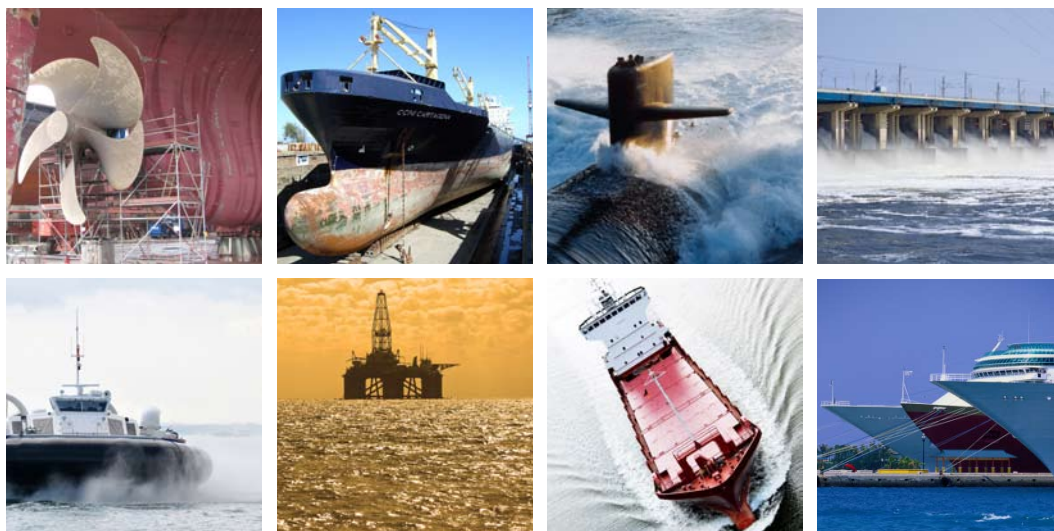


Elastomeric repair coatings offering
long-term protection against erosion,
corrosion, cavitation and wear

MetaLine® Series 700 Cartridge Spray Coating

... the new dimension in repair technology
after 50 years of brush-applied epoxy-ceramic



A leading technology of the world - made in Germany



MetaLine® Series 700

Rubberlike, sprayable wear protective coatings to solve erosion, corrosion and cavitation problems on-board

*More than 50 years of surface protection experience at MetaLine has led to **Series 700** - a product line combining the wear and tear resistance of rubber with the simple processing of epoxy-ceramics. Exceptional lifetime improvements are the result! In interaction with the novel cartridge spray processing: a **milestone** in the long-term protection of metallic structures!*

Natural rubber is a proven wear and corrosion protection material. However, with **seams** that tend to fail, its limited repairability and the massive equipment need for field vulcanisation. Rapid on-site lining is simply not possible. In case of repairs, quite often epoxy-ceramic blends are used instead. However, replacing soft rubber with semihard plastic-based compounds is an unreliable approach . . .

MetaLine Series 700 is an elastomeric coating system that offers a far superior solution. It combines rubber quality features with a novel spray application technique based on cartridge processing. Using this technology, it is possible to apply **sprayable elastomeric wear protective coatings** directly on-board, professionally, rapidly and **seamlessly**. The product is based on a special PUR-Elastomer technology that does not require hot vulcanisation.

The MetaLine cartridge spray gun mixes the product automatically and sprays it on. A hydrodynamic resistant protective coating is created which develops an **erosion and cavitation resistance** so far not achieved. The dynamic wear resistance is exceeded by **up to 50 times** (*) compared to high-end epoxy-ceramics!

MetaLine Series 700 is extremely convincing owing to its professional spray application as well as the extraordinary **surface smoothness** and resultant improvement in **flow efficiency**. Efficiency increases of up to 3.5% can be expected.

This unique process is suitable for the entire protection of metal components as well as for the partial repair of existing rubber linings or parts.

Time savings

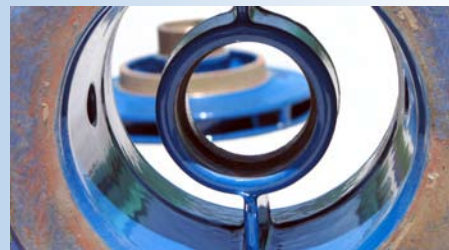
Performance improvement

Lifetime extension

Cost reduction



The daily repair routine when epoxy-ceramic compounds are brush applied. No hydraulic engineer wants to see irregular surfaces like this . . .



