
Combustion engines

A powerful, robust and reliable product range

LIEBHERR

Components
Combustion engines



Powerful combustion engines





Over the past 40 years, we have evolved from an in-house engine manufacturer to an established and important market player. Today, we offer a complete engine portfolio for various needs and applications. Starting with the 4- and 6-cylinder inline engines and through to the large V-type engines up to 20 cylinder. Our combustion engines cover a wide power range from 130 kW to 4,290 kW

With our extensive expertise in various industries, decades of knowledge as an engine manufacturer and through close collaboration with our partners, we understand and are able to answer all your needs whatever your industry requirements are. From our construction and industry origins to mining, from power generation to the immensity of the oceans, our powerful, robust and reliable combustion engines will meet your needs.

Production sites

Bulle (Switzerland) and Colmar (France)

Combustion engines portfolio

From 130 to 4,290 kW

Industries

Built for the toughest demands

High quality

From design to testing

Emission standards

Modular and optimised solutions

Vision 2030

Alternative fuels and future powertrains

Digitalisation

Engine condition monitoring and remote diagnostic with LiDIA

Service

Global organisation for local availability

Production sites

Liebherr combustion engines are designed and manufactured in Bulle (Switzerland) and Colmar (France). The first 6-cylinder inline diesel engines came off the production line in 1984 at the first production site in Bulle. Since then, the product portfolio, manufacturing systems and the production sites have been continuously expanded.



Bulle, Switzerland

Liebherr Machines Bulle SA was founded in 1978, in the Gruyère region, located in the heart of the Swiss Alps. Combustion engines production started shortly thereafter, in 1984. Today development and production departments have grown to offer customised products for individual markets. To achieve these objectives, Liebherr Machines Bulle SA has steadily invested into its development center, production and employees to earn its place as a renowned brand for your engines.



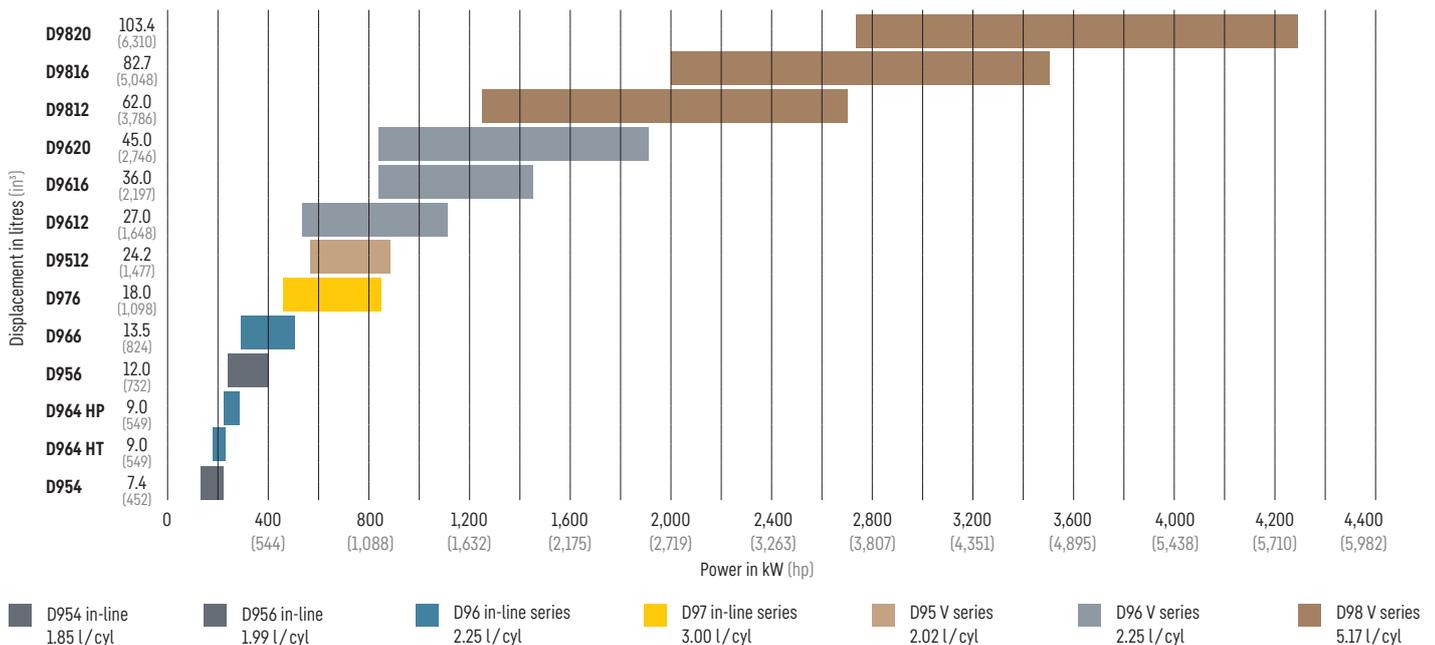
Colmar, France

The production site of Colmar, France is an illustration of the further expansion of the Liebherr group in the engine development and manufacturing. With our new diesel engine, the D98, Liebherr has extended its portfolio in the upper power range. In 2012, a new company specialised in the development of this new D98 series was founded: Liebherr-Components Colmar SAS. Liebherr invested in a facility with world leading infrastructure and technology, two years later in 2014, the brand new factory was built and made ready for production. Among others, this cutting edge facility is equipped with an automated assembly line as well as with several test benches to manufacture the best-in-class combustion engines.

Combustion engines portfolio

Our combustion engines are designed and manufactured in both our production sites in Switzerland and France and cover a power class from 130 kW to 4,290 kW. They have been specifically developed for use in off-road applications. They perfectly suit the toughest environmental conditions and are therefore ideal for a large variety of industries and applications.

Our portfolio



Performance and efficiency

Combustion engines from Liebherr are distinguished by their specific high performance which can be called upon at any time thanks to dynamic responsiveness. Engine architecture, injection system and engine management are integrated with each other in order to achieve an optimal application-specific torque curve. This is beneficial not just for the performance, but also for the degree of efficiency and thereby minimised fuel consumption.

Modular design

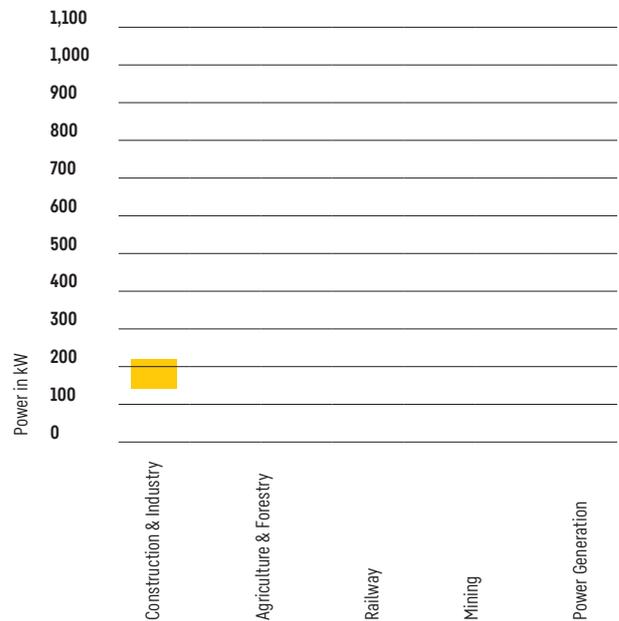
Thanks to a high flexibility and modular design, Liebherr combustion engines can easily be adapted to the different applications and specific region requirements. As a result, provisions for operation in high altitude or in a cold weather can be easily integrated. Furthermore, thanks to additional after treatment systems, every combustion engine from the portfolio complies with the most stringent global emission regulations.

