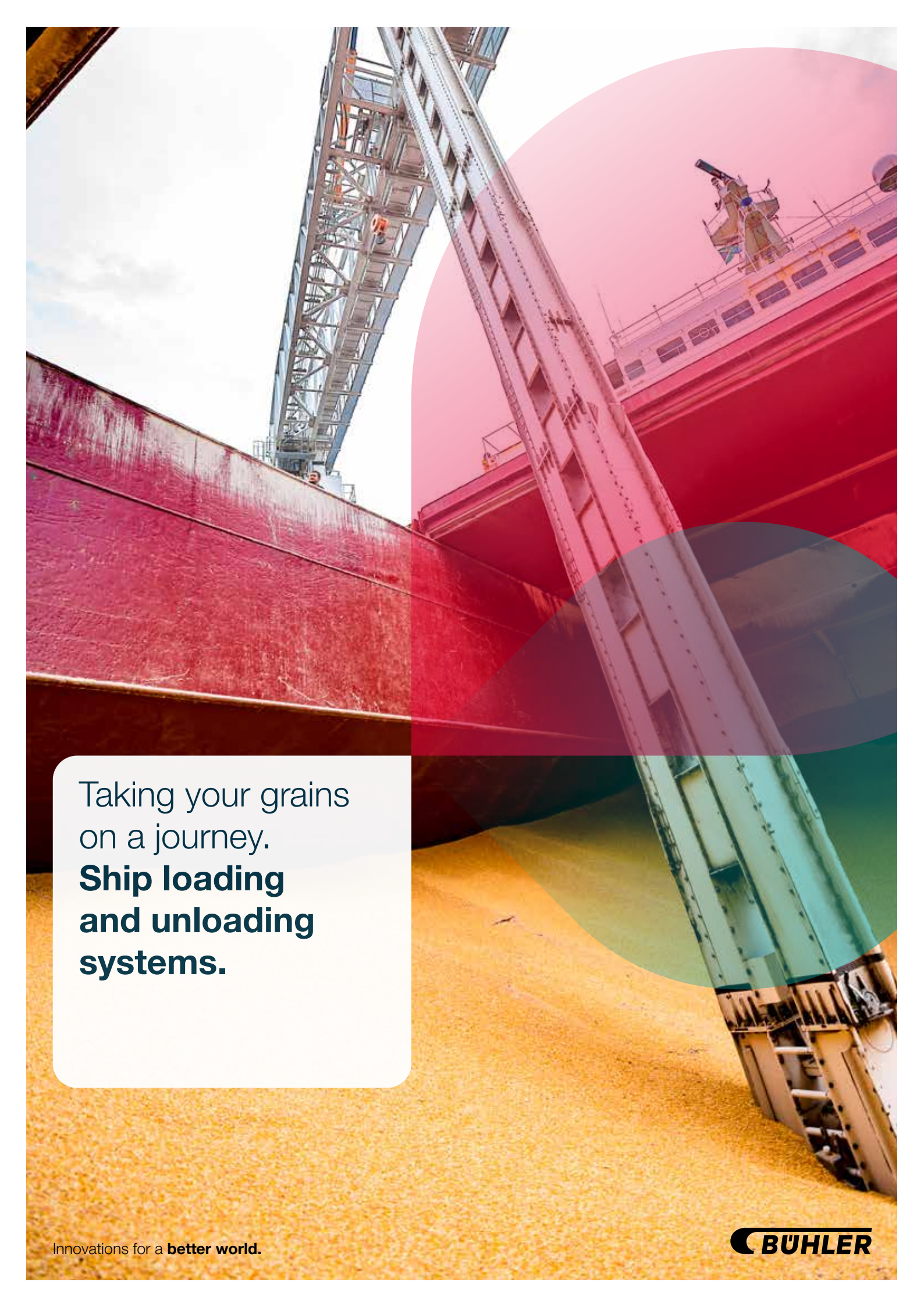




Taking your grains
on a journey.
**Ship loading
and unloading
systems.**

Taking your grains on a journey

Ship loading and unloading systems.

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Taking your grains on a journey.

Efficient shipping systems to feed the world.

An astonishing 1.5 million tons of grains and meals are shipped over the seas worldwide everyday. This requires highly efficient grain terminals that can handle high capacity and volumes in a cost-effective manner. Today the long-term trend of increased conveying and storage capacity is being sustained by larger ships, bigger facilities, and vertical supply chain integration.

Future oriented

Bühler's loading and unloading systems are setting the industrial standard when it comes to capacity, efficiency, reliability, safety, and operating costs. This starts with the planning of the complete terminal, deciding how the product should be supplied to or received from the facility, determining the optimal storage capacity, and calculating the required capacity for loading or unloading.

Which is the best and optimum solution for your project and terminal? Backed by our long-term experience and dedicated team, Bühler can support you throughout the whole project, right from initial ideas to the final installation.

Portalink mechanical unloader. Efficiency and reliable operation.

There are key requirements that an unloader needs to fulfill to maintain an advantage in the increasingly competitive business of grain transportation. The unloader is the backbone of operations at a terminal. Fluctuations in capacity and downtime have a significant impact on costs and overall operation.

That's why the Portalink, Bühler's continuous mechanical unloader, has been designed to achieve maximum efficiency and unrivaled reliability, with low operating costs – enabling you to achieve your business goals.



