

VÄLKOMNA!

Safety Minute

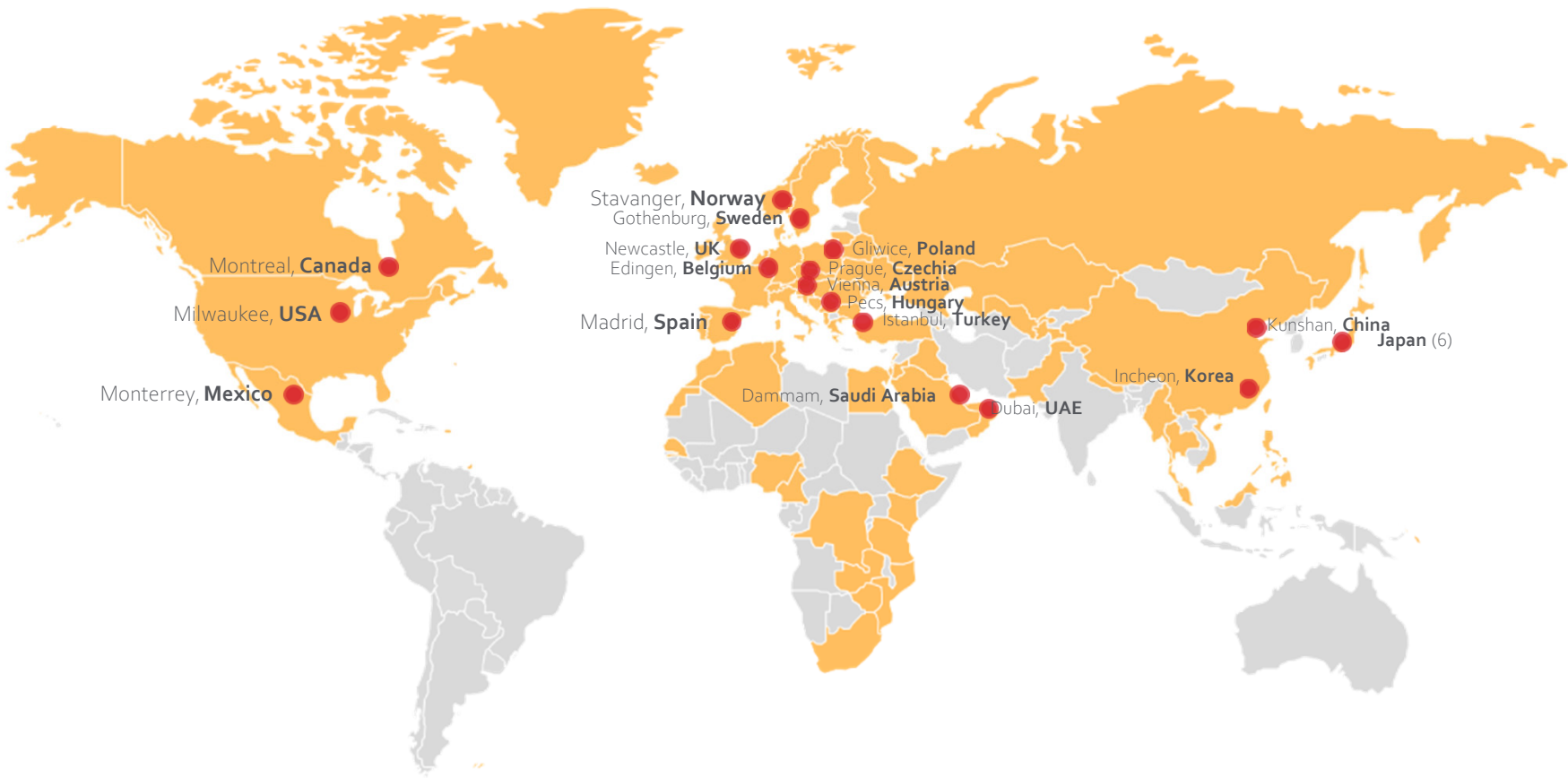
Castolin Eutectic - History



- 1906 Jean-Pierre Wassermann - Switzerland
- 1930s Rene Wasserman (son of Jean-Pierre) - USA.
- 1950s Establishing subsidiaries and factories worldwide
- 2000 Castolin becomes a part of Messer Industry Group
- 2005 Fully acquired by MEC Holding GmbH
- 2020 Paragon aquired Castolin Eutectic



Strategically Located Service Footprint With Global Reach



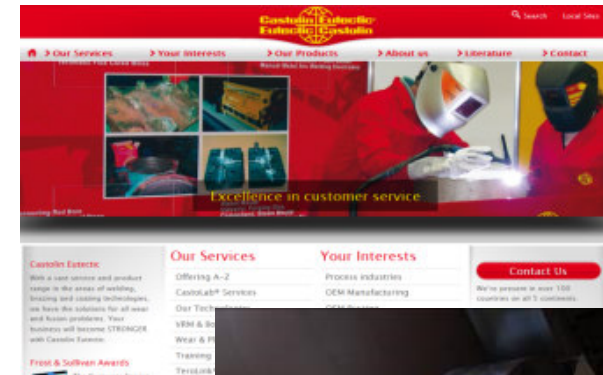
Surface Engineering for Extreme Environments

World leader, 117 years specialised in:

- wear and surface protection
- repair and maintenance technologies
- speciality joining
- services

utilising welding, brazing, wear plates and thermal spray.

PIONEERING INDUSTRIAL SUSTAINABILITY



Mission & Vision



WHO WE ARE.
WHY WE DO WHAT WE DO.