Technical information



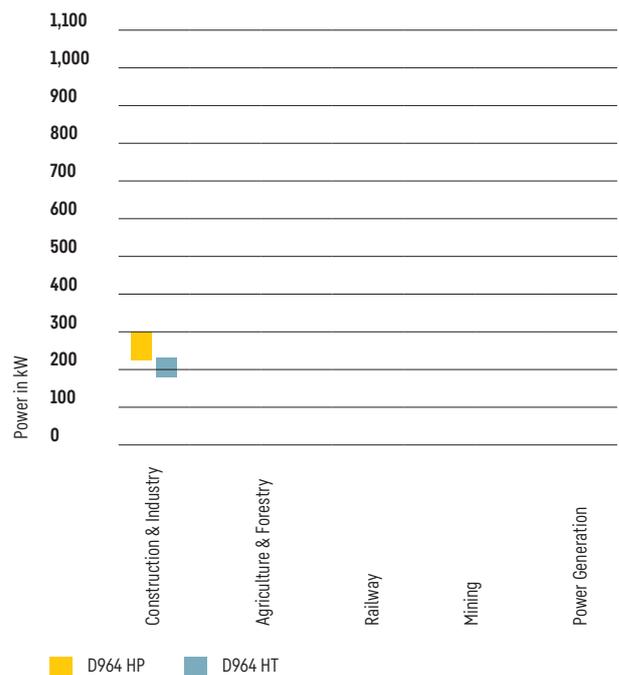
Engine	D954		
Bore	mm (in)	130	5.1
Stroke	mm (in)	140	5.5
Displacement	dm ³ (in ³)	7.4	451.6
Power rating	kW (hp)	140 - 220	188 - 295
Rated speed	rpm (rpm)	1,900	1,900

Power range D954



Engine	D964		
Bore	mm (in)	135	5.3
Stroke	mm (in)	157	6.2
Displacement	dm ³ (in ³)	9.0	549.2
Power rating (HP)	kW (hp)	225 - 300	302 - 402
Power rating (HT)	kW (hp)	180 - 230	241 - 308
Rated speed	rpm (rpm)	1,700 - 2,100	1,700 - 2,100

Power range D964

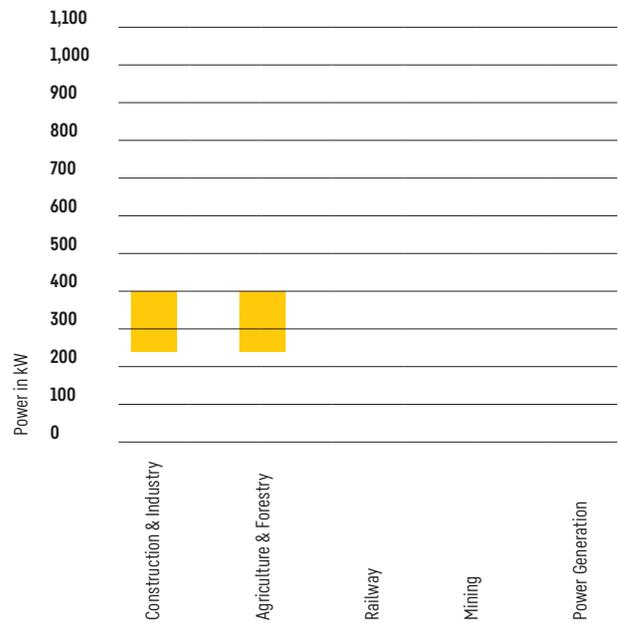


Technical information



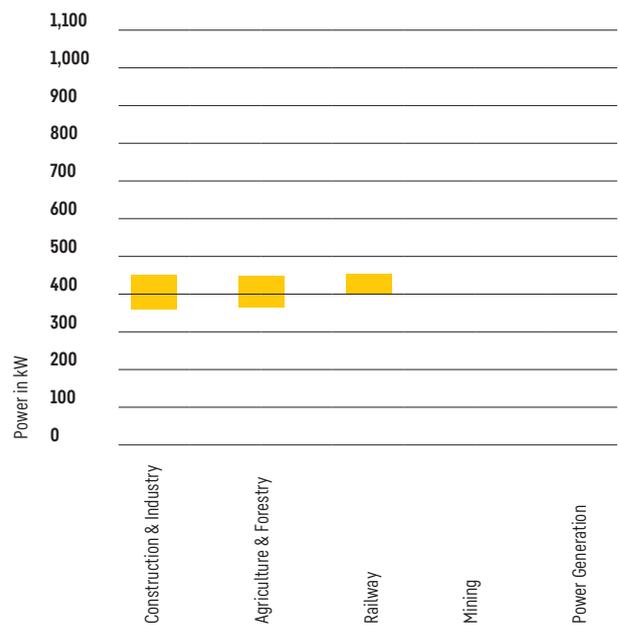
Engine	D956		
Bore	mm (in)	130	5.1
Stroke	mm (in)	150	5.9
Displacement	dm ³ (in ³)	12.0	732.3
Power rating	kW (hp)	260 - 400	349 - 536
Rated speed	rpm (rpm)	1,700 - 2,100	1,700 - 2,100

Power range D956



Engine	D966		
Bore	mm (in)	135	5.3
Stroke	mm (in)	157	6.2
Displacement	dm ³ (in ³)	13.5	823.8
Power rating	kW (hp)	360 - 450	483 - 603
Rated speed	rpm (rpm)	1,700 - 2,100	1,700 - 2,100

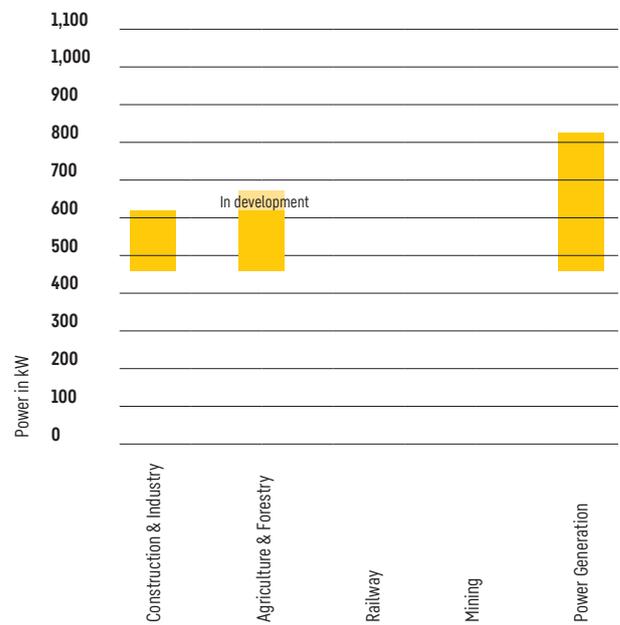
Power range D966





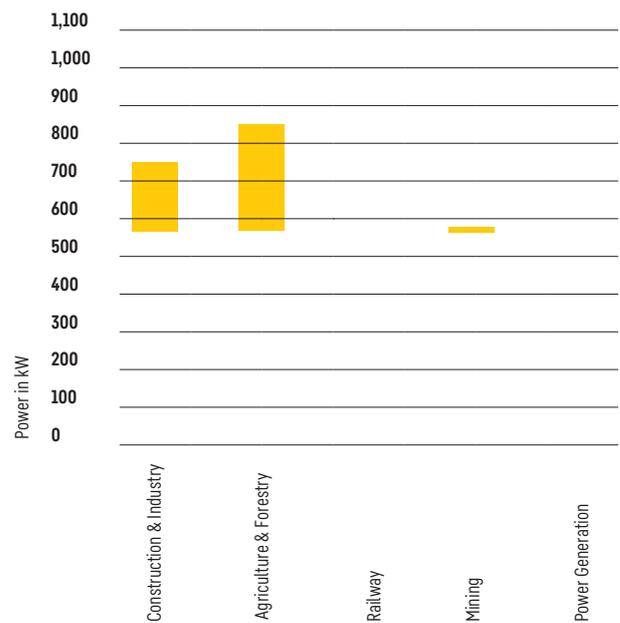
Engine		D976	
Bore	mm (in)	148	5.8
Stroke	mm (in)	174	6.9
Displacement	dm ³ (in ³)	18.0	1,098.4
Power rating	kW (hp)	460 - 820	617 - 1,100
Rated speed	rpm (rpm)	1,700 - 1,900	1,700 - 1,900

Power range D976



Engine		D9512	
Bore	mm (in)	128	5
Stroke	mm (in)	157	6.2
Displacement	dm ³ (in ³)	24.2	1,476.8
Power rating	kW (hp)	565 - 850	758 - 1,140
Rated speed	rpm (rpm)	1,700 - 2,000	1,700 - 2,000

