

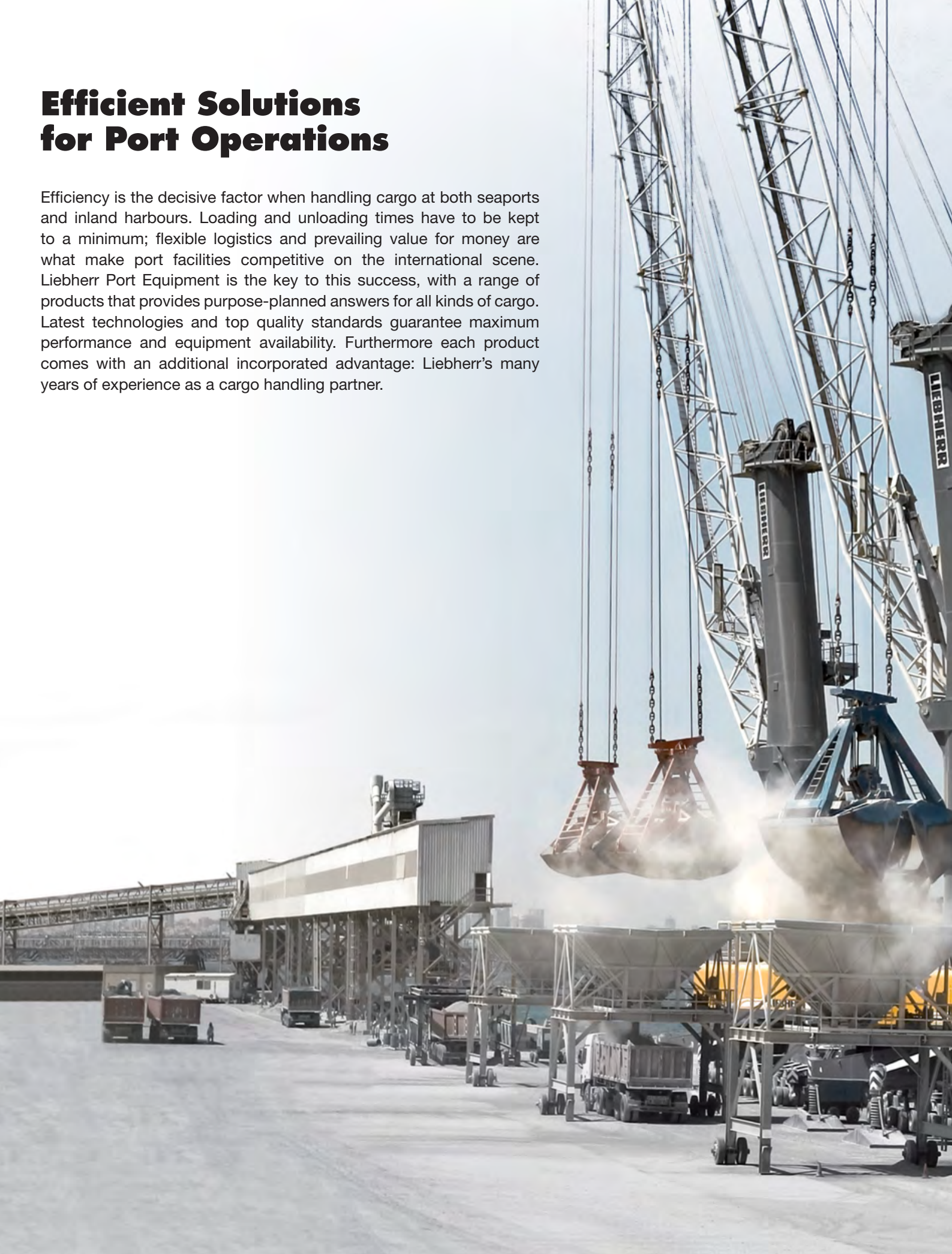
Liebherr Port Equipment



LIEBHERR

Efficient Solutions for Port Operations

Efficiency is the decisive factor when handling cargo at both seaports and inland harbours. Loading and unloading times have to be kept to a minimum; flexible logistics and prevailing value for money are what make port facilities competitive on the international scene. Liebherr Port Equipment is the key to this success, with a range of products that provides purpose-planned answers for all kinds of cargo. Latest technologies and top quality standards guarantee maximum performance and equipment availability. Furthermore each product comes with an additional incorporated advantage: Liebherr's many years of experience as a cargo handling partner.





