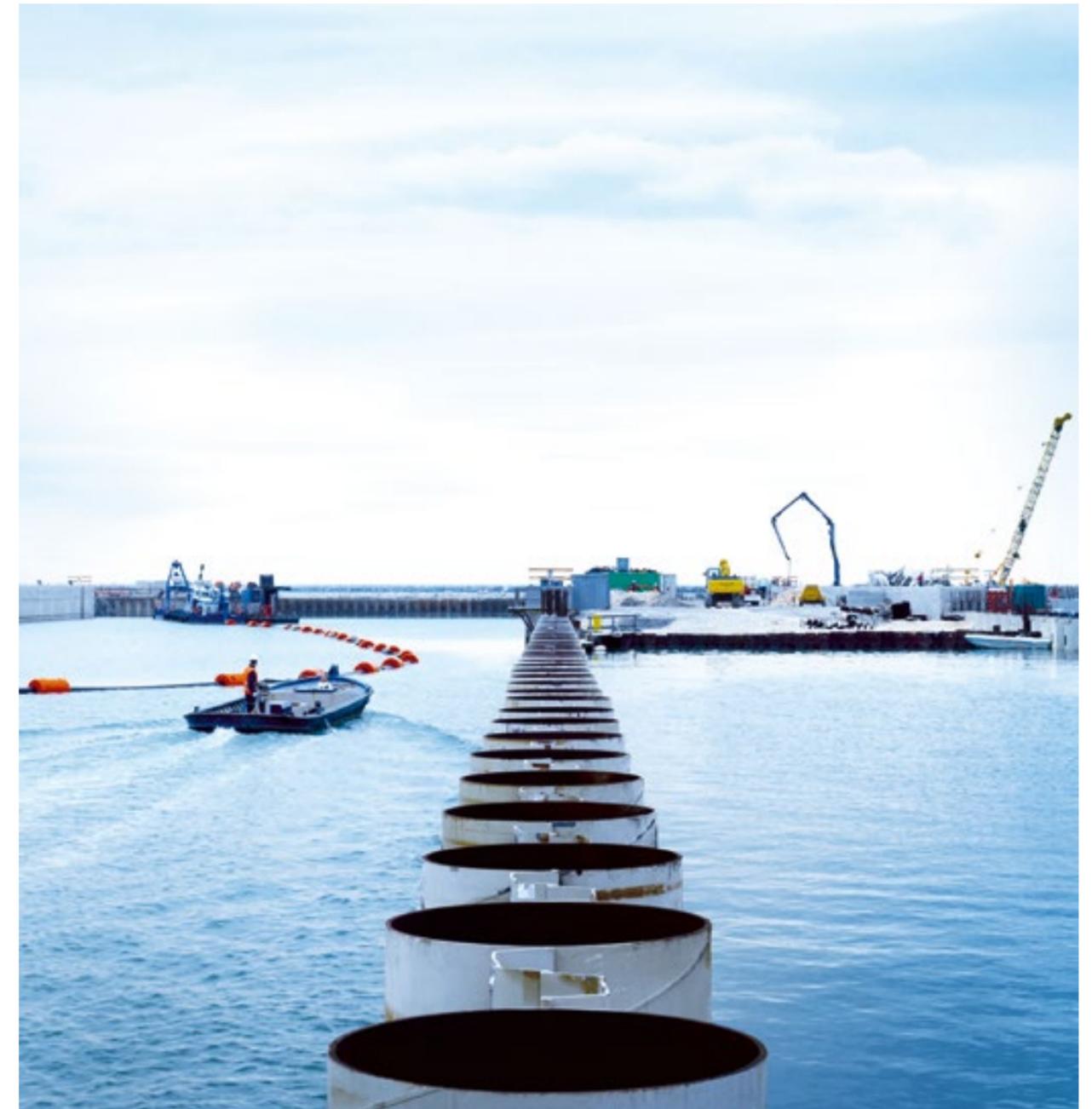
- Impact dolphins used to restrict ship travel routes
- Berthing or mooring dolphins used as mooring points for ships
- Navigation dolphins used to guide floating objects such as pontoons or floating docks

Combined steel sheet piling.

Our combined steel sheet piling consists of load-bearing and intermediate piles and is used especially in heavy-duty marine engineering projects on the coast, including marine applications such as quay walls, piers, dock structures, and ro-ro vessels. The combined piles are also used in sluices, dams, inland ports, landfills, and abutments.

Advantages

- Modular system, which provides options for combined sheet piling
- Optimum adaptation to suit structural and construction requirements
- Good driving characteristics thanks to essentially symmetrical arrangement of pile sections



Examples of our services.

Sheet piling to seal a dam in the Dead Sea.

The enterprise Dead Sea Works LTD planned the construction of an 18-kilometer long dam in the Dead Sea. To seal the structure, we delivered sheet piling that could withstand even an earthquake. The installation, which reaches a depth of more than 30 meters, was used to prevent purging and underwashing of the dam. The total surface area of the sheet piling measures 540,000 square meters – the equivalent of about 75 soccer fields.

One year later we executed a follow-up order: 900 metric tons of sheet piling were transported overnight in special transports down almost 1,000 meters to the level of the Dead Sea, where they were driven 28 meters deep into the soil. Some of the gigantic steel piles were equipped with signal transmitters, which indicate during the installation process whether the sheet piling interlocks engage as planned or whether the interlocks have loosened.



Retaining wall for a parking garage in Essen.

A parking garage was to be built on the corporate campus of the thyssenkrupp headquarters in Essen. A permanent soil stabilization solution was necessary since the subsoil had abrupt topographical changes up to 10.30 meters deep. The construction firm executing the project, in consultation with thyssenkrupp Real Estate GmbH, opted for a retaining wall made of anchored LARSEN steel sheet piling. A total of 720 metric tons of LARSEN 606 n piles in lengths up to 14.30 meters were installed.

More examples of our services.

Flood protection in the Hitzacker region.

April 2006 saw massive flooding from the Elbe River. The floods pushed into the Jeetzel River, a tributary that joins the Elbe in the town of Hitzacker. As a result the Jeetzel overflowed and threatened to breach levees and flood the surrounding areas.

