



Aktion

01

Engineering
Lifting Equipment
Technical Services

Q7

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Topics

Precise planning guarantees optimum performance

Obtaining the right advice is always a matter of going to the right place. As a manufacturer, AXZION-GKS is perfectly placed to find and implement effective solutions for its clients.

Construction of the lifting equipment

The number of load changes is key. The intensity with which the lifting equipment will be used must be taken into account in order for it to be constructed correctly.

Which materials are used?

It is only possible to manufacture a safe, high-quality solution using excellent components. For many years, we have only been working with the best suppliers of steel and building components.

Specialisation as a means of designing optimal lifting equipment

More than twenty experienced design engineers specialising in lifting equipment and with expert knowledge in structural analysis, welding and drive technology design the optimal solutions for your needs.

Specific operating conditions

Not all lifting equipment is used with a crane. If, for example, the equipment is being designed for use with a forklift truck or at sea, the equipment must be designed differently to reflect this.

AXZION-GKS is extremely well qualified

In addition to using certified welders and modern manufacturing machinery, specialist welding engineers are on hand to provide support during the production process.

Drive units and control engineering

Advanced lifting equipment is increasingly fitted with electromechanical or hydraulic drive units. Extremely high demands are placed on the equipment's control systems.

Load tests using in-house test benches

Stringent requirements are placed on lifting accessories and equipment. Our two in-house test benches are capable of carrying out both manual and computer-aided tests on equipment loaded with excess weight.

Maintenance, repairs and operation

Minimising downtimes during operation is one of the important tasks carried out by the service team.

Materials and process testing

Our work is verified by in-house or independent testers using state-of-the-art testing equipment. Needless to say, all certificates are readily available.

Equipment is correctly documented

Lifting equipment must always be delivered with comprehensive documentation, which contains information that is just as important as the manufactured product itself.

Handling instructions

AXZION-GKS employs highly qualified experts in lifting technology as well as specialised graphic designers to create this documentation and carries out this work in collaboration with the equipment operators.

Why our clients
are our driving force.





**Why advanced
lifting equipment is like a
good insurance policy.**

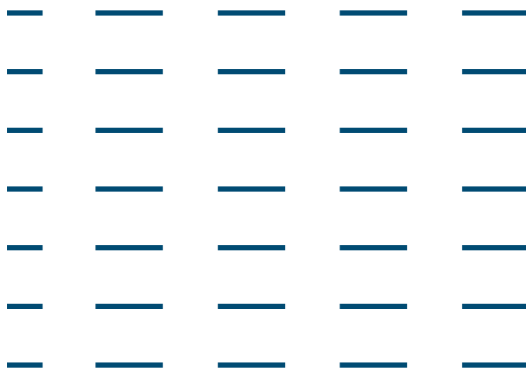


The SpanSet Group is an international specialist in the lifting and securing of loads.

With subsidiaries in all major developed countries and a global network of representatives, SpanSet is well versed in current regulations and can provide comprehensive on-site services.

We manufacture a variety of products, from fibres and trusses, to ratchets, lashing straps, steel components and the lifting equipment itself.

As a manufacturer, we are able to provide you with tailor-made equipment and customised solutions that fulfil the stringent requirements that must be met when transporting and assembling wind turbines and other large-scale components.



Why our expert knowledge translates into responsibility.

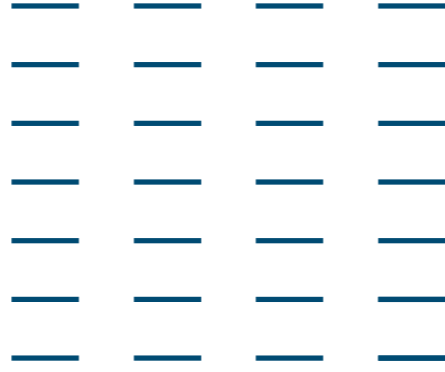
We take responsibility

A manufacturer is "responsible for designing and producing products" that are placed on the market bearing its name.

As soon as an operator designs and produces its own lifting equipment, it automatically becomes a manufacturer. Time and time again, insufficient attention is paid to the risks and liabilities involved in lifting and moving heavy loads, which sometimes has dramatic consequences for those responsible and those affected.

Always buy lifting equipment from a specialist and remember that choosing an unqualified manufacturing company may lead to those making this choice being held personally liable.

With certifications ranging from the manufacturer's qualification for fusion welding pursuant to DIN EN ISO 3834-2 and the DIN EN 1090-1 manufacturer certification, to an in-house factory production control system for structural components up to EXC3 pursuant to EN 1090-2 and a quality management system certified according to DIN EN ISO 9001, you can rest assured that you are purchasing from a company that complies with all the relevant regulations.



From design, welding and testing to documentation and service, large-scale projects often involve a number of companies working simultaneously. This process is rather challenging, as each party must complete its work in full before the next stage can begin.

Responsibility is sometimes not clearly divided between the various companies and opportunities that could be gained through using modern manufacturing machinery are often missed.

AXZION-GKS provides everything from one source.

AXZION-GKS provides everything from one source. Development, manufacture and service are closely linked, any problems that may arise are resolved quickly and the design is tailored perfectly to the latest manufacturing techniques.

Our service team is on hand immediately in the event of any difficulties and we provide on-site instruction to your employees on how to use the lifting equipment supplied by us.

The enormous investments currently being made into renewable energy as well as the production of oil and gas are resulting in a growing need for large-scale lifting equipment. The weight of individual elements is increasing rapidly and many units are preassembled before transportation. In some cases, lifting solutions are needed urgently and the cost of not having lifting equipment can be extremely high. AXZION-GKS is capable of very quickly supplying complete units that have been comprehensively tested by companies such as DEKRA or Germanischer Lloyd or by our in-house 600 t or 1,500 t test benches.



Why does lifting equipment provide a competitive advantage?

01.1

QUALITY SEVEN
Consultation



01.1 CONSULTATION

Advanced lifting equipment

Advanced lifting equipment

Standard or customised solutions

Obtaining the right advice is always a matter of going to the right place. As a manufacturer, we are perfectly placed to find the right solution for you.

This applies in terms of both price and the system itself. The fact that approximately 84% of the solutions provided by us are modified or entirely customised constructions speaks volumes.

Only one sixth of the lifting equipment that leaves our factory is a standard design.

Standard or customised solutions We provide the right advice

By carrying out its own design and manufacturing work, AXZION-GKS has a variety of individual construction elements at its fingertips that can be assembled as required to create a comprehensive modular solution.

Our strength lies in the fact that we are able to create and deliver custom-built machinery in a short space of time. We find the right solution for you, be it an affordable standard construction or a customised design.



Position of the load's centre of gravity

It is imperative that the designers are made aware of the precise location of the load's centre of gravity and the position of the load-attachment points. To this end, a technical consultation is compulsory and extra design features may be necessary.

The load's centre of gravity always lies directly below the crane hook and, where required, the load and the lifting equipment are tilted to achieve this.

Here, it should be taken into account that in accordance with DIN EN 13155 unplanned inclinations to lifting beams must not exceed 6°; this must be observed when designing the equipment. Angles of inclination greater than 6° must be reported individually and secured using special design features.