1 Cargo Handling Cranes

Tailor-made solutions for loading and unloading vessels of all sizes: Container cranes, mobile harbour cranes, fixed pedestal and rail-mounted travelling cranes, each with a variety of optional equipment to suit the nature of the work – and with the quality and availability of a top-class product.

2 Stacking Cranes and Stacking Equipment

Liebherr's rail mounted stacking cranes, rubber tyre gantry cranes, straddle carriers and reachstackers demonstrate their technical superiority through precise handling, synchronised movements and high working speeds. Yet the costs per container are convincingly low. Top quality standards allow this equipment to run reliably round the clock.

3 Special Cargo Handling Solutions

Liebherr is also the first choice for flexibility: for general cargo and bulk material handling it supplies a range of specially adapted equipment from its material handlers and crawler crane, wheel and crawler loader ranges. Rapid working cycles and high handling volumes make these machines highly profitable.

1 Cargo Handling Cranes

For the loading and unloading of vessels at the quayside, Liebherr has an extensive range of container cranes, mobile harbour cranes as well as fixed pedestal and rail-mounted cranes, each of them available with numerous purpose-planned options. Tailor-made solutions – and of course economically viable ones – are supplied for every operating task, size of vessel and type of freight. All cranes and components undergo rigorous testing at the manufacturer's plant, to guarantee the long-term quality and availability expected of a top-quality product.



Container Cranes

In the modern port environment, it's reliability and productivity that count. Container cranes have to be available more than 99% of the time in order to meet the handling rates demanded by shipping lines and port operators. This can only be achieved by purchasing the right equipment. Liebherr Container Cranes is a supplier with an excellent reputation worldwide for delivering high performance and reliable equipment. Container cranes from Liebherr are in operation on all five continents, and feature state-of-the-art technology to satisfy these demands time and time again. An extensive range of ship-to-shore cranes are available, from Panamax size to the latest generation of Megamax cranes with outreaches in excess of 70 m capable of handling the world's largest container vessels and with safe working loads up to 120 metric tonnes.



Mobile Harbour Cranes

Liebherr Port Equipment covers an extensive range of mobile harbour cranes as well as fixed pedestal and rail-mounted cranes, each of them available with numerous purpose-planned options for every operating task, size of vessel and type of freight.

- The result is a well-balanced program of 7 variations of the existing series with performance ranging from 42 tonnes to a maximum of 308 tonnes. Their impressive range of application comprises highly efficient container handling up to 45 moves/hour, bulk operations up to 2,300 tonnes/hour, the handling of scrap or general cargo and even heavy lifts up to 308 tonnes – just by an easy exchange of the lifting attachment.
- Liebherr Mobile Harbour Cranes are based on an innovative concept, which is the outcome of a development process that takes modern material handling requirements into account. The modular-element principle adopted for the basic machine provides solutions for a very wide range of operating requirements.
- The LHM product range, with its outstanding combination of well-established functions and many unique features, is the perfect tool for easy, highly efficient cargo handling. Whatever goods you are looking at – Liebherr mobile harbour cranes are a practical, quick and reliable solution.





