

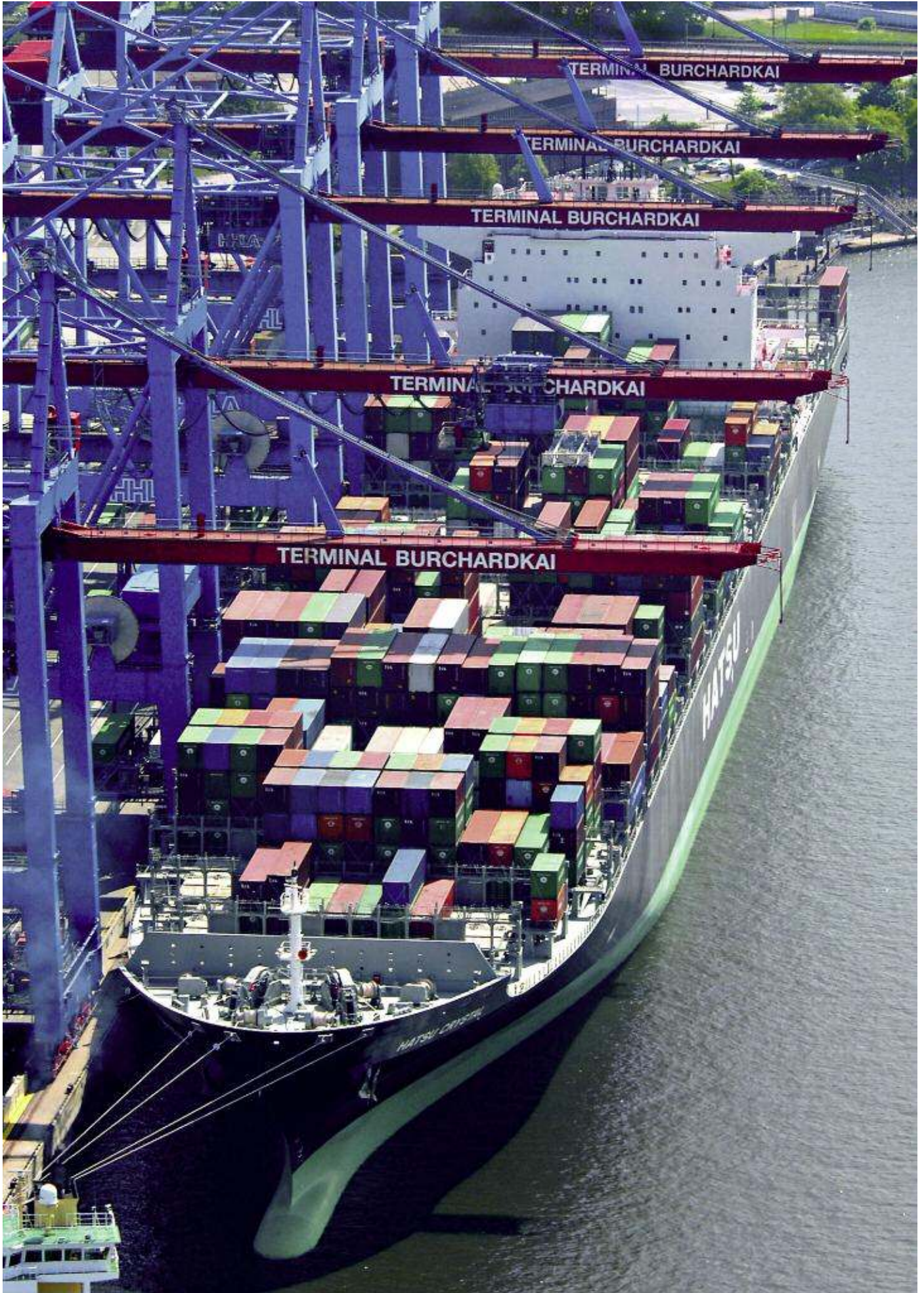
BOXER 4000 / 5000 / 6000

CONTAINER CRANE



KOCKS





↑
Modern container handling by double trolley gantry cranes

THE BOXER:

THE HIGH-SPEED CRANE WITH ULTIMATE PRECISION.