On April 5, 2006, the emergency task force for the administrative district of Lüchow-Dannenberg therefore decided to block the Jeetzel with sheet piling. Project execution began at noon. We delivered 100 metric tons of easily available steel sheet piling and

the optimal driving equipment for the job. In just three and a half hours the Jeetzel was blocked off by a sealed steel sheet piling wall. In the meantime the Federal Agency for Technical Relief (THW) had installed several pumping systems and started redirecting water from the blocked river into the Elbe. Thanks to these efforts, the Jeetzel was prevented from overflowing its banks in the days that followed – saving the surrounding areas from flood damage. The successful campaign shows that sheet piling is also ideal for operational deployment.



Construction of the Xin Xia sluice in Jiangyin on the Yangtze River.

China's top priority is to develop its infrastructure, a focus of which is the expansion of its waterways. As part of this expansion, a two-lane sluice was to be constructed in Jiangyin on the Yangtze River near Shanghai.

We delivered 2,475 metric tons of hot-rolled sheet piling for the sluice basin. The structural requirements of the main wall made it necessary to use highly stable steel in combination with a U-section. In addition to high stability, this approach also delivered great cost-effectiveness – namely due to its low mass per unit area. Our material was also coated with corrosion protection on site.

The entire project went off extraordinarily efficiently: we were able to respond to current conditions with just-in-time deliveries. The delivery sequence was always adapted to suit the need at the time. This approach eliminated the need to store materials on site and saved money. Our suggestions for the process ultimately contributed to fast construction progress.

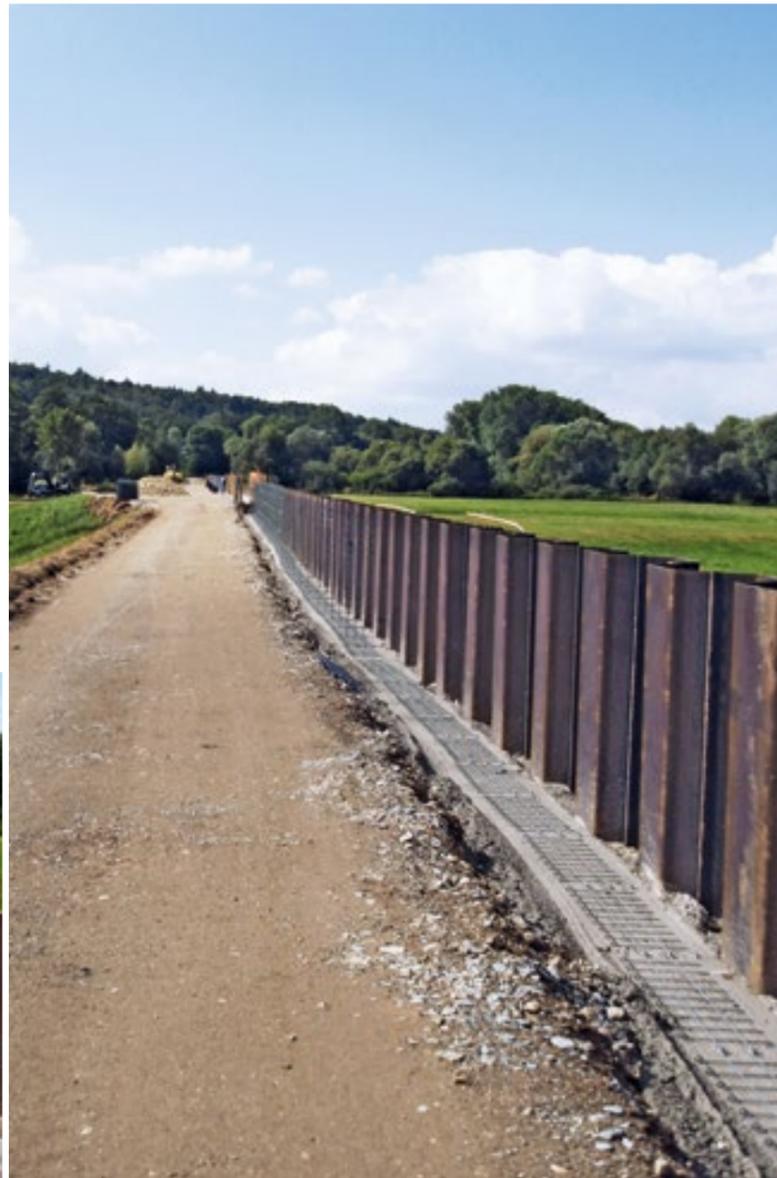
More examples of our services.

Levee retrofit in Michelau, Oberfranken.

Plans were made to upgrade the existing flood protection measures in the municipality of Michelau to the latest state of the art. The aim was to ensure protection against flooding that statistically occurs once every 100 years.

We delivered the material for the second phase of construction: 675 metric tons of tkL 603 DB steel sheet piling sections, most of them measuring four meters in length. The around 1,250 piles had to be processed precisely according to schedule. Since it is very difficult to deliver such huge amounts on time, about one third of the total quantity was provided as used material. This way delays in rolling the sections could be overcome using a combination of used and new piles.

In total a flood line of about 1,500 meters was created. The construction firm executing the project clad the part of the flood line that was above ground with a screen wall filled with limestone.



Construction of steel sheet pile wall for slope stabilization in Hürth.

The gravity wall on Gennerstrasse in Hürth was to be replaced by a sheet pile wall clad with concrete L-profiles in the spring of 2018. We took on all of the technical planning of the sheet pile wall for the construction firm in charge of executing the project and delivered the necessary materials. A total of 54 metric tons of tkL 604 steel sheet pile sections measuring six to 9.5 meters were used.

The construction project was implemented in sections, i.e., one section at a time of the existing concrete wall was taken down and the steel sheet piling was put in its place. Due to the historical buildings in the neighborhood, we pre-drilled the sections and then drove them into the ground using vibration. We manufactured the required radius at a road intersection with seven construction piles made in-house.

The project was scheduled with four weeks allocated for the manufacture of the materials. Due to our tailored logistics concept and powerful machinery, we actually managed to complete the work in just 18 days.

High construction rigidity and low weight: cold-rolled sheet piling.

