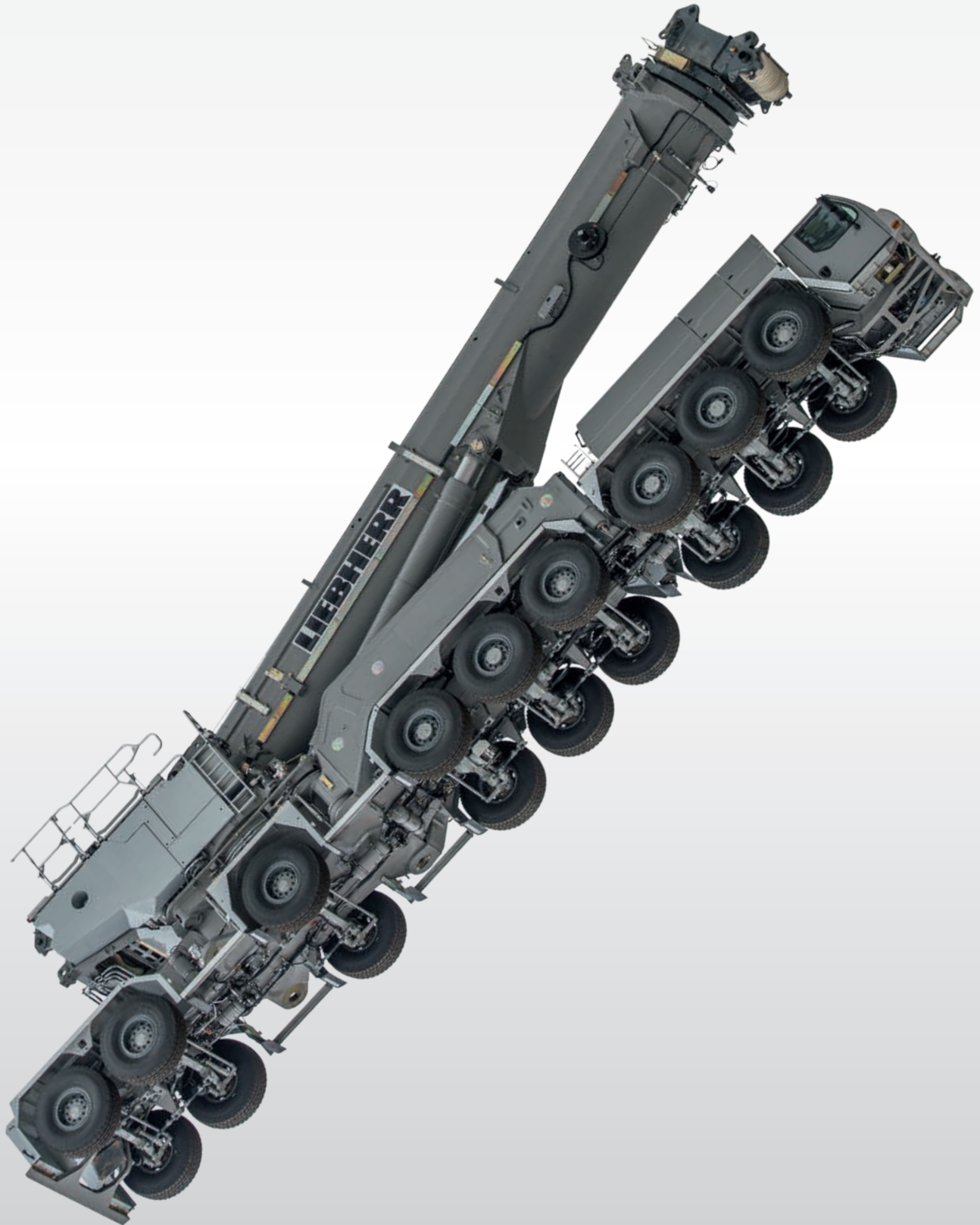


Liebherr – This is how to Build Cranes
Mobile Crane Technology at a Glance

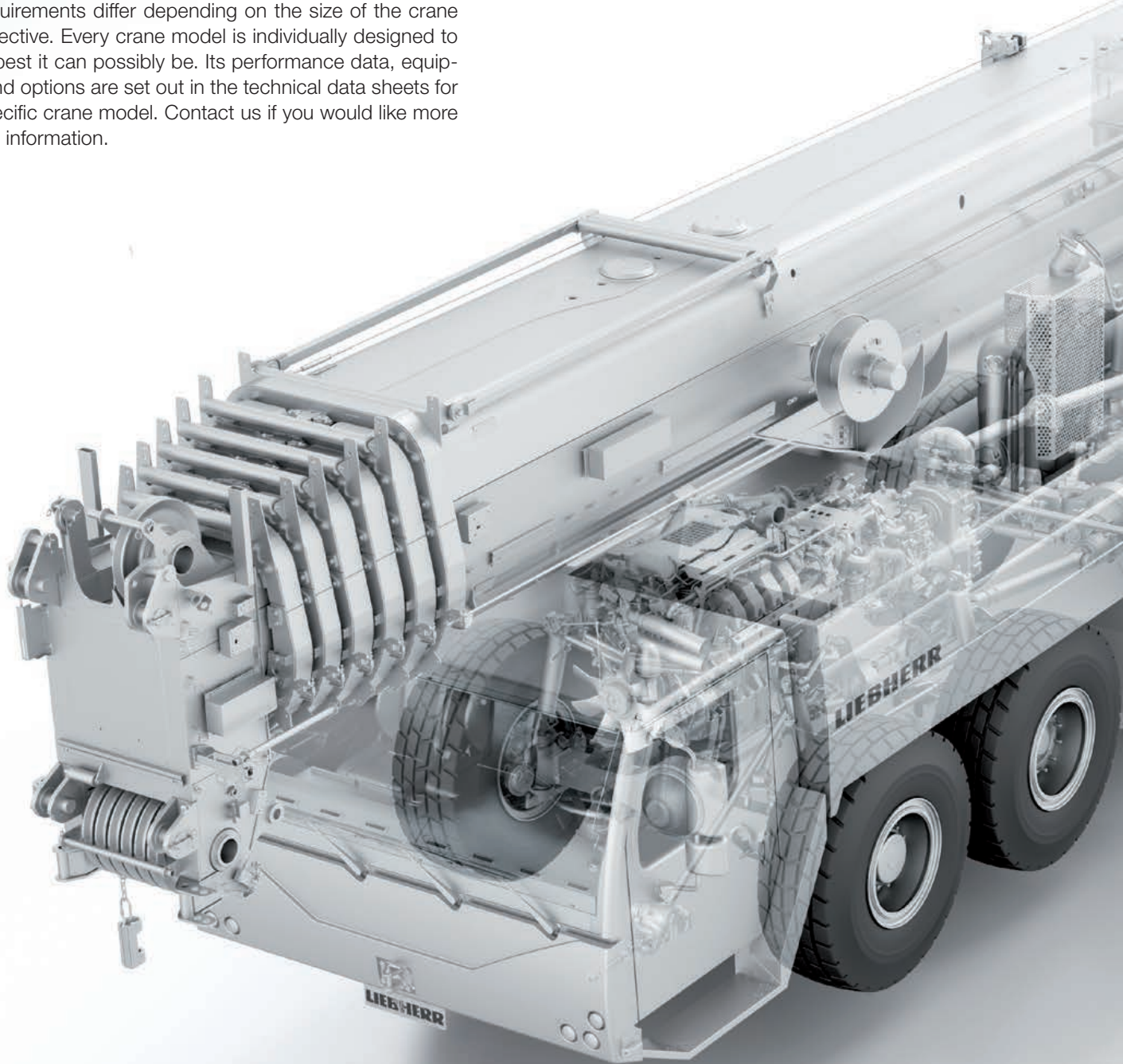


LIEBHERR

Foreword

The “Mobile crane technology at a glance” brochure summarises the main components and technologies of the Liebherr mobile crane range. It contains details of the benefits for practical use.

When they design every individual crane model, our engineers follow an own crane-specific concept based on the requirements of our customers and the market. The technology requirements differ depending on the size of the crane and objective. Every crane model is individually designed to be the best it can possibly be. Its performance data, equipment and options are set out in the technical data sheets for that specific crane model. Contact us if you would like more detailed information.