The rapid tempo of globalisation also sets the pace of the container handling business. The number of containers moved year by year across the oceans and then onto land already amounts to several hundred million today. Tendency: increasing.

The volume of trade results in increasing demands on ports and – it goes without saying – also on cranes.

It must always be possible to operate these cranes exactly as high-performance instruments in all climates and to fulfil many requirements, e.g. regarding handling speed and handling performance, but also regarding adaptation to the new ship sizes and beams.

→ INFO

What exactly characterises the best container terminals?

What are the important factors?

→ The essential factors are:

- low operational costs
- high performance
- permanent availability

→ In detail it depends on:

- efficient and safe handling of containers
- maximisation of handling rates and thus short turnaround times of the ships
- economical unloading
- low maintenance and operational costs
- long service life.

The Boxer with its machinery house trolley on a mono-box boom is the guarantor of such peak performance in the field of container handling.



↑
Containers in a stacking yard

AN ENGINEERING CLASSIC BUILT FOR THE FUTURE: THE BOXER WITH THE **MACHINERY HOUSE TROLLEY**.



↑ Machinery trolley on mono box boom

The first container cranes in Europe were two cranes completely imported from the USA. Container cranes have been built on this side of the pond from 1968 onwards – for the first time by Kocks. Since that time, we have reinvented parts and details of the crane again and again up to the present generation: the Boxer.

Our engineers always have one thing in mind when developing this crane: maximising performance while minimising operational costs. They have achieved this, for example, in the case of the mono-box boom with optimised stability and in the case of the machinery house trolley with extremely high performance rates. This trolley essentially consists of hoisting mechanisms arranged on the motor-driven trolley.

Thanks to this particular fact, a hoisting rope system with very short ropes and perfect coordination results. It should be taken into account that optimal rope running is, among others, the prerequisite for effective use of the electronic anti-sway device and of the positioning control system of the load.

The short hoisting ropes have many decisive advantages: these ropes assure lower spare part costs and provide the advantage that the ropes do not have to be readjusted very often. Even the rope changing periods become considerably shorter. The reason is very simple: the hoisting ropes of the Boxer can be replaced within 2 shifts with the crane set out of operation and with the waterside boom in stowed position.

→ INFO

Typically Boxer

- extremely precise: electronic anti-sway device and positioning control system
- absolutely inexpensive to maintain: short hoisting ropes, high-quality components with easy maintenance requirements
- very low degree of wear: minimised number of components
- extremely light and stable: dynamic deformations under extreme conditions have been calculated and minimised.

In contrast, the long ropes of a crane with a stationary hoisting mechanism require up to 5 shifts. The highlight of the Boxer: processing of ships is not interrupted – precious berths are not blocked.

One further advantage of short hoisting ropes: vertical swinging does not exist (this is only a problem in the case of long flexible ropes). If a container is hooked in the ship's cell, the snag-load device acting on the rope fix point or integrated in the drive chain assures that the hoisting ropes ease off under control. Thus the crane is protected against extreme overload conditions.

And there is an additional overload protection: load cells integrated in the rope fix points switch off the hoisting mechanisms as soon as the nominal load is exceeded.

With regard to the number of system components, our engineers attached great importance to confining themselves to the absolutely necessary points. A low number of components means lower maintenance costs. Performance losses are simultaneously minimised. Thus the rope system of the Boxer requires e.g. only one rope pulley for each hoisting rope.