Attaching a load below its centre of gravity may lead to instability that, at worst, results in the load suddenly shifting position.

01.2

QUALITY SEVEN

Design

01.2 DESIGN

Experience and state-of-the-art technology

Experience and state-of-the-art technology

Specialisation as a means of designing optimal lifting equipment

More than twenty experienced design engineers specialising in lifting equipment and with expert knowledge in structural analysis, welding and drive technology design the optimal solutions for your needs.

To do so, personal consultations are often required. Our developers work at our various locations around the world, including in your area.

Continuing professional development is very important at AXZION-GKS and all employees receive ongoing training.

Specialists from the certification bodies DEKRA and TÜV, our professional association and renowned suppliers ensure that our knowledge is updated regularly so that we are able to comply with new standards as soon as they are introduced.

New knowledge is communicated to all members of staff and experienced developers train our new employees.

Our developers work with modern computers and the latest software. Designs are created in 3D using SolidWorks and are verified using the integrated FEM software, while structural analyses are carried out using MathCad or RSTAB.



Load changes

The number of load changes is key. The design engineer of a piece of lifting equipment must work with the operator to establish whether DIN EN 13155 "Cranes – Safety – Non-fixed load lifting attachments" may be used or whether the lifting equipment must be constructed in accordance with Eurocode 3 – DIN EN 1993 "Design and construction of steel structures". The intensity with which the lifting equipment will be used must be taken into account in order for it to be constructed correctly. The following criteria are used to calculate the lifting intensity.

Factors for determining the design

Planned service life	Operating life in years
Number of lifting operations a day	According to the VBG 9a regulation on lifting equipment, multiple-shift operation occurs when there are > 20,000 load changes
Load changes per lifting operation	A load change occurs when the lifting equipment changes from not carrying a load to carrying a load that weighs at least 50% of the maximum permissible load-carrying capacity of the lifting equipment

Example calculation for design "A"

Service life	4 years 250 working days One-shift operation
Number of lifting operations a day	2
Load changes per lifting operation	2
Calculation	4 x 250 x 2 x 2
Result	4.000
Standard applied	DIN EN 13155

Example calculation for design "B"

Service life	10 years 250 working days One-shift operation
Number of lifting operations a day	40
Load changes per lifting operation	4
Calculation	10 x 250 x 40 x 4
Result	400.000
Standard applied	Eurocode 3-DIN EN 1993

01.2 DESIGN

Experience and
state-of-the-art technology

Experience and state-of-the-art technology

Safety information

Please take note of any changes in the operating conditions (e.g. a change to the usage frequency if the lifting equipment is moved to a different department).

Up to 20,000 load changes

If the lifting equipment being designed is expected to deal with a maximum of 20,000 load changes, EN 13155 "Cranes – Safety – Non-fixed load lifting attachments" is applied in full. This means that the mechanical load-bearing components must meet the following mechanical stability requirements:

I) The dimensions of the lifting equipment must be arranged in such a way that the machinery is able to bear a static load that is three times its load-bearing capacity and hold the load, even if doing so results in permanent changes to its shape.

II) The dimensions of the lifting equipment must be arranged in such a way that it is able to bear a static load that is double its load-bearing capacity without any permanent changes to its shape.

III) A further significant requirement is laid down in paragraph 6 of EN 13155. It states that individually designed and manufactured products must undergo both a design inspection and an individual inspection. With standard products produced in series, the design inspection must be carried out on one or multiple sample products from the production line and the individual inspection must be carried out on each of the manufactured products.

IV) The manufacturer of the lifting equipment must provide evidence that the welding was carried out by personnel qualified to the standard of EN 287-1 or DIN EN ISO 9606-1 "Qualification testing of welders – Fusion welding". Furthermore, the quality of the welded joints must be verified in accordance with DIN EN ISO 5817 "Evaluation of welded joints".

DIN EN 13155 does not cover the dangers concerning the mechanical stability of lifting equipment which is intended to undergo more than 20,000 load changes. As a result, it is imperative that lifting equipment designed in accordance with DIN EN 13155 is withdrawn from service as soon as 20,000 load changes have been performed.



Operating temperatures

The designers must be made aware of the operating temperatures. Standard lifting equipment is used in temperatures of between 0 °C and +80 °C.

When used outdoors, temperatures may fall to -20 °C and in some regions of the world, temperatures as low as -40 °C are possible. In such conditions, low-temperature steels are used.

When hot loads are lifted, on the other hand, extremely high operating temperatures may arise and here, special types of steel capable of withstanding such operating conditions must be chosen.

