

MERUS
WEBN2
Flüssigkeitsbehandlung

The **Merus**
Water **Treatment**



MERUS
DREDGING



www.merusonline.com

DREDGING

Vessels which are used for dredging operations are mainly involved in operations to make underwater pathways clear for other ships. This means that enough space is created to for instance build bridges, dams, and more. As a result of these dredging operations, the dredgers usually encounter problems with the way they handle the large amounts of water. That is why the Merus technology is often provided to dredging hoppers, to prevent any sort of problems related to lime scale, corrosion and biological problems in the water lines and water bearing systems.

The Merus ring can be installed at the hydrophore, vacuum sanitary system, boiler/calorifier, water feed pipe separator, evaporator, ballast water and main seawater lines. As a result of having installed this innovative and sustainable solution, the lifespan of the pipes, boilers, tanks, etc. gets prolonged. In addition, a large amount of time for service and maintenance is being saved, as well as a large amount of money.

Further information available on our website

www.merusonline.com



ROYAL BOKSALIS WESTMINSTER NVG

Boskalis, the leading dredging and offshore contractor, has been happily making use of our Merus rings, as 18 of their vessels have already been provided, for instance including the TSHD's Willem van Oranje, Oranje, Crestway, Gateway, Prins der Nederlanden and the Beachway. For instance, a 14 " Merus ring was installed at the main seawater pipe of the TSHD Medway, to remove problems with lime scale and prevent any type of marine growth, which is particularly problematic along the coast.

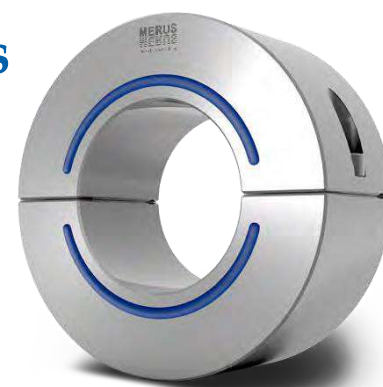


The North Europe partner Completes Installation of Merus-Rings for Boskalis' Vessels

Recently, Pronomar received an order from Royal Boskalis Westminster NV, a Dutch company that provides services in maritime sectors on international basis, for the Merus-rings for their trailing suction hopper dredger, the Prince of the Netherlands.

The Merus rings are a highly innovative, environment-friendly solution for green water treatment.

The fact that Royal Boskalis Westminster NV placed this order, shows that they care about the state of their technical, water-related equipment.



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The following rings were installed:

1 x 2" HCl BIO ring (for the hydrofor)

1 x 1½" HCl BIO ring (for warm water)

1 x 1½" HCl ring (for the hydrofor – technical water)

1 x 4" HCl ring (for Alfa Laval fresh water generator)

Once the Merus rings are installed, they give off tiny oscillations that disturb the lime scale. Afterwards the troublesome substances are simply flushed away. By keeping the equipment free from scaling the initial performance level of the equipment will be brought back, plus you prolong the lifetime of the equipment, which in return means a significant decrease in costs.

Pronomar won yet another cooperation with Royal Boskalis Westminster NV, this time regarding the placement of a MERUS ring (for technical water) on the MV Willem van Oranje, a trailing suction hopper dredger. Her Majesty the Queen named and launched the Willem van Oranje in February 2010, after the founder of the House of Oranje Nassau, William of Orange (Willem van Oranje).

Sustainability was a major focus for the design of the Willem van Oranje. E.g. the ballast water is cleaned before it is pumped overboard. Also space has been left in the funnel where equipment can be installed for the additional cleaning of exhaust fumes. The Willem van Oranje is anticipating the increasingly stricter environmental standards and probably therefore chose for the MERUS ring, which counteracts scaling and preserves the equipment in an environment-friendly manner.

How do the MERUS rings work?

After the installation the rings give off tiny oscillations which then disturb the scaling-process. Very soon afterwards the troublesome substances can be simply flushed away, leaving the equipment, in this particular case the equipment of the Willem van Oranje, free from scaling or any other harmful build-up. By installing the MERUS rings you bring back the initial performance level of the equipment, plus you significantly increase its lifetime. Besides, the MERUS rings do not require any maintenance, which in return means crucial savings in time and costs.

REFERENCES and CASE STUDIES:

In 2014, **Holland America Line** decided to equip its *Rotterdam cruise ship* with various Merus rings for its kitchen hose, hot and cold dishwasher, spa sanitary system, freshwater generator and backup osmosis system. This resulted in less time required for maintenance, extended the life of the machines, reduced the amount of limescale on the dishes, which ultimately resulted in happier and more satisfied staff and guests.

