



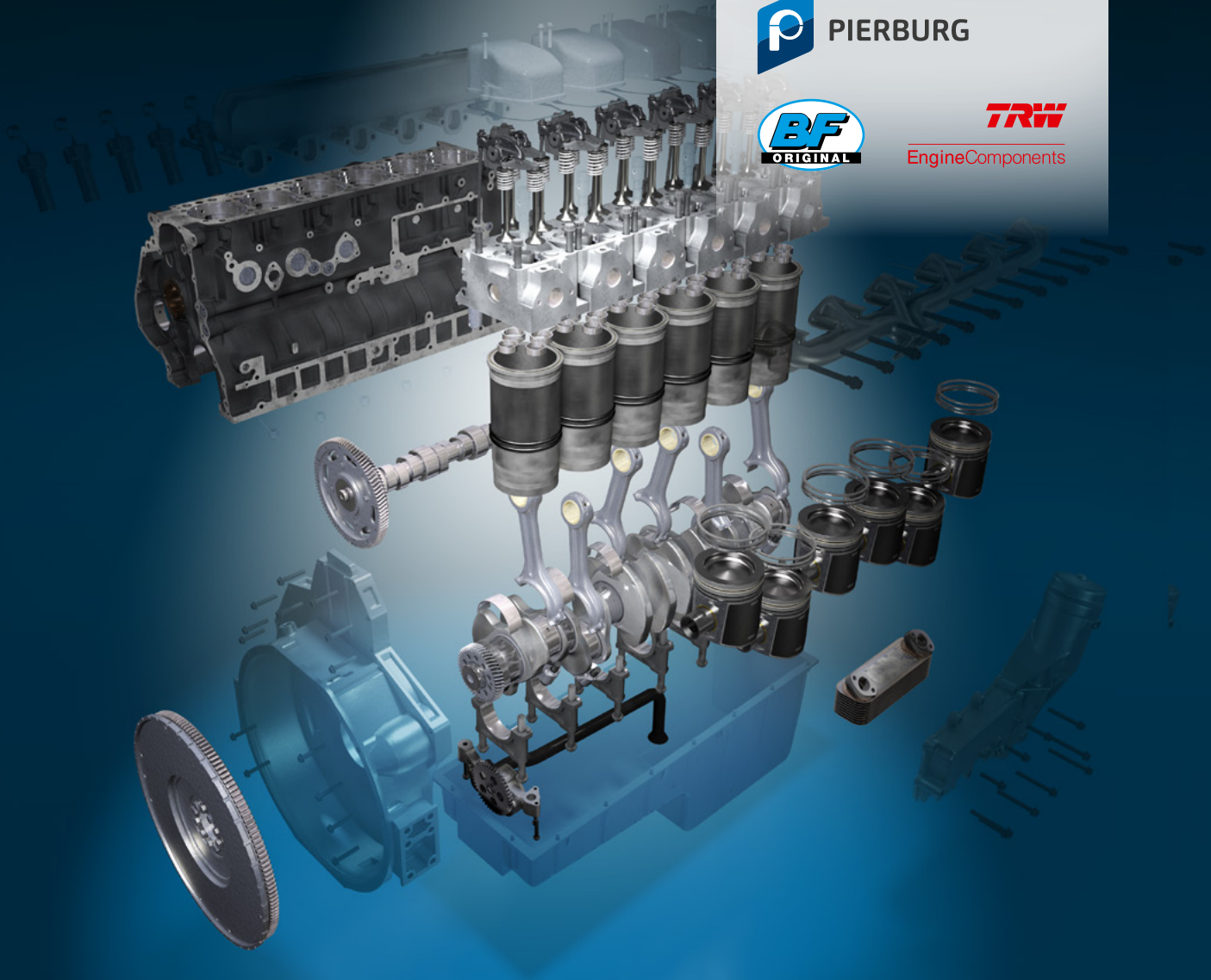
KOLBENSCHMIDT



PIERBURG



EngineComponents



# SPOTLIGHT

ENGINE COMPONENTS IN THE SPOTLIGHT

TAKING RESPONSIBILITY IN A CHANGING WORLD



RHEINMETALL



**MOTORSERVICE GROUP****QUALITY AND SERVICE FROM A SINGLE SOURCE**

The Motorservice Group is the sales organisation for the global aftermarket activities of Rheinmetall. It is a leading supplier of engine components for the independent aftermarket. With the premium brands Kolbenschmidt, Pierburg, TRW Engine Components and the brands BF and turbo by Intec, Motorservice offers its trade and repair shop customers a wide and comprehensive range of top-quality products.

**RHEINMETALL****TECHNOLOGY FOR FUTURE MOBILITY**

As a global supplier to the automotive industry, Rheinmetall's expertise in air supply systems, emission control and pumps and in the development, manufacture and spare parts supply of pistons, engine blocks and engine bearings puts it right at the top of the markets. Product development is carried out in close cooperation with well-known automotive manufacturers.

**KOLBENSCHMIDT****PIERBURG****Edited by:**

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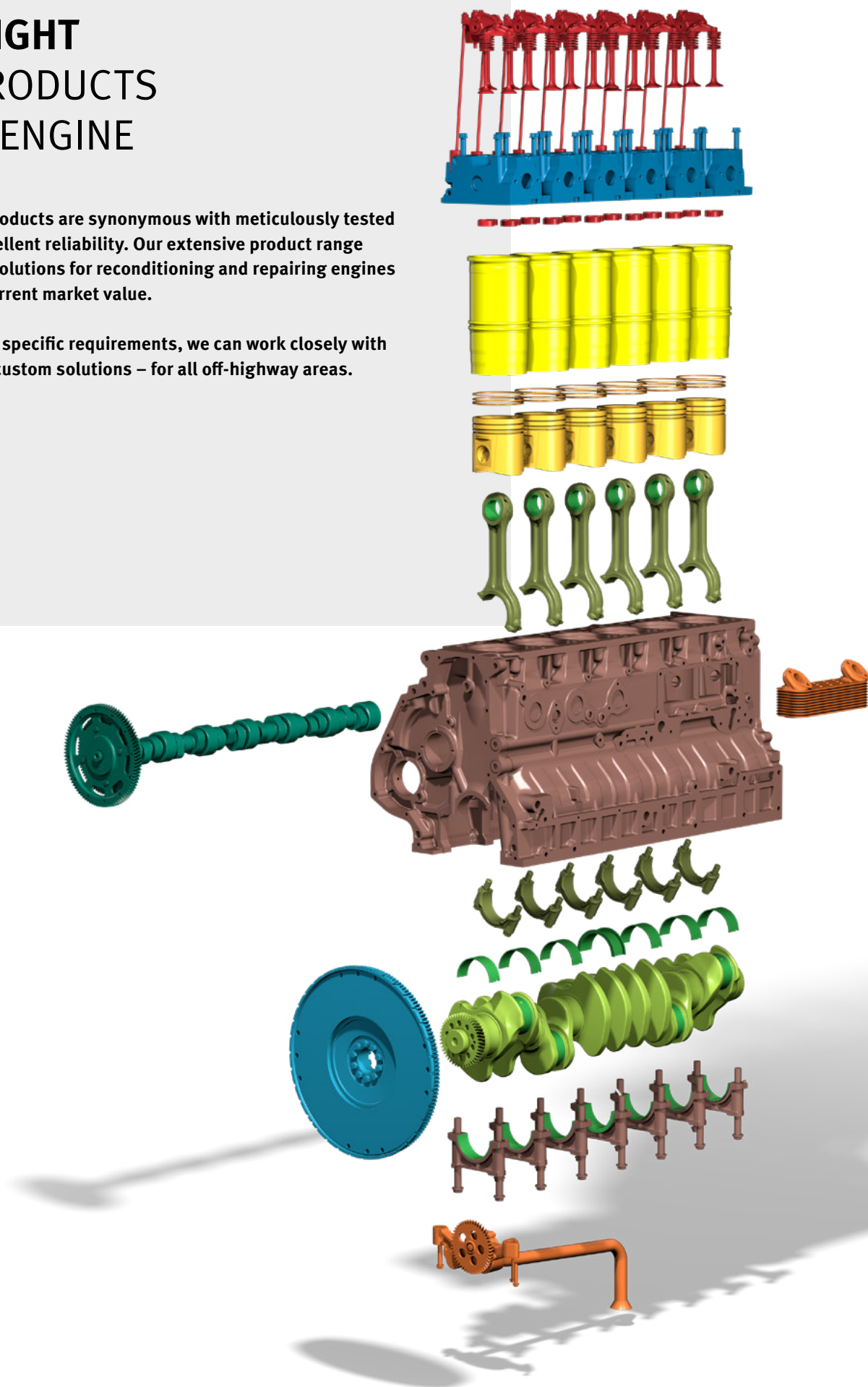
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# SPOTLIGHT OUR PRODUCTS IN THE ENGINE

Motorservice products are synonymous with meticulously tested quality and excellent reliability. Our extensive product range provides ideal solutions for reconditioning and repairing engines based on the current market value.

If you have very specific requirements, we can work closely with you to develop custom solutions – for all off-highway areas.



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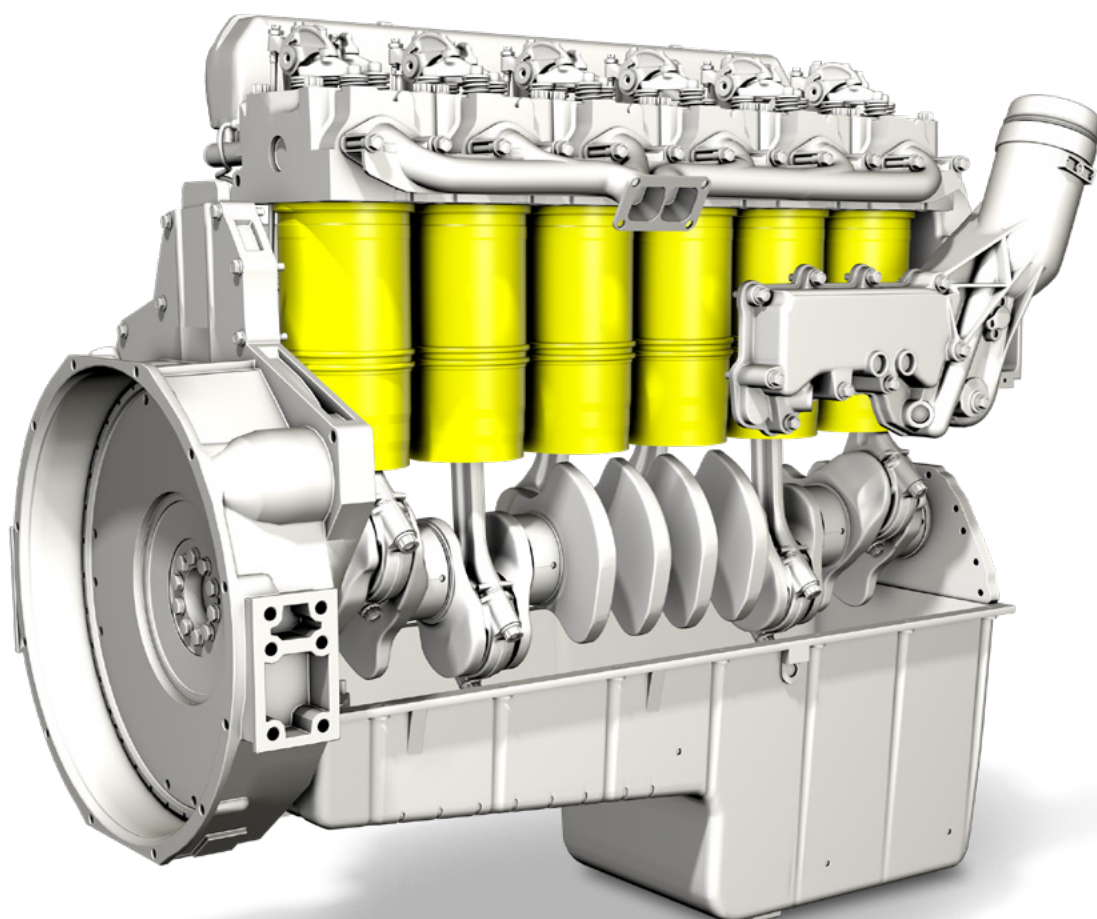
# CYLINDER LINERS

## DURABILITY FOR THOUSANDS OF KILOMETRES

Our comprehensive product range includes wet and dry cylinder liners and air cooled cylinders, as well as cylinders for compressors. The supplied gasket assortments for wet cylinder liners complete the scope of supply.