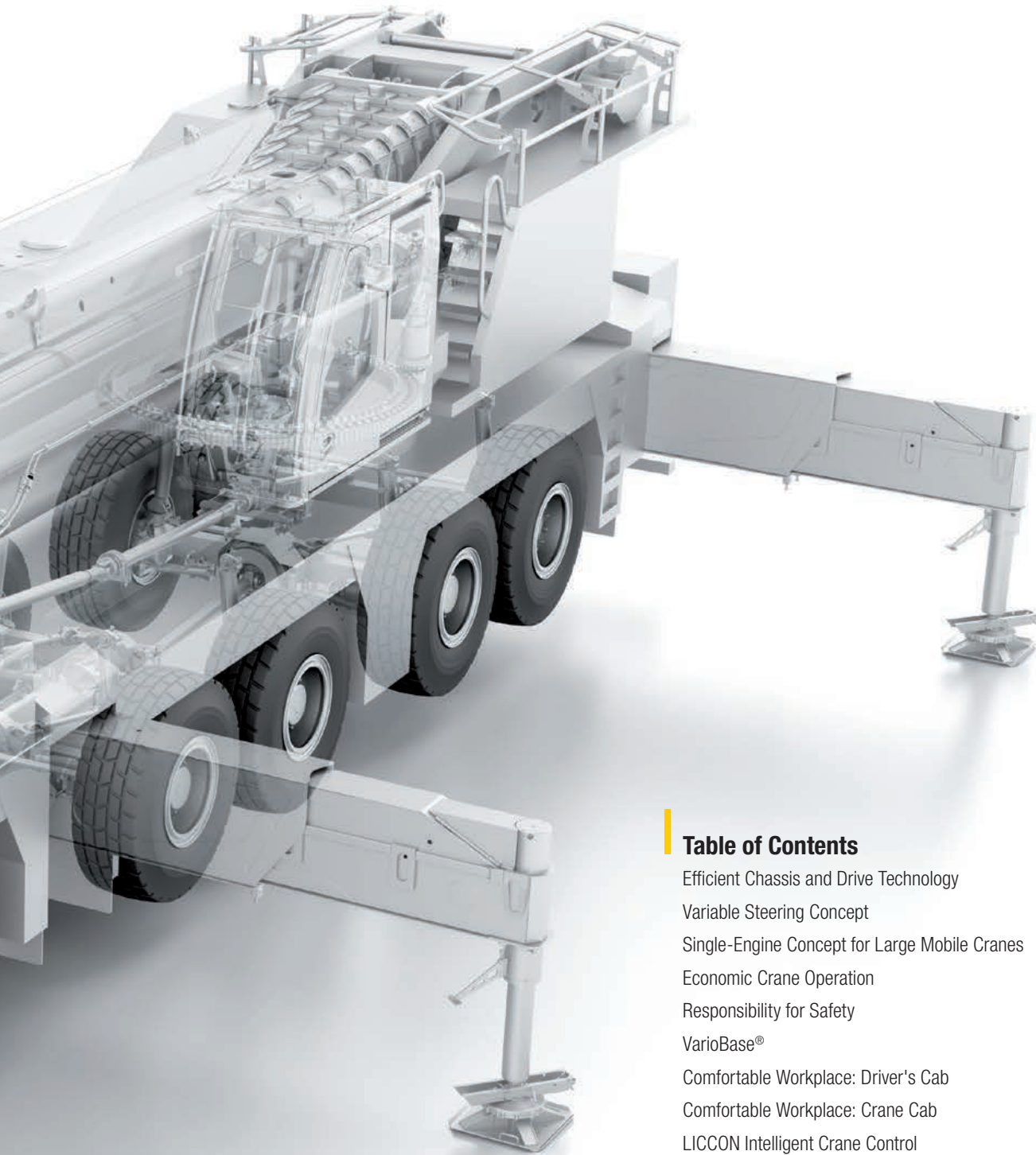


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Efficient Chassis and Drive Technology



The Right Drive Technology for every Crane Model

Liebherr mobile cranes feature enormous mobility on any terrain. This is guaranteed by the high quality chassis and drive technology which also ensures maximum economy. The crane driver has a comfortable workplace in a crane with outstanding manoeuvrability.

High Quality Engines for Powerful Performance

The entire drivetrain has been designed to ensure Liebherr mobile cranes perform superbly. Their powerful Liebherr turbo diesel engines enable the cranes to be driven at good speeds. Innovative exhaust emissions treatment systems provide the cranes with good green credentials.

Economical Transmissions

The automated ZF transmissions provide great economy and ease of use.

- Reduced fuel consumption due to the high number of gears and high efficiency of the dry clutch
- Excellent manoeuvrability and minimum creeper speeds using two-stage transfer cases on 3 to 5-axle LTM cranes
- ZF-TC Tronic transmissions with integral torque converter on LTM cranes with more than 5 axles
- ZF 6WG powershift transmissions with a particularly compact design and integral torque converter for LTM cranes with 2 axles and LTC cranes
- Excellent off-road handling due to multiple powered axles

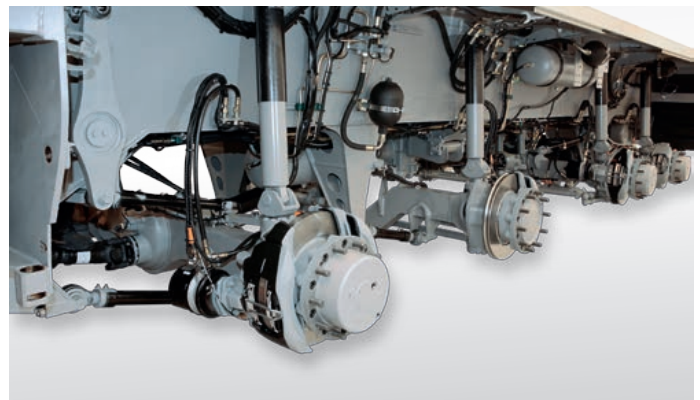
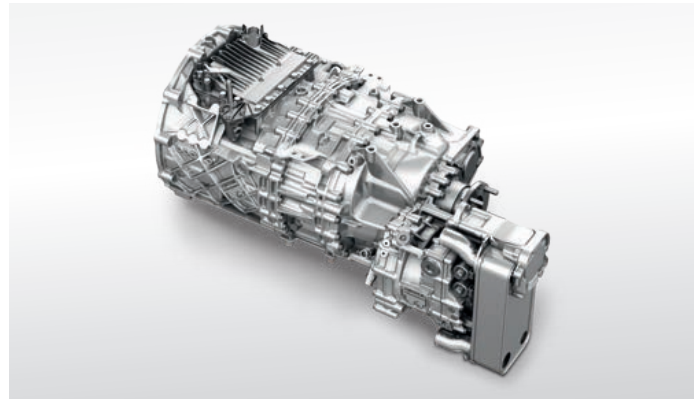
Reliable Braking Systems

Liebherr attaches great value to save, low maintenance braking systems. The braking systems feature very fast activation, smooth braking and low running costs.

- Pneumatic disc brakes with high braking performance and good control
- The ABS anti-locking system prevents the wheels locking when the brakes are applied in an emergency and produces a significant improvement in safety
- Zero wear braking with the ZF intarder for cranes with a load capacity of 90 tonnes and over
- Telma eddy current brake available for zero wear braking to a standstill

Comfortable Suspension

- Niveaumatik hydro-pneumatic axle suspension
- Suspension cylinders require zero maintenance
- Large dimensions for high axle loads
- Great lateral stability when cornering
- Drive states selected using fixed programs



Variable Steering Concept



High Safety and Economy Levels with Active Rear Axle Steering

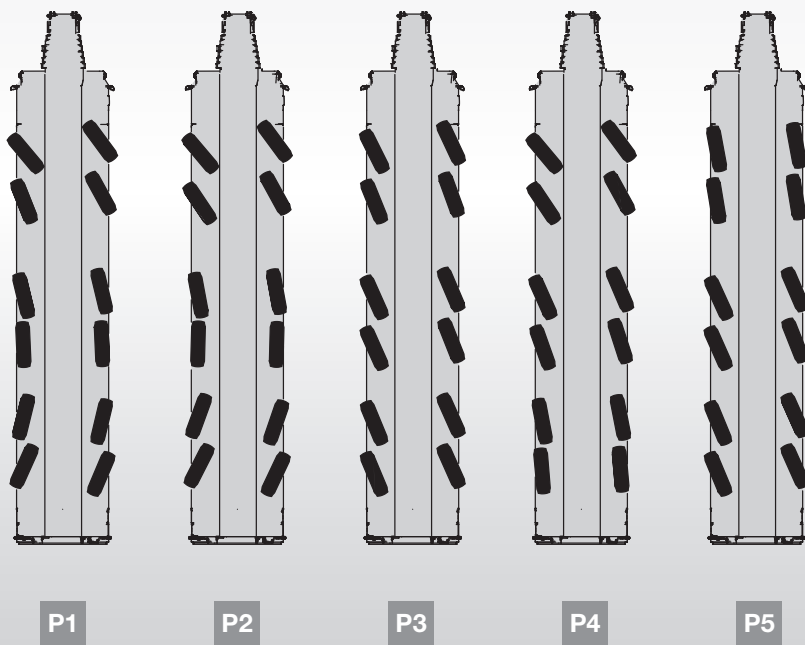
Liebherr mobile cranes are easy to manoeuvre using five steering programs. Their handling is stable even at high speed. Their active rear axle steering drastically reduces tyre wear.

Active Rear Axle Steering

The front axles are steered mechanically using the steering wheel. The rear axles are actively steered by an electro-hydraulic system depending on the steering angle and speed. All the axles on the vehicle can be steered.

High Safety Standards – all Liebherr's Expertise

- Centring cylinder for automatically straightening the rear axles in the event of a fault
- Two independent hydraulic systems with wheel-powered and engine-powered hydraulic pump
- Two independent control computers



P1 Road Steering

The rear axles are steered on a speed-dependent basis. The higher the speed, the less the rear axles are steered. As from a defined speed they are set to a straight line and fixed.

P2 All-Wheel Steering

The rear axles are turned to produce minimum turning circles.

P3 Crab Speed Steering

All the axles are steering in the same direction.

P4 Reduced Swing-Out

The rear axles are turned to minimise the amount that the rear of the vehicle swings out.

P5 Independent Rear Axle Steering

The rear axles are steering independently of the steering angle of the front axles using a push button.

