MetaLine®.com

surface protection

Elastomeric repair coatings

Automotive, Energy Supply, Exploitation, Recycling
Food & Pharma, Pulp & Paper, Water Purification, HVAC

MetaLine® Series 700

fighting against erosion, corrosion, cavitation, wear & tear, breakage, noise, stickiness

Equipment life is just too short without protection!

MADE IN GERMANY

60 YEARS OF EXPERIENCE

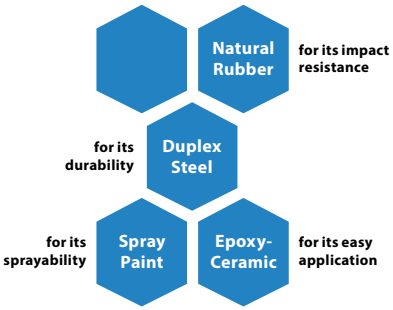
Product Properties

Changing surfaces to the better ...

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

MetaLine® Series 700 incorporates the primary technical characteristics of completeley different materials: The application process is as straight-forward 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-site!

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.

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-&-error approach to finding out which, if any, such products actually do help. Now, in order to shed some light in the dark area of coating technology, KSB has conducted a voluminous series of pertinent tests at its materials laboratory in Pegnitz.

Bernd Schramm
Anja Dieses
Andreas Kühl

Pump materials are subject to very complex loads & stresses. The structural and hydraulic design of pumps involves thermal and mechanical stress exposures. Additionally, all wetted surfaces are exposed to the effects of the fluid itself. Depending on the nature of the fluid, such causalities can cause corrosive, abrasive and cavitation damage to pump components. Grey cast iron and low-alloy steel are standard materials for drinking water pumps, wastewater disposal pumps and cooling water pumps – the main determining factors being price, workability and availability. However, due to their limited resistance and durability, such materials soon come up against their duty limits when they are exposed to solids-laden or corrosive pumped fluids – as evidenced by damaged hydraulic components, e.g. impellers and volute casings. To avoid the need for expensive stainless materials in such cases, the industry makes and sells a wide range of coatings as alternative solutions. However, it is usually difficult to locate a really suitable kind of coating, because there are any number of boundary conditions to be satisfied.

Hard phases (very hard particles of ceramic material)

Fig.1 Upper casing half of a big water pump, with epoxy resin base coating for test purposes.

Fundamental criteria:

- chemical resistance with respect to the fluid
- an service temperature
- geometrical accessibility of the component for the application of a coating
- potable water approval for the coating
- machineability of the coating on sealing surfaces and in gap areas

For users, the problem is to locate among all the various makes and types a coating to fit the case at hand. The producers' advertising vocabulary is full of terms like "extremely wear-resistant", "outstandingly resistant to corrosion", "hard-wearing", "resistant to cavitation" and so on, but all that is of little help. In order to realistically assess such products' fitness for use in and on pumps, KSB subjected a large number of products to wear and cavitation tests.

Two groups of coatings

On the basis of their respective organic binder phases, the coatings in question can be roughly assigned to one of two categories: epoxy resins and polyurethanes.

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techno digest No. 10, December 2004 © KSB Aktiengesellschaft

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!

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+2

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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® APPLICATOR S-700 with Series 700 double cartridges

Video The cartridge spray process

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 rubber linings and conveyor belts as well as optimizing the performance of functional rubber parts
- **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/cm³ (0.038 lb/in³), it is the **most lightweight duroplastic wear protection** available. The potential energy savings when applied to impellers and rotors are considerable.

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

Fields of Application

MetaLine® Info Series 700 – **Available PDF download brochures**

click your brochure

Marine / Sub-Sea-Technology Video

- BWT reactors & installations
- Exploitation/dredging
- Camouflage coatings
- Filter / strainers / water treatment
- Floating hoses
- Hawser & tow rope protection
- Jet drives (Hamilton®/Voith®)
- Jet drives (Rolls Royce®)
- Kort nozzles
- Onboard rubber repairs
- On-deck applications
- Propellers/tail shafts/subsea
- Rig – crack sealing
- Rudder systems Video
- Seawater-/scrubber piping
- Thrusters
- Tug repairs
- Watersports equipment

MetaLine® Series 700 coatings start where epoxy repair products fail – in the area of dynamic erosion and cavitation stresses. Impact, vibration, high velocities and temperature fluctuations are the preferred use for the elastomeric MetaLine® technology. Approved up to a diving depth of 700 meters (2,300 feet).