What a difference - MetaLine surfaces are smoother than any steel casting and about 500 % more wear-resistant compared to mild steel () . . .*

**) Proven by independent research laboratories and OEM pump manufacturers such as KSB AG (Technik kompakt, 12/2004) or ANDRITZ AG*



Case Studies

MetaLine Series 700



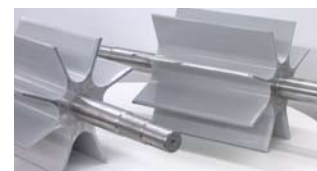
MetaLine Series 700 is used, amongst others, on board the following container ships, bulk carriers, car ferries or fishing vessels:

MV Berge Danuta	MV Uni Promote
MV Hanjin Amsterdam	MV Santa Fiorenca
MV Independent Accord	MV Rio Teslin
MV Logos Hope	MV Asiatic Wind
MV Antonio Nores	MV RT Claire
MV Tsingtao Express	MV Conti Equator
MV Santa Rosanna	MV MSC Firenze
MV Conti Canberra	MV Hermigon
MV Wellington Express	MV Anapurna
MV Hans-Günther Bülow	MV Togo
MV Antje Wulff	MV Toronto
MV Ilse Wulff	MV Paul Russ
MV John Wulff	MV Cormone
MV Johannes Wulff	MV St. Anna
MV Manuela Wulff	MV Suse
MV Hermann Wulff	MV Jansum
MV Hanjin Amsterdam	MV Weserwolf
MV Caroline Russ	MV Elbwolf
MV CMA CGM Comoe	MV E.R. Denver
MV Aenne Rickmers	MV E.R. Savannah
MV Albert Rickmers	MV E.R. Dallas
MV Alexandra Rickmers	MV E.R. Beijing
MV Alice Rickmers	MV E.R. Berlin
MV Andre Rickmers	MV E.R. Kobe
MV Cathrine Rickmers	MV E.R. Santiago
MV Deike Rickmers	MV E.R. Felixstowe
MV Denderah Rickmers	MV E.R. Amsterdam
MV Helene Rickmers	MV E.R. Canada
MV India Rickmers	MV E.R. India
MV Marine Rickmers	MV E.R. Los Angeles
MV Maya Rickmers	MV E.R. Shenzhen
MV Pacific Resolution	MV E.R. Vittoria
MV Patricia Rickmers	MV E.R. Arendal
MV Rickmer Rickmers	MV E.R. Bergen
MV Robert Rickmers	MV E.R. Kristiansand
MV Sabine Rickmers	MV Mol Dedication
MV Sean Rickmers	MV MOL Devotion
MV Vicki Rickmers	MV MOL Delight
MV Willy Rickmers	MV MOL Dominance
MV Rickmers Antwerp	MV MOL Destiny
MV Rickmers Seoul	MV Titan Glory
MV Rickmers Singapore	MV Callisto Glory
MV Fremm 4 Provence	MV Marita Star
MV Nedlloyd Juliana	LNG Gemini
MV Nedlloyd Marita	MV Annette
MV Nedlloyd Valentina	MV Annegret
MV Northern Grandour	MV Botnia
MV CSAV Catabrian	MV Anglia
MV Westwood Pacific	MV Andreas
MV Maersk Sofia	MV Wiebke
MV Maersk Nottingham	MV Merkur Star
MV Maersk Valentina	...

