



Castolin Eutectic

Author : Ing. Martin Trenk, MBA

Presenter: Ing. Ahmet Güteryüz – Castolin Türkiye

Pioneering Industrial Sustainability

WHO WE ARE. WHY WE DO WHAT WE DO.



Services



Welding



Brazing



Coating

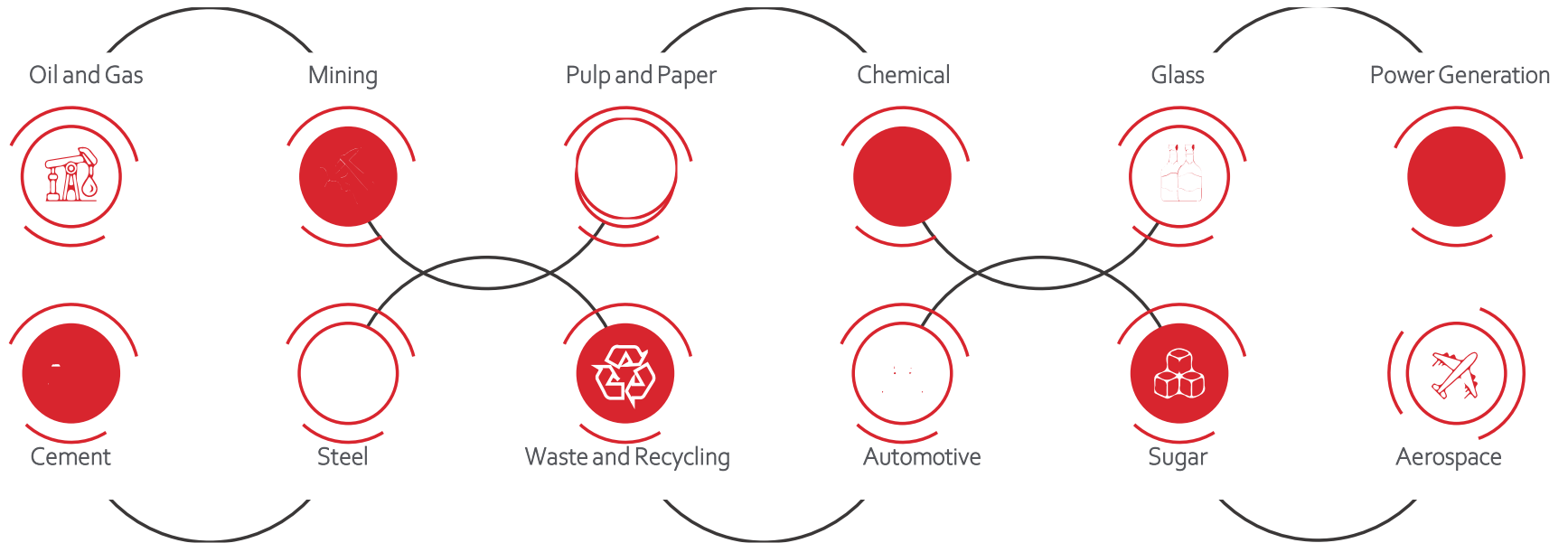


Equipment

Our brand is trusted by **millions of industrial users** in heavy duty and wear intensive industries. Over the course of more than **100 years**, we have brought innovative products and solutions to our customers challenging ourselves to reduce maintenance costs and **increase industrial productivity** through welding, brazing and coating technologies.

We have transitioned from being a family owned business into **a global company** while maintaining our industry expertise, people focus and our deep rooted belief in **sustainability**.

Key Industries We Are Active In

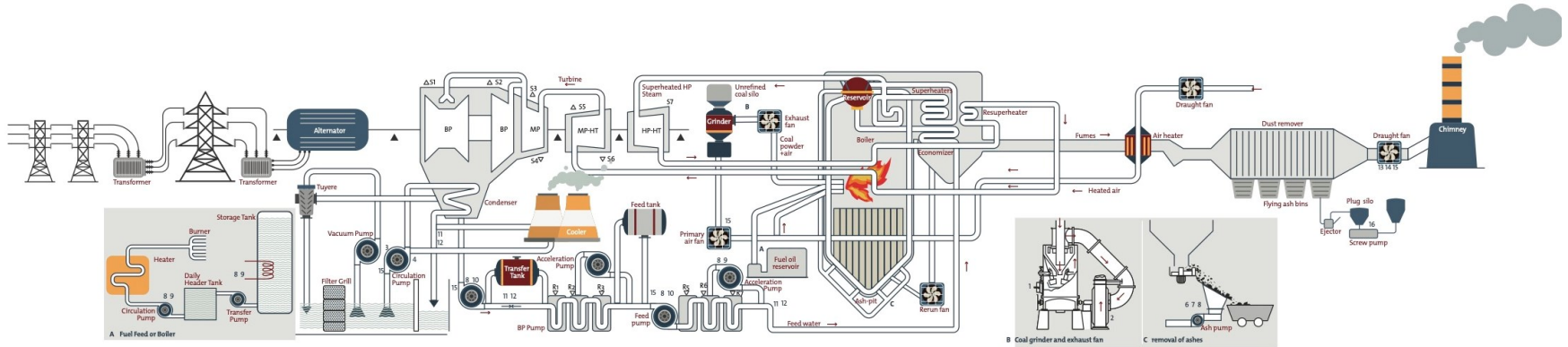
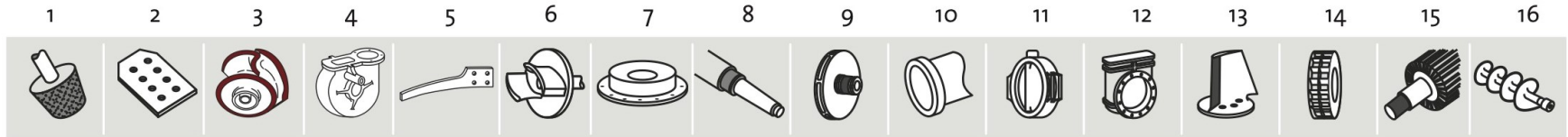