Power range D9512

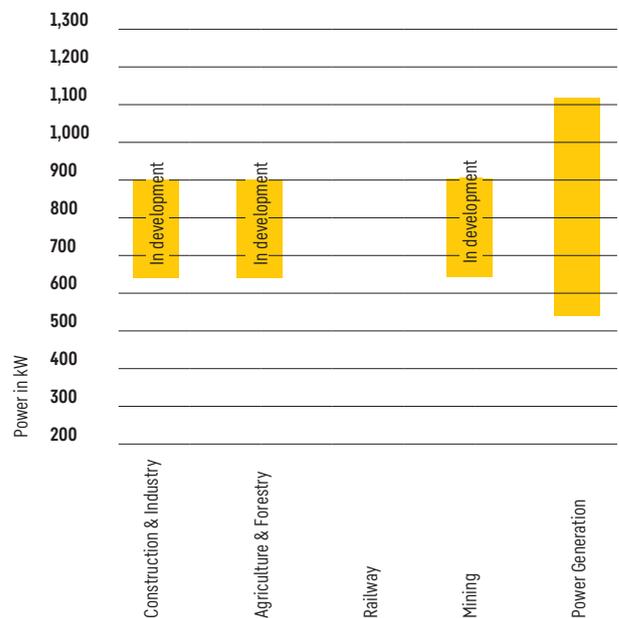


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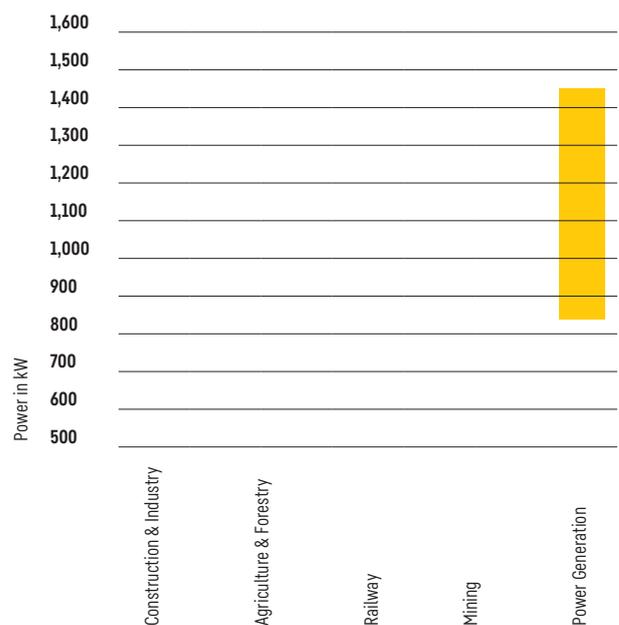
Engine		D9612	
Bore	mm (in)	135	5.3
Stroke	mm (in)	157	6.2
Displacement	dm ³ (in ³)	27.0	1,647.6
Power rating	kW (hp)	537 - 1,114	720 - 1,494
Rated speed	rpm (rpm)	1,800	1,800

Power range D9612



Engine		D9616	
Bore	mm (in)	135	5.3
Stroke	mm (in)	157	6.2
Displacement	dm ³ (in ³)	36.0	2,196.9
Power rating	kW (hp)	839 - 1,450	1,125 - 1,944
Rated speed	rpm (rpm)	1,800	1,800

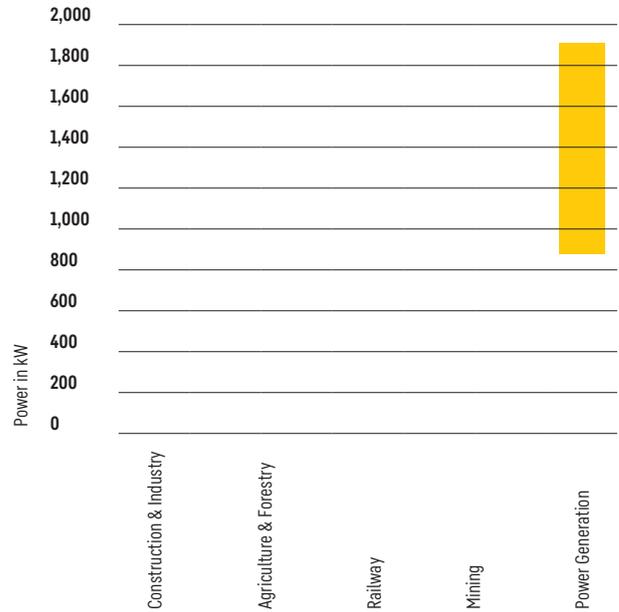
Power range D9616





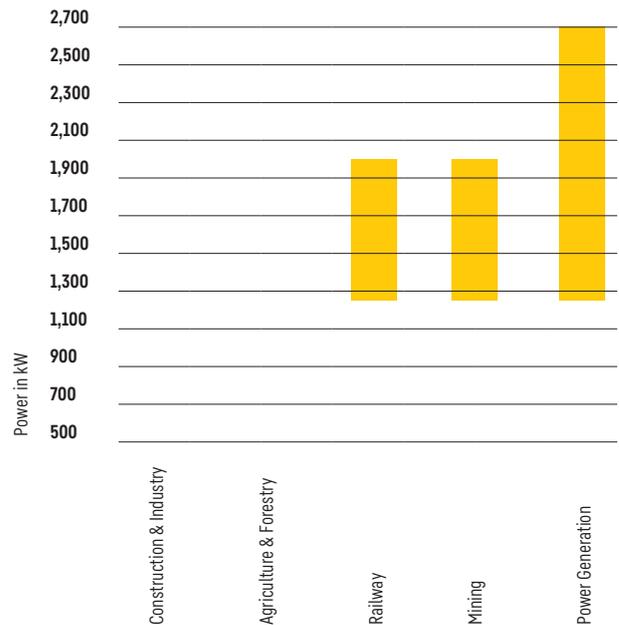
Engine		D9620	
Bore	mm (in)	135	5.3
Stroke	mm (in)	157	6.2
Displacement	dm ³ (in ³)	45.0	2,746.1
Power rating	kW (hp)	839 - 1,910	1,125 - 2,561
Rated speed	rpm (rpm)	1,500 - 2,100	1,500 - 2,100

Power range D9620



Engine		D9812	
Bore	mm (in)	175	6.9
Stroke	mm (in)	215	8.5
Displacement	dm ³ (in ³)	62.0	3,783.5
Power rating	kW (hp)	1,250 - 2,700	1,676 - 3,621
Rated speed	rpm (rpm)	1,500 - 1,800	1,500 - 1,800

Power range D9812

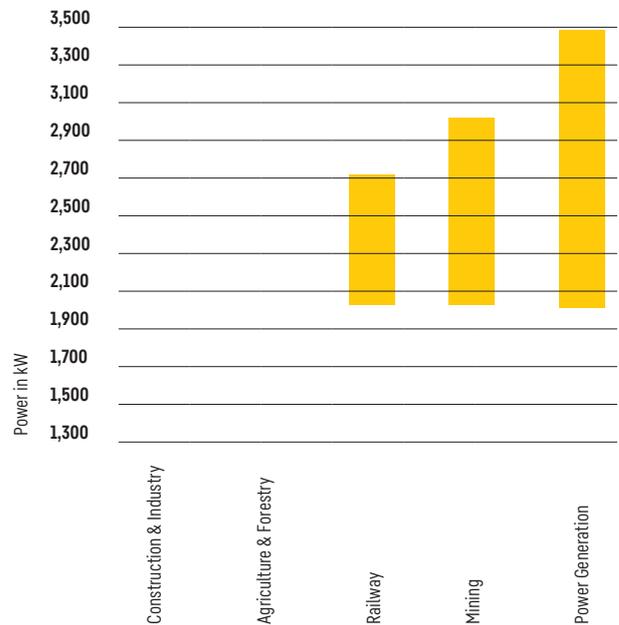


Technical information



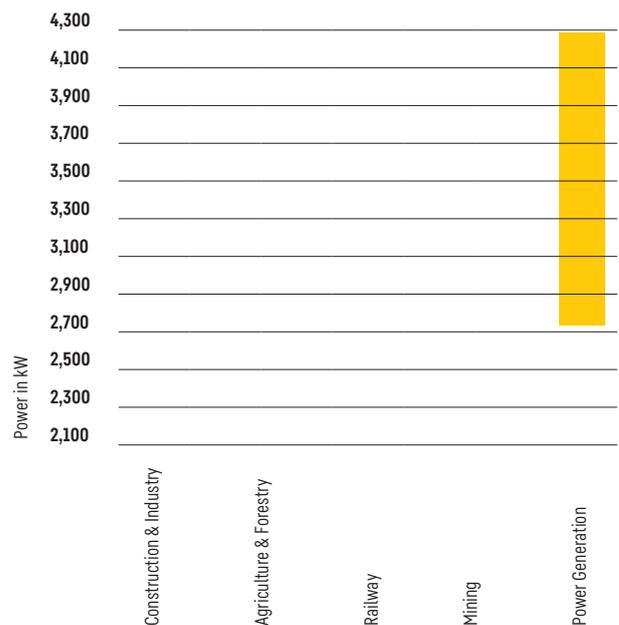
Engine		D9816	
Bore	mm (in)	175	6.9
Stroke	mm (in)	215	8.5
Displacement	dm ³ (in ³)	82.7	5,046.7
Power rating	kW (hp)	2,017–3,490	2,705–4,680
Rated speed	rpm (rpm)	1,500–1,800	1,500–1,800