### PRODUCT RANGE

- Wet cylinder liners
- Dry cylinder liners
- Air cooled cylinders
- Oversized liners
- Cylinder liner castings





### WET CYLINDER LINERS

Wet cylinder liners are chiefly used in utility vehicles and large industrial engines. They are used in the engine block together with sealing rings and have a wall thickness of 7 to 15 mm. Coolant agent from the engine flows directly around them.

The sealing rings and tombak shims are included in the scope of supply for the cylinder liners.



### DRY CYLINDER LINERS

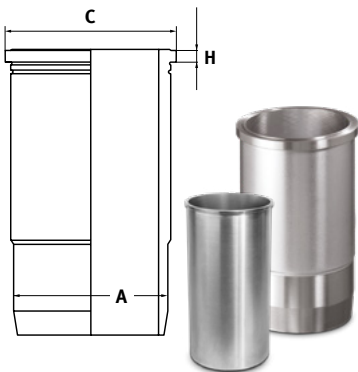
In passenger cars and smaller utility vehicle engines, dry cylinder liners are used wherever the material of the engine block does not satisfy the tribological requirements.

Dry cylinder liners are only a few millimetres thick, and are pressed directly into the engine cylinder (press-fit) or pushed in (slip-fit).



### AIR COOLED CYLINDERS

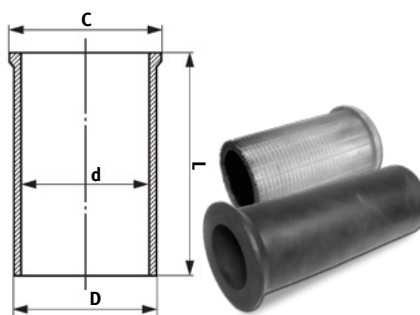
Air cooled cylinders are primarily used in simpler, air-cooled engine designs without a coolant circuit. The air cooled cylinder sits on the engine block and is cooled by the head wind.



### OVERSIZED LINERS

Oversized cylinder liners offer further repair possibilities for passenger car and utility vehicle engines that have seen better days.

Oversized liners are differentiated by the flange diameter (C), flange height (H) and/or the outside diameter (A).



### CYLINDER LINER CASTINGS

Castings made from lamellar grey cast iron and ALUSIL® further extend the product range. They allow engine reconditioners to produce cylinder liners with special dimensions themselves to suit particular requirements.



**Motorservice boasts an extensive product range with over 400 cylinder liners – for more than 2,000 engine and vehicle applications.**

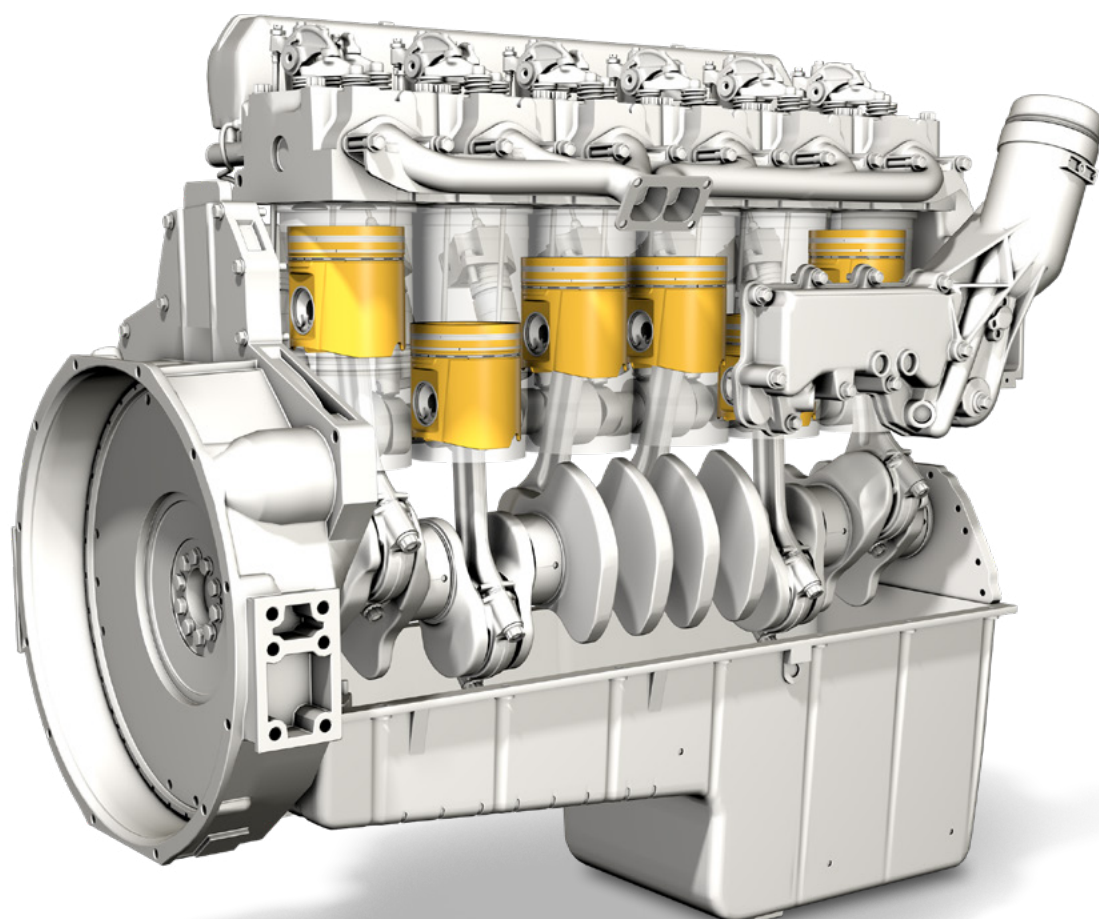
# PISTONS

## DEVELOPED AND PRODUCED DRAWING ON THE STATE OF THE ART

**Motorservice always supplies pistons complete with piston rings, piston pins and the associated piston pin circlips. These expertly coordinated components make ordering easier for you.**

### PRODUCT RANGE

- Aluminium pistons
- Articulated pistons
- Steel pistons
- Compressor pistons





### ALUMINIUM PISTONS

Aluminium pistons are light and have ideal thermal conductivity properties. They feature integral reinforcement parts, such as cast iron ring carriers, steel parts for defined thermal expansion or ceramic fibre reinforcements of aluminium oxide, depending on the intended application.



### ARTICULATED PISTONS

Articulated pistons are used in the construction of utility vehicle diesel engines when conditions are too harsh for aluminium pistons. They consist of a steel upper section and an aluminium piston skirt. Both these parts are connected with friction-locking by the piston pin.

Compared with aluminium pistons, articulated pistons boast higher strength in the steel upper section. This makes them more resistant to high pressures and temperatures.



### STEEL PISTONS (MONOBLOC)

Steel pistons are forged from highly heat-resistant steel with high stress endurance. They withstand high ignition pressures, even at maximum temperatures. They are therefore used in heavy-duty diesel engines in utility vehicles and passenger cars, where they ensure maximum service life and superior reliability. Working in co-operation with various American and European engine manufacturers, Kolbenschmidt has successfully developed steel pistons for utility vehicles and passenger cars in recent years.



### COMPRESSOR PISTONS

These aluminium pistons are used in piston compressors to generate compressed air in utility vehicles. They are subject to a lower thermal load than engine pistons, as they are not exposed to combustion.



**Whether it's special coatings such as LofriKS®, NanofriKS® or graphite coatings or special piston pin bores (Hi-SpeKS®) to increase wear resistance and durability – Kolbenschmidt is a leader in cutting-edge technology for piston development.**

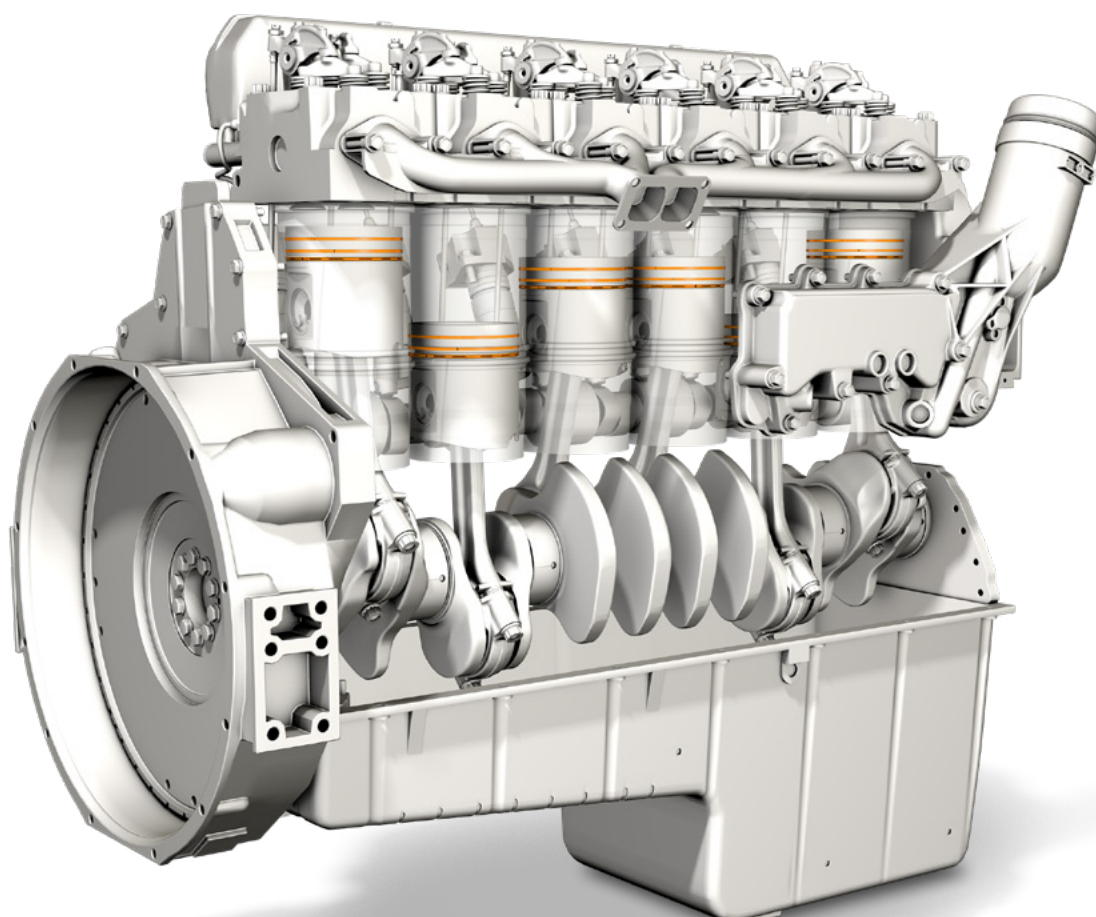
# PISTON RINGS

## LESS FRICTION FOR MORE EFFICIENT ENGINES

Piston rings from Kolbenschmidt excel through their excellent friction values, durability and low oil consumption. Piston rings which are optimised for replacement ensure that repairs are long lasting with optimal results.

### PRODUCT RANGE

- Piston rings with chromium-plated sliding surfaces
- Molybdenum-coated piston rings
- Piston rings with ceramic chromium or diamond-coated coatings



## PISTON RINGS

We generally differentiate between compression rings and oil control rings. The key task for both ring types is to mutually seal off the combustion chamber and crankcase.