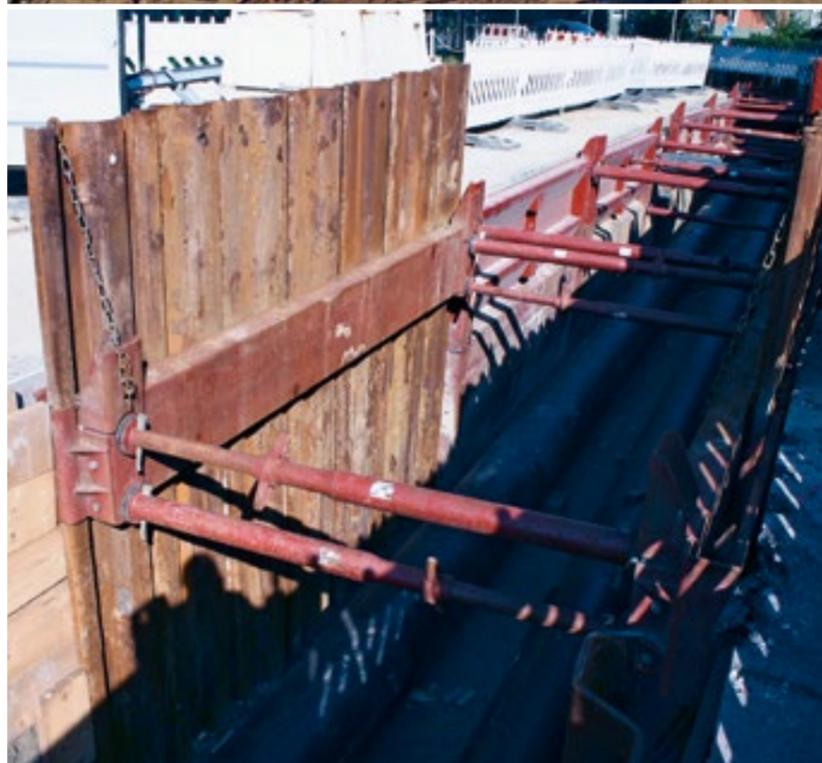
Our cold-rolled sections are shaped cold out of steel sheet. A cost-effective and reliable solution, they are primarily used in trench construction and levee protection. We offer a market-based range of channel steel sheet piles and lightweight sections made in-house at our cold-rolling facilities. This way we guarantee that things go smoothly, with fast delivery on time.

Trench sheeting.

Our trench sheets are used for the reliable shoring of trenches, shafts, and excavations. Such sections are used when sealed interlocks are not necessary. To suit the conditions of driving and the typical applications, the form that has become established for trench sheets is one that is highly stable and suitable for repeated use. Their special shape makes them easy to install and stack. At our cold-rolling facilities we ensure the perfect manufacture of sections that we keep in stock in lengths up to eight meters. We can also roll longer sections upon request.

Advantages

- Trench sheet piles – tailored for modern driving equipment in terms of shape, material thickness, construction width, and quality of steel – especially suitable for urban channel construction as trench cladding
- Symmetrical rotational shaping optimizes the material behavior during setup and driving – intensive mutual overlapping guarantees low soil permeability
- High torsional rigidity thanks to the high yield point of the steel ensures resistance to warpage



Lightweight sections.

Lightweight sections are mainly used for trench shoring in inner-city applications and for upgrading dikes.

The interlock of the lightweight section serves as a reliable hook in such applications. The sections are manufactured in lengths of up to 17 m. For structures requiring greater watertightness, e.g. flood protection, we can supply the sections with an interlock filling made from a durable, pliable bitumen compound.

It is also possible to fit a profiled tk sealing system into the interlocks of the lightweight sections. The sections undergo material testing and quality inspections in accordance with DIN EN 10249 and guarantee safety and reliability combined with optimum drivability.

Advantages

- In contrast to channel steel sheet piles, lightweight sections have interlock connections and can be used in applications where the soil is fluid or where there is water encroachment
- Even though interlock connections are not leak-tight, additional sealing can be ensured through the insertion of fine soil particles in the lock mechanism
- Excellent with additional sealing for flood protection structures in levees

Leak-tightness for any project requirement: sealing systems.

thyssenkrupp interlock sealing system.

Our thyssenkrupp interlock sealing system is resistant to the typical substances and fluids encountered in landfill and legacy pollution. It has two lip seals, which gives it two dependable lines of defense. The thyssenkrupp interlock sealing system is factory-installed in the pile interlocks. It consists of a profiled seal in the threading interlock, plus, for double piles, an injected seal in the middle interlock that adapts perfectly to the interlock slot. A primer ensures dependable adhesion and prevents rust forming underneath.

The seal in the threading interlock is designed in such a way that restoring forces are activated in the sealing material during pile driving which then seal off the interlock slot in the areas required (compression sealing). Providing two lip seals in the interlock ensures that the sealing system has two lines of defense. The driving interlock into which the next pile with its profiled seal is threaded is fabricated with a bevel to ease the threading process. The direction of driving must be specified in advance and adhered to.



Our steel sheet piling has proven itself time and time again in countless construction projects – both in terms of its structural function and its sealing properties. It is used with great success in trenches as well as in water and marine engineering projects. It is also used in landfill construction, flood protection, and in the remediation of contaminated sites. Different sealing systems are available depending on the degree of required leak-tightness.



Bitumen-based interlock fillers.

The bituminous material SIRO 88 can be used to reduce the permeability of the interlocks substantially. It can be applied at the factory or on-site.

The hot-poured bitumen SIRO 88 sealant has proved ideal for vibratory driving. When factory-applied, the system consists of a paste-like filling material in the driving interlock and a poured sealant in the factory-threaded middle interlock. Since the material adheres well to the steel surface, it is not necessary to apply a primer to the interlocks beforehand. Certificates declaring the environmental compatibility of this interlock filler are available.

Other sealing methods.

The following additional sealing methods are available for interlocks that must be sealed after driving:

Where sealing requirements are not excessive, interlocks can be sealed subsequently, e.g. with timber wedges (swelling effect), rubber, or plastic cords.

If total watertightness is required, welding the interlocks is the only solution. As a rule, this concerns the threading interlocks only because factory-threaded interlocks can be welded prior to driving. It is important to note that the interlock can only be welded when the surfaces are dry and clean. The weld must be applied to the side of the sheet piling that faces the base of the structure to be erected. Open interlocks can be covered with, for instance, steel flats or steel sections attached to the sheet piling with fillet welds.



Exclusive sale of corner profiles from ISH SteelWall GmbH.
The corner profiles from ISH SteelWall GmbH are sold exclusively by us. We have developed a new combined wall system especially for these profiles, which significantly reduces the risk of lock breaches thanks to its ductility.



Examples of our services.