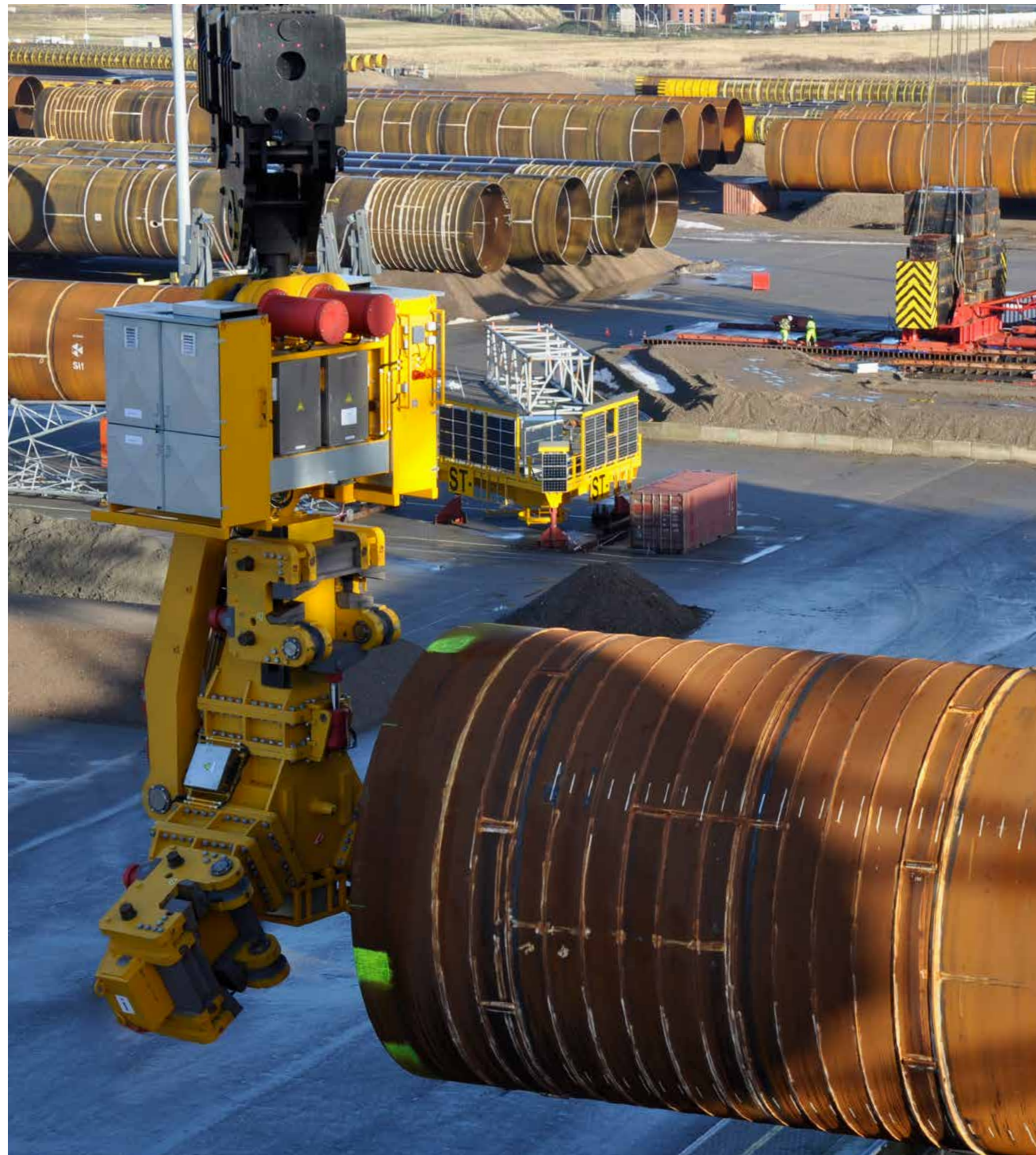
Lifting speed

The lifting equipment must be designed in line with the speed at which the loads will be lifted. In general, the maximum lifting speed is 10 m/sec. To make the loading process quicker, much higher speeds are possible at cargo handling companies (ports, steel works, etc.), for example. These speeds must be communicated to the designers in advance.

01.2 DESIGN

Experience and
state-of-the-art technology

Experience and
state-of-the-art technology



Specific operating conditions

Forklift truck

Not all lifting equipment is used with a crane. For example, lifting equipment is often used with a forklift truck.

This results in significantly higher dynamic load conditions. Moreover, the lifting speed is generally much greater than with a normal crane.

The possible use of the lifting equipment with a forklift truck may result in many load changes taking place in very quick succession and it is essential that this is taken into account during the design phase.

Offshore

The requirements placed on lifting equipment used at sea are particularly stringent and, as a result, the design and production stages are strictly regulated.

The dynamic forces produced by the wind and waves may be enormous, making working at sea dangerous. Lifting equipment used in these conditions must therefore be easy to operate and extremely safe.

By providing us with detailed information on how you wish to use your lifting device, we will be able to design the right equipment for your needs.

01.3

QUALITY SEVEN

Materials



Best components for optimum performance

It is only possible to manufacture a safe, high-quality solution using excellent components. For many years, we have only been working with the best suppliers of steel and, as such, our tested blasted steels are mainly obtained from Arcelor, UnionStahl, ThyssenKrupp and Carl Spaeter.

When selecting the sheet metal to be processed, we not only focus on optimum weldability (lowering the risk of cold cracks, for example) and excellent machinability, but also look for fine-grained steels with high levels of strength and resistance.

We frequently choose to work with various thermomechanically rolled steels (TM steels for short).

The stainless steels used must have outstanding levels of resistance against a number of corrosive substances as well as a high resistance to oxidation. More often than not, these criteria result in us choosing to work with austenitic (non-magnetic) steels with a nickel content of $\geq 2.5\%$ (from material number 1.44...).

Chain components

We mostly obtain our chain components from RUD's chain factory in Aalen, our shackles from van Beest and our wire ropes from Henschel. Renowned companies specialising in closed-die forging, such as RUD Schöttler Umformtechnik & Systemlieferant in Hagen, supply our crane hooks and lifting eyes.

secutex

SpanSet-secutex is the leading manufacturer of plastic components for protecting materials. Thanks to its excellent mould-making skills, the company is able to produce tailor-made solutions rapidly and cost effectively. Efficient planning is essential. secutex impact protection elements form an integral part of the lifting equipment supplied. The parts subject to wear can be changed quickly and easily.

SpanSet

Textile lifting accessories, such as trusses and round slings, of course come from our parent company SpanSet. SpanSet's large manufacturing plant in Übach-Palenberg is able to find solutions even for super heavy-duty lifting. Repairs and express deliveries ensure that the lifting equipment supplied by us is readily available.

01.3 MATERIALS

Materials from
renowned manufacturers

Materials from
renowned manufacturers

All materials are certified

We require that the manufacturers of all the materials used have been awarded at least a 3.1 inspection certificate in accordance with DIN EN 10204. For equipment that is to be used offshore, a 3.2 inspection report in accordance with DIN EN 10204 may also need to be compiled by an independent expert commissioned by the manufacturer. Delivered materials are only approved for use in our manufacturing plant once our appropriately qualified employees have performed a systematic inspection of the incoming goods.

Flame cutting

We place huge importance on top combustion quality and the complete traceability of the materials used. Flame-cut parts are produced using modern CNC-controlled flame or plasma cutting machines, while processing is carried out using state-of-the-art trimmers.

Documented usage list

Steel is only used in the manufacturing process if the appropriate inspection certificates and/or inspection reports are in place and once the material has been approved by our in-house quality assurance team. All material certificates, inspection reports and usage lists are managed and archived on a computer system, meaning that they remain available indefinitely and can be retrieved at any time.



01.4

QUALITY SEVEN

Manufacture



DIN EN 1090

DIN EN 1090 officially came into force on 1 January 2011. In order to obtain approval from building officials across Europe to manufacture steel constructions, companies must meet the applicable technical standards. Only companies that fulfil the requirements laid down in this standard and which have been inspected and certified by a recognised body may be commissioned to manufacture metal structures (e.g. welded steel structures).

Companies that wish to manufacture welded steel structures or perform welding on existing steel structures must prove that they have suitably qualified employees and the required technical equipment. Certified companies must arrange regular inspections to ensure that they are still working in line with the standard. Among other aspects, conforming to this standard involves working in compliance with the quality requirements laid down in DIN EN ISO 3834 in the appropriate level of quality.

To obtain approval from building officials to manufacture structural components, companies must fulfil the following requirements pursuant to DIN EN 1090.

Part 1
Requirements for conformity assessment for structural components

Part 2
Technical requirements for the execution of steel structures

The requirements to be fulfilled are determined by the applicable execution class (EXC) pursuant to DIN EN 1090-2. One of four execution classes ranging from EXC 1 to EXC 4 is allocated depending on the load put on the structural component, the type of steel used, the damage category and other criteria.

01.4 MANUFACTURE

DIN EN 1090

DIN EN 1090



AXZION-GKS has been approved for class EXC 3. The highest class, EXC 4, does not apply to lifting equipment.

Class EXC 3 applies to structural components that have the potential to cause a high degree of damage and that are predominately exposed to static or dynamic load conditions as well as to steels with a yield strength > 355 MPa.

Companies belonging to class EXC 3 must appoint a qualified welding supervisor and certified welders who hold valid welder certification in accordance with DIN EN 287-1 or DIN EN ISO 9606-1 and must follow a welding procedure supported with a valid Welding Procedure Qualification Record (WPQR).