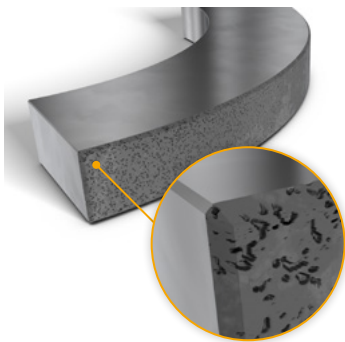
### Main tasks:

- Sealing against combustion gases
- Heat dissipation
- Scrape off and spread oil

Inertia and gas loads, as well as high temperatures, place high technical demands on piston rings. Optimum durability and compliance with emissions regulations are only achieved by tailoring piston rings precisely to the particular engine.

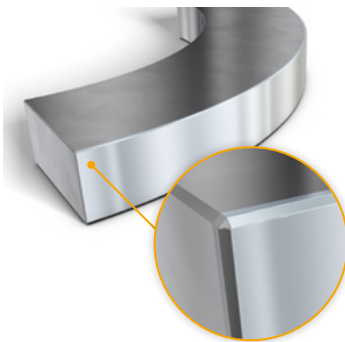


**Motorservice supplies a customer-oriented, comprehensive product range with over 1,100 different ring sets for more than 8,000 applications.**



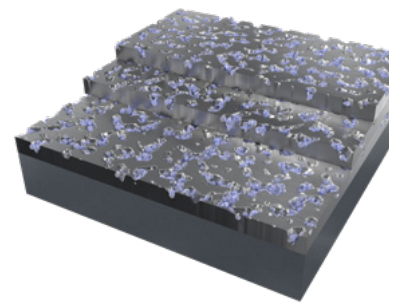
### MOLYBDENUM COATINGS

Molybdenum-coated piston rings offer maximum temperature resistance with excellent emergency running properties.



### CHROMIUM COATINGS

Chromium-plated piston ring sliding surfaces reduce the wear on the interacting sliding parts and increase durability.



### CERAMIC CHROMIUM AND DIAMOND-COATED COATINGS

These coatings consist of a chromium layer with a network of cracks, into which firmly anchored hard materials – ceramic or micro-diamonds – are embedded.

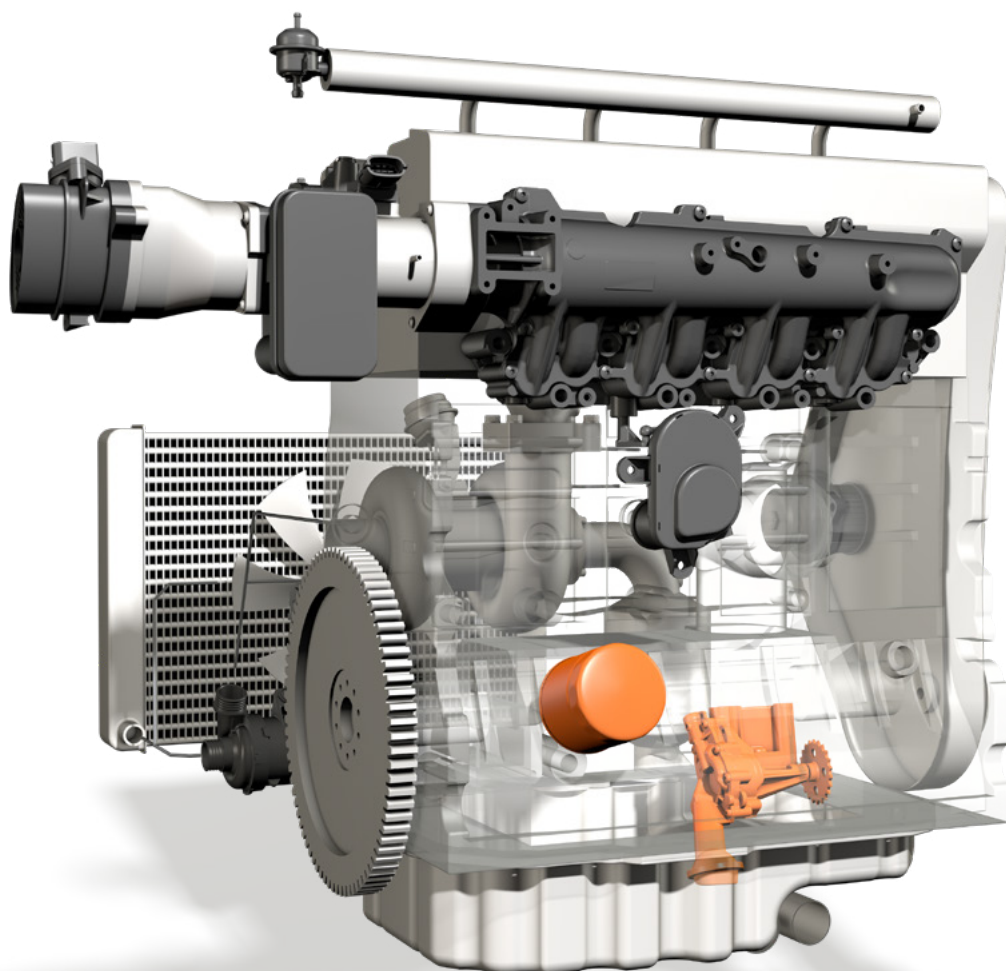
# OIL SUPPLY

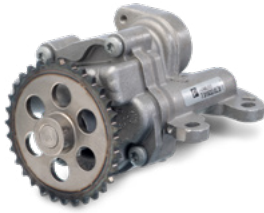
## DURABILITY FOR THOUSANDS OF KILOMETRES

Rheinmetall is the OE supplier for all reputable engine manufacturers of the automotive and light utility vehicle industry, has numerous patents for oil pumps and produces tens of millions of oil pumps worldwide each year. Based on this know-how, Motorservice offers a wide product range for over 3,000 engine applications from the renowned Kolbenschmidt, Pierburg and BF brands. Benefit from this experience at a fair price / performance ratio.

### PRODUCT RANGE

- Oil pumps (unregulated, variable and tandem pumps for passenger cars and utility vehicles)
- Oil filters

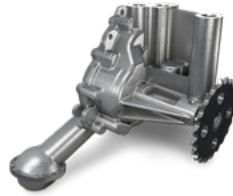




### UNREGULATED OIL PUMPS

Oil pumps ensure that engine parts are supplied with a sufficient quantity of lubricating oil. For sufficient cooling and lubrication, the total oil volume must be pumped 4 to 6 times per minute through the engine.

Moreover, the oil pump design must ensure that the lubricating points are supplied with fresh oil as fast as possible after cold starting, and the flow rate is always adequate even at low engine speeds.



### VARIABLE OIL PUMPS

To reduce CO<sub>2</sub> emissions, Pierburg has developed variable oil pumps. With oil-hydraulic tasks, which are in part new, such as hydraulic valve clearance and camshaft compensation, piston cooling and many more, modern engines require disproportionately large oil volumetric flows, particularly at lower engine speeds.

The delivery rate of the variable oil pumps can be adapted flexibly to the required oil volumetric flow, depending on the temperature, speed and load state of the engine. They help to deliver the oil when required, and thus save fuel.



### TANDEM PUMPS VACUUM / OIL

In tandem pumps, supply pumps for different media are combined on a common axle. While the single-vane vacuum pump generates the vacuum for the brake booster, the connected oil pump takes over either the function of the main oil pump or draws in excess oil from the cylinder head as an oil suction pump.



### OIL COOLERS

In most engines, oil coolers are used to selectively reduce the oil temperature. Due to the temperature output to the engine's coolant circuit, the oil temperature can be reduced by up to 30°C. As oil coolers are difficult to clean, Motorservice recommends always replacing this component.



**The quality of an oil pump in terms of design and workmanship contributes significantly to a long and efficient engine life. Don't take any chances and choose one of the renowned pumps from the Pierburg or BF brands.**

# VALVES AND VALVE ACCESSORIES

## EXACT FIT AND TEMPERATURE RESISTANT

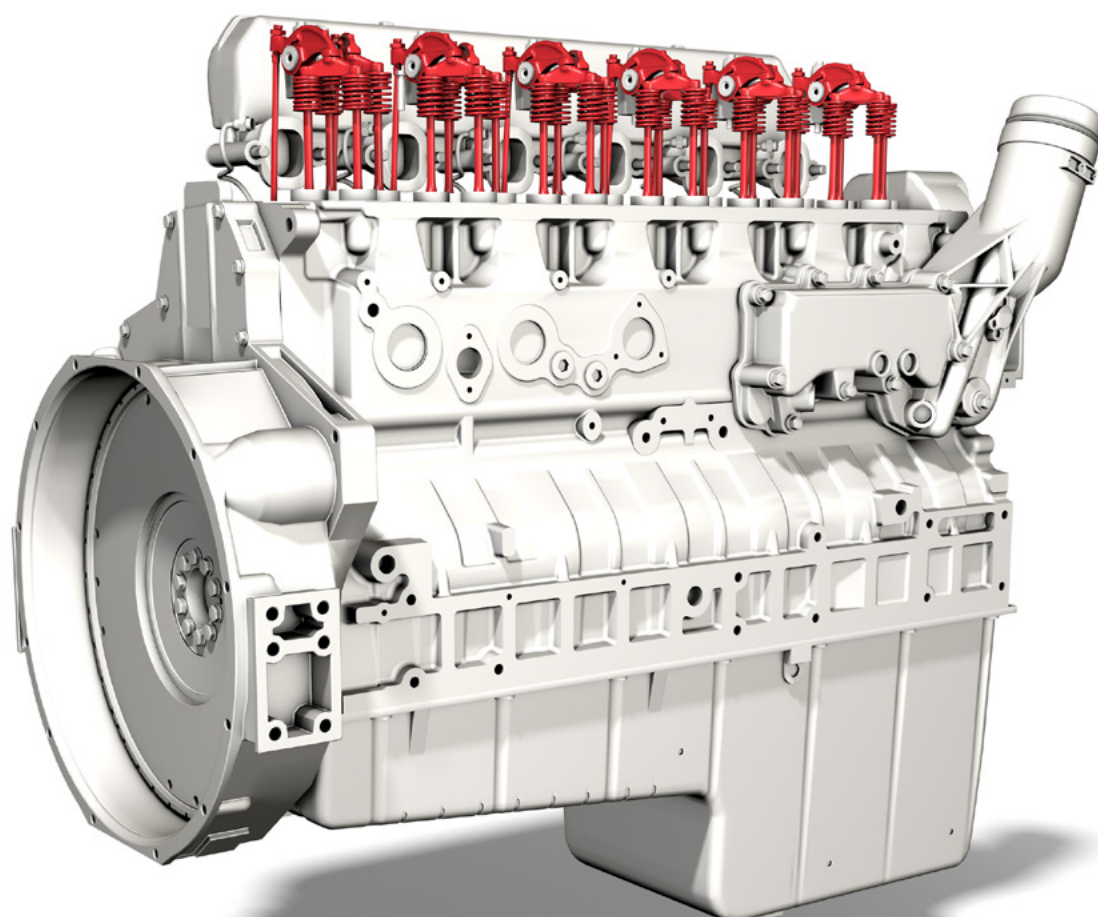
Motorservice is the global sales partner of TRW Engine Components for the aftermarket. Proven quality which provides security when needed.

### PRODUCT RANGE

- Valves
- Valve cotters
- Valve seat inserts
- Valve guides

Valve control elements:

- Valve push rods
- Rocker arms
- Rocker arm bridges
- Valve tappets
- Finger type rockers
- Hydraulic tappets





## VALVES

Valves are primarily used in four-stroke engines, to control the charge exchange process. The valve head seals off the inlet or outlet duct of the closed valve from the valve seat in the cylinder head. Valves feature a diverse range of additional equipment, depending on the engine load and type of use, such as hardening and armouring for the valve heads and valve stem faces. This ensures reliable engine running and durability, even under extreme conditions.