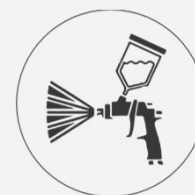
Services



Welding



Brazing



Coating



Equipment

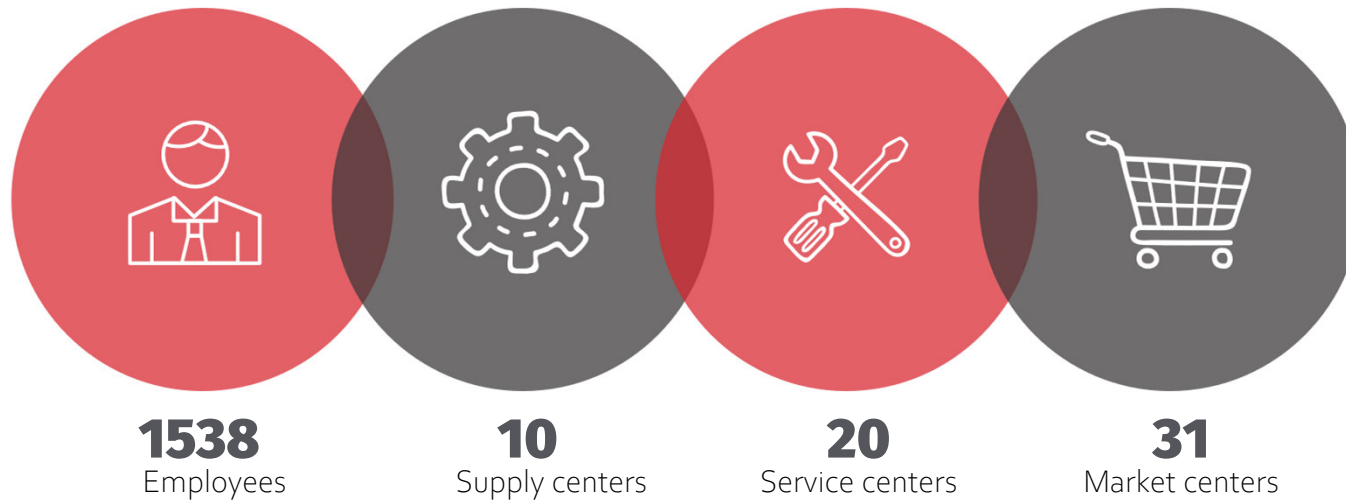
Our brand is trusted by **millions of industrial users** in heavy duty and wear intensive industries. Over the course of more than **100 years**, we have brought innovative products and solutions to our customers challenging ourselves to reduce maintenance costs and **increase industrial productivity**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



In a Nutshell...



OUR COMPANY CULTURE



Innovation



Trust and
Safety



Friendly
Working
Environment

We will continuously act **ethically** and in a manner that fulfills the expectations of our **environment, customers, employees and shareholders.**



Castolin Key Coating Processes

Stronger, with Castolin Eutectic

COLD PROCESS

Maximum temperature during
process doesn't exceed **250°C**



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COLD PROCESS

Different methodes

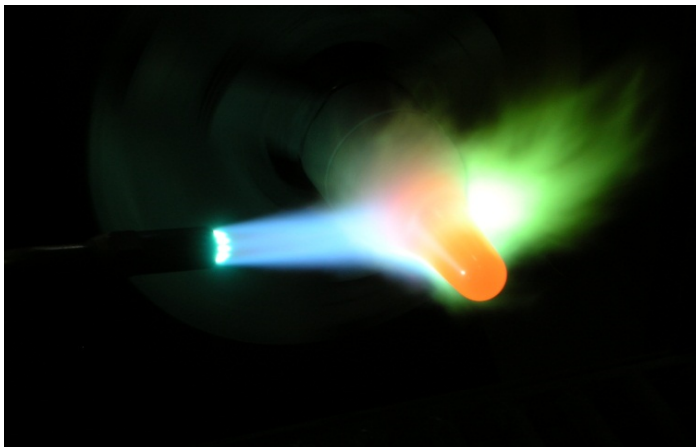
- Flame Spray – Powder
- Arc Spray - Wire
- HVOF - Powder



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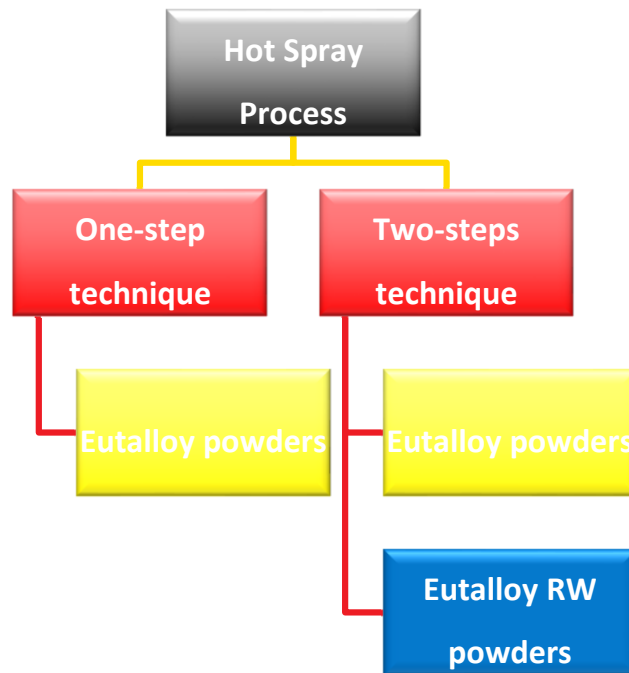
Flame Spray Process

SPRAY & FUSE



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Flame spray process – **HOT PROCESS**

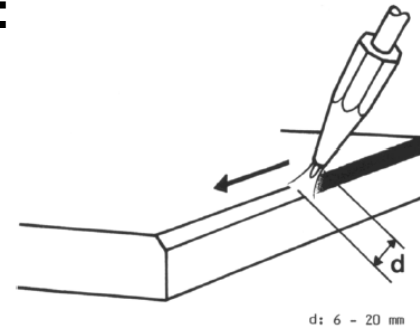


Temperature of fusing layer is about
1000 – 1150°C

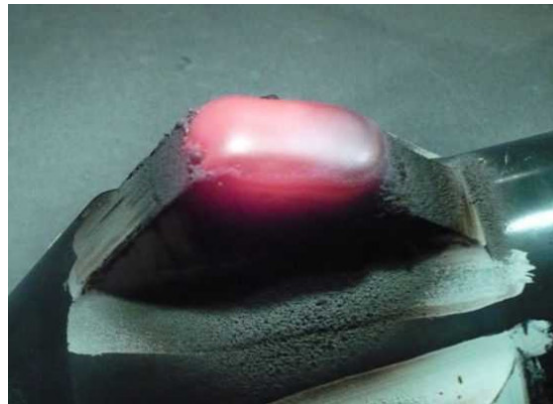
Flame spray process – **HOT PROCESS**

Applications for Hot Spray Process - one step:

- Rebuilding edges
- Rebuilding rims of the parts,
- Rapid rebuilding of small parts



Before flame spraying of Eutalloy powders



Workpiece after rebuilding



SF Lance – mechanized

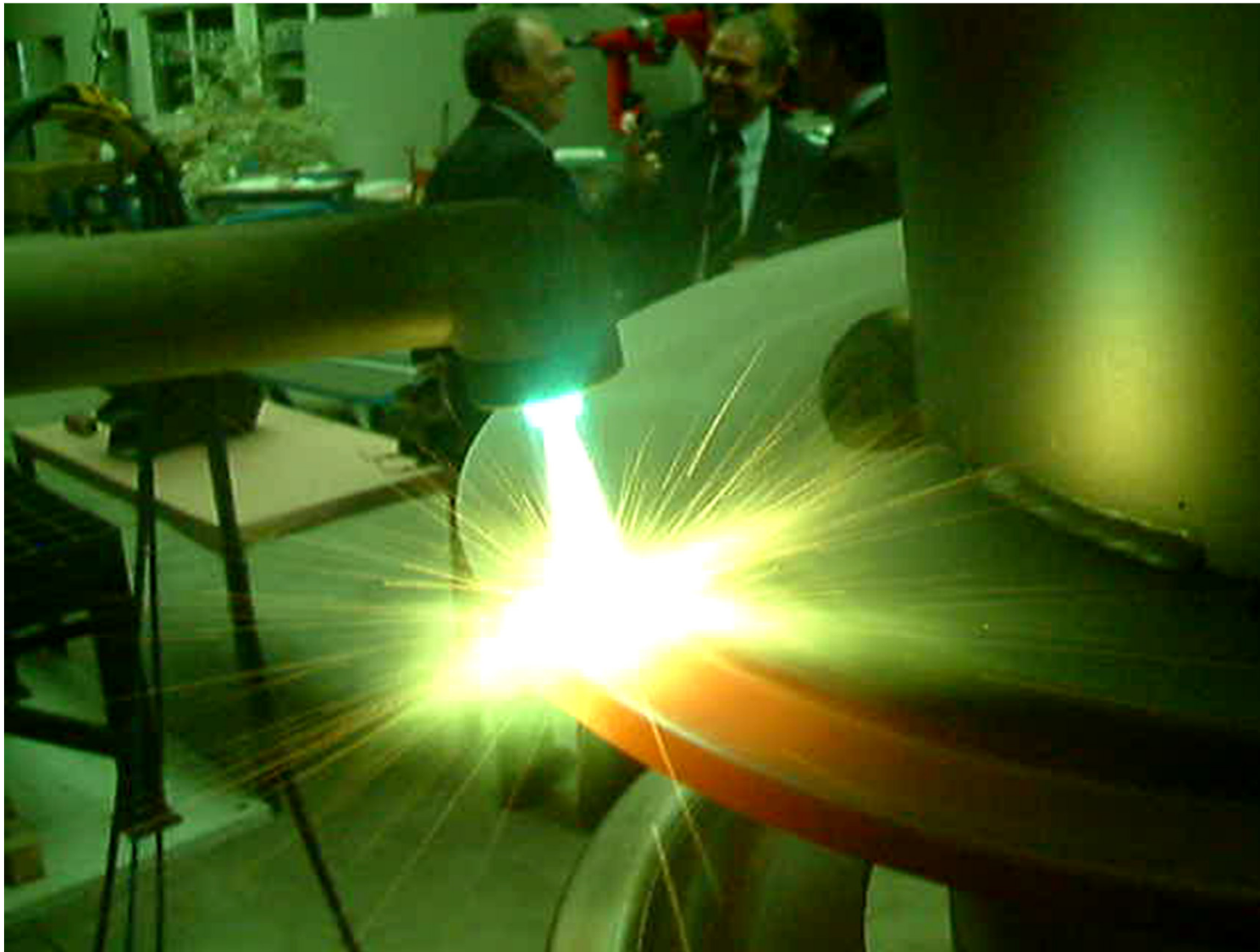
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Applications **S&F** and PTA OEM – Process industry



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Applications **S&F** and PTA OEM – Process industry



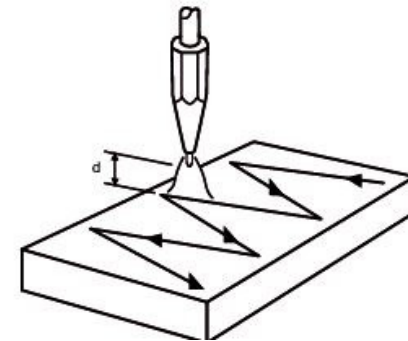
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Flame spray process – **HOT PROCESS**



Applications for Hot Spray Processes – two step:

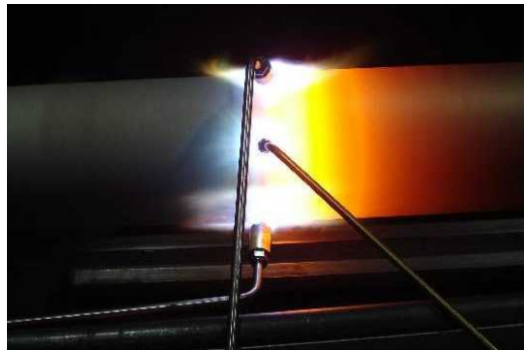
- Dedicated to flat and cylindrical surfaces,
- Preventing coating: anticorrosive, anti-wear
- Preventing against oxidization,
- Rebuilding the worn area.