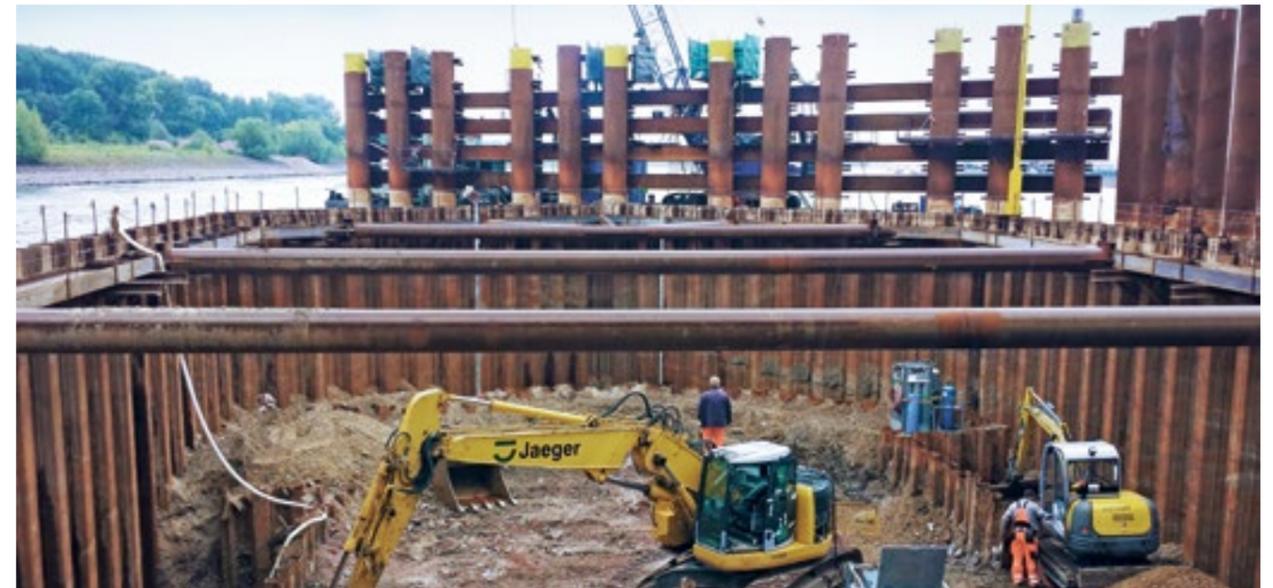
Remediation of the Brandheide landfill in Castrop Rauxel.

The Brandheide landfill is located just outside of Dortmund. It served as the dumping site for household waste, builder's rubble, and tar sludge between 1959 and 1972. The landfill site was given a sealed wall measuring about 800 meters, with steel sheet piling measuring up to 10.50 meters in length, for the purposes of collecting groundwater. In order to guarantee the protection of the water in the long term, we coated the sheet piling on both sides and gave it a permanent lock seal.



Demolition of the old piers of the Rheinbrücke Wesel Bridge.

After the Rheinbrücke Bridge on the B 58 road was constructed, dismantling the piers of the old bridge was necessary. A watertight trench enclosure with sealed sheet piling was installed around the old bridge piers for this purpose. In order to get the steel sheet piling interlocks as leak-tight as possible, a polyurethane seal was used.





Our anchor equipment is used for construction projects such as quay structures, onshore and offshore wind turbine foundations, tunnels, trenches, retaining walls, and slope stabilization. We maintain an extensive range of products that can be used to overcome even the toughest challenges.

Solutions for any challenge: anchor equipment.

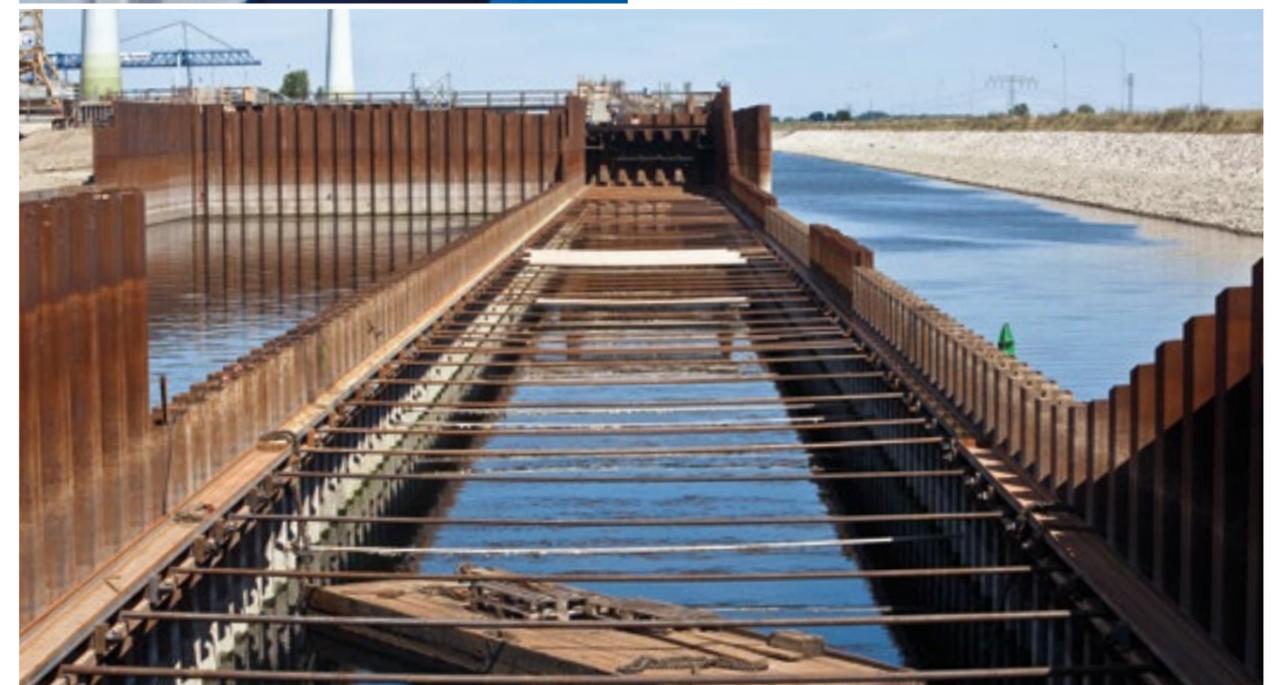


Anchors.

