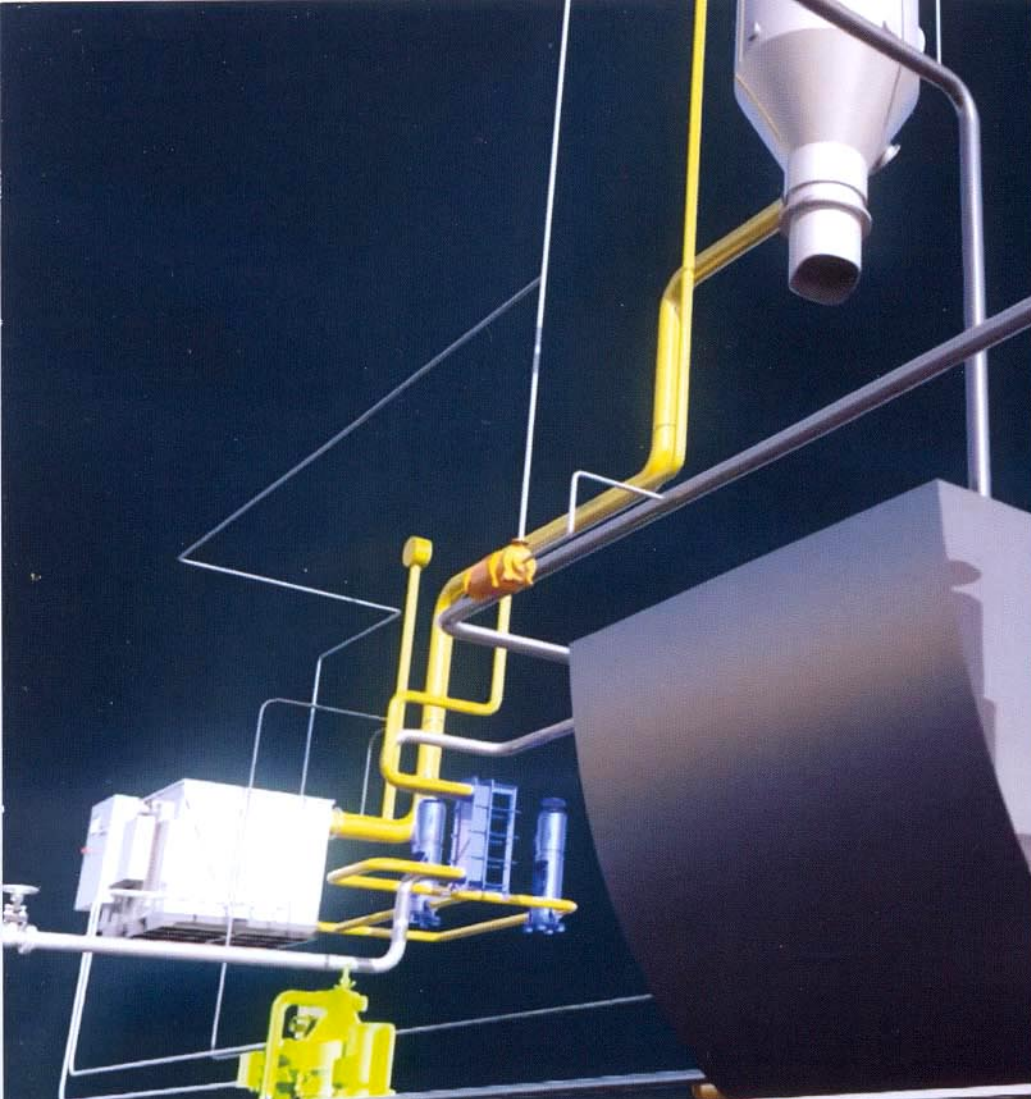




EXHAUST GAS TREATMENT

COST EFFECTIVE, CERTIFIED AND SIMPLE SOLUTIONS



OUR PHILOSOPHY: SIMPLICITY

Over the years Damen, has managed to make scrubbing simple and cost effective. Our scrubber is easy to operate, maintenance free, can be fitted into any vessel and is compatible with all types of engine.

INLINE SCRUBBER

Small footprint, low back pressure and absolutely NO ingress of water into the engines.

OPEN TOWER

Our scrubber has an open structure, no rotating components or filters and because of our patented design we guarantee the optimal reaction between exhaust gas and seawater.

MECHANICAL WATER TREATMENT

During an efficient treatment we create compressed sludge, resulting in minimal residue.

REDUCTION OF SO_x AND PM

Compliant to the latest IMO standards and reduces SO_x and particular matter (PM) efficiently.

ONE STOP SHOP



REDUCED DOWNTIME – MODULAR APPROACH

All major components of the scrubber system are placed in two modules which are pre-fabricated onshore in a controlled environment. We carry out the onboard preparation work, preferably whilst the vessel is engaged.

