



# Howden Air Lubrication System

# Marine Product Portfolio



## Compressors

The most comprehensive portfolio of compressors:

- Centrifugal
- Reciprocating
- Diaphragm
- Turbo
- Oil flooded and dry Screw



## Fans

Cooling & Ventilation requirements:

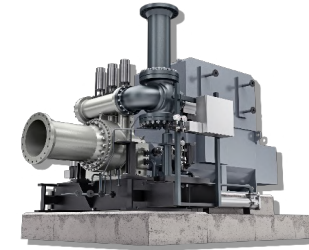
- Axial fans
- Centrifugal fans
- Cooling fans
- Generator Fan
- Crank case exhaust
- Winch cooling...



## Turbo Blowers

Turbo blower & fan range specifically designed for Marine applications

Product design focused on energy efficiency and cost competitiveness



## Steam Turbines

Steam turbine range including both single stage and multi stage. 250KW – 40MW

Applications covering power generation and mechanical drive for pumps / compressors



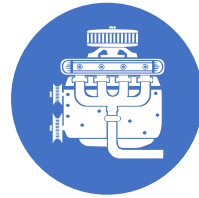
## Digital Solutions

Provide the foundation for maintaining and enhancing operational performance ensuring real-time support for assets worldwide.

# Maritime GHG Emission Reduction

# 40%

Minimum GHG Reduction from  
International Shipping by 2030\*  
Compared to 2008 Level



Choosing modern, multi-fuel engines and fuel handling systems. **EGR technology** supports methanol vessels, growth in LH2 fuelled vessels and supporting port infrastructure requiring **Fuel Gas Supply Systems, cargo containment & piping, port fuel storage & full suite of LNG solutions**



Newbuild installation or retrofit energy-saving technologies such as **Air Lubrication**. Increasing focus on **waste heat recovery** applications

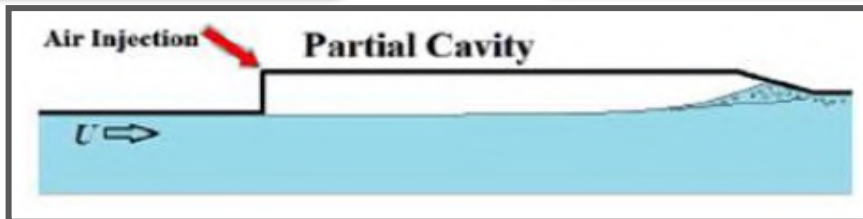
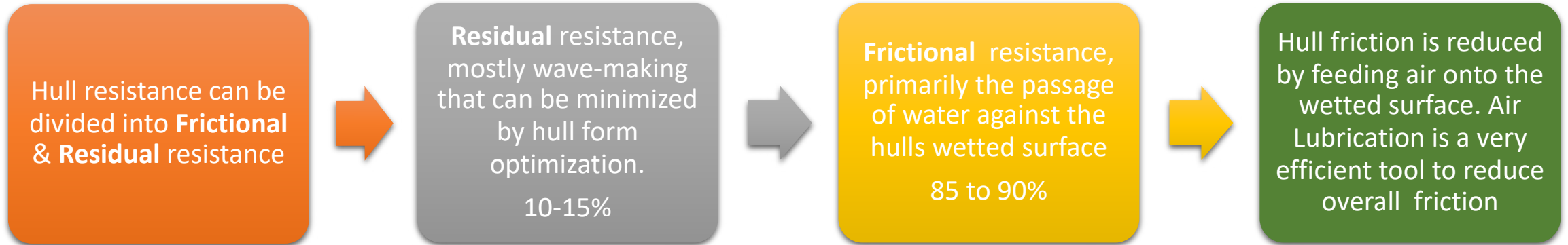


**Cryogenic Carbon Capture** technology & **Earthly Labs** small scale carbon capture



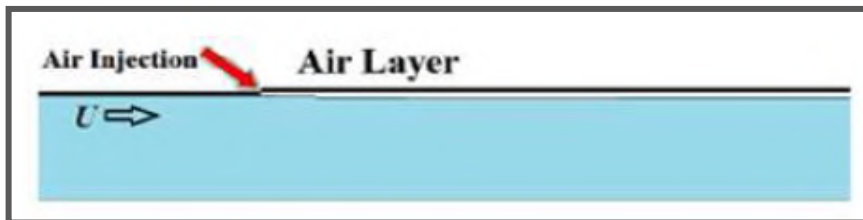
Switching to low and zero-carbon fuels, our extensive range of products enable step changes in emissions through cleaner fuels, energy efficiency and transition to sustainable operations

