

# Why Insist on Genuine MaK Parts?

## Lower Operating Cost

For many MaK owners and operators, the ability to run vessels safely at low speeds or continuously slow steaming is a major factor in reducing total operating expenditure.

## Peace of Mind

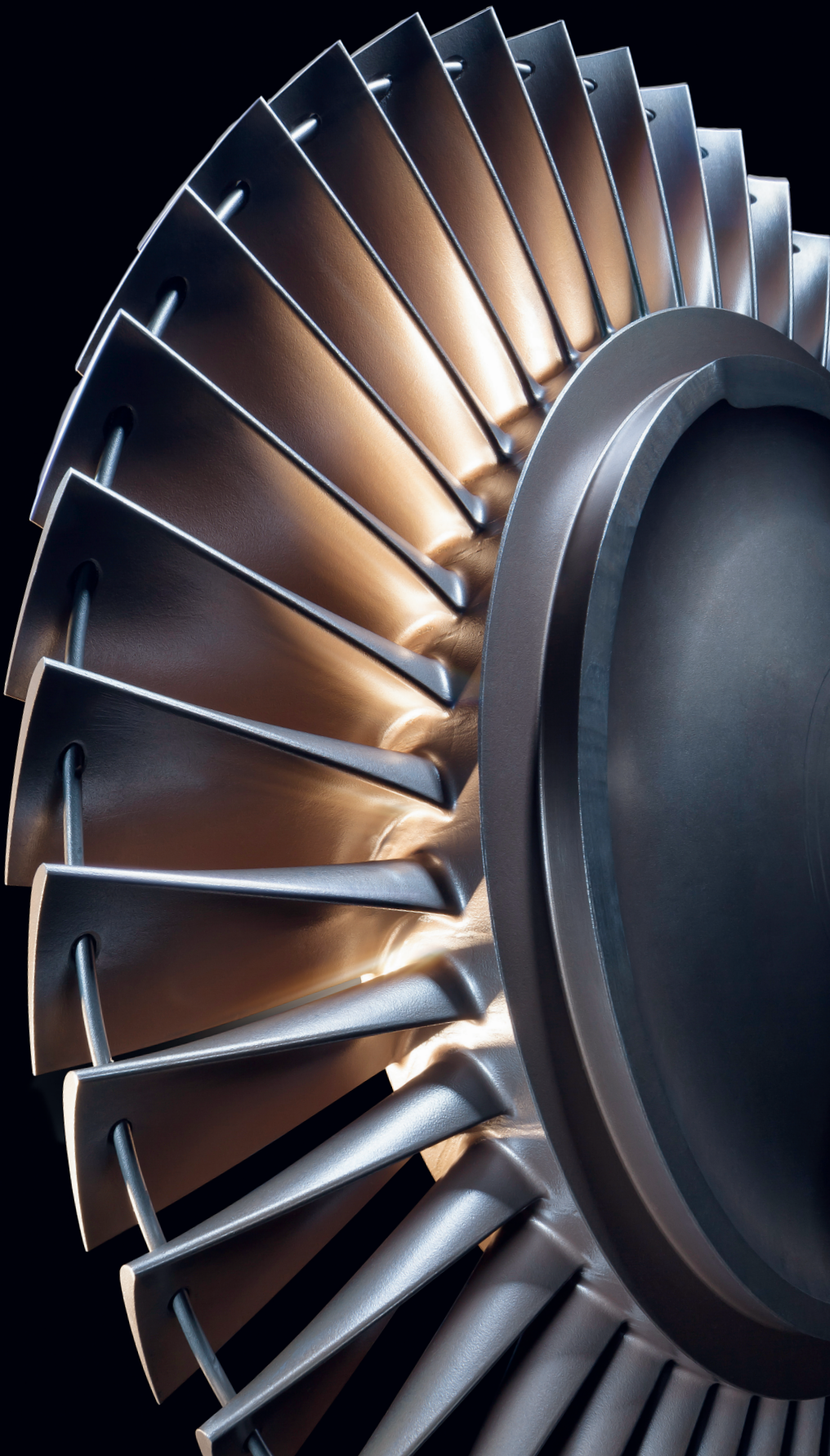
MaK engines operating with genuine MaK parts perform longer with fewer unplanned maintenance events or risk of failure.