AT OWNER'S PREFERRED YARD OF INSTALLATION

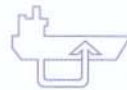
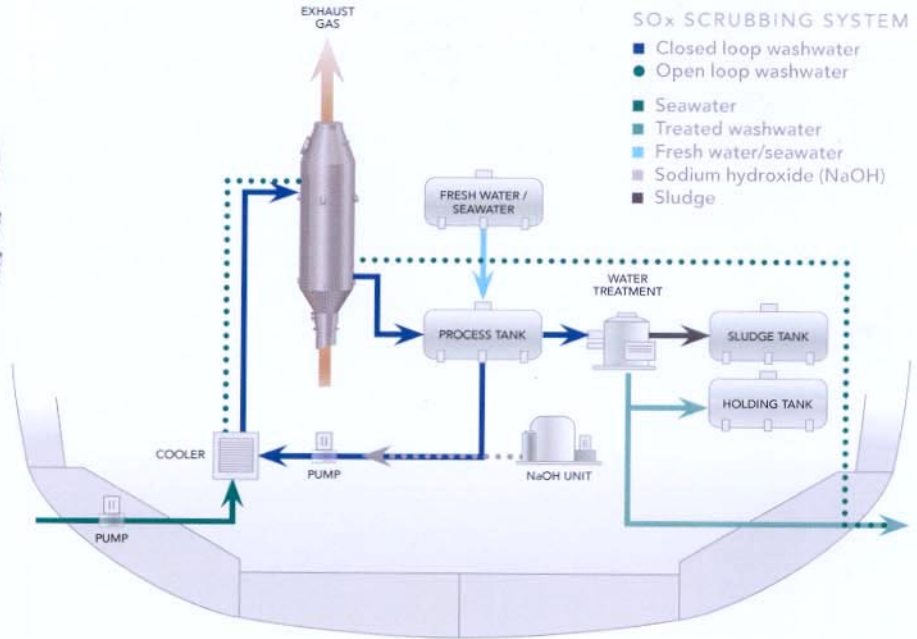
For the installation, the vessel is taken to the owner's yard of choice and is fitted with the pre-tested modules. By utilising a modular approach the downtime will be significant reduced.

DAMEN MODULAR APPROACH



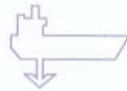
CONVENTIONAL APPROACH





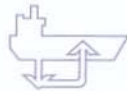
CLOSED LOOP SCRUBBERS

The closed loop is used for zero discharge areas. The seawater in the process is continuously re-circulated.



OPEN LOOP SCRUBBERS

Instead of being re-used, the process water is discharged directly back to open sea while still complying fully with the IMO regulations. Optionally, the seawater can be pumped through a water treatment system removing all solids and oil.



HYBRID SCRUBBERS

The hybrid scrubber system can run in closed or open loop mode. The water is either re-circulated or discharged overboard.

PURCHASING & PRE-FABRICATION

INSTALLATION

START UP & COMMISSIONING

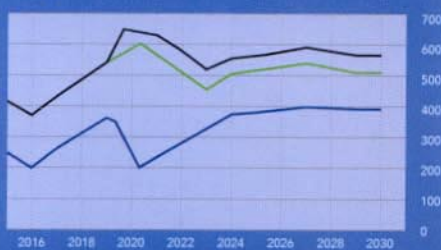
SERVICE

EXHAUST GAS TREATMENT

COMPLIANCY WITH THE IMO SO_x REGULATIONS

RETURN ON INVESTMENT

Due to the price disparity between low sulphur fuels and HFO, money will be saved every time you bunker. The return on investment period could be months. We are happy to make the calculation for your vessel.



BUNKER PRICE \$/ton

■ HFO \$/ton ■ MGO \$/ton ■ 0.50%S \$/ton

SOURCE: INTERNATIONAL BUNKER INDUSTRY ASSOCIATION

The IMO regulations which, limit the amount of sulphur in marine fuel to 0.5%, will be effective from 1st January 2020. Inside (S)ECA areas the limit is already 0.1%. In order to comply, there are two main solutions. Which will you choose?