DIN EN 1090-1 requires that companies have a certificate relating to their in-house factory production control system and a welding certificate, both of which must be obtained from a recognised body after an initial inspection. The companies are also subjected to regular inspections of their in-house factory production control systems.

Certified by DVS ZERT and TÜV Rheinland
AXZION-GKS has certifications ranging from the manufacturer's qualification for fusion welding pursuant to DIN EN ISO 3834-2 and the DIN EN 1090-1 manufacturer certification, to an in-house factory production control system for structural components up to EXC 3 pursuant to EN 1090-2 and quality management systems certified according to DIN EN ISO 9001.

01.4 MANUFACTURE

DIN EN 1090



DIN EN 1090

Support during manufacture by experienced welding engineers

Our professional welding engineers design the constructions in a way that makes them suitable for welding and also measure the welded joints required. The welding process and results are laid down in a WPS (Welding Procedure Specification) pursuant to EN ISO 15609-1.

Welding in line with a WPS means that the process is carried out according to a certified Welding Procedure Qualification Record (WPQR). This serves as a set of instructions on how the welded joints are to be produced and which settings the welder must use on the welding equipment. It also includes instructions on how to prepare and finish the joints.

Certified welders

We attach immense importance to the quality of the welded joints that we produce. All welders possess valid welder certificates pursuant to DIN EN 287-1 and/or DIN EN ISO 9606-1 and undergo continuous in-house training.

Only ultra-modern welding equipment is used and this is regularly inspected and continually updated.

Modern manufacturing machinery ensures the best possible results

The only way that perfect quality can be achieved at an affordable price is through the use of new and modern manufacturing machinery. Our production lines live up to this ideal. All flame and plasma cutting machines are CNC controlled, while our numerous large boring machines and portal milling machines ensure all components are manufactured to a high quality. We work in line with the common mechanical engineering standards. Replacement parts can be reproduced and dispatched at very short notice and adjustments to the lifting equipment are generally unnecessary.

However, modern CNC-controlled machinery is only as good as its operator, which is why our specialists receive continuous in-house training. We, of course, also work hard to instruct the technicians of tomorrow. SolidCAM transfers the designed components directly to the machinery, minimising transfer errors.

A high level of efficiency keeps prices to a minimum

CNC-controlled sawing and drilling machinery is used to cut and process beams and is capable of automatically sawing down steel sections and drilling directly into them.

By manufacturing welded components using our large CLOOS robotic welding systems with eight controlled robot axes, perfectly welded joints can be created with remarkable speed.

Components capable of working at high intensities are manufactured cost effectively in our plant in the Czech Republic, where the required welding certifications are, of course, also in place.

A highly efficient logistics system is particularly important for large welded components. As such, our tall and spacious manufacturing plants are equipped with a number of overhead and jib cranes and enable the production line to run smoothly. In the case of urgent demand, the manufacturing capacity can be markedly increased in the short term.

01.5

QUALITY SEVEN
Drive units and control engineering

01.5 DRIVE UNITS AND CONTROL ENGINEERING

Reliable operation and multiple safety features



Reliable operation and multiple safety features

Hydraulic components

Hydraulic cylinders

AXZION-GKS is equipped with the processing machinery needed to manufacture its own large lifting cylinders. The dimensions of the load-attachment points are calculated with lifting devices in mind and the seals are obtained from qualified suppliers. While the delivery times for cylinders of this kind are often extremely long, we are able to supply replacements at short notice.

Hydraulic drive units

AXZION-GKS commissions hydraulic drive units for use offshore to be built in line with its own specifications. These very compact drive units have two hydraulic pumps that are positioned in a joint tank. If the main pump breaks down, the auxiliary pump can be used to complete the lifting operation without any problems.

Other hydraulic components

Components such as valves and tubes are mainly sourced from a supplier that is represented across Europe, enabling replacement parts to be delivered at very short notice. Redundant valves are sometimes fitted to prevent the system from failing in the event of a fault occurring in one of its essential valves.

Electronic components

Generators

AXZION-GKS commissions generators for use offshore to be supplied in line with its own specifications. Two generators always work in parallel so that if one breaks down, the other can be used to complete the lifting operation.

Electronic drive units

We only use electronic drive units from well-known German manufacturers that have demonstrated their suitability in a number of ways. The units are designed with lifting procedures in mind and the difficult conditions to which lifting equipment is exposed are generously allowed for.

Control systems

Our control systems have a modular structure and are subjected to rigorous testing. They are assembled by our own electrical engineers so that they can be tested on site and adjusted if necessary.

Remote control

AXZION-GKS commissions a supplier that is represented across Europe to build its remote control systems in line with its own specifications.

When it comes to lifting equipment used offshore, we are able to measure any interferences in frequency on deck and adjust the remote control settings accordingly.

Operational procedures that have a crucial bearing on safety and security are locked using key systems and can only be followed when the securely stored second key is used.

Operating messages can be transferred via a WLAN, enabling them to be analysed easily by a remote maintenance team.

Cameras/spotlights

Some of the operational procedures carried out by the supplied lifting equipment must be additionally monitored as a result of some areas being difficult to see.

To overcome this, we use appropriate multiple camera systems with radio transmission that display the recorded images on split screens.

Night turns to day: We also fit the lifting equipment with high-performance LED spotlights.

01.6

QUALITY SEVEN

Testing and documentation

01.6 TESTING AND DOCUMENTATION

Testing

Welded joints and materials testing

Welded joints and materials testing

Materials and process testing provides extra peace of mind. Our work is verified by in-house or independent testers using state-of-the-art testing systems. Needless to say, all certificates are readily available. We conduct our own tests during production and the mandatory final inspections are always performed by an impartial testing institute.

Magnetic particle inspection

Magnetic particle inspection is the most commonly used method for detecting surface defects and near-surface defects such as hairline cracks in magnetisable iron and steel raw materials. The leakage flux that appears at surface cracks when the building component is magnetised means that the magnetisable particles in the testing material stick at that location. The effect is visible and results from the contrast between the background and the testing material.

Dye penetration

Dye penetration is one of the oldest non-destructive testing procedures for detecting surface defects and can be performed on almost any metallic and non-metallic material. During this process, the capillary action results in the test liquid penetrating any type of surface defect