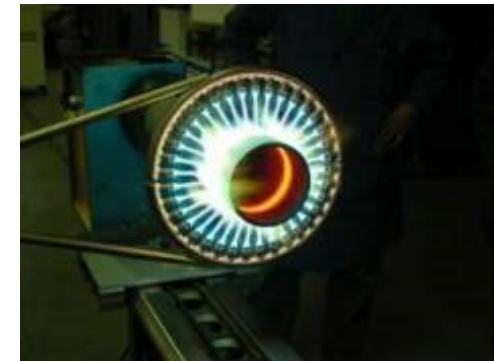
Spraying with Eutalloy Super Jet S



Spraying powders with CastoDyn DS 8000



Fusing the layer with CastoFuse, induction or oven



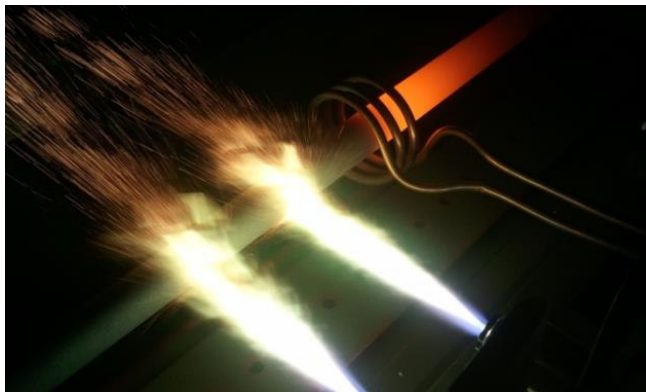
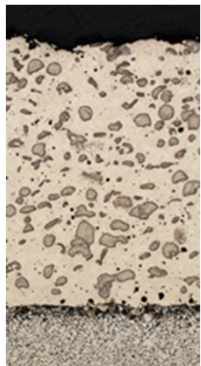
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Flame spray process – **HOT PROCESS**



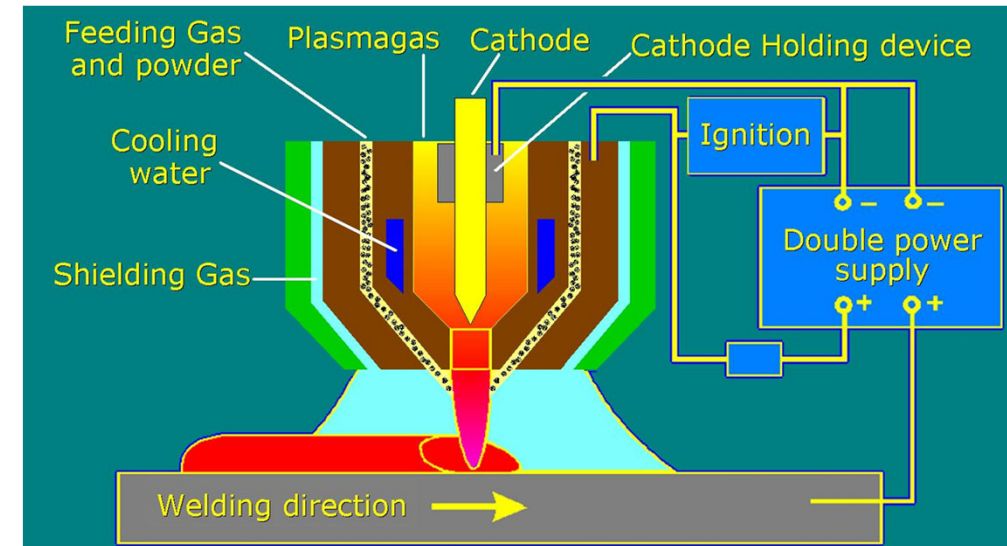
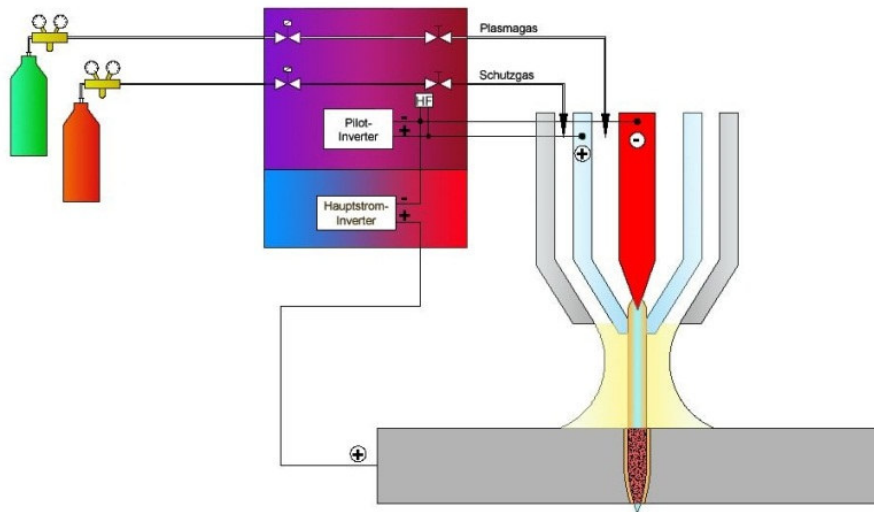
Coating properties

- Completely dense layer
- Metallurgical diffusion bonding (warm)
- Smooth surface, no sharp edges
- Unique microstructure
- Patented hard alloy
- Corrosion resistant
- Resists erosion by soot blowers
- Extremely erosion resistant coating (> 4 times vs. Carbon steel)



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What is PTAW?



