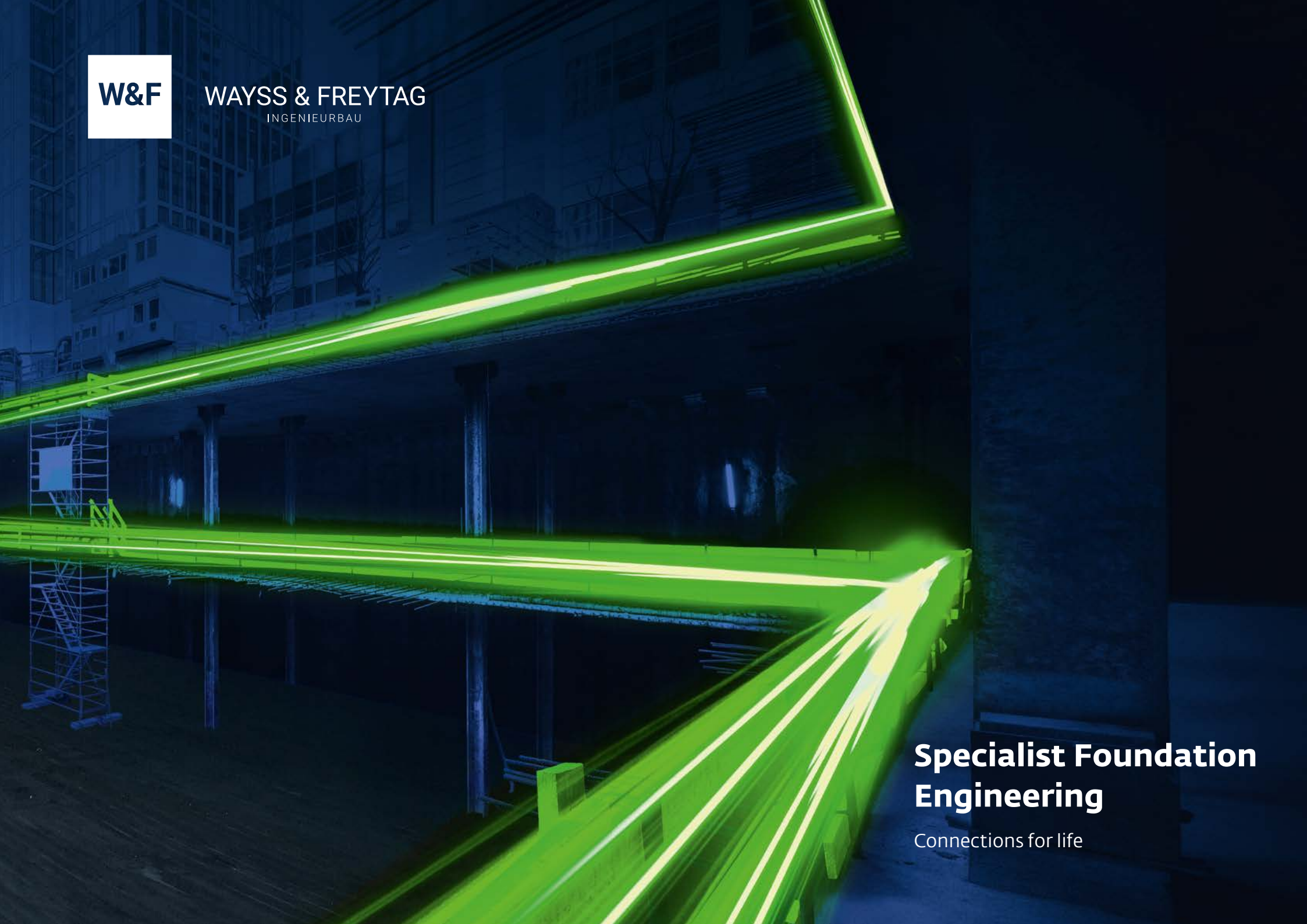


W&F

WAYSS & FREYTAG
INGENIEURBAU

Specialist Foundation Engineering

Connections for life

Connections for life

Wayss & Freytag Ingenieurbau – your partner in specialist foundation engineering

Wayss & Freytag Ingenieurbau AG is your partner in demanding specialist foundation engineering.