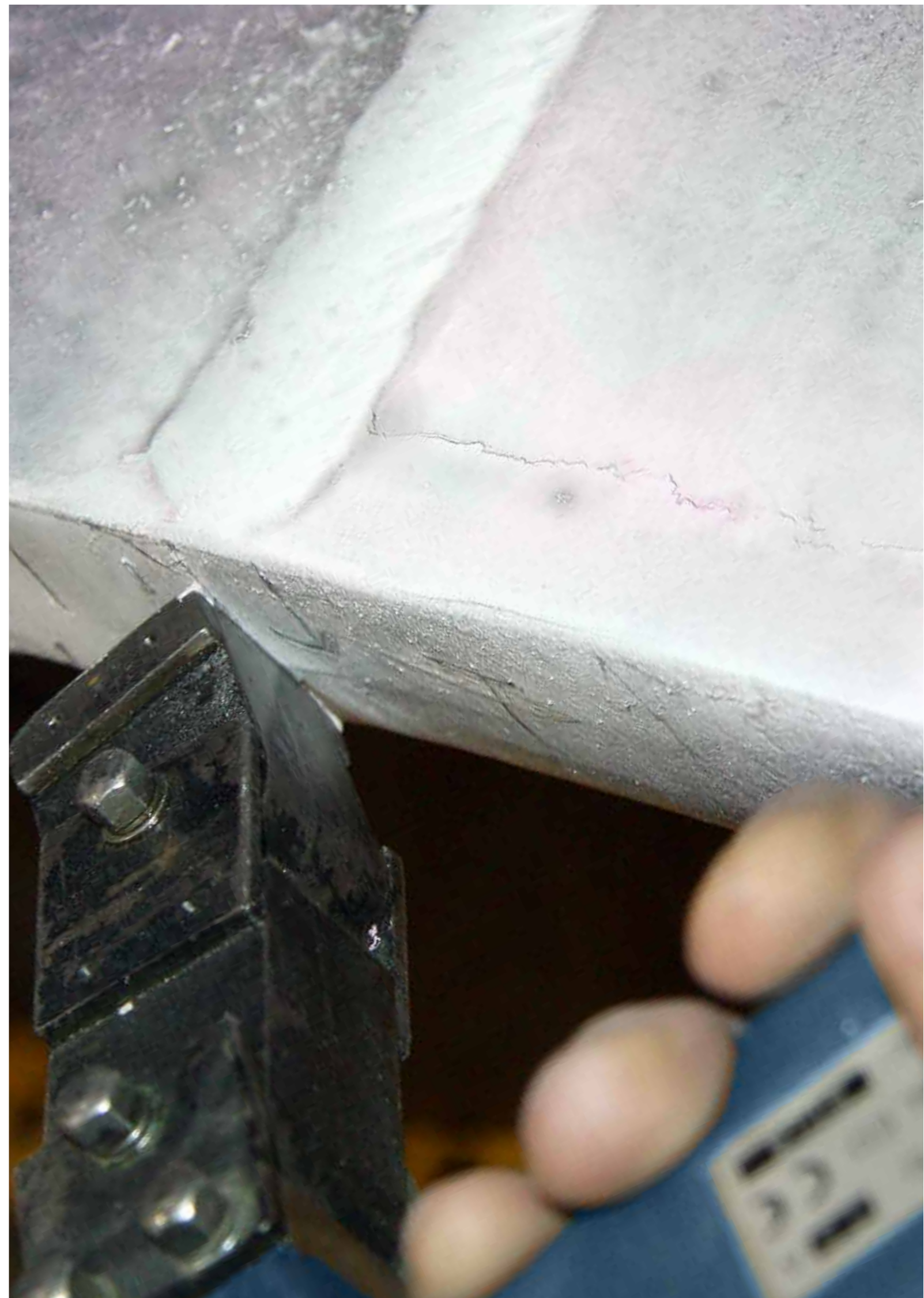
in the material. Following careful washing of the solution, a layer of developer is applied which creates a counter capillary action. This draws out the liquid which had penetrated into cavities and cracks and makes the defects visible.

Ultrasound testing

Ultrasound testing is particularly useful for detecting internal and external defects in materials that conduct sound and is thereby able to find errors throughout the entire cross section of the component. The acoustic method for the non-destructive testing of materials is used for quality assurance in tubes, welded joints and cast parts as well as for determining wall thickness.

Notched-bar impact test

How tough can a material be? Notched-bar impact tests are carried out to determine the toughness of metallic material and even work at extremely low temperatures.



01.6 TESTING AND DOCUMENTATION

Testing

Load testing

AXZION-GKS works closely and in partnership with major certification bodies such as TÜV, DEKRA, Lloyds Register and DNV GL.

This means that new designs are often discussed in advance and the required safety features are jointly determined.

Testers are on our premises almost daily to monitor the construction of large lifting equipment as is necessary under the applicable standards or to oversee the obligatory load tests.

The requirements placed on lifting equipment for use offshore are enormous and, as a result, all lifting accessories and equipment used in this area have always been tested with loads exceeding their load-bearing capacities.

The intense and prolonged exposure to waves and wind and the overall difficult operating conditions place particular stress on the lifting equipment, meaning that tried-and-tested safety features are of the utmost importance.

Turbines, gas compressors and wind power plants are all extremely valuable. As such, damage during transportation must be avoided at all costs, as very long repair and replacement times would result in dramatic economic consequences.



600 t test bench

The 600 t test bench has been used on our premises in Langenfeld for many years and measures 20 m in length, 5 m in height and has an unladen weight of more than 100 t.

The load test can be controlled by hand or by a computer. The latter option generates an evaluation report. The Materials Testing Office NRW has verified the accuracy of the test bench and all measurements are calibrated and certified.

The test bench is open to everyone and even third-party lifting equipment can now be tested here at short notice.

Major certification bodies such as Lloyds Register, Germanischer Lloyd and DEKRA have already overseen load tests on the test bench and were very impressed with the ease with which the equipment can be used.

It has been possible for comprehensive series of tests, such as the testing of new load-attachment points to a tower, to be carried out at the tester's own pace under completely realistic operating conditions.

In the future, more and more lifting equipment that is already in use will be tested in line with DIN EN 13155. These tests require the equipment to bear a load that is double its load-bearing capacity to check that it conforms with the standard. An expert from an impartial certification body is on hand to verify the results.

1500 t test bench

Until now, testing very large pieces of lifting equipment when loaded with excess weight has been extremely difficult and expensive.

For example, testing a large 800 t lifting beam required a floating crane to be hired.

The process involved ten people attaching the test weights and performing the test over several days. The overall cost of conducting this load test exceeded the value of the lifting solution itself several times over.

The testing system measures 12 m in length, 15 m in height and has an unladen weight of more than 150 t.

The traction force of up to 1,500 t is created by two enormous hydraulic cylinders. The volume of the tank in the hydraulic unit is as large as the heating oil tank found in a detached home. The load test can be controlled manually or by a computer.

01.6 TESTING AND DOCUMENTATION

Certification and documentation

Documentation and document management

AXZION DocuManager – properly manufactured equipment needs comprehensive documentation

The documentation is just as important as the manufactured product itself. In international steel construction and mechanical engineering, the materials used must be precisely documented. In fact, an undocumented component may lead to the entire piece of lifting equipment being rejected. Lifting equipment must therefore always be delivered with comprehensive documentation. The data and content must correspond to the current design of the lifting equipment and the documentation must include evidence of the quality of the components and materials used as well as details of the inspections carried out.