Components We Frequently Refurbish



POWER GENERATION

Pulverized coal plants



Our Unique Maintenance & Repair Database



SOLUTIONS PORTAL

More than 10.000 global applications from all industrial sectors
with estimation of CO2 reduction

solutions.castolin.com








The screenshot displays the Castolin Eutectic Solutions Portal interface. At the top, there is a navigation bar with the company logo, 'Solutions Portal' text, and user account options ('My account', 'Log out'). Below this, the main content area is divided into two primary sections: 'The Approved Applications Database' featuring 'TEROLINK' and 'Flash Application Database' featuring 'FAR'. Each section includes an 'Explore' button and a background image of industrial machinery. To the right, a sidebar menu offers navigation options like 'Applications', 'My Favorites', 'My Drafts', and 'Settings'. Below the sidebar, there are filters for 'Application ID', 'Subspace', 'Machine', 'Year (Max)', 'Product', 'Industry', 'Material', and 'Country'. The main content area on the right shows a grid of application cards, each with a title, image, and brief description. For example, one card is titled 'Machine: Fishing boat' and another 'Machine: Overhead Travelling Crane'. A pagination bar at the top of the grid shows '100 Applications from 1000' and a sequence of numbers from 1 to 10.

Strategically Located Service Footprint With Global Reach



MANUFACTURING AND WAREHOUSE LOCATIONS

- Global presence with manufacturing and product development in both Europe and the Americas
- Complete integrated manufacturing processes from foundry and atomisation to finished packaging
- Sufficient capacity and good maintenance of equipment
- Manufacturing operations are spread across all major sales areas, providing a good natural hedge against exchange rate movements
- New Central Warehouse Europe inaugurated in July 2019
- Further upside potential through additional consolidation of production footprint

	ESTABLISHED	TOTAL LAND AREA (m ²)	PRODUCTS/ACTIVITY	MAX. ANNUAL CAPACITY
 Dublin	2007	12.600	Electrodes Flux-cored wires Gas atomised powder Water atomised powder	850 tons 1.460 tons 490 tons 210 tons
 Paris	1989	21.000	Brazing rods Brazing fluxes Regulators Torches Trolleys ZnAl production	170 tons 150 tons 20.000 pieces 20.000 pieces 6.000 pieces 40 tons
 Gliwice	2012	6.493	Flame spray equipment PTA equipment CDP premium production CDP standard production CT production	1.200 pieces 100 pieces 2.400 pieces 3.500 pieces 6.800 pieces
 Kriftel	2019	7.572	Central European Warehouse New building opened July 2019	
 Granby	1975	4.600	Flux cored wire Gas atomised powder Water atomised powder CDP plate production	520 tons 120 tons 490 tons 450 plates
 Menomonee Falls	1980	6.000	Electrodes Polymers and ceramics (Mecatex)	2.496 tons 105 tons
 Mexico City	1973	13.708	Electrodes Flux cored wires Brazing Rods Brazing Fluxes	460 tons 184 tons 34 tons 46 tons

Regional Production of CDP Wearplates & CastoTubes



	STANDARD	PREMIUM	POWDER-LC8 FUSE	CastoTube
Montreal, Canada	—	✓	—	—
Milwaukee, USA	—	✓	—	✓
Monterrey, Mexico	—	✓	—	✓
Wiener Neudorf, Austria	—	—	—	✓
Gliwice, Poland	✓	✓	—	✓
Moscow, Russia	—	✓	—	—
Istanbul, Turkey	✓	—	—	—
Dubai, UAE	—	✓	—	—
Dammam, Saudi Arabia	—	✓	—	—
Tohoku, Japan	—	—	✓	—
Kunshan, China	—	✓	—	—
Bogota, Colombia	—	✓ ¹⁾	—	—
Lima, Peru	—	✓ ¹⁾	—	—
Belo Horizonte, Brazil	—	✓ ¹⁾	—	—

Castolin Eutectic production site
 Production licensed to third parties

1) Licensees

WELDING

Electrodes, TIG, Solid and cored wires



Consumables

COATING

Flame/PTA/HVOF
powders, Laser
Cladding powders

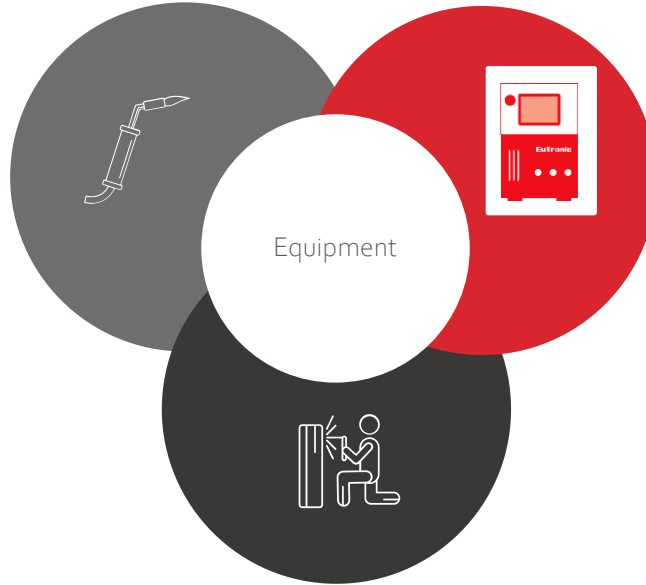


BRAZING

Fluxes, Pastes, Rods



BRAZING
Torches, Water-based
oxyfuel stations



COATING
PTA, Arc Spray, HVOF, Flame
Spray, Laser Cladding

WELDING & CUTTING
MIG, MAG, TIG, MMA, Plasma, Laser

Castolin Eutectic Customers: 40.000 Worldwide





Boiler Coating Services (BCS)