Regardless of the anchoring method, anchors are essentially differentiated by their function: temporary anchors with a maximum service life of two years, or permanent anchors that meet higher requirements for corrosion protection as a priority.

Anchoring systems that do not need to be drilled, driven, or installed using other machinery are especially cost-effective. Just due to the high intrinsic weight alone, hoisting equipment is needed to handle them.

If there is enough space and earthworks are not a problem or are not necessary at all, then horizontal systems are usually the optimal solution.



The solution for sheet pile walls: round steel tie rods.

An anchorage employing round steel tie rods is an economical solution for securing a sheet pile wall, which can be adapted to suit the situation. The forces acting on the wall are transferred via the waling to the round steel tie rods and then to the anchor plates or walls. The selection and design of the anchoring structure is done in accordance with static and structural requirements.

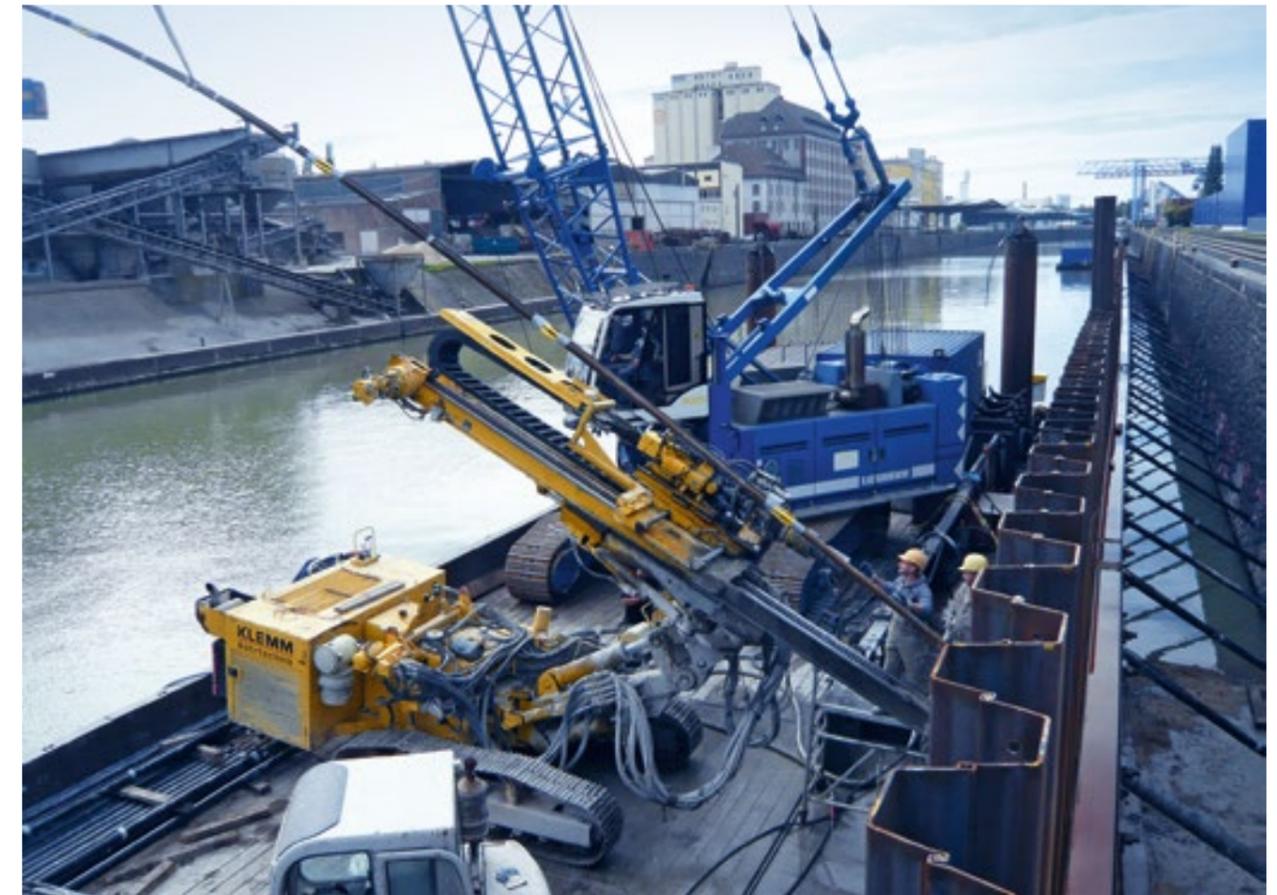
Upon request, we can supply a complete package from one source, consisting of the supply and installation of all the anchorage elements and accessories required for sheet piling structures. Apart from anchors and anchor parts, anchor connection elements, walings and waling fixings, sheet pile wall capping beams, recesses, ladders and mooring lugs plus bollards and special components are also part of our range.

Advantages

- Optimum transfer of tensile forces
- Better dispersion of bending moments thanks to excellent elasticity
- Extendable with the help of couplers or turnbuckles
- Minimal surface for corrosion
- Adjustable to exact length

Applications

- Cofferdams
- Ports and harbors
- Waterways
- Locks



Maximum loading capacity, minimum diameter: thyssenkrupp ASF drilled injection pile system.

Micropiles are being increasingly used as traction elements in water construction and marine projects, gradually replacing driven pile systems. Further development of drilling technology has contributed greatly to this.

Thyssenkrupp ASF drilled injection piles are a micropile system that conforms to DIN EN 14199, which Thyssenkrupp Infrastructure developed in collaboration with special civil engineering companies as a pull/push and interchangeably loaded pile system. This system is a further development of existing pile systems.

Thyssenkrupp ASF drilled injection piles have high internal load-bearing capacities and reserve capacities as well as being very robust and low warpage. This is achieved by using good-quality steel in accordance with DIN EN 10025. The Withworth threaded connection on the shaft of the pile can be used to easily adapt other components such as socket joints, turnbuckles, or Cardan joints.

This development is based on experience from over 30 marine and water construction projects with approx. 50,000 drilled meters.