5 Steering Programs

- Program selection by simply pressing a key
- Clear layout of the controls and indicators
- Programs can be changed whilst moving
- Crab speed easily controlled using the steering wheel

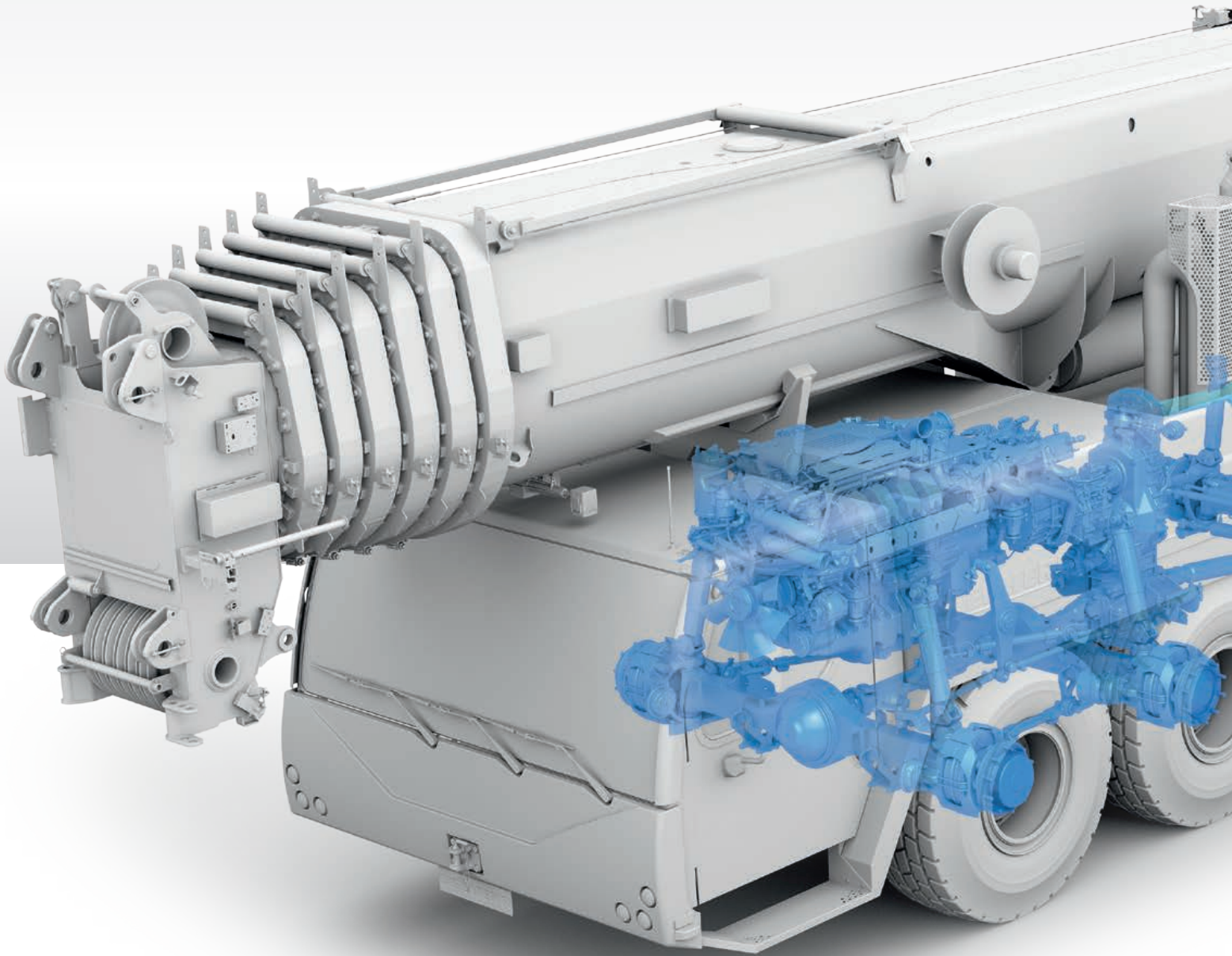


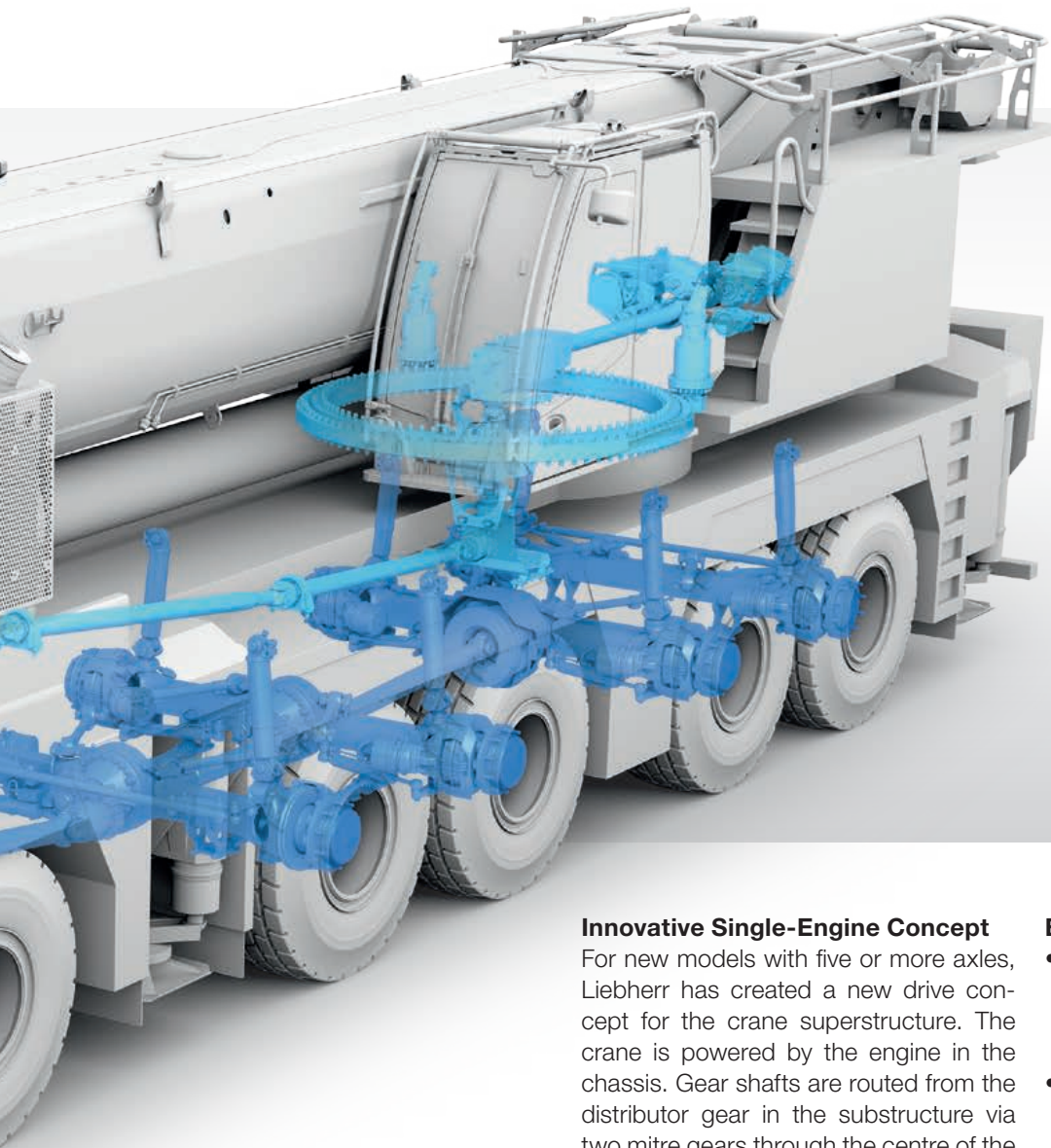
Centring Cylinder

- Automatically straightens the rear axles in the event of a fault

Single-Engine Concept for Large Mobile Cranes

€COmode





Innovative Single-Engine Concept

For new models with five or more axles, Liebherr has created a new drive concept for the crane superstructure. The crane is powered by the engine in the chassis. Gear shafts are routed from the distributor gear in the substructure via two mitre gears through the centre of the slewing ring to the pump distributor gear in the superstructure.

- It is powered by the chassis engine via a mechanical shaft with particularly high efficiency
- Even at low engine speeds, the chassis engine supplies sufficient power for crane operations
- Increased economy and reduced maintenance
- Increased load capacity by using the reduced weight for load-bearing components

ECOMode

- Reduction in fuel consumption by the automatic disengagement of the complete pump drive unit when the engine is idling
- Activated in seconds by the intelligent control system when power is required

Economic Crane Operation



Efficient Operation

Liebherr cranes are designed for all-round cost-effective crane operation. The smart transport, set-up and operating processes have been inspired by practical experience. That saves time, costs and material in everyday use.



Self-assembly of winch 2 on the LTM 1300-6.2

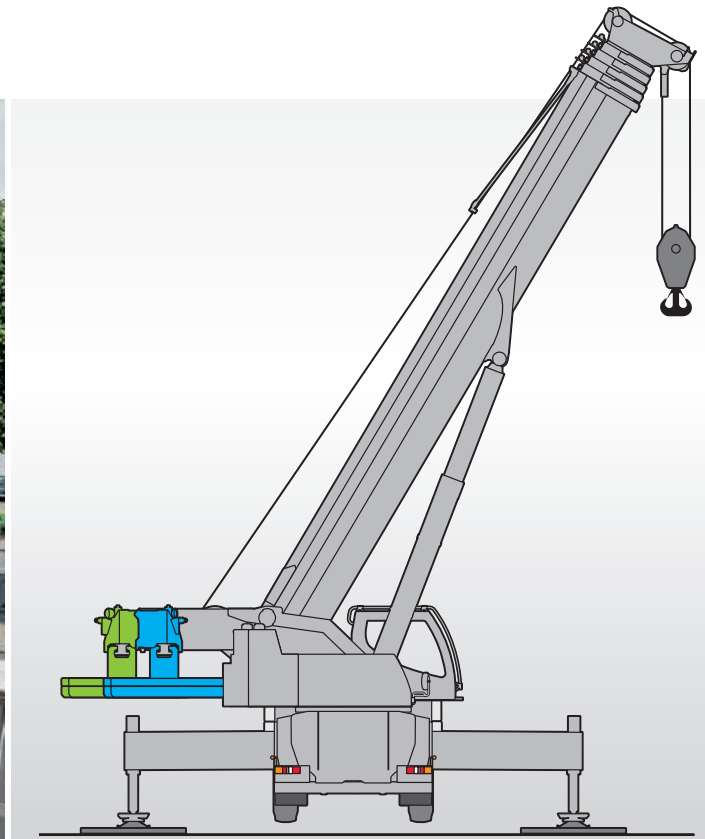
Carefully Designed Set-Up Concepts

The processes to support the crane, install the ballast and mount additional equipment have been designed for speed, safety and convenience. The BTT Bluetooth terminal allows the set-up work to be carried out in full view.

