

# Howden Air Lubrication System

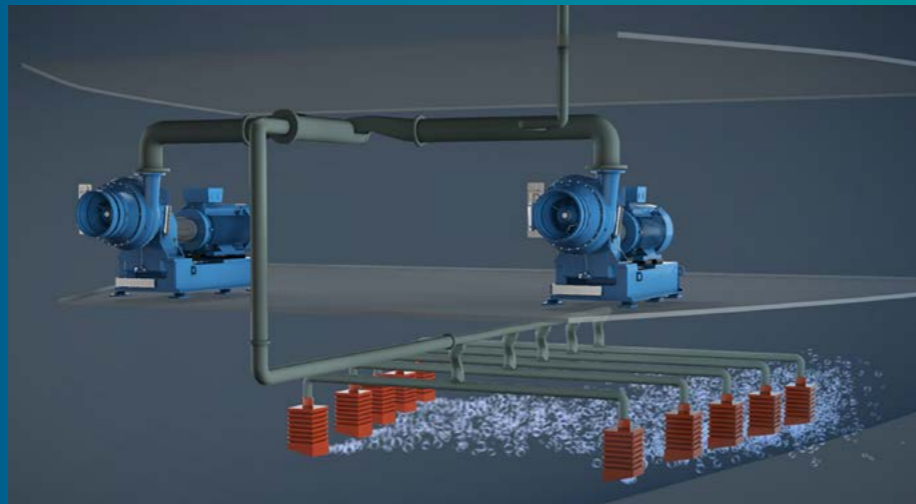
Delivering 7-10% net fuel savings



# Designed to achieve the highest efficiency, for net fuel savings of up to 10%

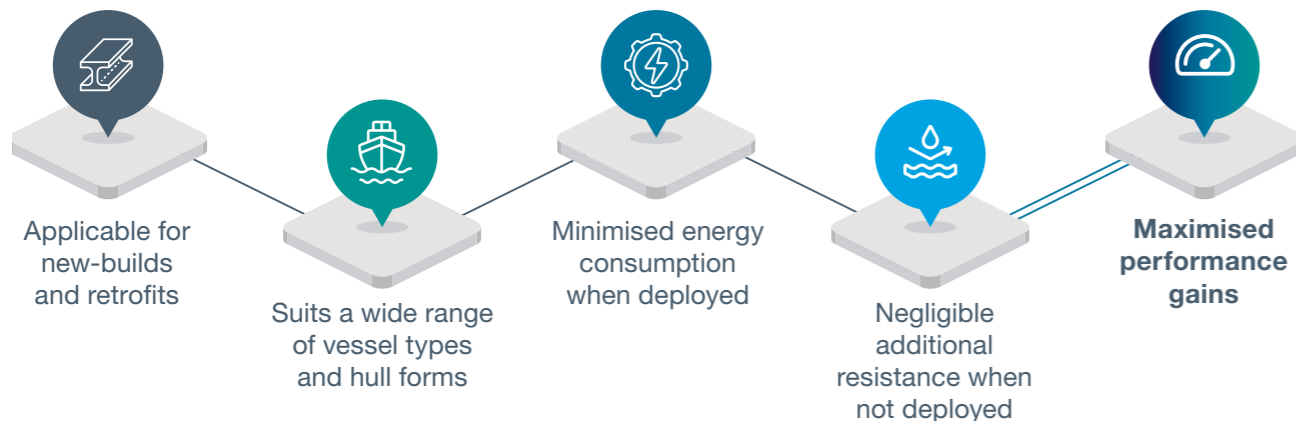
Studies have shown that up to 90% of a ship's hull resistance is frictional. Air lubrication systems work by feeding air onto the wetted surface, which reduces frictional resistance.

Howden Air Lubrication System is an innovative and proven air lubrication system that reduces frictional resistance by creating an air cushion of microbubbles beneath the hull's surface. This reduction in frictional resistance means significantly less engine power is required to drive the vessel. Fuel consumption is reduced by up to 10% net and less CO<sub>2</sub> is emitted. Our system can be deployed on a wide variety of vessel types and hull forms, and is equally suitable for new-builds and retrofits.



## Delivering highest net fuel savings

### Key air lubrication system features



Compressor selection is critical in maximising fuel savings and minimising electrical power by ensuring the correct air volume

As the market leading designer and manufacturer, Howden offers the most extensive portfolio of compressors. For Howden Air Lubrication System, we selected the single stage integrally geared turbo compressor as the most efficient type.

### Compressor selection

**Consistent high efficiency is achieved through Dual Point Control.** By eliminating the VFD, power loss is minimised and by enabling a much larger operational area, Dual Point Control allows for adaptation to fluctuations in the required air volume providing further significant energy savings.

**Howden Air Lubrication System maintains the level of net fuel savings achieved due to the air distribution box pairs, designed by our partner Foreship.** The patented design ensures negligible hull resistance when the system is not in use and retains the highest level of net fuel savings.

**Minimised overall footprint leading to low maintenance.** The high efficiency of Howden's single stage integrally geared compressors typically results in a requirement for only one or two compressors. In addition, the design of the air distribution box pairs means only six to ten box pairs are needed. This minimises overall footprint, facilitates easy installation and reduces maintenance.



### Design features

- Verified Computational Fluid Dynamics method for optimal performance.
- Superior compressor solution - highest efficiency due to Dual Point Control.
- Unrivalled compressor experience, > 10,000 installations in aeration applications.
- Innovative box pair design - negligible increase in hull resistance when system is not in use.
- Minimised overall footprint through intelligent compressor design and optimised number of box pairs.

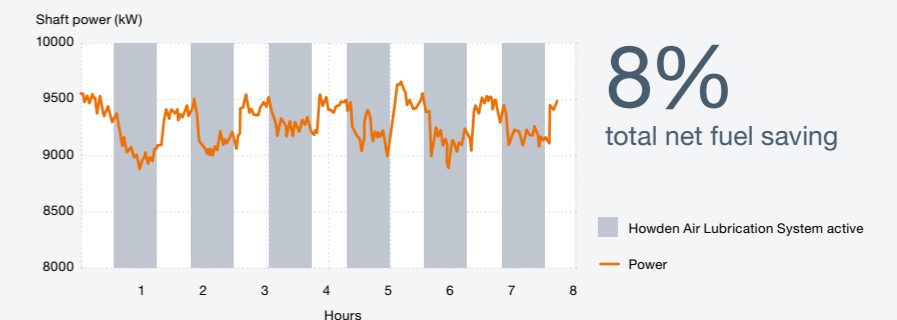
### Proven in operation

Since its development the Howden Air Lubrication System has been installed on multiple vessel types and demonstrated reductions in the propulsive power required.

Results of a test on an 83,000 GT cruise ship over the Atlantic Ocean clearly demonstrated less

energy was required when the Howden Air Lubrication System, comprising two type KA5SV-GL285 single stage integrally geared compressors and six box pairs, was activated. The efficient configuration delivered a third party verified total net fuel saving of 8%.

### Real cruise ship test crossing the Atlantic Ocean



## Howden, a Chart Industries Company

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Allegade 6  
3000 Helsingør  
Denmark

**T:** +45 4921 1400  
**E:** HTO-DK.Sales@howden.com



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