Author : Ing. Martin Trenk, MBA

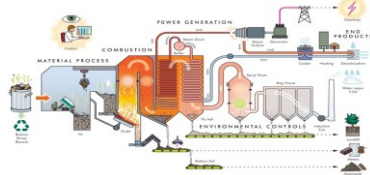
Presenter: Ing. Ahmet Güteryüz – Castolin Türkiye

Pioneering Industrial Sustainability

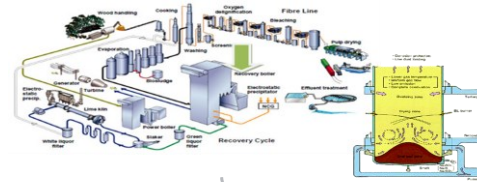
Key Industries where BCS are Active In



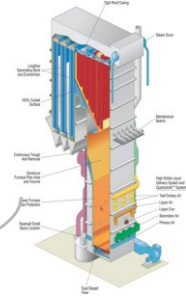
Waste to Energy



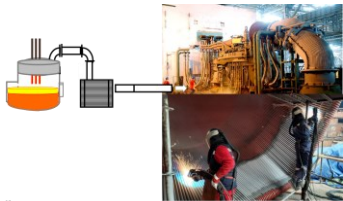
Pulp and Paper



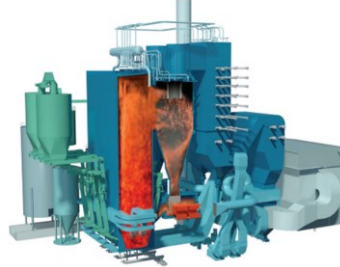
Coal Fired Power Generation



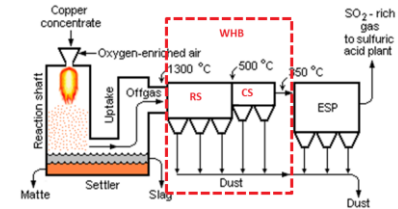
Steel



Biomass Power Plants



Copper Smelter



WHB = waste heat boiler (steam generator)
 ESP = electrostatic precipitator
 RS - Radiation section
 CS - Convection section

Failures that can occur in boilers

Corrosion



Erosion



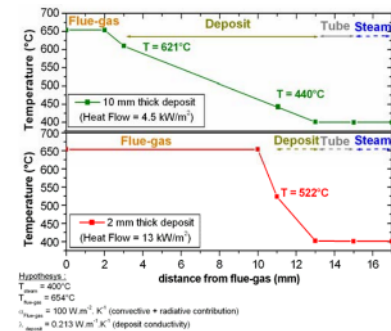
Fouling



**Leakages =
unplanned
stoppages**



**Scale build-up =
Reduced Heat
Transfer = can
increase fuel
consumption**



Product Line for e.g. Waste to Energy (WtE)



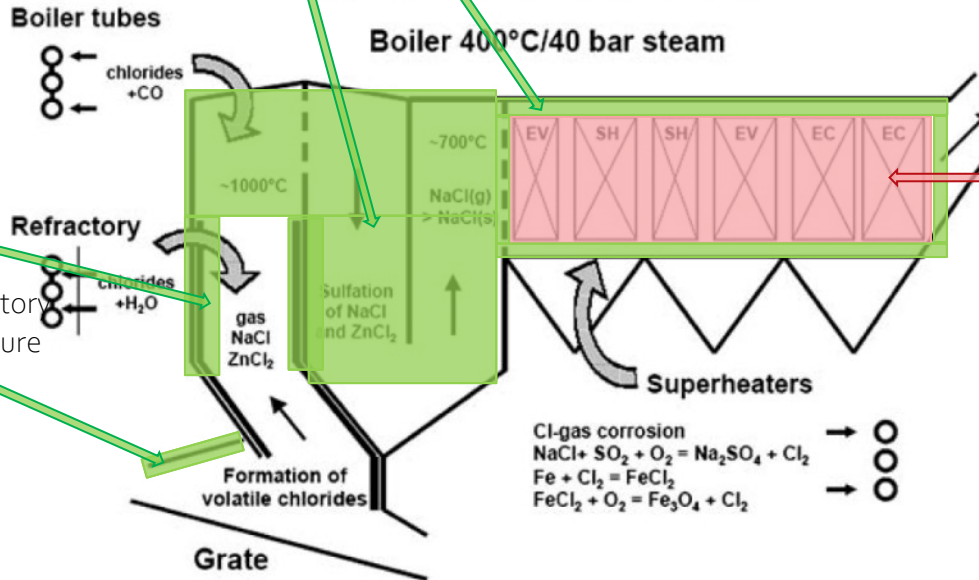
chromeclad™ - Water wall panels

- Tubes
- Areas of water wall panels

Typical corrosion problems

chromeclad™

- Under refractory
- Ignition ceiling (under refractory or directly-surface temperature essential)

