Power range D9816



Engine		D9820	
Bore	mm (in)	175	6.9
Stroke	mm (in)	215	8.5
Displacement	dm ³ (in ³)	103.4	6,309.9
Power rating	kW (hp)	2,733–4,290	3,665–5,753
Rated speed	rpm (rpm)	1,500–1,800	1,500–1,800

Power range D9820

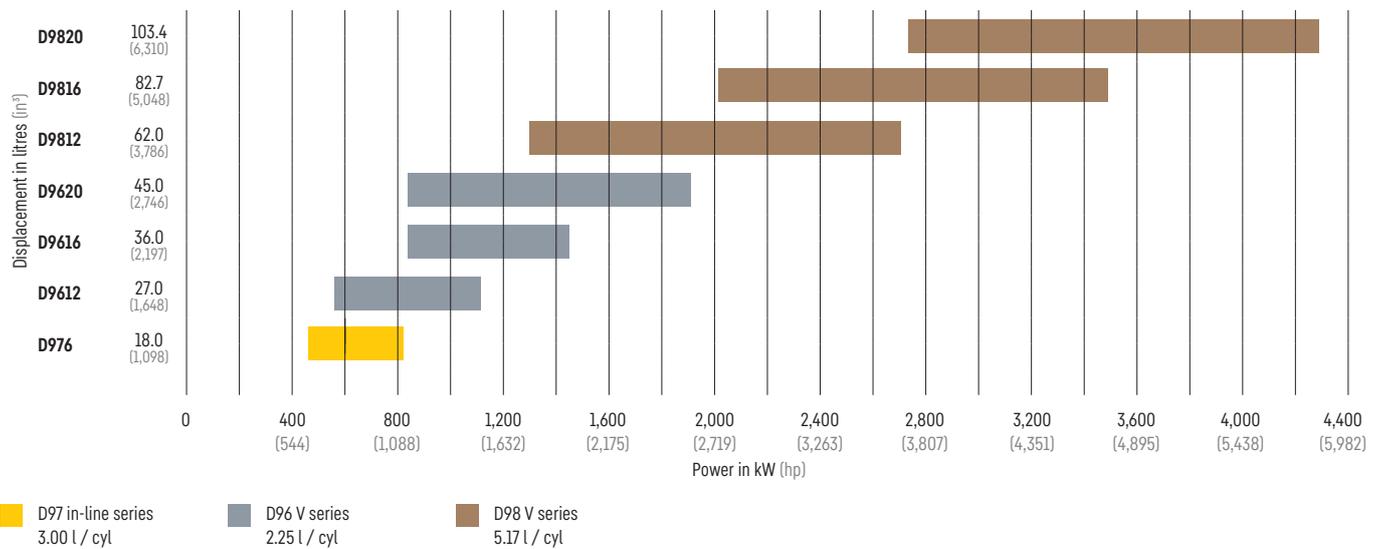


Indicative values only. Please refer to our industry brochures for application specific technical data.

Power generation industry

In places such as hospitals, airports, data centers, etc., power should be available continuously, even under difficult conditions. Thanks to their reliability and robustness, Liebherr engines are the preferred choice.

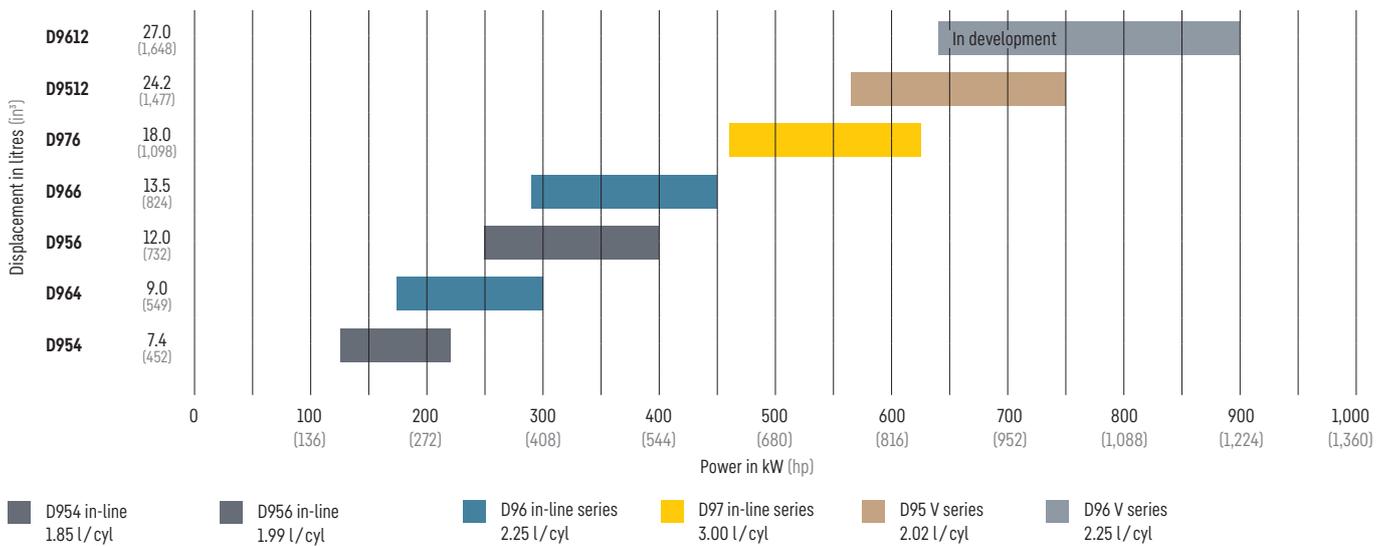
Power range



Construction industry

Liebherr is your perfect partner for heavy duty engines for construction and industrial equipment. Building tough engines for these applications is part of our identity. Our dedicated engines have a robust and sturdy design resulting in long engine life. This makes them the most reliable engines for C&I. Our customers require tough, reliable and economic engines. Our modular system allows our engines to be tailored to our customers' requirements, while complying with emission regulations.

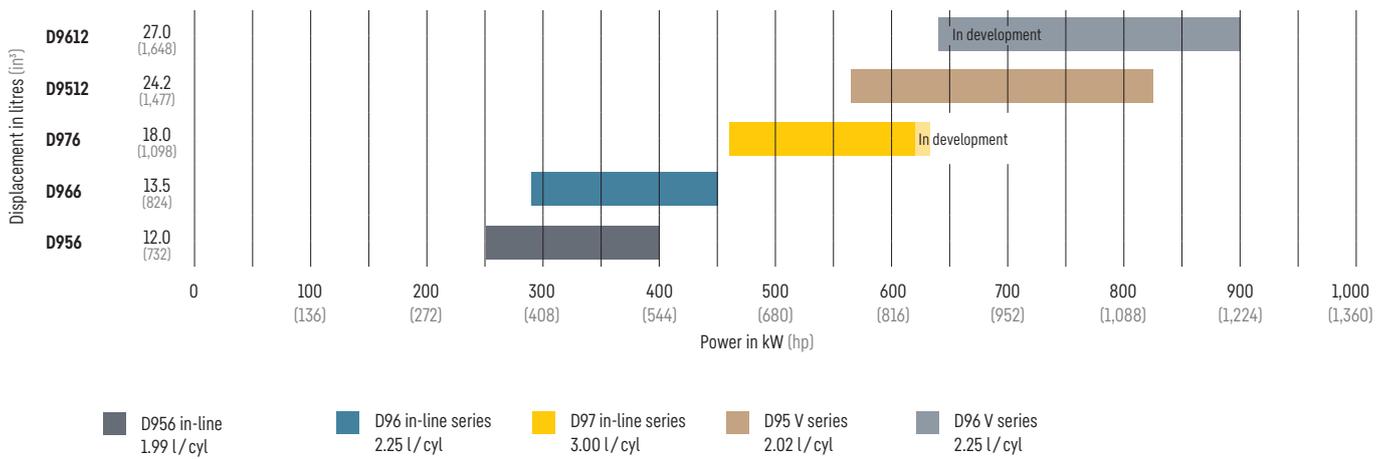
Power range



Agriculture and forestry industry

Agriculture and construction share many similarities in their requirements for tough, efficient and torque producing power solutions. Our engines comply with all worldwide emission standards and are able to cover the entire industry cycle from seeding to harvesting. Liebherr engines are particularly appreciated for their increase efficiency and their reduced total cost of ownership thanks to lower fluid consumption and longer oil change intervals.

