

## Elastomeric repair coatings

offshore, hydraulic engineering, subsea, cruises,  
defense, fishing industry, dredging and water sports

## MetaLine® Series 700

fighting against erosion, corrosion,  
cavitation, wear & tear, fouling



Equipment life is just too short without protection!

# Product Properties

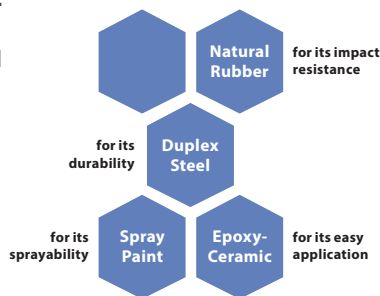
## Changing surfaces to the better ...

**Absorbing destructive energy instead of deflecting it!  
Sprayable elastomeric coatings to solve erosion, corrosion,  
cavitation and abrasion problems on-board**

**MetaLine® Series 700** incorporates the primary technical characteristics of completely different materials: The application process is as straightforward as with an epoxy-ceramic repair product, but the compound itself functions like rubber, and finally possesses erosion resistant qualities equal or **greater than Duplex Steel** . . .

NOT rubber, NOT steel, NOT epoxy and  
**by far NOT paint** - but an ingenious  
mix out of all four of them!

When applied, **MetaLine® Series 700** extends the functional life of steel, alloys, rubber, plastic or concrete by absorbing the destructive kinetic forces. It eliminates typical rubber limits by its innovative **polymeric design!** No seams, no delamination and no massive equipment need for vulcanization. Far more it is rapid in use - means no time-pressure anymore which often tends engineers to use questionable plastic composites replacing natural rubber or metal structures on-board!

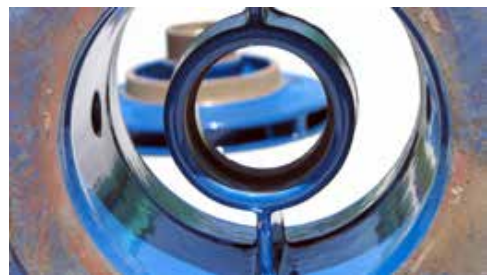


The result is a hydrodynamic resistant protective coating that provides unparalleled erosion/cavitation resistance.

**MetaLine® Series 700** technology is different because of its innovative cartridge spray concept which mixes and sprays the polymer simultaneously. The low pressure spray mode creates an **extraordinary surface smoothness** improving any fluid-flow dynamic. Efficiency increases of up to 3.5 % have been proven.



The daily repair routine when epoxy ceramic compounds are used for linings. No hydraulic engineer wants to see irregular surfaces like this ...



... and that's the way it should be! The **MetaLine® resurfacing technology** is smoother than any steel casting and about **500 % more wear-resistant** compared to mild steel. Repairs extending the durability of original spare parts and offering lower maintenance costs!

## 60 years of experience

In 1960 MetaLine® started its global surface protection activities and developed itself into the **oldest German** manufacturer of synthetic repair compounds and maintenance coating solutions. Our Series 700 technology has become **OEM (Original Equipment Manufacturer)** Standard in different industries.



When handling our coating materials, we place great importance on superb instruction, intensive communication and effective Know-How-Transfer. To realize this, we offer training sessions that range from 1 to 5 days at our location or yours – wherever you need us!

MetaLine® has its headquarter located near Stuttgart (Germany) and through our partners we are represented not too far from you.

**MetaLine®'s time zone is UTC+1**

**Phone: +49 (0) 7034 31000  
E-Mail: [info@metaline.de](mailto:info@metaline.de)**

### Do Coatings Protect against Corrosion and Wear?

The industry has myriad spray-on, brush-on and scrape-on products to offer, the producers of which claim them to have corrosion- and wear-reducing effects. Until now, pump users have had to take a trial-and-error approach to finding out which, if any, such products actually do help. Now, in order to shed some light on the dark area of coating technology, Kfz has conducted a voluminous series of pertinent tests at its materials laboratory in Regnitz.

**Hard phases in hard particles of ceramic materials**



The upper coating half of a high water pump, with which we have coating for test purposes.

Pump materials are subject to very complex loads of pressure, thermal and mechanical stress. The material and hydraulic design of pumps makes thermal and mechanical stress exposure. Additionally, all material surfaces are exposed to the effects of the fluid itself. Depending on the nature of the fluid, self-corrosion can cause erosion, abrasion and cavitation damage to pump components. Only cast iron and steel alloy steel are standard materials for drinking water pumps, wastewater disposal pumps and water pumps. The most determining coating water pumps – the more determining factors being price, workability and availability. However, due to their limited resistance and durability, such materials soon come up against their daily limits when they are exposed to such damage by hydraulic components, e.g. impellers.

**Fundamental criteria** – chemical resistance with respect to the fluid at service temperature, general wear resistance of the component for the application of a coating, period-wise approval for the coating, machinability of the coating on existing surfaces and in new areas.

For cast iron, the problem is to locate among all the various makes and types a coating to fit the use at hand. The producers' advertising vocabulary is full of terms like "extremely wear-resistant", "succeedingly resistant to corrosion", "hard", "outstandingly resistant to cavitation" and so on, meaning "resistant to cavitation" and so on, across vast product lines. In order to realistically put all that's of test into practice to realistically pump, Kfz subjected a large number of products to wear and cavitation tests.

**Two groups of coatings** On the basis of their respective organic binder plants, the coatings in question can be roughly assigned to one of two categories: epoxy resin and polyurethane.

**And what is the response of the international markets?**  
To consider MetaLine® not only as a repair solution but more and more as a novel product concept for the engineering design of new equipment as well. Tested & approved by key **OEM manufacturers**, R&D laboratories, universities & multiple public authorities!

# Application Process

**MetaLine® Series 700** is a solvent-free, two-component elastomer that can be applied by spraying, injecting or casting. Polymerization starts after 1 minute. The coating thickness ranges between 1 mm (40 mils) and 20 mm (3/4 inch) and can be achieved without material sagging on vertical surfaces. MetaLine® Series 700 can be used in **many climatic conditions** (as in zones with extremely high humidity).

MetaLine® Series 700 adheres to **various substrates** including steel, alloys, aluminium, rubber, concrete, wood and different plastics. It is **NOT** necessary to heat the component to be coated. After 5 minutes the coating is dry to touch and most parts can go back in service after 24 hours (at 20 °C / 68 °F). The temperature resistance is between -50 °C (-58 °F) and +120 °C (+248 °F), depending on the relevant application.

