

Components by Liebherr



LIEBHERR

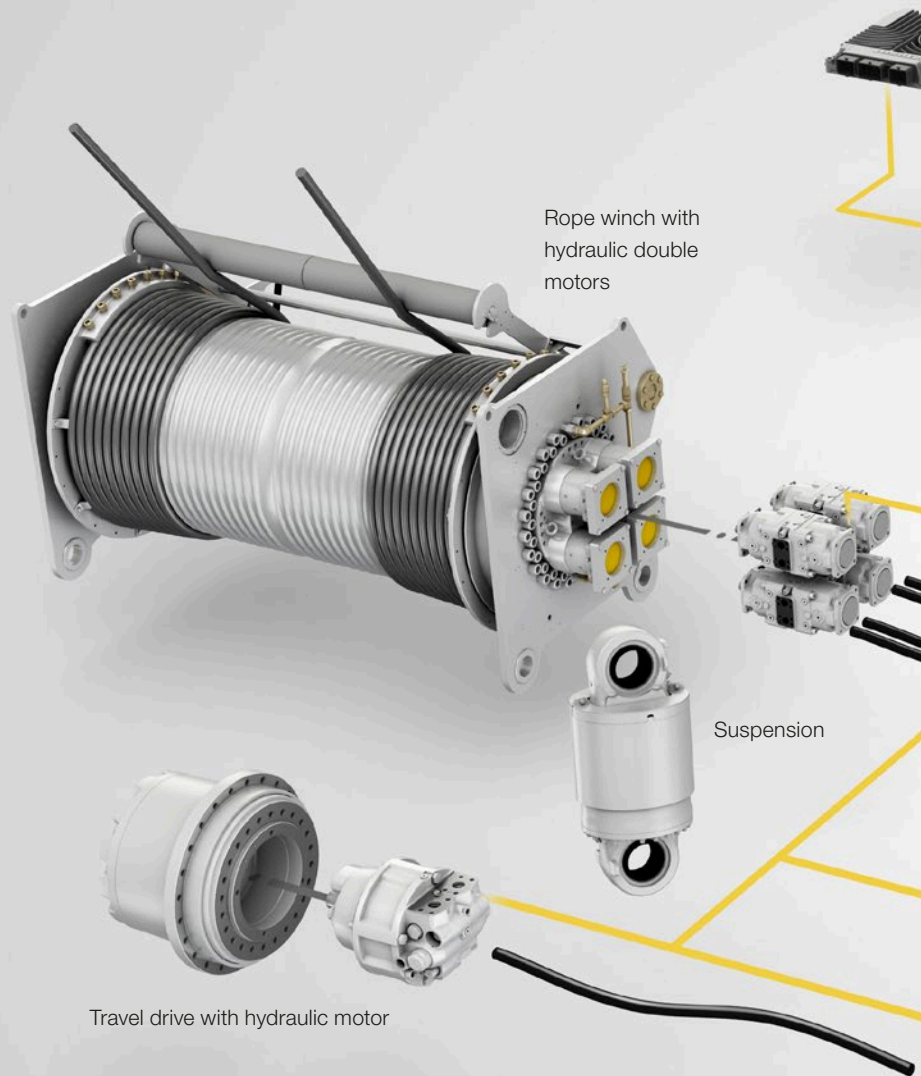
All from a Single Source

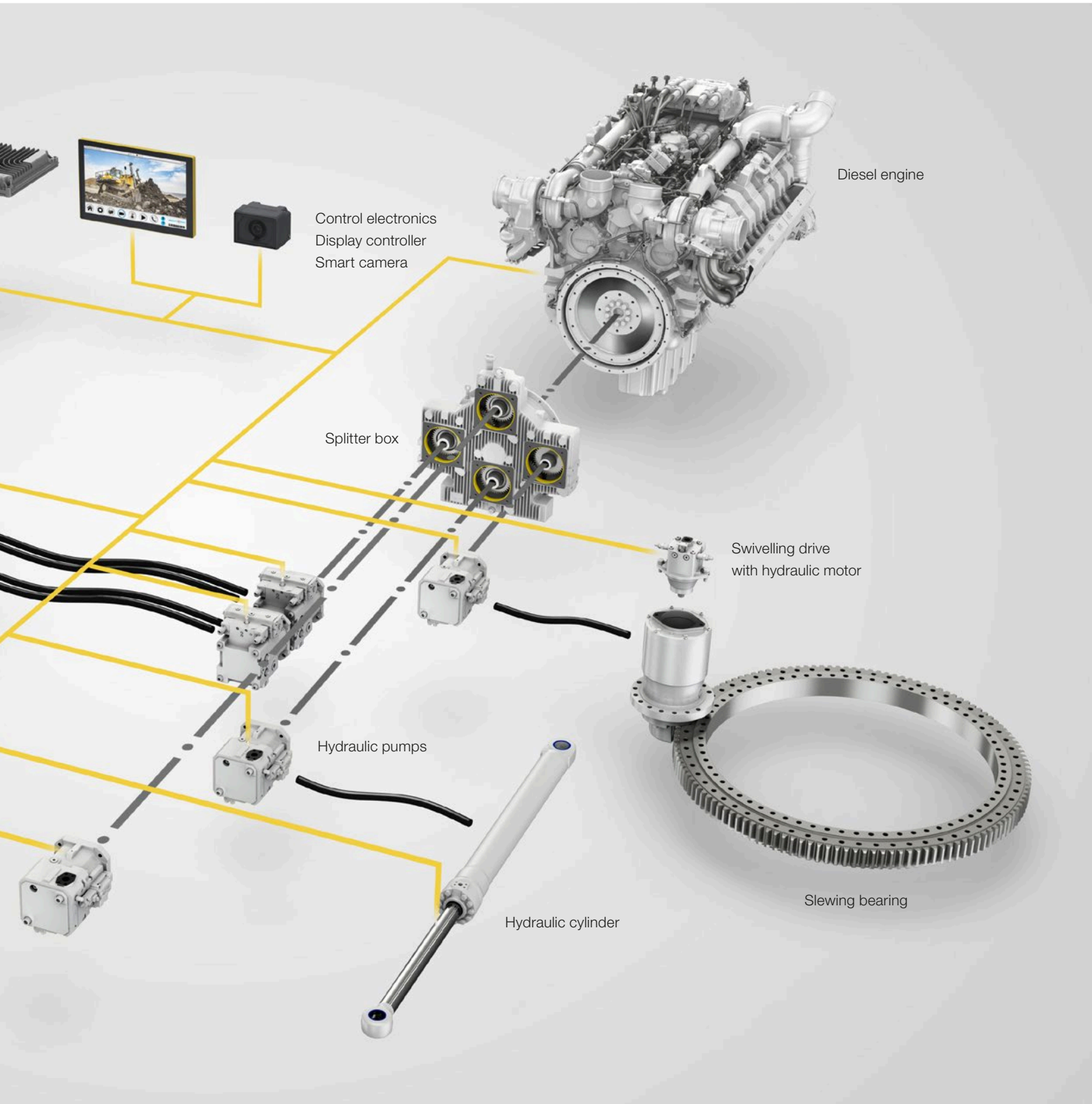
Liebherr develops, designs and manufactures high-performance components for mechanical, hydraulic and electrical drive and control technology.

Liebherr uses advanced production technologies to manufacture its high quality, exceptionally long-serving components. The components are designed for outstanding ruggedness, and withstand even extreme environmental influences like major temperature fluctuations, vibrations, dust or maritime ambient conditions.

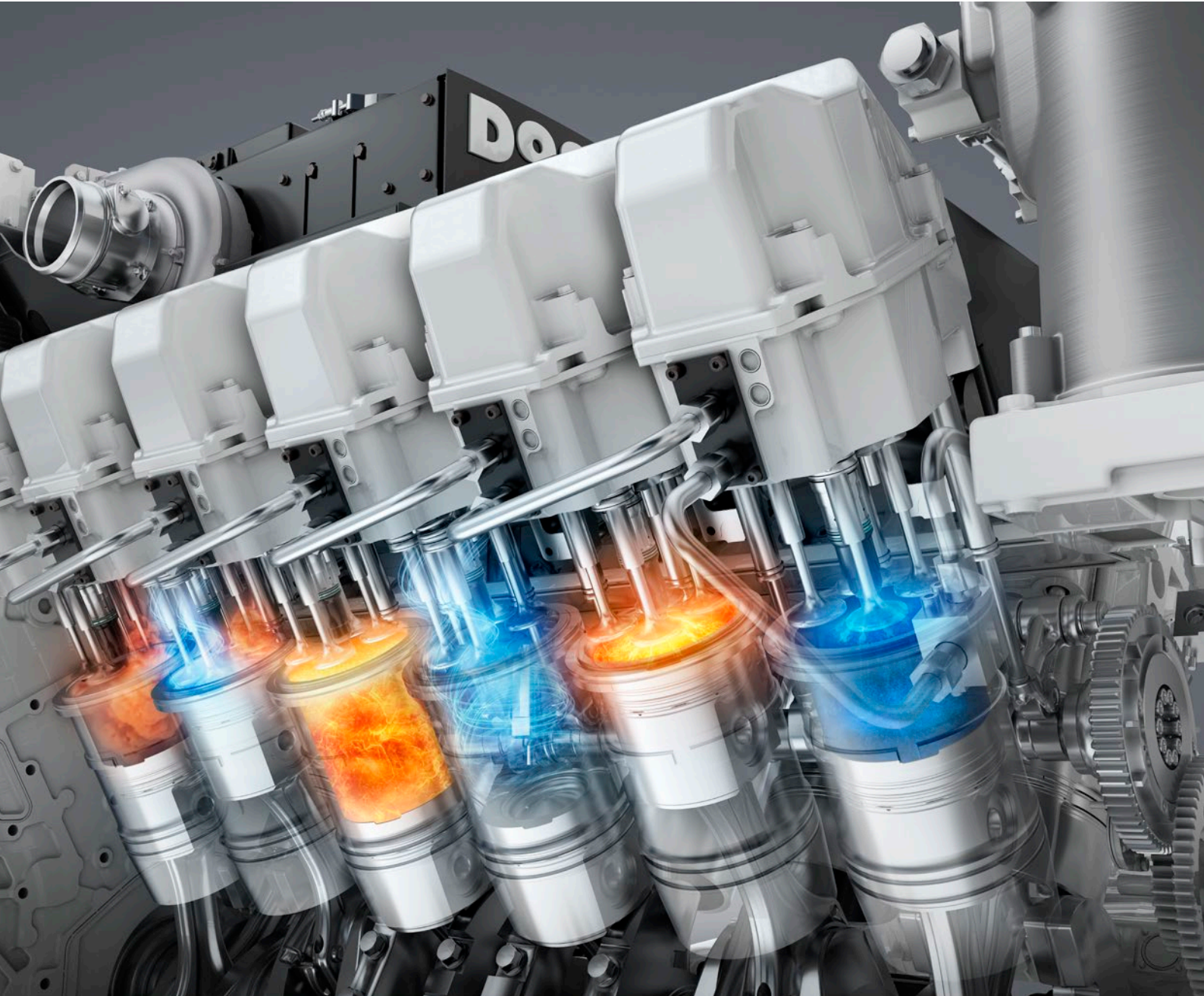
The extensive portfolio of Liebherr components includes the following products:

- Diesel engines
- Gas engines
- Common Rail injection systems
- Axial piston pumps and motors
- Hydraulic cylinders and power units
- Slewing bearings
- Gearboxes and rope winches
- Electric machines
- Human-machine interfaces and gateways
- Control electronics and sensor technology
- Power electronics
- Control cabinets
- Subsystems and complete systems





Diesel Engines



At the sites in Bulle (Switzerland) and Colmar (France), Liebherr develops and manufactures high-performance and robust combustion engines for diverse applications in building construction, mining, in special vehicles, stationary applications, as well as agriculture and forestry machinery. Liebherr engines can be adapted precisely to the respective requirements as not only the engine block is from in-house development and production, but also the Common Rail system and the engine control system.

Efficiency and reliability

Liebherr diesel engines have a high specific power and high torques in a wide speed range while retaining very good operating values. They can withstand the toughest requirements such as extreme outside temperatures, and can be used at very high altitudes.

Smooth running

State-of-the-art analysis methods and design procedures are used to minimize vibration and noise emissions, and to improve rigidity and material distribution. This ensures that engines run absolutely quietly and reliably even when used continuously with fluctuating loads.

Modular engine design

Thanks to an innovative modular system, engines have identical performances, cooling system requirements and the same interfaces during installation for regulated and unregulated markets (Tier 0, Stage IIIA, Stage V and Tier 4 final). This allows the customer to use the same machine design for various emission standards.

Environmental protection

All Liebherr engines comply with statutory emission standards and thus ensure that less nitrogen oxide and particulate matter is discharged. In addition, optimum engine tuning reduces fuel consumption.

Model	D93 In-line	D94 In-line	D95 In-line	D95 V-engine	D96 In-line	D96 V-engine	D97 In-line	D98 V-engine
Configuration	4/6	4/6	6	8/12	4/6	12/16/20	6	12/16/20
(EU) 2016/1628 Stage V	•	•	•	•	•	(•)	•	
USA EPA CARB Tier 4 final	•	•	•	•	•	•	•	•
ECE R96, H (IIIA conform)	•	•	•	•	•			
IMO III				•		•		
IMO II				•		•		
USA EPA Tier 2 (or equivalent)						•	•	•
Fuel consumption optimized	•	•	•	•	•	•	•	•



4-cylinder in-line engine D934



6-cylinder in-line engine D946



6-cylinder in-line engine D966



8-cylinder V-engine D9508

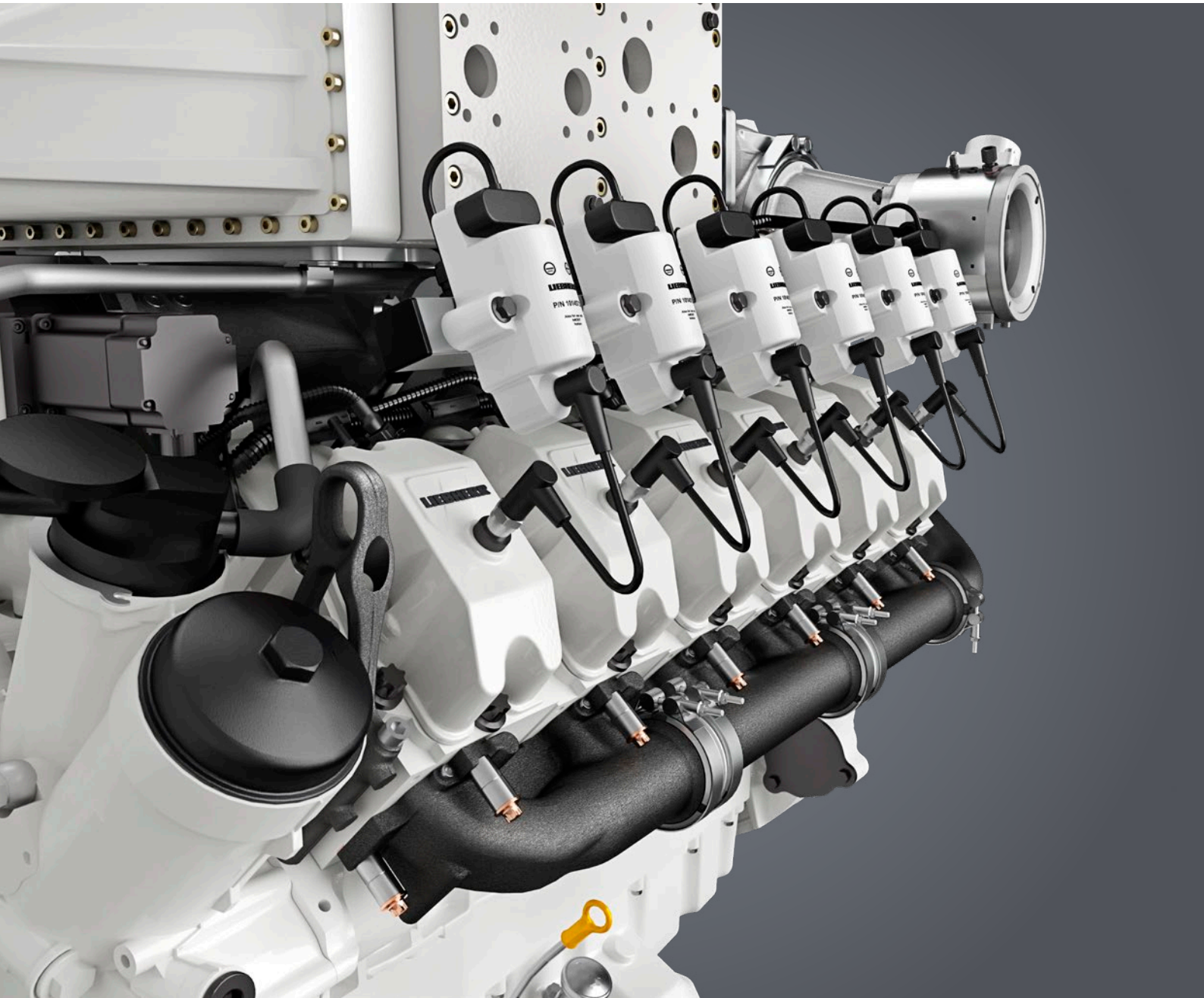


12-cylinder V-engine D9812



20-cylinder V-engine D9620

Gas Engines



The high-performance Liebherr gas engines impress with their high level of efficiency and reliability. Optimised for operation with natural gas, biogas and special gases, they are suitable for diverse applications. Customers particularly appreciate that Liebherr supplies the units ready for installation.

High availability

Thanks to the high availability of gas engines, short downtimes and low maintenance as well as operating costs are guaranteed. The key contributor being the accurate dimensioning of the engines, their sophisticated control system and engine peripherals, high mechanical strength and high resistance to wear. The operating status of the engine, ignition system and Lambda control is continuously monitored by the engine control system.

Performance and efficiency

Liebherr gas engines are particularly impressive due to their performance, a favourable ratio between electrical and thermal power, and high mechanical efficiency of more than

41 %. To achieve these optimum values, Liebherr has optimised the entire combustion process. Quick and complete combustion allows these high levels of efficiency even with a lean gas mixture. The engines comply with the provisions of the Technical Instructions on Air Quality Control (TA Luft).

Ready for installation

The gas engines are manufactured as basic engines as well as complete engines ready for installation. A gas engine with the complete equipment consists of a tuned turbocharger, two-stage intercooler in stainless steel, an ignition system developed specially for Liebherr, gas mixer and engine control unit are included as standard.

Basis engine		G924	G926
Power	kW	59.8	90.1
Displacement	dm ³	6.64	9.96
Weight	kg	740	930
Mechanical efficiency	%	34	34

Complete engine		G944	G946	G9508	G9512	G9620
Power	kW	164	246	344	516	1,060
Displacement	dm ³	8.0	12.0	16.7	25.0	48.7
Weight	kg	950	1,250	1,700	2,150	4,500
Mechanical efficiency	%	41.5	41.7	41.5	42.5	44.0