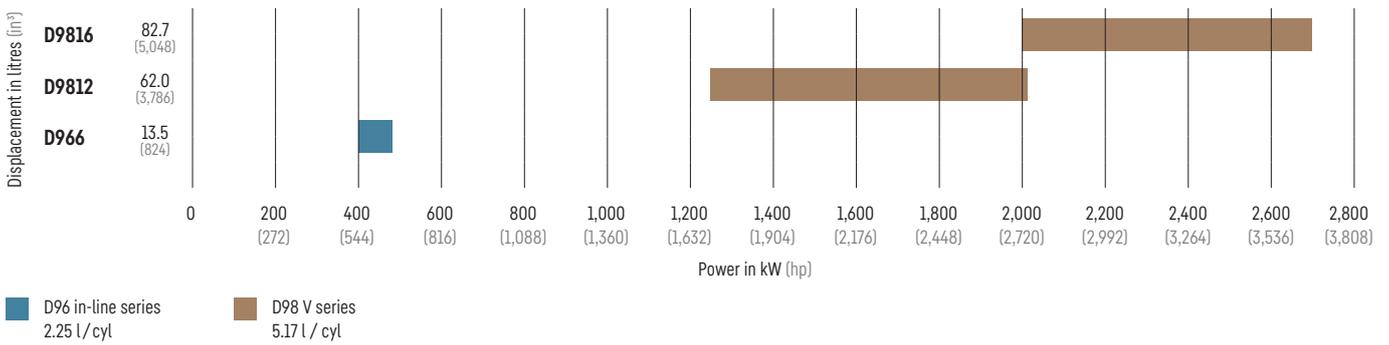
Power range



Railway industry

Designed to achieve uncompromising performance and efficiency while operating at the lowest costs, Liebherr combustion engines are fulfilling the requirements of different applications of the railway industry, such as railcars and diesel-electric or diesel-hydraulic locomotives. Liebherr engines suit new and retrofit installation due to their high power density and flexible operating profiles.

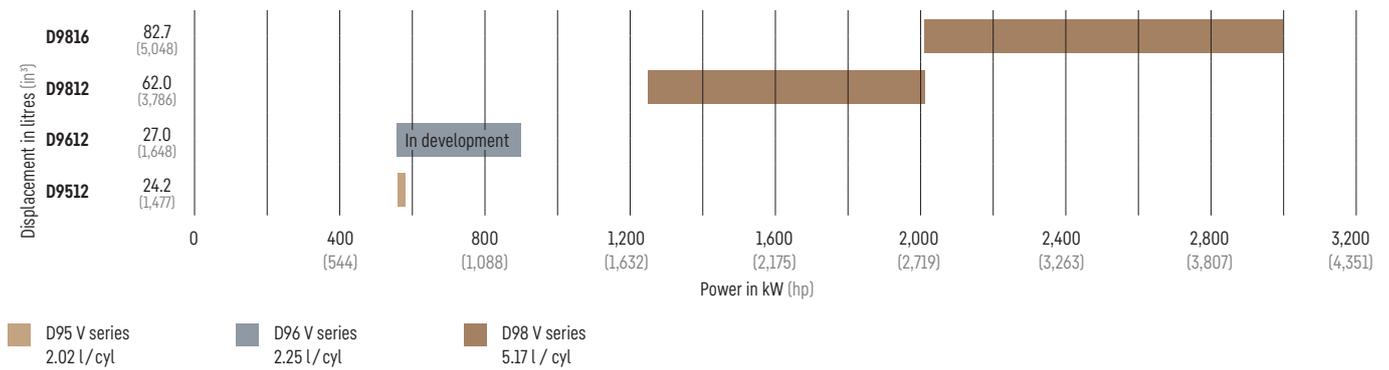
Power range



Mining industry

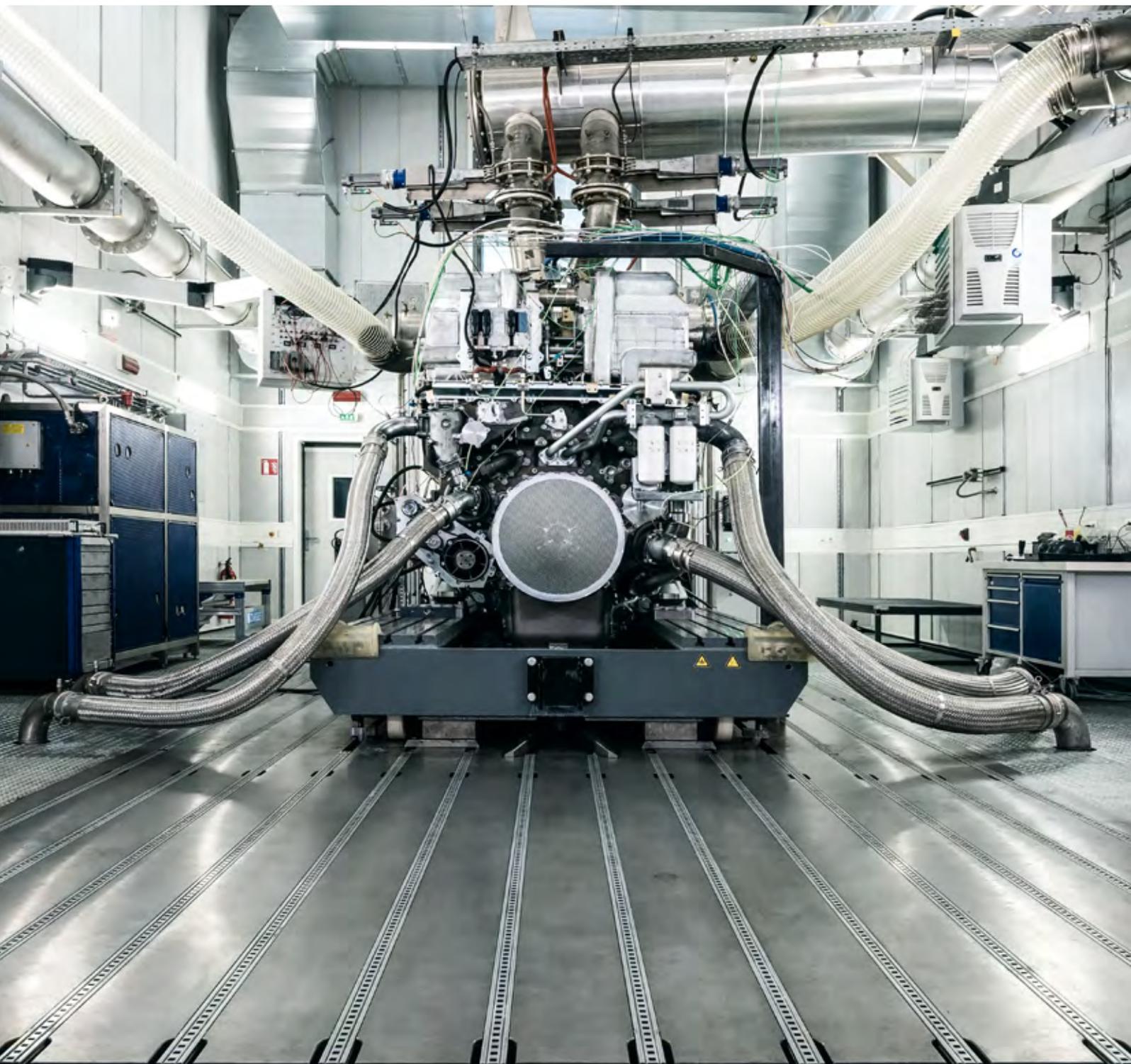
Our combustion engines prove themselves to be cost effective in the extraction of raw materials in the mining segment. We develop and manufacture resilient components with high availability for deployment in surface mining and deep mining applications such as mining excavators, hauling trucks, wheel loaders or bucket excavators.

Power range



High quality from design to testing

Combustion engines from Liebherr have proven their value for decades in the toughest situations and under the most extreme working conditions. Contributing towards their high level of reliability is not just their solid and secure design, but also consistent quality assurance and process monitoring in all areas of business.