MetaLine® Series 700 cures without any tension or shrinkage. In addition to its chemical bonding process, a mechanical **memory effect** is developed. This permanently ties the coating to the substrate, thus counteracting any separation tendency that is normally associated with conventional rubber sheets. MetaLine® Series 700 can be recoated and repaired at anytime!

## MetaLine® Series 700 is supplied in 3 different degrees of hardness

- **MetaLine® 760 (60 Shore A)** serves to repair soft rubber linings and worn fenders as well as optimizing the performance of hatchcover seals
- **MetaLine® 785 (85 Shore A)** is the first choice for the protection of components subjected to erosion, cavitation, corrosion or wear
- **MetaLine® 795 (95 Shore A)** develops non-stick properties. It offers an ultra low coefficient of static friction improving material & fouling release

MetaLine® Series 700 coatings are **non-toxic**, safe to use and have been assessed by US & EU authorities as drug and food-safe according to FDA standards and relevant EEC regulations.

The strength of MetaLine® Series 700 lies in its erosion and cavitation resistance, which is comparable to high-alloy steels and armors. With a density of just 1.05 g/cm<sup>3</sup> (0.038 lb/in<sup>3</sup>), it is the **most lightweight duroplastic wear protection** available. The potential energy savings when applied to impellers and rotors are considerable.



MetaLine® APPLICATOR S-700 with Series 700 double cartridges - because spraying simply gets smoother & better than brushing!

## Just a few steps to go!

The use of highly functional coatings requires competent **surface preparation**. The surfaces to be coated shall be dry, clean, free of grease and salt and need to have a **rough blasted surface profile**. The abrasive grit used must have a particle size of approximately 1-2 mm (40-80 mils).

- 1 Metal substrates are coated with MetaLine® 924 first. This **electro-chemically active corrosion protection** prevents borderline penetration on coating edges and protects damaged areas from rusting.
- 2 After drying, a double coat of MetaLine® 900 Universal Primer on solid surfaces or MetaLine® 910 on rubber surfaces is applied.
- 3 Finally, MetaLine® Series 700 protective coating with the required film thickness and color is sprayed on!

## A process created by practice!

The APPLICATOR S-700 does not come into contact with the coating material itself, so the tool does **not require any cleaning** or maintenance after the job is done:

- based on low-pressure technology (about 5 bars / 72 psi) only 200 liters (52 gal) of compressed air per minute required
- automatic dosing and mixing (no off-ratio risk)
- similar to wet-paint processing (however solvent-free)
- no mixed waste (similar to a 'DIY' spray can)
- re-use of opened cartridges
- no equipment cleaning after spraying
- designed for rough on-board working atmospheres
- investment costs below 1,000 EUR







# Seawater- / Scrubber Piping

MetaLine® Series 700 – Corrosion protection for seawater systems

To reline used piping systems or for the initial treatment of new tubing. Particularly suitable for installations suffering from severe particle impact and abrasion.

## Applications

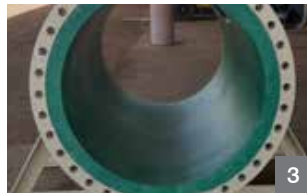
- pipes (starting at 50 mm / 2# diameter)
- curved or straight tubes
- flange coatings
- ballast water treatment systems
- ballast water piping
- seawater inlets
- scrubber systems



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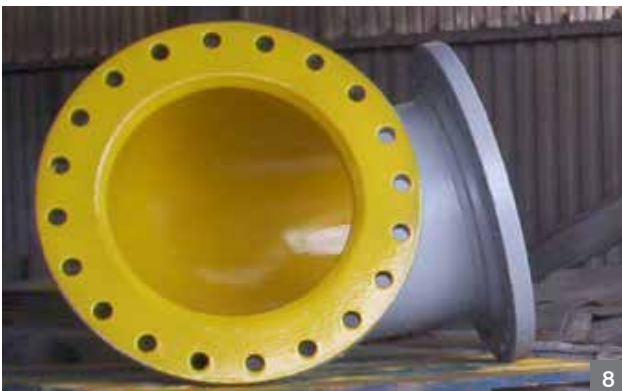
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## Reference

- rubberlike homogenous spray solutions for bended pipes (pic. 1)
- smooth surfaces – even on used parts suffering from pitting corrosion (pic. 7)
- **seamless** protection concept from the flanges via the tube (pic. 8)

# Filter / Strainers / Water Treatment

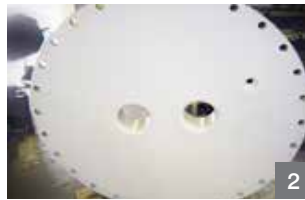
MetaLine® Series 700 – Corrosion protection for seawater systems



For the repair or complete re-lining of maritime filter equipment. Seamless, homogenous, rubberlike character. Fully closed coating concept starting from the complete interior up to the outer flanges. Reduces fouling.

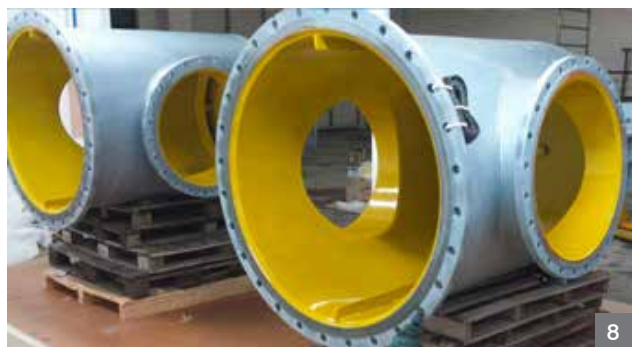
## Applications

- strainer bodies
- strainer covers
- seachests
- wastewater purification systems
- desalination equipment



## Reference

- resistant to slurry - cannot be removed by sandblasting anymore
- superior physical properties & resistance compared to natural rubber (pic. 7)
- active (**encapsulating**) and passive (**anodic**) duplex anti-corrosion properties







# BWT Reactors & Installations

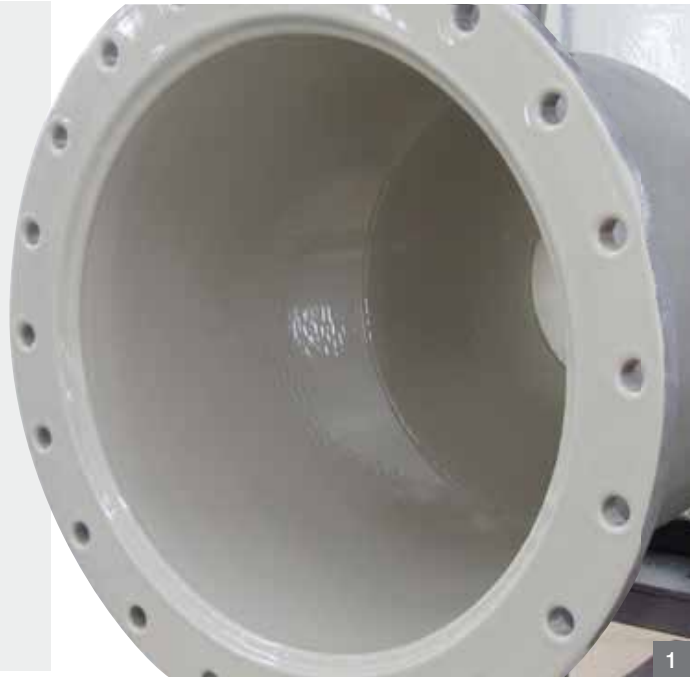
MetaLine® Series 700 – Corrosion protection for seawater systems

The treatment of ballast water due to IMO standards – no matter if using active substances, cavitation, UV-light or whatsoever neutralization process – is a stressful demand for the reactor equipment.