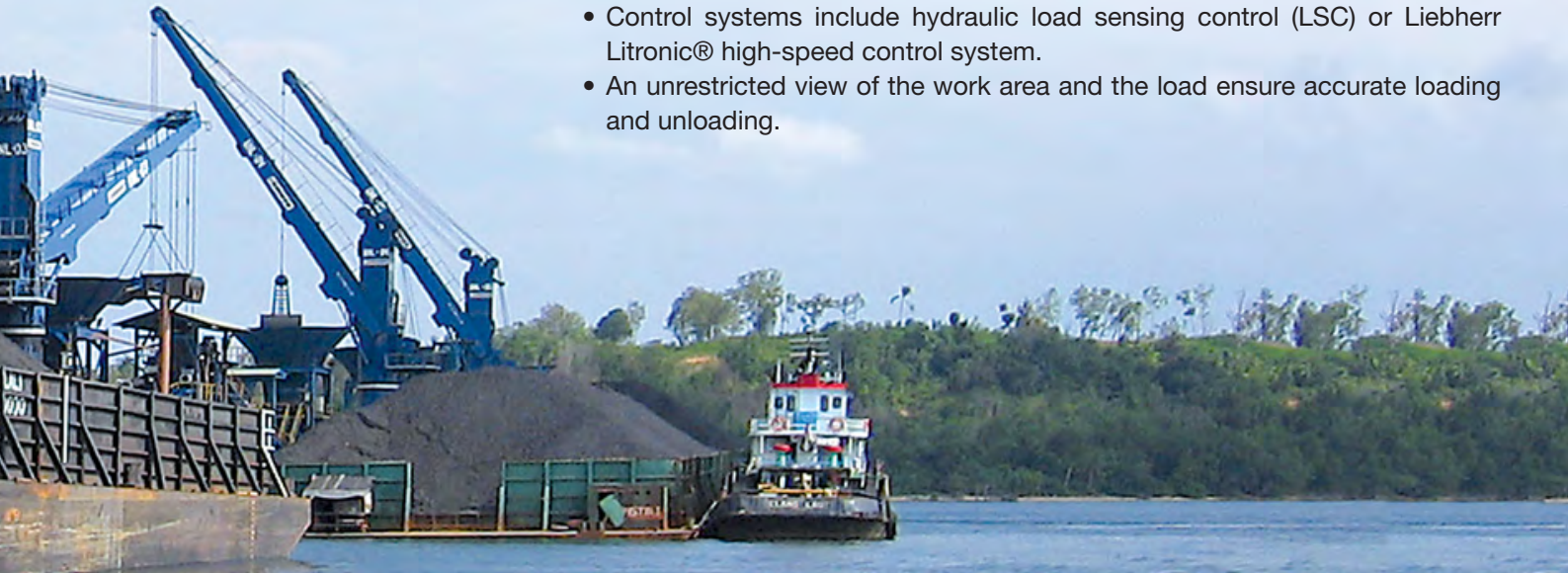


Fixed and Travelling Cargo Cranes

Liebherr's slewing cranes for installation on quaysides, in harbours and in dockyards are available on fixed pedestals (FCC) or on rail-mounted travelling gantries (TCC).

The FCC and TCC ranges are economical, space-saving solutions for cargo handling with vessels up to Capesize. This concept is ideal for harbours and dockyards with limited room for manoeuvre, where low ground pressures are essential or where rail-mounted cranes are called for. The slewing cranes themselves are all proven designs achieving turnovers of up to 1,000 metric tonnes and more; Liebherr has been building cranes for maritime applications for more than forty years.

- Low initial outlay, economical operating and maintenance costs.
- Liebherr FCC and TCC can be equipped with different types of cranes to suit all cargoes and ensure maximum handling efficiency, e.g. wire luffing, cylinder luffing, heavy-duty bulk or double-girder grab/container cranes.
- The extensive range of working attachments enables the crane to be configured for a specific purpose (container or bulk handling), for multi-purpose operation or special applications.
- Control systems include hydraulic load sensing control (LSC) or Liebherr Litronic® high-speed control system.
- An unrestricted view of the work area and the load ensure accurate loading and unloading.



2 Stacking Cranes and Stacking equipment

When there's a need for highly efficient container yard management, Liebherr stacking cranes and equipment demonstrate their technological advantages. With their precise handling, synchronised movements and high speeds, they achieve a high load handling frequency at a low cost per container movement. Their high quality standard and ease of maintenance reduces downtime and increases profitability.