Quality and reliability

Years of development expertise

As early as 1984, the first engine designed by Liebherr engineers came off the production line. Since then, we have accumulated many years of experience in the development of combustion engines.

Thanks to their extensive expertise, the latest construction and simulation methods, our engineers are laying the foundations to ensure that Liebherr engines meet highest quality requirements.

Your engineering partner

Currently, around 250 engineers are continuously working on further engine developments and improvements. Proof of our engineering expertise is the numerous companies which have sought to partner with Liebherr for the development of new engine series in the past years.

A philosophy rooted in quality

Liebherr's philosophy towards quality begins with the design of our engines based on the latest methods and simulation and continues through each stage of production, whether it is goods entry, assembly, or testing. All critical and moving parts such as engine blocks, pistons, connecting rods, etc. are measured in our state of the art metrology centers, equipped with the latest 3D measuring machines. Our automated assembly lines offer an integrated high level of traceability. Before being delivered, each engine is subjected to a performance test under operating conditions (operational test). End-of-line tests are used to ensure the product quality. Quality assurance at production sites is certified in accordance with DIN EN ISO 9001 / 2008.



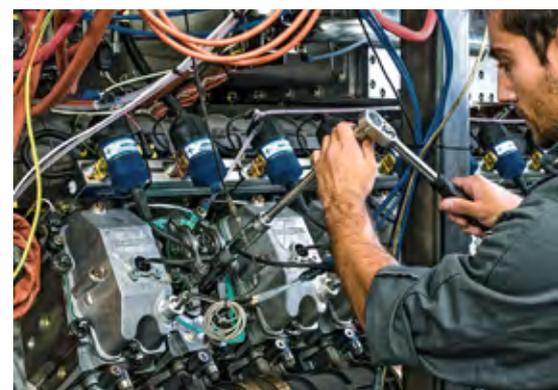
Modern measuring devices 3D

Measuring machines with measuring accuracy down to the μ -meter-range offer the best prerequisites to achieve the level of quality expected by the customer.



Integrated traceability

Our automated production lines allow an integrated high level of traceability which results in detailed and a complete report of the engine assembly.



Performance tests

To ensure engines are fitting your specifications, each of them is tested under operating conditions before being delivered.

Emission standards

With reduced fuel consumption and low emissions, Liebherr's combustion engines are suited to contain environmental impacts and optimise costs. Our exhaust gas aftertreatment systems are adapted to the application and legislative requirements applicable in each region.

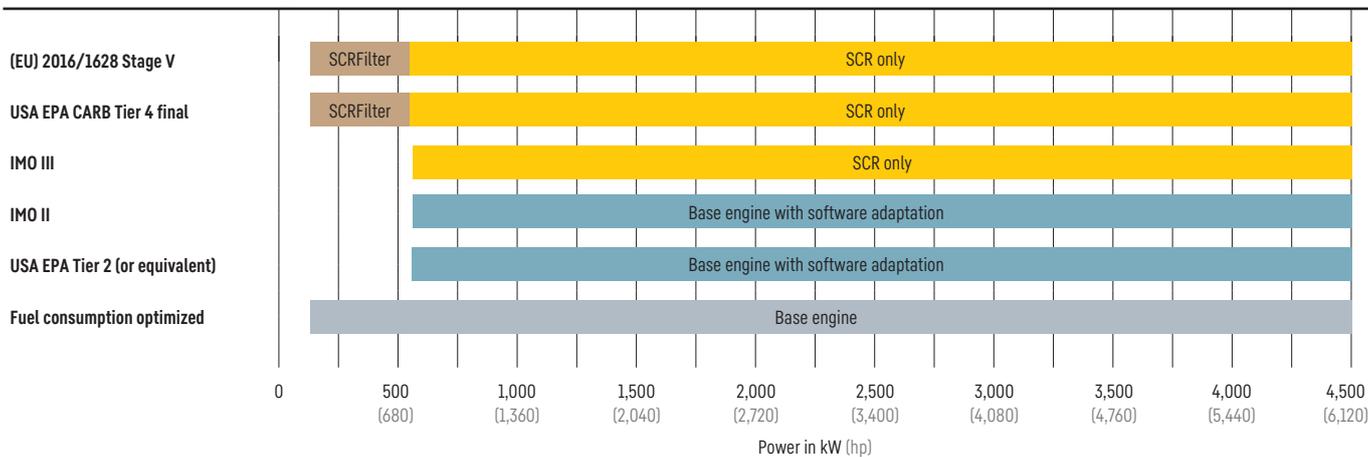
Inhouse solution developments

Customer requirements and emissions compliance are the core of our development for compact and efficient aftertreatment solutions. Not only do we develop our own aftertreatment solutions, but we are also at the forefront of innovation thanks to collaborations with a world-renowned technical institutes, and world-leading manufacturers for the development of innovative aftertreatment technologies. We are able to master the entire combustion chain from injection systems to exhaust aftertreatment system modules through electronic hardware and software. Thanks to our profound knowledge, we not only optimise sub-components, but also full systems. Dedicated test benches allow us to test engines and aftertreatment systems before beginning the series production.

System optimisation

As part of innovative exhaust gas aftertreatment strategies, Liebherr put the entire fuel combustion process under scrutiny. This resulted, for example, in optimised combustion chamber geometry, more efficient turbocharger loading, and optimisation of engine friction loss. Together with the development of the company's own injection systems and engine controls, this enabled the reduction of soot particles to a minimum.

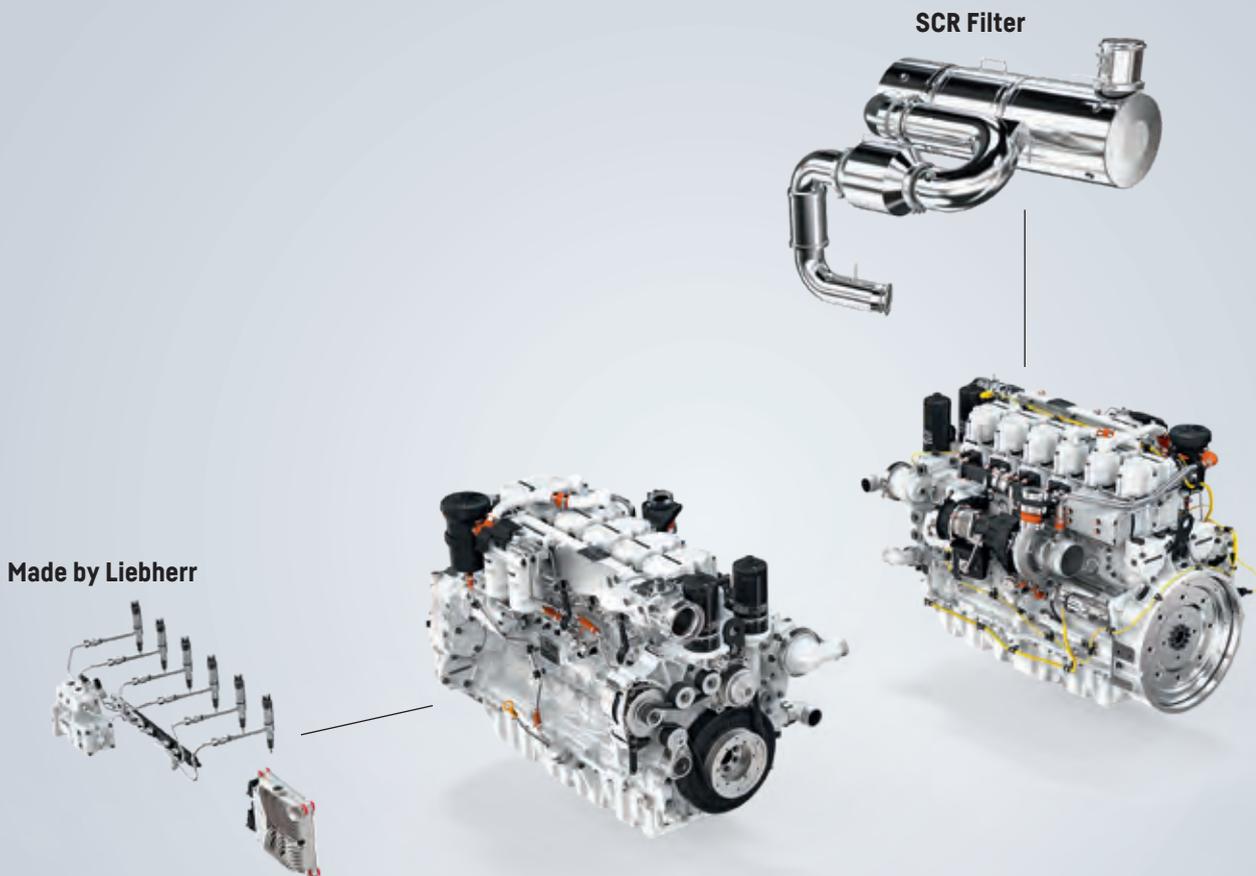
Aftertreatment technologies



Modular system

Modularity is at the core of Liebherr's combustion engines development: each engine exists as a base version that can receive different exhaust gas aftertreatments to meet the required emission standards, including the most stringent global requirements. Keywords being: compactness and a low TCO for the end customer. This means that OEMs only require one machine design to comply with all relevant industry standards and norms.