MetaLine® Series 700

novel wear protective coating system to repair damaged rubber parts or to realise elastomeric in-situ linings of metal structures

- cooling water pumps
- seawater pipes
- ballast water treatment systems
- rudder blades
- seawater filters / strainers
- thusters and nozzles
- ship propellers
- stabilisers
- shaft brackets
- offshore splash zone protection
- hatch seals
- firefighting equipment
- pipe floats
- dredger pumps und chutes
- valves / fittings
- sewage treatment systems
- submarine antennas
- aluminium hulls / decks / walls
- food cold storage cells
- fish processing areas
- buoys / fenders
- ducts
- tidal turbines
- lock gate seals
- bulwarks
- fins / keels
- anchor pockets & chain lockers
- jetski & watersports equipment



**Lloyd's Register EMEA
examined in 10/2013**

metaline.com

Corrosion Protection

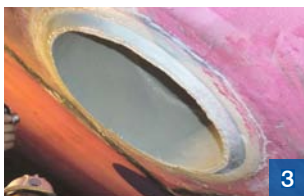
MetaLine Series 700



Seawater-Piping

Sprayable elastomeric coatings to reline used piping systems or for the initial treatment of new tubing. Particularly suitable for installations suffering from severe impact and abrasion

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



- 1 Proven rubberlike spray solutions for curved / contorted pipes
- 2 Seawater pipes during the spray coating at the drydock
- 3 Seawater inlet elastomerified with 2 mm MetaLine 785
- 4 MetaLine offers smooth surfaces - even on corroded parts
- 5 Internal flexible pipe coating including all flange areas
- 6 Seamless protection concept from the flange via the tube

Life-time Extension

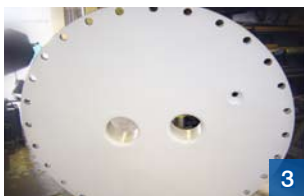
MetaLine Series 700



Filter / Strainers Water Treatment

Sprayable elastomeric coatings for the repair or complete re-lining of maritime filter equipment. Seamless homogenous rubber-like character. Fully closed coating concept starting from the complete interior up to the outer flanges

- strainer bodies
- strainer covers
- ballast water treatment reactors
- wastewater purification systems
- desalination equipment



- 1 MetaLine 785 coated strainers prior to installation
- 2 Seamless elastomeric spray lining of a used strainer
- 3 More resistant than rubber - the MetaLine elastomeric coatings
- 4 Resistant due to an integrated borderline anti-corrosion primer
- 5 Seawater filters with a 2-3 mm MetaLine liquid rubber lining
- 6 Coated ballast water treatment reactor waiting for assembly

Erosion Protection

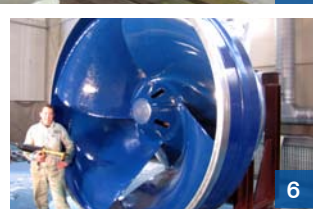
MetaLine Series 700



Pumps / Rotary Valves

Sprayable elastomeric coatings to refurbish worn parts or for the preventive maintenance of new equipment. Extremely resistant to erosion, cavitation and corrosion

- open impellers
- closed impellers
- spiral pump casings
- split case pumps
- submersible pumps
- vacuum pumps
- rotary valves
- cooling water pumps
- wastewater pumps



- 1 Seamless rubberlike lining for maximum erosion protection
- 2 Elastomeric heavy duty wear protection for pump casings
- 3 MetaLine 785 protects wastewater pumps on cruise ships
- 4 No matter what size - MetaLine has hardly any restrictions
- 5 Saltwater corrosion protection with long-term warranty
- 6 Tested and proven for any size of pumping systems

Wear Protection

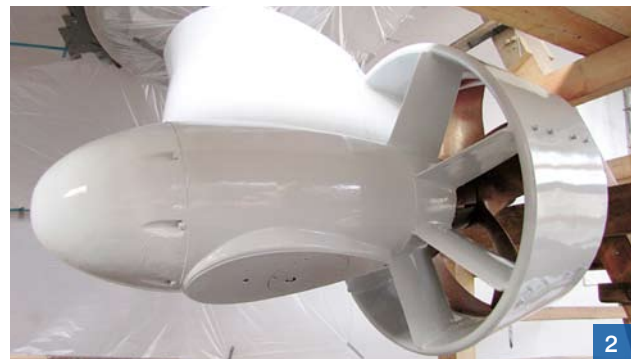
MetaLine Series 700



Propulsion-Drives

Sprayable elastomeric coatings to protect against impact and high-fluid flow forces. These rubberlike linings create a completely seamless and extremely smooth surface which provides increased efficiency