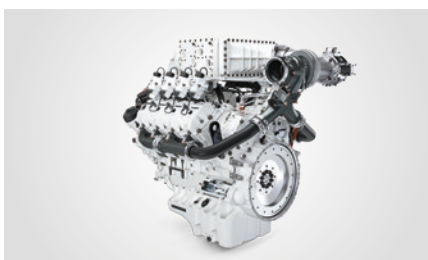
Base gas engine G926



4-cylinder in-line engine G944



6-cylinder in-line engine G946



8-cylinder V-engine G9508

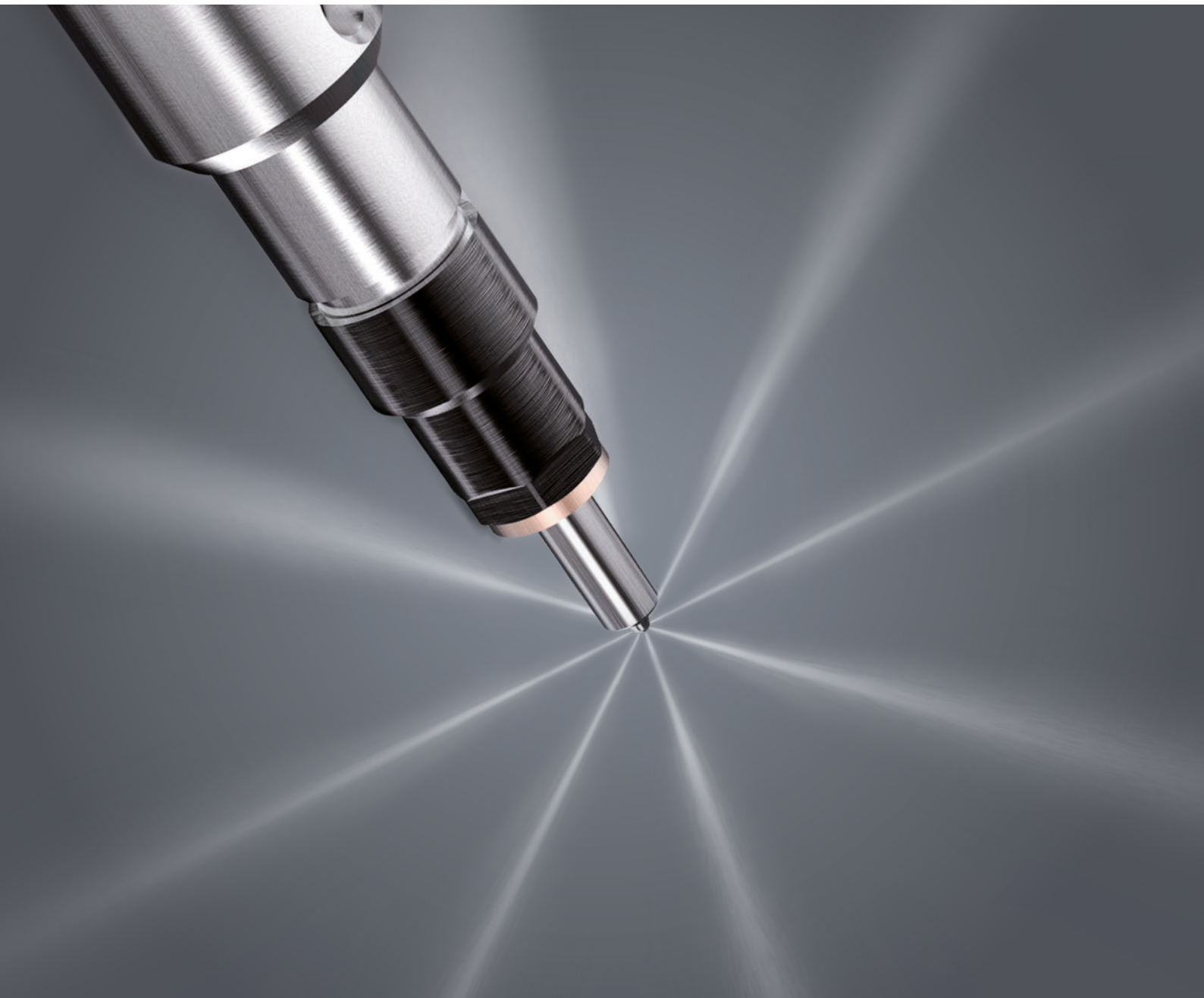


12-cylinder V-engine G9512



20-cylinder V-engine G9620

Fuel Injection Systems



The operational spectrum of Liebherr Common Rail systems extends from machines and commercial vehicles for on- and off-highway applications right up to stationary applications and includes the medium and heavy duty ranges. Compactly designed single components with above-average performance integrated into modular system solutions make Liebherr's injection technology so flexible. Thereby they support compliance with current and future emission standards.

Competence for top quality

Liebherr's great engineering and system expertise as well as its high degree of vertical integration provide high flexibility in integration of Common-Rail systems in various engine variants. Decades of experience in the development and production of diesel engines for the harshest environmental conditions ensure the ultimate high-performance and reliability of injection systems over a long service life.

Modular design

The intelligent design and flexible interfaces enable a simple adaptation of the robust single components to specific engine designs. Thanks to different design variants and variable drive flanges, the modular system components can be easily combined with each other.

Efficiency and performance

Liebherr Common Rail systems deliver a high injection pressure of up to 2,500 bar and ensure high efficiency and low fuel consumption with a very small amount of leakage. They offer outstanding resistance to demanding, particle-contaminated fuels and are already suitable for the use of alternative fuels due to their smart technology and particularly high flow rates.

Quality and reliability

All components are specifically designed for the highly dynamic loads in on- and off-highway applications. A detailed product validation plan is pursued in the development and application process. Prior to injection system delivery the single components are tested for 100 % function and life-cycle quality characteristics.

CRS for commercial vehicles and machinery for on- and off-highway applications

CRS for high performance engines in off-highway applications

CRS for large engines

System pressure	250 – 2,500 bar	250 – 2,500 bar	400 – 2,200 bar
Engine power / displacement	~ 95 kW / cyl	~ 180 kW / cyl	290 kW / cyl
Number of injections	5 – 7	5	4
Hydraulic flow rate	400 – 1,300 ml / 30 sec	1,400 – 2,600 ml / 30 sec	1,400 – 4,000 ml / 30 sec
Nozzle diameter	7 mm	9 mm	13 mm
Max. hydraulic flow (pump)	265 l/h	810 l/h	970 l/h
Control leakage / injector	< 15 ml / min	< 30 ml / min	< 50 ml / min



Common rail solutions for commercial vehicles and machinery for on- and off-highway applications



Common rail solutions for high performance engines in off-highway applications



Common rail solutions for large engines

Axial Piston Pumps and Motors



At its site in Bulle, Switzerland, Liebherr designs and manufactures axial piston pumps and motors in swashplate design for open and closed circuits. Available as constant or variable units, the components offer a wide variety of control functions and drive through options. Valve or control oil pumps can be integrated. These compact units thus permit a very flexible machine design.

Long service life and reliability

All components are machined with high precision and quality on state of the art production plants. The optimum design of the individual parts and special materials guarantee the virtually wear-free reliable operation of pumps and motors in continuous operation under pressures of up to 450 bar.

Optimised efficiency and quiet operation

Modern design and simulation programs (FEM and CFD) are used in the design and calculation of hydraulic pumps and motors, resulting in the optimization of the housing construction design, flow paths and commutation. These, in turn,

lead to top efficiency levels and low pressure pulsations. The noise levels thus reduced are further optimized on Liebherr's own acoustic test stand, and in the end devices.

Pilot control devices and valves

As a components supplier for hydraulic systems Liebherr offers in-house designed and manufactured hydraulic and electrical pilot control devices and valves in addition to pumps and motors. The valves, which are designed primarily for mobile applications, offer various functions for open and closed circuits.

		Pumps			Motors			Double motors	
		DPVO DPVD DPVP	DPVG	LH30VO	DMVA	DMFA	CMVE	FMF FMV	DMVA D
Power / unit	kW	151–375	232–508	44–96	259–638	541	199–299	71–368	593–744
Displacement	cm ³	108–215	108–280	28–85	108–370	355	85–165	25–250	273–380
Circuit		open	closed	open	open/ closed	open/ closed	open	open/ closed	open/ closed
Nominal pressure	bar	400	450	280	450	400	380	350/420	450



Variable pump
DPVG 108



Variable pump
DPVO 165



Variable double pump
DPVD 108



Variable pump
LH30VO



Hydraulic motor
FMF 45



Plug-in motor
CMVE 108

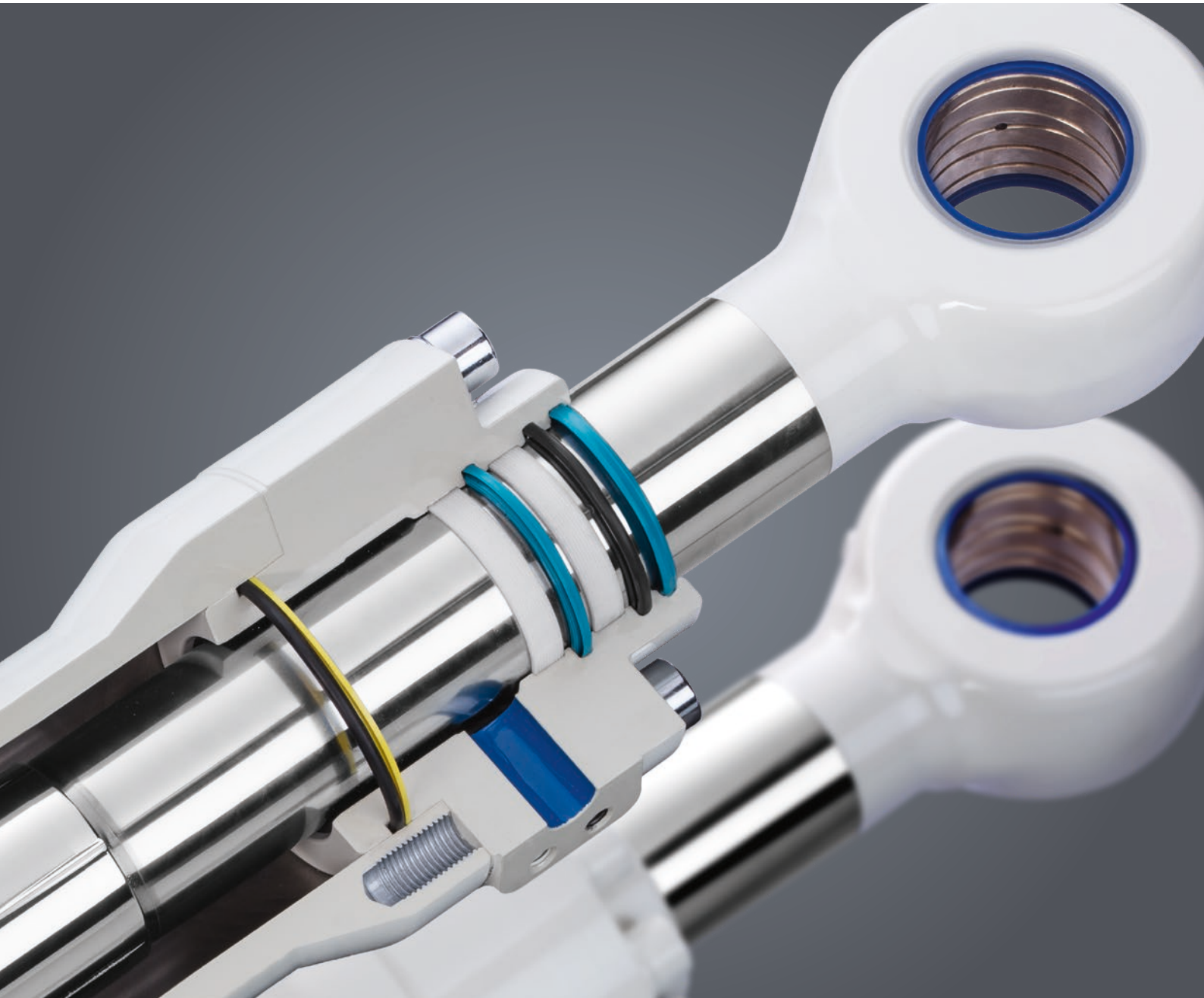


Flange-mounted motor
DMVA 165



Flange-mounted double motor
DMVA D 165-165

Hydraulic Cylinders and Power Units



Since 1958 the Liebherr Group has been developing and producing hydraulic cylinders at the site in Kirchdorf an der Iller, Germany. The product portfolio reaches from standard cylinders to large heavy duty cylinders and suspensions through to high-stress lightweight and special cylinders. In addition to hydraulic cylinders for mobile and stationary applications, as well as shock absorbers, Liebherr also offers tailor-made hydraulic power units and other components for hydraulic system solutions.

