

Product Brochure

ENGINEERING
TOMORROW

Danfoss

Hydroclad™ laser cladding

Reliable coating for

efficient cylinder operation

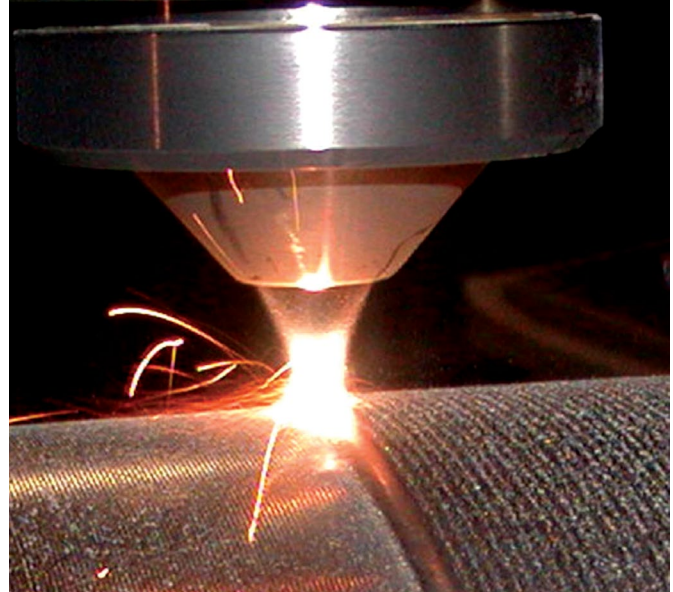


VICKERS
by Danfoss

Hydroclad™ laser cladding provides uptime and reliability to enhance cylinder operating efficiency

Anti-corrosion protection is an important requirement for high-functioning cylinders, and our award-winning Hydroclad laser cladding is best-in-class. Hydroclad is a high-performance, field repairable, third-party certified, cylinder rod coating for the most demanding applications.

NOTE: Danfoss' Hydroclad™ laser cladding was previously known as Eatonite®. While the product remains the same, its name was changed to Hydroclad™ in 2023. Hydroclad™ is a trademark of Danfoss A/S. Eatonite® is a registered trademark of Eaton Corporation. Eaton Corporation is not associated with either Hydroclad™ or Danfoss A/S.



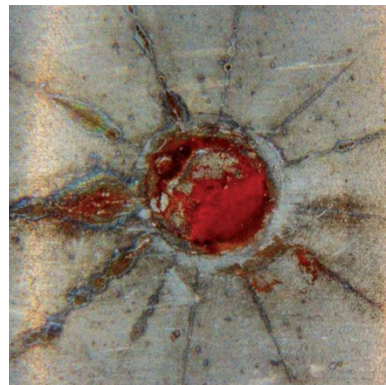
Hydroclad comparison

Benefits of Hydroclad laser cladding

- **Corrosion-resistance** – Vickers by Danfoss cylinders have been in service on offshore oil rigs for more than 10 years
- **Flexibility without cracking** – Can be applied to cylinder rods up to 21 meters long without cracking and can withstand up to 180° bend
- **Impact resistance and wear** – Withstands impact up to 32 joules (24 ft-lbs) of force without cracking
- **Field repairable** – Repair damaged coatings on-site

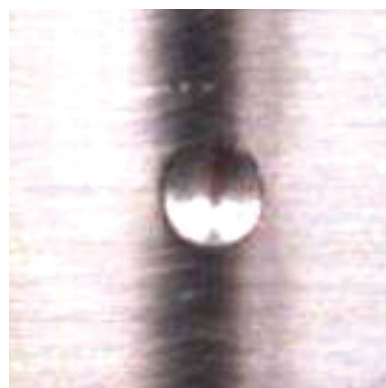
Features

- Third party certified
- Suitable for offshore deep-water exploration and production, marine, and other saltwater applications
- Applicable to new or refurbished hydraulic cylinders
- Optimized corrosion, wear, scratch, and impact resistance
- Tight process control designed for consistent results
- Optimized for ductility and toughness