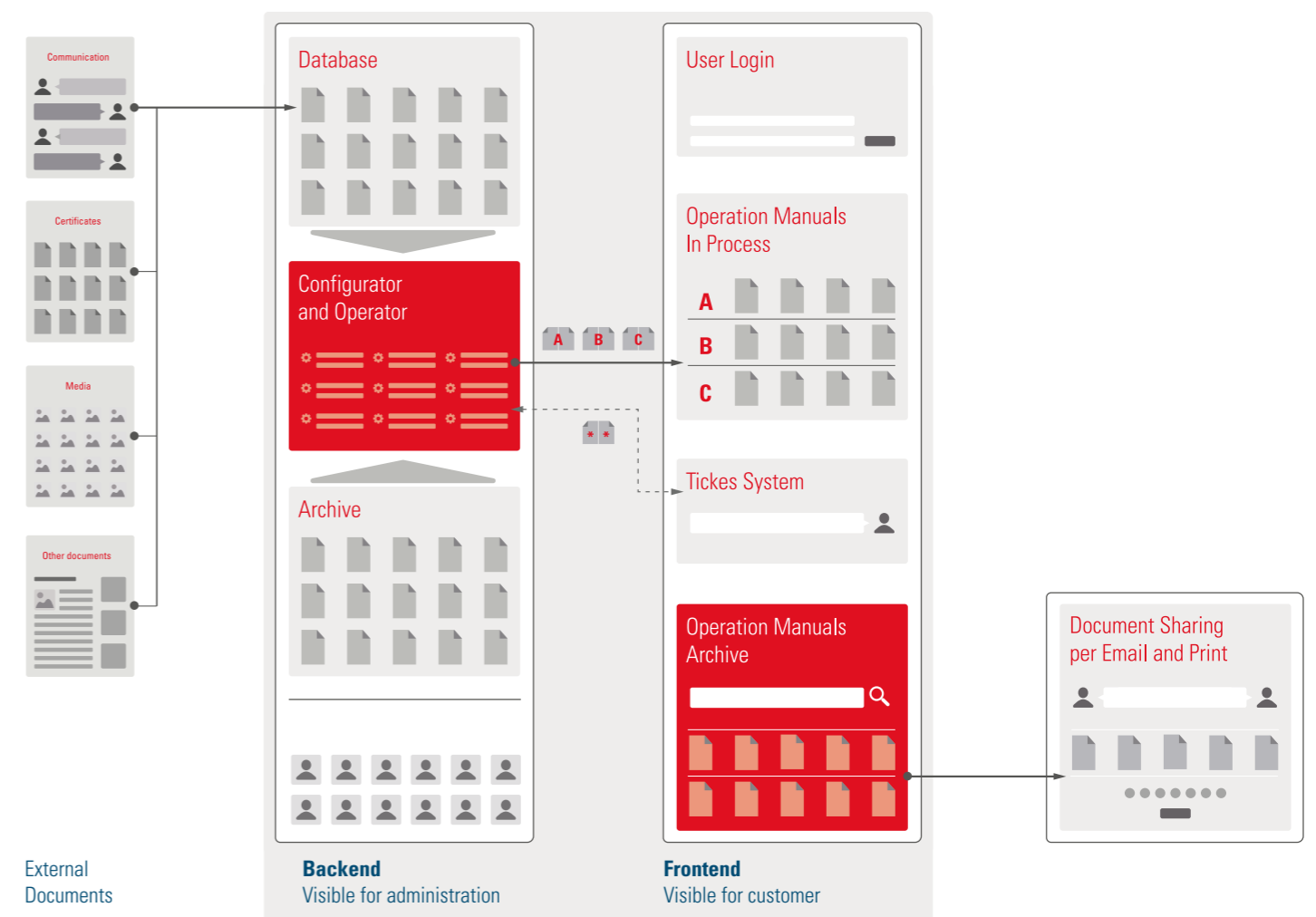
While templates can be used to create the documentation for simple standard constructions, complex customised solutions require their own amended set of operating instructions. To create these, documents from various sources must be compiled and the content is formatted by hand in the same way as documents for printing. The proofreading process takes place over multiple channels, such as email and telephone, making it hard work and time-consuming.

However, the newly developed AXZION DocuManager has made this process easier by generating, managing and archiving documentation semi-automatically and by organising the workflow between the client and manufacturer. Content, which is the part requiring editing, is prepared separately from the design of the document and is only laid out properly on the page once it has been exported to a PDF. The documents produced in this way are archived in the system and can be consulted and sent from the program.

Advantages of the AXZION DocuManager:

- Formatting no longer required thanks to standard layout, resulting in a considerably reduced working time
- High-quality documents thanks to standardised document structure and recurring content
- Client-specific layout possible (documents conform to quality management and/or corporate design)
- Documents comply with current legal standards (AXZION documentation is DEKRA compliant)
- Archive of all project-related data with revisions
- Users are automatically informed of any changes in status to the documents
- In-house ticket system organises the proofreading process of each document
- Documents can be sent from the system via links
- Print service allows documents to be ordered from the system as booklets (automatic print and logistics jobs without any manual input)

Partially automated document management with a ticket system and document sharing interface



01.7

QUALITY SEVEN

Service

01.7 SERVICE

Maintenance, repairs and operation

Maintenance, repairs and operation

Tests pursuant to the German Accident Prevention Regulations

According to the German Accident Prevention Regulations, lifting equipment must be tested at fixed intervals to check that it is in safe working order.

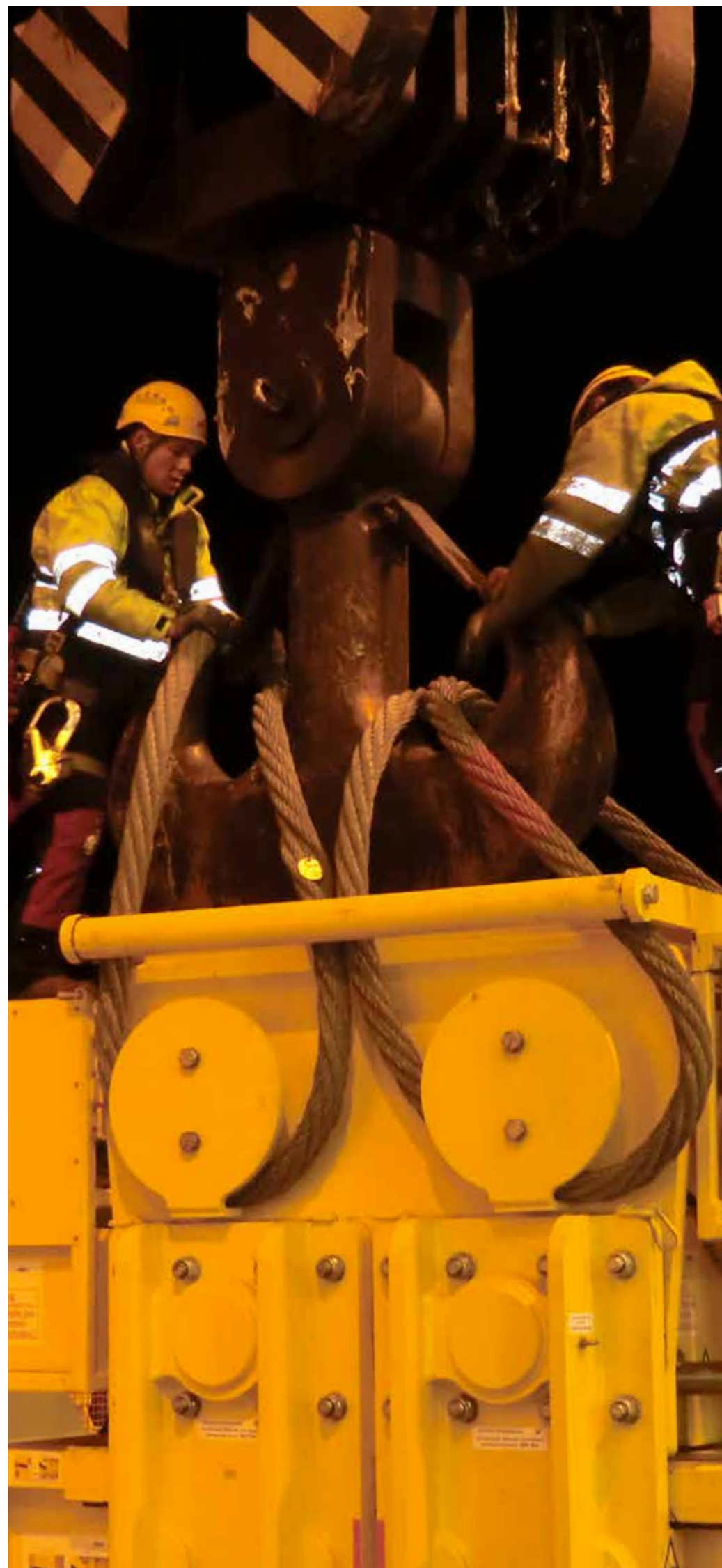
Our service team includes highly qualified experts in cranes and welding, specialists in hydraulics and electrical engineers.