Pumps / Fluid-Flow-Technology Video

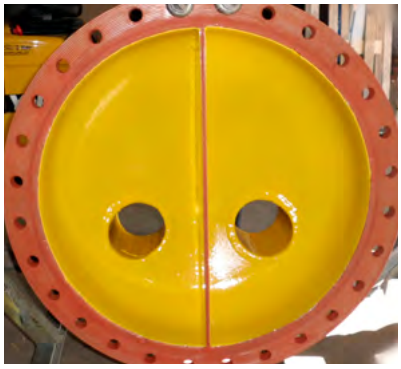
- Centrifuges/pulpers
- Elbow pumps
- Closed pump impellers
- Horizontal inline pumps
- Fish pumps
- Impellers (special shapes)
- Open pump impellers
- Pump semi-shells
- Spiral pump casings
- Pump volute refurbishment
- Pump impeller refurbishment
- Split case pumps
- Submersible pumps
- Vacuum pumps

The elastomeric MetaLine® coating technology is the great winner of the "KSB Pumps (Germany) coating test". In comparison with about 25 international competitors, our energy absorbing material process has established itself with an up to 35 (!) times higher erosion and cavitation resistance.

Fields of Application

MetaLine® Info Series 700 – **Available PDF download brochures**

General Manufacturing



- Cyclones / separators / sifters
- Rubber equipment spares
- Fans / blowers
- Gasket repairs
- Heat exchangers
- Heat exchanger housings

MetaLine® Series 700 elastomeric coatings offer solutions up to transport velocities of maximum 70 m/s (230 ft/s). Destructive energies occurring are initially absorbed by the soft coating (energy storage). Surfaces are protected durably against excessive stressing and structural loss caused by colliding particles.

Power Generation / Wastewater

- Agitators / mixers
- Biogas systems
- Francis impellers
- Hydraulic steelworks
- Immersed steel constructions
- Kaplan impellers
- Municipal technology
- Pressure pipes
- Turbine guide apparatus
- Filter / water management
- Water purificaton

The low weight of only 1.05 kg/m²/mm (0.22 lbs/sqft/40 mils) and the smooth surface geometry improve the fluid-flow efficiency better than ceramic protective systems. The elastic material structure is impact resistant and helps compensate for the continual variances in tension and pressure loads under cavitation.

Fields of Application

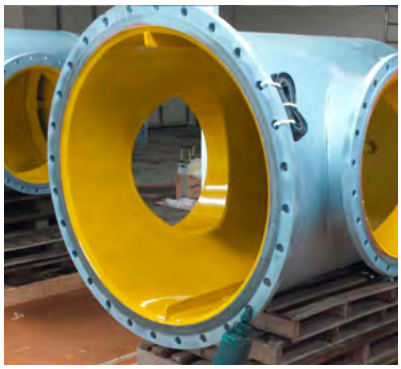
MetaLine® Info Series 700 – **Available PDF download brochures**

Mining / Quarrying

- Conveyor belts
- Fans/blowers
- Flotation tanks
- Flotation accessories
- General mining (1)
- General mining (2)
- Rubber equipment spares
- Solid rubber tires
- Screening decks Video
- Screening frames
- Screens/filters
- Screw conveyors Video
- Slurry pipes
- Spiral concentrators

Permanent resistance against system vibration is guaranteed. Volume abrasion according to DIN 53 516 standards amounts to only 55 mm³ (0.002 fl oz) in sprayed-on condition – significantly lower than the highest quality wear protection rubber coatings. Exposure to saltwater or de-mineralized water is permitted.

Petrochemical / Oil / Gas



- Ball valves
- Ball check valves
- Flanges/seals
- Flange encapsulation
- GFRP/CFRP-pipes
- Pipes (external coating)
- Pipes (internal coating) Video
- Pipes (internal coating) Semi-Automatic
- Silo constructions
- Tanks/containers
- Tank rubber linings
- Underwater rubber repairs
- Valves / fittings / tubing

Soft properties reduce bouncing forces and prevent cracking or peeling. Various application technologies are available for the internal coating of pipes from 75 mm (3 inches) diameter up to a length of 12 meters (40 ft). As a giudeline chemical resistance is given in a pH-range between 3 and 11.