Going with the flow

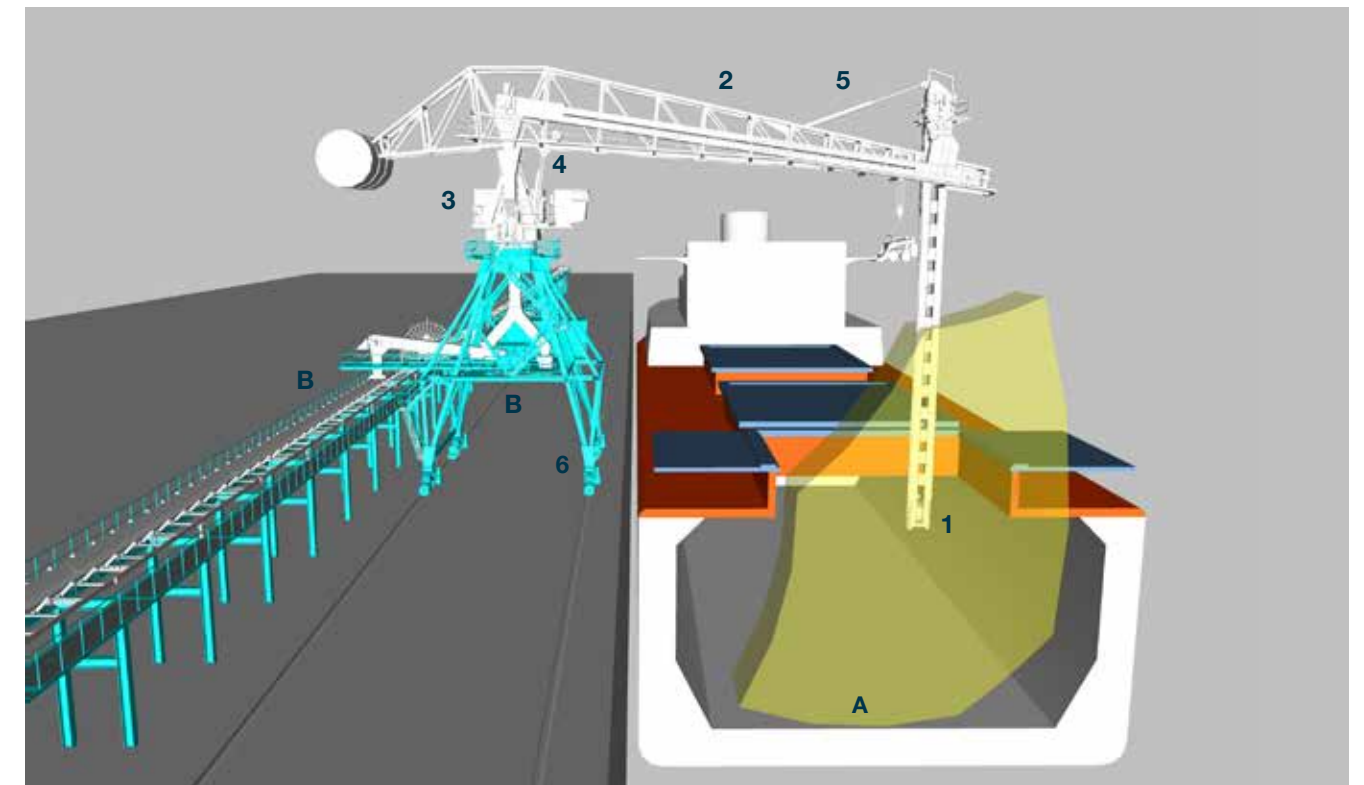
The marine leg is the key to the efficiency of the overall system and the heart of the machine. Portalink's marine leg is a vertical chain conveyor that unloads product in a compact column at a rate of 300 to 1,300 t/h. The low conveying speed protects the product from degradation. Low energy use keeps operating costs down. The automatic sink-in mechanism maintains the intake boot at an optimal level within the product during the unloading process, enabling the system to unload at constant full capacity.

Advantage

- High efficiency unloading
- Low operation costs
- Gentle product handling
- Low energy usage

How it works.

The Portalink unloader consists of a gantry construction with a swiveling top section, a trussed horizontal boom, and the marine leg with kick-in/kick-out system. The unloader transports bulk product from the ship's hold to the pier at low speed using two independent high-performance chain conveyors.



Full range of movement

Portalink has a wide range of movement. The unloader can be designed to travel on rails or equipped with steerable tire wheels. The boom can be lifted, lowered and swiveled as required. In addition, the kick-in/kick-out system enables the marine leg to move through the hatch and reach the product below the rim of the cargo hold, minimizing the need for bulldozers to remove the residue. This speeds up unloading throughput rates and reduces berthing times.

Operation principle

- A** Working range
- B** Pier conveyor
- 1** Intake booth of the marine leg
- 2** Horizontal chain conveyor
- 3** Enclosed transfer chutes
- 4** Boom luffing cylinder
- 5** Kicking cylinder
- 6** Traveling gear

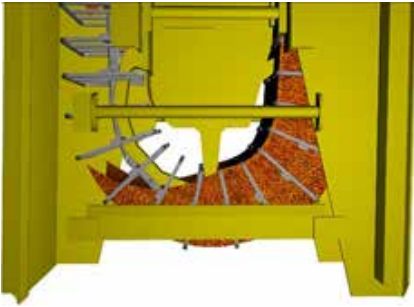
Marine leg.



The intake boot at the end of the marine leg sinks into the product in the hold. The automatic sink-in ensures the intake boot is constantly at an optimum level within the product as it is unloaded. In addition, by balancing out the vertical movements of the ship caused by waves or rising tide, the automatic sink-in improves safety and lowers stress on the steel structure, thereby extending the life of the unloader.

Marine leg

The specially designed chain conveyor picks up the product from the hold in a compact column inside the conveyor's casing. This moves continuously at a low uniform speed to the outlet. From here, the product is carried to the pier conveyor or to the truck or train loading spouts.



Rail traveling gear

Most unloaders are on rails which allow the unloader to operate easily and efficiently. Our modular rail traveling gear is the most commonly used and most versatile traveling gear available. Moreover, it can carry heavy loads for larger unloaders.