fuseclad™

laserclad™

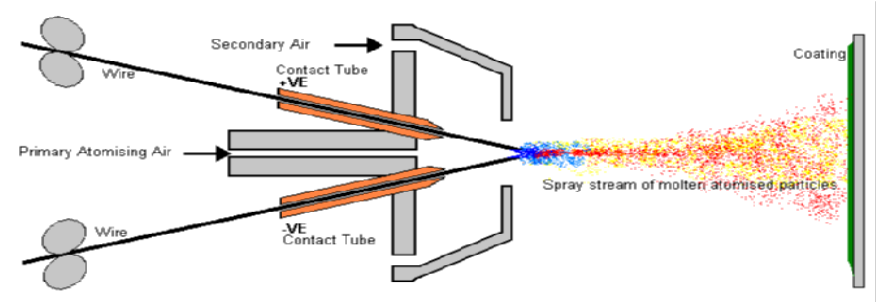
Boiler Services



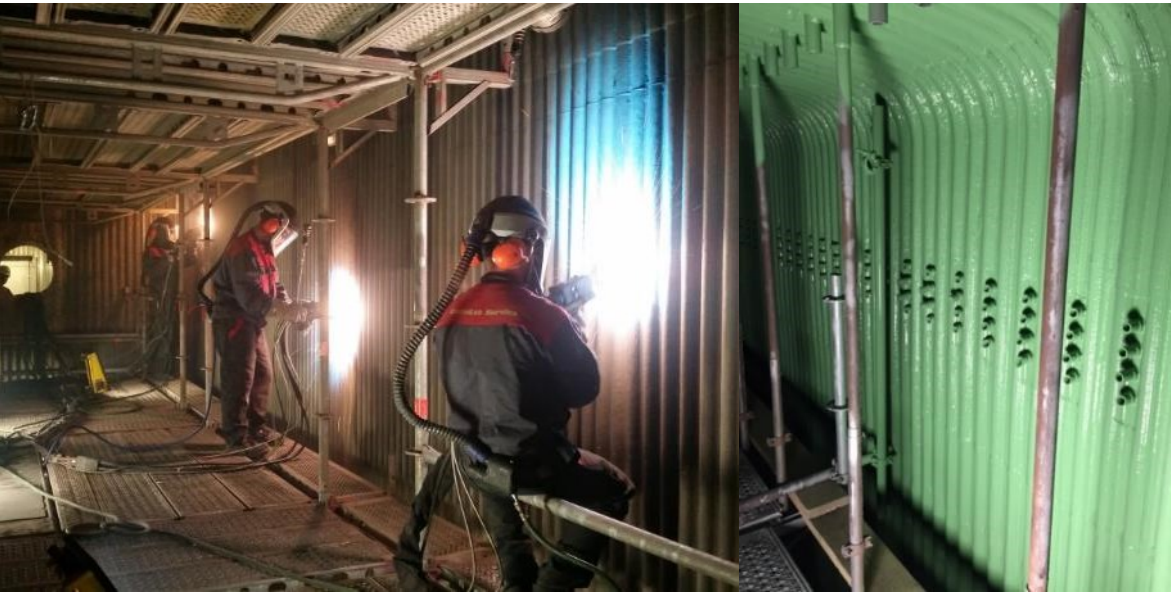
	WtE Boiler Biomass Boiler		Coal-fired Boiler		Pulp & Paper	Steel	Others
Boiler design	Grate Fired boiler	Fluidized bed boiler	Fluidized bed boiler	Pulverized coal-fired boiler	Black liquor recovery boiler	Heat recovery boiler	Vessels
1-Combustible material	Waste, Municipal, Industrial, Medical	RDF, wood, scrapped wood Bi-product	Lignite Coal (brown coal) Subbituminous Coal Bituminous Coal Anthracite		Black liquor	Flue gas of steel production	Various chemical components
2-Type of wear	Corrosion	Erosion + Corrosion	Erosion + Corrosion		Corrosion	Erosion + corrosion	corrosion
3-Wear description	Chlorides	Sand of fluidized bed + Chlorides	Sand of fluidized bed (erosion)	Sand of fuel (lignite) (erosion), low Ox	Sulphur	Ashes, Chloride, Sulphur	various
4-Critical areas	Water walls (1 st and 2 nd flue) Roofs Superheater	1 st heating flue Superheater Bed	1 st heating flue Superheater Bed	1 st heating flue Superheater	Combustion chamber	Hood ducts	Wall of vessels
5-Protection by	Overlay welding and thermal spray coating Laser cladding   	Thermal spray coating Laser cladding   	Thermal spray coating  	Thermal spray coating  	Overlay welding and thermal spray coating Laser cladding  	Thermal spray coating  	various

Twin Wire ARC Spraying

- Economical thermal coating process
- The coating material has to be electrically conductive because the electrical arc is created between two wires
- Compressed gas, normally air is used to atomize and propel the molten material
- The coating exhibit excellent bonding strength



chromeclad[™] *Stop the Clock on Corrosion & Erosion*



Premium coating system

- Long lasting coatings
Controlled surface preparation
- High reliable coatings
Metallic coating applied by our state-of-the-art arc spray technology
- Perfect suitable coatings
Specific alloys developed in-house
- Very dens coatings
Tube Armor on top as an additional inert barrier (green ceramic layer)