Model	D95 In-line	D95 V-engine	D96 In-line	D96 V-engine	D97 In-line	D98 V-engine
Configuration	4/6	12	4/6	12/16/20	6	12/16/20
(EU) 2016 / 1628 Stage V	■	■	■		■	
USA EPA CARB Tier 4 final	■	■	■ (Only D966)		■	
USA EPA Tier 4 final				■		■
IMO III		■				
IMO II		■		■		
USA EPA Tier 2 (or equivalent for D9512)		■		■	■	■
Fuel consumption optimized	■	■	■	■	■	■



Aftertreatment technologies not applicable above 560 kW (751 hp)

Vision 2030

The reduction of global greenhouse gases is one of the biggest challenges of our generation. Striving to reach zero emissions in the future, Liebherr works on alternative and zero-emission power train concepts. Thereby, the Liebherr team pursues an open-technology approach. In the field of combustion, the focus of the research and development activities lies on multiple solutions, depending on the needs different fields of application will show in the future.

Liebherr is convinced that internal combustion engines will remain an important solution for heavy-duty and off-highway vehicles and machines, while responding to the goal of carbon neutrality by 2050. We consider the combustion engine one of the most promising powertrains for high mechanical power under extreme operating conditions in the off-highway industry. In particular, harsh conditions, to which many heavy-duty vehicles are exposed to, challenge the development of climate-friendly, reliable and efficient powertrain solution. Internal combustion engines have met these challenges and requirements for decades, and will remain the primary powertrain in this sector – offering a sustainable solution to the market's demands.

In terms of exhaust emissions, the concern is not the combustion engine, but the fuel that is burned. The challenge then is to find the right fuel and to adapt the engine in a way to produce zero to near zero emissions.

Hydrogen is one of the options, since it is a promising, carbon-free energy and can be burned in the internal combustion engine without producing CO₂ emissions. Hydrogen is colorless, odorless, can be produced from water using renewable electricity. It holds a great potential in reaching the zero emissions destination.

Liebherr has made a significant investment into the development of the hydrogen combustion engine and test facilities recently. Prototype engines are being tested since 2020 and are providing promising results in terms of performance and emissions. Injection technologies, such as port fuel injection (PFI) and direct injection (DI), are being further developed and tested. We have had prototype machines equipped and running with these hydrogen injection solutions since 2021.

On the road to zero emission, Liebherr is continuously investigating and looking for the best combustion technologies. Some additional solutions and research activities are already ongoing and should enable an even more stable combustion, resulting in very high power density.

Liebherr thinks globally when it comes to reducing emissions and examines different technologies and fuels. Hydrotreated Vegetable Oils (HVO) is particularly interesting because it is an already available, interim technology. Liebherr's entire line of combustion engines are validated and approved for use with HVO fuels providing a simple and efficient alternative to diesel.

In older construction, machines with diesel engines, which are often in use even longer in many regions of the world emissions, can also be reduced significantly with HVO as a diesel admixture – a further contribution to reducing climate change.

The advantages that present HVO are numerous:

- The use of HVO requires no modification and is compliant with fuel system components.
- The HVO has a very good low temperature stability.
- HVO enables the reduction of Ad blue use.
- HVO decreases nitrogen oxides and soot particle emissions.
- HVO can be mixed with diesel for use in conventional internal combustion engines.

HVO fuels that comply with standard EN15940 with a base of hydrogenated vegetable oils can make a valuable contribution to reducing global emissions of greenhouse gases. Of course, different technologies will exist or coexist in the future to achieve a long-term climate target. Liebherr will develop and propose multiple powertrain solutions in the future and select applications to support the customer's needs.



Digitalisation

Digitalisation has touched all aspects of our daily lives. Based on decades of experience in the development and production of drive components, Liebherr works on producing intelligent solutions in the field of engine condition monitoring and diagnostic.

Monitoring the performance of engines is a critical part of every industry. By constantly monitoring and improving the components' current state, machine downtime can be reduced to a minimum. Using diagnostic tools allows customers to properly care for the engine system while maximising uptime and equipment availability.

Condition monitoring

Liebherr's engine condition monitoring provides meaningful insights in form of various Key Performance Indicators (KPI's) on the engine's current health, performance and maintenance; the KPIs can be delivered to a mobile device as an application or to the customer's backend through a web service (API).

Liebherr's engine monitoring collects data to monitor crucial operating parameters such as oil pressure and a counter displaying the remaining hours to an oil change, load profile, fuel consumption analytics, cooling temperature profile, cooling fault indicator, and a counter displaying the remaining hours to an air filter change.

This allows the user to gain visibility into the real-life status of the equipment in order to plan downtime and repair work more dynamically. The condition monitoring provides the data on the engine's geo-localisation and delivers live notifications of engine faults. This also helps to reduce overall maintenance costs and allows optimisation of spare part inventory by enabling preventive maintenance based on the engine's actual needs.

Remote diagnostic with LiDIA

LiDIA is an intuitive and user-friendly engine diagnostic tool which requires no configuration and reduces the complexity of diagnostic procedures to the essentials. LiDIA offers a rapid overview of all information on the engine system status, error codes, active limitations and error reactions.

Liebherr's diagnostic tool provides users with the visualisation of history, variables and systems dashboard. Furthermore, LiDIA delivers statistics and usage profiles about fuel consumption, load profiles and snapshots.

LiDIA facilitates access to the engine environment and helps to make users autonomous. The remote diagnostic tool offers numerous benefits to the end-users as it allows 24/7 remote support and offers a shorter response time. Initial troubleshooting allows approaching the machine with correct replacement parts. This helps to increase machine availability and to improve customer's service journey.



Service

Providing our customers with high quality product support and tailored assistance is what we strive for. Whether it is connecting you with a local service partner or assigning an urgent problem to a dedicated team of Liebherr experts, we are ready to assist you.

Our combustion engines are designed to support the highest level of serviceability. The clear arrangement of the installed parts and a well-structured documentation facilitate the efficient performance of maintenance work. Ongoing training makes effective and accurate customer service operations possible. Original spare parts are available quickly. The practically oriented assembly of maintenance and repair sets also contribute towards maximum operational readiness of the equipment.

Customer service & training center

Professional maintenance and repair make a significant contribution towards maximum exploitation of Liebherr components' lasting character. Comprehensive training courses prepare our customers' technicians to provide efficient customer support. Liebherr consequently offers hands-on basic and advanced training. In our training center the experienced trainers can also simulate extreme repair operations.

