

# **Adaptable Corrosion Prevention for Long-Term Ship Asset/Equipment Sustainability**

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# Agenda

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- Improving Maritime Maintenance and Repair
- About WWM and Wencon
- Maritime Industry Challenges
- Product Range and Benefits
- Reduce Cost of Ship Equipment
- Damage Control Capability
- Asset Extension Examples



# IMPROVING MARITIME MAINTENANCE AND REPAIRS

World Wide Metric and **WENCON** are industry partners to improve the way ship owners face corrosion prevention, extend life of ship equipment and perform emergency repairs.



# WWM & Wencon

- **50 years marine experience**
- US based company
- Supplier to the US Navy
- Engineered solutions
- Family owned and operated
- **Wencon solutions provider for US Navy**



- **40 years of experience** with epoxy compounds focused on the maritime industry
- COTS products that provide solutions that **repair, rebuild and protect**
- More than **10,000 ships worldwide** have repair kits

**WENCON®**

# Solutions to Maritime Challenges



## On-board Repairs

The tools to repair leaks and cracks always at hand



## On-site Repair & Maintenance

Extend the lifetime of machinery and equipment



## Planned Solutions

Specific repairs relating to maintenance availabilities and dry-docking

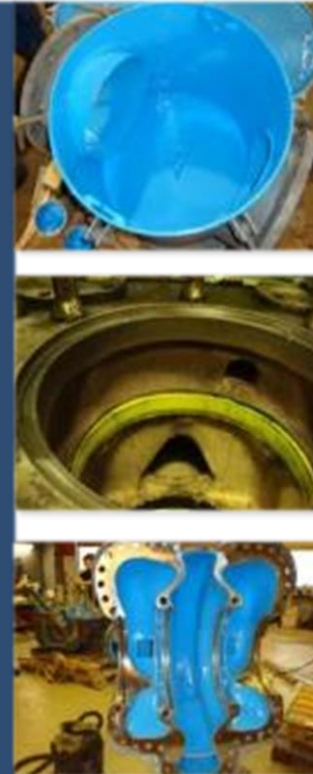
### Repair Kits:

- On-board repairs
- Exhaust system
- Pipes & Tanks
- Heating coil repair
- Hull repairs
- Engine cracks
- User Manual with 60 applications with tech docs and data sheets



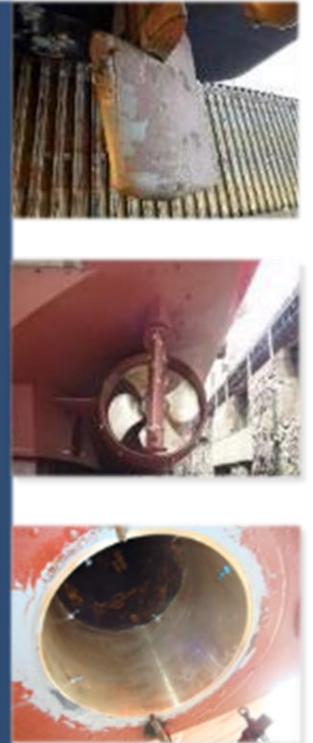
### Repair and Maintenance:

- Sea Water strainers
- Pumps in general
- Valve seats & housings
- Cooler covers
- End Plates
- Engine water cooling systems



### Major Planned Repairs:

- Thruster gear housings
- Propeller Nozzles & Shafts
- Thruster tunnels
- Rudders & Rudder Stocks
- Bushings & Bearings cast to fit solutions
- Overboard pipes

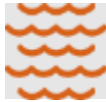


# Versatile Product Range



## STANDARD PRODUCTS

Suitable for all metal types



## UNDER WATER PRODUCTS

For wet surfaces and humid areas including diving operations



## HIGH PERFORMANCE PRODUCTS

For high temperatures, abrasion and chemical resistance

**Other advantages**  
Type Approved By  
Class



- Solvent free
- No metallic fillers
- Easy mixing ratios
- Delivered as non-dangerous goods

# Reduce Cost of Ship Equipment

## **Cost Challenges**

High cost of ship equipment maintenance and repair, often leads to a financial burden for ship operators

## **Efficiency and Longevity**

Wencon for rebuilding, repairing and protecting. Extending the lifetime of a ship's equipment, delaying costly replacements and contributing to overall cost efficiency

## **Unpredictable Expenses**

The unpredictability of maintenance and repair costs can fluctuate based on equipment failure rates, availability of parts, and changes in regulatory requirements.