↑ Snag-load device integrated in the hoisting drive chain



↑ Snag-load device acting on the rope fix point

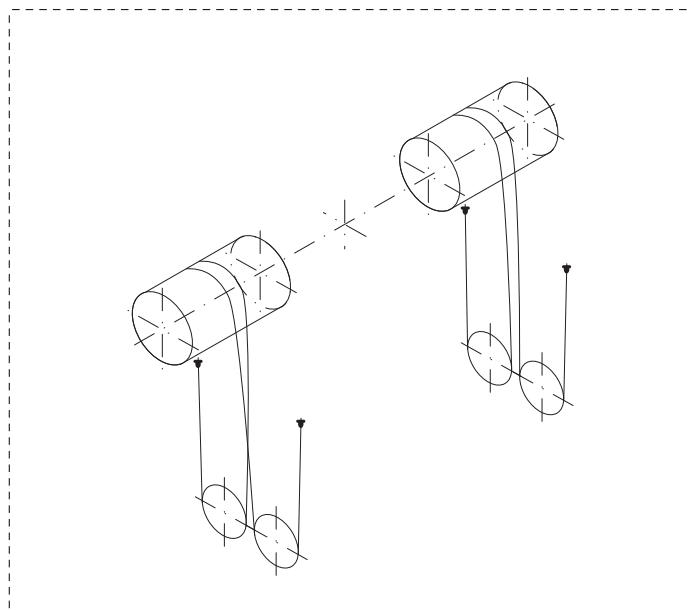
The rigid gantry structure is also an exceptional point: this structure corresponds to the solid box girder principle and forms the solid lower structure of the crane and meets the loading applied.

The latest methods of stress analysis measuring values from the wind tunnel and the intention to create an optimal crane system give the Boxer its concrete form. Apart from all German engineering rules, daily practical experience also provides the inspiration for all further developments. Thus deformations under extreme conditions are not accidental. These have already been calculated during the projecting and construction phase and taken into account during dimensioning. Only a rigid and less flexible structure is the solid basis of a high-performance crane.

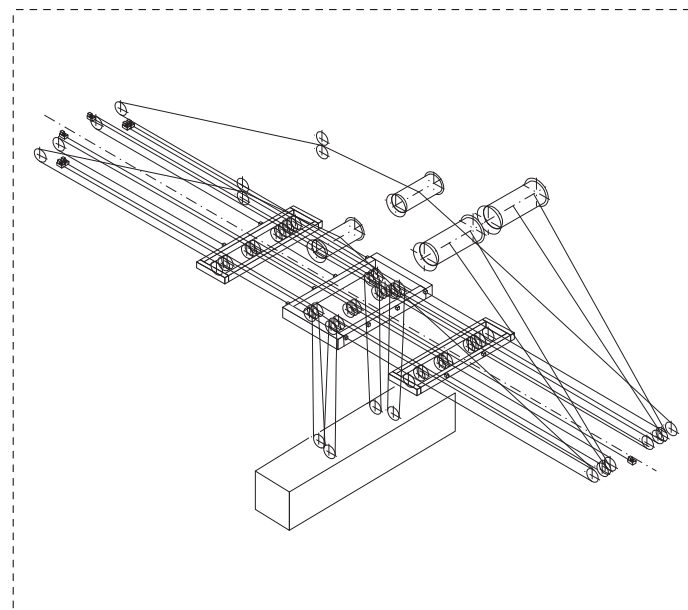
As an experienced specialist in the field of lightweight structures, Kocks is able to realise lightweight super post-Panamax cranes on narrow crane gauges (from 18 through 24 m), so that it is possible to operate large-sized cranes with high handling rates on older quays with limited corner loads.

The Boxer with its special machinery house trolley offers optimal control of the load, i.e. in the case of manual operation as well as in the case of automatic operation: thanks to optimal rope guiding and shortest hoisting rope lengths.

Standstill periods due to maintenance are minimised, high availability is assured.



↑ Rope system of the Boxer



↑ Rope system of a container crane with stationary hoist and trolley drive including catenary trolleys.

THERE ARE MANY REASONS FOR CHOOSING **THE BOXER**. THE MOST COMPELLING ARE:

01 THE BOOMS

The weight and stability of the boom system of the boxer – with waterside boom and bridge girder in mono-box design – have been optimised. The characteristic feature of this structure is the fact that it is subject to extremely easy maintenance: the structure can be easily reached from the exterior side via the machinery house trolley and the interior is accessible.

The waterside boom is connected with the bridge girder via a low-maintenance pivot and an adjustable boom support locking device. The boom support locking device is a speciality of Kocks: it not only releases the pivot from vertical loads but also assures a jerk-free transition.