Coating Products

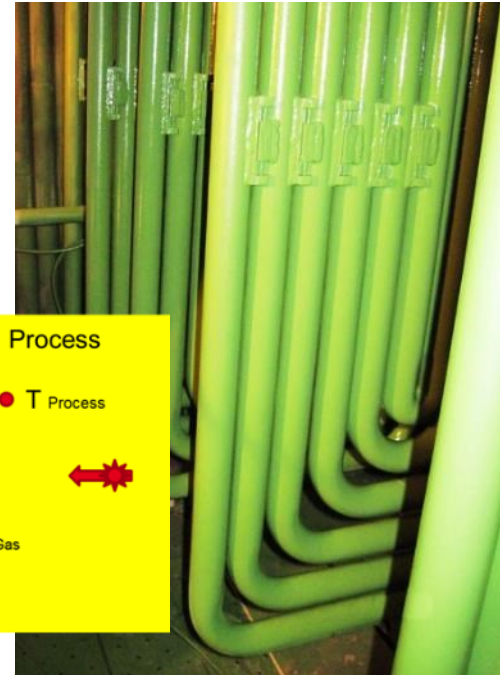
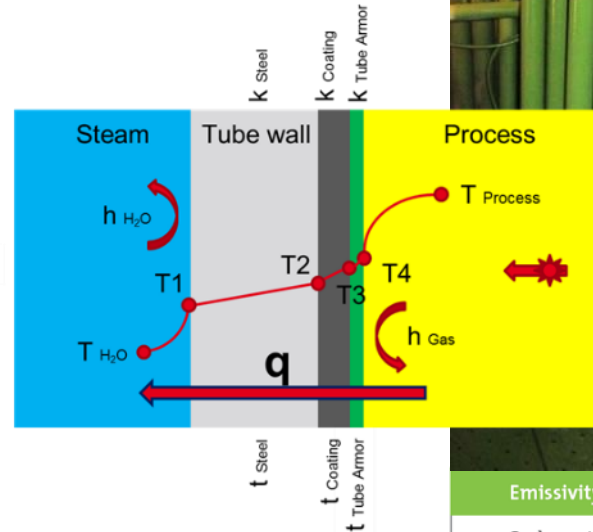


Advanced high emissivity ceramic coating

- Protection up to 900° C, withstand thermal cyclic conditions up to 1000° C
- Inert, dense and non-reactive
- Provide resistance against oxidation, corrosion and erosion
- Decrease significantly slag build-up
- Reduced amount of soot blowing
- Ease the cleaning process during outage
- High emissivity to improve thermal efficiency
- Helps to lower furnace exit gas temperature
- Longer service life of your equipment



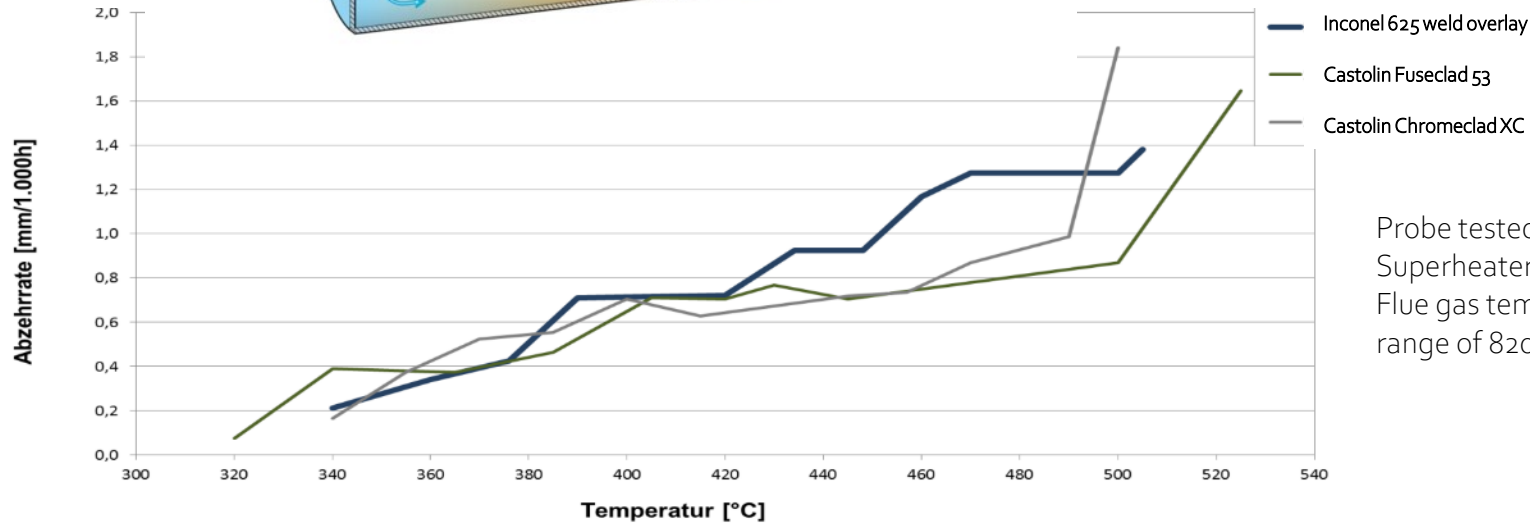
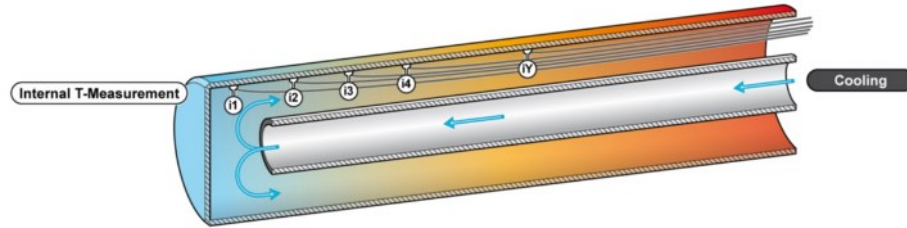
$$q = \dot{m}\Delta T$$



Emissivity Coefficients (ASTM E1933-99A)

Carbon steel	0.34
Tube Armor	0.80

Corrosion tests in WTE boiler (thermal spray)



Probe tested by Chemin
Superheater section
Flue gas temperature in the
range of 820-900° C

Below 400° C there is similar resistance, above 420° C tends to be a better durability of the coatings compared to the Inconel 625. These test coatings were sprayed over an old Inconel 625 weld overlay. Just a note that, weld overlay is much thicker than arc-sprayed coating meaning longer life-time in total. Also, note the high flue gas temperature and corresponding high corrosion rate.