Motorservice has a constantly growing product range with over 1,100 valves designed for more than 8,000 applications.



## VALVE GUIDES

The valve guide has the task of absorbing the lateral forces acting on the valve stem. The valve guide centres the valve on the valve seat insert, and conveys some of the heat from the valve head through the valve stem to the cylinder head.

Motorservice has a wide range of over 800 valve guide types for more than 3,500 applications.



## VALVE COTTERS

Valve cotters are employed as retaining and locking components. They connect the valve-spring retainer to the valve by friction locking, and thus keep the valve-spring preloaded. Valve cotters are wear parts, and must always be replaced at the same time as valves.

Motorservice has the right cotters in its range for all common valve stem faces.



## VALVE SEAT INSERTS

Together with the valves, valve seat inserts seal off the combustion chamber of the cylinder head. The valve seat inserts are made from grey cast iron or sintered metal and prevent the valve from knocking / burying into the cylinder head. They also convey the heat from the valve.

Valve seat inserts are not selected on the basis of engine type, but by their dimensions. With over 400 different dimensions available, Motorservice offers virtually unlimited use in all conventional engines.



## VALVE CONTROL ELEMENTS

In order to ensure valve train reconditioning is carried out flawlessly, the control elements such as rocker arms, tappets or hydraulic tappets or valve push rods often also need to be replaced. All valve control elements are available separately from Motorservice.

# FILTERS

## KEEP DIRT AT BAY

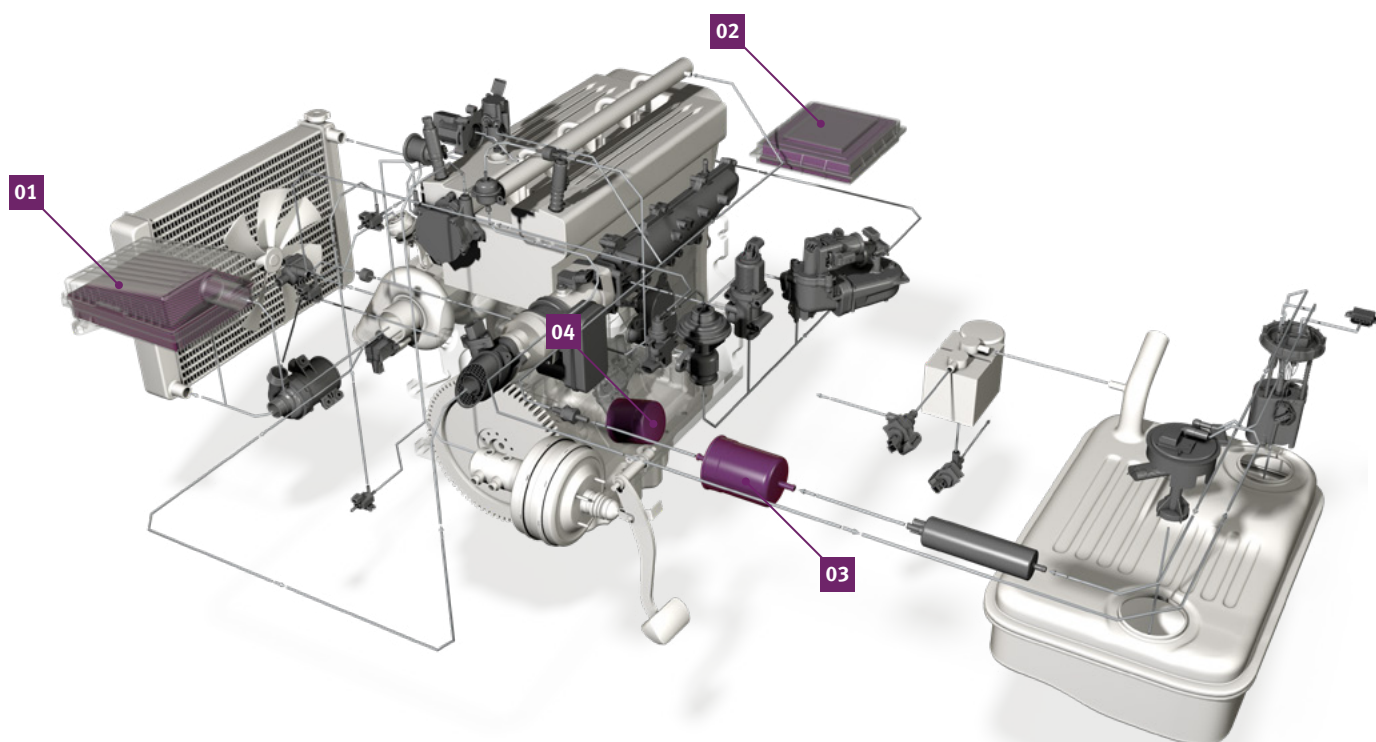
Engine filters protect the engine against impurities in the oil, air and fuel. High-quality filters are essential for ensuring long durability and for minimising wear on engine parts.

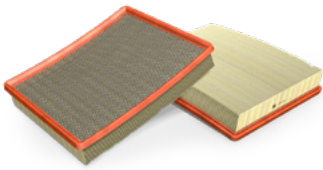
### PRODUCT RANGE

- 01** Air filters
- 02** Cabin filters
- 03** Fuel filters
- 04** Oil filters

Not listed in the graph:

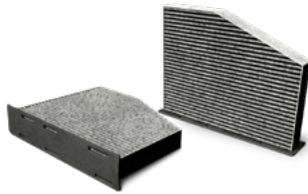
- Coolant filters
- Urea filters
- Gear oil filters
- Air dryers for brake systems
- Special filters
- Oil centrifuge filters





### AIR FILTERS

The optimised particulate separation efficiency of the air filter minimises the wear on pistons, piston rings and the running surface of cylinder liners. The air filter, adapted to the engine characteristics and installation space, effectively suppresses disruptive intake noises.



### CABIN FILTERS

Cabin filters prevent foreign particles such as dust, pollen, spores and soot in the ambient air from entering the passenger compartment through the ventilation system. Cabin filters with activated carbon are not only fine filters for solid particles, they also absorb unpleasant odours and harmful gases such as nitrogen oxides, sulphur dioxide, ozone and hydrocarbons, and prevent them from entering the passenger compartment at a rate of 95 %.



### FUEL FILTERS

Even minor impurities in the fuel system can lead to severe malfunctions. Modern injection systems, in particular, require an extremely clean, pulsation-free and homogeneous fuel supply.



### OIL FILTERS

Foreign bodies that get into the engine with the fuel or via the intake air and abraded metal that arises within the engine are filtered out of the oil circuit and trapped by the oil filter.



### COOLANT FILTERS

Coolant filters protect the engine cooling system by filtering out impurities. The additives in the filter are also released into the cooling system at a controlled rate.



### UREA FILTERS

In modern exhaust treatment systems with SCR (selective catalytic reduction) catalytic converters, urea filters filter the urea solution, thereby protecting system components against wear.

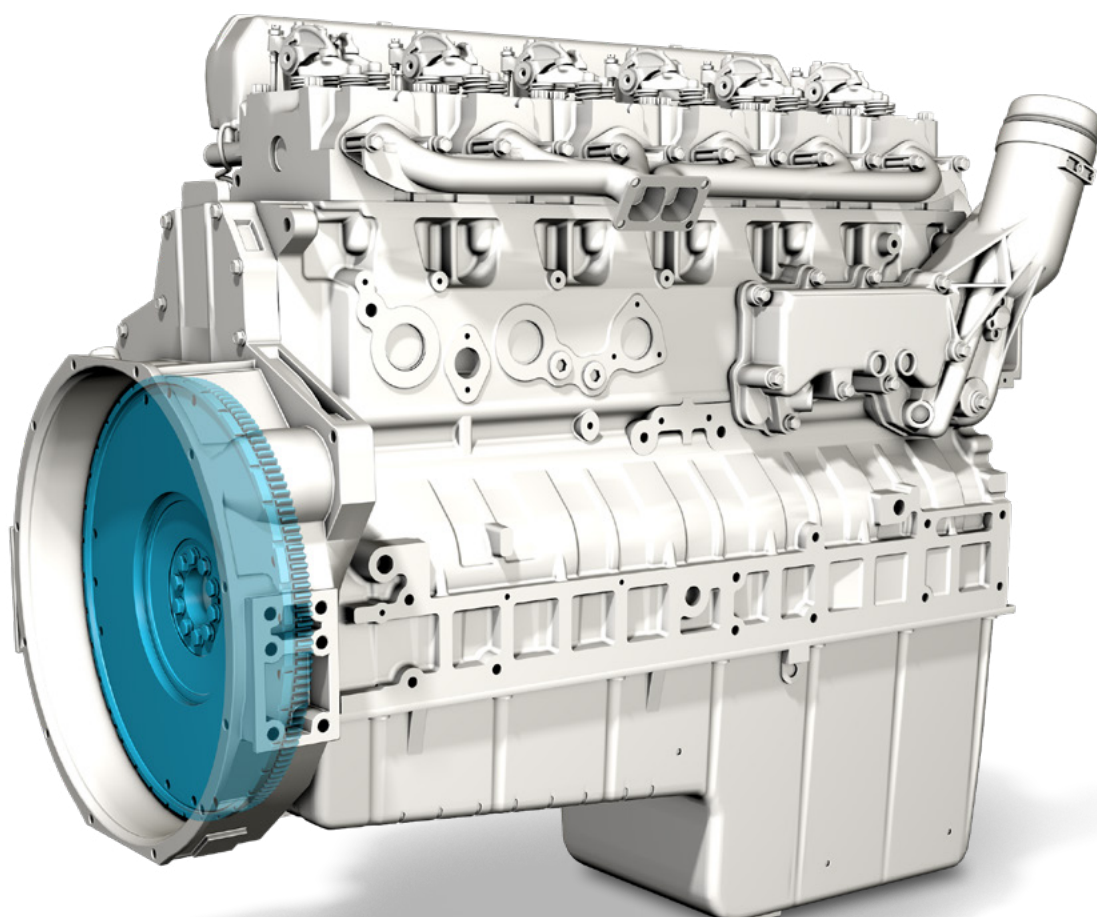
# FLYWHEELS

## PRECISION AND WEIGHT FOR SMOOTH ENGINE RUNNING

Motorservice sells flywheels made from high-value grey cast iron or steel under the BF brand. These precision parts efficiently reduce uneven running and vibration in the engine. This ensures that wear on the gear train is kept to a minimum.

### PRODUCT RANGE

- Single mass flywheels
- Dual mass flywheels
- Starter ring gears





### SINGLE MASS FLYWHEELS

Single mass flywheels are manufactured from grey cast iron or steel and frictionally connect the crankshaft with the drive train via the clutch. By storing kinetic energy, flywheels compensate for uneven running and vibrations which occur during engine operation.



### DUAL MASS FLYWHEELS

The flywheel mass is divided into a primary and a secondary mass. Both flywheel masses are connected by means of torsion damping springs. Dual mass flywheels are characterised by very good vibration damping in all respects.



### STARTER RING GEARS

The ring gear transfers the force of the starter to the crankshaft via the flywheel. This initiates the start procedure for the engine.

On older engine types, the ring gear also has the task of communicating the TDC position to the engine control via the TDC sender. The TDC position is also used to adjust the control times.

Motorservice offers separate starter rings as replacements.