The cable carrier beam is arranged at the landside end of the boom. In case of maximum landside outreach and in case of maintenance, the cable carriers are positioned on this beam. These can always be reached without difficulty: this is assured by the easily accessible and extremely safe platform system.



↑ Mechanical lock between waterside and landside boom

We offer two types of trolley rails:

- as a welded rail: this rail can be calculated in the stress analysis as a load-bearing part by 75% of its cross-section.
- as a bolted rail: with or without flexible lining.

The bridge girder is suspended via steel structural hinges and separate shear transmission elements providing decisive structural advantages.

When using the stability reserves, even extremely heavy loads can be handled in special cases – assuming well-founded know-how and a heavy-load hook beam.



↑ Boom connection to gantry on waterside



↑ Boom connection to the gantry at landside

02 THE GANTRY

Boxer gantries are rigid and non-swinging, because the light box design with strengthening by diagonals and bracings has a particularly clever effect. Due to our flexibility and creativity in the design, versions with a personnel elevator and stair ascent in the gantry leg are possible.



↑ Gantry structure with inside elevator and stairs

03 THE TIES

The sophisticated tie system consists of waterside and landside ties forming the suspension of the booms and also assuring the special stability of the crane. The landside ties are provided with steel-on-steel hinges.

This is quite different in the case of the waterside ties: in order to assure hoisting of the boom, these are equipped with maintenance-free hinged bushings.



↑ Landside tie links



↑ Waterside tie links

04 ACCESS TO THE CRANE

The integrated concept of the Boxer allows the complete structure to be reached easily and safely. Therefore ladders, stairs and platforms complement one another to form an intelligent system of access. This also permits, on request, comfortable stairs as the main ascent and/or a personnel elevator in one of the gantry legs.

05 THE MACHINERY HOUSE TROLLEY

The machinery house trolley as the performance-dominating crane component of the Boxer is sophisticated technical engineering. It houses the hoisting mechanism provided, depending on requirements, with a central spur gear reducer, with two separate spur gear reducers or with two planetary gearboxes installed in the drum.

Four single-wheel drives assure the optimal traction of the wheels on the trolley rail – and thus a trolley operated without obstructions. Horizontal guide rollers assure almost wear-free running of the flangeless wheels.

We can also supply the machinery house trolley as a special version in the form of a slewing trolley. Then the interaction of roller bearing slewing ring and slewing drive with planetary gearbox (as compact design) assures the excellent slewing possibility via a slewing range of almost 360 degrees.

Kocks machinery house trolleys reach a speed of more than 230m/min including high acceleration values of 0.83m/sec².

By the way: the weather-proof casing in the area of the machinery house can, on request, also be built as a noise-reducing casing – in the lateral walls as well as in the platform.

And as it is understood that performance also implies convenience, all components can always be reached and replaced easily for maintenance purposes.



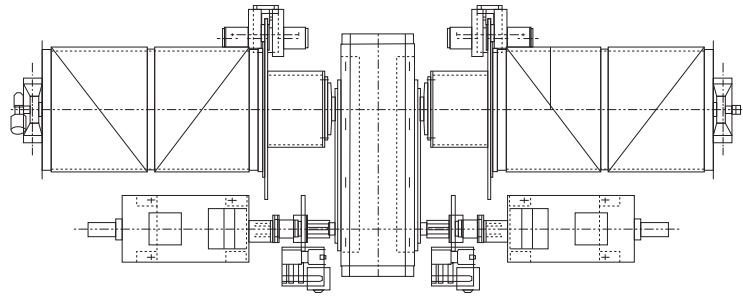
↑ Ascent platforms at pylon



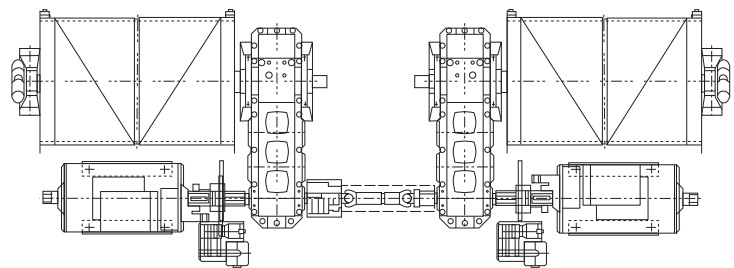
↑ Machinery trolley on the waterside boom



