

Damen Air Cavity System[®]

UPGRADE YOUR VESSEL TO REDUCE EMISSIONS AND SAVE FUEL

DAMEN
MARINE COMPONENTS



How DACS works

With DACS an air cavity is created by injecting air underneath the vessel behind a small cavitator plate that separates the water flow. To secure the cavity, longitudinal skegs are installed to prevent the air from escaping. The air only needs to overcome the hydrostatic pressure due to the draught of vessel. As a result of this, the air cavity method requires considerably lower air flow, thus compressor power, then competitive first generation systems. To maximise the area of the hull covered by the system, a series of subsequent cavities are created, separated by transverse skegs that ensure seakeeping behavior is maintained.

Having a series of cavities in place has the additional advantage that any air escaping from one cavity is absorbed in the next.

Seagoing ships

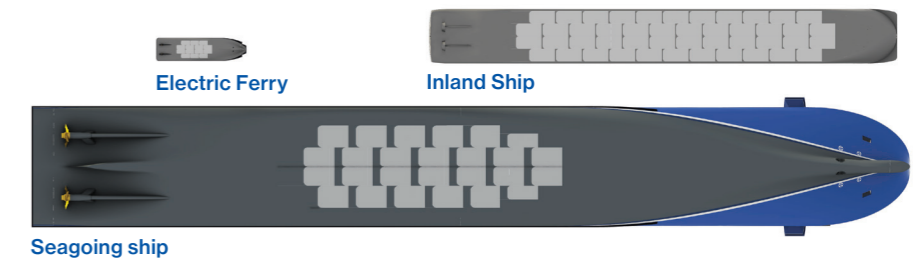
Depending on ship type the confirmed fuel savings on seagoing vessels are between 5 and 12%. Although the relative savings are smaller compared to the inland waterway vessels, the

absolute values are often much larger. This is because seagoing ships are larger, have more installed power and sailing at a higher speed.

Start saving fuel today

DACS is easy to install during a regular docking in a yard of your choice or at any of our Damen Shiprepair yards.

DACS is adapted to each vessel to maximise the use of the flat bottom area, see below examples



Damen Air Cavity System[©]

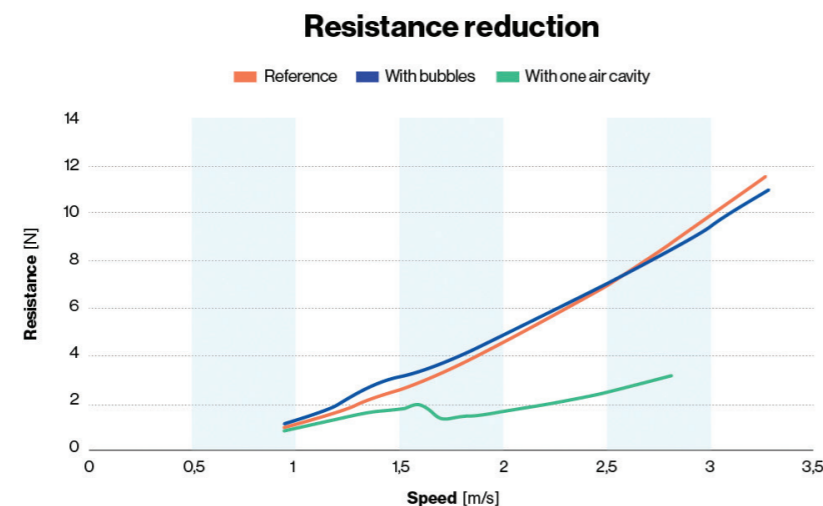
The Damen Air Cavity System (DACS) is a patented Air Lubrication System (ALS) that was originally developed at the Delft University of Technology (TU Delft) in the Netherlands and commercialised by Damen Shipyard Group. By maintaining a thin layer of air between the hull and the water underneath the flat bottom area, a significant reduction of the resistance can be achieved. This leads to a higher efficiency of the propulsion system, reduction of fuel consumption and emissions.