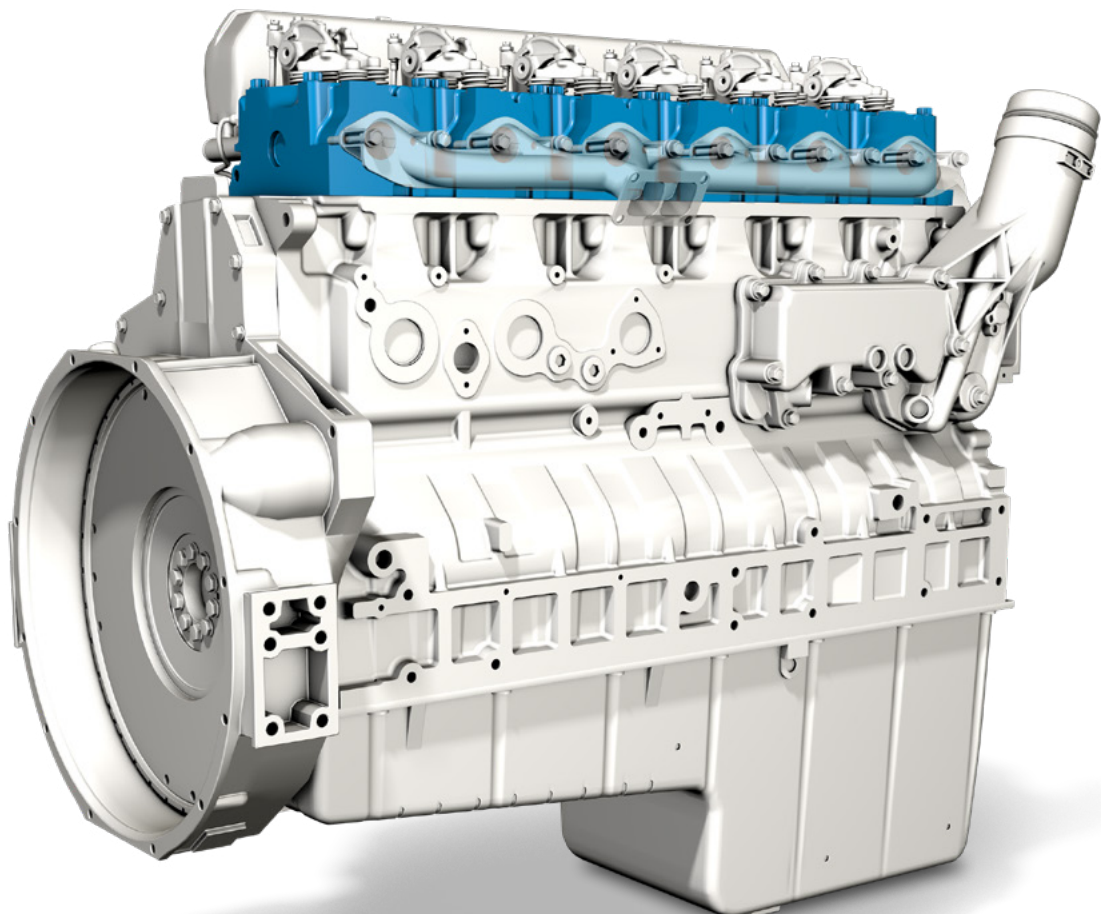
**Motorservice offers flywheels for over 1,000 different engine applications.**

# CYLINDER HEADS COMPLETED TO MEET REQUIREMENTS

Motorservice boasts an extensive product portfolio of cylinder heads for passenger cars and utility vehicles. The cylinder heads are also available with pre-assembled valves and valve-springs according to requirements and for ease of repair.

## PRODUCT RANGE

- Water-cooled individual cylinder heads
- Air-cooled individual cylinder heads
- Multiple cylinder heads





### **WATER-COOLED INDIVIDUAL CYLINDER HEADS**

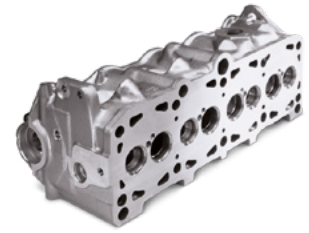
Individual cylinder heads are increasingly being used for utility vehicle engines. In combustion engines, the cylinder head represents the end of the combustion chamber above the pistons.

Modern engines are water-cooled with just a few exceptions. A mixture of water and a frost and anti-corrosion agent usually acts as a cooling liquid.



### **AIR-COOLED INDIVIDUAL CYLINDER HEADS**

Air-cooled engines are cooled directly by the air streaming past. To increase the surface giving off heat, cylinders and cylinder heads in air-cooled engines have cooling fins.



### **MULTIPLE CYLINDER HEADS**

Multiple cylinder heads are predominantly used in passenger cars and in newer utility vehicle engines. V engines with multiple cylinder heads have one cylinder head for each cylinder line. On engines with multiple cylinder heads, the camshafts are often located in the cylinder head. Due to their design, these engines are always water-cooled.



**Motorservice boasts an extensive product portfolio of cylinder heads for over 650 engine applications and over 1,250 vehicle applications.**

**In order to meet all repair requirements, the cylinder heads are available with:**

- Seating rings and valve guides
- Mounted valves and valve-springs
- Mounted camshafts (ready to install)

# ENGINE COOLING WATER PUMPS – COOLING FOR A LONG ENGINE LIFE

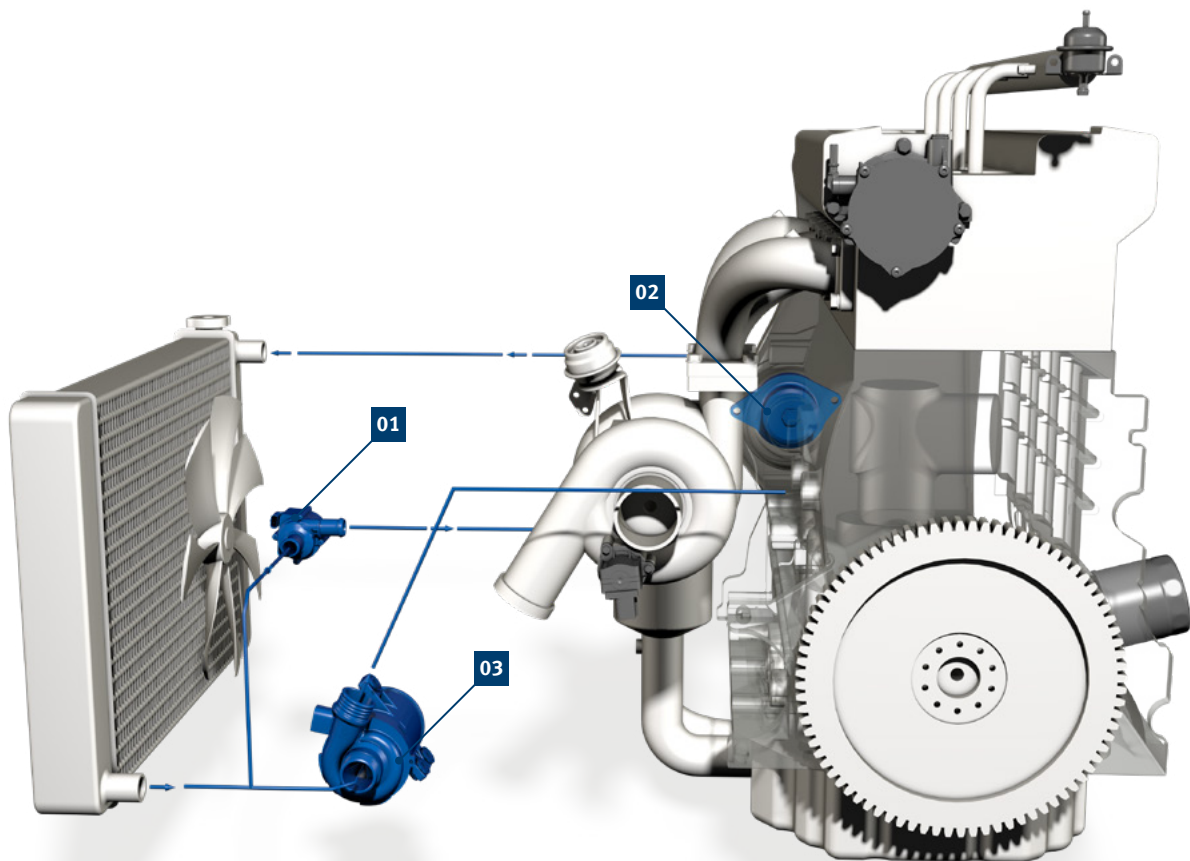
The water pump is the central component in the coolant circuit.  
Mechanical water pumps are a well-established solution.

Electrically powered coolant pumps provide demand-based engine cooling, reduce power requirements and cut frictional losses, fuel consumption and pollutant emissions.

Pierburg production sites produce more than seven million mechanical and electrical water pumps for motor vehicles and utility vehicles every year.

## PRODUCT RANGE

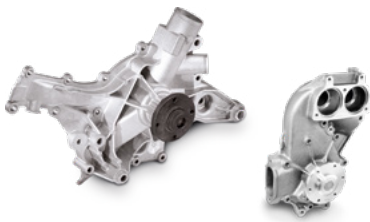
- 01 Water circulating pumps
- 02 Mechanical water pumps
- 03 Electrical water pumps (coolant pumps)





## VARIABLE MECHANICAL WATER PUMPS

With its variable mechanical water pumps, Motorservice offers another innovative state of the art and up to the minute thermal management product in the aftermarket sector. The pumps are used to comply with current and future emissions standards. Regulated and demand-based cooling saves fuel and thus reduces CO<sub>2</sub> emissions. The options for regulating the volumetric flow include electromagnetic couplings, thermostat modules with thermostat valve, electronically actuated rotary slide valves with worm gear, covering the impeller with an electro hydraulic or pneumatic adjustable ring, and pneumatic bypass flaps inside the pump module. As a result, the pumps are in line with the current trend towards smart accessories in combustion engines.



## MECHANICAL WATER PUMPS

The cooling liquid of the water pump absorbs the heat from the engine block and cylinder head and releases it into the ambient air through the cooler. Depending on their design, mechanical water pumps are located either externally on the engine in their own pump housing or are flanged directly on the crankcase and are driven by a V-belt, toothed belt or the engine directly.

Motorservice water pumps have the following quality features:

- High-quality sliding ring sealing cartridge
- Maintenance-free, long-life rolling bearings
- Flow-optimised impellers made from plastic, steel, aluminium or brass
- Gaskets and O-rings are included in the scope of supply



## ELECTRICAL WATER PUMPS

Electrical water pumps make a significant contribution to emission control on modern engine designs.

A delivery rate that is not dependent on the engine speed enables demand-based cooling. This reduces the power requirements whilst also cutting down on frictional loss, fuel consumption and pollutant emissions.

Pierburg has made this technology ready for series production and is the world's first series-production supplier of electrical water pumps.



## WATER CIRCULATING PUMPS

Water circulating pumps are used where cooling or heating functions need to be performed independently of the coolant circuit. In independent heating systems, water circulating pumps are used, for example, to rapidly heat the passenger compartment.

The first generation alone was tried and tested millions of times over, proving itself to be a simple and robust coolant pump.

The second to fourth generations then underwent further optimisation in terms of dimensions, weight, control and hydraulic power.