P T A W Plasma Transferred Arc Welding

means in Castolin Eutectic – terminology G A P Gas Arc Process

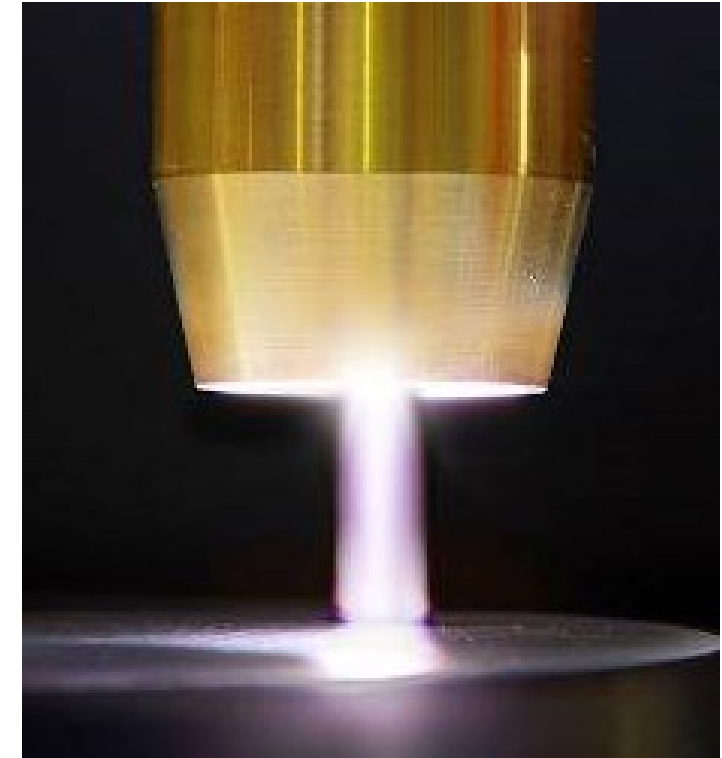
First GAP machine launched in early 1970's

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Advantages of PTA

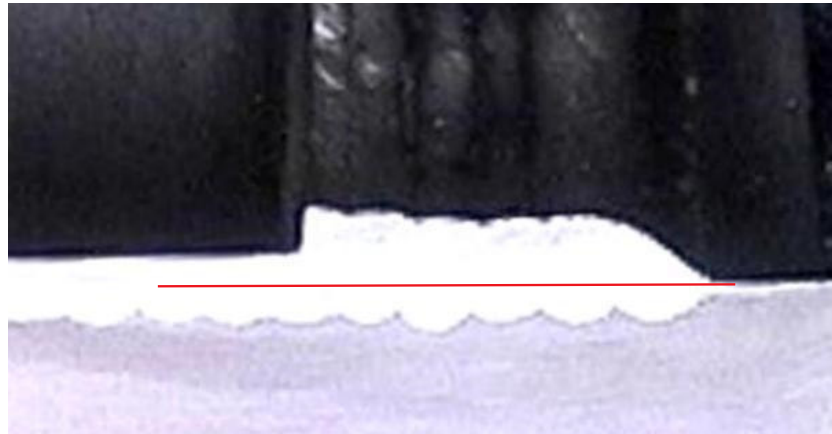


- high energy density
- high deposit capacity up to 20kg/h
- homogeneous and non-porous layers
- low degree of dilution
- excellent reproducibility of layers
- applicable as a fully automated system
- minimal post hardfacing processes/treatment
- large range of coating materials
(Castolin powder production in Ireland and Canada)
- high surface quality
- low heat affects on the parent material

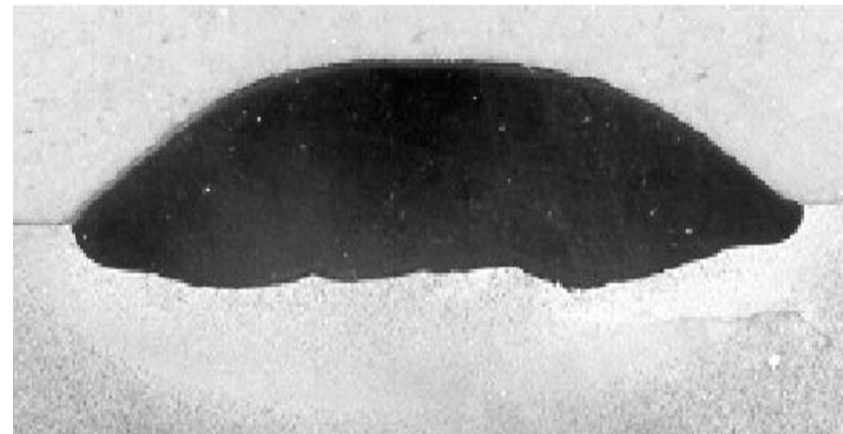


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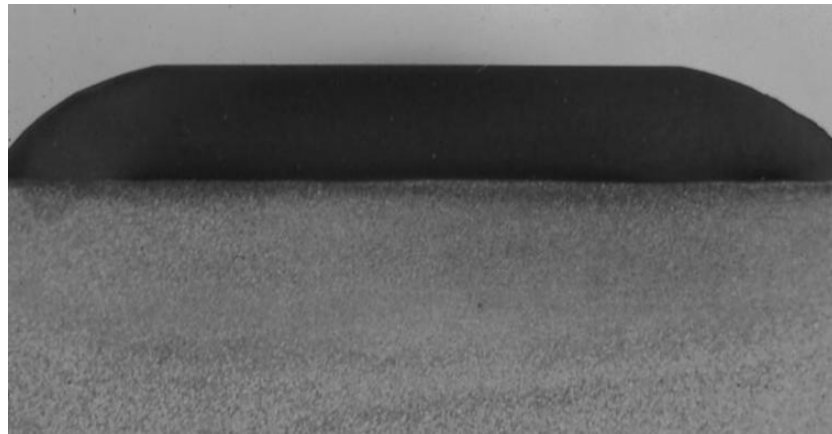
Comparison of Dilution