- propulsion systems
- kort nozzles
- thrusters
- Z- / L-Drives
- jet propulsion drives
- Voith-Schneider® propellers



- 1 MetaLine's elastomeric technology – no chance for impact
- 2 Smooth surfaces to fight against cavitation and turbulence
- 3 MetaLine coatings – designed for immersion purposes
- 4 Electrical insulation properties prevent galvanic corrosion
- 5 Fluid flow, performance & cost optimisation with MetaLine
- 6 State-of-the-art seamless elastomeric spraylinings

Impact Protection

MetaLine Series 700



On-Deck-Applications

Sprayable, decorative elastomeric coatings to enhance slip protection on board. The seamless and smooth film finish promotes cleanability as well as improving hygiene for food processing and storage

- food fridge areas
- fish processing areas
- fishnet weights
- rescue equipment
- helicopter flight decks
- skirting boards
- bulwarks
- shackles
- handrails / handles
- rope-end sealing



- 1 Impact-resistant long-lasting on-deck corrosion protection
- 2 Fish processing areas & cold storage cells covered seamlessly
- 3 Elastomeric saltwater protection for the Offshore & Navy
- 4 A safe technology at sea - sprayed rubberlike properties
- 5 Bulwarks, anchor lockers, hatches with sound-deadening spraylining
- 6 Decorative sliding protection on steps, bathing ladders, gangways ...

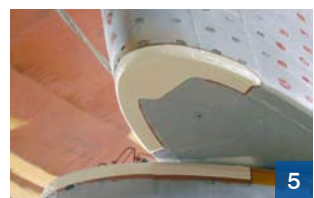
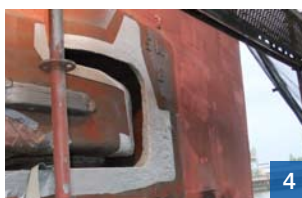
Cavitation Protection

MetaLine Series 700

Rudder-Systems

Trowelable or sprayable elastomeric repair compounds to resurface worn metallic structures. Applicable in every desired thickness. Highly elastic and extremely resistant against severe cavitation forces

- rudder horns
- rudder blades
- side thrusters
- retractable fin stabilisers
- bilge keels



- 1 *MetaLine - feels at home in highly abused areas*
- 2 *Rudder with a final topcoat after MetaLine 785 partial coating*
- 3 *MetaLine in dry-dock operation - no vulcanisation required*
- 4 *Seamless and tensionless elastomeric lining on-site*
- 5 *Reconstruction of the missing structure and preventive protection*
- 6 *High-tech engineering and cost savings "Made in Germany"*

Non-Stick Properties

MetaLine Series 700



Valves / Fittings / Tubing

Sprayable elastomeric coatings to protect the interior and exterior against saltwater corrosion. Resists chemical exposure within a pH range between 3 and 11. Non-stick characteristics are present. Available in 7 different colours

- butterfly valves
- stop valves
- compensators
- spigots
- throttle valves
- gaiters
- fireplugs
- fire-extinguishing water supply pipes



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- 1 Large valve after elastomerisation with MetaLine 785
- 2 Firefighting systems during the protective coating process
- 3 Even stainless steel can be improved with MetaLine . . .
- 4 2 mm MetaLine 785 elastomeric lining inside this ball valve
- 5 Slurry stop valve after overhaul with MetaLine products
- 6 Saltwater valve fully encapsulated with MetaLine 795