Special equipment enables the self-assembly of the crane – the ballasting, erection of the second hoist gear or mounting of the fixed jib can be completed efficiently on many types of cranes without requiring an auxiliary crane.

Electronic Engine Management

The modern Liebherr engine management system combines the complex control of the engine and all the systems involved. This ensures better performance and lower emissions.



Great flexibility with VarioBallast®

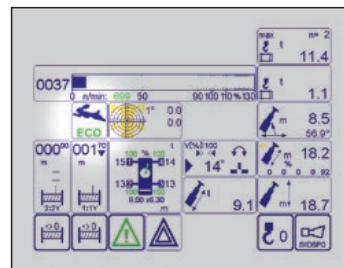
VarioBallast®

On some new LTM models, the ballast radius can be changed quickly and easily using a simple adjustment. The small radius is very useful in constricted working environments. The large radius enables the mobile cranes to achieve maximum load capacities.

ECOMode for more Efficient Mobile Crane Use

On mobile cranes with load sensing control system, the crane driver sets the working speed in ECOMode using the control lever. The perfect engine speed is calculated by the LICCON2 controller and set on the crane's engine by the engine management system.

- Up to 10% lower fuel consumption
- Lower noise emissions



Responsibility for Safety



Additional Safety

Every genuine Liebherr crane features a sophisticated safety concept. Equipment and systems for working in, on and around the crane are available to ensure the crane driver's safety.

Safe Working at Height

Access ladders, handles and railings protect crane operating personnel working at height. Furthermore, personal protective equipment is supplied with the crane. Every crane is designed to ensure that the erection processes can be completed safely.



Safe Ballast Handling

Liebherr has developed a ballast concept for each crane model, designed to ensure safety and efficiency.

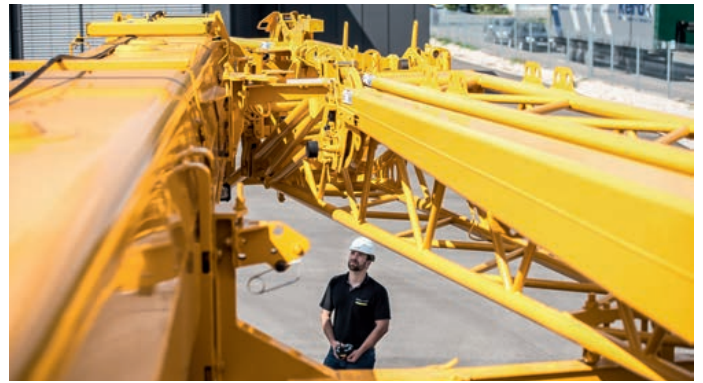
On cranes with a load capacity of up to 300 tonnes, the ballasting process takes place quickly and easily from the crane cab using keyhole technology.

On larger mobile cranes, the ballast plates can be positioned easily and safely on the base plate of the counterweight frame. They are compatible with many models which is a great advantage for fleet operators with several Liebherr mobile cranes.



Mounting the Folding Jib

The folding jib is mounted safely and easily by controlling the hydraulic assistance using the BTT Bluetooth terminal. At the same time a mechanical safety bracket provides additional security.



Automated Erection of the Luffing Jib

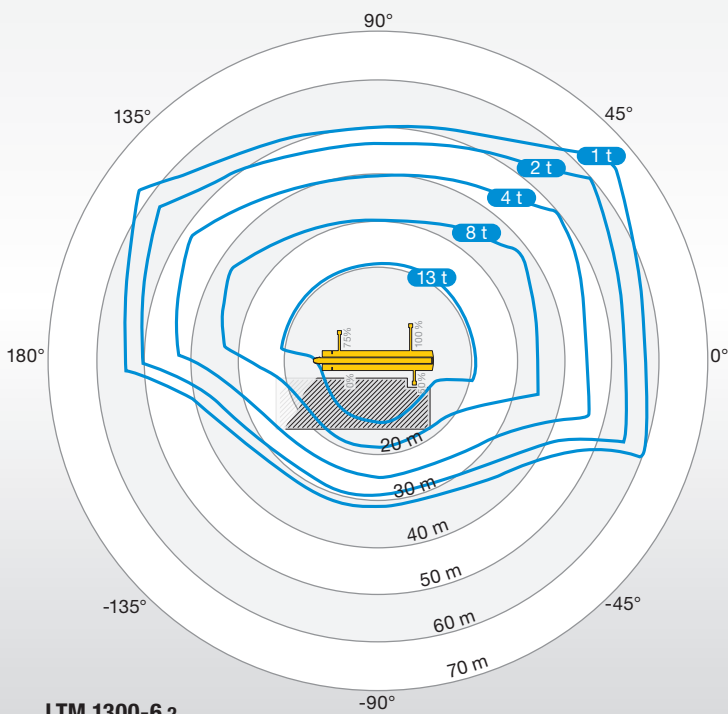
The luffing jib is erected by an easy-to-use automatic system. This relieves the strain on the crane driver and enhances safety.





Variable Supporting Base for Greater Safety and Higher Lifting Capacity

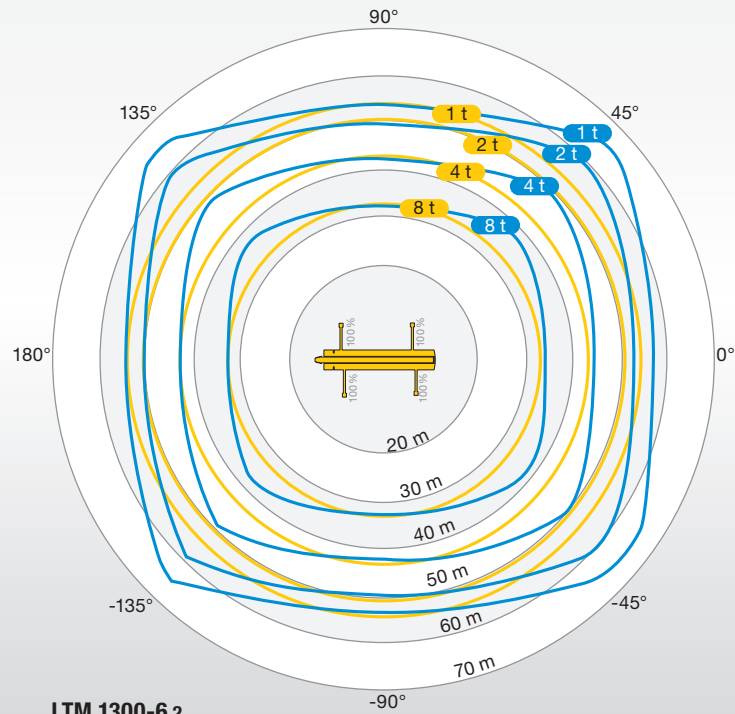
VarioBase® allows each individual crane support to be extended to arbitrary lengths. At the same time, the crane's work is secured by the LICCON controlled load moment limiter. The extension length and support force of every single support is measured and the maximum load capacities for this situation are calculated by the crane controller.



Greater safety in constricted working conditions

Greater Safety

VarioBase® ensures safe operation in constricted working conditions. The maximum load capacities are calculated individually and precisely for every situation. This ensures safe working with any practical support base.



Higher load capacity and larger working range

Higher Lifting Capacity and Larger Working Range

Even with the maximum support base VarioBase® delivers higher load capacities and a larger working area. The largest increases are made in the operating ranges directly above the supports. The variable supporting base also makes improvements for hoisting to the front and rear.

The greatest increases are achieved when partial ballast is on the crane. With just a little ballast the mobile cranes can almost achieve the load capacity values from the standard table with high ballast. This reduces the amount of ballast that has to be transported for crane jobs.

LICCON Work Planner in the Crane Cab

The VarioBase® system is integrated in the LICCON work planner. Dispatchers can plan jobs using the variable supporting base in advance. The work planner is also installed in the LICCON control in the crane cab to ensure that hoists can be simulated on the site.



Comfortable Workplace: Driver's Cab



Drive in Traffic and Manoeuvre On Site Safely with full Concentration

The modern driver's cab enables the driver to relax on the way to the site and manoeuvre the crane once he gets there. Intuitive controls, good vision and plenty of space ensure that the crane driver can concentrate on what really matters to get his Liebherr crane safely to the site.



1 Air-conditioned driver's seat (optional)

2 Various storage facilities and compartments

3 Clear layout of the displays and controls

4 Radio with hands-free device
Optional rear monitoring system

Modern Driver's Cab

- Excellent vision through large windows with tinted safety glass
- Heated, electrically adjustable exterior mirrors
- Pneumatic driver's seat with integral headrest and pneumatic lumbar support, infinitely adjustable
- Steering wheel can be adjusted infinitely in height and angle
- Intelligent heating and ventilation system
- Air-conditioning system standard
- Optional engine independent heating system, including timer
- Standardised control and display instruments arranged ergonomically and functionally
- Single-key system

Comfortable Workplace: Crane Cab



Full Performance due to Functional Cab Design

The attractive, well designed crane cab enables the driver to feel at home so that he can produce top performance. Clever details accumulate to produce an overall concept that combines efficiency, economics and success.



Intelligent heating and ventilation system, air-conditioning system standard

Modern Crane Cab

- Excellent vision with perfect all-round view
- Full safety glass, tinted windows, hinged front and roof windows
- Adjustable crane driver seat, with headrest and pneumatic lumbar support
- Individually adjustable control panels, ergonomic design of all elements
- Optional engine independent heating system, including timer
- Standardised control and display instruments arranged ergonomically and functionally
- Single-key system
- Powerful working lights on the cab, additional working lights on the pivot section available with load tracking system
- Running board extends to the side to provide easy access to the cab



Tilting cab: can be tilted 20° backwards

- 1 Easy access to the cab
- 2 Options: Perfect view of the winches with camera monitoring system; camera on boom head for improved visibility of the working area

- 3 Central control unit, 24 volt socket, cab lights
- 4 Double roller blind for roof window, roller blind for front window to protect the driver from the sun



1 2



3



4

LICCON Intelligent Crane Control



Specially Developed for Liebherr Mobile Cranes

Liebherr develops the software and hardware for its control itself. The heart of the system is the LICCON (Liebherr Computed Control) computer system. Its modern and future-oriented control architecture enables it to adapt to the continually growing needs of the market. Liebherr specialists continue to develop the system all the time.