MetaLine® 785 is an approved coating solution to protect the reactor or its piping. Furthermore the use of expensive saltwater-resistant stainless steel equipment can be minimized.

## Applications

- ballast water reactors
- ballast water pipes
- ballast water pipe bends



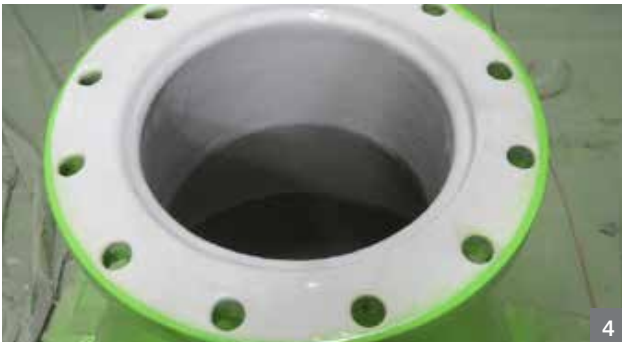
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## Reference

- resistant to saltwater and numerous chemicals in a ph-range between 3 to 11
- sprayable and castable in a single process by use of the APPLICATOR S700 (pic. 3)
- hydraulic and pneumatic pressure resistant up to 70 bars (1,000 psi)

# Heat Exchangers

MetaLine® Series 700 – Corrosion protection for seawater systems



**For temperatures up to +60 °C (140 °F)**

**MetaLine® Series 700** – elastomeric

Spraycoatings with an complementary anodic corrosion protections pre-treatment. Resists saltwater. FDA approved. Due to its superior erosion resistance perfectly suitable for heat exchangers moving abrasive solids.

Color selection as per choice.

**For temperatures up to +120 °C (250 °F)**

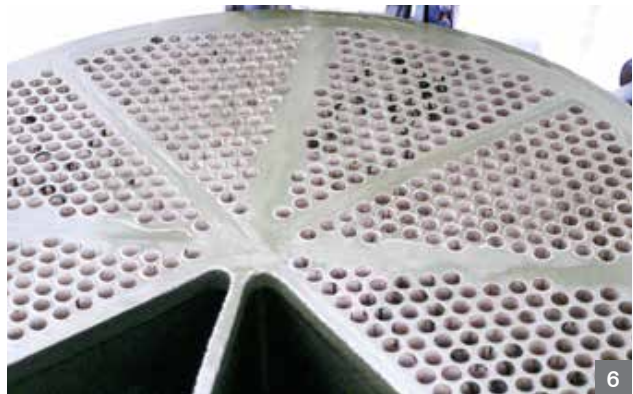
**MetaLine® 100 XTM** – brushable or castable

Novolac coating system. Semi elastic film properties. Extraordinary chemical resistance. Very low water absorption and permeability. Color is grey-anthracite.



## Reference

- resonable thermal conductivity of 0.2 W/m·K (0.11 BTU/h · ft · °F)
- substantial flexibility of up to 380 % in order to withstand thermal elongation
- fast return to service within 24 hours after application







# Hydraulic Steelworks

MetaLine® Series 700 – Effective wear protection for hydropower plants

MetaLine® is a state of the art technology to increase service life in hydraulic steelworks. It sets benchmarks when it comes to elastomeric resistance and durability. A seamless, rubberlike, long-term protection against colliding flotsam, ice floes or climatic influences.

## Applications

- water vanes
- weirs
- wicket gates
- floodgates
- bulkheads
- sluices
- steel sheet piles



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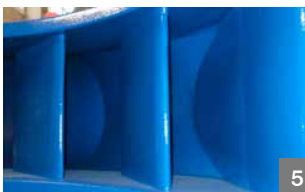
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## Reference

- weather resistant, non-chipping/peeling material properties
- **overhead** sprayability without thickness limitation (pic. 7)
- applicable by different tools including trowel or low & high pressure spray



# Cargo Loading Gates

MetaLine® Series 700 – Service-life extension for bulk cargo handling



Off-loading processes often require non-stick surfaces. To be more correct – **wear resistant** non-stick surfaces! MetaLine® 795 offers such characteristics thus being completely seamless compared to screwed or glued plastic plates. Food grade & easy to clean on top.

## Applications

- cargo gates
- off-loading chutes
- hopper and bunker installations



## Reference

- ultra-low coefficient of static friction  $\mu(0) = 0.15$
- available in different colours to have an active contrast controll of material build-up
- more wear resistant and **not tenting** under massive load like HDPE/PP/POM sheets





# Floating Hoses

MetaLine® Series 700 – **Service-life extension for bulk cargo handling**

Castable, trowelable and sprayable repair compounds. Can be applied in thick coats overhead or on vertical surfaces. Reduces fouling and maritime growth. Resistant to environmental and marine impact. Ultra wear resistant to cover dredging and mining demands.