## **Logistical and Procurement Delays**

Procuring replacement parts causes delays, which increase direct costs

## **Reduce Downtime**

Rapid repairs with Wencon minimize downtime and enables ships to return to operation faster

## **Reduce Carbon Footprint**

Reducing the need for new parts by repairing existing parts, minimize the carbon footprint and lower both manufacturing and disposal costs

# Addressing Military Ship Challenges

In the military environment, operational continuity is paramount. Challenges faced by ship operators include the necessity for rapid and dependable repair solutions during deployment, the simplification of ship piping system maintenance, and the ability to maximize operational time to enhance steaming hours. It underscores the strategies for conducting repairs without interrupting vessel operations and revitalizing assets that are either outdated or subject to prolonged procurement periods.

- **Rapid, simple reliable repair solutions**
- **Ease of maintenance of ship hull and piping systems**
- **Ability to repair while underway**

- **Renew assets with long lead times or that are outdated or obsolete**
- **Maintain operational stability**
- **Increased steaming hours**



# Damage Control



- ✓ Perform rapid repairs while underway
- ✓ On decks, pipes, and hulls
- ✓ Complete repairs on dry, wet or underwater surfaces
- ✓ Used for DC repairs by NATO members

# Pipe Repair Kits

- No tools required for rapid repair
- Polyurethane impregnated tape is activated by water or seawater in 10 seconds
- After application, the pipe tape is fully cured and operational in 10 minutes
- Pipe tape by itself can be used on 16bar/232psi systems
- Putty is added for holes, cracks and on higher pressure systems to 2250psi
- Piping repairs can be completed on pressurized pipe (up to 50 psi)
- Metallic and non-metallic pipe sizes ½" thru 18"
- Tested to 240 bar/3520psi
- Class Approved as a permanent repair
- 3-year shelf life
- Video - <https://www.youtube.com/watch?v=tURNyoTUcMo>

PREP



PUTTY



APPLY TAPE



FINAL  
Approx. 30 min.



# Pipe Reinforcement Tape

- Reinforcement Tape is used for pipe repairs, cracks or holes in engine blocks, oil sumps, etc.
- Mix the 2-part Wencon Cream and apply with reinforcement tape
- Wrap the coated reinforcement tape around the pipe having the Wencon Cream on the inner side.
- The length of the tape should enable it to go 3-4 times around the pipe.
- Cream has a 3-year shelf life – can be resealed and stored
- Class Approved as a permanent repair (not temporary)
- Before – during - after



# Asset Life Extensions

## Before – During - After

**SEA WATER FILTER**  
Attacked by corrosion.  
Grit blasted and rebuild  
with Wencon Cream and  
protected with Wencon  
Coating white and blue.



**THRUSTER GEAR CASING**  
Attacked by bi-metallic  
corrosion. Grit blasted  
and rebuild using Wen-  
con Cream and protec-  
ted with Wencon Coating  
white and blue.



**SPLIT CASING PUMP**  
Bronze pump affected by  
corrosion / erosion.  
Support ring seats rebuild  
with Wencon Rapid.  
Protected with Wencon  
Coating white and blue.



**RUDDER TRUNK BUSHING**  
Surface prepared and  
new bushing installed  
using Wencon Rapid in  
existing oversized seat.  
Bushing cast to fit, using  
Wencon Coating injected  
to fill the clearance.



# Rudderstock Refurbishment

→ **CURRENT LIFE CYCLE** (RUDDERSTOCK – 9,000 KG) ————— BASED ON SCENARIO 1



CURRENT  
CARBON FOOTPRINT  
**71,172 KG CO<sub>2</sub>eq**

**SDG POTENTIAL**



↻ **REFURBISHMENT LIFE CYCLE** (RUDDERSTOCK – 9,000 KG) ————— BASED ON SCENARIO 2



NEW CARBON FOOTPRINT  
**9,072 KG CO<sub>2</sub>eq**

TOTAL CO<sub>2</sub>EQ SAVINGS  
**87.2%**

## COMPARATIVE LIFE CYCLE ASSESSMENT

SCENARIOS	POTENTIAL SAVINGS
S1 Business-as-usual	0%
S2 Refurbishment	87.2%
S3 Refurb. w. oceanic transportation	80.1%
S4 Refurb. w. aerial transportation	-127.8%
S5 Refurb. w. ReCiPe modelling framework	87%
S6 Refurb. w. geographical location	87.4%



## RECOMMENDATIONS

- Reduction potential from life extension Wencon refurbishment significantly lowers CO<sub>2</sub> footprint
- Rudderstocks may be transported by ship for refurbishment Wencon refurbishment lowers CO<sub>2</sub> footprint even when transported over large distances via oceanic freight
- Rudderstock aerial transportation should be avoided Wencon refurbishment may not reduce CO<sub>2</sub> footprint if transported over large distances via air freight
- Rudderstock refurbishment may change geographical location Benefits may be obtained although refurbished in China

# Questions?

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