With our well-coordinated and reliable team of experts, we offer experienced-based competence as well as sound expertise and motivation at all hierarchy levels – skilled workers, foremen, technical and commercial employees. State-of-the-art, high-performance, special-purpose machines ensure quality and adherence to schedules.

In the field of specialist foundation engineering, we realize demanding infrastructure projects. As a member of ZECH Group, we carry out specialist foundation engineering works throughout Europe.

We look forward to helping you solve your complex specialist foundation engineering tasks.

We develop complete solutions for turnkey construction pits and carry out specialist foundation work primarily in-house. Our highest priorities are quality, adherence to schedules and profitability, so that the success of your construction project is ensured.

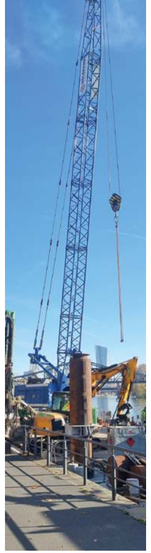
Range of services

Competence for your success

Our wide range of services covers almost all aspects of specialist foundation engineering. We offer you all the various specialist foundation engineering construction methods for the realization of a wide variety of construction work.

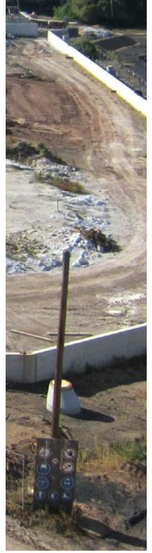
Construction pits
also turnkey, for residential, office and industrial construction

Construction pits for infrastructure projects
such as railway and road tunnels, lock systems

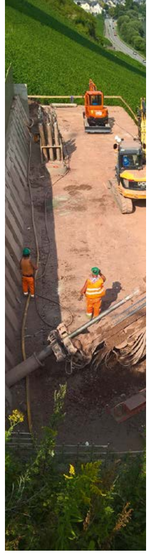


Seawalls and quay walls
construction and rehabilitation of canal and harbour facilities

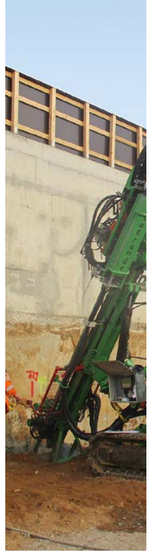
Special foundations
for high-rise and industrial buildings, power plants, wind energy and crane installations or bridge structures



Encapsulation of contaminated sites
at landfills or dyke sealing for flood protection