## Applications

- hard rubber linings
- soft rubber linings
- natural rubber linings
- polyurethane linings
- polyurea linings



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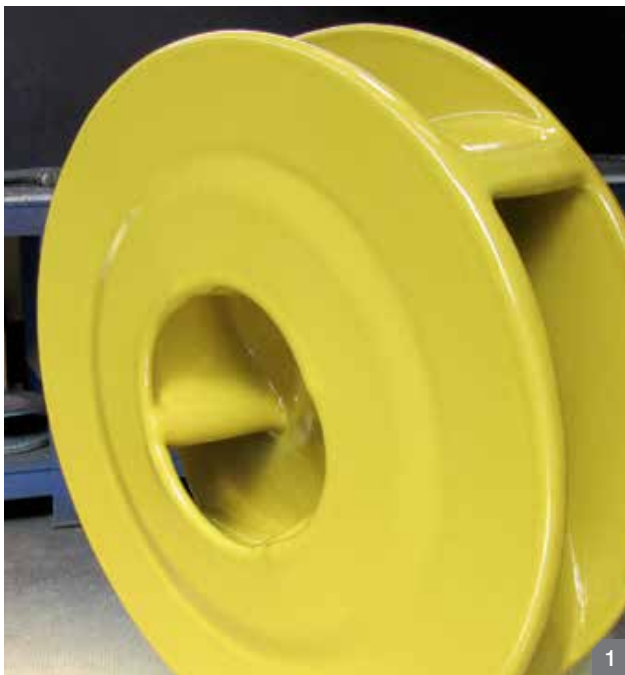
## Reference

- injectable to combat cracks and hard to reach failures
- suitable for structures subjected to massive bending forces (pic. 5)
- bonds extremely well to almost all natural rubber formulations



# Exploitation / Dredging

MetaLine® Series 700 – Service-life extension for bulk cargo handling



Sprayable elastomeric coatings to repair eroded metallic or rubber parts. Up to 50 times as resistant as epoxy-ceramic repair compounds. Suitable for sand and gravel up to 25 mm (1#) screening size.

NOT suitable for rocks!

## Applications

- pump impellers
- pump casings
- draft tubes
- suction strainers
- floating equipment
- floating pontoon
- barges



## Reference

- erosion resistance up to 25 % above AISI 316 (saltwater resistant stainless steel)
- installable in a thickness starting from 1 mm (40 mils) to unlimited
- **repairable** and overcoatable at any time at almost any location





# Thrusters

MetaLine® Series 700 – Cavitation protection for propulsion equipment

Extremely smooth elastomeric surfaces providing an increased efficiency under high speed fluid flow forces. Impacting torque is rebounded protecting the substrate from destroying erosion and material fatigue.

## Applications

- propulsion systems
- kort nozzles
- thrusters
- jet propulsion drives
- Voith-Schneider® propellers



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## Reference

- processable in tropical conditions at up to 100 % of humidity & high temperatures
- multistep product design to slow down borderline & galvanic corrosion
- **self-cleaning**, fouling release properties beyond 22 m/sec (72 ft/sec) flow speed



# Kort Nozzles

MetaLine® Series 700 – Cavitation protection for propulsion equipment



MetaLine® is a coating concept that absorbs shock loads and provides significant vibration damping instead of using inefficient paints or rigid epoxy resin compounds. This leads to an increased service life and less cost-intensive maintenance.

## Applications

- kort nozzles rings
- Z-Drives / L-Drives
- Azimuth thrusters
- Azipod thrusters
- stators
- rope guards



## Reference

- excellent **cavitation resistance** beyond all existing metallic structures
- approx. 55 % vibration dampending at a coating thickness of 4 mm (160 mils)
- visual wear control indicaton by colour changes during application (pic. 4/6)





# Jet Drives (Hamilton® / Voith®)

MetaLine® 700 – Cavitation protection for propulsion equipment

MetaLine®'s progressive engineering copies rubber characteristics however avoiding its typical restrictions & problems. Polymerization instead of vulcanization, resulting in an ultra-dynamic responsive spray-elastomer. Developed in order to protect.

## Applications

- stators
- steering nozzles
- deflectors
- frames



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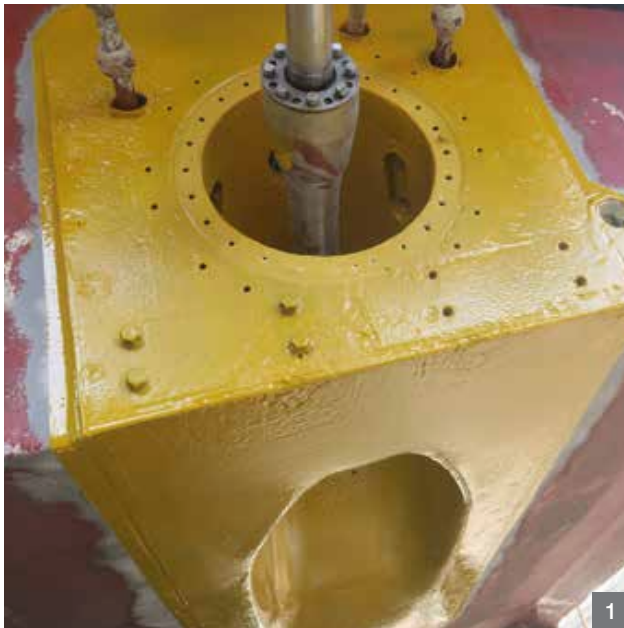
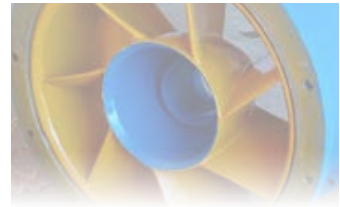
## Reference

- flow speed suitability of up to 70 m/sec (230 ft/sec)
- applicable to geometries impossible to reach by conventional rubber lining
- bonds to **all known metals** including brass, aluminium, stainless steel . . .



# Jet Drives (Rolls-Royce®)

MetaLine® 700 – Cavitation protection for propulsion equipment

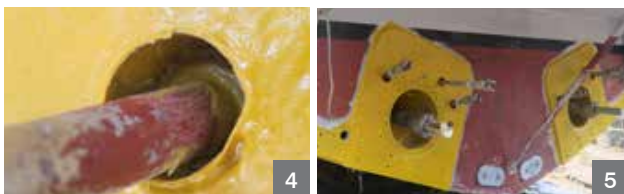


These aluminium made propulsion drives require a highly effective and durable protection against cavitation and electro-chemical deterioration. Paint, powder coating or galvanical treatments cannot withstand the massive mechanical forces.

MetaLine® absorbs destructive forces and smoothenes the surface thus maintain power & speed – particularly beyond 20 knots . . .

## Applications

- water intakes
- shaft tunnels
- deflectors



## Reference

- smooth surface structure to fight cavitation and turbulence
- **electrical insulation** properties prevent galvanic and pitting corrosion (pic. 3)
- structural born noise / sound reduction of up to 5 db(A)





# Propellers / Tail Shafts / Subsea Systems

MetaLine® Series 700 – Cavitation protection for propulsion equipment

Low weight material characteristic and a tensionless high bond nature to many different substrates. MetaLine® changes the underwater signature of subsea operating vessels.