Surface Protection

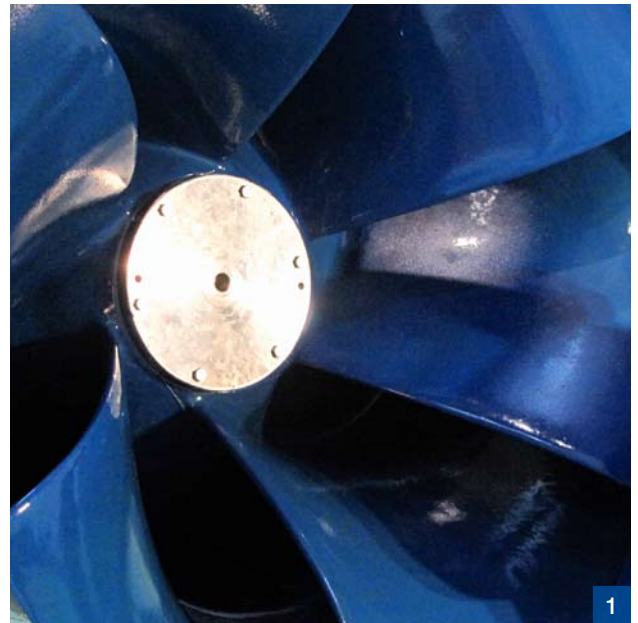
MetaLine Series 700



Propellers Subsea Systems

Sprayable elastomeric coatings to protect against cavitation, bio-corrosion and fouling. Low weight material characteristic with a density of 1.05 g/cm³. Tensionless high bond to many different substrates. Changes the underwater signature of subsea operating vessels

- sportboat propellers
- steven systems
- ship propellers
- controllable-pitch propellers
- submarine screws
- submarine antennas
- submarine rubber hull repairs
- tidal turbines



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- 1 MetaLine changes the signature of subsea equipment
- 2 Midsize ship propeller during the coating process
- 3 MetaLine – elastomeric linings without hot vulcanisation
- 4 This might be the future of maritime propulsion protection . . .
- 5 Rubberlike coated aluminium propeller - suitable for saltwater
- 6 MetaLine coated steven bracket on a coast patrol boat

Spares Recycling

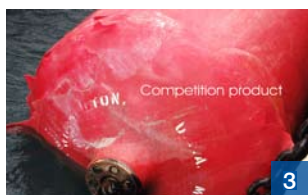
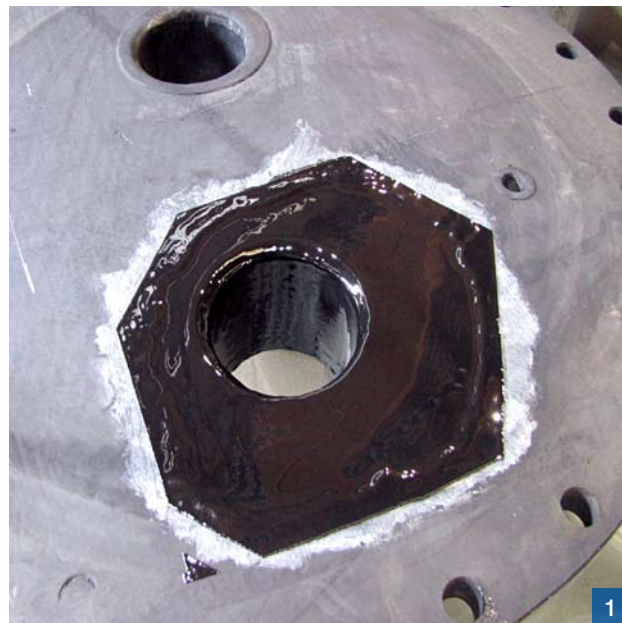
MetaLine Series 700



Rubber / Foam-Repairs

Castable, trowelable and sprayable repair compounds with elastomeric properties. Applicable on vertical surfaces or overhead. Can be used as a liquid gasket for flange sealing. Sticks permanently to different kinds of substrates without hot vulcanisation

- vulcanised rubber linings
- liquid flange gaskets
- hatch cover seals
- submarine rubber hull repairs
- fenders / buoys
- lifting bags / leak sealing bags
- hovercrafts
- dinghies / zodiacs®
- lock gate seals



- 1 Rubber-lined strainer cover during the MetaLine in-situ repair
- 2 Red soft rubber lining partially repaired with black MetaLine 760
- 3 Not a problem for MetaLine - but a disaster for our competition
- 4 Repair of a floatable leak-sealing bag using MetaLine 760
- 5 Broken rubber impeller during MetaLine overhaul
- 6 Liquid sealing of a seawater treatment unit with MetaLine 785