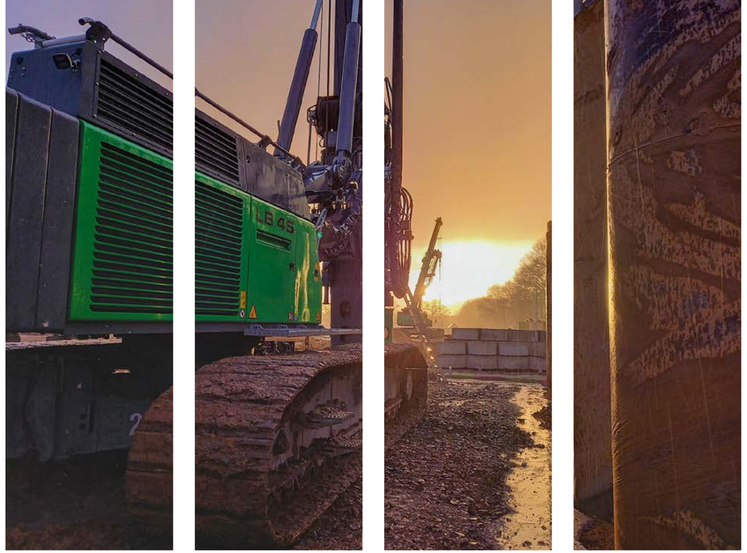


Retaining walls and anchorages
to secure slope breaks or embankments



Underpinning of buildings
Sealing work and soil improvement

Construction pits



The start for your project

The construction of deep, turnkey construction pits in city centres is both a technical and logistical challenge and one of our core competences. We use sheeting walls in diaphragm or bored pile wall technique in combination with anchoring or stiffening and provide horizontal sealing against inflowing groundwater using DSV (jet grouting) technology or underwater concrete. For construction pits in the cut and cover method, anchorages can be dispensed with. This allows early use of the areas above the covers. We ensure both the technically sound and timely completion of your project.

In-situ concrete diaphragm walls

And the groundwater remains outside.

Diaphragm walls are narrow structures which are built sheet by sheet of in-situ concrete, which can be used as largely watertight, low-deformation sheeting walls or as static foundation elements (barrettes). The construction is carried out in the gripper or cutter method, however in rock only the cutter method can be used.

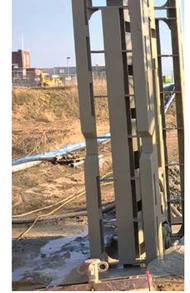
The guide walls serve to support and guide the gripper in the starting area. Once the guide walls have been built, the excavation of the diaphragm elements takes place under the protection of a supporting liquid with thixotropic properties (bentonite suspension, 2-phase diaphragm wall).

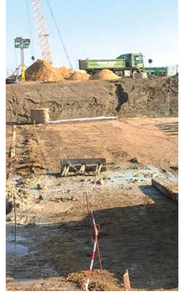
Advantages of the diaphragm wall technology are the high accuracy, a result which is largely watertight, the high rigidity and the fact that the walls can be constructed in close proximity to the building. Another advantage of the diaphragm wall technology is the high speed of execution.

Diaphragm walls are used for deep sheeting walls which are situated in groundwater in inner-city construction pits with high loads or for circular, deep shaft construction pits. The diaphragm walls can be integrated in the building as permanent structures, e.g. for underground car parks.

It is possible to build heavily loaded barrettes as a foundation for high-rise pillars or as foundation elements of primary supports in the cut and cover method. These foundation elements can be additionally equipped with hose systems for geothermal use.

Diaphragm walls





The pollutants stay where they are.

Diaphragm walls are also narrow structures which are built sheet by sheet of a self-hardening suspension, which can be used as watertight sheeting walls or as vertical sealing elements.

They are usually constructed in diaphragm technique by means of an excavation under the protection of a supporting liquid in the gripper or cutter method. In contrast to a 2-phase diaphragm wall with bentonite support and subsequent concreting, a self-hardening suspension is used to support the slot during excavation. These suspensions can be adapted so that they remain liquid during the excavation phase and harden slowly in the state of rest after completion of excavation and the placing of beams, where applicable.

Advantage of the sealing wall technology is the high impermeability to water of the hardened sealing wall material, so that it is often used for sealing purposes in the encapsulation of contaminated sites or in dyke and dam construction. An economical method for securing construction pits is the use of sealing walls as a sheeting element integrated into a natural water retention element. For this purpose, the sealing walls are reinforced in the statically required area with beams or sheet piling and can then be built further without reinforcement up to the water retaining layer.

Bored piles

The load carrier

Bored piles are one of the classic deep foundation elements. They serve to transfer loads from structural loads into deeper, load-bearing soils. The load transfer takes place via peak pressure and surface friction. Bored piles are used as cylindrical foundation elements or as sheeting elements to secure construction pit walls. Bored piles can be installed either as individual piles, in groups or as pile walls. Overlapping bored piles can also serve as sealing. Bored piles can be driven with low vibration in all types of soil.