Tire traveling gear

An unloader on tires can be moved aside from the berth into a designated parking zone. It is especially helpful for smaller capacity unloaders and multi-purpose berths that need to keep clear of fixed structures.



Gently does it

The bulk product is conveyed from the ship's hold by the marine leg in a totally enclosed system. It travels inside the casing of the marine leg in a compact column at a uniform low speed. This not only ensures that the product is handled gently, minimizing financial loss from product breakage, but also reduces energy consumption and wear and tear on machinery. Once unloaded, the bulk product can be transferred downstream to conveying systems or directly into road or rail vehicles.

Versatile in design and application

Portalink ship unloaders come in a range of designs. Mobile or stationary, powered by cable reel or diesel engine, they are well suited for use on ship sizes from 3,000 to 120,000 DWT (dead weight tons).

The lifting and lowering of the boom, and the swiveling motions are powered by hydraulics. All motions are protected by overload valves. Built-in proportional control valves ensure gentle and continuous, variable movements. The control system is equipped with PLC elements. A display shows the operating conditions, error messages, and the preventative maintenance program.

Type	Throughput (t/h)	Typical ship sizes (DWT)	Boom length (m)	Traveling gear	Winch capacity (t)
Portalink 300	300	up to 30,000	20	Rail / Tires	7.0
Portalink 400	400	up to 60,000	25	Rail / Tires	7.0
Portalink 600	600	up to 120,000	25 / 27 / 32	Rail / Tires	10.0
Portalink 800	800	up to 120,000	27 / 32	Rail	10.0 - 15.0
Portalink 1100	1100	up to 120,000	27 / 29.5	Rail	15.0
Portalink 1300	1300	up to 120,000	27 / 29.5 / 32	Rail	15.0

Portacombi.



The Portacombi is a highly efficient unloader and loader combined. Ideal for high capacity unloading and loading from large to smaller ships, it is available in a wide variety of designs. The Portacombi's versatility means you save on space and costs.

Portalink and loader in one

Combined ship unloading and loading systems are often used at facilities with import and export activities that handle cereal grains, oilseeds and derivatives.

For example, after the oil has been extracted from soybeans, the soybean meal is then sold on to other processors.

Barge loading

The Portacombi can also be used to unload product from a sea-going ship on one side of the pier, and load it directly on to a barge on the other side, saving time and money for complex product transfer routes.

Portalink Options.

To make your Portalink and unloading operation even more efficient, we have developed several attachments to the marine leg that increase remnant unloading, improve the unloading of mealy products, and provide the best machine set-up in your port.



Portablade

Reduced remnant unloading time

With the Portablade, more product is removed from the hatch, reducing remnant unloading time.

Earlier bulldozer usage

By flattening the product on the hatch bottom, bulldozers can then be brought in earlier during the unloading process.

Improved product accumulation around marine leg

The Portablade creates a wall so that the product fed by the bulldozer is placed where needed and does not gather around the marine leg, improving unloading efficiency.



Decompacting screws

Increased unloading efficiency

Soymeal, fishmeal and similar products can become compacted during shipping. Decompacting screws loosen the material and break up large clumps for easier and more efficient handling.

Shorter unloading time

A free product flow is ensured increasing the unloading rate and reducing the unloading time.

Constant unloading capacity

With the required feeding machines (bulldozers), the unloading capacity is higher and more stable, keeping the mealy products in movement.