Corrosion probe of Chromeclad XC (on In625)



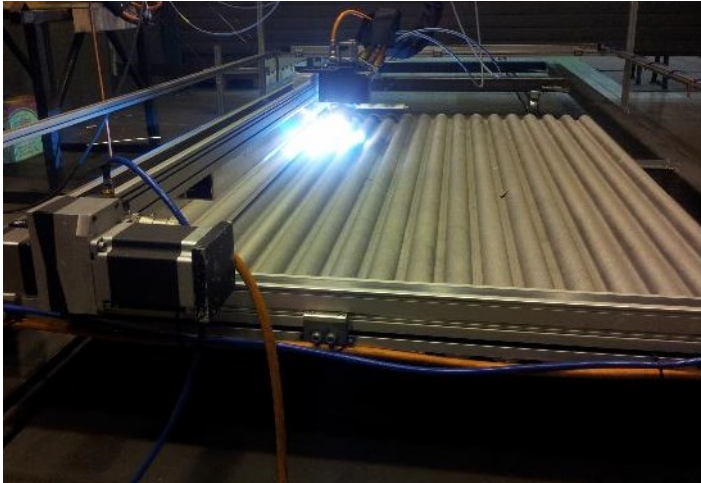
Inconel 625 + Chromeclad XC
2,1 – 2,3 mm weld overlay
ca. 600 - 700 µm Arc-Spray



Coating Products

Automation

- Better control of the coating thickness and of the overlapping zones
- Improved coating quality
- Higher application speed
- Applicable on-site and in workshop



Hot-wire laser cladding



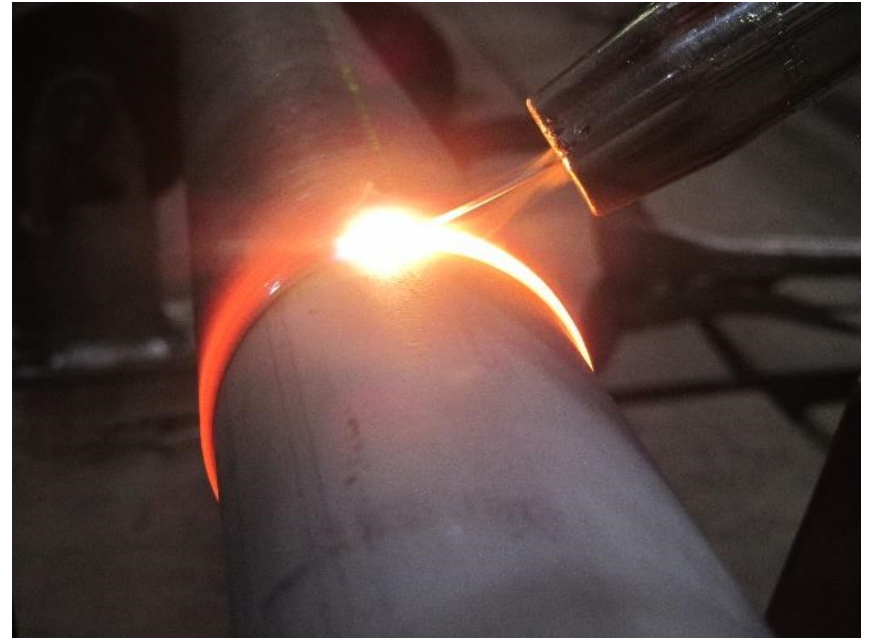
Description:

- A laser beam is used to generate a melt pool
- A welding source is used to heat the wire resistively (between the contact tip and the work piece) and fed to the melt pool

Why hot wire cladding instead of powder:

- The preheating of the wire improves productivity and reduces dilution (mixing of the base metal to the cladding material)
- Wire as a consumable is cheaper, better available and the utilization is very high (no waste).
- The deposited metal quality is higher with wire (than powder) giving better ductility for tube bending.

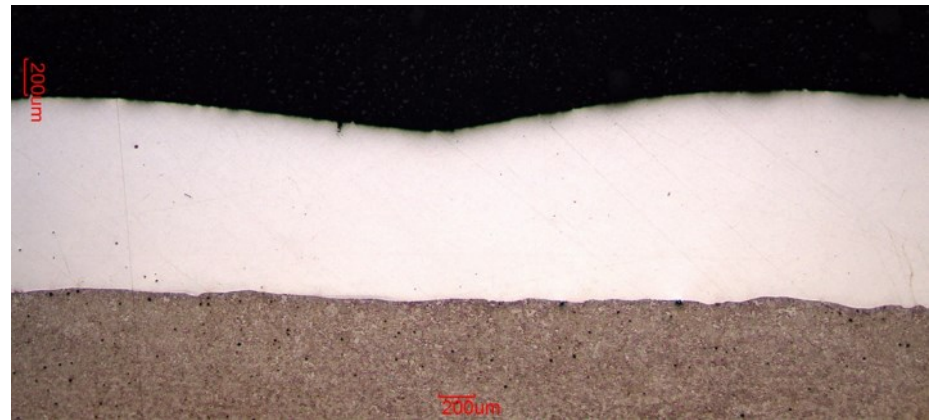
Actually, hot-wire cladding is used only for single tubes.