Rubber Tyre Gantry Cranes

Rubber tyre gantry cranes (RTGs) are manufactured according to individual customer needs in a variety of models. Crane spans of between five (5) and eight (8) containers wide (plus a truck lane) and hoisting heights between one (1) over three (3) to one (1) over six (6) containers high are available. Liebherr RTG cranes are designed in either eight (8) or sixteen (16) wheel configuration with AC or DC drive control. Special design features are also available such as DGPS autosteering, stack profiling, semi-automation and remote access. A full range of power options can be supplied to suit different operational models. Whether diesel, electric, hybrid or a combination, a Liebherr RTG ensures higher productivity.







Rail Mounted Gantry Cranes

Rail mounted gantry cranes (RMGs) are manufactured according to individual customer needs and have kept pace with developments in design and technology over the past four (4) decades. A range of design features are available, such as automation, remote control, stack profiling and remote access. Rail mounted gantry cranes are supplied in a variety of models with spans from 20 metres to over 72 metres.





Straddle Carriers

Liebherr Straddle Carriers are custom built in two standard heights, 3 containers high (1 over 2) and 4 containers high (1 over 3). The straddle carriers are designed for single and twin lift operation. 8 wheels mounted on four steering axles when coupled with the superior response of the Liebherr drive and control system offers the ultimate in manoeuvrability and stability. The innovative design feature of positioning the hydraulics at low level results in a more dynamic response from the steering and braking system. Design improvements over alternative models ensure the Liebherr straddle carrier benefits from lower maintenance costs, increased fuel economies with increased productivity. The Liebherr carrier has been developed from over 40 years experience in container handling and brings new and innovative features to this market.

Features:

- Fine Creep Control on travel drives for superior and faster positioning accuracy over a container.
- Steer and Brake by Wire control system ensuring a more dynamic response irrespective of engine speed.
- Impact Protection and Automatic Wheel Alignment.
- Four axle steering with two and four wheel steering modes with increased stability both in straight line and while cornering, maintaining maximum agility for positioning.
- Extended component life and reduced tyre wear leading to increased container handling rates and lower operational costs.
- Spacious, well equipped driver's cabin ergonomically designed with improved visibility.
- Hoist gear positioned for easy access with external disc brakes and simple reeving layout.
- Twin operating brake system - Electric regeneration and hydraulic wet disc brakes.
- Power regeneration between hoist and travel drives.





Reachstackers

To extend its successful maritime cargo handling equipment product line, Liebherr has introduced its own reachstacker. This powerful machine, characterised by its curved telescopic boom, offers hitherto unavailable handling functions and has many other unique features such as fully hydrostatic transmission, an individual wheel drive and a highly efficient shock absorbing system.

- Thanks to a revolutionary boom design, access to the second and third row of containers is possible without having to remove containers from the front row.
- Loading/unloading of containers from or to below ground level is easy, as is direct access to the spreader from the ground.
- Stepless speed control with an automatic power regulator makes for easily controlled, smooth travel movements and maximum efficiency, which is reflected in the remarkably low fuel consumption.
- Simple, ergonomically correct operation of the reachstacker is carried out from a large, well-equipped driver's cabin with a unique all-round standard of visibility.
- Special damping measures enhance driver comfort and also extend the reachstacker's operating life and reduce maintenance costs.