## Applications

- drive shaft struts
- rope guards
- tail shafts
- propellers
- tidal turbines
- submarine antennas
- submarine rubber hull repairs
- ICCP shields



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## Reference

- approved up to 700 meter (2,300 ft) of diving depth in saltwater (pic. 6)
- adhesion / bond strength of up to 15 N/mm<sup>2</sup> (2,175 psi)
- good gamma radiation resistance and **nuclear decontaminability**



# Rudder Systems

MetaLine® Series 700 – Cavitation protection for propulsion equipment



Hard surfaces are no longer the “ultima ratio” for fighting cavitation. MetaLine® was the first coating supplier to offer professional resurfacing and protective elastomers to combat compression/tensile forces in the most aggressive cavitation zones.

## Applications

- rudder horns
- rudder blades
- rudder bulbs
- retractable fin stabilizers
- bilge keels



## Reference

- certified for rudders on ultra-fast operating defense vessels (pic. 9)
- free of any metal impurities and absolutely non-corroding
- “white paper” class approval by **Lloyd's Register**



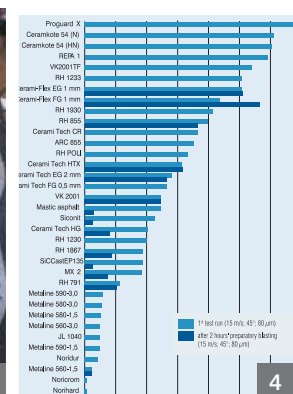
# Pump Volute

MetaLine® Series 700 – Wear protection for on-board installations

Up to 50 times (approved by e.g. KSB® / Andritz Hydro®) more wear resistant compared to famous epoxy-ceramic repair brands. Improving AISI 316 for about 25 % in its erosion resistance at an impacting angle > 40°.

## Applications

- casings made of grey cast iron
- casings made of stainless steel
- casings made of duplex steel
- casings made of special alloys



## Reference

- **ultra lightweight** product structure of 1.05 g/cm³ (0.038 lb/in³)
- capable to handle up to 60 % of solids in slurry applications (pic. 2)
- up to 550 % of life-time enhancement compared to grey cast iron volutes (pic. 4)





# Pump Impellers

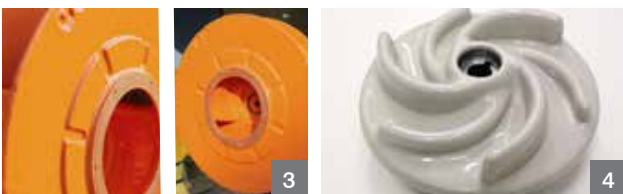
MetaLine® Series 700 – **Wear protection for on-board installations**



Extremely smooth surface properties, which can optionally be equipped with non-stick properties. This results in hydrodynamically optimized surface structures, which lead to energy savings and an increase in efficiency.

## Applications

- impellers made of mild steel
- impellers made of stainless steel
- impellers made of brass / aluminium
- impellers made of polyurethane
- impellers made of rubber
- impellers made of GFRP



## Reference

- up to 3.5 % of efficiency increase compared to casted steel surfaces
- superior erosion / cavitation resistance compared to stainless steel (pic. 1)
- resists waste & gray water as well as sewage





# On-Deck Applications

MetaLine® Series 700 – **Wear protection for on-board installations**

The seamless film finish promotes a great cleanability as well as a improving hygiene for food processing and storage. Slip protective structures can be implemented.

## Applications

- food fridge areas
- fish processing areas / equipment
- rescue equipment
- helicopter flight decks
- bulwarks
- shackles
- handrails / handles



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## Reference

- translucent and peelable corrosion protection design available (pic. 6)
- **solvent-free**, non-toxic meeting various food and pharma standards
- suitable from -50 °C (-58 °F) up to +120 °C (+248 °F) in dry environment



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# Hawser & Tow Rope Protection

MetaLine® Series 700 – **Wear protection for on-board installations**



Effective hawser protection is of importance for safety-related and economic reasons. High-performance tow ropes with interwoven Dyneema® protective tubes cause costs of up to 400 EUR per meter run.

Partial coating with MetaLine® 795 offers protection. Fibers are penetrated and prevented from wearing out while preserving the rope structure at the same time. Low static friction enables rope movements in the fairlead and in the trestle.

By different color combinations, optical warnings can be provided. However, a protective coating may only be applied if the rope core has not been damaged yet.

## Applications

- plastic or natural fiber ropes (no wire)
- hawser sections in the area of fairlead and trestle
- protection of the spliced in eyes
- rope-end sealing



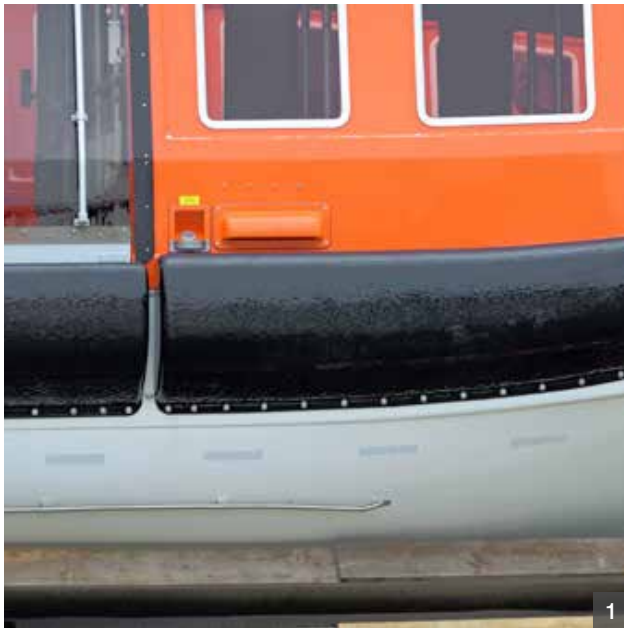
## Reference

- electrically fully non conductive (anti-static  $< 1 \times 10^9$  Ohm on request)
- implementable on-board in less than 30 minutes
- featuring natural or synthetic ropes of every diameter



# Onboard Rubber Repairs

MetaLine® Series 700 – Repair technology for rubber maintenance



Castable, trowelable and sprayable repair systems for the daily maintenance of rubber parts being abused by UV-radiation and saltwater exposure. Suitable on deck and under deck.

Slip resistant or slip enhancing, signal tints or dead colors, very thin or extremely thick, smooth or textured, in most cases far better looking than natural rubber.

## Applications

- Hoovercraft skirt boards
- impact bars
- hatch cover seals
- drains



## Reference

- no vulcanization / heat impact required for the installation
- normally inflammable (German B2 standard) in cured status
- 60 - 85 - 95 Shore A (soft / medium soft / medium hard) available





# Tug / Fender repairs

MetaLine® Series 700 – Repair technology for rubber maintenance

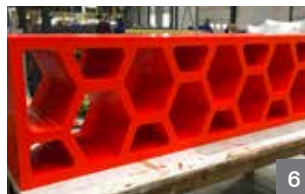


Tug boat operation requires massive dampening characteristics and cushioning effects to secure safe manouvering. Some times the load is simply too high and rubber structures fail.