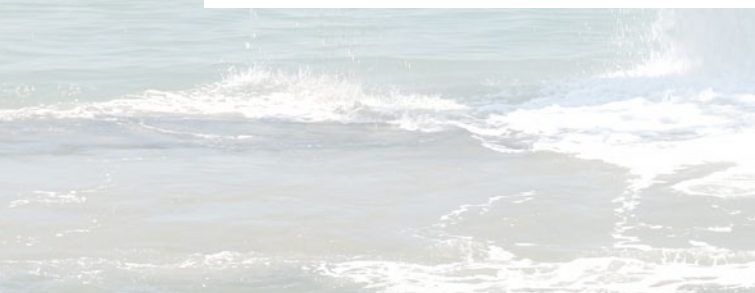
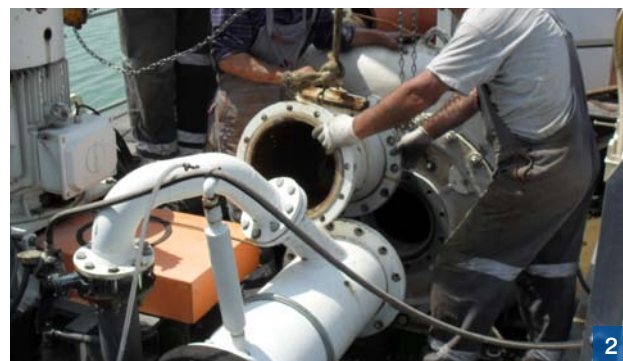
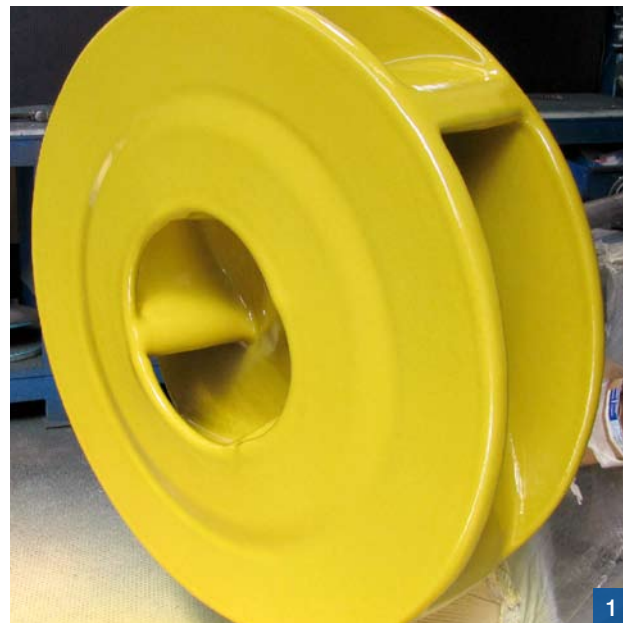
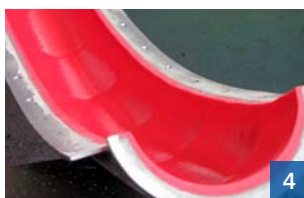
Abrasion Protection

MetaLine Series 700

Exploitation Dredging

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 screening size

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



- 1 Dredging impeller with a 25 mm thick coating of MetaLine 785
- 2 Reinstallation of a MetaLine-coated dredging pump casing
- 3 Large pump casing protected with MetaLine 785
- 4 Elastomeric protection inside a longitudinally split elbow pipe
- 5 Repaired rubber floating pipe from gravel extraction
- 6 MetaLine offers flow-optimised, smooth pump geometries

Saltwater Protection

MetaLine Series 700



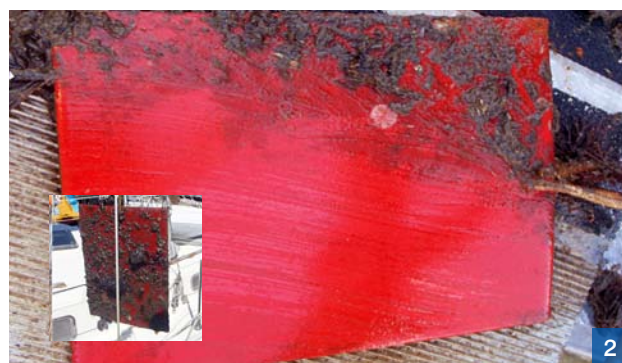
Water-Sports-Equipment

Brushable, trowelable or sprayable elastomeric products to repair or protect sensitive synthetic naval surfaces. A low coefficient of friction is available in order to ease launching and retrieving of sports equipment