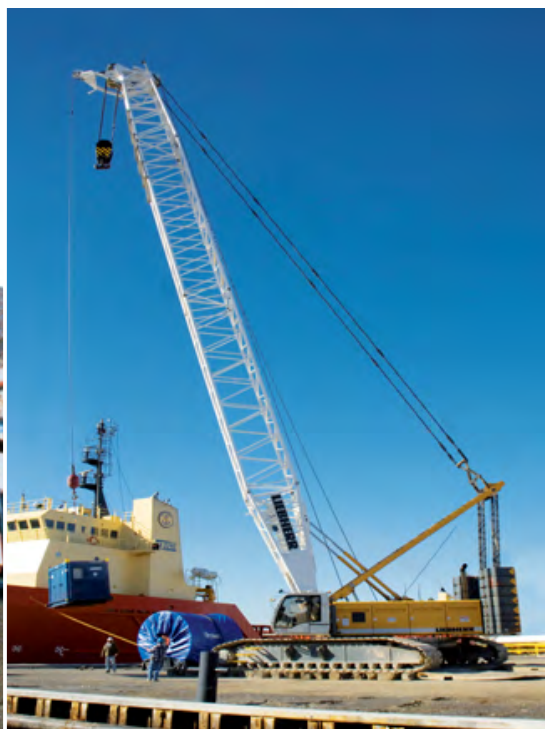
3 Special Cargo Handling Solutions

For the flexible handling of individual loads or bulk materials, Liebherr offers its full range of maritime load handling equipment, but also many machines specially modified for such tasks from its hydraulic crawler crane, material handlers, wheel and crawler loader model ranges.

Crawler Cranes

Liebherr is a leading international manufacturer of modern hydraulic crawler cranes. The wide range of equipment and attachments available enables them to be converted rapidly and without difficulty for either cargo or bulk material handling. Low operating costs are another very significant advantage. For harbour use, a special equipment package is supplied to match the specific needs of loading and unloading from vessels at the quayside. This package comprises:

- A raised operator's cabin for an unrestricted view into the vessel's hold.
- An adapter between the crane's undercarriage and superstructure, to raise the boom pivot point. This makes working close to the vessel more efficient and ensures that the crane can operate at minimum outreach and therefore closer to its maximum load capacity.
- An extended safety package with access ladder guards, wide catwalks every-where on the superstructure, additional mirrors for an unobstructed view and an acoustic travel warning signal.
- The modern Litronic® control system as standard equipment.
- Precise online load-moment computing to allow maximum use of available load capacities.



Material handling machines

Liebherr's well-planned program of wheeled and crawler material handlers provides a highperformance solution for fast, efficient load handling tasks at dockside. Characteristic for these machines are the long reaches, the high lift capacities and their outstanding stability.

- Vastly differing types of use requires a wide range of models. To ensure that Liebherr offers a variety of undercarriages, attachment combinations, working tools and quick change systems as well as a massive selection of equipment. Each machine can be configured individually to suit specific uses and requirements.
- Low fuel consumption with intelligent machine control: With Liebherr-Power-Efficiency (LPE) the interaction of the drive components in terms of efficiency is optimised. Thereby LPE enables machine operation in the area of the lowest specific fuel use for less consumption and greater efficiency with the same performance.
- Power, speed and precision: The Liebherr material handlers ensure a maximum of productivity and performance. The excellent interaction between the engine, hydraulic and electronic components guarantees precision, fine control whilst also ensuring fast, powerful movements.
- Excellent all-round vision: The large areas of glass, different versions of cab elevations and the rear and side area monitoring systems provide the driver with an excellent view of his working area and the zone around the machine. This perfect view enhances the driver's safety and ensures that he can handle the machine safely at all times.





Crawler loaders

Liebherr crawler loaders are compact universal machines which are used to unload ships, and to distribute the ship's load, e.g. maize or cane sugar, in the hull of the ship.

- The chain drive enables crawler loaders to work reliably even under difficult operating conditions.
- The unrivalled manoeuvrability benefits the crawler loaders especially in very tight spaces, like in the hull of a ship.
- The Z-pattern linkage of the lifting gear in conjunction with the high-performance working hydraulics makes an especially high loading capacity possible.



Wheel loaders

In harbours, Liebherr wheel loaders are employed for transporting loads, for unloading ships and for loading lorries and goods trains.