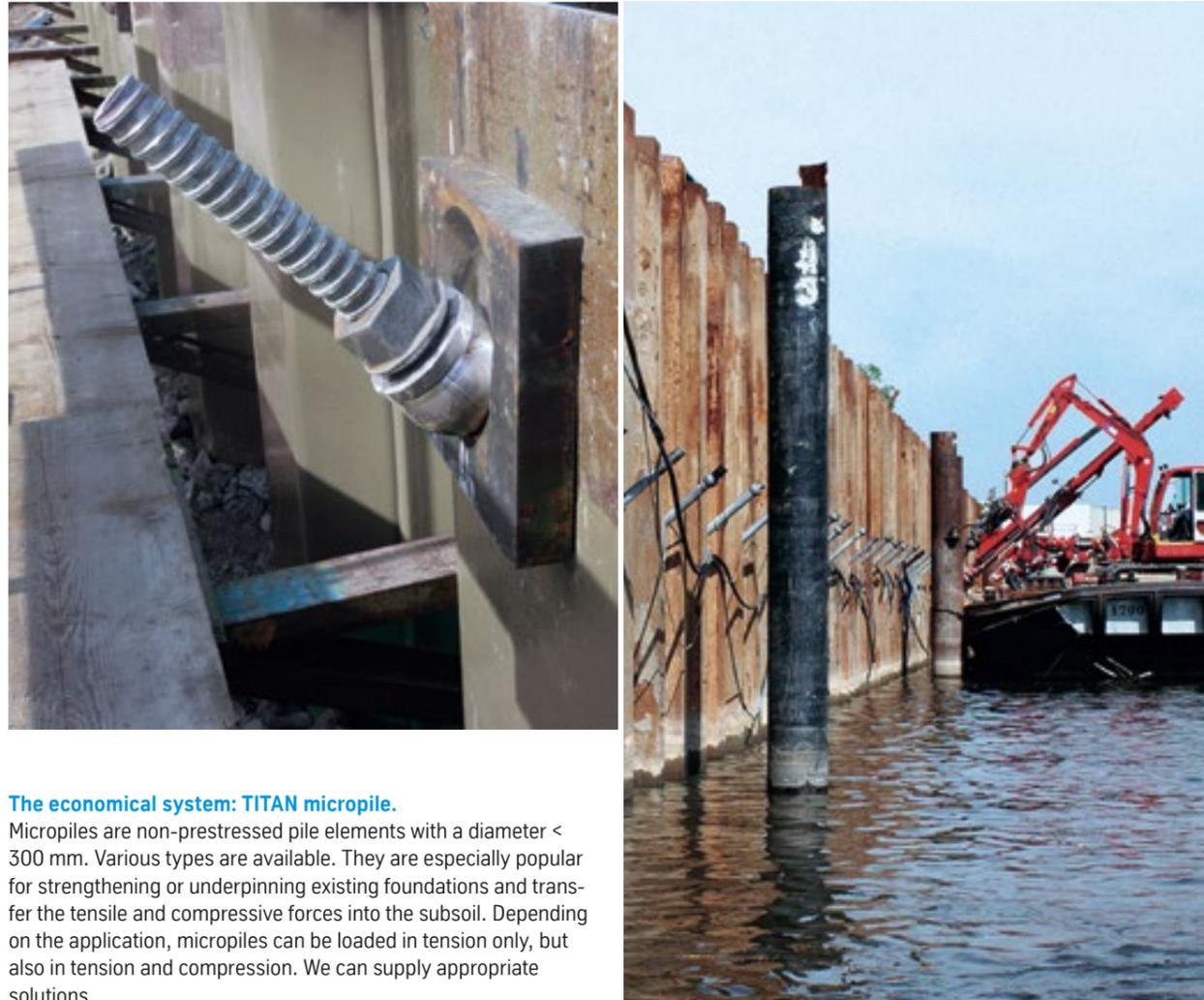
Advantages

- Maximum strain of up to 7,930 kN
- Can be used as compression and tension piles in accordance with DIN EN 14199
- Low steel strain guarantees rapid activation of forces with low deformation
- Corrosion protection along the entire length due to the alkaline environment of the cement covering, which saves time and costs
- Length up to 35 m deliverable ex works, unlimited extension possible using weld joints or couplers
- Pile head connection with steel transition construction; component of DIBt* approval

Applications

- Foundation piles
- Bracing in marine and special civil engineering
- Bracing in waterway expansion

*DIBt (Deutsches Institut für Bautechnik)



The economical system: TITAN micropile.

Micropiles are non-prestressed pile elements with a diameter < 300 mm. Various types are available. They are especially popular for strengthening or underpinning existing foundations and transfer the tensile and compressive forces into the subsoil. Depending on the application, micropiles can be loaded in tension only, but also in tension and compression. We can supply appropriate solutions.

TITAN micropiles are governed by the general technical approval Z-34.14-209 granted by the Deutsches Institut für Bautechnik (DIBt). They are micropiles (compound piles) for which the stipulations of DIN EN 14199 in connection with DIN SPEC 18539 must be observed, unless otherwise specified in the approval.

Advantages

- Can be adapted to any load profile
- Short execution times
- Can be used with any drilling equipment
- Can be used as pull and push piles
- Low settlement when used in foundations with pressed piles



Micropiles: loaded in tension only.

A micropile is a continuous steel tendon that is inserted into the subsoil. Pressure grouting produces a body of grout at the bottom end of the steel tendon. This grout is connected with the part to be anchored by the steel tendon (unbonded length) and the anchor head. Loads are transferred to the ground via skin friction over the defined anchorage length.

Applications

- Anchors in tunneling
- Tunneling under rail embankments
- Anchoring of ramps
- Horizontal high-pressure grout injection for pipe umbrellas in tunneling
- Shear reinforcement for pier noses
- Stabilization of fault zones with polyurethane systems, e.g. in tunneling
- Slope stabilization at tunnel entrances

Micropiles: loaded in tension and compression.

Here, a continuous steel tendon is surrounded over its full length in the ground by the cement grout injected subsequently. The force is transferred via the combination of tendon and grout along the pile's full length. The load is transferred into the subsoil by means of skin friction. The micropiles can be drilled either vertically or at an angle and are generally loaded axially.

Applications

- General excavations
- Anchoring of retaining walls
- Underpinning/strengthening of bridge foundations
- Uplift protection
- Road widening
- Reinforcing of bridge abutments
- Refurbishment of bridge piers and port areas
- Foundations of electricity pylons, transmission masts, wind turbines
- Overhead line masts for railways
- Noise protection barriers
- Avalanche protection

Versatile anchor for every terrain: TITAN soil nail.