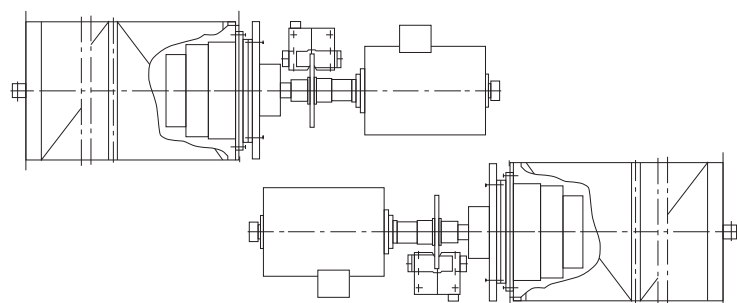
↑ Machinery house trolley on mono-box boom



↑ Hoisting winch with central gearbox



↑ Hoisting winch with two gearboxes



↑ Hoisting winch with two planetary gears

06 THE BOOM HOIST MECHANISM

Assuring maximum safety for all crane components is a core value of Kocks. This applies in particular in the case of the boom hoisting winch. This winch is arranged in the machinery house within the gantry and is equipped with a safety brake as well as an emergency drive. Thus the boom can be kept safe in case of excessive speed or failure of the drive. The emergency drive assures safe movement into the end position.

In case of maintenance, a travelling crane is provided, which can set parts onto the quay or pick up these parts from the quay.



↑ Emergency drive for boom hoist



↑ Emergency band brake at boom hoist

07 DRIVER'S CABIN

The cabin of the panoramic view type provides much comfort and a full range of visibility. It is suspended directly at the machinery house trolley, but can also be uncoupled from the trolley. In this case it is drawn via a separate cabin carriage.

The elements and indication devices required for operation are designed carefully and arranged meticulously in accordance with ergonomic aspects. In this cabin, the crane driver has everything under control.



↑ Maintenance crane inside of machinery house



↑ Ergonomical operator seat



↑ Ergonomical arrangement of control elements

08 THE CRANE TRAVEL MECHANISMS

We also set standards with regard to the crane travel mechanism. The wheels are arranged in a bogie equalising system and are driven either as single wheels or in pairs. Either as support of the wheels or in the gearboxes: anti-friction bearings from European suppliers are a must.

In case of endangered areas, we have developed floodable travel mechanisms – or, where necessary, also curvable trucks, thus assuring curving up to 90 degrees.

09 THE ELECTRICAL EQUIPMENT

The freely programmable electrical control, too, is state-of-the-art technical engineering. It is based on approved industry components communicating via bus systems with the digital three-phase frequency converters.

Anti-sway guiding of the hoist load or optimised hoist load guiding can be realised for optimal operating conditions. Semi-automatic or fully automatic operation assures continuously high handling rates during long periods of operation.

The communication of the devices is assured in accordance with the usual industrial standards by Industrial Ethernet, profibus or CANbus, to a large extent via LWL connections.



↑ Curvable travelling unit with guide rollers



↑ Gantry drive unit



↑ Cubicles inside electrical house



↑ Separate working station for engineers



↑ View to cubicles on trolley



↑ Arrangement of instruments on trolley



↑ Power supply by sealed spiral cable reel



↗ Curvable track for 90 degrees curve



↗ Festoon system with driven carriages to harmonise acceleration

THEORY:
 MAXIMUM HANDLING RATES
 WITH HIGHEST RELIABILITY.
SOLUTION: THE BOXER.



↑
 Postpanamax and super postpanamax container gantry cranes

The Boxer is used where containers are to be handled.