- The large wheel loaders (L 550 - L 586) and the all-round loaders (L 524 - L 542) are characterised in particular by their economy. They consume around 25% less fuel than comparable machines of other manufacturers under the same operating conditions.
- Even under the hardest of operating conditions, the Liebherr travel drive always brakes hydraulically. The mechanical service brake only has a supporting action, so it remains practically free of wear.
- Tractive force can be freely regulated to prevent the wheels from spinning, reducing tyre wear by up to 25%.
- The Liebherr Steroloaders (L 507 - L 514) are especially efficient and safe. Their unique steering system combines centre-pivot steering with a steered rear axle. Not only does that make the machines up to 20% more manoeuvrable; it also helps to give them extraordinarily good stability as the articulation angle is just 30° and not the 40° employed by conventional centre-pivot steering machines. At the same time, this enables it to transport large loads with a comparatively low dead weight.



The Complete Range at a Glance

Multiple Solutions for Container Handling								
Vessel Size	Megamax/ Malacca Max	Megamax/ Malacca Max	Super Post Panamax Size	Post Panamax Size	Panamax Size	Handy Sized Vessel	Feeder/ Coastal Vessel	Barge/ Mini-sized Vessel
No. of containers	22+	19+	18	16	13	11	8	6
Container Cranes	P210 +		P150 - P210	P130 - P210	P115 - P210	P100 - P147	P100 - P129	
Mobile Harbour Cranes	LHM 800	LHM 800 LHM 600	LHM 600 LHM 550	LHM 550 LHM 420	LHM 550 LHM 420	LHM 420 LHM 280	LHM 280 LHM 180	LHM 120
Slewing Cranes					FCC TCC	FCC TCC	FCC TCC	FCC TCC
Reachstackers								LRS 645



Multiple Solutions for Bulk Handling

Multiple Solutions for Bulk Handling							
Vessel Size	Capesize Bulk Carrier	Post Panamax Bulk Carrier	Panamax Sized Bulk Carrier	Handy Max Bulk Carrier	Handy Sized Bulk Carrier	Coastal Bulk Carrier	River Bulk Carrier
Beam in metres	> 40	40	32,5	28,5	25	22,5	12
DWT	220.000	150.000	80.000	50.000	30.000	15.000	7.500
Mobile Harbour Cranes	LHM 800 LHM 600	LHM 600 LHM 550	LHM 550 LHM 420	LHM 420 LHM 280	LHM 280 LHM 180	LHM 180 LHM 120	LHM 120
Slewing Cranes	TCC	FCC TCC	FCC TCC	FCC TCC	FCC TCC	FCC TCC	FCC TCC
Crawler Cranes						HS Serie LR Serie	HS Serie LR Serie
Material handlers			LH 150	LH 150	LH 150	LH 80	LH 50 LH 60



The Liebherr Group – Partner For The Future

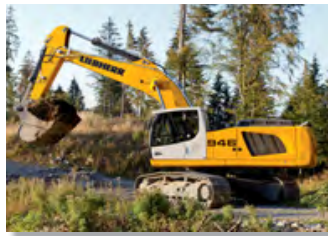
Today, Liebherr is among the leading manufacturers in the fields of hoisting technology and materials handling equipment. The name Liebherr stands for products and services. It has become a synonym for ideas and innovations.

Liebherr – A Family Enterprise

In family-operated companies, ownership merges with active entrepreneurship. This results in characteristic principles. Liebherr is both a family business and a corporation. This does not have to be a contradiction, as the continuous success and steady growth prove.

To create top products, the development capacities and production facilities must measure up to the highest standards. This requires substantial investments. From stable locations, Liebherr is following a solidly financed expansion course. The profits made are almost entirely

retained within the Group. This provides ample scope for extensive investments. The economic power of the Liebherr Group is best shown by its unusually high equity ratio of more than 50%. This sound economic basis makes Liebherr highly independent in its strategic decisions, and it provides an important basis for future investment and innovation strategies. Offering high-quality products and services which are aimed towards customers' needs remains the benchmark.