After that, **Amsterdam, Zaandam and Volendam** were equipped with Merus rings.



Freshwater Generators & RO systems



Vacuum sanitary system



mv SLINGEBORG

Dear mr Baars,

With this letter we wish to express our opinion about the MERUS ring installed on mv Slingeborg.

During the past 14 years we have struggled with sea growth contamination on our 3 identical vessels operating in the North Sea area yearround.

Due to the lay out, the 25 meter long suction line from the cross over to the engine room was full of mussels almost every year. We have tried (and still are..) using various chemicals and cathodic protection. But no significant improvement as result. In the best case the fouling with mussels was extended over 2 years in stead of 1 year. At high cost of chemical dosing and a lot of problems with coolingwaterflow.

In November 2013 we became aware of the MERUS ring concept, we decided to install such a ring on the sea water inlet before the sea water filter. After one year our preliminary conclusion is that it has a positive effect on the sea growth in the sea water suction line towards the engine room. Where we before had a drop in suction pressure before the sea coolingwater pumps, we now still have a positive suction pressure, even with a big Drencher pump working. Below are some pictures to prove the above mentioned. Left is the typical condition we find the pipe in after one or two years, right was the condition last November 2014.



Typical at end of season



November 2014 > 1 year with ring

Regards Marten Kolster
Chief engineer mv Slingeborg
Wagenborg Shipping

User: Hapag Lloyd, Hamburg, Germany



Hapag Lloyd is located in Hamburg in northern Germany. It is one of the largest container shipping lines in the world with more than 100 vessels it operates. Tokyo Express is a modern container vessel 300 meters long and with a capacity of 4890 TEU (twenty units for equivalent food). We did that in this case study.

A current topic in the maritime industry is green shipping. A lot of effort is being invested in upgrading vessels with new technology to reduce their negative impact on the environment. The use of chemicals to clean or operate engines and machinery is critically observed. Hapag Lloyd, like many other shipping companies, is looking for new measures to make shipping more environmentally friendly.

Fresh water generator problem

All vessels that travel by sea, not only along the coast, must produce drinking water or fresh water from the sea on board. In this case, there is a fresh water generator on board the Alfa Lava, whose production capacity is 25 m³ per day. Despite cleaning the generator with chemicals, production capacity has been reduced over time. Once the volume produced reached the minimum amount of water needed on board, the fresh water generator had to be dismantled. Each tile needs to be manually cleaned with chemical cleaners before it can be put back to work. In addition to all seals that need to be replaced during the cleaning process.



The cleaning process not only creates costs but also means that fresh water is not produced on the container while the cleaning work is being carried out.

The first picture shows what the plates in the generator look like after several months of work.

Solution

The Tokyo Express is equipped with a single generator, just like most cargo ships. We installed one Merus ring on a common supply line to process all the supply water to the machine. Thus both sides of the freshwater generator could treat only one Merus ring. Both sides mean, the side of the condenser and the evaporator plate in the heat exchanger.

In order to get a clear picture of the effect of the Merus ring, the customer also decided not to clean the heat exchanger plates after shooting. The freshwater generator is assembled without removing existing deposits. At the same time, they stopped adding water treatment chemicals to the system.

Furthermore, they decided to keep the freshwater generator for over 8 months without opening it. The reason was that the ship had to go to the dry dock after that period anyway.



Execution monitoring



The system automatically collects data on the production volume and pressure in the generator. Therefore, it is very easy to follow the development from the inside. Under normal conditions, a gradual drop in pressure is expected as described above. After installing the Merus ring, we recorded an amazing increase in production volume. After increasing the value stabilized at nominal capacity so far.

"See – believe", so the fresh water generator was dismantled on a dry dock in Hong Kong as planned. The purpose was just to see the development from the inside.

The figure shows that all plates are clean, just as assumed from the monitoring data.

The only dirt is brown film that can be easily removed with a cloth.

From Hapag Lloyd we received an email from the fleet manager stating: " After 8 months since the last cleaning the condition of the evaporator is very good. All plates are clean and there are no residues on the surface of the evaporator or condenser. "

RWS 78

Two Pronomar Merus rings were installed on the RWS 78 in May 2012, to prevent problems with marine growth in the seawater feedlines.

The two rings are installed on the seawater feedlines on Port and Starboard.

This document is an evaluation of the demo period of 15 months.