# TIMING CHAIN KITS

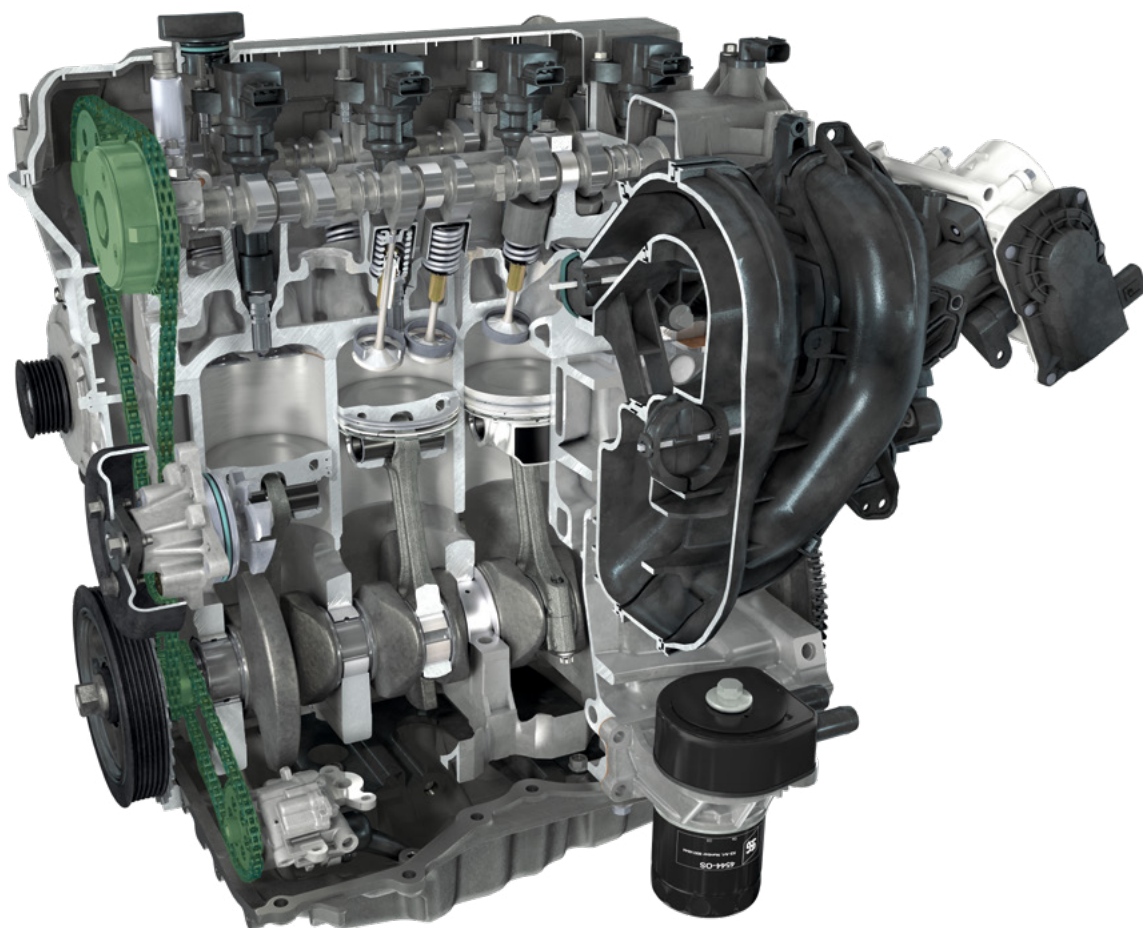
## PRECISION AND STABILITY, FOR RELIABILITY AND POWER

In around a third of all passenger car engines, the camshafts are powered by timing chains. Malfunctions to the engine's primary drive normally result in expensive repairs, which is why it is worth opting for quality products.

### PRODUCT RANGE

Timing chain kits consisting of:

- Timing chains
- Guide and sliding rails
- Tensioner blades
- Chain tensioners
- Gaskets
- Crank and camshaft gears
- Camshaft adjusters



## TIMING CHAIN KITS

During reconditioning and scheduled servicing of the chain drive, all components affected by wear and the associated gaskets should always be replaced. The kits are put together for specific engines.



### SPROCKETS

Normally made of sintered metal or precision punched metal to save weight. Often have special fittings and grooves for mounting in the correct position.



### TENSIONER BLADES, SLIDING AND GUIDE RAILS

Made of aluminium and plastic. They tension and guide the chains. They usually have special sliding surfaces to reduce noise and friction.



### CHAIN TENSIONERS

Mechanically and hydraulically dampened designs. Their main tasks are: Maintaining the chain tension at all times, compensating for chain wear and the vibrations in the primary drive.



### CAMSHAFT ADJUSTERS

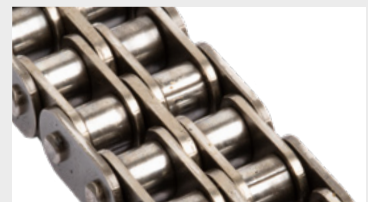
Capable of twisting the camshaft and thus adjusting the opening times of the valves to the engine operating mode.



## TYPES OF CHAIN

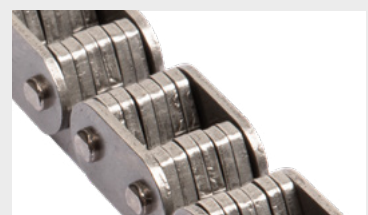
### BUSH AND ROLLER CHAINS

Single or multiple row. Roller chains have an additional roller on each bush to reduce friction.



### SPROCKET CHAINS

Individual shackles with teeth pointing inwards for the gear wheels. The chain has no openings on the outside.



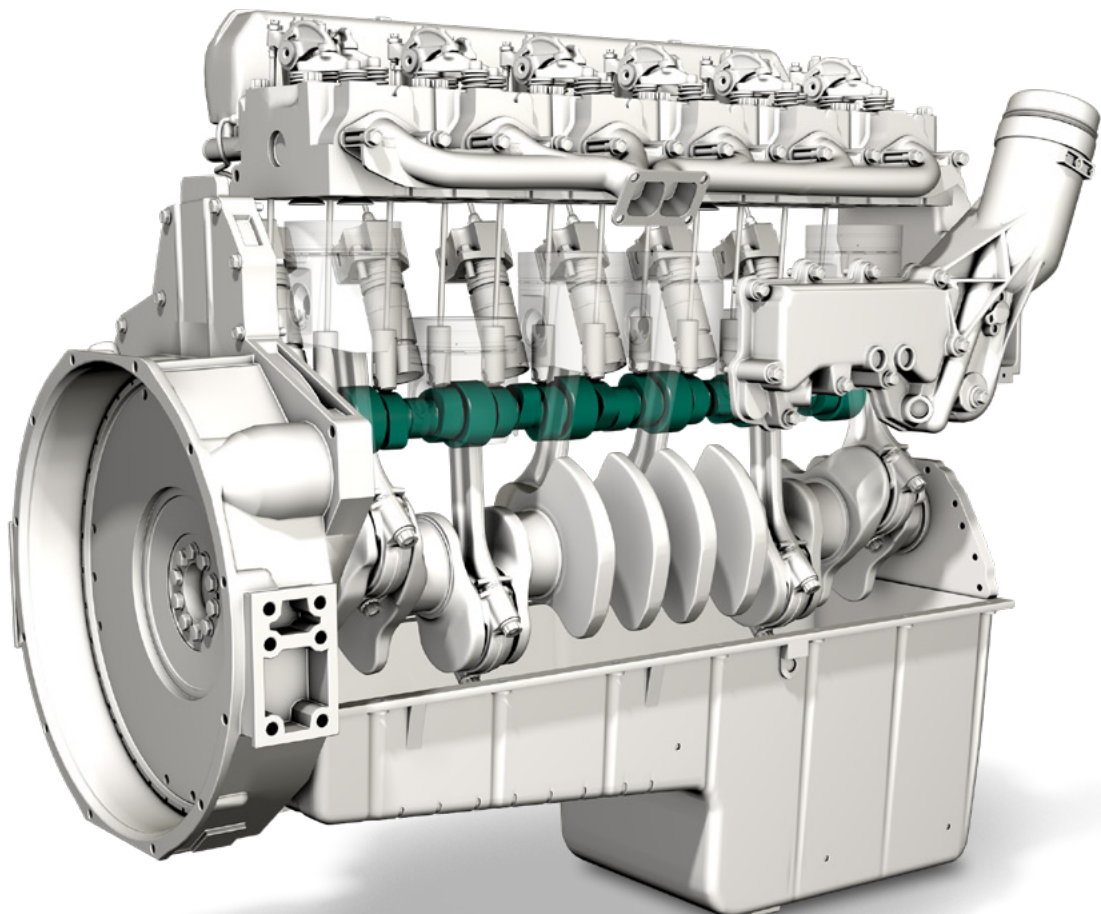
# CAMSHAFTS

## WEAR-RESISTANT CAMS FOR LONG, POWERFUL ENGINE LIFE

To withstand the high bending and torsion forces over the long term, the camshafts in the Motorservice product range have been designed to incorporate high strength properties.

### PRODUCT RANGE

- Bottom-mounted camshafts
- Overhead camshafts
- Combined camshafts



## CAMSHAFTS

The camshaft is driven by the crankshaft via the drive pulley and controls the valve train of the engine. The camshaft helps to ensure that the intake and exhaust valves open and close at a pre-determined time. The duration of opening, valve stroke and movement when opening and closing are determined by the shape of the cam.



### OVERHEAD CAMSHAFTS

Where camshafts are overhead, the valves are opened directly by the cams via the tappets, rocker arms or finger type rockers. Overhead camshafts are used only with multiple cylinder heads.

On engine designs that have two camshafts (DOHC), one shaft actuates the intake valves and the other shaft actuates the exhaust valves. To ensure maximum fill, the cam stroke of the intake camshaft is typically greater than the stroke of the outlet camshaft.



### BOTTOM-MOUNTED CAMSHAFTS

Where camshafts are bottom-mounted, the tappets and valve push rods transfer the stroke of the camshaft to the rocker arms.



### COMBINED CAMSHAFTS

Three cams for PLD fuel injection systems:

- Intake cam
- Outlet cam
- Cam for driving the pumps or the pump nozzle units



**Camshafts should always be replaced at the same time as their interacting sliding parts, to prevent damage due to wear on the interacting sliding parts. Motorservice can supply the associated valve actuating elements, such as tappets, rocker arms / finger type rockers and valve play compensating elements separately or as a kit with the corresponding camshaft.**

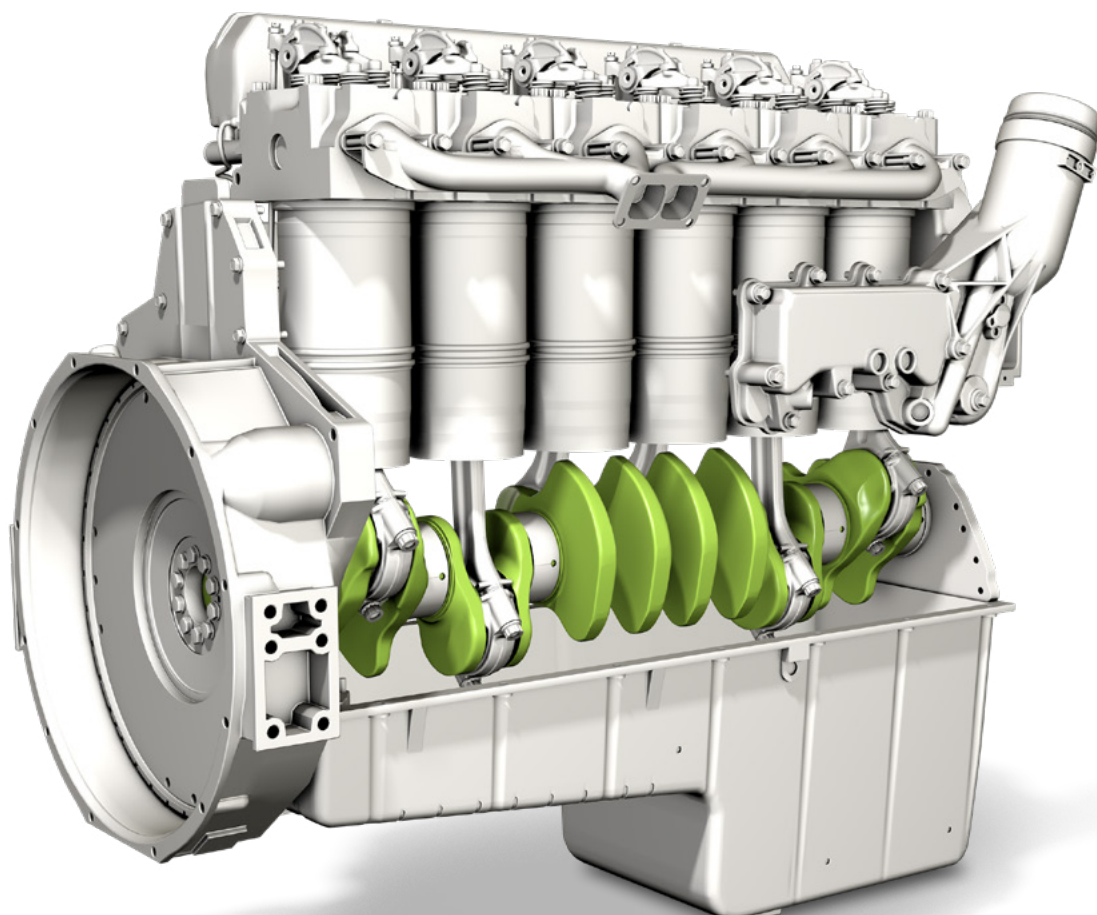
# CRANKSHAFTS

## FORGED MASTERPIECES FOR EVERY TORQUE

To achieve the high quality standards of BF forged crankshafts, most crankshafts are produced on our own tools. They are also subject to stringent test procedures. The dimensional accuracy ensures smooth running and therefore a long engine life.