Fields of Application

MetaLine® Info Series 700 – **Available PDF download brochures**

Automation / Robotics / E-Power

- Automation components
- Clamping/gripping tools
- Drive pulleys/rollers
- Electrical insulation
- Feeder bowls
- Lifting devices
- Vibratory chutes
- Weighing technique

MetaLine® is individually adapted to the geometry and surface stiction of the parts to be protected. Variation takes place in hardness, texture, coefficient of friction, thickness, color and eletrical conductivity. In most cases our services meet pharmaceutical standards according to FDA 177.1680 (Title 21).

Pharma / Food / Hygiene

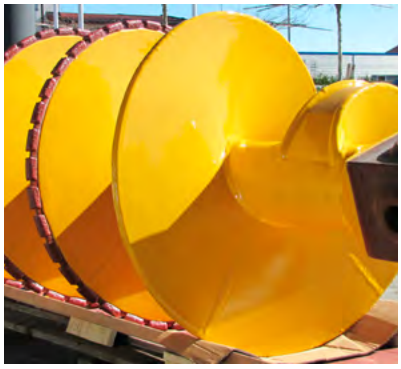
- Functional seats
- Food/Beverages
- Forklift attachments
- Occupational safety
- Orthopedics/sports equipment
- Pharmaceutical/medical engineering
- Ultra-pure production process
- Tank-Inliners

MetaLine® Series 700 coatings can be equipped with non-stick properties. The soft material characteristics protect against breakage, e.g. for frozen, glazed or impact-sensitive foodstuffs. Noise reduction is a welcome "side effect" of the elastic protective skin meeting (EU) No. 1935/2004 & (EU) No. 10/2011 regulations

Fields of Application

MetaLine® Info Series 700 – **Available PDF download brochures**

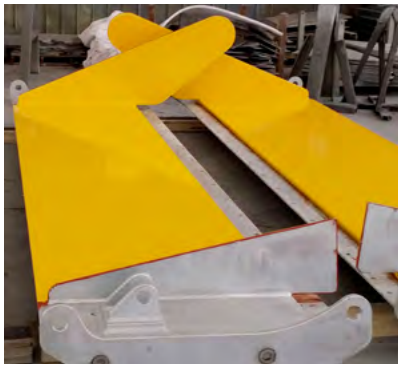
Construction / Concrete

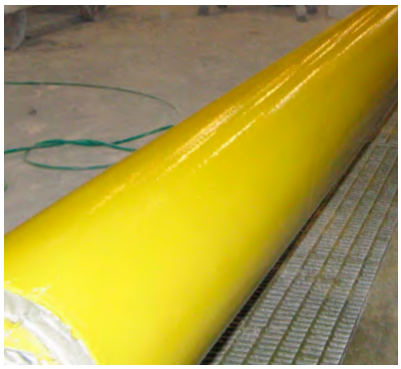


- Concrete molds — Video
- Concrete processing — Video
- Concrete structures
- Construction machines — Video
- Earthmoving equipment

Anti-adhesive properties minimize material buildup. Operational pressure forces create a wave-like movement in the rubber-like skin. Hard, sticky residues on top detach or at least start to crack – due to this artificial "shake off process".
Weather resistance is fairly good but not fully color stable.

Pulp / Paper / Glas / Recycling





- Bulk material plants
- Cargo loading gates
- Pulp/paper
- Dumpsters/containers

Noise reductions of up to 10 db(A) are possible. The required coating thickness varies between 1 and approx. 10 mm (40 to 400 mils) depending on the conveying speed, particle size, and output. The elastic, stretchable protective film is electrically insulating, but must not be used in explosion hazardous (ATEX) areas.

