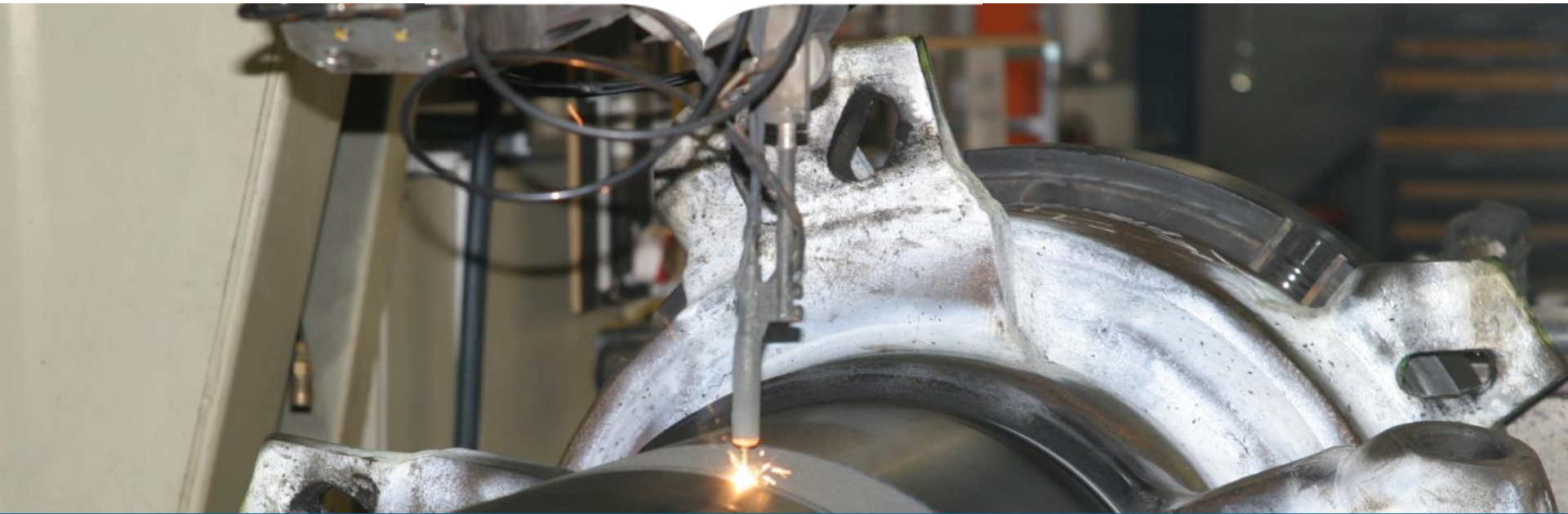




LASERBOND[®]
PRODUCTIVITY | INNOVATION | CONSERVATION



SURFACE ENGINEERING APPLICATIONS THAT EXTEND WEAR LIFE OF COMPONENTS 2 – 5 TIMES

Presentation for AustMine Webinar: Predictive Maintenance & Optimising Life of Assets.
By Wayne Hooper | Executive Director

A QUESTION:

What effect would increasing the productive time of your mining equipment have on the bottom line?



Materials Analysis



Mission critical QA Systems



Material analysis

ABOUT US



25 years of Surface Engineering Leadership

LaserBond's offer services, products and technology.

- We reduce unit operating costs of capital intensive equipment with high wearing components.
- We apply advanced materials to surface of components to replace wear and/or enhance properties.
- We use a range of application technologies.

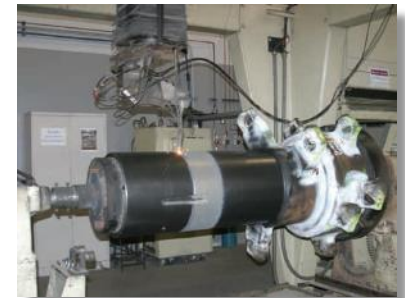
Two Facilities

Services Division – Sydney

- Long standing business, steady growth
- 50+ employees
- High capacity engineering workshops
- Large capacity surface engineering systems

R&D, Product Manufacturing – Adelaide

- Founder & Exec Director – R&D relocated in 2013
- SA offered strategic manufacturing advantages
- Installing new 16kw laser & robotic systems



LASERBOND®

OUR DNA

Surface Engineering Experts

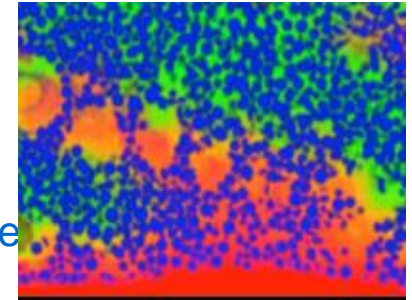
“Surface Engineering” is our DNA

- Longer wear-life – Corrosion / Erosion / Abrasion resistance
- Higher Operating Performance in specific environments
- Repair and remanufacture of components

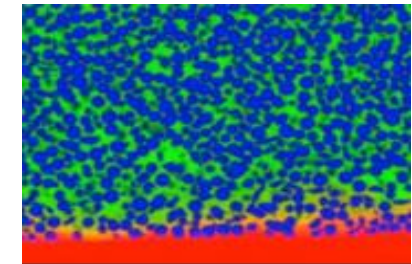
R&D activities focus directed to application processes and resultant enhanced metallurgy.