Thermal spray

- Brittle behavior
- Cracks; corrosion
- < 10 joules (8 ft-lbs) impact

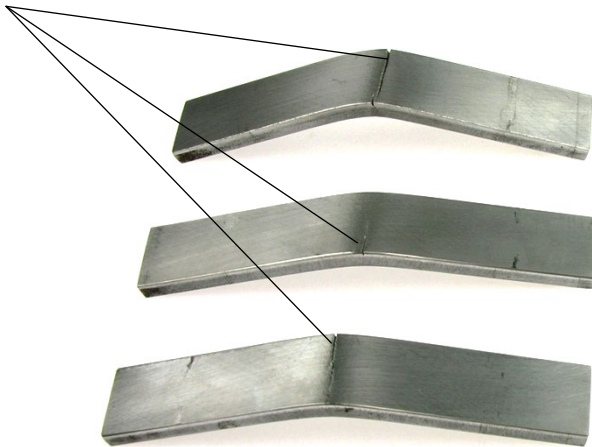


Hydroclad™

- Ductile behavior
- No cracks; no corrosion
- > 32 joules (24 ft-lbs) impact

Not all coatings are **created equal**

Bend test results



Competitor

Competitor's laser cladding cracked during bend test

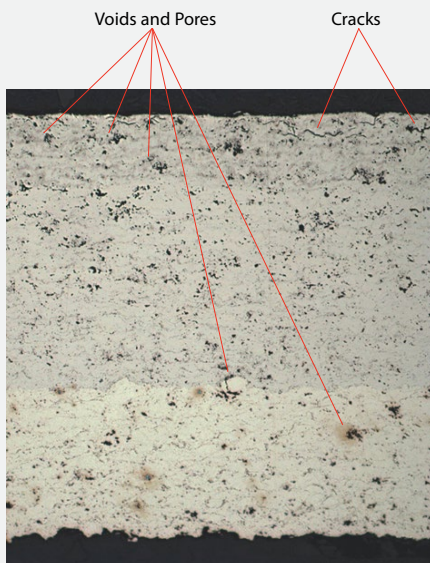


Hydroclad™ Laser Cladding

Hydroclad's optimized ductility allows it to bend 180° without cracking

Micrographs were performed by DNV at 100m magnification.

- Competitive coating shows extensive pores and voids as well as multiple cracks.
- Hydroclad DNV micrograph show a clean and uniform deposit with no cracks.



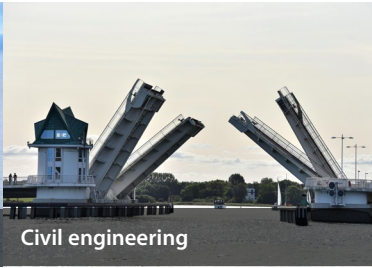
Competitive Coating



Hydroclad Laser Cladding



Oil and gas



Civil engineering



Marine



Alternative energy (wave)

Upgrade or repair damaged coatings on-site

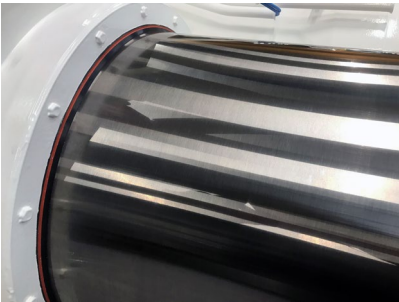
A primary benefit of Hydroclad laser cladding is field repairability. Impact to a rod surface protected with standard coatings may allow unwanted nicks, dents, and cracks which lead to corrosion. In addition, excessive side loading can produce undesirable, localized wear areas on the rod's surface. Hydroclad laser cladding can be repaired with conventional fusion welding processes on-site, saving your operation time and money.

Common causes for rod damage

- Harsh environments
- Improper material handling practices
- Hard debris falling from the upper derrick or floating in the water
- Swinging chains and cables

Hydroclad layer thicknesses

Process	Coating	Layer Thickness	Description
Laser clad coated	ABC-L1	≥ 1200 micron	Hydroclad™ ABC-L1 laser cladding is a high performance, field repairable, DNV certified, cylinder rod coating for the most demanding applications and harshest operating environments, that provides uptime and reliability to enhance offshore rig/ship operating efficiency. Premier fresh and saltwater corrosion resistance designed for saltwater splash zone.
	ABC-LC	≥800 micron	Hydroclad™ Laser cladding cylinder rod coating with excellent corrosion resistance and ductility for non-splash zone applications. <i>Also possible in combination with Hypos stroke measurements system.</i>
	ABC-L3	≥300 micron	Hydroclad™ Laser cladding cylinder rod coating with excellent corrosion resistance and ductility for top derrick applications. <i>Also possible in combination with Hypos stroke measurements system.</i>



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