MSG – Flux cored Wire



MMA

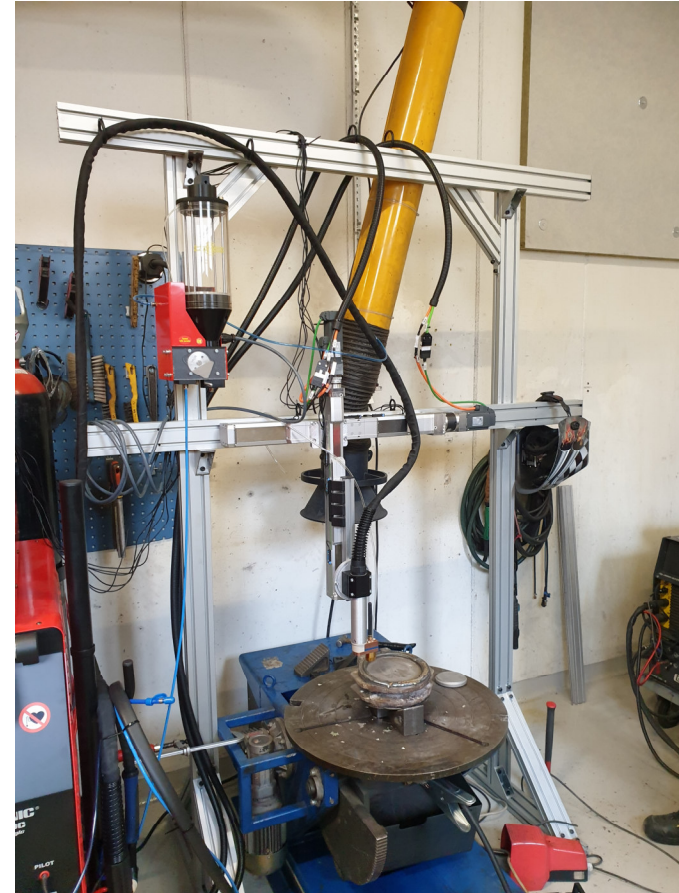


Spray and fuse diffusion



PTA

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OEM wear parts with Spray & Fuse and PTA

- Agriculture
- Pulp & Paper
- Valves
- Waste Water Treatment
- Mining

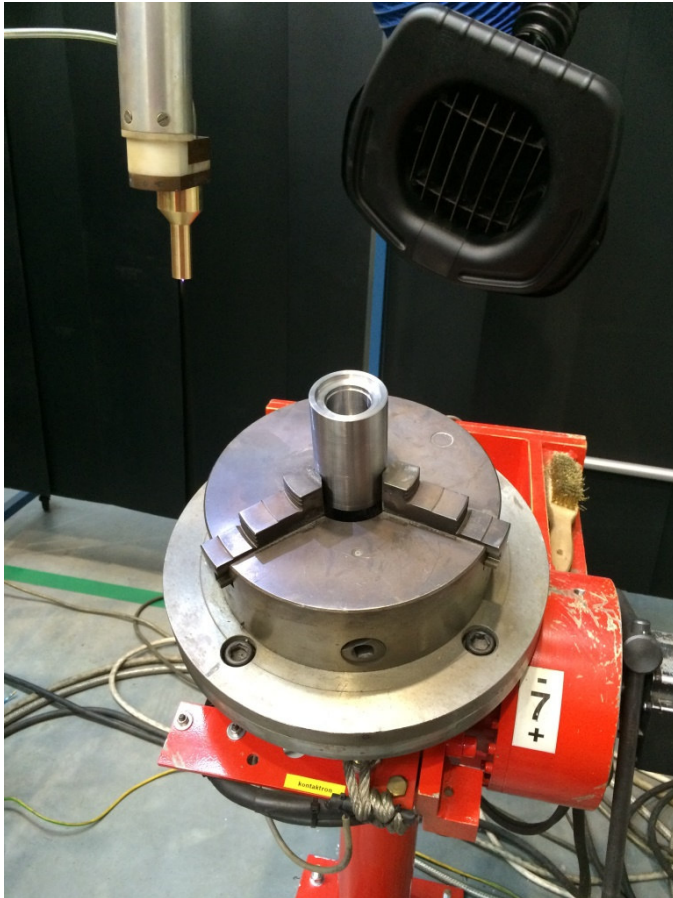
Bushing

Powder: Stellite 16008

Current: 65 A

Powder: 20 %

Special anode – 54 mm was used.



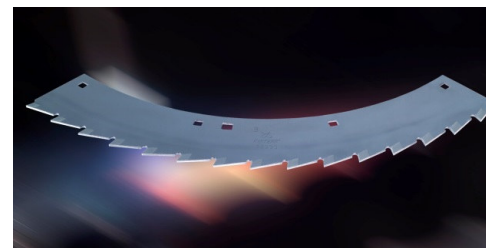
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Glass – Moulds – GAP Unicoating



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Applications **S&F** and **PTA** OEM - Agriculture



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OEM - Applications S&F and PTA



Multiple S&F system for high capacity WC coatings using Castolin SF Lance

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Applications **S&F** and PTA OEM – Pulp & Paper



Spraying

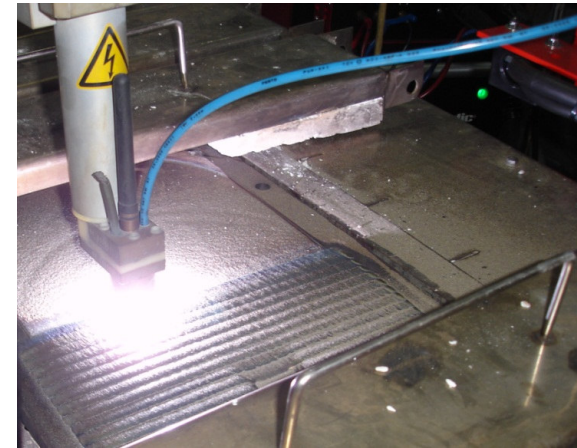
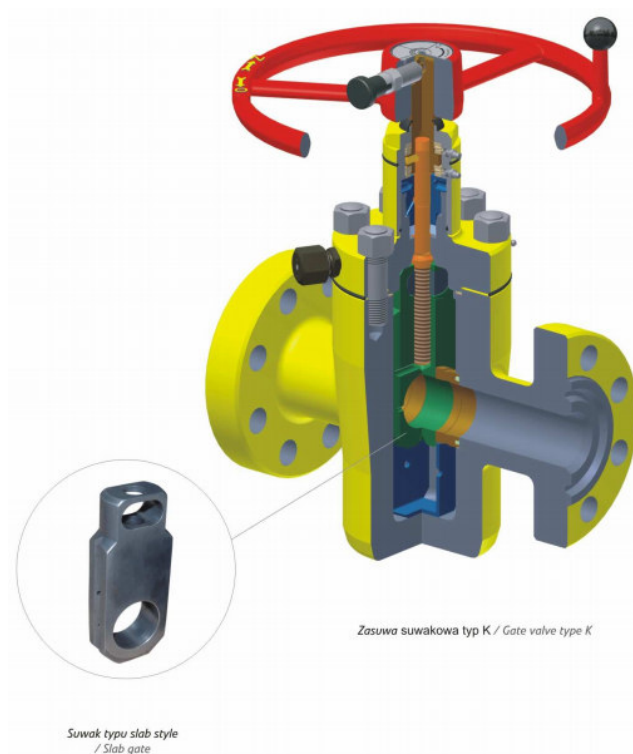