In this context, the Boxer proves to be an extremely efficient and simultaneously reliable device: in case of single lift operation, the Boxer effects 40-45 moves per hour, in 20' or 40' twin lift operation, the Boxer yields double the result. The clever constructional design – machinery house trolley on mono-box boom – ensures optimal control of the load, either during manual operation or in automatic mode. Moreover, complete additional modes of operation can be realised, for example magnet operation or service with grabs. Thus a pure container crane becomes a multipurpose crane.

When unloading ships, above all high performance rates are required during continuous operation. The Boxer is one of the most favoured solutions worldwide.

→ **INFO**

The Boxer is characterised as follows:

- high handling rates
- high positioning accuracy
- high working speeds
- low maintenance expense
- no interference or interruption of ship unloading by replacement of hoisting ropes
- high availability
- low dead weight
- high performance parameters even on narrow crane gauges
- long service life
- high resale value

WHY KOCKS?

CRANE CONSTRUCTION SINCE 1872.

→ KNOW HOW

Kocks has developed high-performance ship unloaders since 1913. We are considered pioneers in the development of container cranes in Europe – and we are leaders on the world market in the field of Goliath cranes. Kocks sets standards for the high performance of cranes.

Our engineers consistently apply the approved regulations of German engineering when continuously developing and designing cranes. Designing and classification for continuous operation is carried out particularly conscientiously.

The goal always remains the same: increased efficiency, safety and environmental friendliness of the cranes.

→ QUALITY

To us quality means: a sophisticated product concept, profound know-how in the fields of design and control as well as the greatest accuracy with regard to fabrication and execution. It goes without saying that our engineers test and check all mechanical and electrical components meticulously.

This provides decisive advantages:

- maximum efficiency and reliability of the cranes
- low operational costs
- long service life (even under the toughest operating conditions).

→ SERVICE

Perfect maintenance is part of a good product for us. We therefore train the personnel of our customers intensely in the fields of crane theory and crane practice. We want to assure that continuous availability of the cranes is guaranteed.

If a failure should occur in spite of everything, we assist quickly and in a flexible and unbureaucratic way. Around the clock.

→ PARTNER APPROACH

The Boxer is an extremely durable product. The decision in favour of the Boxer means the start of a comprehensive relationship between customer and supplier, which is evident from the many repeat and follow-up orders.

We therefore attach great importance to ensuring that this relationship is fair and with long-term benefits for both sides. For us this starts long before the signing of contract. We will be pleased to advise you, simply give us a call.

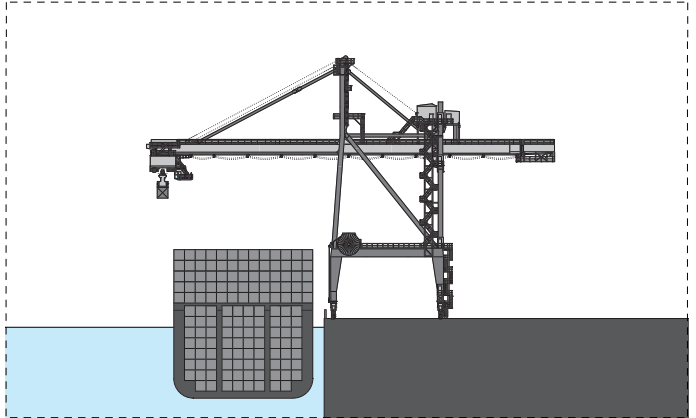


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Home of Kocks Crane in Bremen

THE BOXER – THE ESSENTIAL TECHNICAL DATA.

AN OVERVIEW OF THE BOXER.

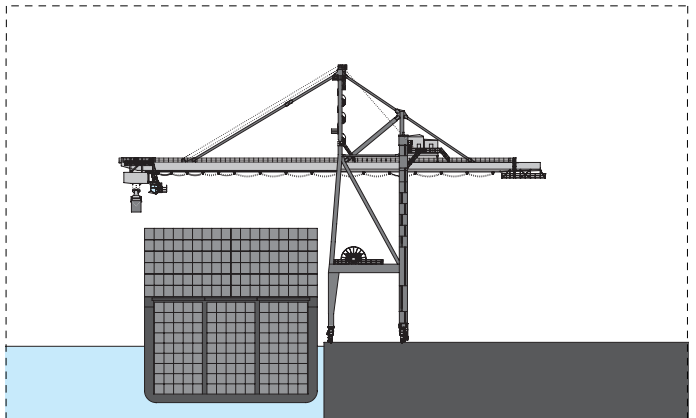
BOXER 4000



- Capacity below spreader 40t
- Handling mode 20/40 ft
- Outreach waterside 40m
- Outreach landside 0 to 25m
- Rail centre gantry 50/80/100ft
- Hoisting height 30m