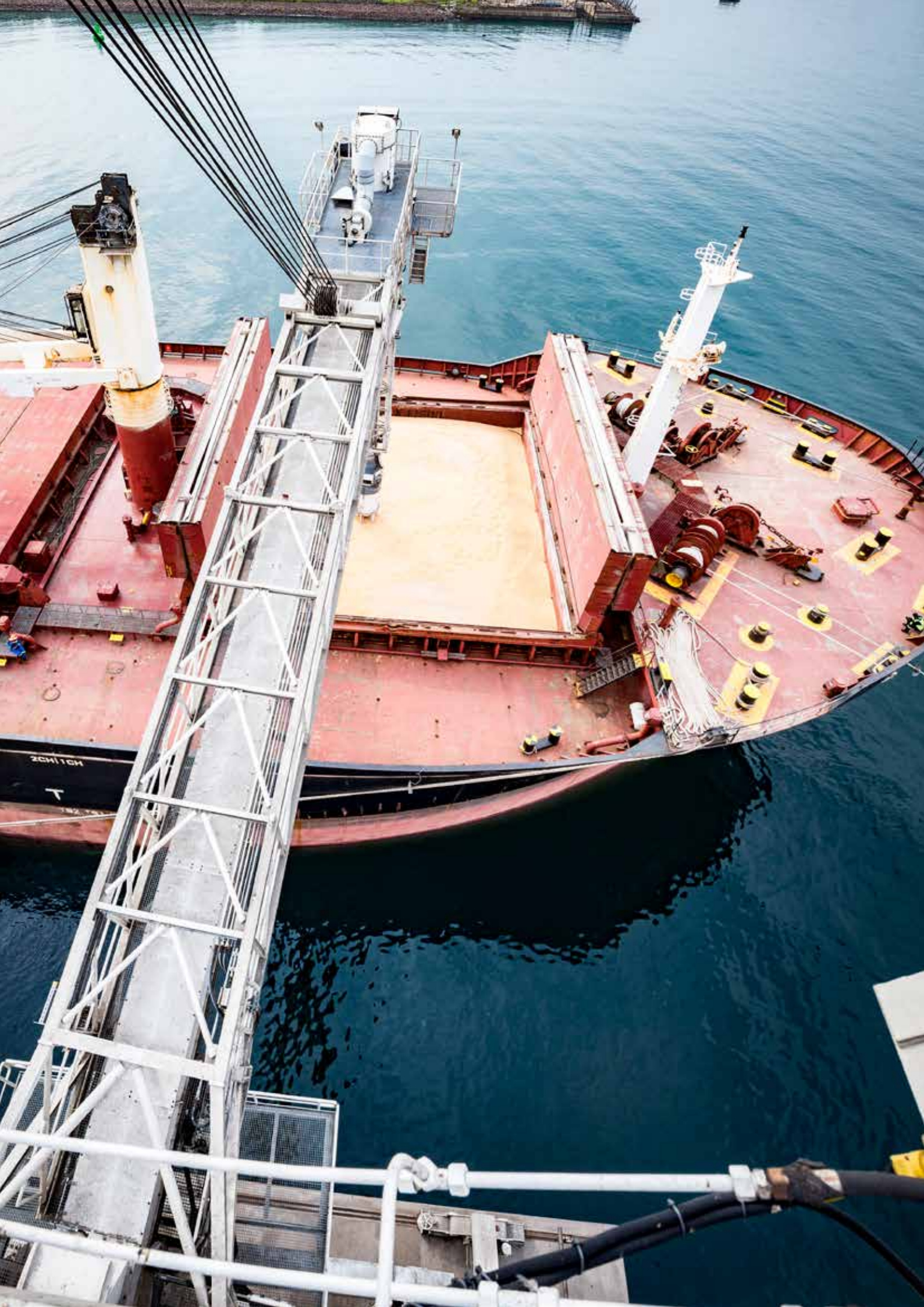


Unloading simulation software

Optimal unloading

The software application shows the best possible unloading processes for a particular system.

The software simulation clearly shows the influence of different system layouts and individual machine throughputs. The customer facility can then be tailored precisely to meet existing requirements.



Portaload. Fast, safe, efficient ship loading.

Grain and derivate transshipment is a business in which a 1 cent difference per ton can create a competitive advantage. Keeping ship loading costs low and efficiency high is therefore vital. Portaload ship loaders are sturdy, hard-wearing and equipped with advanced instruments, enabling them to load quickly, safely and efficiently at low operating costs.

The best solution for your needs

Whether a mobile or stationary solution best suits your needs depends on your requirements. Both loading systems are designed to provide high availability and low wear, meaning reduced downtime and lower maintenance costs. With many years of experience, the dedicated team at Bühler can advise you throughout your project, from initial ideas to the final installation.

Mobile or stationary: Two loading concepts compared

Mobile or stationary? Which loading solution is most suitable for each terminal operator depends first and foremost on shipment volumes and, of course, on available terminal infrastructure. The following provides a comparison of the performance characteristics and advantages of the two loading concepts – valuable indicators as to which is the most appropriate solution.

Mobile loader	Stationary loader
If you have an existing berth, which you possibly share with neighboring companies, then a mobile loader could be the best option. A mobile loader is usually mounted on rails and connected to a high capacity pier conveyor and tripper car which brings the product from the silos to the loader. They are ideal for installation on existing quays. The benefits of a mobile loader are flexibility of use, energy efficiency in total, and, in terms of the loader itself, lower investment costs. The use of two mobile systems offers quantifiable advantages over a single system.	If you do not have an existing berth available and you have high annual loading throughput, then a stationary loader could be the best solution. A stationary loader consists normally of 3 to 4 towers each with a rotating loading boom attached to either one or two sides of the tower. They are ideal for high annual loading throughput and high capacity. The benefits of a stationary loader are highly efficient loading and minimal interruption between hatches. The concepts deliver higher throughputs and shorter loading times, resulting in quicker pay off for investment costs.

Mobile Portaload.

Mobile loaders are high value loading installations thanks to their wide range of application, their high capacity, and their suitability for multi-use berths. Mobile loaders are installed on rails ensuring stability during operation and when parked. Parallel movements alongside the ship is guaranteed, making operation easy for the operator.

Design highlights

With the development of the Mobile Portaload, an interdisciplinary team took up the challenge to create the best loading concept, based on the latest technology available. The new Mobile Portaload is the most innovative loader on the market and sets a new industry standard.

For example, the curving vertical pylon combined with the cable suspension is the best design to balance pier loads, reducing the requirements on the quay installation and ensuring the optimal distribution of forces, weight and stability in all positions.

With throughputs ranging from 1,400 t/h up to 2,800 t/h, the mobile loader is designed to load ships as quickly and efficiently and with as high a capacity as possible, from the start of operation through to trimming.

The fixed product inlet and outlet point on the boom ensures that wear is reduced and that the creation of dust is limited and can be kept to a minimum through effective aspiration. The gentle movements of the individual components reduce stress on the whole loader, increasing availability and lifespan.

Benefits

- No hydraulics
- Easy operation
- Totally enclosed system
- Lowest weight



Full range of movements

The Mobile Portaload has a wide range of movements focused on maximizing loading efficiency and minimizing operating interference. Installed on rails, the loader can lift, lower and swivel the horizontal loading boom, as well as lower and raise the vertical spout as required by the operator. Swiveling and moving the boom requires minimal involvement from the operator, enabling a highly efficient loading process with minimal dust emission.

How it works

The Mobile Portaload is connected to the silo by means of quay conveyor with either fixed product transfer points or with a so-called tripper car, which moves alongside the mobile loader. From here the product is transferred up the gantry conveyor before dropping onto the high capacity boom belt conveyor. The product then falls into the hatch through the vertical spout. To reduce dust emission, aspiration and a dust suppressor can be installed.