## Availability

All parts can be dispatched within 24 hours through our strategically located distribution center and delivered globally by our authorized distributors.

## Quality

The quality material and stringent process controls ensure our products are durable and OEM guaranteed to offer long service life with minimal risk of failure.



### The Power You Need.

The Cat® and MaK™ brands of Caterpillar Marine offer premier high- and medium-speed propulsion, auxiliary, and generator set solutions, as well as optional dual fuel, diesel-electric, and hybrid system configurations. With the launch of Caterpillar Propulsion our comprehensive and evolving product line gives customers one source for the most extensive engine power range available, as well as for complete propulsion systems, controllable pitch propellers, transverse and azimuth thrusters, and controls. Cat and MaK products and technologies have proven reliability and are built to last in all marine applications, demonstrating superior productivity and the lowest lifecycle cost.

The Cat Global Dealer Network, more than 2,200 global service locations strong, ensures that you will have local expertise, highly-trained technicians, rapid parts delivery, and the proper equipment and services to keep you working – anytime, anywhere.

Construction, term, or repower financing through Cat Financial will help you make Cat and MaK power a reality. With our knowledge of customer needs, local markets, and legal and regulatory requirements, we have been providing tailored financing solutions and exceeding expectations since 1986.

For more information or to find your local dealer, visit our website: [www.cat.com/marine](http://www.cat.com/marine)  
Visit Cat Financial at: [www.CatPowerFinance.com](http://www.CatPowerFinance.com)

### BUILT FOR IT.™

## Caterpillar Marine

### Europe, Africa, Middle East

**Caterpillar Marine**  
A Division of  
**Caterpillar Motoren GmbH & Co.KG**  
Neumühlen 9  
22763 Hamburg  
Germany

Phone: +49 40 2380 3000  
Telefax: +49 40 2380 3535

### Americas

#### MaK Americas Inc.

3450 Executive Way  
Miramar Park of Commerce  
Miramar, FL 33025/USA

Phone: +1 954 885 3200  
Telefax: +1 954 885 3131

### Asia Pacific

#### Caterpillar Marine Trading (Shanghai) Co., Ltd.

19/F, 1319 Yan'an West Road  
Shanghai 200050, China

Phone: +86 21 2216 0600  
Telefax: +86 21 6226 4500

**Caterpillar Marine Asia  
Pacific Pte Ltd**  
No. 5 Tukang  
Innovation Grove  
Singapore 618304  
Republic of Singapore

Phone: +65 68287 600  
Telefax: +65 68287 625

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# Lip Seal for Turbochargers

## Genuine MaK Parts





# Continuous Product Improvement

## Lip Seal Upgrade

Keeping up to date on changes in the industry, and informing customers of product improvement to meet new operational conditions is a part of our commitment to your success.

Often, the needs for product improvements are only evident or discovered at sea, or during dry dock, where the cost of repair and replacement may be limited by time and capital.

Turbocharger overhaul, exchange cartridges and specialized services are part of the capabilities of our growing MaK marine distributor network.

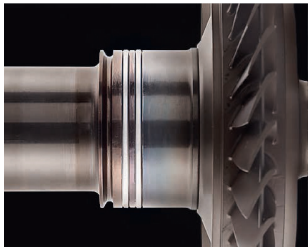
The new lip seal arrangement is a standard feature in the next generation turbochargers and the lip seal has proven its reliability and improved sealing function on many Cat® engines. In addition, a number of turbochargers have already been tested and modified on MaK engines to take advantage of the enhanced sealing arrangement.



## You Get what You Pay for

Long term aftermarket support and quick availability to quality parts is critical for your business, often making the difference in uptime and staying profitable. Genuine MaK components are designed to function reliably as part of a complete system. Our products are therefore continuously improved to ensure that using MaK parts enhances engine performance, even under changing economic conditions.

Lip seal upgrades can be requested from Cat® approved and MaK authorized distributors who are OEM trained and equipped to carry out maintenance on specific turbocharger types.



## The Impact and Proposed Solution

While engine performance is not affected, the lower operating speed of the turbocharger does not produce sufficient sealing air to the shaft seal and lubricating oil may leak past the piston ring into the area behind the turbine wheel.

