

The new crack free, corrosion resistant and hard transceramic Lunac 2+ coating virtually combines all surface properties desired for hydraulics.

Our Lunac 2+ coating is a **partly ceramic, crack free, non spray gun coating with unique properties**. This coating has already been applied to machine constructions for a longer time, because of its **high hardness, anti-galling properties, welding quality adhesion to the substrate and a almost unparalleled (under) corrosion resistance**. These properties proved to be essential in the successful long term application of Lunac 2+ coatings on hydraulics and axles since 1999.



Picture 1: Hydraulic cylinder for offshore-industry, (600 metric tons) coated with Lunac 2+. The coating thickness on the outside is generally 55-70 μm and 10 μm on the inside. The unparalleled high corrosion protection is mainly caused by the entirely closed structure. The high wear- and scratch resistance is caused by the high hardness (harder than quartz sand) and toughness of this material. The continuing metal lattice from the substrate up to the coating causes the welding quality bond. Especially the high reliability of the Lunac 2+ coating is frequently mentioned by the applicants. The insert displays a long term seawater corrosion test. Two Steel 52.3 rods are coated with 50 μm Lunac 2+ since 10-08-2007

and 04-01-2008. In case of micro cracks, a striking brown deposit of iron oxides would have been visible around that spot already after 14 days. (We recommend to study the corrosion page on our website for details).

Generally, galvanic coatings are rather affordable and moderate up to sufficient corrosion resistant (nickel chromium). The scratch and wear resistance is reasonable to good, but cannot be compared with the ceramic coatings. Delaminating and limited 'full' salt water resistance or pore problems with nickel-chromium coatings on (high tensile) steel have been recorded. HVOF ceramic coatings are notable for their good anti-galling properties and high hardness. However, especially these ceramic coatings can show bond and brittleness problems, as well as increased seal-wear. In many cases, particularly the mono layers, inherent to the process, are not able to seal the surface entirely and, as a result, limit the corrosion resistance. For these reasons there continued to be a need for coatings on hydraulics, without compromises. Lunac 2+ proved to be able to combine the desired properties as mentioned above and withstand harsh marine circumstances as yet unprecedented. If not used, the surface of Lunac 2+ can slightly tarnish. To acquire the highest corrosion resistance, the basic material needs to be ground accurately. **Recently we launched the new Lunac 2+ duplo system which is able to withstand the ecp-2 corrosion test and pass the 1000 hours ASTM-B117 salt spray test (this moment even > 2500 hours without any rust spot).**

Most important advantages of Lunac 2+ coatings:

Very high resistance against adhesive wear and fretting. Lunac 2+ shows an effective hardness of Hv 2200, because of its transceramic nature. The material reacts to wear as if it is composed of sintered technical ceramics (wear resistance increase compared to hardened steel DIN 1,2379 HRc 68 under an adhesive load at 1.6 KPa, 0.7 m/s against 1,2379: **17 times**).

Excellent abrasive wear resistance.

Lunac 2+ is very resistant against scratches induced by (quartz) sand.

Totally closed structure. A typical increased 'seal on ceramic' wear is not present (see our website at the 'friction' hyperlink!) and seals cause no 'course tracks' up to a pressure far above 1000 bar. We recommend applying harder seals such as polyurethane seals Shore-A 95.

Relatively low cost (comparable with chromium/nickel coatings).

The bond with the substrate (steel up to HRc 50) exists from a continuing metal lattice, and is as a result, of **welding quality**. **Even serious bending will not detach the coating** (however cracks will show up if the coating is elongated over 0.28%).



Picture 2: Lunac 2+ pistons after 7 years being exposed to various tough offshore conditions do not show any observable wear or corrosion.

The Lunac 2+ coating is highly **saltwater-resistant** and protects the (steel) substrate durably if the surface does not show serious local failures/ pores at the time of the treatment. The surface must be ground (not rolled) to a roughness of $R_a < 0.2 \mu\text{m}$ (0.0079 mil)/ $R_z < 2 \mu\text{m}$ (0.079 mil).

Reduced coefficient of friction with respect to stainless steel under water (as low as 0.009!).

You can recognize Lunac 2+ treated parts by the particular high hardness and toughness. The cutting edge of an HSS drill is not able to scratch the surface.



Picture 3: These lock door hinges are coated with Lunac 2+. In this application the Lunac 2+ coating proved to withstand the air-water interface exceptionally well as well as under-corrosion.

Recently we expanded our production capacity. Now we can deal with parts up to L=3800 mm , \varnothing 780 mm at 3 Tons.

Interested? Please contact us for an orientation conversation. Moreover W.M.V. offers a broad technical support because of its tool specialization and its laboratory for material research!

Read more about Lunac2+ on:

<http://www.wmv.nl/Lunac2+appliedtohydraulics.htm>



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