# Why Air Lubrication Technology?



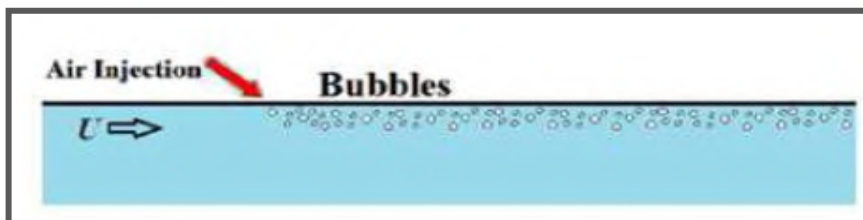
**Partial Cavity**

Creating an air cavity (air streaks), special shaped ducts are needed on the underside of the hull



**Air Layer**

The flat bottomed hull must be surrounded by vertical edges to maintain an air layer below the ships hull



**Micro Bubbles**

For micro bubbles, only small holes are needed on the ship bottom

# Optimization at Every Step

## Technology Development Goals

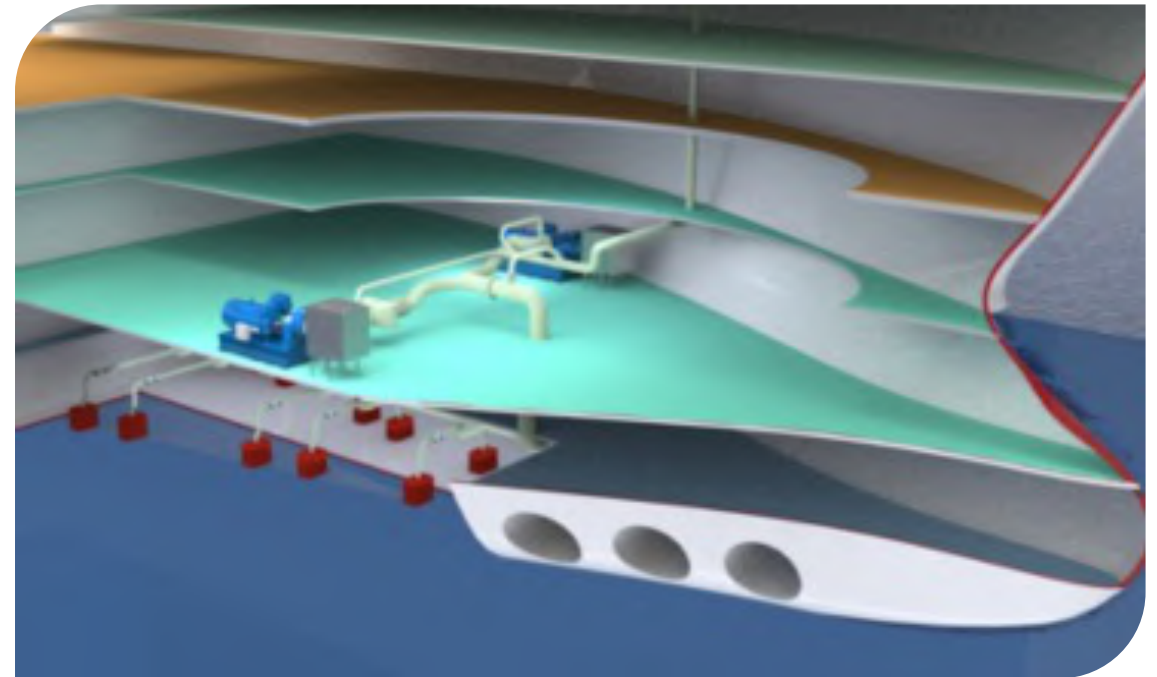


### The Air Lubrication System consists of

Foreship optimised Air Distribution box design

The most efficient Turbo Blowers suited for multiple duty conditions with smallest footprint