MetaLine® Series 700 is made for repairs in extreme conditions – with a superb flexibility.

## Applications

- all types of tug
- pontoon protection
- special corner fenders
- ocean-going tugs
- bridge and pile protection



## Reference

- completely **free of shrinking/swelling** during cure
- **reinforcable** by synthetic mesh or metal wires / screens
- DIN 53516 dynamic abrasion index > 55 mm<sup>3</sup> (rubber > 120 mm<sup>3</sup>)



# Watersports Equipment

MetaLine® Series 700 – Fouling release properties for leisure boats



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Repairing or protecting sensitive synthetic naval surfaces. Equipped with a low coefficient of friction to facilitate the launching and recovery of sports equipment.

FRC-technology (**Fouling Release Coating**) in order to support cleaning or enable self-cleaning at high water velocity beyond 22 m/sec (72 ft/sec).

## Applications

- jet skis / kayaks / canoes
- diving equipment
- aluminium hulls
- seats / benches
- bilge sealings
- centreboards / keels
- anchor lockers
- bathing ladders / gangways
- slipways
- boat trailers
- rental equipment



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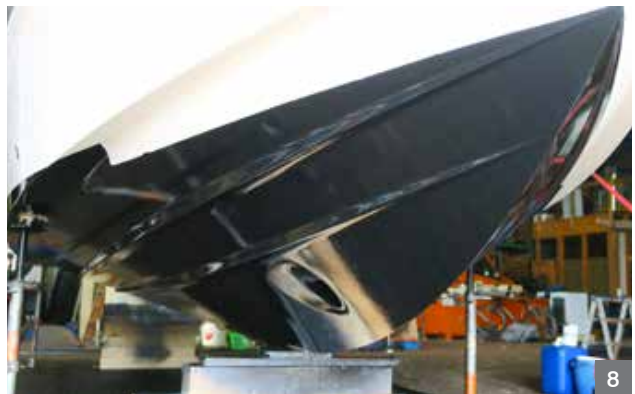
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## Reference

- free of biocides any other bleaching toxic substances
- prevents osmosis on GFRP substrates and increases the impact durability
- available in many different colours including **customer tinting** (except white)



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# Case studies

**MetaLine® Series 700 is used, amongst others,  
on board the following container ships, bulk carriers, car  
ferries, rigs, navy ships and fishing vessels**



1. Aenne Rickmers
2. Al Rahaba y 02
3. Albert Rickmers
4. Alexandra Rickmers
5. Alice Rickmers
6. Anapurna
7. Andre Rickmers
8. Andreas
9. Anglia
10. Annegret
11. Annette
12. Antje Wulff
13. Antonio Nores
14. AS Victoria
15. AS Vincentia
16. AS Virginia
17. Asiatic Wind
18. Asterdea
19. Avalon
20. Bahama Spirit
21. Balthasar Schulte
22. Barbara
23. **BENCHIJIGUA EXPRESS**
24. Benjamin Schulte
25. Berge Danuta

26. Betis
27. Boavista
28. Botnia
29. Brandy
30. BRITISH CORMORANT
31. British Falcon
32. British Kestrel

33. British Robin
34. BRITISH SAPPHERE
35. Bugsier
36. Callisto Glory Calisto
37. Caroline Russ
38. Cathrine Rickmers
39. Cheick el Mokrani
40. Chopin
41. CMA CGM Azure
42. CMA CGM Carmen
43. CMA CGM Comoe
44. CMA CGM Don Carlos
45. CMA CGM Don Giovanni
46. CMA CGM Don Pascuale
47. CMA CGM Faust
48. CMA CGM Jade
49. CMA CGM Onyx
50. CMA CGM Parsifal
51. Conti Canberra
52. Conti Equator

53. Cormone
54. Cosco China
55. CPO India
56. CSAV Catabrian
57. CSAV Houston
58. CSB40 - patrol boats
59. David Schulte
60. Deike Rickmers
61. Denderah Rickmers
62. Donnaconna
63. E.R. Athina
64. E.R. Dallas
65. E.R.Amsterdam
66. E.R.Arendal
67. E.R.Beijing
68. E.R.Bergen
69. E.R.Berlin
70. E.R.Canada
71. E.R.Denver
72. E.R.Felixstowe
73. E.R.India
74. E.R.Kobe
75. E.R.Kristiansand
76. E.R.Los Angeles
77. E.R.Santiago
78. E.R.Savannah
79. E.R.Shenzhen
80. E.R.Vittoria
81. Eastern Light
82. Eilbeck
83. Elbwolff
84. Esperanza N
85. Eurasian Higway
86. Excelsior
87. Fairplay 35
88. Finnsea
89. Finnsky
90. Finnsun
91. Finnwave
92. Fremm 4 Provence
93. Fremm 5 Languedoc
94. Fremm 6 Auvergne
95. Fremm 7 Bretagne
96. Gowind 2500
97. Hanjin Amsterdam
98. Hans-Günther Bülow
99. Helene Rickmers
100. Henriette Schulte

101. Hermann Wulff
102. Hermigon
103. Hispania Spirit
104. Honourable H. Jackmann
105. Ilse Wulff
106. Independent Accord
107. India Rickmers
108. Jansum
109. Johannes Wulff
110. John Wulff
111. King Seaways
112. Lavender
113. LNG Excellence
114. LNG Express
115. LNG Gemini
116. LNG Lagos
117. LNG Wilgas
118. Logos Hope
119. Maersk Edinburgh
120. Maersk León
121. Maersk Montana
122. Maersk Nottingham
123. Maersk Seoul
124. Maersk Sofia
125. Maersk Valentina
126. Maja Rickmers
127. Manuela Wulff
128. Maple Ace II
129. Marine Rickmers
130. Marita Star
131. Marta Schulte
132. Maya Rickmers
133. Merkur Star
134. Minna
135. MOL Dedication
136. MOL Delight
137. MOL Destiny
138. MOL Devotion
139. MOL Dominance
140. Montesperanza
141. MSC Bendetta
142. MSC Brianna
143. MSC Firenze
144. MSC Florida
145. MSC Geneva
146. MSC Gina
147. MSC Irene
148. Nedlloyd Juliana
149. Nedlloyd Marita
150. Nedlloyd Valentina
151. Ningpo
152. Northern Grandour
153. Oaxaca