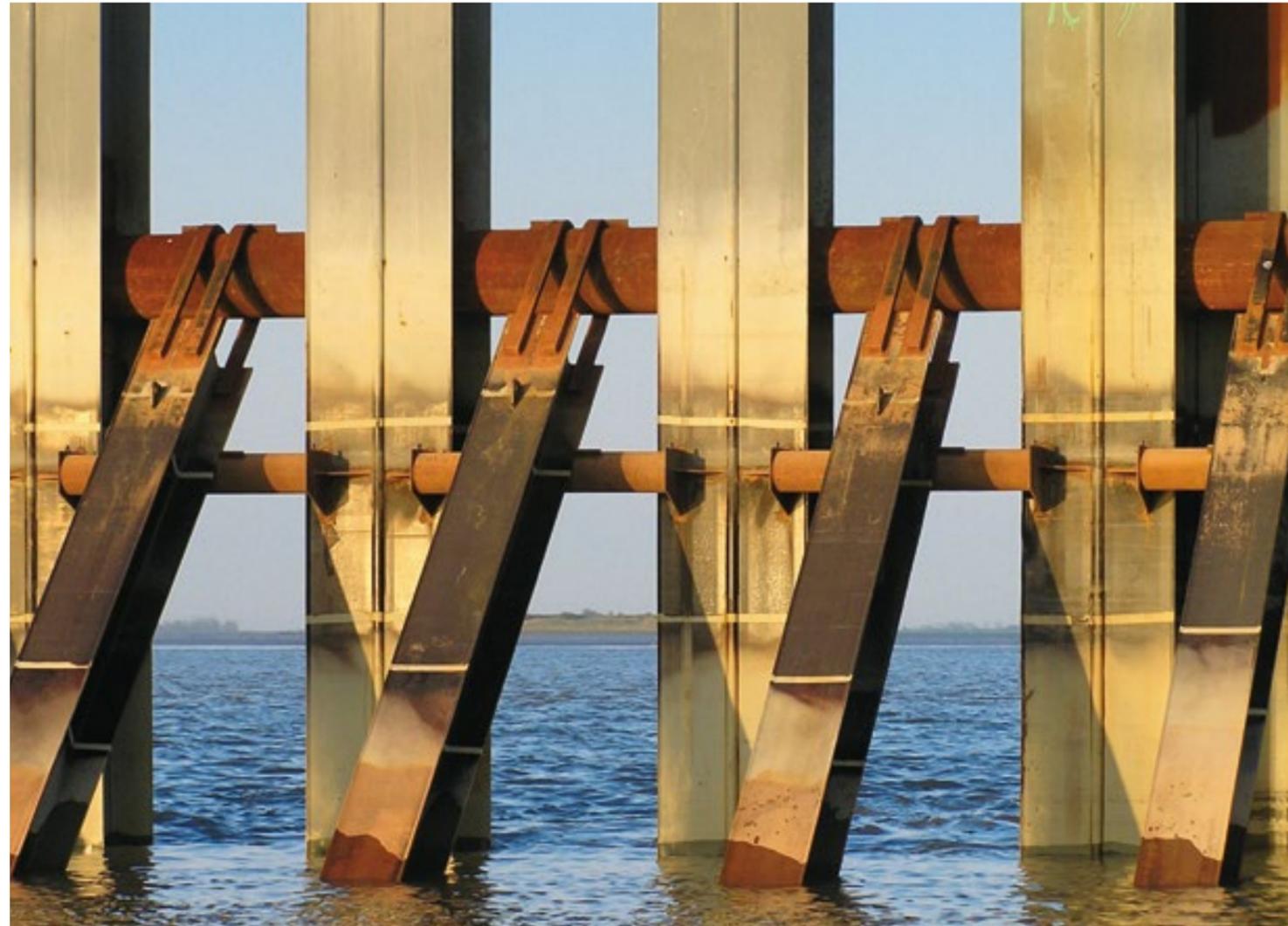
Soil nailing is a method of improving the natural stability of the soil. Soil nails in accordance with DIN EN 14490 increase the cohesion that is lacking in loose material. They also enhance the tensile and shear strength of such soils, thus creating a new composite material with a high load-carrying capacity. The soil must exhibit an adequate minimum stability for site operations.

Advantages

- Stabilizes embankments and prevents settlement
- Ideal for steep slopes because soil nails can be installed in 2 or 3 m lengths with lightweight drilling rigs
- Flexible, environmentally friendly method of construction suitable for any terrain
- Ideal for existing structures such as walls or stocks of trees that are to be incorporated into new construction works
- Minimal vibrations
- Little noise
- Cost-effective method for temporary and permanent applications

Applications

- Slope stabilization
- Excavation shoring
- Refurbishment of unstable slopes and hillside roads
- Retaining walls
- Foundations for rockfall nets
- Strengthening the permanent way
- Made embankments



Safe anchorage of high tensile forces: driven anchor piles.

Our driven piles for anchoring are used in the construction of quay walls.

Additional warpage can essentially increase the load on the piles, so that the maximum load is sometimes not on the head of the pile but rather behind the sheet piling. This must be taken into account when installing the piles and the pile connection.

The benefits of slow-action hammers

- Longer effect of driving force
- Particularly suitable for cohesive soils
- Environmentally friendly
- Much less noise, far fewer vibrations

The benefits of fast-action hammers

- Particularly suitable for non-cohesive soils
- "Vibratory effect" increases load-carrying capacity

Examples of our services.

Bracing a clad steel sheet piling wall with micropiles in the Schwelgern Port.

Schwelgern is a plant port owned and run by thyssenkrupp north of Duisburg. Some of its embankments were in need of renovation and were no longer meeting growing demands. Around 400 meters of clad steel sheet piling was to be installed at the north embankment in front of the existing embankment wall and then braced at the specified points. In addition to the complete technical processing, we were also in charge of logistics planning and site management.

This project involved a high degree of prefabrication – such as the application of steel cladding and leader and bollard devices at the factory. The base plates for the anchor elements were also welded in place at the factory.

Ultimately more than 70 heavy-duty transporters delivered the sheet piles. Each week an excavator leader, working on a pontoon on the water, drove in approx. 30 elements through vibration. High-pressure water jets were used to do this, driving the sheet pile sections down one meter before reaching the structurally defined incorporation point. They were then hit with a fast striking hammer without the jets until they reached their final depth.

As the sheet piling wall came into being, we inserted special customized piles in to compensate for measured tolerances. The driven piles were also fitted with a waler line. These waler lines are used to distribute the load lengthwise, helping to align the structure.