There are different techniques for bored pile construction. We offer our customers the powerful rotary drilling method, but it is also possible to use a rope grab and a hydraulic piping system. The most frequently used drilling system in Germany is the so-called "Kelly drilling method". For this purpose, the driving force is transmitted to the drilling tool via a telescopic extension. The borehole is supported by means of piping or by a supporting liquid. In stable soils bored piles can be driven without any pipework or supporting liquid.

If, in instable soils, the borehole is supported by means of a support suspension, then only a standpipe is set to ensure the suspension level. Thus, the method of suspension-supported piles is very well suited for piles which are wider at the pile base or for the construction of primary supports. The wider pile base serves to increase the load-bearing capacity by increasing the peak pressure area. In the technique of pile base widening, the lower drill section in the pile base area is widened in the form of a truncated cone using special drilling tools. With this method pile foot diameters up to 3 m are possible and thus increase the pile base area enormously. Alternatively, it is also possible to carry out base or shaft grouting to increase the pile load transfer.

In principle, piles can be driven in all soils as well as in rock. This makes bored piles universally applicable. They serve as foundation piles for load transfer, for example for bearing and discharging large building loads and for mast, crane and bridge foundations. They can also be designed as a combined foundation and energy pile for the use of geothermal energy. Because of their flexural strength, piles can also be used to transfer horizontal loads and serve as shoring for slope breaks. Another advantage of shoring with bored piles is the variable adaptation to all geometries of construction pits.

Jet grouting

If the soil carries and seals

In the jet grouting method, the soil structure is dissolved by means of a high-energy cutting jet (water or cement suspension) and partially extracted. The coarser components are mixed with a cement suspension, and this mixture then hardens in the building ground. With this method, a variety of shapes can be produced. This method serves to stabilize the building ground, which can be used for soil improvement, underpinning of buildings or horizontal or vertical sealing of construction pits. Cylindrical structures or cylinder segments can also be built.

The diameter of the generally cylindrical elements can be influenced depending on the soil by varying the extraction and rotating speed of the jet rod and pump pressure. This method can be used for nearly all kinds of soil (whereas non-cohesive soils are more suitable for the jet grouting method than cohesive soils). Various sizes of drilling equipment are available for the diverse fields of application of the jet grouting method. For example, work in basements can be carried out at working heights of less than 2 m, or high-level drill rigs are available for the production of deep jet grouted floors. In Germany, jet grouting works are carried out on the basis of a license received from the general building inspectorate. Electronic records of the drilling and grouting parameters ensure the consistent quality of the column construction.

Soil injections

Injection treatment against cavities

Injections serve to improve the soil and consolidate and seal the building ground. We offer consolidation injections to underpin buildings and as a securing method in pipeline and tunnel construction as well as sealing injections to make construction pits watertight (closure of gaps and sealing of tunnel floor) and curtain sealing for barrages, weirs and dams.

The injection technique is also used to generate specific soil elevations. For this purpose, after the pore space injection, the soil is additionally injected in certain areas and then grouted to raise the soil permanently. In combination with appropriate monitoring systems, the injection technique can be used to raise buildings or balance building settlements. This technology is often used as a supplement to inner-city tunnelling in order to compensate for possible deformations caused by tunnelling work.

Micropiles

Universal foundation element

The term "micropiles" refers to piles with a diameter of up to 300 mm. Single rods or rod groups (type GEWI) and also small reinforcement cages are frequently used here as bearing element.

Micropiles are suitable both for base anchoring as buoyancy control and to anchor supporting and retaining walls. In combination with shotcrete fences, micropiles are effectively used for soil nailing in slope stabilization. Micropiles are driven by means of anchoring drills and, in restricted spaces and heights, by small drills. These special basement drills enable pile driving even at working heights of only 2 meters. Micropiles are a universally applicable foundation element, e.g. as foundations of alternating load-loaded masts, and are particularly suitable for retrospective foundations.