- Integral LML load moment limiter
- The key components are manufactured by Liebherr
- Guaranteed availability of spare parts
- Proven all over the world in a wide variety of climatic conditions
- User friendly
- Highly reliable due to the use of data bus technology



Operating Menu

Clear display of all the main information about the crane geometry.

Set-Up Menu

Display of the lifting capacity tables according to the entered set-up status.

LICCON

Test System

- Fast localisation of faults on the screen without measuring instruments
- Display of error codes and error description
- Convenient dialogue functions to observe all inputs and outputs

LICCON

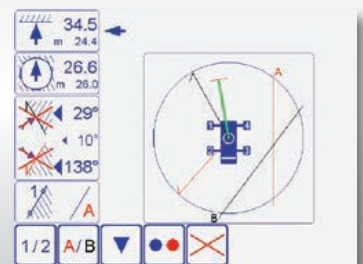
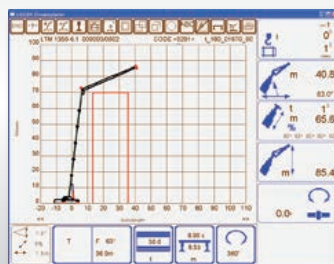
Work Planner

- Computer program for planning, simulation and documenting crane work
- Search for a suitable crane
- Calculation of maximum support forces and wind speeds

LICCON

Working Range Limiting System

- Relieves the crane driver by automatically monitoring the working range limits such as bridges, roofs, etc.
- Simple programming



Remote Crane Control



Convenient, Safe Set-Up

Renowned Liebherr technology for more convenience, economy and safety: The crane driver controls the set-up processes in his direct view using the BTT Bluetooth terminal.

BTT Bluetooth Terminal

The BTT enables you to complete set-up and working processes quickly, safely and conveniently.

- Robust design, insensitive to the vagaries of the weather
- Simple, easy to understand operation
- Excellent functionality
- Ergonomic handling

Supporting

- Electronic angle indicator
- Fully automatic levelling

Hook Block Installation

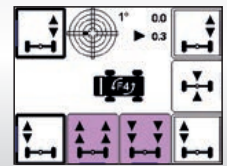
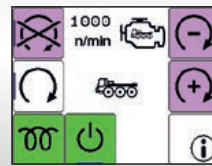
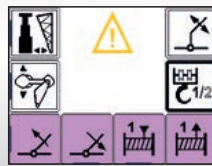
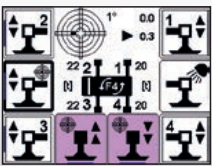
- The hook block is attached and detached with direct sight contact
- Operation of winch and telescopic boom

Diesel Engine

- Engine start/stop
- Engine speed control

Axle Suspension

- Raise / lower the vehicle
- Axle blocking



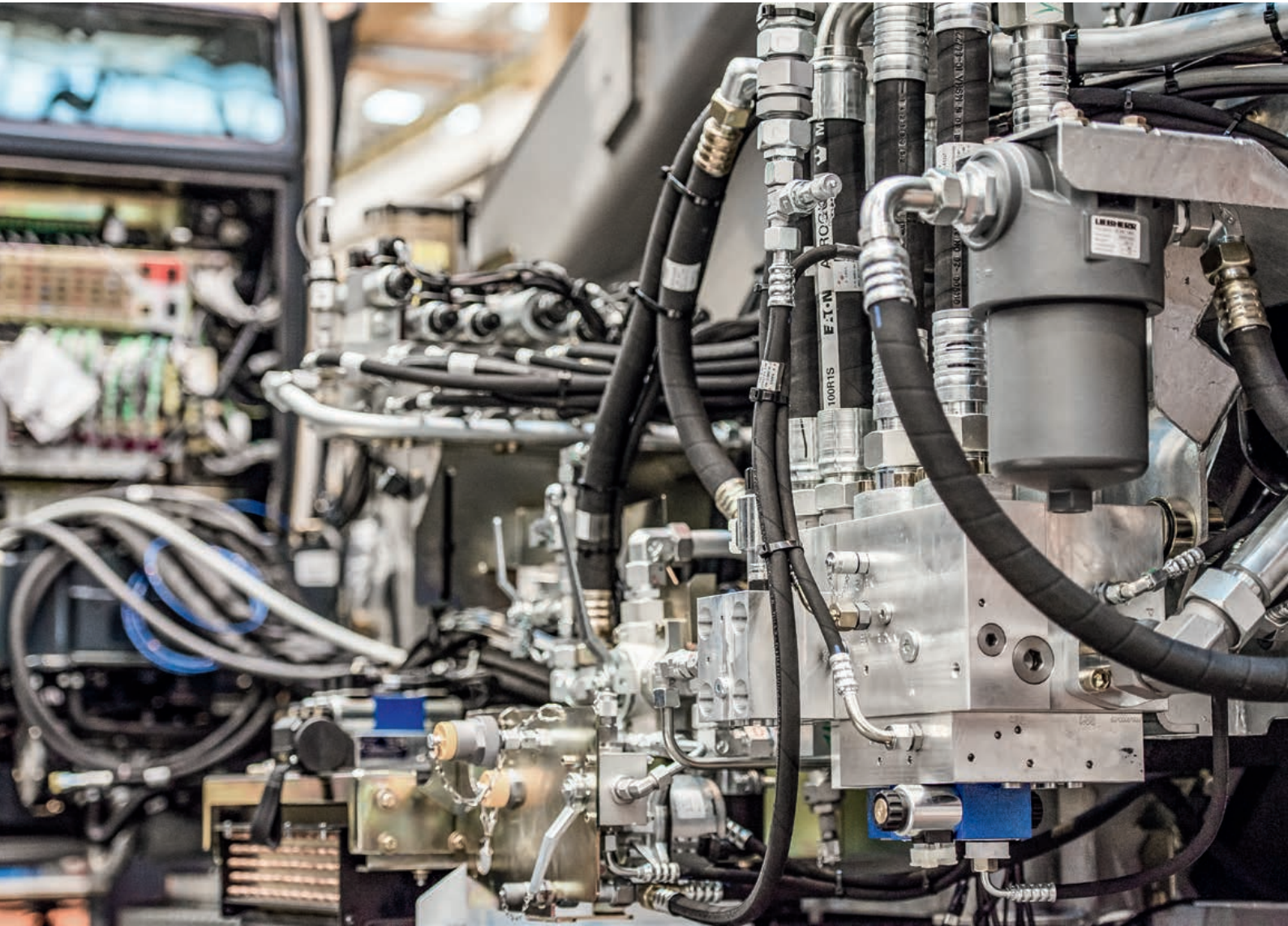


Complete Remote Control

All mobile cranes with the LICCON2 control are now programmed as standard by Liebherr for the remote control of all crane movements. The purchase of a control desk, a console with two master switches into which an existing BTT can be inserted, enables all programmed LICCON2 cranes to be controlled remotely.

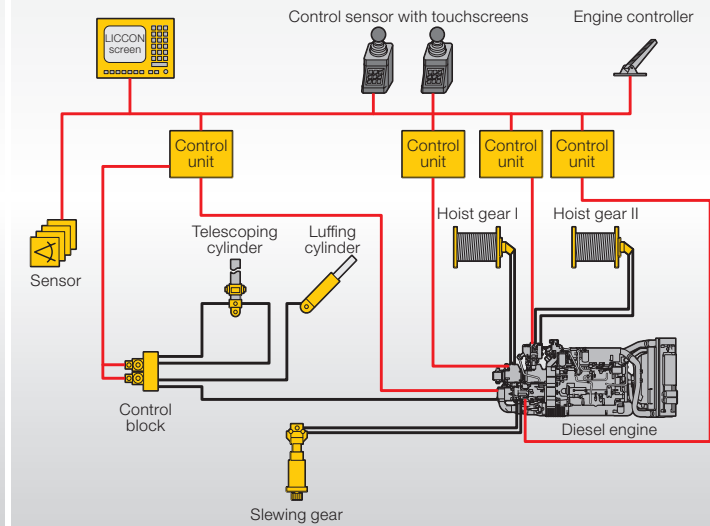
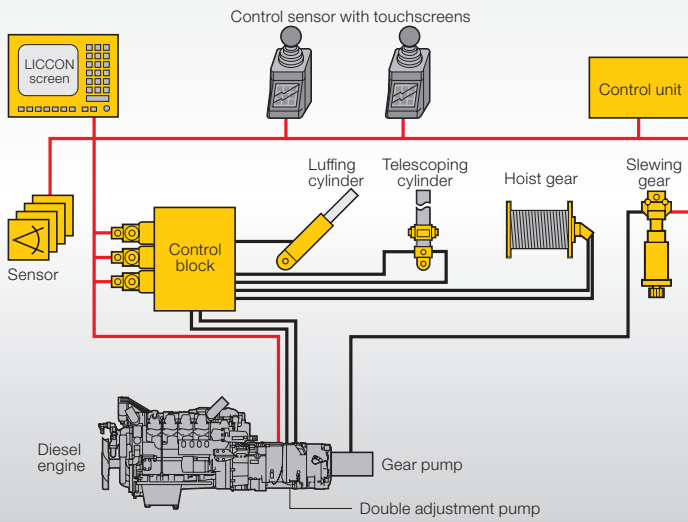
- All crane movements can be controlled from outside the cab
- Clear lines of vision and proximity to the load
- Greater economy and comfort

Powerful Hydraulics



High Performance and Sensitivity

To move large loads accurately, hydraulic drive units and electronic control systems must be perfectly tailored to each other. Liebherr has developed systems tailored to each capacity class which are designed for practical applications.