The finished sheet piling was braced with micropiles in the foundation. Our Thyssenkrupp ASF drilled injection piles were used, a micropile system that conforms to DIN EN 14199, which we developed as a pull and push pile system. The system is a further development of existing micropile systems, and has especially high internal load-bearing capacities and reserves as well as being highly robust and having low warpage. Thanks to precise preliminary planning, all of the works went smoothly.



New embankment for Logport II at Duisburg Port.

Due to the growing need of the logistics industry, Duisport GmbH at Duisburg Port decided to establish a new logistics center: the Logport II. As part of this project, a new embankment measuring 360 meters long had to be built. It was executed in a combination of sheet piling with single bracing and sheet piling with double bracing on large-scale drilled piles.

In order to absorb the large bending moment calculated in the structural analysis, we had to reinforce the sheet piling material with slats in the field moment range. Anchor plates for absorbing the anchor forces were then welded into the sheet piling troughs.

The driving work was carried out with a combination of vibration and hammering technology. Thanks to precise driving, the LARSEN wall was built so true to size that with a wall length of 360 meters, there was only a protrusion of 25 centimeters in the direction of the wall axis. This is due to the high driving rigidity of the piles and the low delivery tolerances of the double U-sections from the LARSEN section range.



In parallel to the driving work, the 24-meter-long thyssenkrupp ASF drilled injection piles were manufactured for bracing the embankment. Thanks to high driving accuracy, we were able to keep to the theoretical anchor distances exactly. This was important because drilled piles with a diameter of 1.50 meters and lengths of 20 meters needed to be installed behind the sheet piling between the anchors. A one-meter thick and eight-meter tall reinforced concrete wall measuring 310 meters in length was erected on top of these drilled piles and secured with thyssenkrupp ASF drilled injection piles and a dead-man anchor construction.

The success of a project depends on having the right equipment and the right technical support for that equipment. In addition to our products, which we both sell and rent, we also offer a wide range of different services.



Service in every aspect: special services.

Corrosion protection.

Three forms of corrosion protection are available to enhance the durability of sheet piling – and hence increase the chances of success for your project: coating, hot-dip galvanizing and cathodic corrosion protection.

Coatings.

The choice of coating system depends on the corrosion loads expected and the design life (see also DIN EN ISO 12944). Owing to the high loads to which steel sheet piling is usually exposed, epoxy resin or polyurethane coatings are normally used. Such coatings are also compatible with the thyssenkrupp interlock sealing system.

Hot-dip galvanizing.

Hot-dip galvanizing is another method of corrosion protection and is also compatible with the tk interlock sealing system. It can also be combined with a coating (duplex system) to yield additional benefits. The requirements of DIN EN ISO 1461 must be adhered to.

Cathodic corrosion protection.

Corrosion of steel sheet piling below the waterline can be largely eliminated by the use of cathodic corrosion protection. This is particularly recommended in areas where renewing protective coatings or repairing corrosion damage is technically very difficult. These areas must be taken into account in planning.

Signal transmitters.

This system helps to prevent declutching in difficult soil conditions. The signal transmitter, fitted securely to the base of the section to be threaded, indicates declutching instantly so that effective measures can be taken in good time.

Knife-edge bearing.

This system, with a German national technical approval, transfers static and dynamic vertical loads directly, i.e. without intermediate fittings, from the reinforced concrete support to the sheet pile cross-section.

Vibration measurement.

The equipment used to install sheet piles can cause vibrations in the ground. The müller data collection system MS-DATA is available to monitor vibrations in accordance with DIN 4150. Permanent monitoring of the operating parameters of the vibrator automatically prevents set vibration limits for ground or buildings from being exceeded.

Engineering Division.

The specialists in our Engineering Division take care of every aspect of project planning, such as tendering, structural analyses and calculations, construction plans, and tailored solutions for individual needs. We are also happy to offer alternative solutions that are optimized for specific budgets.

Welded structures.

Our plants have been fabricating welded structures from steel piles for many decades. All our sheet piling steel grades are suitable for arc welding in compliance with general welding regulations. Foundation piles, dolphins plus fittings, box piles, structural piles such as corner and junction piles, piles with impact strengthening, piles with interlocks sealed by welding, and custom piles to suit special requirements are all fabricated to proven quality standards.

General and specific quality assurance procedures, e.g. non-destructive weld seam testing, are carried out by an independent institute according to German or, if required, international regulations.



Materials Services
Infrastructure

thyssenkrupp Infrastructure GmbH
Hollestraße 7a
45127 Essen, Germany
P: +49 201 844-562313
F: +49 201 844-562333
info.tkinfrastructure@thyssenkrupp.com
www.thyssenkrupp-infrastructure.com

Australia, Indonesia, Japan, New Zealand
thyssenkrupp Infrastructure Ltd.
Suite 502, 11 Help Street
Chatswood NSW 2067, Australia
P: +61 2 8448-3555
F: +61 2 9411-4311
www.thyssenkrupp-infrastructure.com.au

Baltic States

UAB thyssenkrupp Baltija
Minijos g. 180
93269 Klaipeda, Lithuania
P: +370 46 355-401
F: +370 46 355-032
www.thyssenkrupp-baltija.lt

Brazil

thyssenkrupp Infrastructure Brasil
Av. Rio Branco 124, sl 1602
CEP 20040-001 Rio de Janeiro,
Rio de Janeiro, Brazil
P: +55 3282-5245
www.thyssenkrupp-infrastructure.com

Kazakhstan

TOO thyssenkrupp Infrastructure Kazakhstan
Republic of Kazakhstan
050008 Almaty, Prospect Abaja
109 W, BC Globus, office 1
P: +7 727 356 15 50
F: +7 727 356 15 50
www.tkif-kz.com

Russian Federation

OOO thyssenkrupp Infrastructure
Prospekt Bolshevnikov 54 B, office 211
193315 St.-Petersburg
Russian Federation
P: +7 812 337-6510
F: +7 812 337-6511
info@tkif.ru
www.tkif.ru

United Arab Emirates, Iraq

thyssenkrupp Infrastructure GmbH Abu Dhabi
c/o Royal Business Center
Al Whada City Tower, 11th St,
Hazaa Bin Zayed the First Street
Abu Dhabi, United Arab Emirates
P.O. Box 127432
P: +971 2 8157-860
F: +971 2 8157-888
info-construction.ae@thyssenkrupp.com
www.sheetpiling.ae