Hull optimisation generally helps to reduce the wave making and pressure resistance whereas the frictional resistance, which is dominant, is considered as given and it is proportional to the wetted area. DACS is reducing the wetted area of the vessel. This is done by creating a stable layer of air that separates the hull from the water. The system has a high overall efficiency and can be used on ships for fuel consumption and emission reduction.

HSVA to validate under real ship conditions. The system aims to reduce resistance in the water, particularly for ships with a low Froude number. Such vessels are known to encounter the greatest resistance in the water. By reducing this, DACS looks to

lower both emissions and fuel consumption/OPEX.

At similar flow rates, the air cavity reduces the friction significantly more than the traditional bubbles generating systems, as shown in the graph below.



DACS

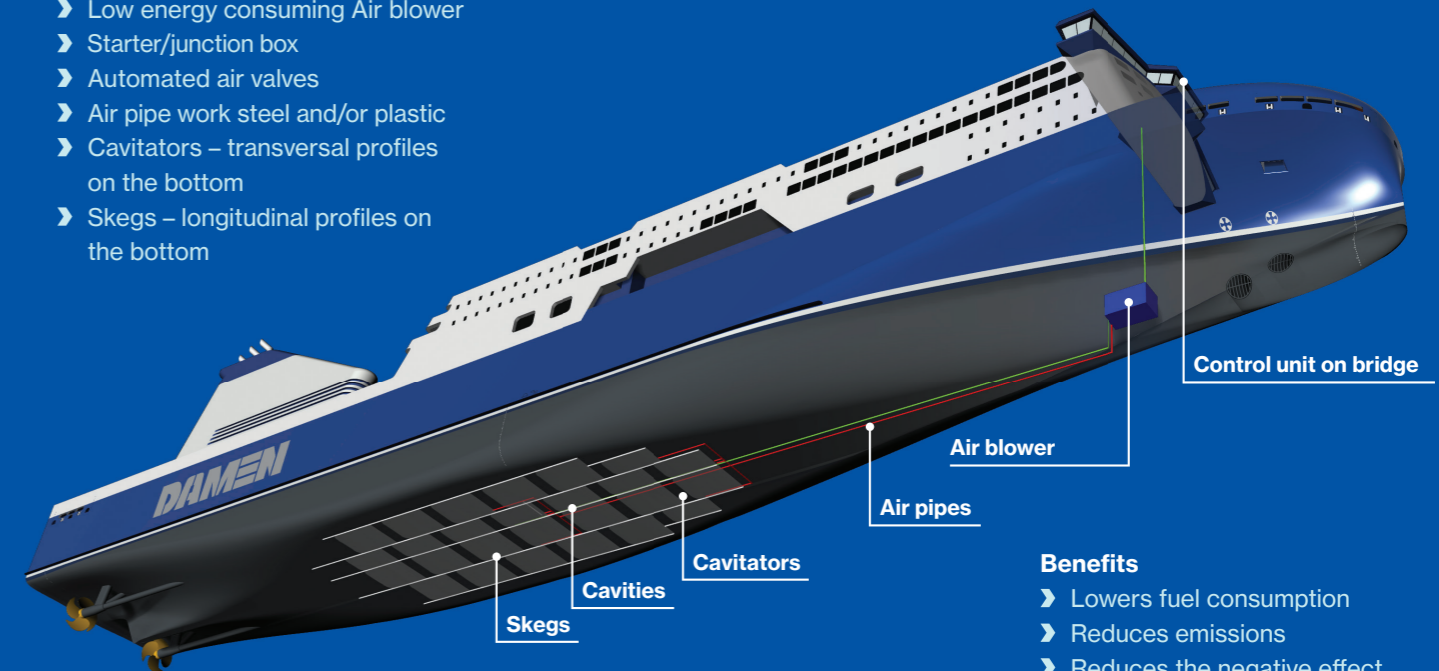
DACS was developed in a collaboration with Delft University of Technology. The technology is patented worldwide. Damen Shipyard group has adapted the technology for various shipping applications by using MARIN and

DACS components

DACS layout

DACS includes the following components integrated into a ship:

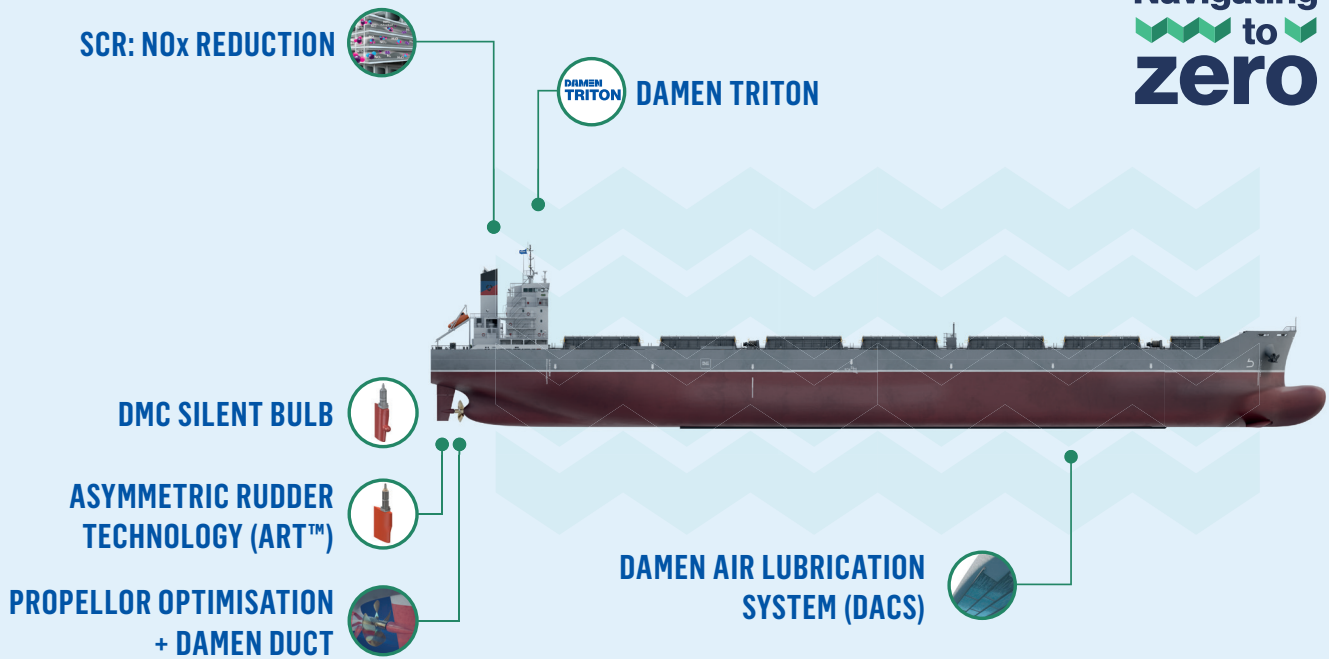
- › Bridge control and alarm panel
- › Low energy consuming Air blower
- › Starter/junction box
- › Automated air valves
- › Air pipe work steel and/or plastic
- › Cavitators – transversal profiles on the bottom
- › Skegs – longitudinal profiles on the bottom



Benefits

- › Lowers fuel consumption
- › Reduces emissions
- › Reduces the negative effect of resistance by fouling
- › Qualified for Green Award
- › Qualified for EIA tax reduction (for Dutch flag vessels)
- › Promises accounted in EEDI & EEXI
- › RINA certified





Let's reduce your GHG emissions together

The roadmap to improve your vessel CII Rating

Make your vessel more sustainable, reduce emissions, and save fuel. You can save costs and, at the same time, make your vessel future-proof. With current IMO and EU regulations, it's necessary to take action. Damen provides best-in-class solutions to decarbonise your vessel and achieve lower emissions. Damen offers a unique

combination of expertise, proven technology, financial services, and installation support. Moreover, our digital solutions will make fuel consumption reporting very straightforward.

Improve your vessel EEXI and CII rating now!

- Reduce up to 12% on your fuel consumption
- Improve CII and EEXI rating by reducing CO₂ emission
- Result: Lower CO₂ taxes



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