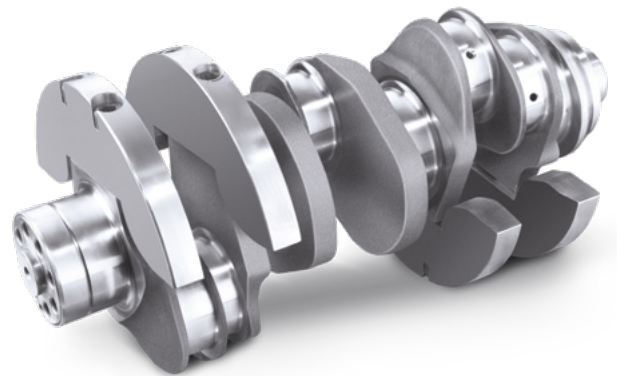
### PRODUCT RANGE

- Crankshafts for utility vehicles



## CRANKSHAFTS

The crankshaft in the engine has the task of converting the up and downstrokes of the pistons into a rotary motion with the aid of the connecting rods. The torque produced is transmitted to the fly wheel.

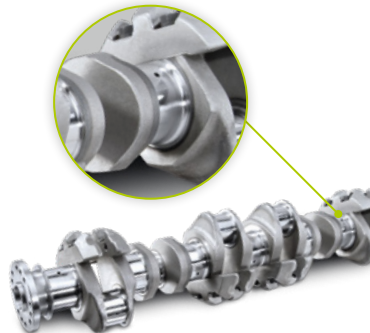


## MODELS



### Integrated counterweights

e.g. OM 611 4-cylinder in-line engine



### Bolted-on counterweights

e.g. OM 335 6-cylinder in-line engine



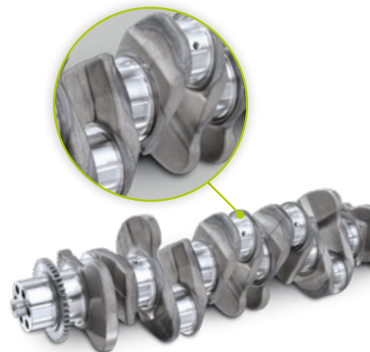
### Offset conrod journals

e.g. OM 501 6-cylinder V engine



### Two connecting rods per conrod journal

e.g. OM 422 8-cylinder V engine



### Twisted conrod journals

Twisted: in order to realise different crank angles on the conrod journal after the die forging stage, the crankshaft is reheated at the main bearing points after forging and twisted – e.g. OM 906 6-cylinder in-line engine.

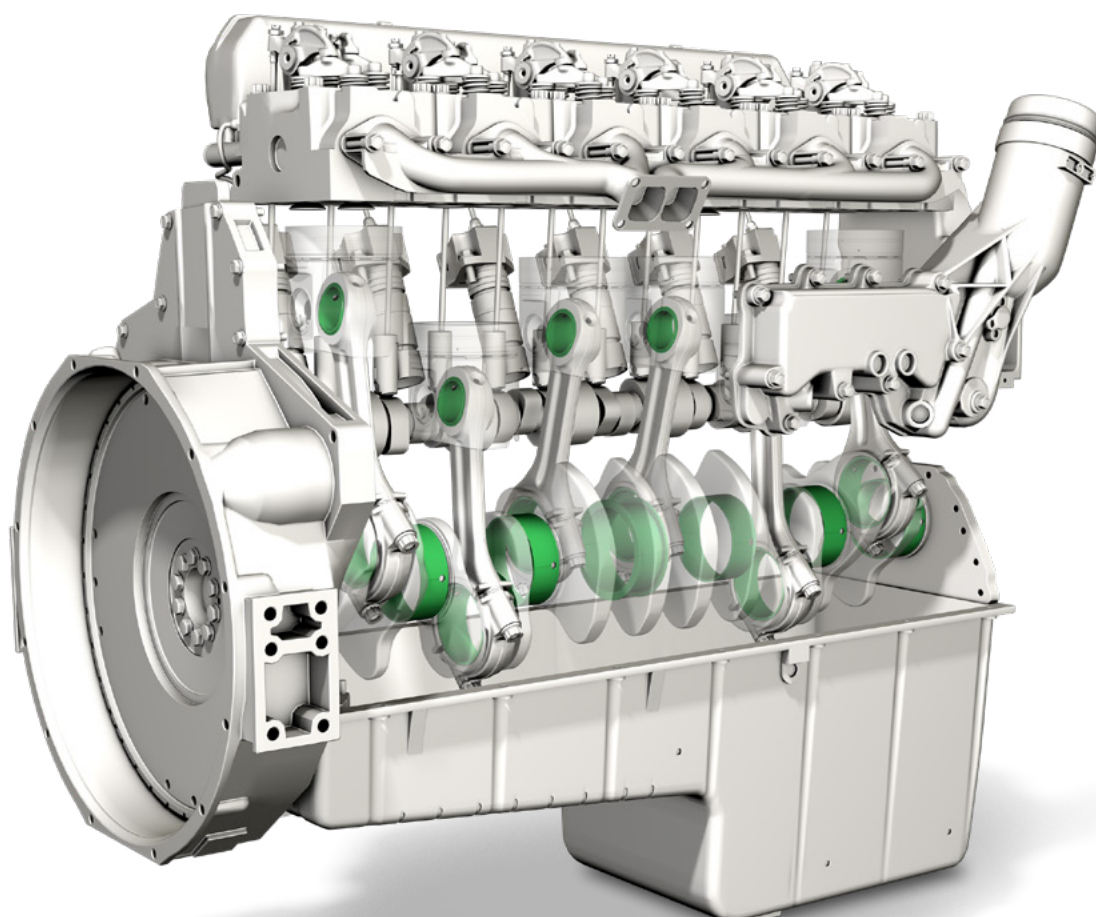
# ENGINE BEARINGS

## MAKING SURE EVERYTHING RUNS SMOOTHLY

With their optimum sliding materials and perfect geometry, Kolbenschmidt engine bearings ensure less friction and more dynamics. In addition to a large range of standard and large sizes, Motorservice offers particular special solutions for repair.

### PRODUCT RANGE

- Main and conrod bearing shells
- Flanged bearings and thrust washers
- Bearing bushes for camshafts
- Conrod bushes





### ENGINE BEARINGS

Engine bearings are an important component for combustion engines. Due to the complex requirements and high loads facing the bearing points of moving engine parts, materials that have been meticulously adapted for the specific application need to be used.



### THRUST WASHERS

In conjunction with half shell bearings, thrust washers replace flanged bearing halves in the engine. Engine cases are specifically configured to accommodate thrust washers. Rotation must be prevented, and reliable guidance along the outside diameter of the thrust washers must be guaranteed.



### FLANGED BEARINGS

Flanged bearing halves (also known as collar bearing shells) are responsible for axially guiding the crankshaft.

“Installed” flanged bearings consist of half-shells and thrust washers. Normal flanged bearing halves are manufactured from one piece.



### SPUTTER BEARINGS

Engine bearings with a sputtered sliding layer are used in all modern diesel engines in which conventional dual or three-component bearings reach the limits of their stress-bearing capabilities due to the high engine performance.



### CONNECTING ROD BEARING BUSHES

Bearing bushes for connecting rods are semi-finished; in other words, they have to be machined to the required nominal dimension after being pressed into the connecting rods.



**Kolbenschmidt engine bearings are available in a wide range of oversizes. This is frequently the last opportunity to perform professional engine reconditioning work.**

**Motorservice has a wide European and Asian product range for more than 50,000 engine types.**

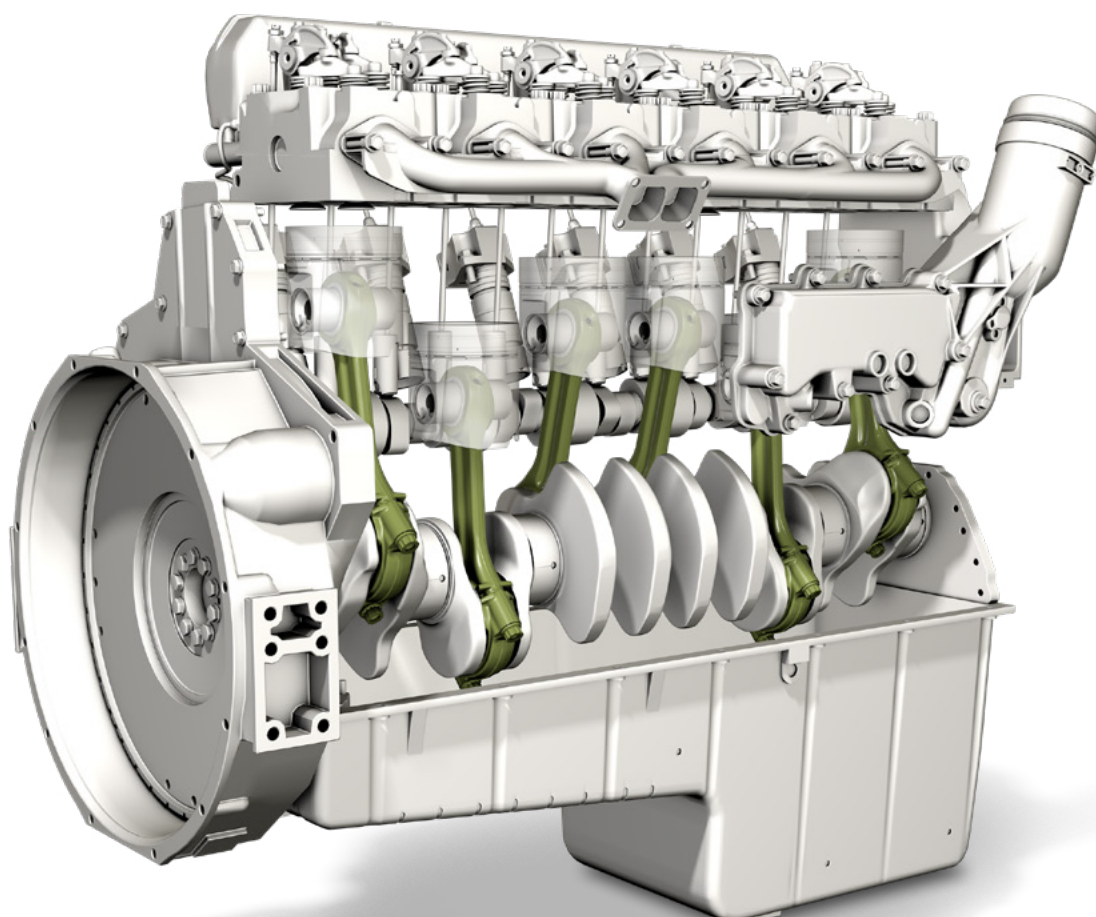
# CONNECTING RODS

## ROBUST FORCE TRANSMISSION

The high strain on the connecting rod due to tension, pressure and torsional forces requires connecting rod designs with high strength and low weight. With the high-quality product range from Motorservice, you are always on the safe side.

### PRODUCT RANGE

- Connecting rods for passenger cars and utility vehicles



## CONNECTING RODS

Connecting rods connect the crankshaft to the pistons, thus conveying the gas and inertial forces to the crankpins of the crankshaft.