- In-house Scanning Electron Microscope
- Metallographic lab
- Continuous research into materials and application methods
- Built one of world’s first laser cladding systems

- **Provide repair, remanufacture ‘Services’**
- **Specialist manufacturer of extended wear-life ‘Products’**



Laser cladding with dilution effects



New (patent) LaserBond® Deposition



Scanning Electron Microscope

LASERBOND®

NEW TECHNOLOGY > LOWER COSTS

Reducing Unit Costs

Longer Maintenance Cycle - *Productivity*

- Longer life between shutdowns
- Less breakdown stoppages

Specific Performance – *Efficiency*

- Rock cutting mechanics – angle & speed
- Tool wear - metallurgy
- Energy conversion to work
- Cutting speeds - lower \$/bcm or \$/m

Less Risk

Workplace Safety & Environment - *Conservation*

- Reduce exposure of workforce to hazards
- Less leakage of contaminants
- Less scrap & embedded energy lost



LaserBond® clad shearer drum trials



HP-HVOF coated coal wash baskets



Unclad vs LaserBond® clad mining picks

LASERBOND®

INDUSTRIES WE SERVE

Resources

Mining

- Extraction – Surface & Underground
- GET - Cutters

Mineral Processing

- Materials handling & crushing equipment
- Slurry pumps, agitators, ...

Drilling – Exploration & Production

- Cutting speed – life edge
- Extraction & separation efficiency

Others

- Power Generation – turbines, boilers, pumps, ...
- Heavy Manufacturing Plant – rollers, hydraulics, ...
- Transport – Off-road, Heavy Rail & Marine



Upgraded continuous miner drums



Crusher shaft repair

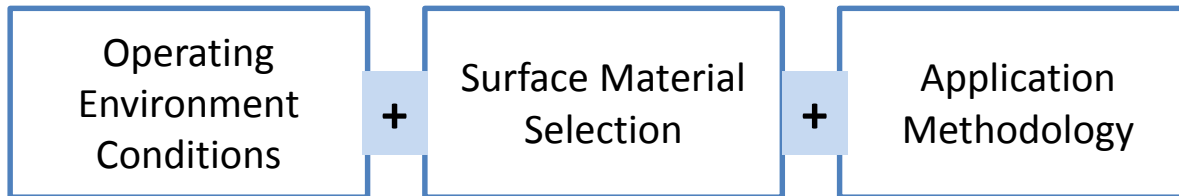


Cat 777 Wheel Spindle reman

LASERBOND®

TAILORED SOLUTIONS

Designing Solution for Operating Conditions



Operating Conditions

- Wear characterisation; abrasion + erosion + corrosion
- Health & Safety; hazard exposure, pollutants
- Loading; static & dynamic

Material Selection

- Metallurgy; ductility, hardness, conductivity
- Substrate; ferrous, non-ferrous

Application Methodology

- Economics; initial cost vs performance gain
- Shutdown value and other associated savings.



Corrosive + high impact + local static



LaserBond® cladding



Thermal spraying

REMAN WITH SUPERIOR METALLURGY

Rebuild Worn Mining Drum & Increase Life

Challenge: Corrosion + Abrasion + Galling + Impact = High Wear

- Moisture and coal particles leads to pitting and corrosion
- Steel on steel caused galling, and seizure
- Spare equipment expensive – as is downtime
- OEM lead-time and costs were prohibitive

Solution – Repair components with superior metallurgy

- Internal surfaces rebuilt with steel
- Hard, low friction metal to eliminate galling effect.

Key Benefits - Productivity

- Useful life extended from 20,000 hrs to 40,000 hrs
- Reclaiming complete drum assemblies slashed costs
- Increased machine availability with no seizures
- Reduced exposure to health, safety and environment risks

“Intelligent material selection offered a superior to OEM solution”



Reman of UG cutter drum assembly



LaserBond® reman of damaged drum



Superior metallurgy

LASERBOND®

DTH HAMMER – 3 TIMES LIFE

Reducing Cost of Drilling

Challenge: High Wear Rate of Casing

- Industry best DTH hammers worn out in 3,000 m
- Hammer wear represented 15% of mine drilling costs
- Wear characteristic changed up the casing
- Internal dimensions critical to mechanical operation

Solution: Redesign for LaserBond® cladding

- Outside of casing clad with tailored metallurgy
- Internal parts improved to support long life

Key Benefits: Productivity

- 3 times life improvement over industry- leading brands.
- 7.5% total drilling cost saving.
- Reduced safety risk and better for the environment.
- A significant increase in penetration rate.

“The LaserBond DTH Hammer is a game-changer”.



Independently controlled test site



DTH Hammer Comparative



Redesign of all components

LASERBOND®

REMAN DRIVE SPINDLE - FAST

Better than OEM Repair

Challenge: High cost and delay of OEM repairs & replacements

- Fretting of bearing surfaces with extremely high loads
- Contamination causes spline wear
- Complex safety critical component
- Unsuitable repair methods by inexperienced compounds risk

Solution: Rebuild with identical metal and remachine

- High quality matched material
- Metallurgical bonding of repair – negligible heat effects
- Accurate machining with high QA

Key Benefits: Fast turnaround & lower cost.

