

## **Marine engines: efficiency down to the last detail**

How sensors reduce the fuel consumption of large ships and cut harmful CO<sub>2</sub> emissions by the tonne

**While container ships, tankers and freighters are essential for the international transport of goods, they are also responsible for around 3 percent of global CO<sub>2</sub> emissions. Sensors from Kistler can be installed in marine engines to reduce these emissions: by monitoring the engines, they save significant amounts of fuel and CO<sub>2</sub>, thereby reducing the ecological impact on the environment and relieving the financial burden on shipping companies.**

90 percent of all goods are transported by ship across the world's oceans every day. Large marine engines are used to propel these vessels and provide the necessary power on board. Depending on the size of the ship, these large engines can be up to 16 meters high and consume up to 300,000 liters of heavy fuel oil per container ship per day when operating around the clock under full load. But where there are high levels of consumption, there is also savings potential. In fact, it is possible to cut the total annual fuel consumption by around 2 percent simply by monitoring the ships' large engines with special cylinder pressure sensors. In the largest marine engines, these sensors make it possible to reduce harmful CO<sub>2</sub> emissions by up to 20 tonnes per engine per day, which is equivalent to the annual carbon footprint of 2.5 residents of Germany.

### **Internal and external regulation**

The sensors are installed in the cylinder – this is the location of the piston, which is connected to the crankshaft and which drives the engine with its upward and downward movements. These upward and downward movements are powered by the explosive combustion of the fuel mixture, which generates pressure in the cylinder. The sensor's task is to monitor the pressure in real time during this process so the engine control system can compensate for pressure differences between the cylinders. The more even this pressure is, the less fuel is required to drive the engine – and the volume of CO<sub>2</sub> emissions is also reduced.

While marine engines traditionally burn heavy fuel oil (HFO) or marine diesel oil (MDO), the importance of liquefied natural gas (LNG) is increasing steadily due to ever-stricter environmental regulations. A current example of this shift is what are known as dual-fuel engines. Engines of this type can be converted from standard liquid fuels to liquefied natural gas (LNG), therefore helping to reduce emissions. To ensure that dual-fuel engines can provide maximum efficiency and optimal power, their internal combustion processes must be continually monitored and regulated. And this is where extremely robust cylinder pressure sensors from Kistler in Winterthur come into play once again.

While experts cannot say for sure which environment-friendly alternatives will be used to power the marine engines on our oceans ten years from now, one thing is already certain today – the smallest parts can have the biggest impact. Sensors from Kistler will remain an essential component of the marine engines of the future, regardless of whether they run on methanol, ammonia or biodiesel.

## Image material (please name the Kistler Group as picture source)



Large container ships burn up to 300,000 liters of heavy fuel oil a day. Special sensors for monitoring engines help to reduce fuel consumption, thereby cutting CO<sub>2</sub> emissions by up to 20 tonnes per engine per day.

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### About the Kistler Group

Kistler is the global market leader for dynamic pressure, force, torque and acceleration measurement technology. Cutting-edge technologies provide the basis for Kistler's modular solutions. Customers in industry and scientific research benefit from Kistler's experience as a development partner, enabling them to optimize their products and processes so as to secure sustainable competitive edge. Unique sensor technology from this owner-managed Swiss corporation helps to shape future innovations not only in automotive development and industrial automation but also in many newly emerging sectors. Drawing on our extensive application expertise, and always with an absolute commitment to quality, Kistler plays a key part in the ongoing development of the latest megatrends. The focus is on issues such as electrified drive technology, autonomous driving, emission reduction and Industry 4.0. Some 2,050 employees at more than 60 facilities across the globe are dedicated to the development of new solutions, and they offer application-specific services at the local level. Ever since it was founded in 1959, the Kistler Group has grown hand-in-hand with its customers and in 2020, it posted sales of CHF 361 million. About 9% of this figure is reinvested in research and technology – with the aim of delivering better results for every customer.