High reliability through low wear

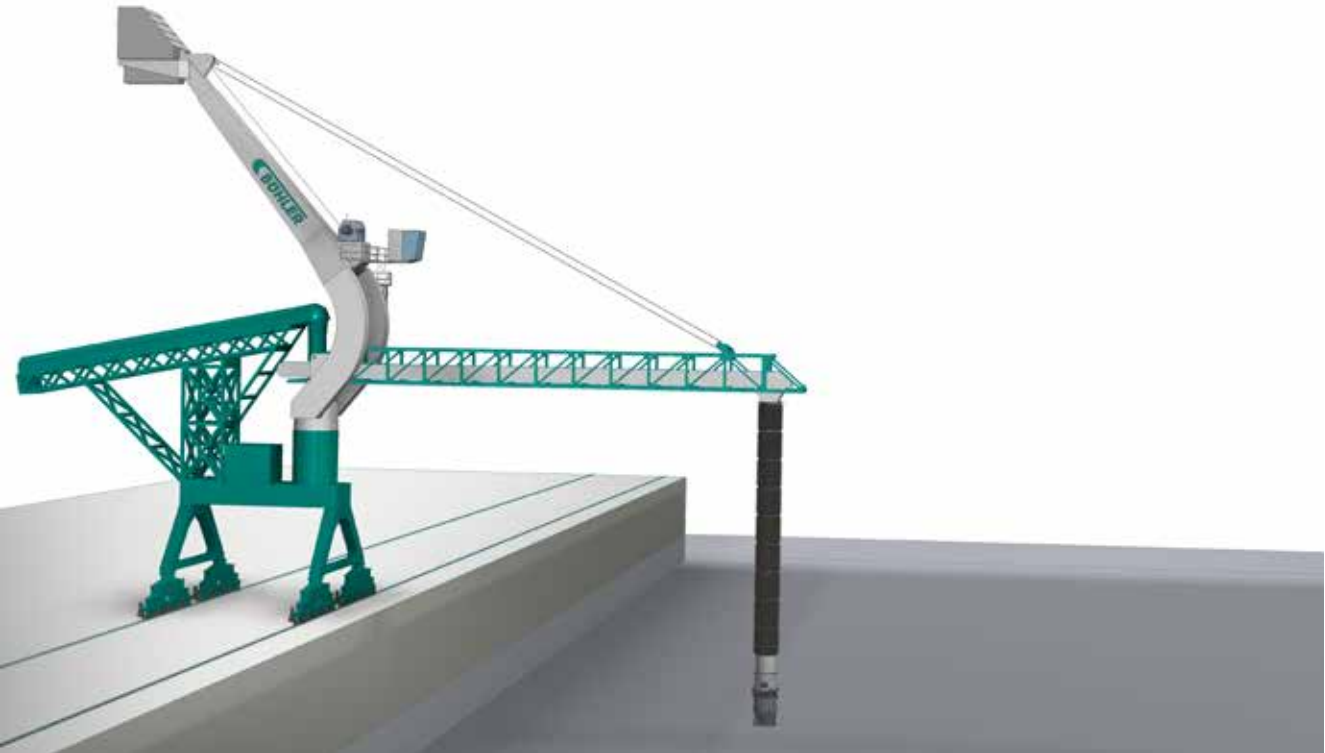
In developing the Portaload, particular attention was paid to minimizing the number of wear and tear parts, and such parts were used only in those areas where it was absolutely necessary (“smart wear”). Furthermore, the components’ surfaces under load are designed to undergo minimum wear and tear.

Maintenance

We have been able to remove the necessity of a “kick” system without reducing loading efficiency. This helps eliminate all the hydraulics on the loader. With this, not only the new installation of the loader but, more importantly, the maintenance requirements have been lowered significantly.

Three sizes to cover all requirements

To cover current and future loading requirements, the Mobile Portaload is available in three boom lengths per loading capacity. With this setup, all ship sizes can be loaded optimally combined with sound investment costs.



Type	Throughput (t/h)	Boom length (m)	Typical ship sizes (DWT)
Mobile Portaload 1400	1400	28	80,000
		32	100,000
		36	120,000
Mobile Portaload 2000	2000	28	80,000
		32	100,000
		36	120,000
Mobile Portaload 2800	2800	28	80,000
		32	100,000
		36	120,000

Stationary
Portaload.

Stationary loaders have been around as long as mobile loaders and are designed to load ships with maximum performance and minimum interruption, resulting in highly efficient loading and the shortest possible berthing times.

Generally, stationary loading systems are comprised of three towers, each with a horizontal loading boom. Of the three loading booms, two load simultaneously while the third moves into position to enable a hatch change without interrupting the loading process. This design ensures that there is no need for the conveyor belts to be stopped or emptied when switching between hatches. The three towers together achieve a total loading output of 6,000 t/h.