# Marine Classification



154. Pacific Jewel
155. Pacific Resolution
156. Passat Euro Max
157. Passat Spring
158. Passat Summer
159. Patricia Rickmers
160. Paul Russ GmbH
161. Pipistrello DP 4469
162. RHL Aqua
163. RHL Audacia
164. RHL Concordia
165. RHL Consientia
166. Rickmer Rickmers
167. Rickmers Antwerp
168. Rickmers Singapore
169. Rickmers Soul
170. Rio Teslin
171. Robert Rickmers
172. RT Claire
173. Sabine Rickmers
174. Salama
175. Santa Fiorenca
176. Santa Rosanna
177. Santa Rufina
178. Saules Krastas
179. Sea Danuta
180. Sean Rickmers
181. Spirit of Bangkok
182. St. Anna
183. St. Annstrand
184. Sunrise
185. Suse
186. Thomson Dream
187. Tianjin
188. Tilly Russ
189. Titan Glory
190. Togo
191. Toronto
192. Tsingtao Express
193. Uni Promote
194. Vicki Rickmers
195. Vyborgskiy1
196. WAF Motion
197. Wellington Express
198. Weser Stahl
199. Weserwolf
200. Westwood Pacific
201. Wiebke
202. Willi
203. Willi Rickmers
204. ZIM Antwerp
205. ZIM Rotterdam

## Two leading classification organizations confirming (letters of non-objective / white paper) that NO Class Approval is required for MetaLine®!

" ...

10. October 2013

### Subject: METALINE® 700

This is to confirm that Lloyd's register EMEA is of the opinion that this type of material is not liable for either materials approval or Type Approval.

The use of repair and refurbishment materials is considered on a case by case basis and is dependent on numerous factors which would preclude a Type Approval of this product.

" ...

" ...

Monday, 18. August 2014

Dear Sir,



"MetaLine® 785/795" products and in this regard we have discussed your submitted documentation/information with our London based Materials Section.

While we note that MetaLine® 785/795 are PU spray coatings please be informed that coatings **in general are not a class requirement** but, when used as repair tools then an assessment would be required on a **case to case basis**. ...

Very truly yours, W.P. Senebald

ABS Europe Ltd.  
Hermannstrasse 15  
D-20095 Hamburg

" ...







# Technical Data

## MetaLine® Series 700 – ultra dynamic responding spray-applied elastomers

	MetaLine® 760	MetaLine® 785	MetaLine® 795
<b>Preferred usage</b> (multi-purpose use is possible)	shock absorption rubber repairs noise deadening slip resistance	wear protection erosion protection cavitation protection electrical insulation	fouling release non-stick character corrosion protection fluid flow efficiency increase
<b>Processing</b> spraying / casting / injecting	APPLICATOR S-700 high pressure / low pressure	APPLICATOR S-700 high pressure / low pressure	APPLICATOR S-700 high pressure / low pressure
<b>Solids content</b> DIN EN ISO 3251	100 % by weight / volume no solvent / zero VOC	100 % by weight / volume no solvent / zero VOC	100 % by weight / volume no solvent / zero VOC
<b>Mixing ratio</b> cartridge based application process	2 : 1 by volume	2 : 1 by volume	2 : 1 by volume
<b>Consumption</b> theoretically per mm (40 mils) film thickness	1.25 kg/m <sup>2</sup> 0.25 lbs/ft <sup>2</sup>	1.20 kg/m <sup>2</sup> 0.24 lbs/ft <sup>2</sup>	1.20 kg/m <sup>2</sup> 0.24 lbs/ft <sup>2</sup>
<b>Processing time</b> at 60 °C (140 °F) material temperature	7 minutes	1 minute	1 minute
<b>Solidification</b> at 20 °C (68 °F) – dependent on stress	> 1.5 days	> 1 day	> 1 day
<b>Hardness</b> A.S.T.M. D2240-68	60 Shore A sprayed 65 Shore A casted	82 Shore A sprayed 85 Shore A casted	95 Shore A sprayed 98 Shore A casted
<b>Density</b> DIN EN ISO 1183-2	1.10 g/cm <sup>3</sup> 0.039 lb/in <sup>3</sup>	1.05 g/cm <sup>3</sup> 0.038 lb/in <sup>3</sup>	1.05 g/cm <sup>3</sup> 0.038 lb/in <sup>3</sup>
<b>Pull-off adhesion strength</b> A.S.T.M. D4541	> 15 N/mm <sup>2</sup> (Steel S235JR) > 2,175 psi (Steel ASTM A36)	> 15 N/mm <sup>2</sup> (Steel S235JR) > 2,175 psi (Steel ASTM A36)	> 15 N/mm <sup>2</sup> (Steel S235JR) > 2,175 psi (Steel ASTM A36)
<b>Tensile strength</b> A.S.T.M. D412-16	20 N/mm <sup>2</sup> 2,900 psi	20 N/mm <sup>2</sup> 2,900 psi	24 N/mm <sup>2</sup> 3,480 psi
<b>Tensile modulus at 100 % elongation</b> A.S.T.M. D412-16	6 N/mm <sup>2</sup> 870 psi	7 N/mm <sup>2</sup> 1,015 psi	13 N/mm <sup>2</sup> 1,885 psi
<b>Tear resistance</b> DIN 53 515	68 N/mm 388 pound/inch	55 N/mm 314 pound/inch	68 N/mm 388 pound/inch
<b>Elongation at break</b> A.S.T.M. D412-16	650 %	380 %	275 %
<b>Bashore resilience</b> DIN 53 512	63 %	45 %	27 %
<b>Coefficient of thermal conductivity</b> ISO 8302	0.2 W/K · m 0.11 BTU/h · ft · °F	0.2 W/K · m 0.11 BTU/h · ft · °F	0.2 W/K · m 0.11 BTU/h · ft · °F
<b>Dielectric surface resistivity</b> DIN EN 62631	> 7 x 10 <sup>10</sup> Ohm	> 7 x 10 <sup>10</sup> Ohm	> 7 x 10 <sup>10</sup> Ohm
<b>Dielectric breakdown voltage</b> DIN EN 60243	> 5,000 Volts/mm	> 5,000 Volts/mm	> 5,000 Volts/mm
<b>High temperature resistance</b> above water / under water	+ 100 °C / 212 °F dry + 60 °C / 140 °F wet	+ 120 °C / 248 °F dry + 60 °C / 140 °F wet	+ 120 °C / 248 °F dry + 60 °C / 140 °F wet
<b>Low temperature resistance</b> dry	- 50 °C - 58 °F	- 50 °C - 58 °F	- 50 °C - 58 °F
<b>Linear abrasion (Taber®)</b> A.S.T.M. D4060, H-22, dry, 1 kg, 1,000 revolutions	n.a. n.a.	8.2 mg 0.12 grain	10.5 mg 0.16 grain
<b>Dynamic abrasion</b> DIN ISO 4649	85 mm <sup>3</sup> 0.005 in <sup>3</sup>	55 mm <sup>3</sup> 0.003 in <sup>3</sup>	65 mm <sup>3</sup> 0.004 in <sup>3</sup>
<b>Coefficient of static friction</b> DIN EN ISO 8295	μ(0) = approx. 0.7	μ(0) = approx. 0.6	μ(0) = approx. 0.15
<b>Approvals (dry)</b> pharma & food conformity	FDA 177.1680 (21) EU 1935/2004	FDA 177.1680 (21) EU 1935/2004	FDA 177.1680 (21) EU 1935/2004
<b>Approvals (wet)</b> drinking (potable) water conformity		BS 6920 Part 2.6 AS/NZS 4020:2005	
<b>Purity</b> formulation being free off	no free isocyanate no polyurea, no silicone	no free isocyanate no polyurea, no silicone	no free isocyanate no polyurea, no silicone