Quality and Economy

State of the art production facilities enable variable batch sizes, swift delivery and short reaction times. Consistent production focusing on the core competencies of piston rods, cylinder tubes, assembly, painting and inspection at each stage in the production process ensures a high level of quality, economic efficiency and reliability of the products.

High Availability and Longevity

Liebherr hydraulic cylinders are noted for careful material selection, high manufacturing precision of components, customised sealing systems and top surface finishing quality. The resulting optimum sliding action permits virtually wear-free operation of the hydraulic cylinder.

The portfolio at a Glance

Technical Data Hydraulic Cylinders

- Stroke lengths up to 8,000 mm
- Nominal diameters up to 500 mm
- Operating pressures up to 630 bar
- Lifting speeds up to 1 m/s
- Operating temperatures from $-40\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
- Chrome coatings, nickel-chrome, HVOF etc.
- Corrosion protection for continental and maritime environments
- End of stroke cushioning (piston side and/or rod side)



Hydraulic power units for mobile and stationary applications



Hydraulic cylinder with position transducer LiView

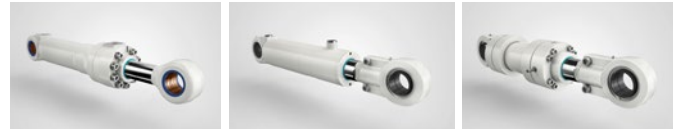
Hydraulic Power Units and Sensor Technology

In addition to the customer-specific selection of hydraulic cylinders, Liebherr offers hydraulic power units, both as individual component or coming along with a complete hydraulic system. According to the customers requirements, the products are manufactured. Individual components such as pump types, monitoring elements or accumulators as well as control systems can be specifically selected.

Liebherr relies on proven manufactures or in-house developments when sensor technology is required to support the work of the components.

Hydraulic Cylinder Series-Production Ranges

Three standard series-production ranges within the performance spectrum offer a suitable product for every application with individual configurability and short delivery times.



380 bar

260 bar

ISO 6022

380 bar Series-Production Range

The solutions of the series are characterized by robustness and are designed for long service life, in order to convince in highly dynamic applications in mobile environments. As a highlight, these hydraulic cylinders can optionally be equipped with the self-developed position transducer LiView.

260 bar Series-Production Range

The 260 bar series-production range offers the customer a hydraulic cylinder portfolio reduced to the essentials, which can also be used in demanding conditions both mobile and stationary.

Series-Production Range according to ISO 6022

The hydraulic cylinders designed according to the same named standard are primarily used in the stationary sector. Individual equipment options such as end of stroke cushioning or sensors are available.

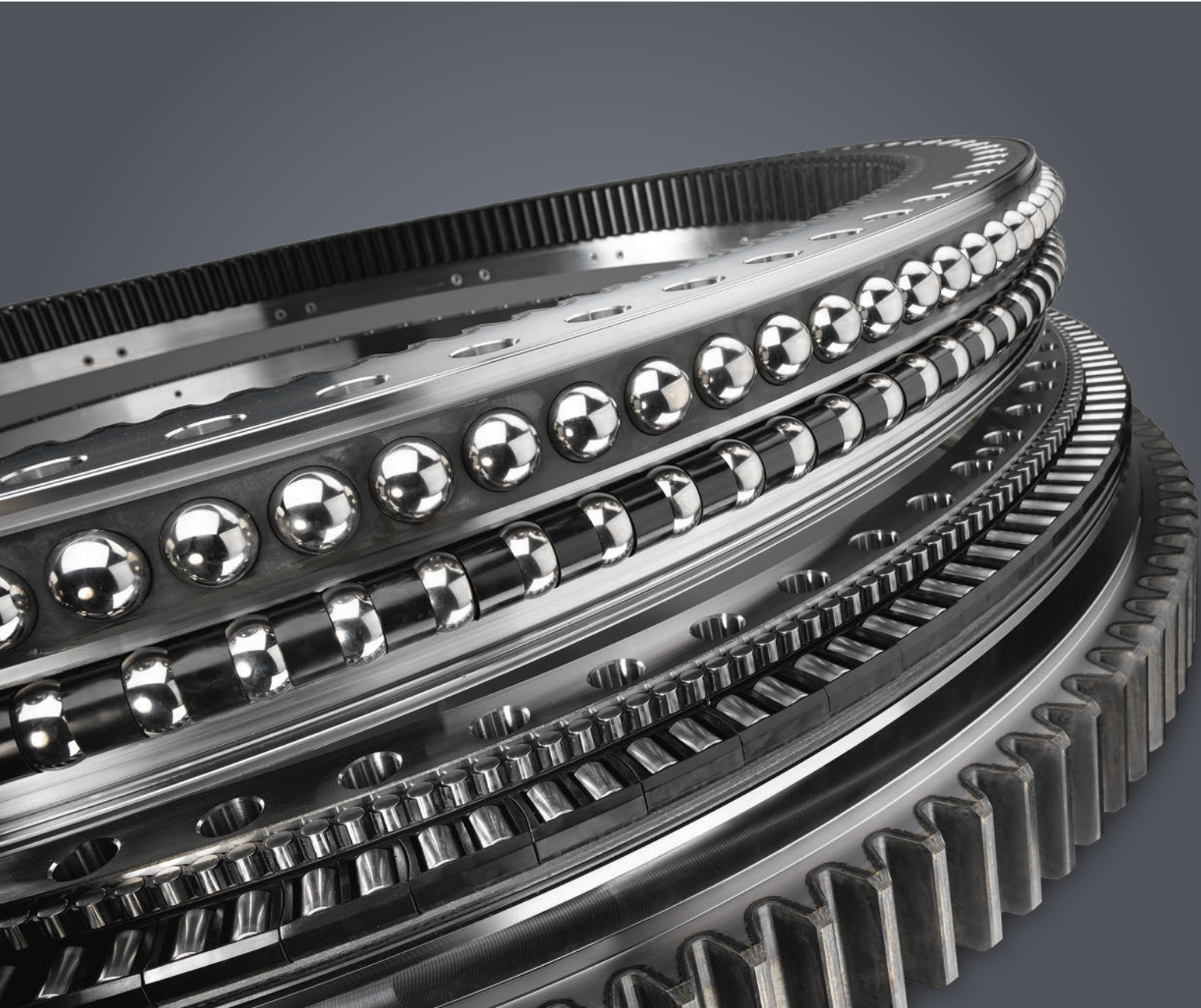


Tailor-made property profiles characterise CRP components.

Solutions made of Carbon-Fibre Reinforced Plastic (CRP)

Fibre composite technology offers a maximum of design flexibility regarding the development of the component. A wide variety of raw materials and the orientation of the reinforced fibres allow the material to be designed. Thus, the use of composite materials creates individual solutions in various fields. CRP can be used wherever weight optimization increases the performance of the component and thus of the entire system. From development to production – Liebherr combines the expertise of the entire process chain in-house.

Slewing Bearings



Liebherr manufactures ball bearing and roller bearing slewing rings in various dimensions and versions. Decades of experience, comprehensive engineering know-how and expertise, together with state-of-the-art manufacturing plants, ensure top-quality products. The large diameter bearings from factories in Germany, Mexico and Brazil are used not only in construction machines and cranes, but also in wind turbines and maritime applications.

Large range of dimensions

State-of-the-art production facilities provide for efficient manufacture of all design sizes, both in small and large batch production. Slewing bearings by Liebherr are available in a diameter range from 800 to 9,500 mm. Larger sizes are possible in a segmented design. The internal and external gear teeth of the bearings, which weigh up to 25 t, can be designed with a gear module of up to 50. Other gear versions are available on request. Balls, cylinder rollers or tapered rollers are used as rolling elements. All slewing bearings are carried out with induction hardened, finely machined raceways and, depending on the application, also with induction hardened gear teeth. They have a sealed raceway system with grease lubrication.

The most varied of designs

The current product range includes ball bearing slewing rings, which can be designed as single-row or double-row, triple-row roller bearing slewing rings, combined ball and roller bearing slewing rings as well as tapered roller bearings with or without internal or external gear teeth. Besides standard designs, a large variety of special customer and application-based models have already been made. In addition to anti-friction bearings, geared rings and ring segments as well as high-precision worm gears for machine tools, made from composite materials, are also available.

Slewing drives product line

The slewing drives product line includes worm, spur gear and belt drives. The range is notable for its particularly compact design and high power density. The slewing drives are powered by a hydraulic or electric motor.