Hot-wire laser cladding characteristics



- Fully dense with metallurgical bonding (a welding process)
- Low dilution - deposit with an iron content typically between 0.5-3% for alloy Inconel 625
- Superficial heat affected zone only for maximum tube performance
- Well established alloys with known performance (Inconel 625, 622 and 686)
- One pass coating thickness between 0.8 mm to 1.7 mm (about 0.030-0.070 mils)



Bendability of laser clad tubes



- Inconel alloys 625 and 622 can be bent to a bending ratio of 1 (bending radius / tube diameter)
- Inconel alloy 686 can be bent at least to a bending ratio of 1.25
- Coating thickness, overlap, tube alloy affect bendability so pre-production bend tests are strongly advised!
- In case of non-standard cladding thickness, the tooling availability must be checked



fuseclad[™] 89

Combined corrosion and erosion protection

Ni-base alloy containing hard phases

Hardness: 725 HV₃₀

Max. steam temperature: 350° C

fuseclad[™] 53

Corrosion protection

Ni-base alloy with high Mo-content for severe corrosion resistance

Hardness: 610 HV₃₀

Max. steam temperature: 380° C

fuseclad[™] 17

Corrosion protection at moderate erosion

Ni-base alloy with high Cr-content

Erosion protection for soot blowers

Hardness: 400 HV₃₀

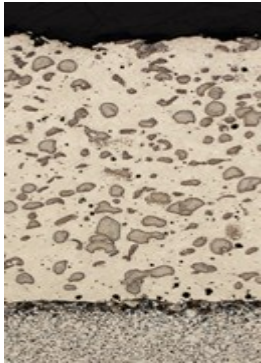
Max. steam temperature: 550° C



Fuseclad spray & fuse coating



- Fully dense
- Metallurgical bonding (diffusion)
- Smooth surface
- Unique microstructures
- Corrosion resistant
- Resistant to erosion from soot blowers
- Produced at workshop in Belgium



The Way to an On-Site Coating



Inspection of Coating

- Dedicated measurements device
- Calibration acc. coating



Wear Rate

- Status of Boiler
- Wear rate and type (corrosion, erosion)

Recommendations

- Product recommendation
- Process

Delivery of dedicated material on-site

- Equipment and auxiliary devices
- Trained and qualified operators

Incoming Inspection

- Visual inspection
- Documentation
- Incoming documents with customer



The Way to an On-Site Coating



Grit Blasting and Activating

- $R_t \approx 85-170 \mu\text{m}$
- Metallic clean
- Defined surface structure



Arc spray Coating

- Manually / automatic
- Step-by-step, $\sim 1 \text{ m}^2$ subarea



Thickness Control

- $0,7 \pm 0,2 \text{ mm}$ (depending on specification)
- Visual inspection: defects, appearance, holes, pits, ...
- Measurement by dedicated device