These employees have the appropriate level of qualifications and are responsible for ensuring that legal provisions are complied with.

Repairs and maintenance

We perform regular on-site maintenance work. This work is conducted by service staff with multiple qualifications and faults are quickly detected and immediately resolved.

If a necessary component is not in stock, our efficient manufacturing plant is able to produce a replacement at short notice.



Expert knowledge from our professional association

Lifting equipment for transporting people	BGR 159	DGUV Rule 101-005
Hydraulic line engineering	BGR 237	DGUV Rule 113-015
Ladders and steps	BGI 694	DGUV Information 208-016
Personal protective equipment for protection against falls	BGG 906	DGUV Policy 312-906
Testing of electrical equipment and systems	BGV A3	DGUV Regulation 3
Testing of lifting accessories and equipment	BGR 500	DGUV Rule 100-500
Cranes	BGV D6	DGUV Regulation 52
Winches, hoisting and towing equipment	BGV D8	DGUV Regulation 54

Expert knowledge

Load securing	VDI 2700a
Inspection for cracks	MT 1+2
Inspection for cracks	PT 1+2
SCC Document 017	(Safety Certificate Contractor) for operational managers

Suitability for working offshore in accordance with the Global Wind Organisation

First aid
Fire prevention
Survival at sea
Helicopter underwater escape training incl. EBS
Working at height

01.7 SERVICE

Maintenance, repairs and operation

Maintenance, repairs
and operation



24/7 service

Minimising downtimes during operation is one of the important tasks carried out by the project management team. As part of your service agreement, our highly qualified service team is available around the clock, including at the weekend and on bank holidays.

Our employees have been trained to work offshore and can also be flown by helicopter to remote locations. By arrangement, replacement parts can be stored at our service centre in Großefehn, Germany, and in the future, it will also be possible for them to be stored in Denmark.

Training and operation

Our lifting specialists pass on their knowledge to ensure the smooth running of your lifting equipment and lifting operations.

Some lifting processes are extremely difficult and present additional risk. In these cases, our lifting specialists can operate the lifting equipment for you.

01.7 SERVICE

Maintenance, repairs and operation

Maintenance, repairs and operation

Risk analysis and assessment

Point 1 of Annex I of the 2006/42/EC Machinery Directive states: "The manufacturer of machinery or his authorised representative must ensure that a risk assessment is carried out in order to determine the health and safety requirements which apply to the machinery. The machinery must then be designed and constructed taking into account the results of the risk assessment."

This applies to the manufacturers of machinery that fall under the scope of this Directive. Lifting equipment is included in this.

Manufacturers must perform a risk assessment that determines all risks that may arise when using the lifting equipment for its intended purpose and that takes into account any foreseeable misuse.

To avoid possible risks and lessen the risk of dangerous situations arising, manufacturers must define measures that can be used to avoid or minimise risks.

The lifting equipment must then be designed and constructed taking into account the results of the risk assessment and the measures defined.

Operators of lifting equipment are obliged to carry out a risk assessment for this equipment.

The following points must be taken into account when performing this assessment:

- Interactions with other work equipment when the lifting device is in operation.
- Risks that may arise when using the lifting equipment itself.
- Risks that may arise between the lifting equipment and the working environment.

Moreover, when testing work equipment, operators must above all determine the type and scope of the required tests, as well as when they must be carried out.

Employers also have to identify and lay down the requirements to be fulfilled by personnel appointed by them to test and trial the work equipment.

The mandatory process of analysing the risks involved in using the lifting equipment is sometimes very challenging and time-consuming.

AXZION-GKS employs highly qualified experts in lifting technology to create these analyses and carries out this work in collaboration with the equipment operators.



Handling instructions

Handling instructions that explain how to use the lifting equipment correctly are increasingly required. In addition to describing the lifting process in detail, these documents should discuss special cases.

The mandatory process of analysing the risks involved in using the lifting equipment is sometimes very challenging and time-consuming.

AXZION-GKS employs highly qualified experts in lifting technology as well as specialised graphic designers to create these documents and perform these analyses, carrying out this work in collaboration with the equipment operators.

Standards, regulations and bodies of rules

For the design, manufacture and execution of lifting equipment

STANDARDS, REGULATIONS AND BODIES OF RULES

For the design, manufacture and
execution of lifting equipment

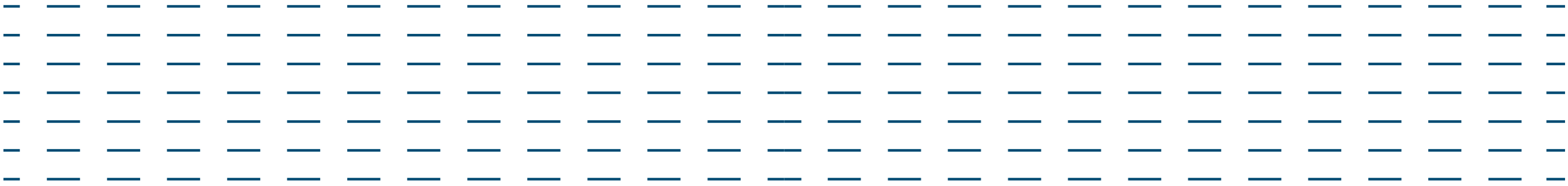
For the design,
manufacture and execution
of lifting equipment