# Cost Effectiveness



## And what about the cost effectiveness?

MetaLine® is often more efficient and cost-effective than OEM replacement parts and longer lasting than other means of repair. When comparing prices with conventional synthetic repair methods (such as epoxy-ceramic or trowelable rubber repair grouts) the MetaLine® technology is impressive, providing **cost savings of up to 60 %**. For example, 1 kg (2.2 lbs) of MetaLine® Series 700 covers almost 1 m<sup>2</sup> (10.7 sqft) in a thickness of 1 mm (40 mils). For an identical coverage of epoxy-ceramic, more than 2 kg (4.4 lbs) would be required!

For start-up users, we recommend the **MetaLine® Onboard-Kit**. This fully equipped set comes with:

- stable aluminium transport box
- SP-1 blasting gun and blasting grit
- Applicator S-700
- spare nozzles
- cleaning agent
- primers for metal and rubber
- Series 700 coating product
- mixing tools and brushes
- disposable gloves
- masking tapes
- detailed **Processing Instructions**



**FDA**  
Certified pharmacy  
quality as per CFC  
177.1680 (title 21)

The MetaLine® Onboard-Kit is complete & ready to start at any time at any place. Surface preparation, cleaning, masking, spray-equipment, coating material – all in one. Shelf life about 2 years.

MetaLine® – by professionals for professionals ...

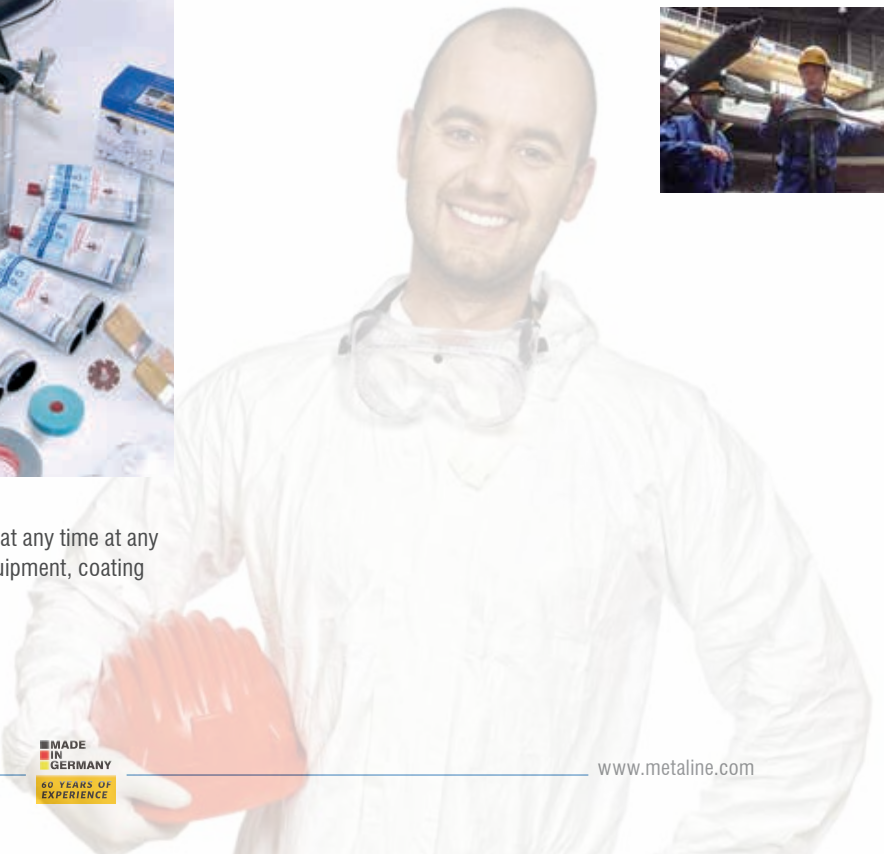
## “Pimp” your crew!

We support your crew during the technical implementation of our coatings.

A MetaLine® trainer will instruct your team regarding the realization of professional repairs – in many different languages and almost **any place in the world!** Alternatively, you may also send your employees to our German training center to attend a certified training session there.

For us it is very important that **your crew** achieve solid and reliable results. Therefore, we offer you our experience, our advice and our proven support.

MetaLine® encompasses a lot more than just the sale of products ... you may take our word for this!





# MetaLine®.com

surface protection

**cavitation** protection  
**permanently elastic**  
**fouling release**  
**non-stick** function  
**shock absorbing**  
**speed enhancing**  
**slip resistant**



You will find MetaLine® products being used in various industries such as:

- |                            |                            |
|----------------------------|----------------------------|
| ■ Aeronautical Engineering | ■ Nautical                 |
| ■ Automation Technology    | ■ Occupational Safety      |
| ■ Automotive Manufacturing | ■ Offshore & Marine        |
| ■ Ceramics Industry        | ■ Packaging Technology     |
| ■ Chemical Industry        | ■ Petro-Chemical           |
| ■ Concrete Production      | ■ Pharmaceuticals          |
| ■ Conveyor Technology      | ■ Plastics Processing      |
| ■ Electrical Engineering   | ■ Power Plant Technology   |
| ■ Fertilizer Production    | ■ Pulp & Paper             |
| ■ Foodstuff Processing     | ■ Recycling Technology     |
| ■ Glass Processing         | ■ Surface Technology       |
| ■ Metal Foundries          | ■ Textile Machinery Design |
| ■ Mining Technology        |                            |
| ■ Municipal Technology     |                            |
- ... and many more

Simply trust MetaLine's "Engineering made in Germany"!



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globalpumps.com.au/gsp

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K-700 Maritime (EN), July 2023