Densifier

- Advanced equipment



Final Acceptance

- Visual Inspection
- Documentation
- Final acceptance with customer



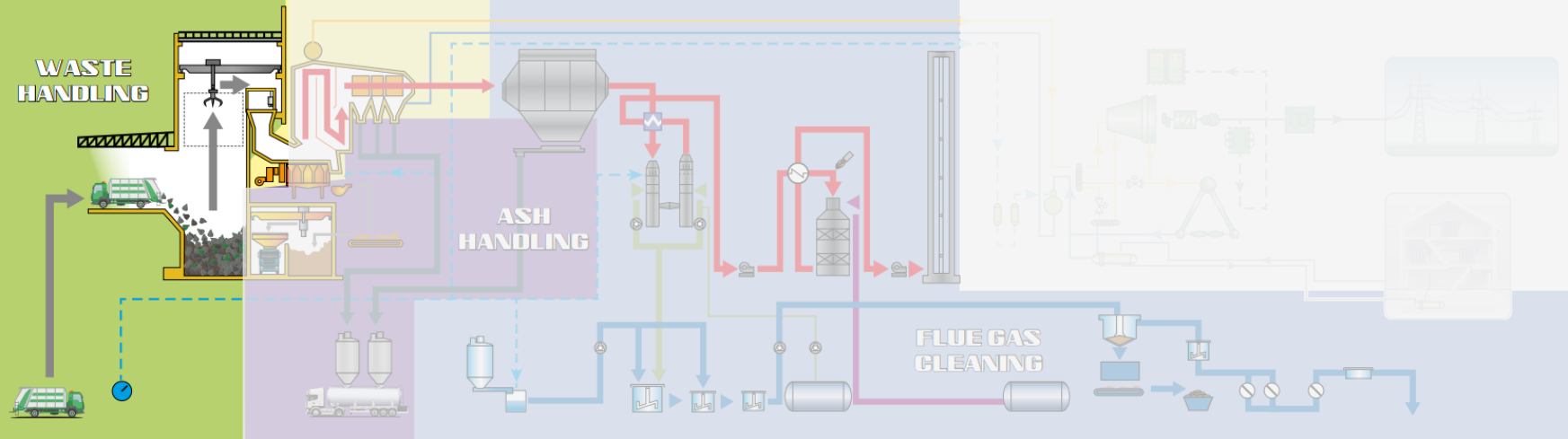


Waste to Energy Applications

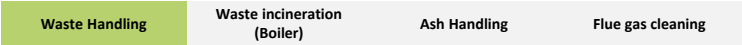
Castolin Eutectic Services

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Waste Handling



Ribbon indicators





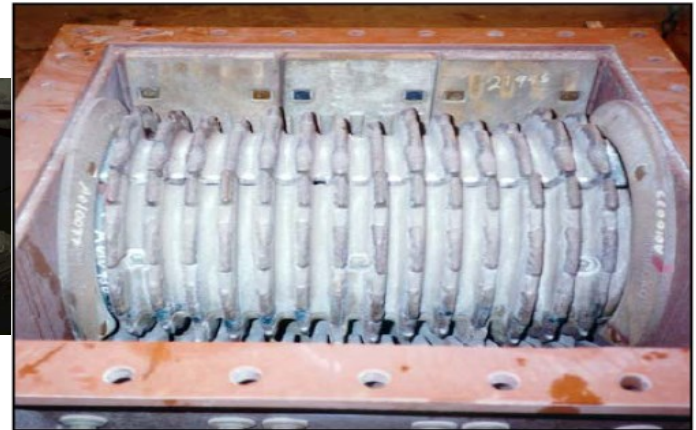
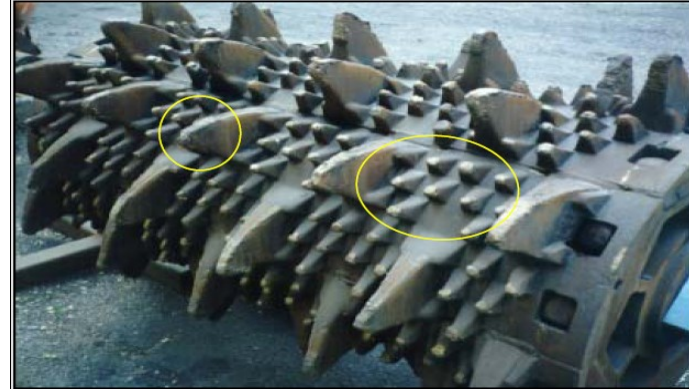
Power Generation Applications

Pioneering Industrial Sustainability

Coal handling



Primary crushing - Transport



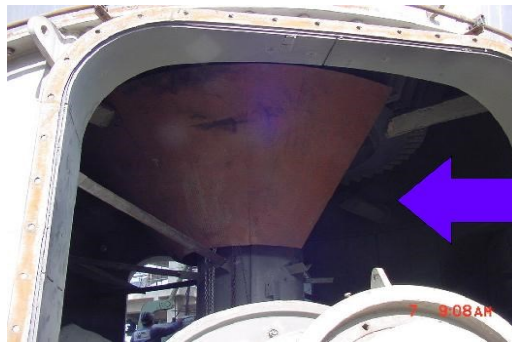
Coal Mills

Where we extend life:

- Rolls and table
- Housing
- Blades
- Separator
- Fan
- Transport line for coal powder (fuel) from the mill to the kiln burner



Coal Grinding VRM



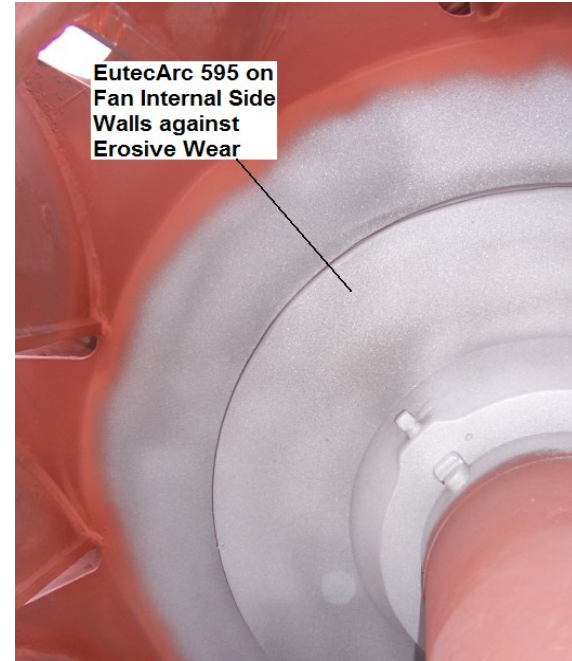
Eutectic – Multi process approach



Xuperwave

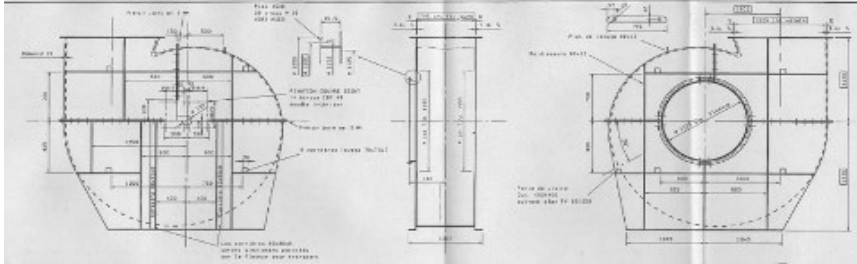


CDP 4666 and Nanoalloy DO*390N



With an Internal EutecArc 595 Protective Coating

Fan Housing



CDP 4666, Nanoalloy or
Laser welded plates LC8



Pioneering Industrial Sustainability

Thank you! – Teşekkür ederiz.

*We reduce maintenance costs and increase industrial productivity through
welding, brazing and coating solutions*

www.castolin.com www.eutectic.com