- Fast component turnaround – less downtime
- No risk of repair failure
- Cost saving over OEM replacement

“Reman offers better than new replacement at less cost”



Off highway wheel spindle repairs



Failed repair work by others



Repaired splines and bearing surfaces

LASERBOND®

LONG LIFE SLURRY PUMP COMPONENTS

Long life Reduces Shutdown Frequency

Challenge: Erosion & corrosion of high wear components

- Aggressive corrosive and abrasive slurries
- Frequent plant shutdown determined by component wear life
- Product leakage – losses to environment

Solution: Redesign component with advanced materials

- New component specifically designed for laser cladding
- Metallurgy of cladding tailored to operating environment
- Specialised component manufactured for OEM

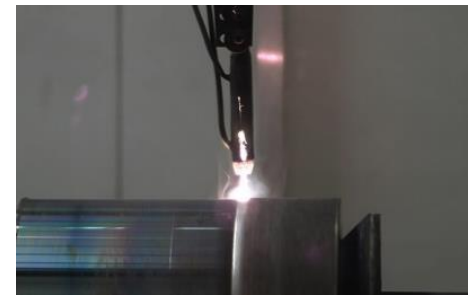
Key Benefits: Longer life of total pump package

- 4 times wear life of component
- Eliminated mid maintenance cycle plant shutdown
- Pump runs at higher efficiency for longer
- Less cost than previous cast 'Nihard' equivalent

“Innovative solution that redefined maintenance thinking”



Redesigned pump inlet wear rings



LaserBond® cladding with custom carbide



Tungsten Carbide pump sleeves

LASERBOND®

NON TOXIC – BETTER PERFORMING HARDCHROME REPLACEMENT

Laser cladding offers superior life

Challenge: Environment and performance issues

- Hexavalent chromium is a recognised occupational carcinogen
- Hardchrome is porous – unsuitable for corrosive environments
- Unsuitable to high impact loading - mining

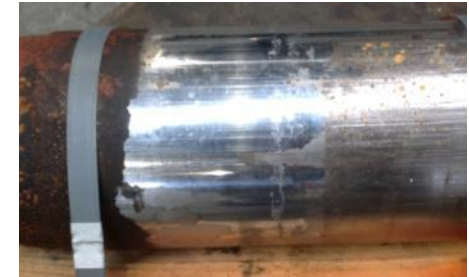
Solution: Cost effective new deposition process

- Hydraulic ram is designed for laser cladding
- Grinding and super-finishing is highly polished
- Hard cladding and metallurgical bond resists impact
- Non-porous eliminates corrosion of substrate.

Key Benefits: Longer life of total pump package

- Achieving 7 times wear life of hydraulic rams
- No risk to employee health or environment from Cr [V1]
- Highly cost effective in corrosive and impact applications

“Laser cladding is an attractive alternative to a problem product”



Mining ram with impact and corrosion damage



LaserBond® cladding 8m ram



Super finished carbide cladding

LASERBOND®

OTHER OPTIMISED WEAR LIFE

Mining, Drilling & Mineral Processing

- Road header ram and 'pineapple' rebuild
- Aluminum smelter agitators
- Smelter lining and door cladding
- Drill stabilisers and reamers. Deck bush repairs.
- Coal wash baskets

Power Generation, Plant & Equipment

- Turbine repairs. Boiler tube cladding.
- Shafts, gearboxes and gears
- Compressor rotors, screw conveyors,
- Extrusion dies

Transport, Heavy Industry and Marine

- Rail system bogie components
- Track repair systems

All wear takes place at the surface – Surface Engineering reduces it's cost



Industry led R&D collaboration



Multi-axis robot controlled laser cladding



INNOVATION > PRODUCTIVITY

Innovation

Collaborative R&D partnerships

- Excessive wear is avoidable with new surface engineering technology
- Working with UniSA and industry partners

New application technologies & materials

- Cladding methodology + metallurgy optimised for application > 2 – 7 times life

Productivity

Extending Life of Key Components

- Reduced downtime – longer production cycle
- Improved operating performance – efficiencies
- Lower unit costs to extract, and process

Globally Competitive

Innovation collaboration develops new technology for mining

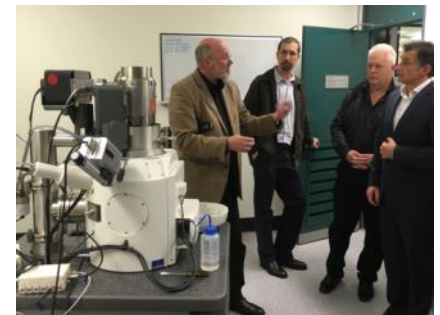
- Offer strategic cost advantages to Australian mining sector
- Superior Health, Safety and Environmental outcomes.



Industry led R&D collaboration



Multi-axis robot controlled laser cladding



New technologies – lower costs

LASERBOND

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