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

By Wayne Hooper | Executive Director
A QUESTION:

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

AustMine – Webinar Aug’16
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
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.
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”
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”.
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”
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”
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”
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
**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.
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