



Hardfacing and Weld Overlay Cladding

Course: Wear Protection, CRA Overlay and Repair Welding



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Introduction:

Hardfacing and weld overlay cladding for wear protection, CRA overlay and repair welding is a 5-day course for maintenance, reliability and welding engineering staff that ends with a Component Rebuild and Surfacing Plan. Crusher liners, mill rolls, pump impellers, valve seats and shafts are scrapped or replaced too early when wear is misdiagnosed, the wrong surfacing alloy is chosen or dilution and cracking go unchecked. Nominees already plan or supervise component repairs, and the course is taught through inspection walkthroughs of worn parts, deposit sections and repair records. CoreConcept Training Center delivers this hardfacing and weld overlay cladding course.

Course Objectives:

- Diagnose abrasion, impact, erosion, galling and corrosion damage on worn components and record the dominant wear mechanism
- Select a hardfacing alloy family and deposition process that matches the wear mechanism, base metal and component geometry
- Specify corrosion-resistant alloy weld overlay on valves, vessel internals and pipe bores with a dilution limit at the finished surface
- Compare thermal spray, laser cladding and weld surfacing routes on bond type, heat input and service conditions
- Plan repair welding of shafts, gear teeth and castings with preheat, buttering layers and post-weld heat treatment
- Verify surfacing quality with chemistry checks, hardness surveys, penetrant testing and ultrasonic bond inspection

Target Audience:

- Engineering staff responsible for maintenance of crushers, mills, kilns, pumps and valves
 - Reliability engineering staff responsible for wear-part life and repair-or-replace decisions
 - Welding engineering staff responsible for surfacing procedures and consumable selection
 - Materials and corrosion engineering staff responsible for overlay specifications on pressure equipment
 - Workshop engineering staff responsible for rebuilding shafts, rolls and castings in-house or through contractors
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Course Outline:

Day 1: Wear Mechanisms and Component Condition Survey

- Abrasive Wear Classes Low Stress, High Stress and Gouging
- Impact, Erosion and Cavitation Damage Recognition on Worn Parts
- Adhesive Wear, Galling and Metal-to-Metal Sliding Surfaces
- Corrosion and Wear Interaction in Slurry and Process Service
- Worn Component Survey Sheet With Profile and Thickness Records

Day 2: Hardfacing Alloy Families and Deposition Processes

- Chromium Carbide and Complex Carbide Iron Alloys for Abrasion
- Tungsten Carbide Composite Deposits and Matrix Selection
- Austenitic Manganese and Martensitic Alloys for Impact Service
- Cobalt and Nickel Base Alloys for Heat and Galling
- SMAW, Open-Arc FCAW, SAW Strip and PTA Process Selection

Day 3: Corrosion-Resistant Overlay, Cladding Routes and Thermal Spray

- Nickel Alloy 625 and Stainless Weld Overlay Applications
- Electroslag and Submerged Arc Strip Cladding of Vessel Shells
- Laser Cladding and Hot-Wire GTAW for Low-Dilution Bores
- Dilution Calculation, Layer Count and Iron Content at Surface
- HVOF, Arc Spray and Spray-and-Fuse Versus Weld Surfacing

Day 4: Repair Welding Problems, Cracking Control and Deposit Inspection

- Shaft Journal Build-Up Distortion Control and Machining Allowance
- Cast Iron Repair With Nickel Electrodes and Peening
- Steel Casting and Gear Tooth Repair With Buttering Layers
- Preheat, Interpass Limits and Post-Weld Heat Treatment for Rebuilds
- Relief Checking, Spalling and Disbonding Diagnosis With Hardness Surveys

Day 5: Inspection Walkthrough and Component Rebuild and Surfacing Plan

- Walkthrough Case Cement Vertical Mill Roller Hardfacing Records
 - Walkthrough Case Slurry Pump and Mining Bucket Lip Rebuild
 - Walkthrough Case Gate Valve Seat Overlay and Bore Cladding Report
 - Penetrant, Ultrasonic Bond and Chemistry Acceptance Checklist Assembly
 - Component Rebuild and Surfacing Plan Completion and Peer Review
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Skills You Will Gain:

- Wear Mechanism Diagnosis
- Surfacing Alloy Selection
- Deposition Process Matching
- Dilution Control
- Overlay Specification Writing
- Rebuild Heat Treatment Planning
- Deposit Quality Verification
- Repair-or-Replace Evaluation

Why Attend This Course:

- Deliver a Component Rebuild and Surfacing Plan to the maintenance manager and the reliability lead, covering alloy, process, heat treatment and acceptance checks for a priority wear part
- Decide whether a worn component should be hardfaced, clad, thermally sprayed, rebuilt by welding or replaced
- Prevent premature spalling, cracked overlays and rejected cladding that force repeat shutdowns and emergency spare purchases
- Brief workshop crews and surfacing contractors on dilution limits, preheat rules and inspection hold points

Conclusion:

Back at work, the participant hands the Component Rebuild and Surfacing Plan to the maintenance manager and the reliability lead. They use it to choose surfacing alloys and processes for priority wear parts, to set dilution and hardness acceptance values in repair orders and to judge contractor procedures before work begins. After the first rebuilt component returns to service, the unit should measure its wear rate against the replaced part, record any cracking or disbonding and adjust the alloy, layer count or heat treatment in the plan.

Frequently Asked Questions FAQ:

What should participants know before a hardfacing and weld overlay cladding course?

Participants should already plan, supervise or approve component repairs and read basic welding terms such as preheat and heat input. No surfacing qualification is required. A short review of wear mechanisms on the first day brings all participants to a common starting point.

How does a hardfacing and weld overlay cladding course differ from a general welding inspection course?

This course concentrates on surfacing worn and corroded parts: wear diagnosis, surfacing alloy choice, dilution control and rebuild of shafts and castings. A general welding inspection course covers joining processes, procedure qualification and inspection of new structural and pipeline welds.

Why does dilution matter in weld overlay cladding and hardfacing?

Dilution mixes base metal into the deposit and changes its chemistry. In a corrosion-resistant overlay it raises iron content at the surface and weakens corrosion resistance; in hardfacing it lowers carbide content and hardness. Process choice, heat input and layer count control it.

What do participants take back from the hardfacing and weld overlay cladding course?

Participants take back a Component Rebuild and Surfacing Plan for a priority wear part, with wear diagnosis, alloy and process selection, heat treatment steps, dilution and hardness targets and an inspection checklist ready for the next repair order.