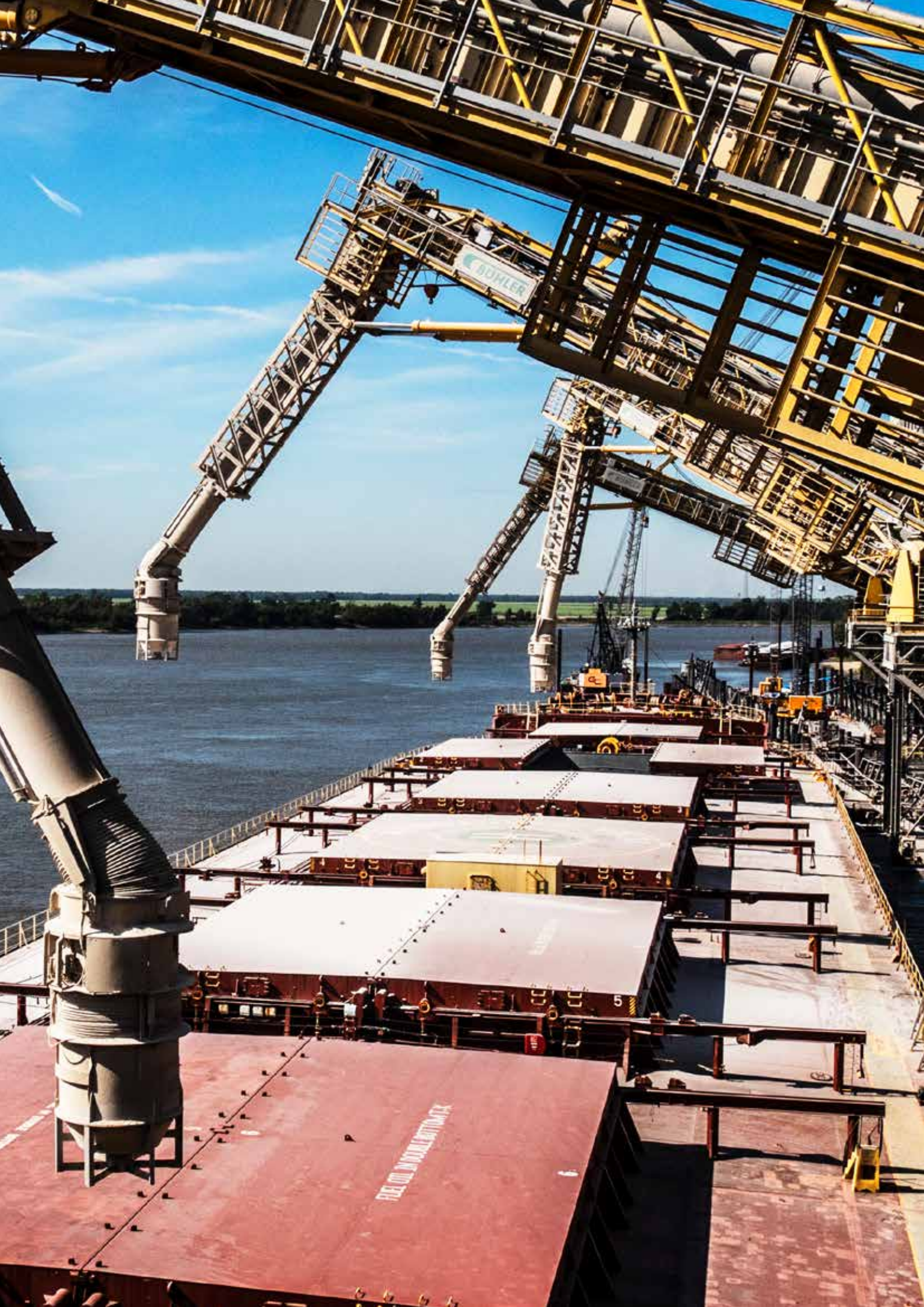
Designed to last

As with the Mobile Portaload, the number of wearing parts has been minimized, and wear-prone moving parts have been omitted on the conveyor system. The entire structure has been designed with a long service life in mind. The precisely balanced boom plays an important role in this. It rotates, torsion-free, on a bearing with just a single seal. This means a massive reduction in wear and maintenance. The short boom also contributes to reducing the load on the tower structure, in combination with the kick-in/kick-out technology.

Benefits

- Highly efficient loading
- Fully enclosed
- Low maintenance requirements
- Low investment costs





High efficiency loading with two booms in one hatch

To use the full loading capacity over the ship and according to every loading plan, each boom of the Stationary Portaload can load individually creating an optimal balance during loading, or have two booms loading in the same hatch. This is achieved by the slender structure of the loader combined with the kick system. This allows sufficient space for the loading spouts to maneuver safely.

Low investment costs

The optimized design, low position of the boom and balanced force reduce the capital investment costs of the loading system as a whole. The low position of the boom is achieved by combining a horizontal boom that can be rotated and lifted, with a vertical boom with a kick system. This enables a higher hatch coverage rate and provides for greater flexibility because it means loading can be carried out around existing superstructures. It also significantly reduces the load on the

tower structure. Both result in a major reduction in the capital investment costs involved.

Reduced energy consumption

The low position of the boom means that the product only has to overcome relatively small differences in height. As a result, the rating of the electrical installations can be kept to a minimum. The mechanical handling of the conveyor system reduces the level of energy consumption even further.

Totally enclosed system

From the silo the product is transported on high capacity conveyors into the distribution tower, where it continues its journey into the spout and onto the fully enclosed boom conveyor. From the boom conveyor it falls into the vertical spout and dust suppressor. The fully enclosed system reduces dust emission at every point.



With a view to the future:
Post Panamax and Baby Cape

Bühler's stationary loader as a rule has three loading towers which provide the optimal hatch filling rate for ships ranging from barges and coasters up to Panamax.

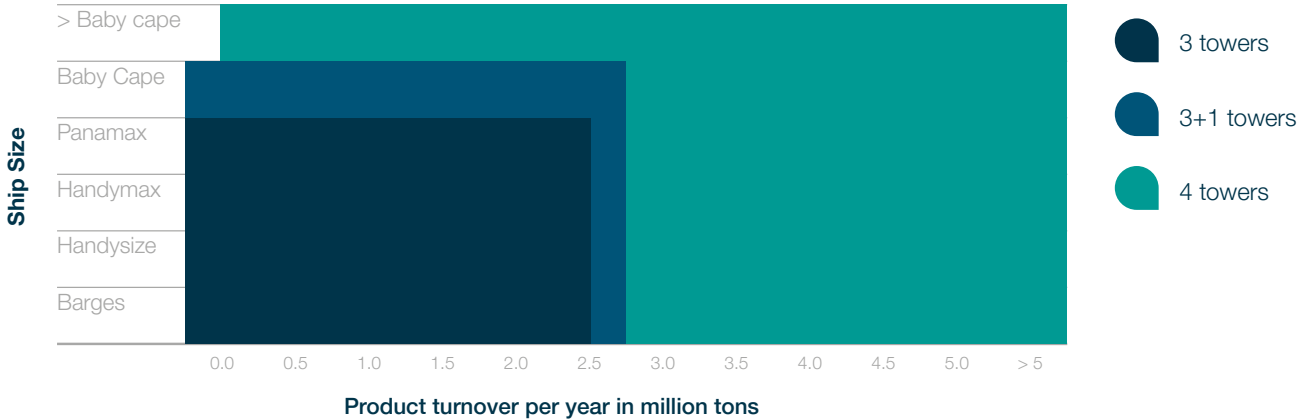
The 4-tower solution

With the long-term trend toward bigger ships requiring higher throughputs, a four tower solution is better. The additional tower not only increases the loading capacity, but also

improves the loading distribution over the whole ship, thereby improving the loading efficiency.