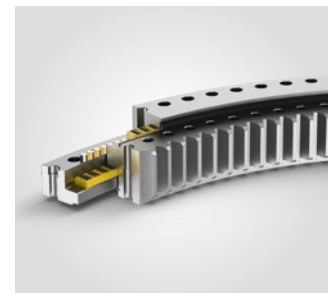
Single-row four-point bearing, with internal gear with through holes



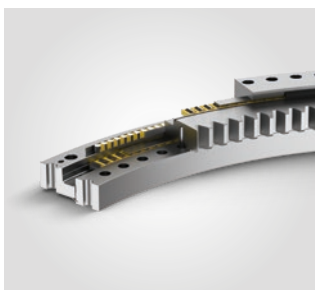
Double-row ball bearing without gear



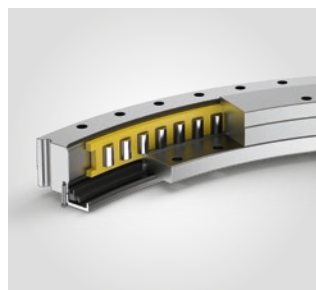
Double-row four-point bearing with external gear



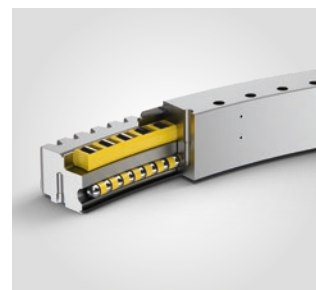
Triple-row roller bearing with internal gear



Segmented roller bearing with internal gear



Radial roller bearing without gear



Combined roller-ball bearing with external gear



Tapered roller bearing without gear

Gearboxes and Rope Winches



Every year Liebherr manufactures tens of thousands of gearboxes and rope winches in Biberach an der Riss (Germany), in Dalian (China) and in Bulle (Switzerland) with the utmost reliability and quality. Customers particularly value the large product range and the application-specific design. Liebherr offers perfectly dimensioned gearbox versions up to large-scale gearboxes. The scope of performance also comprises individual customer developments.

Variety of sizes and designs

The product range extends from slewing and swivelling drives, wheel and travel drives as well as compact and heavy duty winches to splitter boxes, drilling drives, cyclone drives, mixer drives and other special solutions. Gearboxes are available in a large range of sizes and transmit drive torques from 2,000 to 2,500,000 Nm. Standard gearboxes are designed as two- to four-stage planetary gears and can be extended with spur gear drives or bevel gears. Depending on gearbox design and number of planetary stages, a torque ratio of the driving electric or hydraulic motors is possible between $i=15$ and $i=1,400$.

High performance density

The integral design of Liebherr's gearboxes allows for compact installation spaces and the best weight to performance ratio. The sun and planetary wheels are optimised for a low circumferential backlash. Well thought-out construction principles and application know-how ensure an even load distribution of the individual stages and therefore a high performance density. Liebherr's gearboxes and rope winches are characterised by their optimised design that uses few components, with a minimum number of seal surfaces and a high level of functionality.

		Slewing and swivelling drives	Travel drives	Planetary plug-in gearb.	Splitter boxes
Output torque	Nm	4,000–620,000	24,000–2,300,000	6,000–1,250,000	-
Output shaft module		8–51	-	-	2–6
Connection diameter	mm	210–850	375–1,700	295–1,200	SAE 0 - SAE 4
Weight	kg	71–5,600	200–16,000	100–4,800	60–2,800

		Compact rope winches	Heavy duty rope winches	Gear ring rope winches
Abtriebsmoment	Nm	6,000–944,000	50,000–944,000	390,000–2,500,000
Cable diameter	mm	13–52	20–76	50–100
Drum diameter	mm	340–1,500	470–1,650	1,000–3,600
Weight	kg	200–22,000	2,000–11,000	7,000–175,000



Swivelling drive



Slewing drive



Electric travel drive



Hydraulic travel drive



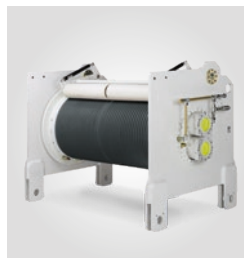
Splitter box



Planetary plug-in gearbox



Compact rope winch with frame

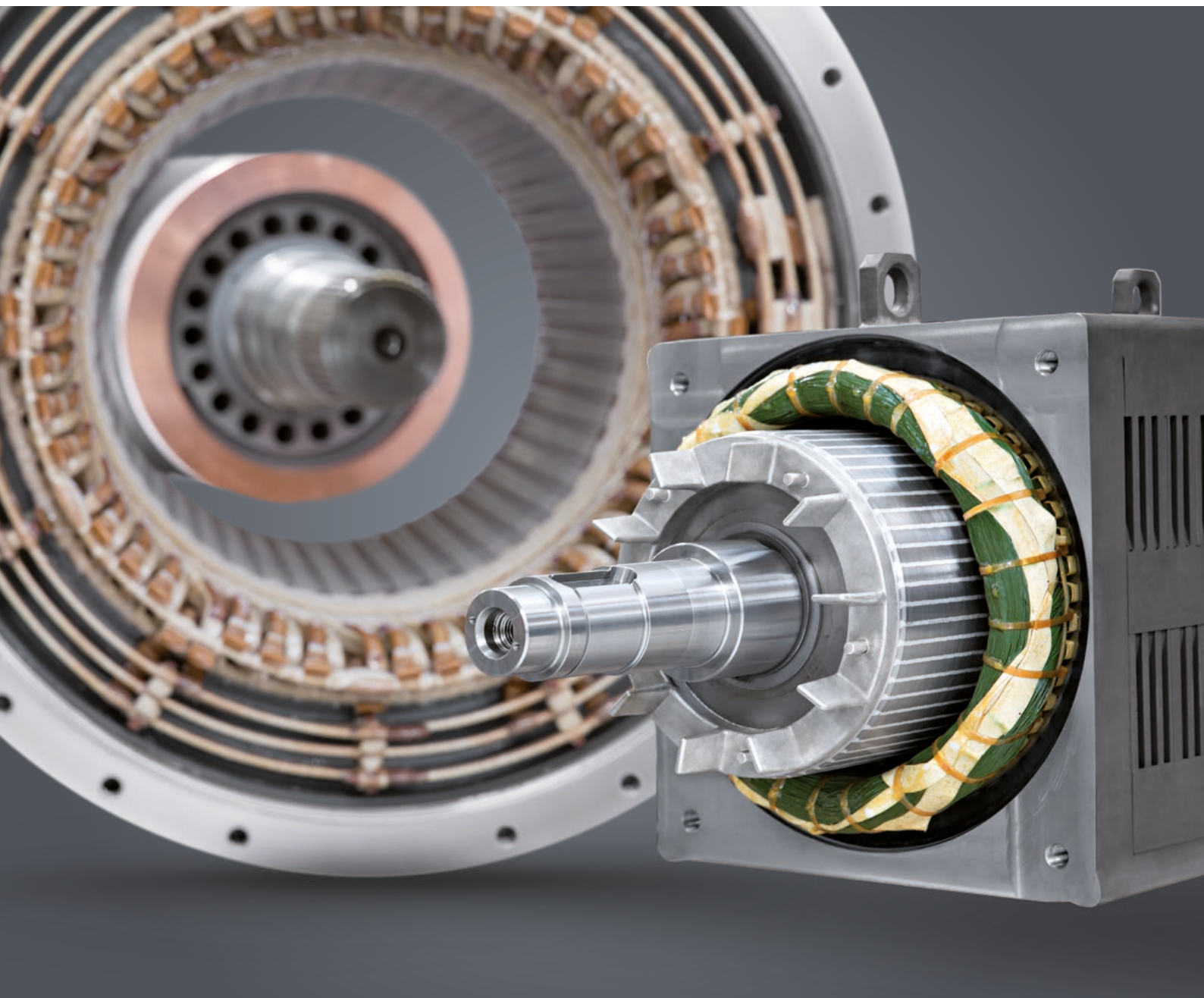


Heavy duty rope winch with plug-in gearbox



Gear ring rope winch with external slewing drives

Electric Machines



As an ideal supplement to gearboxes and control systems Liebherr develops and manufactures compact air-cooled asynchronous squirrel-cage motors, liquid-cooled permanent magnet machines and synchronous generators. The performance of the motors ranges from 4 kW to 2,000 kW, of the generators up to 3,500 kW. The electric machines are used under toughest conditions – such as in diesel-electric mining trucks, construction machinery, tower cranes and container cranes.

Power density and flexibility

Electric motors by Liebherr are designed as compact, robust and maintenance-free three-phase squirrel cage motors, synchronous generators and permanent magnet motors, and are noted for their high power density. The motors were primarily designed for use in variable-speed drives with frequency converters, and for high dynamic applications. They are designed for a constant rated torque from standstill to the rated speed, and in addition for speeds for constant rates up to 4,500 rpm.

Modular system

Except for the smallest size (BG 132) and permanent magnet motors – all electric motors are designed with a self-supporting stator core, which supports the housing in addition to the active electrical functions.

All models are based on a modular system and can be upgraded with additional components to cover a wide range of applications.

Economy and quiet operation

The electrical design and the construction principle offers a low volume-performance ratio in combination with effective cooling. The compact design permits a low noise level and very quiet operation.

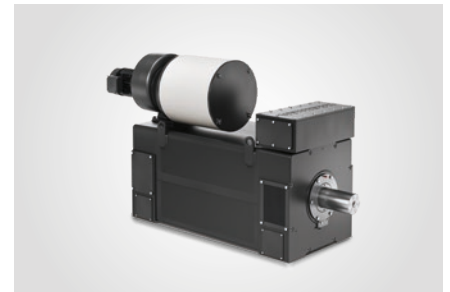
Name	Design	Power [kW]
Electric motor BG 132	Asynchronous squirrel cage motor, conventional design	4–6 (6-pole), 7.5–11 (4-pole)
Electric motors BG 160–250	Permanent magnet machine, motor and alternator	80–250 (6-pole)
Electric motor BG 132	Asynchronous squirrel cage motor, without housing	7.5–37 (4-pole)
Electric motors BG 180–315	Asynchronous squirrel cage motor, without housing	24–230 (4-pole), (25–100 Hz) 300–500 (4-pole), (25 Hz)
Electric motor BG 450	Asynchronous squirrel cage motor, without housing	750–2,000 (4-pole), 1,100 (6-pole)
Synchronous generators BG 450–530	Separately excited synchronous generator, without housing	900–3,500 (8-pole)



Asynchronous motor BG 132



Permanent magnet machine BG 225



Asynchronous motor BG 315



Asynchronous motor BG 450



Synchronous generator BG 515

Human-machine Interfaces and Gateways



Besides display-controller units, the Liebherr portfolio in the field of human-machine interfaces comprises digital cameras and keyboards. The ergonomic display and control units are also suitable for use in modern assistance systems. Thanks to their powerful hardware and open software environment, our IoT gateways enable you to implement a wide range of applications for the secure connectivity of mobile machines.