- jetskis
- 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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- 1 Life enhancement and value preservation for boat owners
- 2 Marine growth takes place - the difference is easy removal
- 3 Repair / renewal coating of PE-foam rental equipment
- 4 Aluminum floating equipment coated with "liquid rubber"
- 5 Glide-enhancing coating to ease retrieval of water jets
- 6 Impact-resistant sealing & scratch protection beneath the water line



MetaLine® Series 700 Spray-Elastomers

	MetaLine 760	MetaLine 785	MetaLine 795
Hardness (Sprayed / Casted) (A.S.T.M. D2240-68)	60 / 65 Shore A	82 / 85 Shore A	95 / 98 Shore A
Density (DIN 53 479)	1.10 g/cm ³	1.05 g/cm ³	1.05 g/cm ³
Tensile Strength (A.S.T.M. D412-68)	20 N/mm ²	20 N/mm ²	24 N/mm ²
Tensile Modulus at 100% elongation (A.S.T.M. D412-68)	6 N/mm ²	7 N/mm ²	13 N/mm ²
Tear Resistance (DIN 53 515)	68 N/mm	55 N/mm	68 N/mm
Elongation at Break (A.S.T.M. D412-68)	650%	380%	275%
Bayshore Resilience (DIN 53 512)	63%	45%	27%
Coefficient of Thermal Conductivity (DIN 52 612)	0.2 W/K·m	0.2 W/K·m	0.2 W/K·m
Dielectric Surface Resistivity (DIN 53 482)	7 x 10 ¹⁰ Ohm	7 x 10 ¹⁰ Ohm	7 x 10 ¹⁰ Ohm
Dielectric Breakdown Voltage (DIN 53 841)	> 5 Kv/mm	> 5 Kv/mm	> 5 Kv/mm
Temperature Resistance (dry / wet)	+100 °C / +60 °C	+120 °C / +60 °C	+120 °C / +60 °C
Taber Abrasion (A.S.T.M. D1-044-73 - Rad H-22, dry, 1 kg, 1.000 rpm)	n.d.	8.2 mg	10.5 mg
Abrasion (DIN 53 516)	80 mm ³	70 mm ³	n.d.
Coefficient of Static Friction (DIN EN ISO 8295)	μ(0) = approx. 0.7	μ(0) = approx. 0.6	μ(0) = approx. 0.2
Solids Contents (DIN EN ISO 3251)	100%	100%	100%
Solidification (at 20 °C - dependent on stress)	> 1.5 days	> 1 day	> 1 day
Coverage (theoretically per mm film thickness)	1.20 kg/m ²	1.20 kg/m ²	1.20 kg/m ²
Approvals (international)	FDA 177.1680 (21)	FDA 177.1680 (21)	FDA 177.1680 (21)
Preferred usage (multi-purpose use is possible)	shock absorption slip resistance noise deadening rubber repairs	wear protection erosion protection cavitation protection signature change electrical insulation	anti-fouling performance glide enhancing corrosion protection increased efficiency improved hygiene

Product-Details & Costs

MetaLine Series 700



The Product

MetaLine Series 700 is a **solvent-free** 2-component elastomeric repair and coating process. It is applied by either spraying, injecting or pouring. Polymerisation begins after 1 minute so that even on vertical surfaces, coating thicknesses between 1 and 20 mm can be achieved quickly. MetaLine Series 700 can be used directly on-board in almost **any climatic** conditions (e.g. even in high humidity).

MetaLine Series 700 adheres to most substrates, including steel, brass, aluminum, bronze, rubber, concrete and many plastics. It is not necessary to heat the components to be coated. After approximately 5 minutes the coating is dry to touch and service can start after about 24 hours (at 20 °C). Maximum temperature resistance is between **-50 °C and +120 °C**, depending on the relevant application.