The 3+1 solution

There may not be many Baby Cape ships yet, but to be prepared for the future, Bühler has developed the 3+1 solution. With this solution, three loading towers are constructed in the first phase of the project, and all the preparation is completed for future expansion to a fourth tower. This provides an ideal combination of flexibility and investment costs.



Type	Throughput (t/h)	Total loading capacity	Typical ship sizes (DWT)	Amount of towers (No.)
Stationary Portaload 800	800	1,600	80,000	3
	800	2,400	120,000	4
Stationary Portaload 1200	1200	2,400	80,000	3
	1200	3,600	120,000	4
Stationary Portaload 1600	1600	3,200	80,000	3
	1600	4,800	120,000	4
Stationary Portaload 2000	2000	4,000	80,000	3
	2000	6,000	120,000	4
Stationary Portaload 2500	2500	5,000	80,000	3
	2500	7,500	120,000	4
Stationary Portaload 3000	3000	6,000	80,000	3
	3000	9,000	120,000	4

Loading outlet options.
for both Portaload systems.

To optimize your loading system even further, there are two outlet options available to be attached to your loading spout. While the dust suppressor is your perfect solution to comply with strict dust emission regulations, the Portaspoon can increase loading range and can be installed on an existing system with limited dust creation.



Loading with minimal dust emission



Reduced dust emissions when throwing product

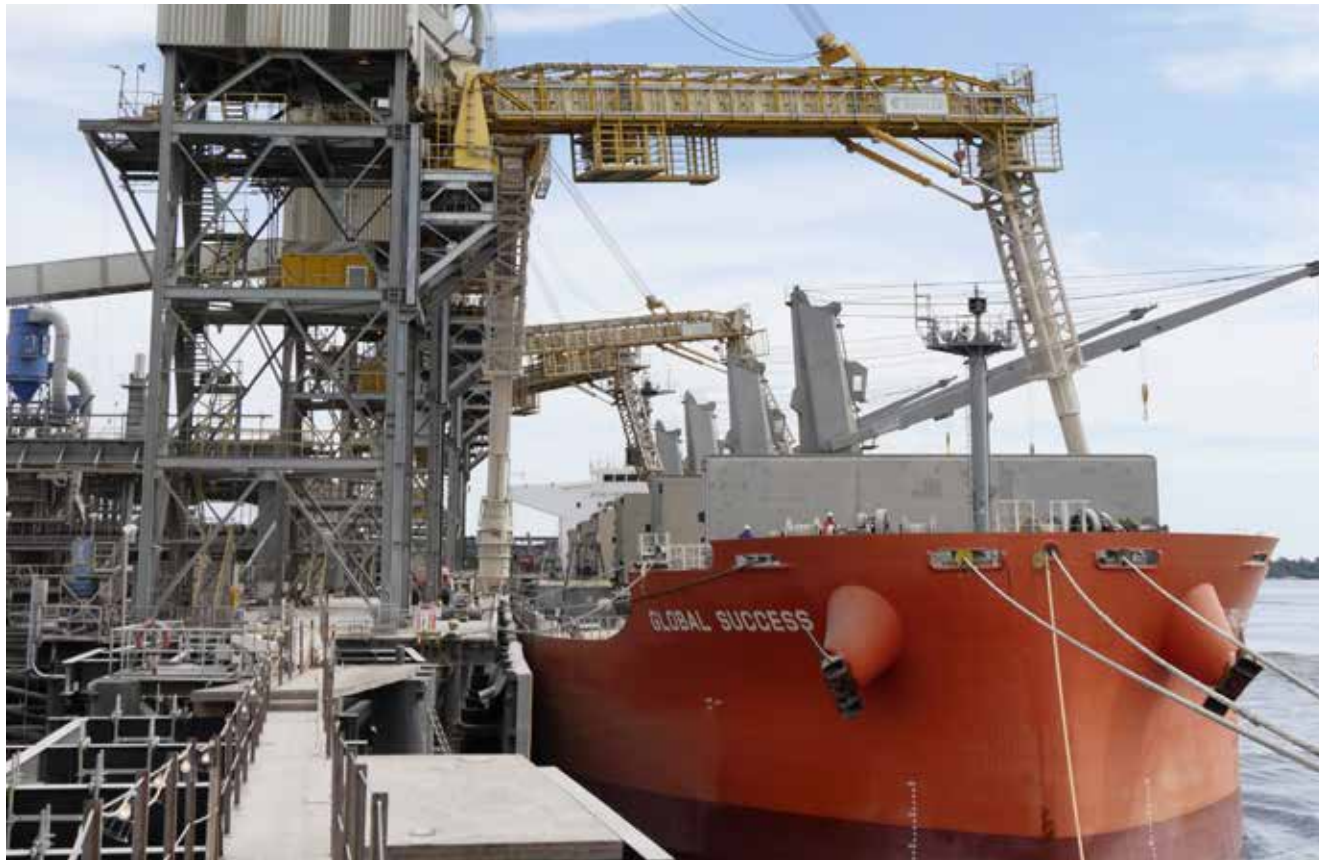
Dust Suppressor

- Products such as soybean meal and grains emit huge amounts of dust during loading, which is increasingly becoming a problem for harbors that are close to residential areas, given stricter regulations from environmental agencies.
- For this, the dust suppressor has been developed to reduce dust emission during loading, independent of product and loading throughput.
- The product is stabilized in a product depot before being released into the hatch at low speed, thus minimizing dust generation.