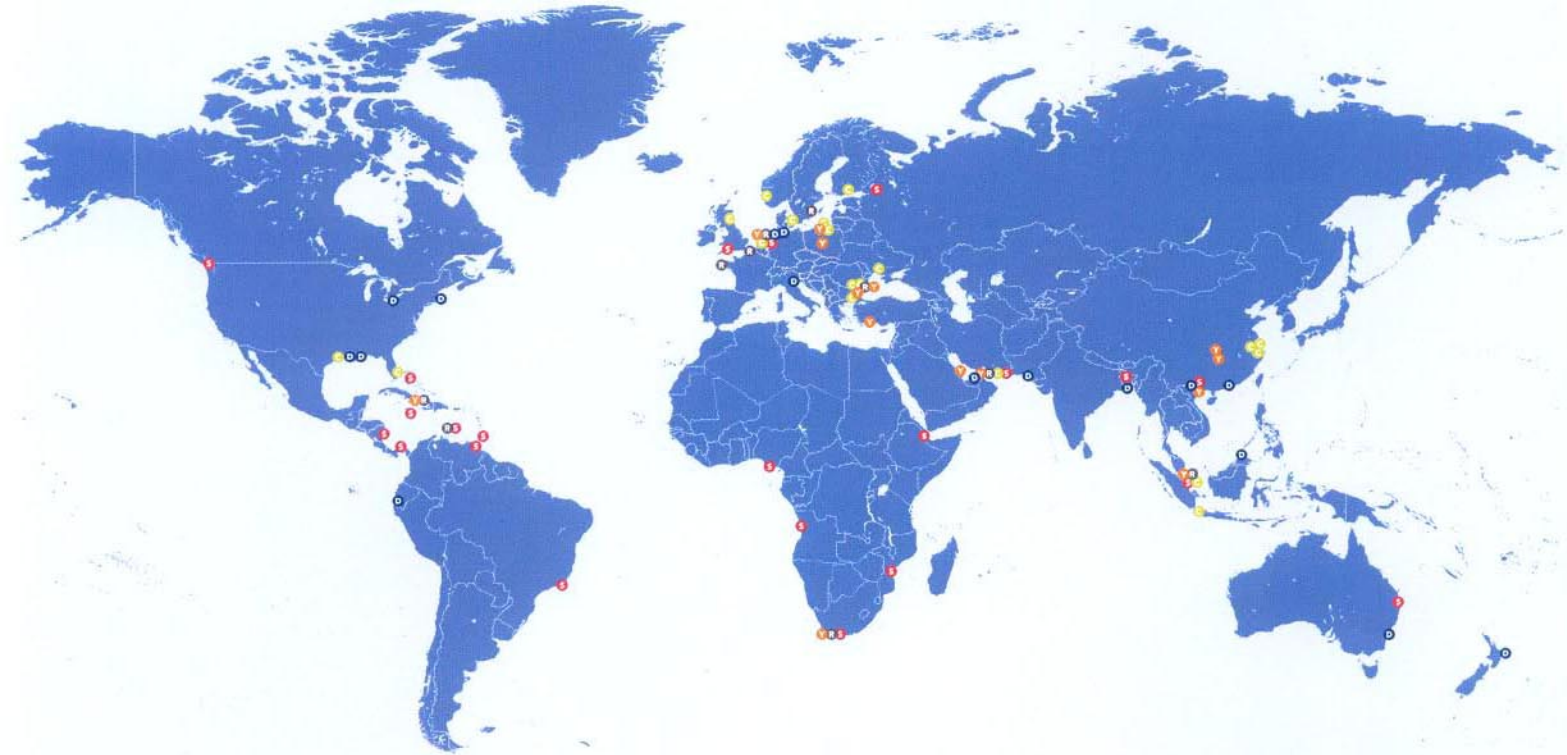
SOLUTION – EXHAUST GAS TREATMENT + HFO

The installation of an exhaust gas treatment system, in some cases, has a return on investment period of less than 24 months. Don't wait, 2020 is now.



ALTERNATIVE – LOW SULPHUR FUEL (MGO)

Low sulphur fuel is a quick way to comply, but are you willing to spend more money for fuel every time you bunker?

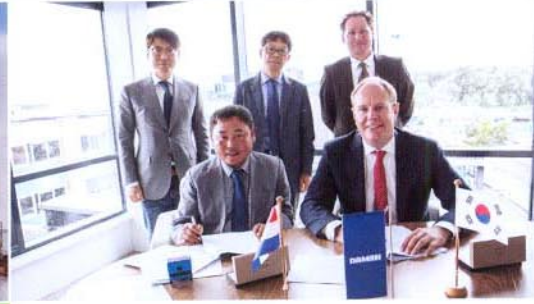


COMBINING CAPABILITIES TO HELP YOU

Damen can help you. We are more than happy to provide you with a complete package. We offer training, services, spare parts, consultancy, support, customer finance, etc.

PICK YOUR OWN LOCATION

We can install the scrubber, either at one of Damen's shipyards throughout the world, or at another shipyard of your choice.



WHAT ABOUT NO_x AND BALLAST WATER TREATMENT?

At Damen Green Solution we offer SCR solutions to reduce NO_x to comply with the IMO Tier III regulations. In addition, we are experienced in ballast water treatment. Our solutions include onboard examples as well as our unique port-based solution, InvaSave.

We are more than happy to help you.

CONTACT US AT GREEN@DAMEN.COM


Or contact your local Damen Shiprepair & Conversion yard to discuss the solution that suits you best.



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