Open Oil Circuit for Mobile Cranes with Load Sensing Control System

Liebherr mobile cranes are powered by a diesel-hydraulic power transmission system. The open oil circuits are controlled electrically by the load sensing system.

- Four working movements are possible simultaneously
- Changeable slewing gear as standard: open or hydraulically locked to allow the movement to be tailored perfectly to various conditions, for example sensitive erection operations or high speed cycles

Closed Oil Circuit for Mobile Cranes in the Higher Capacity Classes

The hoist gear and slewing gear can be controlled particularly accurately in closed oil systems.

Hoist Gear

- Hoist winch with integral planetary gear and spring-loaded multi-disk brake
- High line pull means less rope reeving required
- Second hoist gear optional

Slewing Gear

- Liebherr planetary gear
- Spring-loaded multi-disk brake
- Infinitely adjustable slewing speed

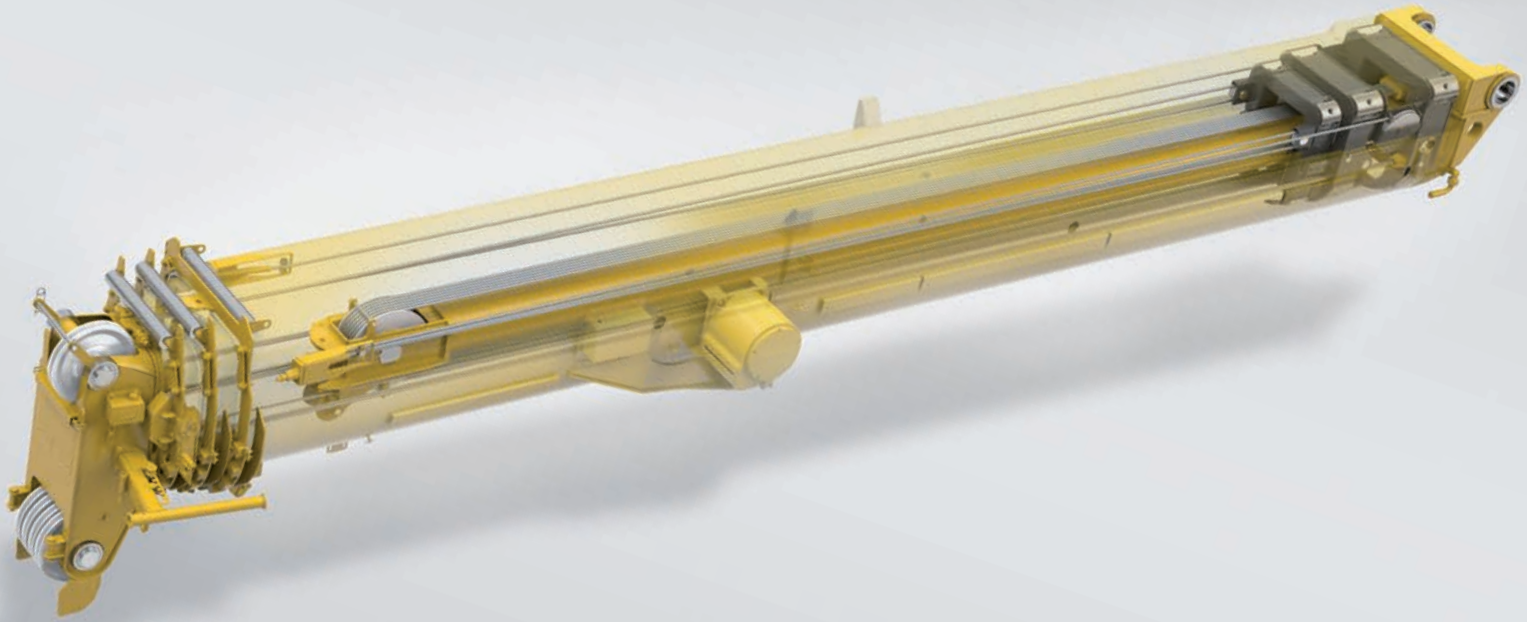


Telescoping Technology: Hydro-Mechanical System



High-Speed Telescoping Using Rope Pull Technology

For LTM mobile cranes whose telescopic boom consists of the pivot section and a maximum of three telescoping parts, Liebherr uses a hydro-mechanical telescoping system. The integral rope pull technology enables the telescopic boom to be extended to the required length particularly easily and quickly.



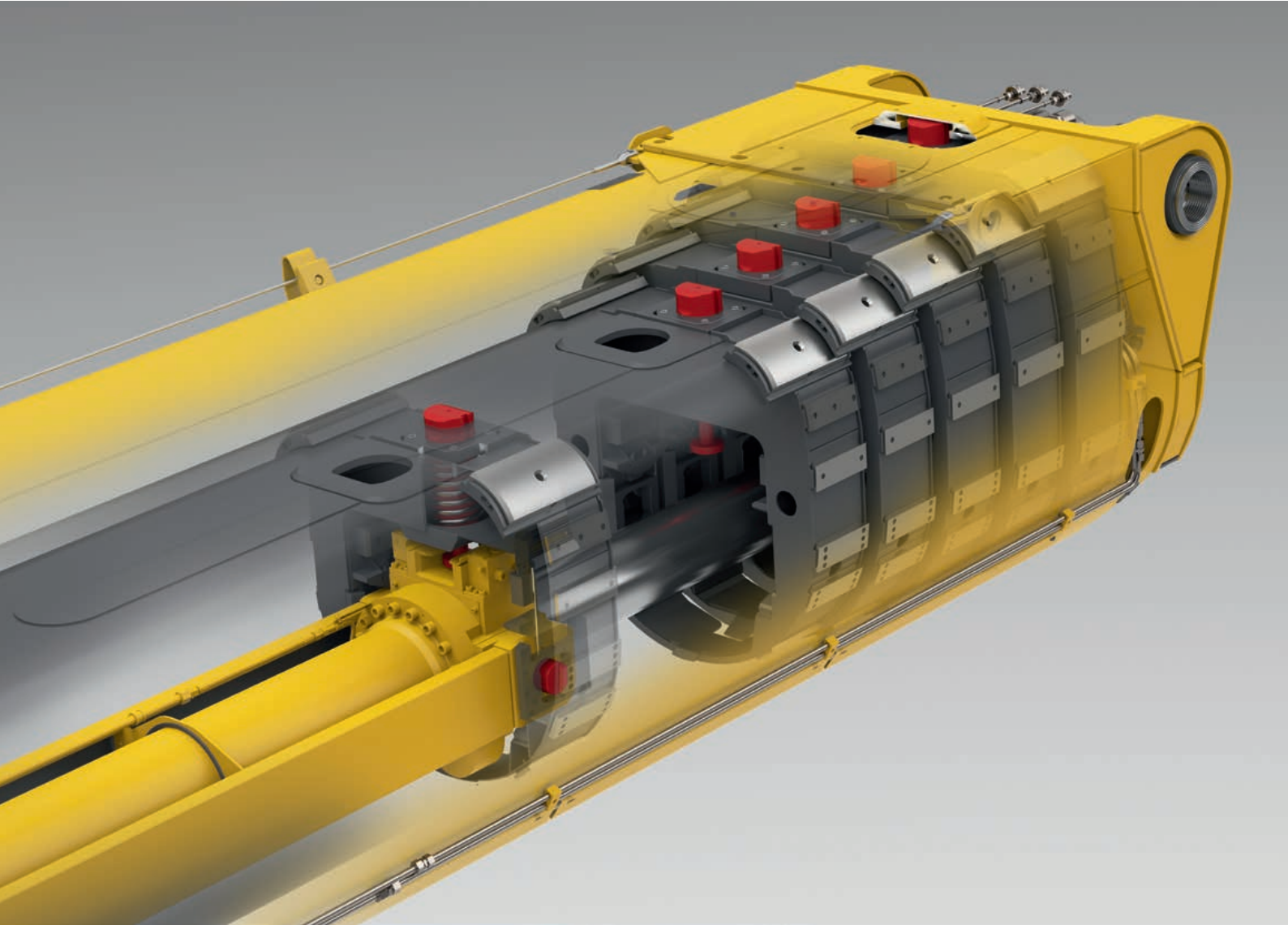
Telescopic Boom Can Be Extended to any Length

The hydro-mechanical telescoping system uses a single-stage, double-action hydraulic cylinder. This extends and retracts telescope 1. Telescopes 2 and 3 are telescoped by ropes. The rope pull technology enables the telescopic boom to be extended to any length quickly and easily.