Portaspoon

- The Portaspoon brings two worlds together; low dust emission combined with an increased loading range.
- The Portaspoon is specially designed to use the speed of the product stream to throw the product into the hatch. The product is bundled in such a way that loose dust particles are integrated with the main product stream.
- Due to its construction and low weight, the Portaspoon is a perfect fit for existing installations – especially when a loading spoon or similar system is already installed.

Customer success. Biggest Bühler booms delivered so far.



Zen-Noh, the largest grain exporting company in the world, operates four new ship loading booms worth almost 10 million US dollars. These are the highest capacity loading booms ever sold by Bühler.

Zen-Noh Grain Corporation (Zen-Noh) is the largest grain exporter in the world. And they have invested in four new ship loading booms from Bühler, investing almost 10 million US dollars. Bryan Colclough, General Manager from Zen-Noh, would go to Bühler again for new ship loaders: "Yes, I would partner with Bühler again. I think that we've got a good product here, and that makes it a lot better for us." Colclough was referring to the original installed shiploader. "Through the longstanding relationship with Bühler and having had the original loading booms for 30 years, Zen-Noh has placed its expectation and trust for the coming decades of loading with the newly installed Bühler loading booms," says Andreas Herzer, the Head of Competence Center ship loading and unloading.

Sound arguments for Bühler

The loading booms from Bühler could be installed on the existing towers and have an optimal reach to load even the New Panamax ships. The capacity of the loaders allows Zen-Noh to reach their daily goal of loading 55,000 tons – with an unrivalled low level of dust formation. The Bühler booms even surpass the strict environmental rules with their dust suppressors. "Bühler's new ship loaders operate on the forefront of technology, allowing us to intensify and prolong this successful business relationship," says Andreas Herzer about Zen-Noh's purchase.

Bühler enables efficient grain import and export in South Africa.

South African Bulk Terminal (SABT), a major customer of Bühler located in Durban, South Africa, decided in 2005 to invest in an extensive overhaul of their first grain import terminal in the port of Durban. The existing silo had been upgraded and SABT had also invested in a mechanical ship unloader, Bühler's Portalink 800, which at the time was state of the art and had been successfully commissioned in 2006. SABT has used the Portalink continuously over the years and has unloaded over 20 million tons with a constant high and reliable unloading capacity.

At their second grain terminal, SABT are presently undertaking an extensive plan to upgrade not only the silo installation, but also install a new unloader and loader. Based on their excellent experience with Bühler's mechanical unloader, which was installed at their first site, and the long-standing relationship between the two companies, Bühler was the logical choice for the new investment.

The site is preparing for unloading larger vessels in future. Both the mechanical unloader Portalink and the mobile

Portaload are capable of handling vessels up to 80,000 DWT. The Portalink, with an unloading capacity of 800 t/h, is in line with the Portalink installed at SABT's first site. The mobile Portaload has a loading capacity of 1,000 t/h. The additional capacity enables SABT to be a key player in grain import and export at the port of Durban.

The main technical reasons why SABT invested in Bühler's mechanical unloaders on both occasions are not just the low energy costs per unloaded ton (between 0.35 and 0.4 kWh), but also the low maintenance costs. A particularly important factor for the operation and efficiency of the unloader is the ease of operating the unloading installation. Through SABT's experience with the first Portalink, the company had gained confidence in the ability of the automatic sink-in function to ensure high efficiency unloading.



SABT chose Bühler not only because of its market-leading equipment but because of Bühler's professional project management and expertise. These factors together gave SABT the confidence that Bühler could handle complex projects and "get them done". SABT also places great value and trust in Bühler thanks to its long history as a competent partner with excellent aftersales service.

To enable the optimal working conditions for SABT's operating crew, both the Portalink and Portaload were equipped with an operating cabin in addition to the remote control. The operating cabin enables the operator to have full control and information about not only the installation but also the loading or unloading procedure from a secure and strategic position overlooking the entire quay. To further support the operator's view, the Portalink is also equipped with cameras that have a 360 degree view from the end of the horizontal boom.

The existing loader did not have a specialized loading head and emitted considerable amounts of dust during loading operations. Apart from being unpleasant for the immediate surroundings, this also represents valuable cargo that is lost in the air. With this upgrade, SABT also invested in Bühler's dust suppressor, enabling loading with minimal dust emission. To quote:

"The dust suppressor works damn well."

Managing Director, SABT, Mr Lourens



Long-term safety. Spare parts, training and maintenance.

Whether high-quality spares and wear and tear parts, targeted education and training, innovative retrofits or quick repairs; Bühler offers effective service solutions for sustainable business success. Together we will find the optimal solution for your business and your needs. We will be happy to advise you and look forward to hearing from you!



Original Bühler spare parts

We provide our customers with high quality spares and wear and tear parts speedily and reliably over the long term. We assist in the identification of the correct parts and guarantee optimum compatibility for maximum performance and operational reliability.



Education and training

Specialized trainings are offered which take your team through the complete facility with all its critical parts. For example, a special training can focus on maintenance and its requirements, or on how to operate an unloader most efficiently. You get the most out of the training as it will be at your plant, combining class room training followed by on-site application.



Preventive maintenance

Keeping your port equipment running trouble-free with minimal interruption can be a hassle. Ensuring adequate personnel is available at the right time, with the necessary knowledge to solve the problem efficiently is an even bigger challenge. Bühler offers various solutions to keep your equipment running, for example with service contracts.

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