Display controller with touchscreen

Whether display, control computer or input device: The high computing capacity and integrated PCAP touch screen open up a wide field of use. The DC5 display controller provides a reliable display of operating parameters or camera images in the driver's cab – thanks to its high protection class, even under demanding operating conditions. Our existing DC5 portfolio offers an ideal platform for individual developments.

Digital smart cameras

Our smart cameras deliver digital images in HD quality with a resolution of up to 1280 x 960 pixels. Due to their robustness and adaptability in constantly changing lighting conditions, the cameras are the ideal solution for mobile applications. Thanks to their sensor functions, the cameras are ideally equipped to serve as a reliable image sensor in environment recognition systems. They can thus contribute to increasing the operational safety of mobile machinery.

Assistance systems and automation

Modern technologies for smart systems: Liebherr develops and manufactures electronics for mobile machinery. Our components enable the realisation of modern assistance systems, with solutions for accident avoidance being a focus. Precise sensor data is the basis for the automation of motion sequences – for more efficiency in operation.

IoT gateways for telematics applications

Condition monitoring, predictive maintenance and automation of mobile machines – our IoT gateways are the basis for efficiency-enhancing applications of digitalization. We attach great importance to the continuous development of our gateways – and thanks to Form-Fit-Function, we guarantee the protection of your investment. The gateways cover all available mobile networks and, thanks to special mechanisms, ensure optimum connection of your machine to the Internet. The open programmability on Linux basis together with the fully configured Yocto system allows a universal use of the gateways – full innovation capability for your application.



Display and control units

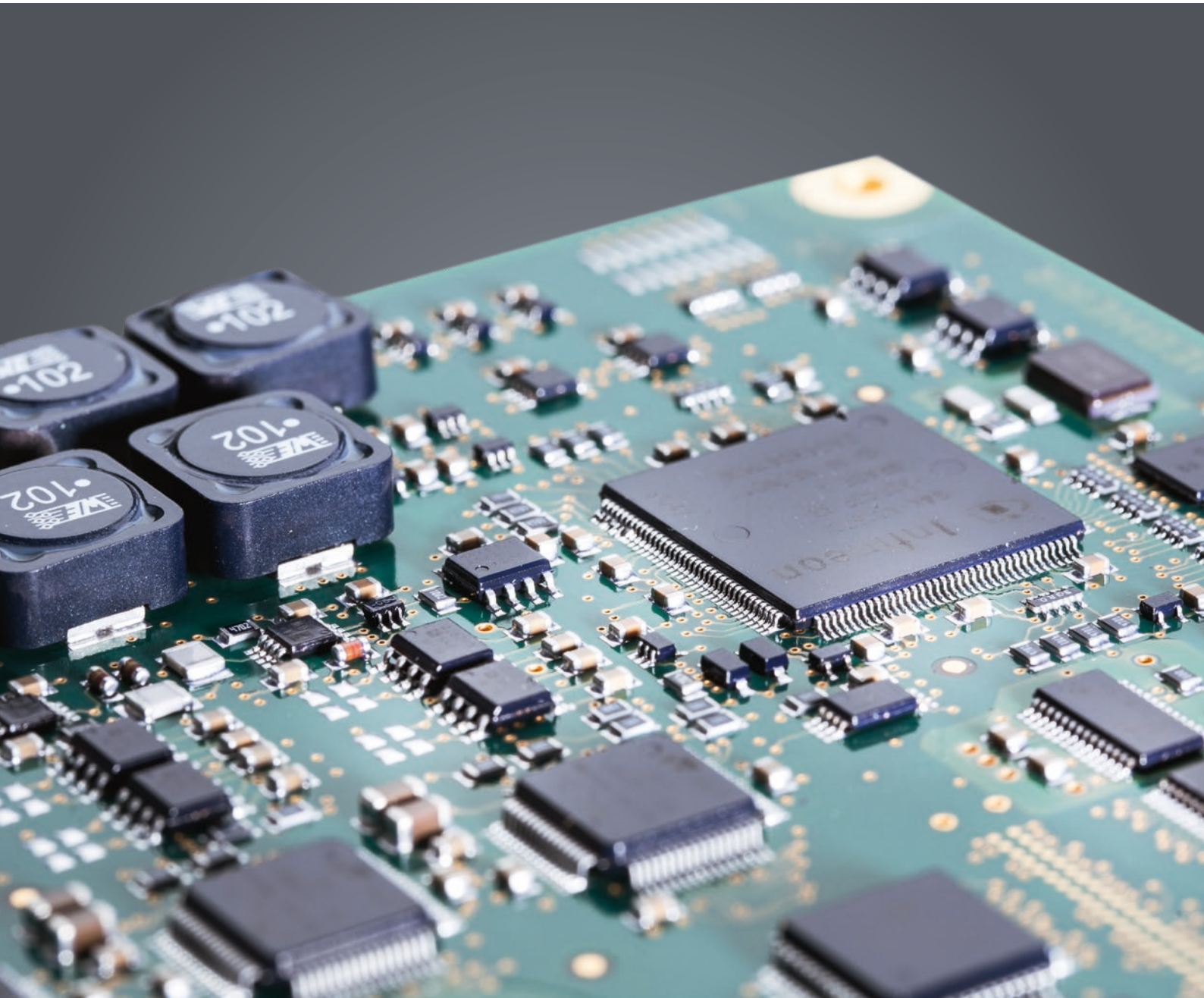


Digital smart cameras



IoT gateways for telematics

Control Electronics and Sensor Technology



Based on the requirements of our customers, we develop tailor-made control solutions for mobile machinery. The spectrum ranges from powerful individual components to harmonized complete systems – everything perfectly matched to your application. In the field of sensor technology, our position transducer for hydraulic cylinders LiView determines the exact piston position and speed through a unique measuring principle.

Customer-specific mobile electronics

As long-term partner, we provide our customers with expert advice throughout the entire development and production cycle – with full support from initial idea to product end-of-life. Our cross-industry know-how comprises the best technologies of different applications for an optimised control solution, also suitable for safety-relevant applications.

- **Reliable:**

Based on many years of extensive experience, we develop solutions that can be relied on even in the harshest operational environments.

- **Cost-effective:**

Our product portfolio may serve as a platform for your customised solution. Using an already approved platform as basis for your developments saves time and reduces costs – with plenty of freedom for individuality.

- **Short paths:**

As a one-stop shop, we deliver everything from one place: development, industrialisation, production, qualification and verification as well as analysis. This means short paths, saving time and money.

Customer service for the complete life cycle

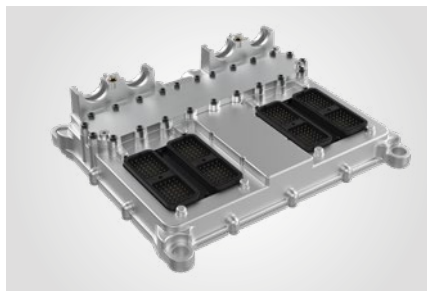
Optimized production processes in line with customer demands ensures delivery reliability and fast reactions to changing needs. Extensive production tests guarantee the high quality of our components. Liebherr provides reliable technical and logistic support also for especially long product life cycles. This includes, for example, management of cancelled components and component shortages, an ongoing product redesign service as well as availability of series and spare parts for decades.

Position transducer for hydraulic cylinders

The intelligent position transducer LiView determines the exact piston position and speed of hydraulic cylinders, independent of cylinder length or diameter. The highly robust system convinces by easy mechanical integration, without weakening of the piston rod. LiView is certified for safety-relevant applications and ideal for the automation of mobile machinery.