High Load Capacities

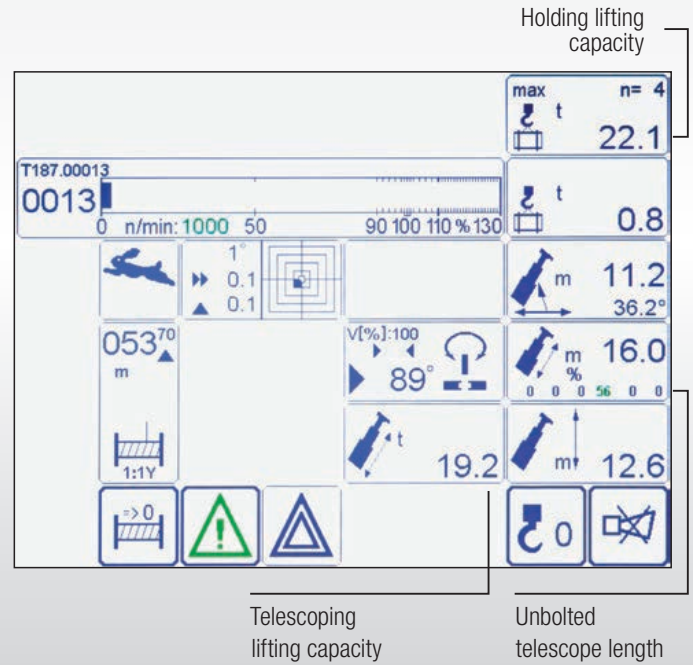
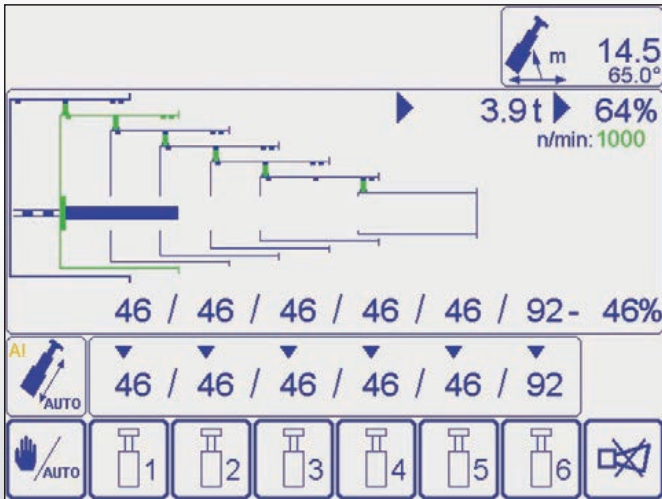
- Liebherr telescopic booms deliver high load capacities with both full and part ballast
- Oval boom section for high lateral stability
- High telescoping lifting capacities

Telescoping Technology: TELEMATIK



Powerful Boom with Single-Cylinder System

Liebherr revolutionised the crane market with the development of its TELEMATIK high-speed telescoping system and established itself as the pioneer in boom technology. TELEMATIK makes cranes more powerful and economical. The technology is used for telescopic booms with up to seven telescoping sections.



TELEMATIK: Lightweight Telescoping System for Outstanding Performance

The TELEMATIK automatic high-speed telescoping system operates using just one hydraulic cylinder and an internal locking system for the individual telescoping sections. The telescoping sections are extended easily and automatically to the required lengths using the hydraulics cylinder and are then bolted.

Powerful Boom with Large Radius

- The “lightweight” TELEMATIK telescoping system delivers high load capacities on long booms and large radii
- Excellent load capacity properties since the various telescopes can be extended in any order and completely independently of each other
- Telescoping system requires zero maintenance
- Fully automatic telescoping by very simple operation and control of the process on the LICCON screen

High Lifting Capacities with Unbolted Telescope Lengths

- High telescoping lifting capacities by interpolation
- Separate load capacity tables to hold loads with unbolted telescope lengths
- Displays on the LICCON monitor

Variable Boom Systems: Folding Jib



Functional Accessories around the Folding Jib

Liebherr can supply a folding jib to extend the range of use of all mobile cranes with a load capacity up to 300 tonnes. Other functional accessory options ensure that the cranes are perfectly suited to all jobs.

5.5 m integral erection jib,
hydraulically adjustable



Hydraulically adjustable folding jib
(0° to 45°)



Rooster sheave
foldable sidewise



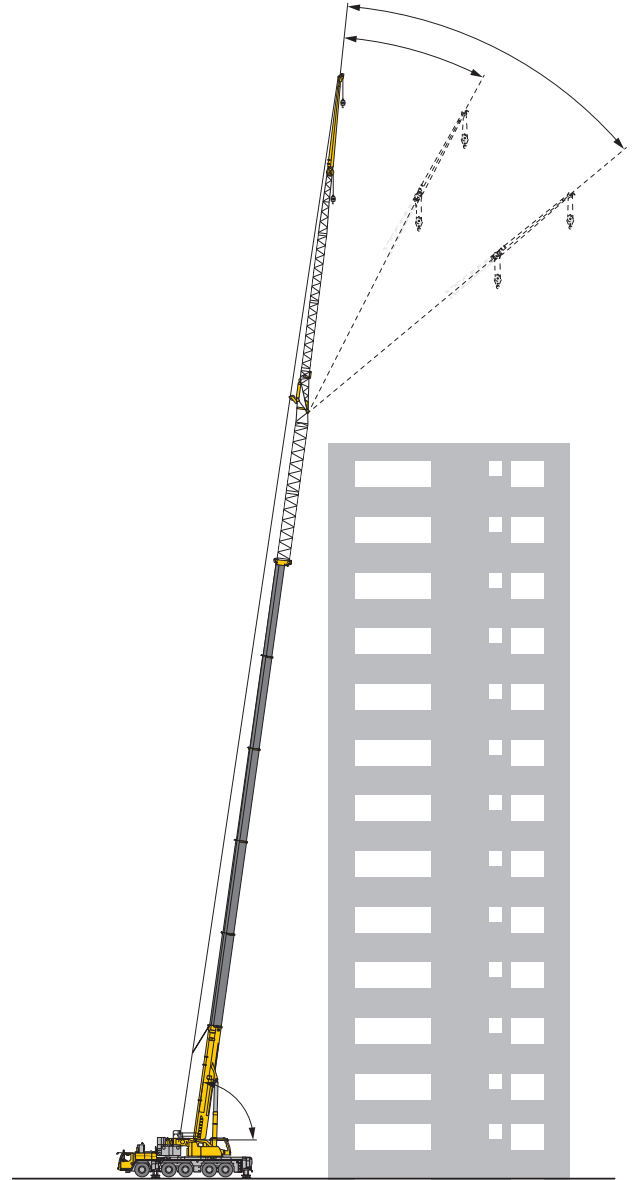
Ready for Use Quickly and Particularly Economic

The folding jib significantly increases the working range of mobile cranes. On some crane models, the double folding jib can be carried on the crane with a 12-tonne axle load. By eliminating additional transports and by the extremely short set-up times, these mobile cranes are particularly economical to use.

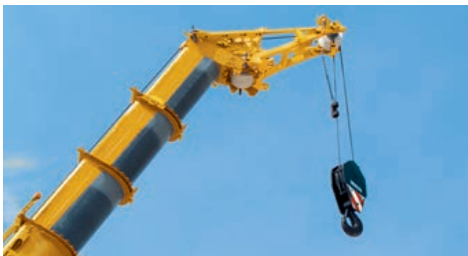
Functional Accessories around the Folding Jib

Additional bespoke systems and components are available for every crane model to improve its flexibility even further.

- Folding jib extension
- Telescopic boom extension
- Various working angles for the jib
- Hydraulic adjustment under full load, lifting capacity interpolation
- Special folding jibs
 - Different lengths
 - Integral erection jib
 - Hydraulically adjustable
- Rooster sheave



Erection jib, consisting of the adapter from the folding jib and an additional set of rollers or a hook traverse



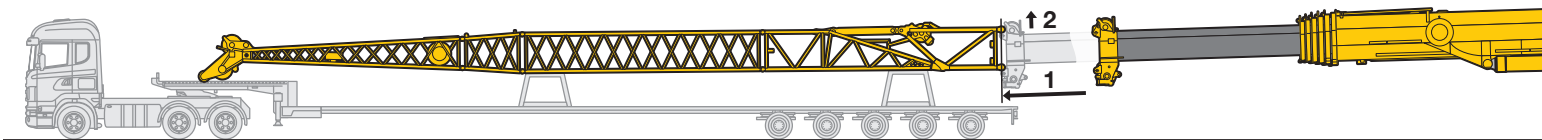
Hydraulic assistance to mount the folding jib with BTT



Hose drum for hydraulic cylinder



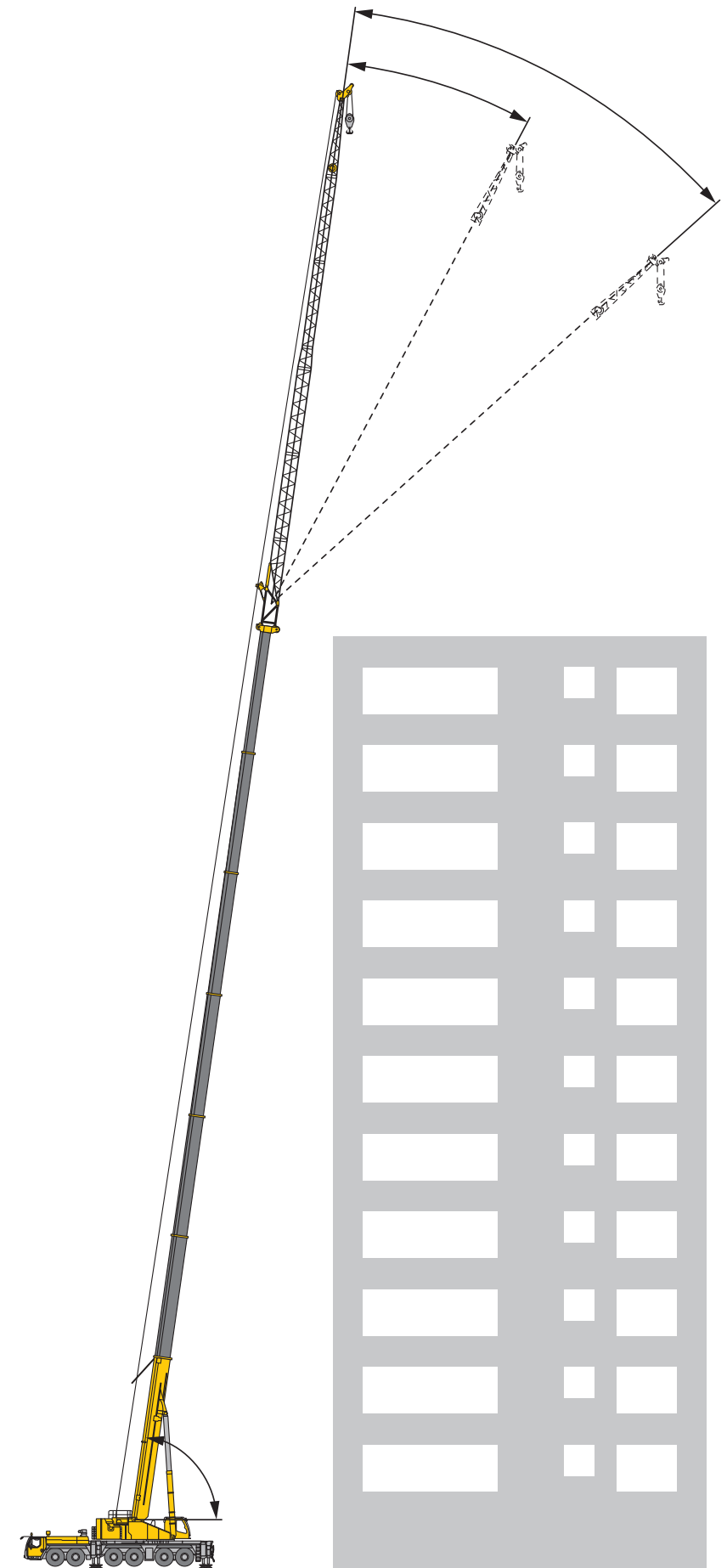
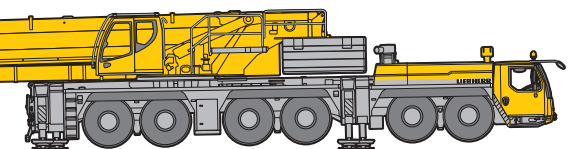
Variable Boom Systems: Fixed Jib