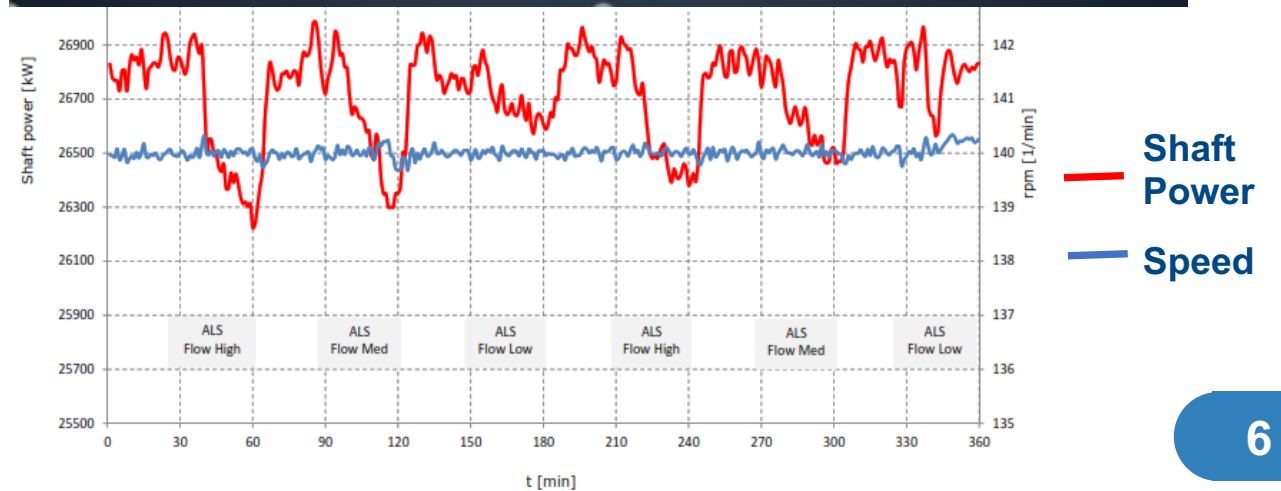
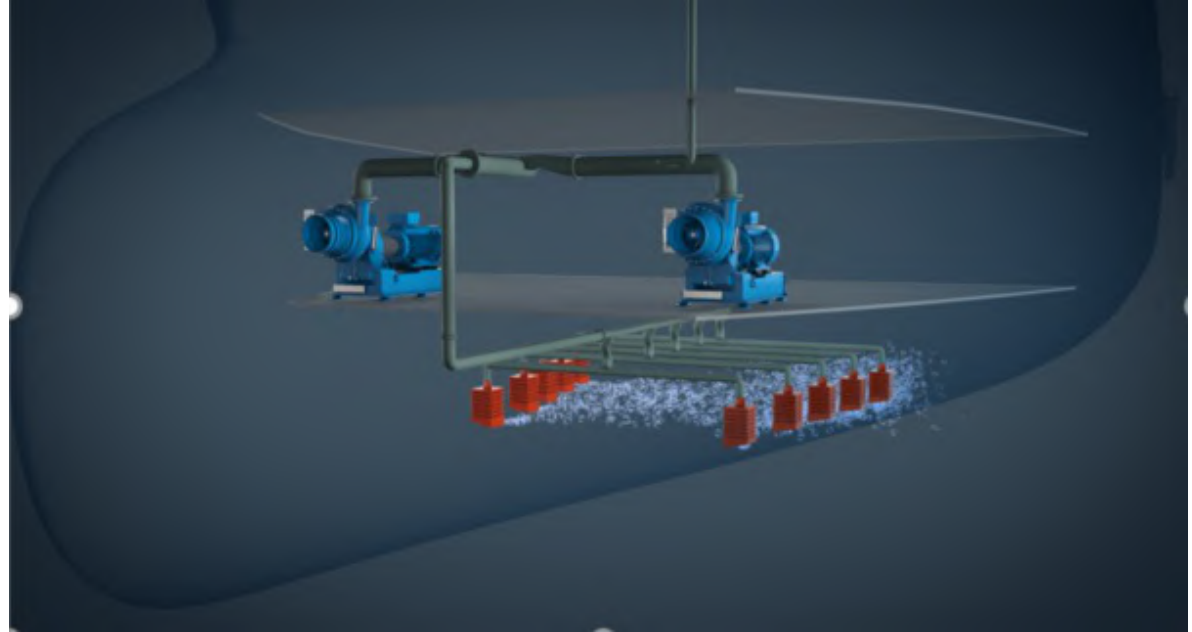
Intelligent Control System with optional Howden Uptime digital support



# Proven Performance

Focus on the ship's operation profile enables 7 to 10% net fuel savings

- CFD system design to ensure optimal performance
- Superior compressor solution harmonized with the specific vessel
- Innovative and patented Foreship air distribution box pair design creating negligible resistance to hull when not in use
- Extended compressor experience - more than 10.000 compressors installed in aeration applications
- Suitable for new builds and retro-fits



# Thank You

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# Howden

*A Chart Industries Company*