Mastering Key Technologies

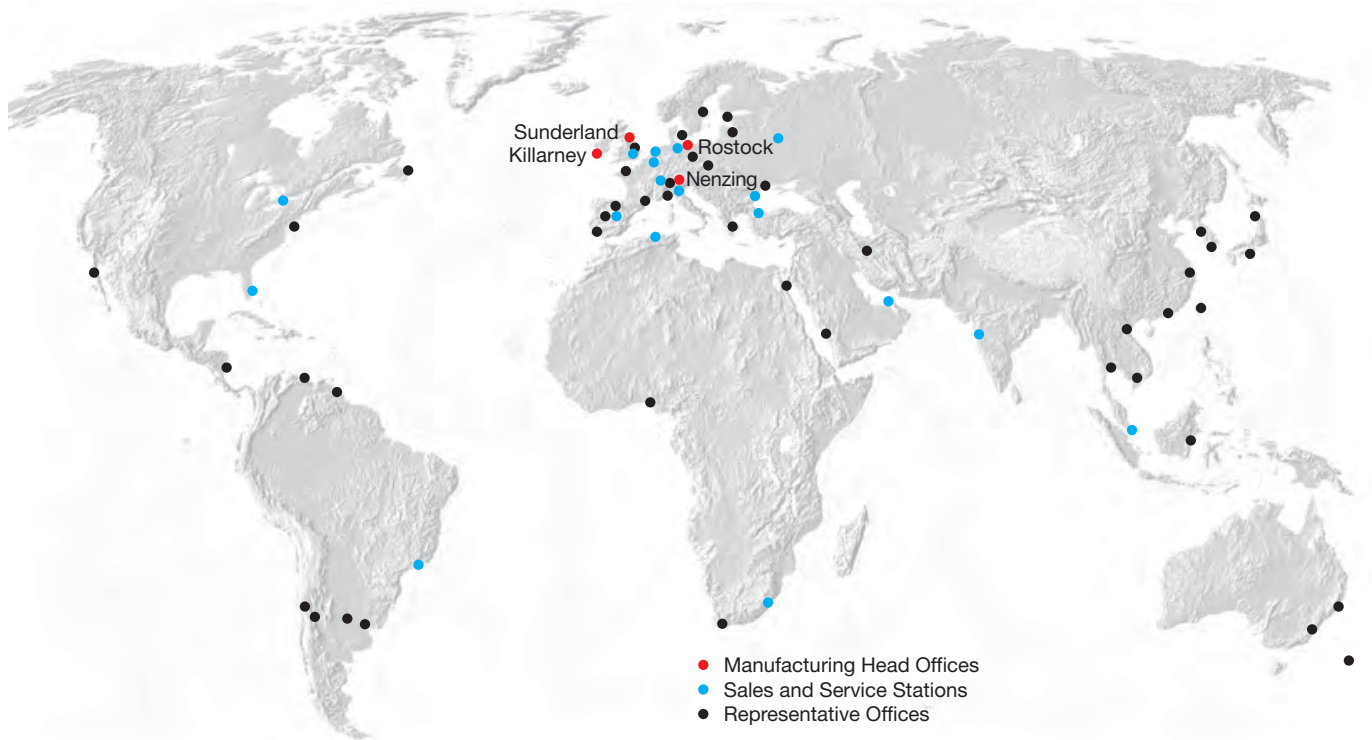
In view of the high quality that Liebherr demands of its products, mastering key technologies internally and keeping core competencies in-house has always been of great importance to the company. Therefore, Liebherr develops and produces crucial components, such as the entire propulsion and control technology, themselves. Further examples are hydraulic components, slip ring elements, and diesel engines. Here, Group suppliers are measured against the best and most efficient external providers.

Decentralized And International, Based On Tradition

Operating efficiently in manageable, self-dependent units and aiming strategically at emerging markets have always formed part of the basic business principles. Thus, Liebherr regularly invests substantially in further marketing and service companies as well as in new production sites. Entering and expanding into new markets means being locally available to assure the customer receives full and lasting manufacturer support.

While maintaining the proven decentralized organizational form, a divisional company structure, whose international expansion is being carried forward, was implemented globally.





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