Fields of Application

MetaLine® Info Series 700 – **Available PDF download brochures**

Automotive / Aviation

- Automation components
- Aeronautical engineering
- Bellows
- Special tools
- Cathodic dip painting
- Plastic welding
- Protective covers for assembly
- Transporters/light trucks
- Vans/Pick-up
- Commercial vehicle self-coating Video
- Heavy trucks
- Workpiece carriers
- Workpiece magazines

The versatile MetaLine® coating textures are of particular importance for scratch protection. Foreign contaminants can escape into the depths, while the component surface lies on the coating tips and no more extensive contact occurs. Free from silicone and other paint adhesion disturbing substances.

Surface treatment

- Blasting technology Video
- Plastics 3D printing
- Tribofinishing equipment Video

Applicable on site, in the best case, without disassembly – the great strength of the MetaLine® Series 700 coating technology. Completely shrink & swell free polymeric curing mode. Very good resistance against hydrolysis representing a considerable increase in service life & quality performance.

Technical Data

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

	MetaLine® 760	MetaLine® 785	MetaLine® 795
Prefered usage (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
Processing spraying / casting / injecting	APPLICATOR S-700 high pressure / low pressure	APPLICATOR S-700 high pressure / low pressure	APPLICATOR S-700 high pressure / low pressure
Solids content 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
Mixing ratio cartridge based application process	2 : 1 by volume	2 : 1 by volume	2 : 1 by volume
Consumption theoretically per mm (40 mils) film thickness	1.25 kg/m² 0.25 lbs/ft²	1.20 kg/m² 0.24 lbs/ft²	1.20 kg/m² 0.24 lbs/ft²
Processing time at 60 °C (140 °F) material temperature	7 minutes	1 minute	1 minute
Solidification at 20 °C (68 °F) – dependent on stress	> 1.5 days	> 1 day	> 1 day
Hardness 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
Density DIN EN ISO 1183-2	1.10 g/cm³ 0.039 lb/in³	1.05 g/cm³ 0.038 lb/in³	1.05 g/cm³ 0.038 lb/in³
Pull-off adhesion strength A.S.T.M. D4541	> 15 N/mm² (Steel S235JR) > 2,175 psi (Steel ASTM A36)	> 15 N/mm² (Steel S235JR) > 2,175 psi (Steel ASTM A36)	> 15 N/mm² (Steel S235JR) > 2,175 psi (Steel ASTM A36)
Tensile strength A.S.T.M. D412-16	20 N/mm² 2,900 psi	20 N/mm² 2,900 psi	24 N/mm² 3,480 psi
Tensile modulus at 100 % elongation A.S.T.M. D412-16	6 N/mm² 870 psi	7 N/mm² 1,015 psi	13 N/mm² 1,885 psi
Tear resistance DIN 53 515	68 N/mm 388 pound/inch	55 N/mm 314 pound/inch	68 N/mm 388 pound/inch
Elongation at break A.S.T.M. D412-16	650 %	380 %	275 %
Bashore resilience DIN 53 512	63 %	45 %	27 %
Coefficient of thermal conductivity 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
Dielectric surface resistivity DIN EN 62631	> 7 x 10^{10} Ohm	> 7 x 10^{10} Ohm	> 7 x 10^{10} Ohm
Dielectric breakdown voltage DIN EN 60243	> 5,000 Volts/mm	> 5,000 Volts/mm	> 5,000 Volts/mm
High temperature resistance 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
Low temperature resistance dry	- 50 °C - 58 °F	- 50 °C - 58 °F	- 50 °C - 58 °F
Linear abrasion (Taber®) 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
Dynamic abrasion DIN ISO 4649	85 mm³ 0.005 in³	55 mm³ 0.003 in³	65 mm³ 0.004 in³
Coefficient of static friction DIN EN ISO 8295	$\mu(0)$ = approx. 0.7	$\mu(0)$ = approx. 0.6	$\mu(0)$ = approx. 0.15
Approvals (dry) pharma & food conformity	FDA 177.1680 (21) EU 1935/2004	FDA 177.1680 (21) EU 1935/2004	FDA 177.1680 (21) EU 1935/2004
Approvals (wet) drinking (potable) water conformity		BS 6920 Part 2.6 AS/NZS 4020:2005	
Purity 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 m² (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** with video support (pdf-download)

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

corrosion resistant
permanently **elastic**
abrasion & erosion resistant
sprayable and **castable**
shock absorbing
glide enhancing or
slip **resistant**

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

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

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

... and many more

protect | repair | save | cover | improve

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