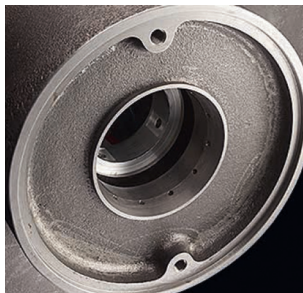
To prevent this from occurring, a contact type seal, or lip seal can be introduced which is designed to overcome low load operating conditions. Compared to a piston ring, this solution ensures an effective seal during continuous slow steaming.

The turbocharger lip seal is specially designed with materials chosen to minimize wear to the running surfaces of the shaft, and has proven to have a long and reliable lifetime between major overhauls.

## Upgrade to Existing Turbochargers

The upgrade of the turbocharger includes the turbine bearing housing and rotor shaft which both require replacement in a suitable exchange cartridge.

The solution is a more robust shaft seal which can improve the cleanliness of the engine, reduce lubricating oil losses and minimize occasional smoke due to oil leakage at low load.



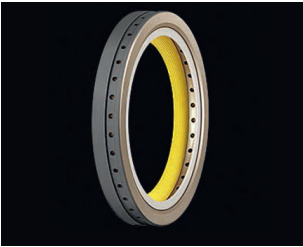
With consequential wear and damages that could result in a catastrophic malfunction, if the condition is permitted to remain without due care, attention and modification.

The risk of oil leakage past the piston ring seal is increased, particularly at the turbine end.

## Better Engineering, Parts, and Service. Better Solutions.

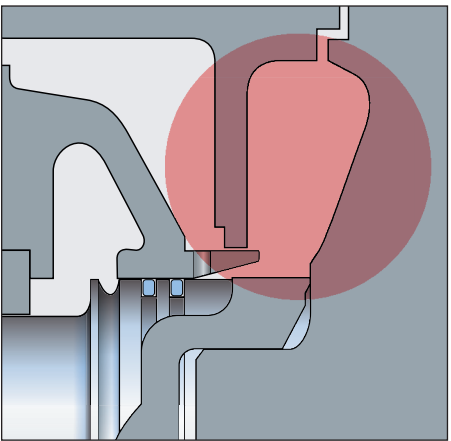
For the past 25 years, turbochargers have been one of the core technologies of modern marine diesel engine. The improvements to OEM components, designed, tested and manufactured according to Caterpillar specifications bring benefits to owners and operators over the life of the engine.

One of the results of changes to the voyage pattern of vessel operations has been lower ship speed or “slow steaming”. This has meant an adjustment to many vessel operational profiles, which can have consequences for the reliable function of the engines, turbocharger and air system.



For many MaK engines operating under extended idling/low load conditions, or continuous slow steaming, the engine and turbocharger may benefit from an upgrade to an improved sealing arrangement.

Greater reliability maximizes your uptime and reduces Total Cost of Operation. For this reason, we have developed a turbocharger cartridge upgrade which is offered as a factory guaranteed exchange through our authorized dealers. This includes the following: the turbine bearing housing and rotor shaft which both require replacement in a suitable exchange cartridge.



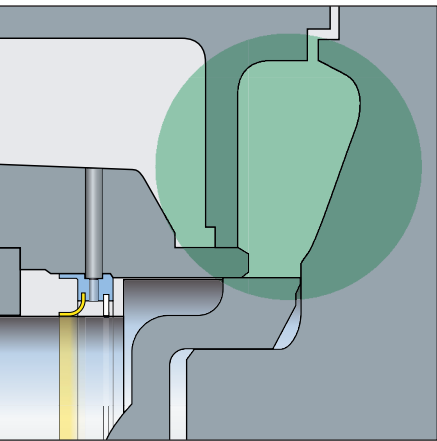
**Original piston ring seal**  
The oil leakage can rapidly lead to a significant accumulation of hard deposits between the bearing housing and the rear of the turbine.

## What’s the Risk?

Oil leakage can rapidly lead to a significant accumulation of hard deposits between the bearing housing and the rear of the turbine.

Consequential wear or damages to the sealing area and back of the turbine wheel may result in major malfunction, if the conditions are permitted to persist.

Subsequent to recurring periods of extended low load operation, the risk of oil leakage past the piston ring seal is increased.



**New lip seal arrangement**

Genuine MaK Parts