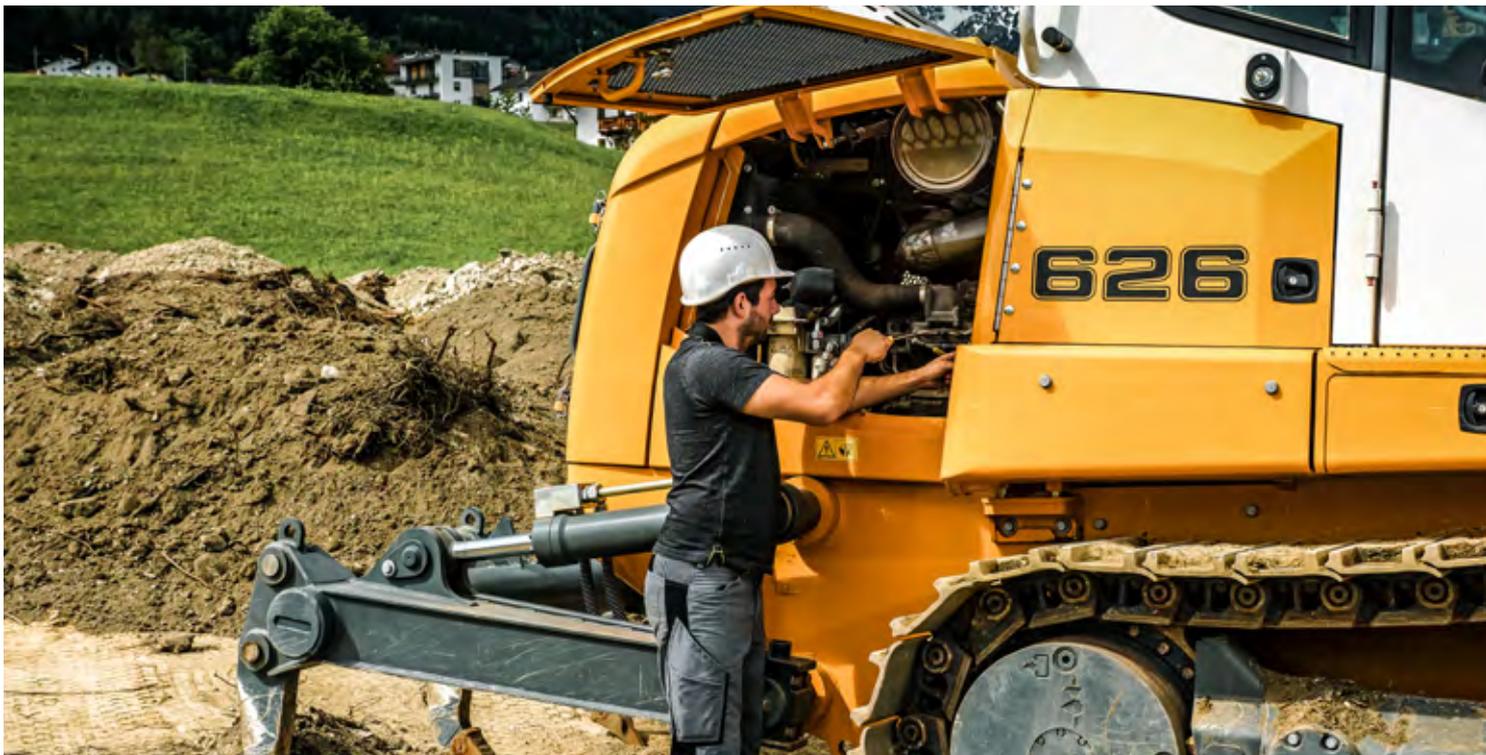
Maintenance and spare parts

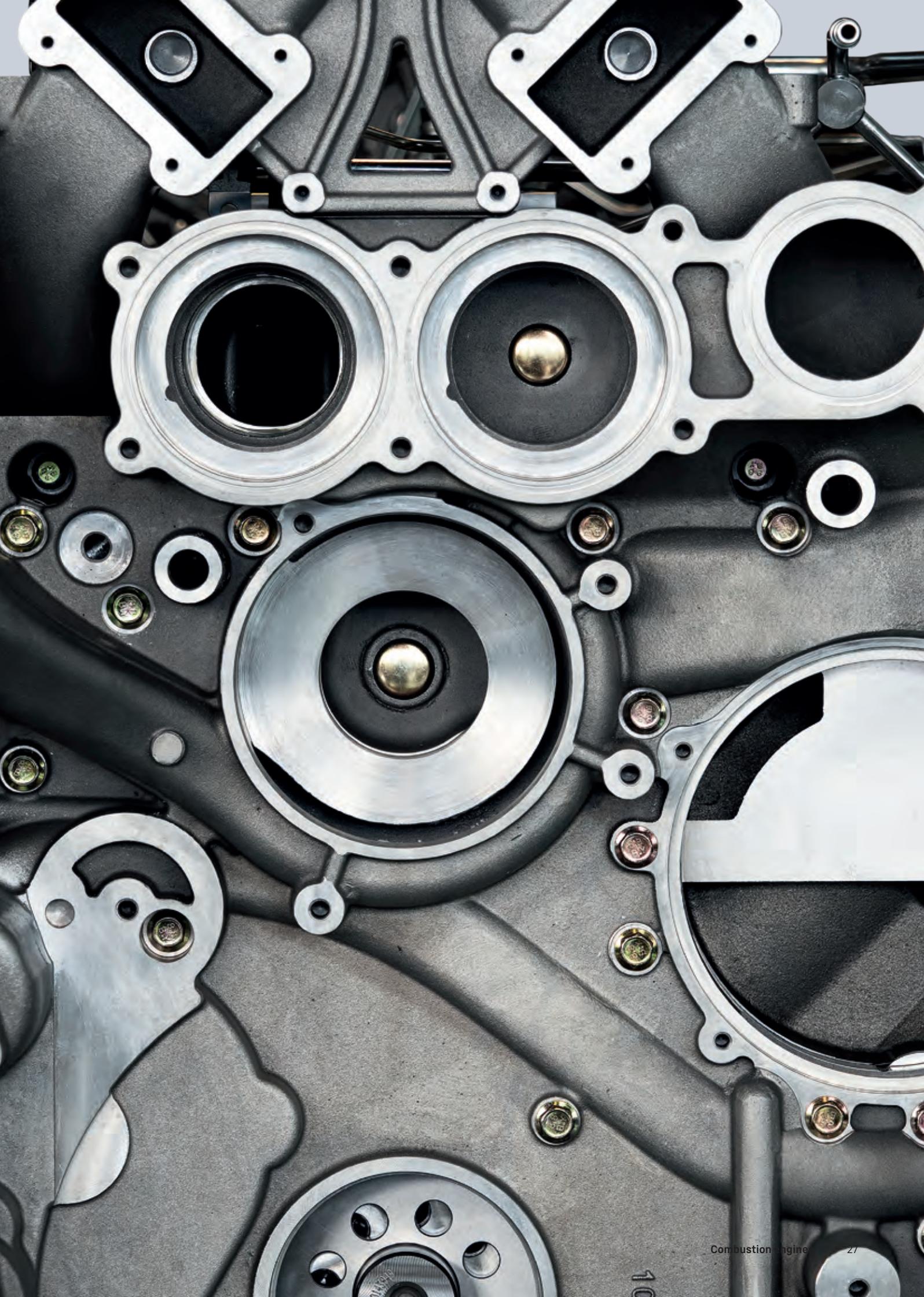
Practically orientated maintenance and repair kits, such as packs of seals, facilitate combined ordering of parts that need to be replaced together and ensure a high level of repair quality.

Remanufacturing/repowering

As your engine needs to be replaced several times during the overall lifetime of your machine, we are helping you to reduce your costs by offering you an alternative to a new engine. With our Reman program, we will transform your used engine by equipping it with new parts in accordance with industry standards. The program offers a financial benefit by helping business to cut costs whilst reducing environmental impacts through the various product's life cycle stages.

Our second alternative is the repowering of your machine regardless of its brand and make. To improve reliability and fuel consumption, we can offer a complete repowering service and kit. Overall, we are focusing on saving your time, increasing your equipment availability and optimising your total operating costs so that your total cost of ownership meets or exceeds your expectations and forecasts.





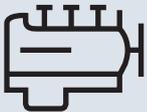
Components

As a provider of a vast variety of products, the components product segment offers solutions in the area of mechanical, hydraulic, electric and electronic drive system and control technology. Our state-of-the-art components and systems of the highest quality are designed and manufactured at ten production sites worldwide. Representatives from each of our product segments are available to our customers at

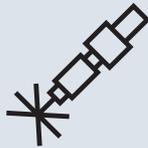
Liebherr-Components AG and the regional sales and distribution branches.

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

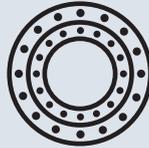
components.liebherr.com



Engines



Fuel injection systems



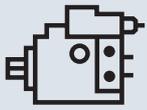
Slewing bearings



Gearboxes



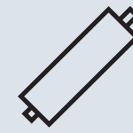
Winches



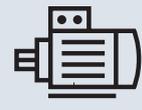
Hydraulic pumps and motors



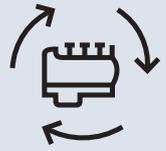
Hydraulic cylinders



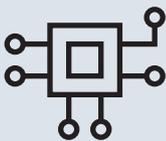
Piston accumulators



Electric machines



Remanufacturing



Industrial electronics



Electrical drive and control technology



Drive systems



Aerospace electronics



Fibre composite

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