Compact control unit

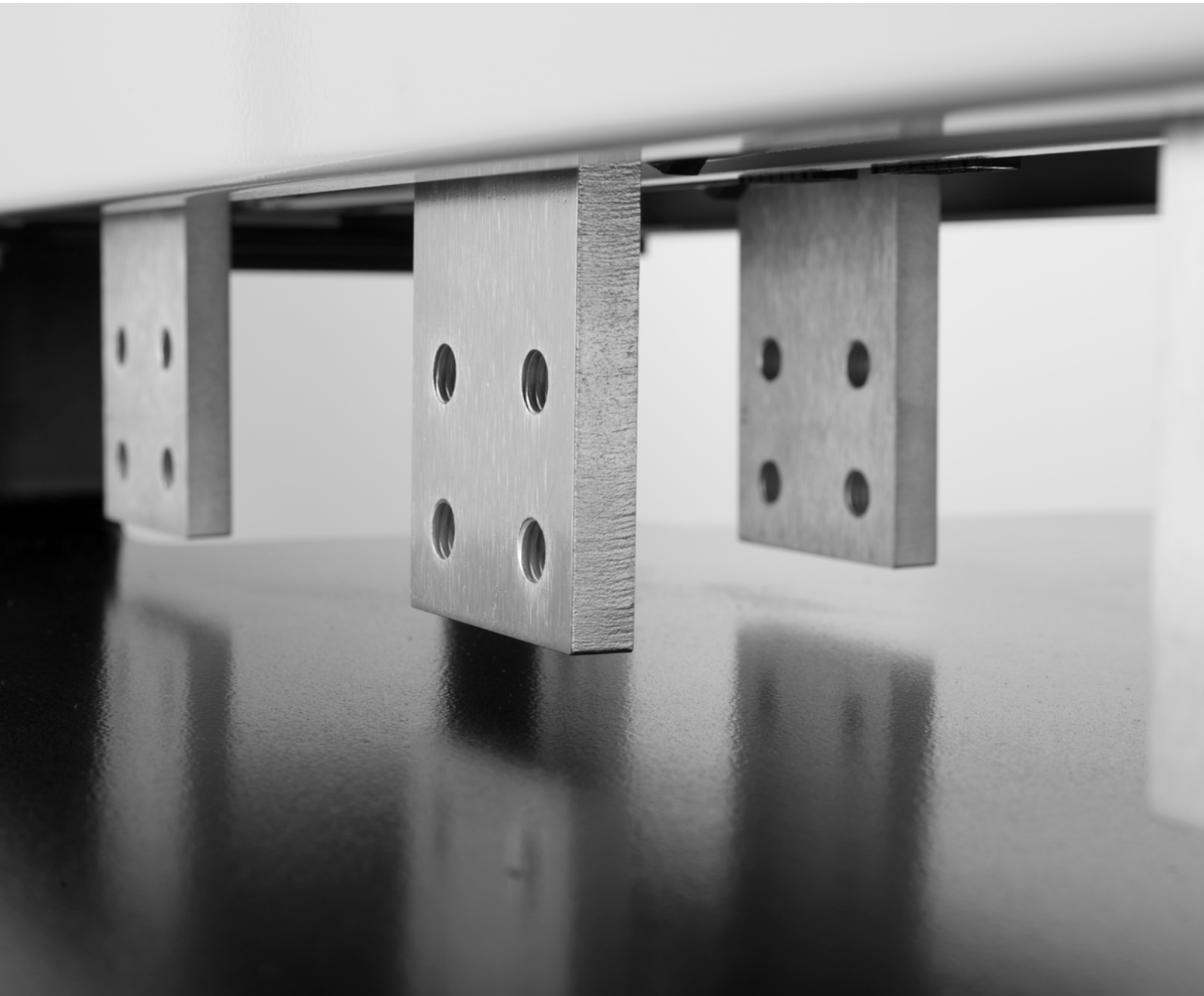


Engine control units



Position transducer for cylinders

Power electronics



Liebherr power electronics are developed for use in harsh environmental conditions and easily withstand dust, vibrations and extreme temperatures. All products impress with their high availability and serve as reliable partners in mobile or stationary applications.

Frequency converter systems

Liebherr frequency inverter systems for wind, maritime and industrial applications are characterised by their high power density and modular design. Application-specific solutions for electric drive systems can thus be implemented with maximum flexibility in the smallest of installation spaces.

Frequency converter power modules

The core components of the frequency converter system are Liebherr's power electronics modules, which cover a power range from 110 kW to 2,000 kW with just two designs. The innovative cooling system greatly increases the power density and significantly raises the efficiency of the frequency converter system.

The flexible modules can be configured as a drive or regenerative unit and can be used in both AC/AC and DC multi-drive systems. As an option, they can also be configured with an integrated brake chopper.

Liduro energy storage

The Liduro Energy Storage systems are designed for highly dynamic industrial applications with high peak loads and variable power requirements. achieves considerable cost savings and efficiency increases. In drive and control systems, especially in lifting and lowering applications in industry, transport and logistics, energy costs can be reduced by 20–40% through the storage and efficient use of recuperative energy.



Frequency converter system



Energy storage unit Liduro – LES 200



Energy storage unit Liduro – LES 300

Control Cabinets



The product portfolio extends from control cabinets for tower cranes, systems for mobile equipment in the mining and in the earth-moving sectors, to control cabinets for machine tools, air conditioning and automation engineering, rail vehicles and test benches. The power inside the control cabinet ranges from a few kW to the MW range, both in alternating current and direct current technology. For this Liebherr draws on its long-standing experience of the low- and medium voltage sector.

Wide range of services

The built-in control technology covers the entire spectrum from simple contactor control systems to the most sophisticated PLC controls according to EN ISO 13849. A wide variety of field bus systems like Interbus-S, ASI, CAN, CA, Ethercat, Profibus, and Profinet are used. Control cabinet is adapted to customers' individual needs, for instance to particular ambient conditions, higher protection classes or special dimensions.

Maintenance friendliness and practical component arrangement

Special importance is placed on the practical and clear arrangement of the components in the control cabinet, this in turn enables a high level of maintenance friendliness.

Maximum safety and reliability

Throughout the entire design and manufacturing process requirements related to the safety and reliability of the control cabinet are strictly observed. Among others, requirements concern the clearance and creepage distance, protection class and cooling.

Observance of standards and guidelines

Liebherr has an intimate knowledge of the respective national requirements regarding control cabinet, and ensures that regulations are observed in relation to electrical and operational safety and EMC. Liebherr offers control cabinets for the European market with CE certification, and with UL approval for the North American market.



Electric supply for hydraulic excavator



Mining truck control cabinet



Straddle carrier control cabinet



Tower crane control cabinet



Container bridge control cabinet



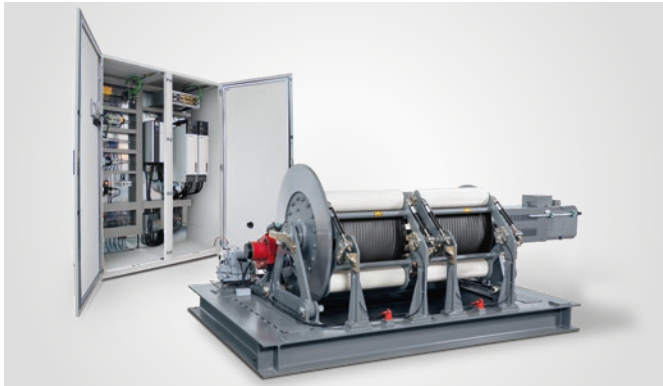
Container crane control cabinet

System Solutions



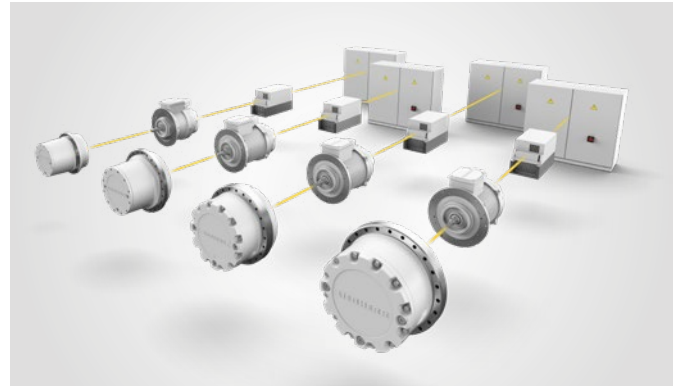
Liebherr is your one-stop source of system solutions for countless applications in electrical and hydraulic drive and control technology. Our experts guarantee the optimal match-up of all drive components. They also develop the controls which, with their application-dependent functions, improve performance, handling and energy efficiency.

Whether for machinery and plant engineering, for example, or the offshore and wind industries, Liebherr can draw on many years of experience in the design of system solutions for a wide range of end devices. On this basis we devise systems that are specifically designed for a given application and customer requirement, such as with regard to optimising efficiency, space constraints or costs, and offer a one-stop source for all this.



Winch systems

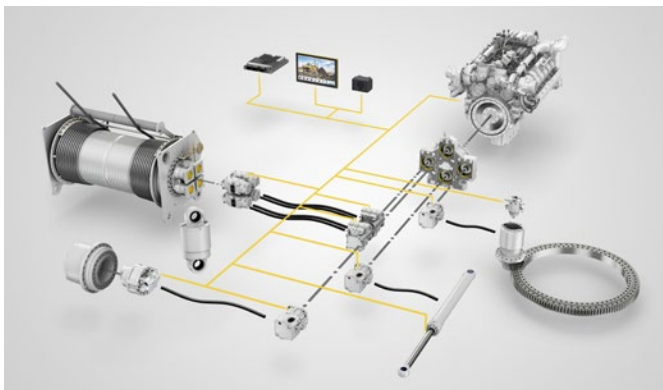
With years of experience as a components manufacturer, Liebherr supplies winch systems for various applications in lifting and conveyor technologies as well as adjustment systems. The modular winch system was designed to cover a wide range of customer requirements and convinces with short development times.



Electric travel drive systems

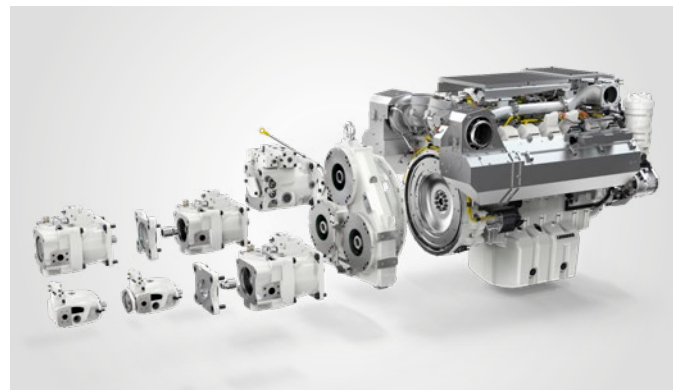
The advantage of modular solutions for electric tracked vehicle drive systems is that the individual electrical and mechanical components are perfectly matched to one another.

With its electric travel drive series (eFAS), Liebherr supports the full electrification of semi-mobile track-based machinery. Liebherr drive controllers in the frequency converters together with the permanent magnet motors and travel drives manufactured in-house achieve excellent performance and handling.



Application-specific system solutions

Liebherr develops and supplies application-specific solutions for diesel-electric and diesel-hydraulic drivetrains, from a single source. We always focus especially on optimising performance, handling and energy efficiency. To this end, our experts assess existing systems through field measurements and simulations. This basis is then used, in close collaboration with our customers, to come up with new concepts. These are simulated under boundary conditions as close to reality as possible.



Drivetrain

Liebherr also offers splitter boxes and axial piston pumps that can supplement the diesel engines to create a customer-specific drive-train. All the components are developed and manufactured at Liebherr sites. They are therefore adapted optimally to each other and form a compact, powerful system with a high degree of overall efficiency.

Customer Service



Aside from high performing components, Liebherr also supports customers with comprehensive services. Customers profit from short response times, original spare parts with fast availability and an extensive range of training courses. In this way, Liebherr assures the performance of the components throughout the entire lifecycle.

Service

Competent specialist personnel can be at the site quickly if required. This helps to minimise downtimes. Furthermore, our customers can take advantage of technical advice and support from specialists at our production sites.

Training courses

Professional maintenance and repair make a significant contribution towards maximum exploitation of Liebherr components' lasting character. Our experienced staff are happy to pass on their specialist knowledge to customers and sales partners in the course of training. The company has its own training centres at the production facilities for this purpose. If necessary, we can also run training courses directly on-site.