- | | |
|-------------------------------------|-----------------------------|
| Operating speeds | Acceleration |
| → Hoisting and lowering 60/90 m/min | a = 1 m/sec ² |
| → Trolley travelling 150 m/min | a = 0.65 m/sec ² |
| → Gantry travelling 45 m/min | a = 0.15 m/sec ² |
| → Boom raising 5 min | |
| → Boxes per hour 40 | |

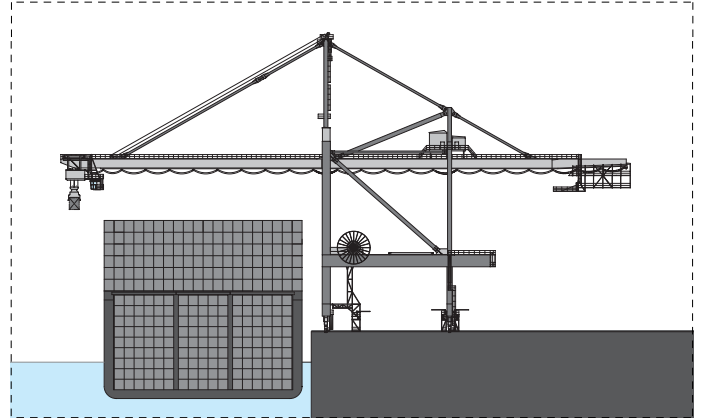
BOXER 5000



- Capacity below spreader 65t
- Handling mode 20/40 ft/twin twenty
- Outreach waterside 50m
- Outreach landside 0 to 25m
- Rail centre gantry 50/80/100ft
- Hoisting height 36m

- | | |
|------------------------------------------------|-----------------------------|
| Operating speeds | Acceleration |
| → Hoisting and lowering 90/120 m/min | a = 1 m/sec ² |
| → Trolley travelling 150 m/min | a = 0.72 m/sec ² |
| → Gantry travelling 45 m/min | a = 0.15 m/sec ² |
| → Boom raising 5 min | |
| → Boxes per hour 40 single lift / 80 twin lift | |

BOXER 6000



→ Capacity below spreader	65 / 60t	Operating speeds	Acceleration
→ Handling mode	20 / 40ft / twin twenty/ double twin twenty	→ Hoisting and lowering	120 / 160m/min $a = 1 \text{ m/sec}^2$
→ Outreach waterside	= / > 60m	→ Trolley travelling	200 to 240m/min $a = 0.83 \text{ m/sec}^2$
→ Outreach landside	0 to 30m	→ Gantry travelling	45 m/min $a = 0.15 \text{ m/sec}^2$
→ Rail centre gantry	50 / 80 / 100ft	→ Boom raising	5 min
→ Hoisting height	42 m	→ Boxes per hour	45 single lift / 80 twin lift / 90 to 100 double twin twenty

KRANUNION. WORLD MARKET LEADERS UNITED.

Kranunion is an association of three crane manufacturers specialised in hoisting and transporting heavy loads.

KIROW is the world market leader for railway cranes and slag pot carriers

ARDELT is the world market leader for double jib level luffing cranes

KOCKS is the world market leader for Goliath cranes

Central to all Kranunion products are the technical design concepts created by our experts. Of course, we continue to optimise those fundamental concepts even further in the interests of our customers. Kranunion products are therefore based on practical requirements and are a symbiosis of tradition and innovation combining the tried and tested with the new.

Customers who choose Kranunion choose great German engineering skill: for environmentally-friendly and safe, modern technology, for low operating costs, for high performance and reliability.