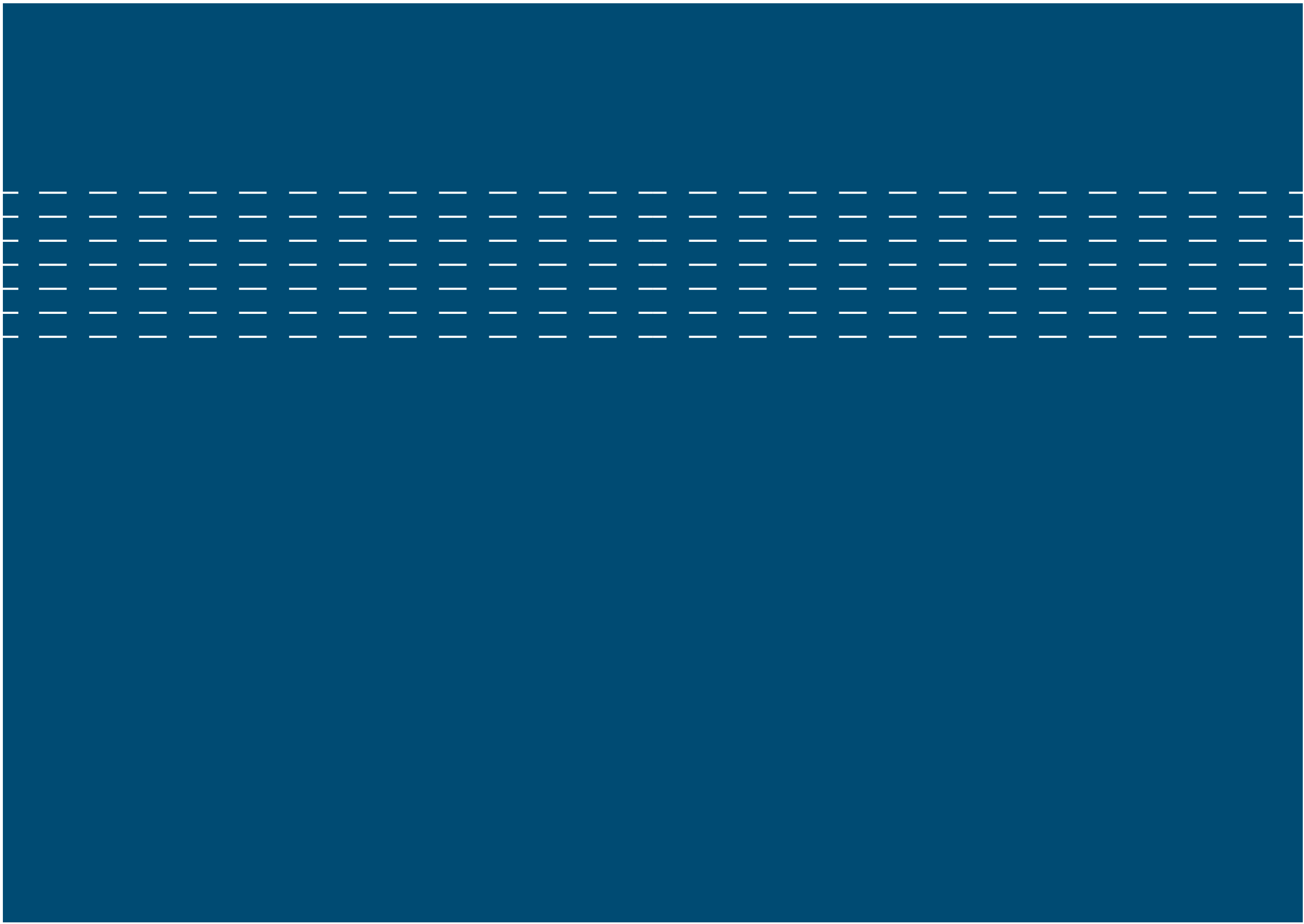
Expert knowledge from our professional association

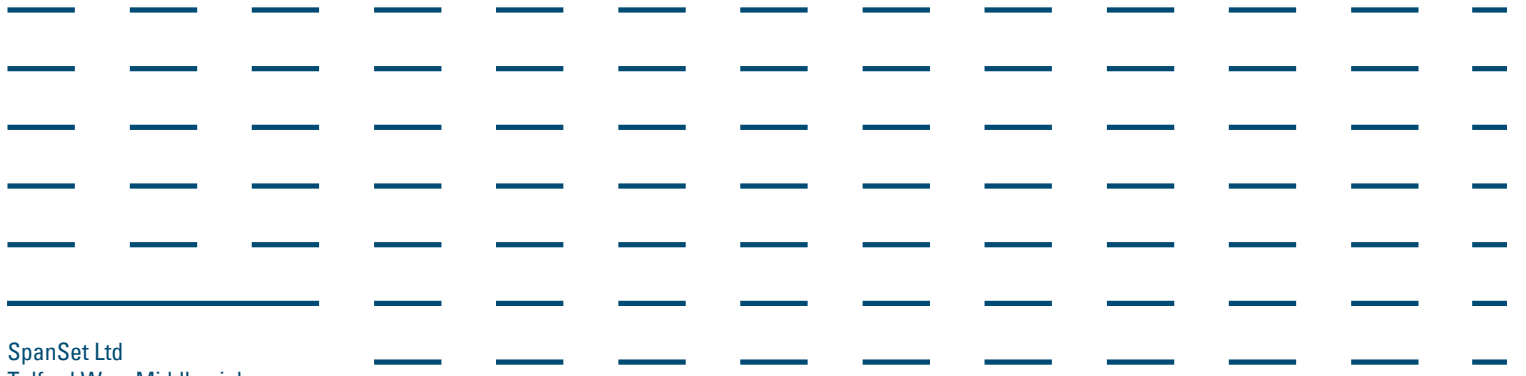
DIN EN 13155	Cranes – Safety – Non-fixed load lifting attachments
DIN EN 1090-1	Steel structures, requirements for conformity assessment for structural components
DIN EN 1090-2	Steel structures, technical requirements for the execution of steel structures; required execution class: EXC 3
DIN EN ISO 5817	Reference standard for the assessment of welded joints and component-specific applications and test certificates; required evaluation class: B
EN ISO 12944-(x)	Corrosion protection of steel structures by protective paint systems; required execution class: C3/P1 in the relevant parts (x) of the standard
Eurocode 3-(x) DIN EN 1993-(x)	In the relevant parts of the section on the "Design and construction of steel structures" in the relevant parts (x) of the standard
EN 13001-(x)	Cranes – design (old national standard: DIN 15018) in the relevant parts (x) of the standard
DASt 014	Recommendation on avoiding lamellar tearing in welded steel constructions

Expert knowledge from our professional association

DIN EN 10164	Steel products with improved deformation properties perpendicular to the surface of the product
DIN EN 287-1 bzw. DIN EN ISO 9606-1	Qualification testing of welders – Fusion welding
Machinery Directive	EC Machinery Directive 2006/42/EC
Professional association regulations	Professional Association Rule BGR 500 I Renamed: German Social Accident Insurance Rule DGUV 100-500, Operation of work equipment dated January 2005 (updated version dated April 2008) BGR 234 – Stable storage racks Renamed: German Social Accident Insurance Rule DGUV 108-007
VDI and VDE regulations	If applicable
German Ordinance on Industrial Health and Safety (BetrSichV)	If applicable







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