Furnace fusing

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Gate valves hardfacing

Hardfacing process on 6 axis Reis robot
Constant preheating in the electric oven

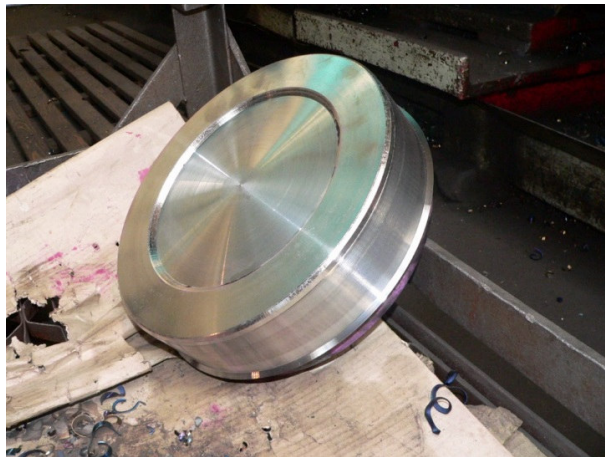


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Coal power plants

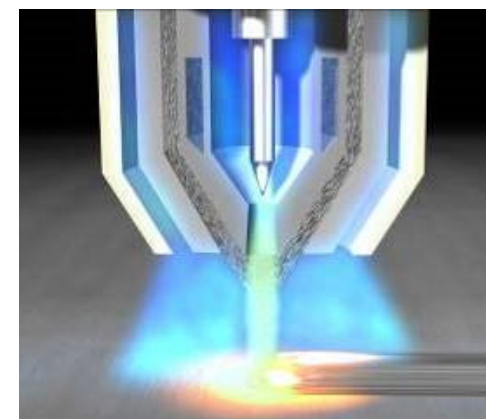


Shut-off valve Disc and seat coated on dedicated surfaces



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Applications **PTA** OEM – Valve industry



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Applications **PTA** OEM – Pulp & Paper



Rotating knives and supporting rolls



Wear sleeves

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Applications S&F and **PTA** OEM - Mining



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Applications S&F and Laser OEM – Pulp & Paper



Tungsten Carbide coated ready made plates



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- Boilercoating
- Monitor Coating
- Trio Laser cladding
- Austria Laser cladding

Services - Boilercoating



Services - Monitor Coatings Key Services

	Steel	Renewables	Aerospace	Industrial
Process	HVOF cHVOF Arc Spray Slurry Coating Ceramic Coating	HVOF cHVOF Plasma Arc Spray Slurry Coating Ceramic Coating	HVOF cHVOF Plasma Arc Spray Slurry Coating Ceramic Coating	HVOF cHVOF Plasma Arc Spray Slurry Coating Ceramic Coating
Coating Properties	Wear Resistance Thermal Barrier Product Improvement	Corrosion Wear Resistance Erosion Protection Thermal Barrier	Thermal Barrier Wear Protection Corrosion Protection	Thermal Barrier Wear Protection Corrosion Protection

2-off HVOF Booths
 1-off cHVOF Booth
 2-off Plasma Spray Booths (2-off 3MB Guns, 1-off 9MB Gun)
 2-off Twin Arc Spray Units (portable)
 1-off Slurry & Ceramic Coating Booth
 1-off Large Vertical Oven
 1-off Box Oven
 2-off Small Kilns

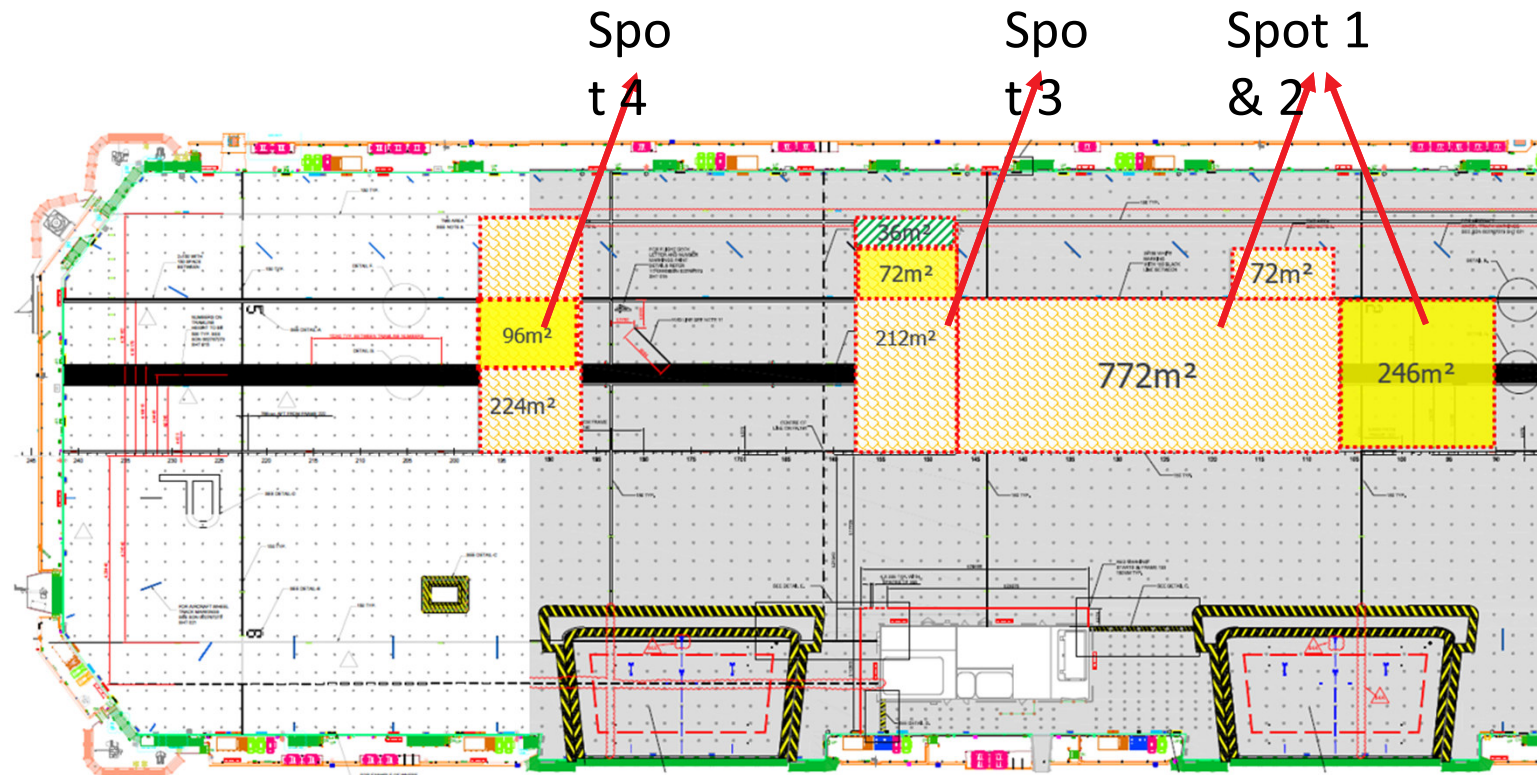
Services - Monitor Coatings - Carrier Deck