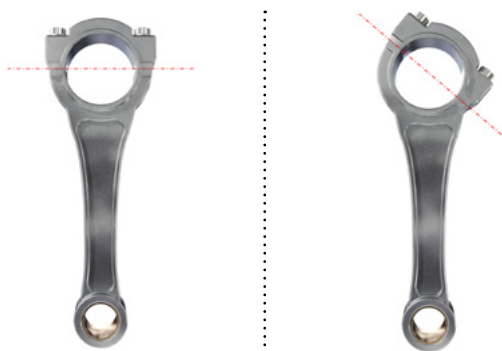
Connecting rods are forged from steel, with either alloyed steel or quenched and tempered steel used depending on the strain.



### MILLED OR GROUND SEPARATION PLANES

A proven method of creating the connecting rod bearing cap is separating or sawing. The large connecting rod eye is sawed apart and the separation planes are then milled and, if necessary, ground.

On flat separation planes, the connecting rod bearing cap is fixed in place using locating bolts or register pins. Due to their toothing, toothed separation planes do not need additional means of fixation.



Straight separation

Angled separation

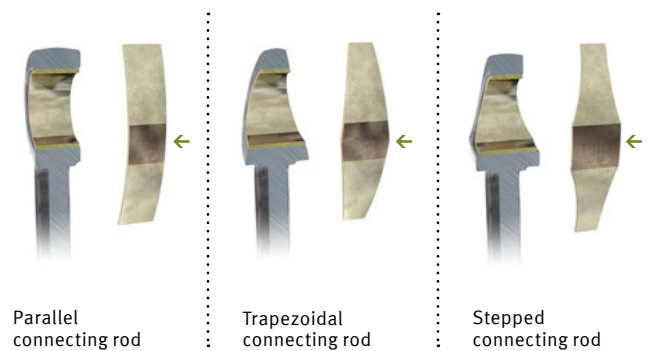
### STRAIGHT AND ANGLED SEPARATION

On very large crankpins, the connecting rods can have angled separation. The angled position is required to push the connecting rod through the cylinder bore despite the large connecting rod eye. If connecting rods have angled separation, it is crucial that the installation position is correct, particularly with in-line engines.

### CRACKED SEPARATION PLANES

Cracked connecting rods are initially produced as a single unit, then given break lines (sinter rods) or laser notches (steel connecting rods) and split (cracked) into two parts. Both parts are screwed together when the connecting rods are assembled. Due to the point of fracture, they fit together precisely.

Cracked connecting rods are advantageous with regard to strength, costs and production accuracy. Connecting rods and connecting rod caps sit precisely on one another, which allows for optimal force transmission.



Parallel connecting rod

Trapezoidal connecting rod

Stepped connecting rod

→ Usable area

### PARALLEL AND TRAPEZOIDAL CONNECTING RODS

The steadily increasing combustion pressures cause ever-increasing stresses in the piston pin mounting of the connecting rods. Trapezoidal and stepped connecting rods are increasingly being used, in order to reduce the moving masses and better absorb the forces by optimising the size of the usable area.

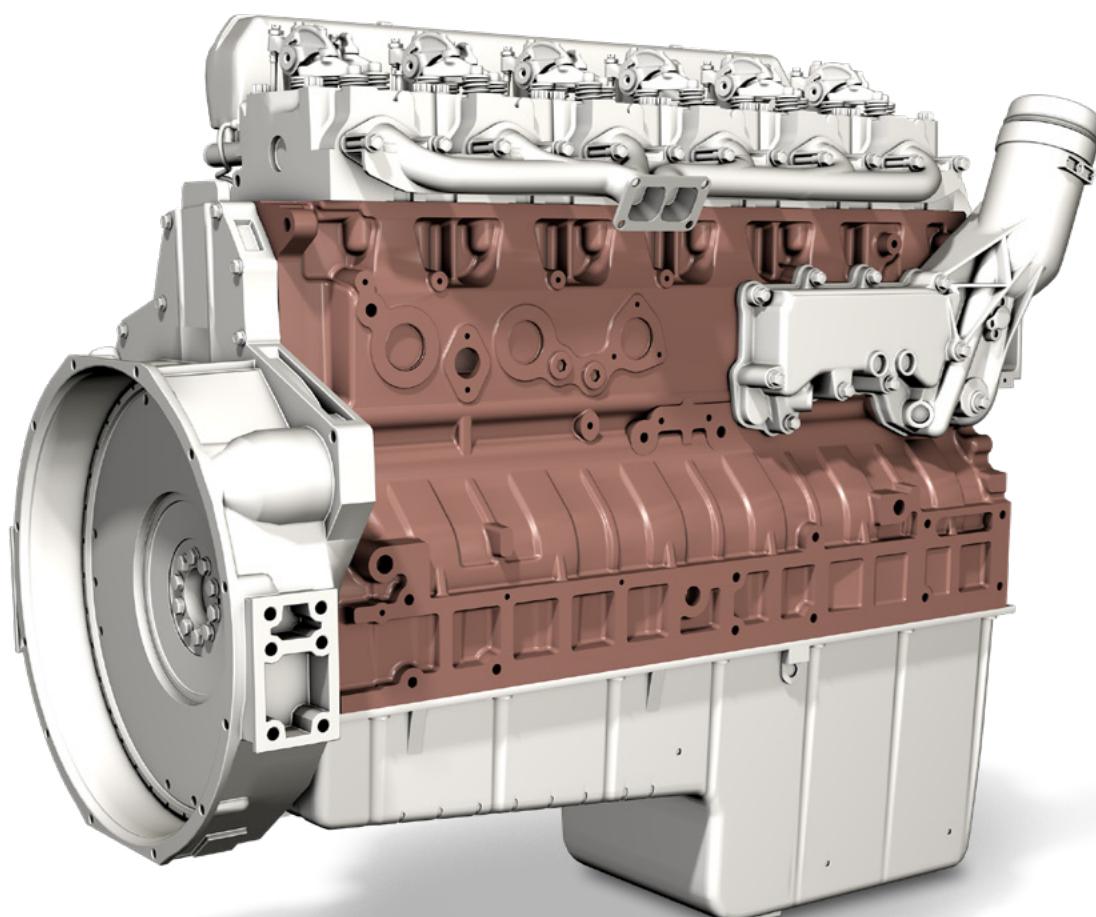
# CRANKCASES

## GEOMETRIC PRECISION AND DIMENSIONAL STABILITY FOR OPTIMAL PERFORMANCE

As the housing for the drive mechanism and cooling jacket, the crankcase forms the central component of the engine. BF offers a high-quality portfolio of crankcases to provide quick, cost-effective solutions for repairing engines on utility vehicles.

### PRODUCT RANGE

- Crankcases for utility vehicle engines



## CRANKCASES

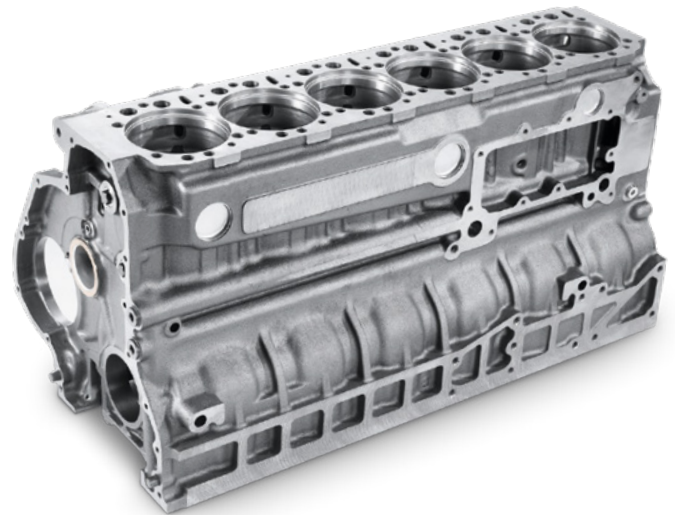
The crankcase is the central component in the engine. It houses the entire crank mechanism including pistons, cylinders and connecting rods. In utility vehicle engines it often also houses the camshafts. Accessories, the transmission and the engine control system in the cylinder head are attached to the crankcase.

Due to the oil and cooling channels required for cooling and lubrication purposes, the crankcase is the most complex cast part in a combustion engine.



### **BF – HIGHEST PRECISION DOWN TO THE LAST DETAIL**

**Modern crankcases can only be manufactured and tested using CAD systems. The BF brand is synonymous with absolute dimensional accuracy across all faces and bearing blocks, which ensures optimal functionality and quality.**



# TOOLS AND TEST DEVICES BY PROFESSIONALS FOR PROFESSIONALS

For professional and quick mounting of their products,  
Motorservice offers a range of useful tools.



## PISTON RING ASSEMBLY CASE

Sturdy plastic case containing piston ring pliers, piston ring scuff bands and one feeler gauge.





### FEELER GAUGE

For measuring the ring joint clearance on piston rings, for measuring the valve clearance and for other applications.

Measuring range of 0.05 – 1.00 mm.  
13 blades in a nickel-plated shell.



### DIAL GAUGE WITH MEASUREMENT BRIDGE

Measurement bridge made of anodised aluminium for dial gauges with 8 mm diameter (screw clamping). For measuring piston protrusion, cylinder liner protrusion, valve recess, and many other things. Dial gauge with a measuring range of 0–10 mm and a measuring accuracy of 0.01 mm.



### DIAMOND HONING STONES

Plastic-bound diamond honing stones on a metal support for the professional fine machining of aluminium cylinder sliding surfaces with perfect machining results.



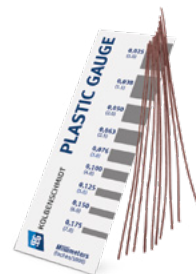
### SILICON EXPOSING STRIPS

Exposing strips with abrasive particles of silicon carbide bound in a porous plastic body. For mechanical exposure and rounding of silicon crystals on ALUSIL® and LOKASIL® cylinder sliding surfaces.



### PISTON RING PLIERS

Piston ring pliers ensure the safe fitting and removal of piston rings. Damage to pistons and piston rings, such as scratches, fractures and excessive strains is prevented.



### PLASTIC GAUGE

The Plastic Gauge enables a simple but accurate inspection of bearing clearances and gap dimensions. Areas of application include crankshaft and connecting rod bearings as well as situations in which a feeler gauge cannot be used.

# KNOW-HOW TRANSFER

## PROFESSIONAL KNOWLEDGE FROM THE EXPERTS

### WORLDWIDE TRAININGS

#### Direct from the manufacturer

Each year, around 4,500 mechanics and engineers benefit from our training courses and seminars, which we hold on-site in locations across the world or in our training centres in Neuenstadt, Dormagen and Tamm (Germany).

### TECHNICAL INFORMATION

#### From practical experience for practical use

Our Product Information and Service Information publications, technical brochures and posters keep you at the forefront of the latest technological developments.

### TECHNICAL VIDEOS

#### Knowledge transfer via video

Our videos provide you with useful information on our products, such as hands-on fitting instructions and system descriptions.



### PRODUCTS IN FOCUS ONLINE

#### Our solutions explained clearly

Interactive elements, animations and video clips provide interesting information about our products in and around the engine.

### ONLINESHOP

#### Your direct access to our products

Order at any time. Quick availability check. Extensive product search by engine, vehicle, dimensions etc.

### NEWS

#### Regular information via e-mail

Subscribe online to our free newsletter now and receive regular information about additions to the product range, technical publications and much more.

### INDIVIDUAL INFORMATION

#### Especially for our customers

We provide extensive information and services relating to our wide range of services: e.g. personalised sales-promoting materials, sales support, technical support and much more.



### TECHNIPEDIA

#### Technical information on all aspects of the engine

We share our know-how with you in our Technipedia. You can get professional knowledge direct from experts here.

### MOTORSERVICE APP

#### Access technical know-how on the move

Here, you will find the latest information and services relating to our products quickly and easily.

### SOCIAL MEDIA

#### Always up to date





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