



CASE STUDY - LCUMPM2018

# Powered Roof Support Cylinders

# Powered Roof Support (PRS) Cylinders life extension, beyond original specification.



PRS are large diameter, three stage, telescopic, hydraulic cylinders used on Longwall Roof Supports in underground coal mines. These PRS Cylinders operate in extremely adverse mining conditions and are difficult and expensive to access for repairs or removal, being hundreds of metres underground. Their reliability is paramount to maintaining the smooth operation of the Longwall Mining process and ensuring the safety of underground personnel.



## The Problem

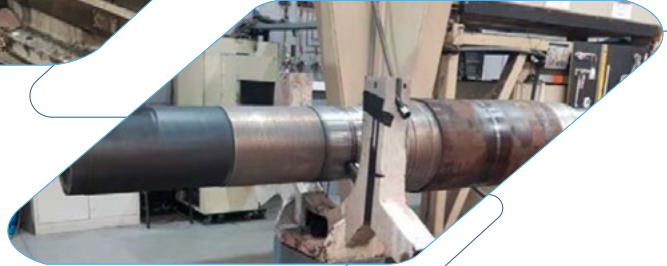
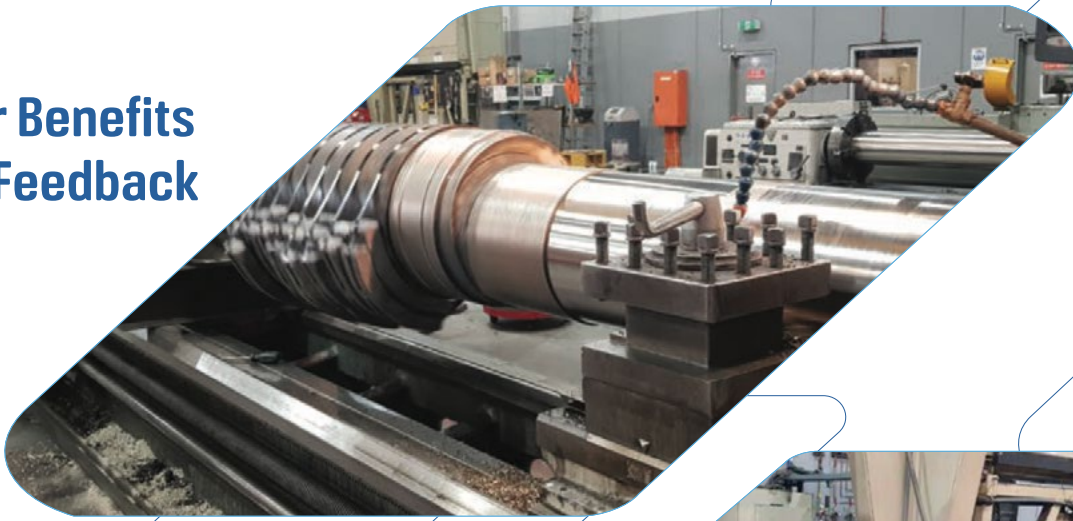
Corrosive mine water penetrates the porous nickel chrome coating on the inner and outer stages and causes under corrosion, forming a raised blister. As the cylinder cycles through its range of motion the blister cracks and begins to fragment. The razor sharp edges of the flaking coating cut the seals, causing the legs to leak and reduce their limiting pressure loads.

Corrosive mine water also frequently penetrates into the top gland nuts and degrades the static seal areas with corrosion pitting resulting in further leaking issues. If the water and oil emulsion that is used to power the cylinders is not maintained to the correct ratios, internal corrosion of the bores can also occur. The failure of internal wear

bands and seals increases the risk of contact between the piston skirts and bores, damaging both components and ongoing bypassing issues. All of these issues lead to the reduction of the operational life of the PRS, which in turn can increase the safety risk due to possible catastrophic failure. This results in the PRS requiring extraction from underground, resulting in expensive mining production downtime.

Laserbond, in conjunction with Long Wall OEM's and Australian Industry leaders investigated the leading causes of premature failure in PRS components. From there, tailored surface engineering solutions were created to overcome the failure mechanisms.

# After Benefits and Feedback



## The Solution

Utilising the in house R&D capabilities and relying on 20 years of industry experience, Laserbond chose an alloy to give superior corrosion resistance combined with optimal strength and hardness. Laserbond® Cladding was selected as this process enables the deposition of a metallic or metal matrix composite overlays with a full metallurgical bond over the base material. The accurately focused and infinitely controllable high power laser beam results in minimal heat affects to both the overlay and base substrate, while the fully programmable robotics system allows for accurate deposition dimensions.

The highly corrosion resistant alloy was Laserbond® Clad to the inner and outer stages of the PRS, damaged static seal areas (under the gland nuts) and PRS bores that have metal galling and/or corrosion pitting.

## Key Benefits

- Significant operating cost savings – the repair cost was substantially less than new replacement cost
- Less time out of service, with the repair lead time being less than new purchase lead time
- A reduced carbon footprint due to not having to the replace and dispose of the worn Jaw Crusher Shaft

## The Outcome

Customer Feedback Customer written endorsement:

“Laserbond has become the OEM's repairer of choice delivering a highly superior product back into production with extended operating life and lower total cost”

## About Laserbond

We are a specialist surface engineering company, founded in 1992, that focuses on the development and application of materials, technologies and methodologies to increase operating performance and wear life of capital intensive machinery components. Our surface engineering technology has applications across many industries, such as resources and energy, agriculture, advanced manufacturing, defence and infrastructure construction.



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