Spare parts

Original spare parts are available for all components from Liebherr. The extensive internal quality assurance system checks assure, along with our components themselves, that these meet the highest demands in terms of perfection and performance. The use of original parts makes it possible to assure the cost effectiveness and value retention of Liebherr components.

Spare parts logistics

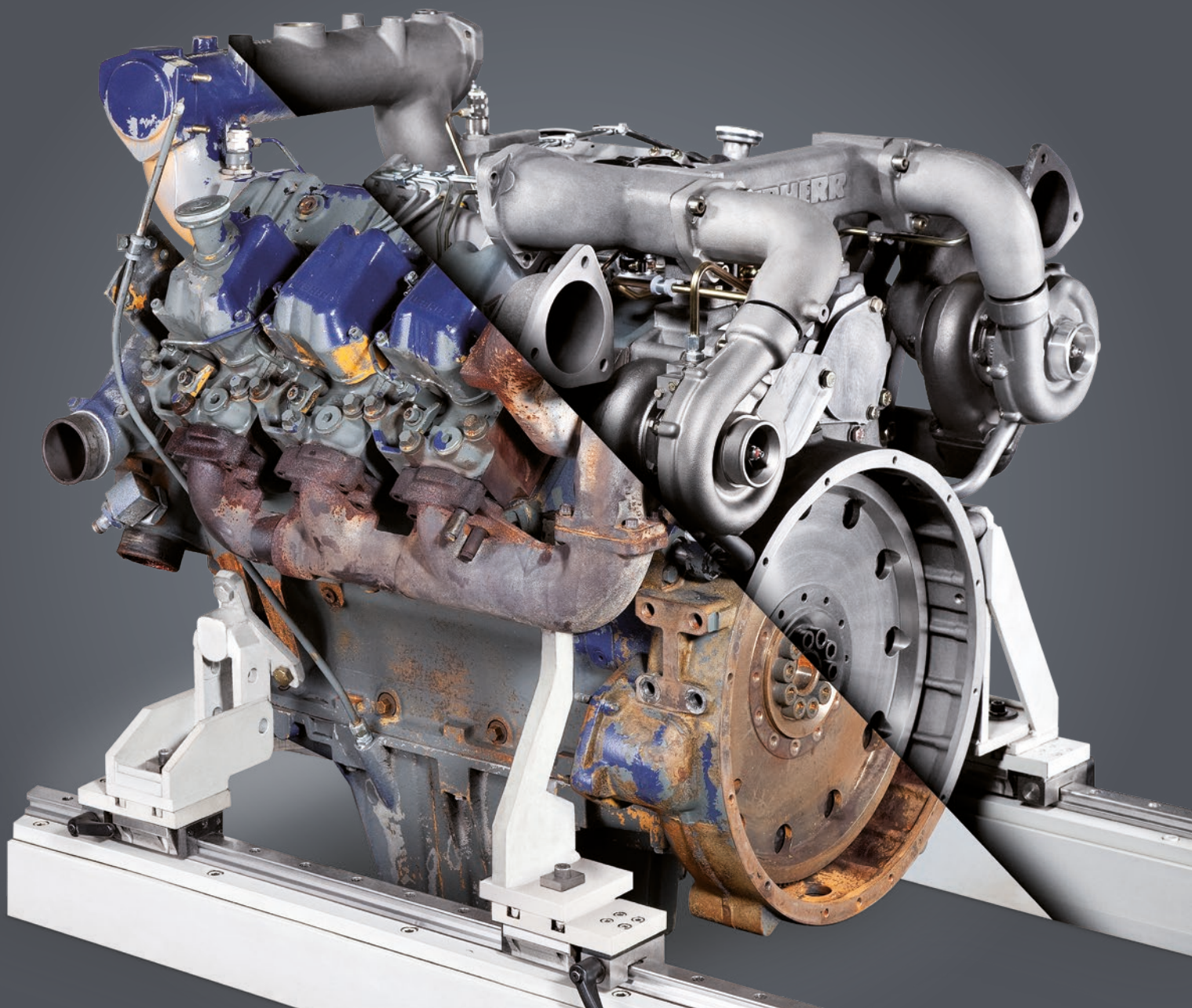
The highly modern spare parts centre in Oberopfingen (Germany) assures fast dispatch of spare parts to any location. A comprehensive parts spectrum for all components is available here for use around the world at any time. Central handling by the Liebherr sales organisations enables efficient and reliable processing of spare parts.

Training centre in Bulle

At the training centre in Bulle (Switzerland), customers and sales partners are taught by professional trainers how to work with combustion engines, hydraulic pumps and motors as well as injection systems.



The Reman Program



At the Reman competence centres in Ettlingen (Germany), Nizhny Novgorod (Russia), Guaratingueta (Brazil) and Burlington (Canada) used components are refurbished. Depending on the location, the portfolio includes diesel engines, hydraulic cylinders, pumps and motors, travel and swivelling drives, as well as rope winches, splitter boxes and axles. Depending on their budget, residual value of the machine, and potential downtime, customers can choose between three different levels of remanufacturing.

Exchange components

Customers receive an anonymous state-of-the-art component with a new part guarantee. In the case of preventive orders, the machine downtime is less than 24 hours. The used component is completely disassembled. Individual parts that can be refurbished are stripped of paint, cleaned, adjudged according to strict guidelines, and then reconditioned. Customers receive attractive refunds for used components.

General overhaul

The customers' own components are restored to their original technical condition at a fixed price. Components are also completely disassembled and cleaned during general overhaul. All wear parts are replaced, and a guarantee is issued for the entire component.

Repair

Repairs are performed on approval by the customer of an individual quotation. In the event of repair, a guarantee is also issued for the entire component.

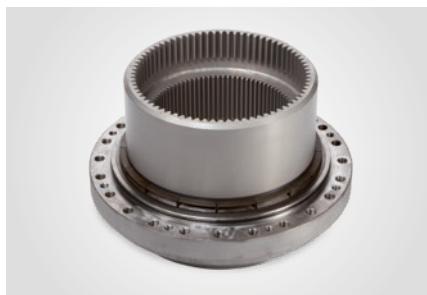
Environmental benefit

Compared to the production of a new part, Reman saves an average of 70% energy, and can reuse up to 75% of the existing material. Precious resources are thus saved, and the impact on the environment considerably reduced.

Diesel engine reconditioning



Travel drive reconditioning



Examples of Use

Liebherr develops and manufactures high-quality components for customers from diverse industries. As an experienced partner, we boast extensive know-how and expertise and optimise our components for specific applications. Customer benefit from customised solutions with compatible components.

The areas of application are manifold and include besides machines for construction and civil engineering, agriculture and mining equipment as well as decentralised energy systems and special vehicles. Customers from the maritime industry, machinery and plant construction, aerospace and wind industry value Liebherr's wide product range.

All components are characterised by high reliability and high performance capability also in adverse environmental conditions. They are developed and produced with high quality standards and comply with the required safety regulations of the various industries.



Agriculture and forestry

Liebherr components contribute to the fuel-efficient operation of agricultural and forestry machinery. Electronic solutions provide comfort in the cab.



Decentralised energy systems

Energy is produced where it is needed: Our gas engines are designed for decentralised energy supply in continuous operation.



Aerospace

Liebherr develops reliable electronic solutions for aviation. These meet the high safety standards of the industry.



Building construction and civil engineering

Liebherr offers robust components for building construction and civil engineering. These components cope with dust, dirt and mechanical loads.



Special vehicles

Whether it is for fore engines or aircraft tugs:
We develop components for various special vehicles specific to the application.



Machinery and plant construction

In machinery and plant construction Liebherr components make a decisive contribution towards resource-friendly production.



Maritime applications

Certified components from Liebherr prove themselves near coastlines, as well as under extreme conditions on the high seas.



Mining

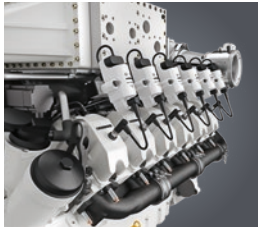
Liebherr components defy the harsh conditions in mining. The high availability ensures the efficient extraction of raw materials.



Wind energy

For wind turbines we supply individual components and complete systems. These are used for the electromechanical and hydraulic rotor blade and yaw adjustment.

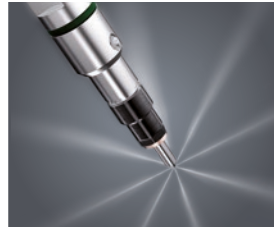
Liebherr Components



Gas engines



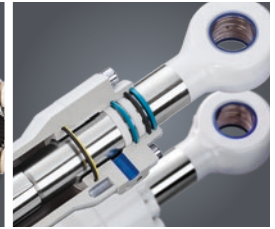
Diesel engines



Fuel injection systems



Axial piston hydraulics



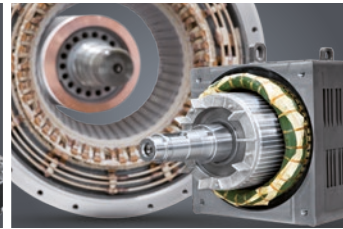
Hydraulic cylinders



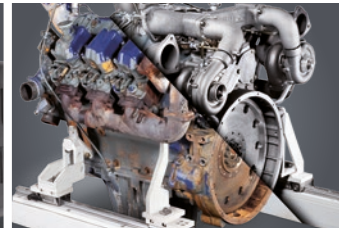
Slewing bearings



Gearboxes and winches



Electric machines



Remanufacturing



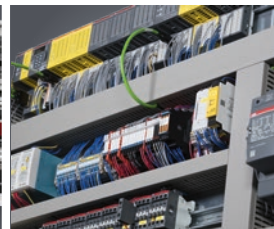
Human-machine interfaces and gateways



Control electronics and sensor technology



Power electronics



Control cabinets



Software

From A to Z – the components division of the Liebherr Group offers a broad range of solutions in the area of mechanical, hydraulic, electric and electronic drive system and control technology. The efficient components and systems are produced at a total of ten production sites around the world to the highest standards of quality. Central contact persons for all product lines are available to our customers at Liebherr-

Components AG and the regional sales and distribution branches.

Liebherr is your partner for joint success: from the product idea to development, manufacture and commissioning right through to customer service solutions like remanufacturing.

components.liebherr.com