Anchorages

And everything stays in place.

Anchors mainly serve to transfer predominantly horizontal loads into more distant, bearing soil layers to protect base structures, retaining walls or embankments against tipping, sliding or buoyancy. Depending on the period of use, one differentiates between permanent, semi-permanent or temporary anchors. The anchors can consist of single strands or a single rod which is installed in the respective drill holes. For this, by the precise injection of cement mortar, a grout body is built up, which takes over the transfer of loads into the building ground. Once the cement mortar has hardened, the anchor is usually prestressed to limit deformations. In cohesive soils, the use of post-injection increases the load bearing capacity significantly. For this purpose, the incompletely hardened cement mortar of the grout body is broken up by means of hydraulic pressure, and these areas are subsequently filled with cement suspension.

By using special sealing constructions during drilling and installation of the anchors, they can also be installed while being exposed to extremely high groundwater pressure and without any of the soil behind the retaining wall being washed out. Temporary anchors can be removed after use.

Ground freezing

Put on ice

During the ground freezing process, the soil is temporarily frozen by extracting latent heat, thus increasing the stability and sealing the ice formation of the fissure and pore water. Liquid nitrogen or natural brine are used as freezing agents. This method is used for temporary stabilization and sealing during the construction of cross passages or to close gaps in the sheeting where pipes cross.

Advantages of this method are that, once the frozen mass has thawed, no residues remain in the soil and that this method can also be used to close groundwater windows. With the aid of small-scale drilling technology, freeze pipes, through which the freezing agent runs, are accurately positioned in the ground. To check whether the freezing was successful, the soil temperature is monitored by means of temperature pipes, which are also drilled.

Specialist foundations

Inexpensive and reliable

Various special techniques are available for building foundations. The use of ductile cast iron piles has proven to be a competitive method for pile foundation. Here, a ductile cast iron pipe is driven into the soil in 5 m segments by means of a hydraulic hammer. Once a specified ram criteria has been reached, during which the soil cannot be penetrated further within a defined interval, the ramming process is completed and the cast iron pile cut to target height. The advantage of this method is that the remaining part can be used for the next pile. Each piece of a pile has a sleeve so that the pile can be enlarged by inserting a new piece of pile. The piles can transfer their load into the ground either as grouted friction piles or end-bearing piles which transfer the load into the ground through their tip.

Quality, HSE, environmental protection and technical consultation

High standards for people and the environment

To ensure the functionality and quality of our services, we maintain an extensive quality management system according to DIN EN 9001. This guarantees our customers a consistently high quality standard. Regular training of our employees and numerous quality controls support the quality management system. In this way we avoid product and manufacturing defects in advance. We are supported by well-equipped construction laboratories for suspension control.

Production parameters are electronically recorded in the individual work steps and the performance is measured in order to be able to react early to deviations from specifications. This includes electronic records of drilling and gripper movements to meet accuracy requirements. Static and dynamic pile tests for the determination of pile forces as well as suitability and acceptance tests ensure that the planned forces can be safely transferred into the ground. In addition, we increase the safety of deep construction pits by using special measuring programmes. The control of anchoring forces of deformations in sheeting gives information about the conformity with the calculation assumptions.

Safety at work for the protection of all project participants is our top priority. Consistent training, exercises and regular checks ensure a high level of on-the-job safety. We are AMSBau certified and more than 95% of our employees have been instructed in accordance with SCC guidelines.
We actively protect the environment by using state-of-the-art machine technology.

Our state-of-the-art equipment meets the latest guidelines with regard to exhaust and noise emissions while minimizing the consumption of operating materials.

Through the targeted use of our construction processes, we plan the use of materials in as resource-saving a manner as possible. Our specialist staff has many years of experience and is happy to advise you on technical planning tasks such as e.g. complex construction pits. In our projects we are supported by the specialists of our in-house technical department.

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