Cross-over

All pictures below are the same cross-over. As you can see the biofouling has reduced in the cross-over.



Without Merus-ring, after 1 year.



With Merus-ring, after 1 year.



Port



Starboard

Cross-Overs

The outgoing pipeline of the cross-over connected to other applications are also clean and almost biofouling free, as you can see on the pictures.



Filter Chamber and Seaweed Chamber

You can see that the marine growth is reduced and has a softer structure.



SEA GROWTH

The Problem

The cross-over and the seawater lines of existing vessels can be quite full of scaling and seagrowth in general.

Seagrowth, barnacles and shells can grow when they can hold fast to rough surfaces, like scaling.

As a result, the pipes get blocked and show reduced flow. In turn this affects for example the cooling capacity of the engines.

In the picture you can see sea growth built up in less than one year !



The Set-up

The seawater lines are equipped with the Merus technology as close to the point of water intake as possible. This will mainly be the cross-over: two Merus rings, one at each side, after the seawater inlet filters. Behind the point of installation there is the cross-over pipe itself, which acts as manifold, and the various seawater lines (e.g. going to the engines with strainers in front of them). Another set-up can be to only equip a distinct seawater line, e.g. leading to heat exchangers.

The Merus Technology

The Merus technology prevents or slows down new scaling, but it also loosens already existing scaling with time.

The Merus technology does not harm any biology, but with loosening the scaling, also the sea-growth gets loose and is released to the pipe. At the same time, new larvae do not find so much breeding ground any more due to cleaner pipes and the seagrowth is slowed down.

The Monitoring

After installing the Merus rings, the Merus technology will loosen the scaling with time, and together with that the seagrowth, shells, etc. will get loose.

What we experience with the Merus technology is that scaling and seagrowth comes loose and is found or filtered somewhere along the flow line.

The scaling is brittle and typically found in loose parts.

Many chief engineers report to us that at that moment there is an increase of filter change and cleaning work is indispensable until the loosened parts have been flushed out and cleaned away.



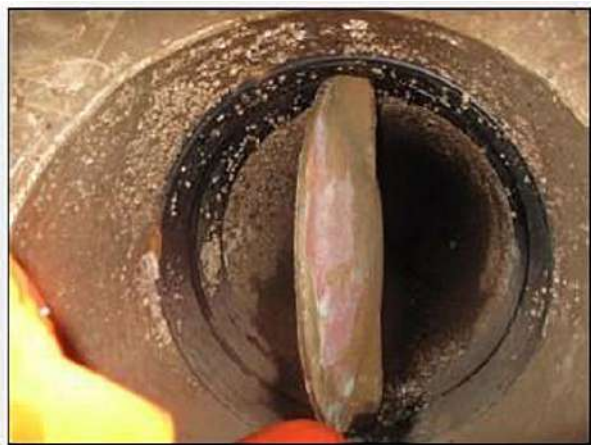
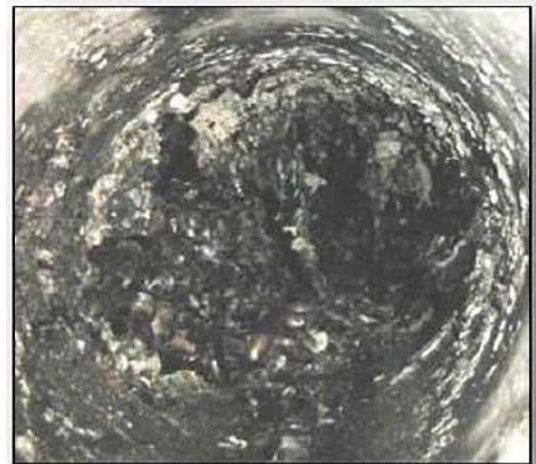
The Challenges & The Result

Depending on the flow conditions in the system several effects can be noticed:

In case the flow is quite low, the scaling and the shells can just come to lie at a lowest point
For example in a cross-over they can lie loose at the bottom of the pipe.

Another example is when only one sea-inlet is used and the other side is closed: in this case quite a lot of scaling and shells can accumulate in the not so much used section.

With full flow (for example when sailing with full engine power and thus maximum flow), the accumulated matter goes with the flow and is then found e.g. in strainers as quite loose material.



Another possibility is that with increased flow the shells come loose from the pipes because the loosened scaling does not hold the shells so tightly any more.

A seawater pipe on a dredger after 2 years sailing in warm waters with the Merus Technology.

Additionally to less seagrowth in general, it was reported that the remaining barnacles were much easier to clean.