MetaLine Series 700 cures without tension and in addition to its chemical adhesion develops a mechanical **memory effect**. This presses the coating permanently against the substrate counteracting any separation tendency as it is the case with conventional rubber sheets. MetaLine Series 700 can be recoated and repaired with itself at any time! Three different degrees of hardness are available:

■ **MetaLine 760** (60 Shore A) serves to repair damaged soft rubber linings or conveyor belt top covers

■ **MetaLine 785** (85 Shore A) is the first choice for the protection of components subjected to wear, impact, erosion and cavitation

■ **MetaLine 795** (95 Shore A) develops non-stick properties owing to the low coefficient of static friction

Lloyd's Register EMEA examined the MetaLine Series 700 coatings in and confirmed that "... MetaLine is NOT liable for either materials approval or type approval ...". MetaLine Series 700 pass FDA standards by the US authorities and are classified as **drug and food-safe**.

The outstanding durability of MetaLine Series 700 is based on its erosion/cavitation resistance which is comparable to high-alloy steels. With a specific density of 1.05 g/cm³ it is the most **lightweight** duroplastic wear protection concept available. Compared to metallic armouring, substantial energy savings can be realized when applied to impellers.



Application

The novel MetaLine cartridge spray process is based on air-dispersed, **low-pressure spraying** in connection with a pneumatically controlled continuous material flow.

Surfaces to be coated must be dry, clean, **desalinated**, grit-blasted and primed with MetaLine primers.

By means of the MetaLine **cartridge spray gun** the required amount of material is sprayed off, similar to a 'DIY' spray can. Mixing takes place in a plastic disposable mixer acting as an atomiser nozzle at the same time. Partially used cartridges can be reused at a later point.

The gun does not get into contact with the coating material as this is processed directly off the cartridge packaging. **No spray equipment cleaning** is needed.

Application is similar to wet-paint processing, although no solvent is involved. Compressed air with 5 bar (70 psi) pressure and a volume of 300 litres (80 gal) is necessary.

Pricing

In contrast to epoxy-ceramic, the cost is surprisingly **low**! As 1 litre of MetaLine Series 700 corresponds to a volume of 2.5 kg epoxy-ceramic, MetaLine offers **cost savings of up to 60%**. With smaller coating areas, the MetaLine material cost amounts to roughly 80 EUR/m² for a 1 mm thick protective coating.

For first-time users the **MetaLine On-Board Surface Protection Kit** is recommended. This is a fully equipped mobile workshop including grit-blasting gun, cartridge gun, cleaning agent, primers, spare nozzles, blasting grit, roughening tool, brushes, masking tapes, gloves, processing instructions and 10 kg of MetaLine's Series 700 coating material. All seaworthy packed in a practical aluminium box (see illustration above):



Only 2,670 EUR (net price - ex stock Germany)

The shelf life amounts up to 2 years. Have the **MetaLine On-Board Surface Protection Kit** on-board and be safe if need for repair arises!



- Protect
- Repair
- Save

For more than 50 years

MetaLine has its headquarters near Stuttgart (southern Germany) and, through our sales partners, we are represented in more than **70 countries**.

When handling our coating materials, we attach great importance to expert **instruction** and customer support. To realise this objective, we offer expert **training that lasts from one to several days** at our premises or if more convenient, on-site. Our experienced trainers are at your disposal!

Training can be held in German, English, French, Spanish and Italian. Also, we are able to offer discussions about concrete problems and product demonstrations by means of **online video conferences**.

Do not hesitate to contact us!

MetaLine[®]
protect ■ repair ■ save
proven coating systems since 1960

You will find MetaLine products in most industrial areas such as automation technology, mining industry and mining technology, pulp & paper, petro-chemical, power plant technology, foodstuff processing, concrete production, municipal technology, pharmaceuticals, chemical industry, recycling technology, plastics processing, electrical engineering, glass processing, conveyor technology, fertiliser production, ceramic industry, surface technology, occupational safety, automotive manufacture, metal foundries, packaging technology, aeronautical engineering, textile machinery construction . . .

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