Increased Hoist Height and Radius

The telescopic boom on large mobile cranes from Liebherr can be extended using a fixed lattice jib. That enables to deliver great hoist heights and load capacities. The fixed jib is particularly helpful when working with projecting edges, such as on high buildings. It can be fitted at various working angles.

Great economy due to the self-assembly of the fixed jib



Variable Boom Systems: Luffing Jib



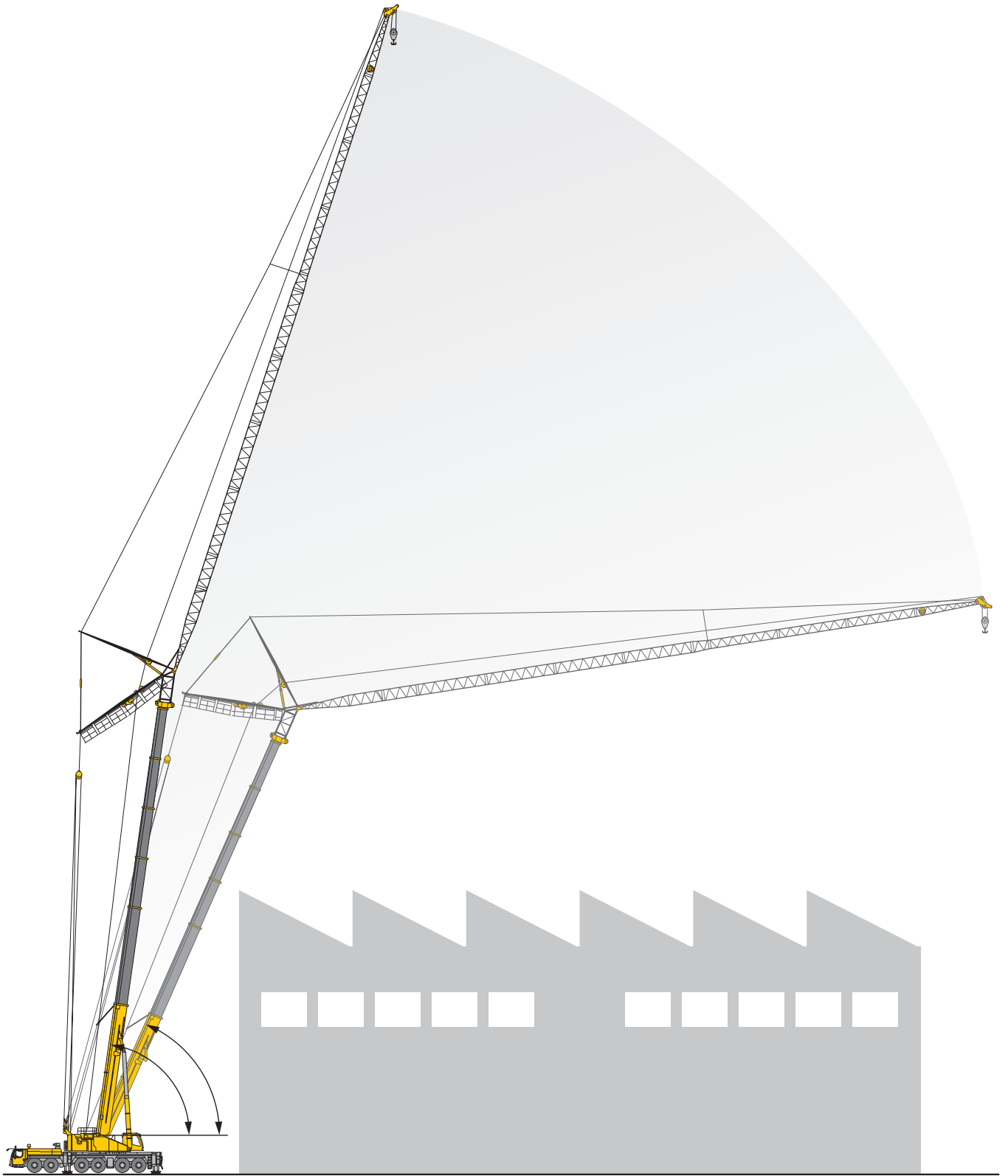
Enormous Working Range with Luffing Lattice Jib

Large Liebherr cranes can cover a massive working range with a luffing lattice jib. That is ensured by the infinite load capacity interpolation when luffing the boom combination.

The luffing jib is used in particular for hoisting work which requires a large radius.

Automated Erection of the Luffing Jib

A user-friendly automatic system allows the luffing lattice jib to be erected easily. The straightforward handling takes the strain off the crane driver and enhances safety. The crane driver only has to luff the telescopic boom. The adjustment winch is operated by the crane control.



High Load Capacities with Y Guying



Increased Load Capacity due to Greater Lateral Stability

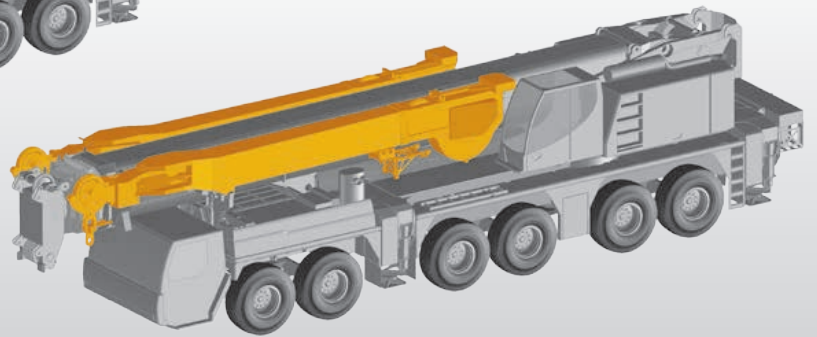
Some Liebherr mobile cranes with a load capacity of 350 tonnes or more can be fitted with Y telescopic boom guying. This allows enormous increases in lifting capacity to be achieved, particularly on long boom systems since it significantly improves lateral stability. During the guying process, the ropes are set to exactly the same length on both sides by clamping cylinders so that the boom is held in the best possible straight position in static load terms.



Efficient Assembly

Liebherr's telescopic boom guying systems are designed to be erected quickly and easily on site.

On some crane models the Y guying system can be mounted in self-assembly.



Manoeuvring on Site

The design of the telescopic boom guying systems and the technical layout of the Liebherr mobile cranes allow that the cranes can be manoeuvred on site when erected.







Mobile and Crawler Cranes from Liebherr-Werk Ehingen GmbH

Liebherr-Werk Ehingen GmbH develops and manufactures highly modern telescopic and lattice boom cranes on mobile and crawler chassis. Its services also include the design and project completion of large parasols. The company is the global market leader in mobile cranes. The keys to this success are its innovative products, high quality and committed workforce. As the company attaches a great deal of value to high technological standards, Liebherr-Werk Ehingen GmbH invests heavily in research and development. The needs of the customer are

the primary focus from development to service. The objective is to set standards in quality, functionality and safety and ensure that the machines are highly reliable in use. Liebherr-Werk Ehingen GmbH is part of the global Liebherr Group of Companies. This family-run company is one of the largest manufacturers of construction machinery in the world and is also renowned as a supplier of technically advanced, user-focussed products and services in many other industries.



LTM mobile cranes



LTC compact cranes



LTF telescopic truck-mounted cranes



LG lattice boom mobile cranes



LTR telescopic crawler cranes



LR crawler cranes

LTM Mobile Cranes

The range of LTM cranes extends from the twin-axle 35-tonne model to a heavy duty crane with a load capacity of 1,200 tonnes. The all-terrain chassis is ideal for combined on-road and off-road use. The powerful, long telescopic booms can reach great working heights quickly and easily.

LTC Compact Cranes

Compact cranes are all-terrain cranes with a particularly compact design. They are ideal for use on extremely constricted sites.

LTF Telescopic Truck-Mounted Cranes

LTF truck-mounted cranes are a low cost alternative in the taxi crane class. Mounted on standard truck chassis, they cost very little to drive around to jobs.

LG Lattice Boom Mobile Cranes

LG mobile cranes with lattice booms can handle particularly heavy loads, enormous working heights and radii.

LTR Telescopic Crawler Cranes

Telescopic cranes on crawler chassis deliver short set-up times and excellent off-road manoeuvrability. They are particularly flexible to use.

LR Crawler Cranes

LR crawler cranes are used all over the world, wherever very heavy loads need to be moved safely and economically. With extremely variable boom systems and lifting capacities of up to 3,000 tonnes they can cover a particularly wide range of uses.

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