Monitor Coatings were originally approached by BAE System and MOD to produce an anti-skid, anti-corrosion and high temperature resistant coating to be applied to the carrier deck aboard HMS Queen Elizabeth and HMS Prince of Wales.

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Services - Monitor Coatings Carrier Deck – Landing Areas



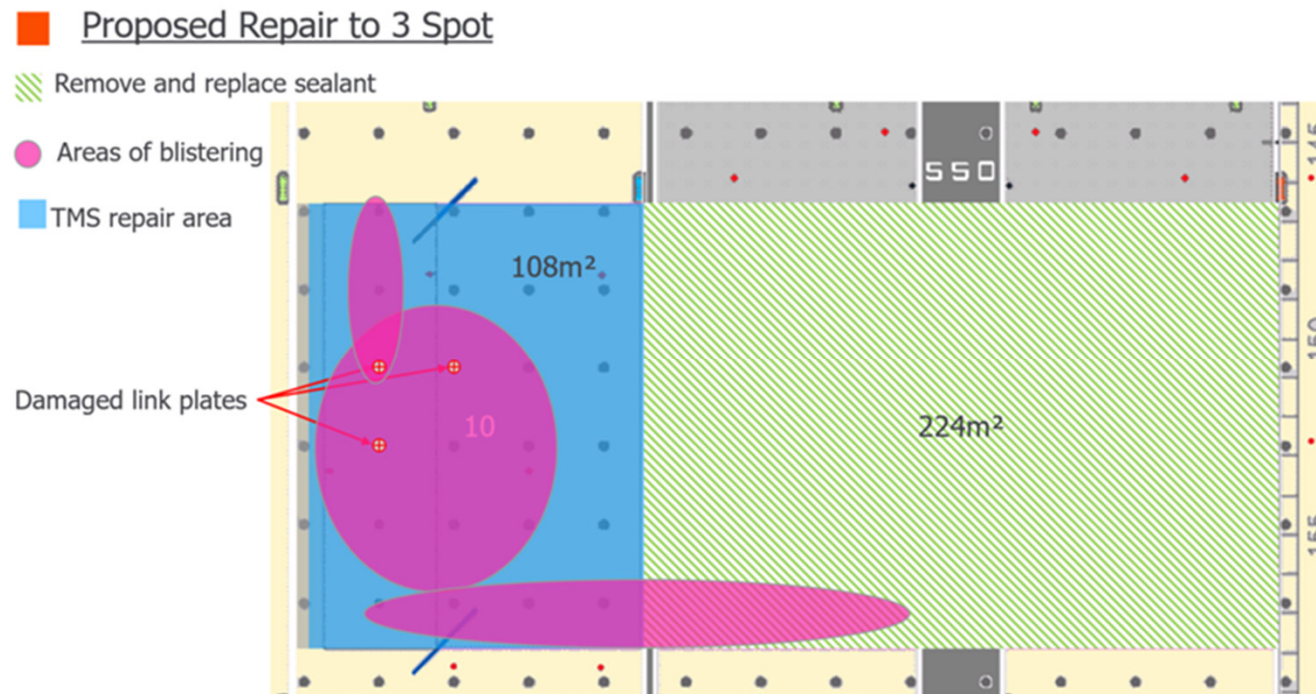
The areas above are typical coating “spots” which range from 36m² up to 772m², these spots are identified by MOD and BAE Systems and a schedule and quotation is produced based on this area size.

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Services - Monitor Coatings Key Services



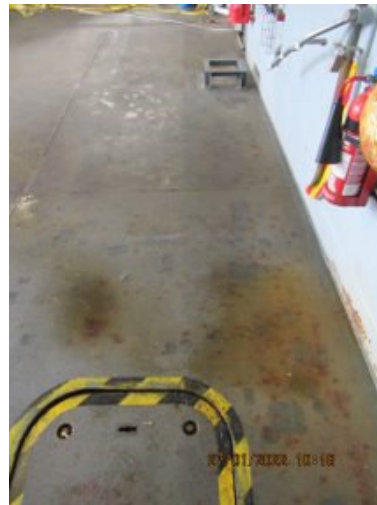
This is the Queen Elizabeth which Monitor will be carrying out repair and maintenance work to TMS Arc Spray solution.



Services - Monitor Coatings Key TMS Benefits



- Prevent premature deterioration of deck steel through corrosion
- Improve resilience to impact and wear damage
- Limit need for routine maintenance by Ship's Staff
- Reduce need for routine replacement of traditional non-skid system (repair when needed)



Services - Monitor Coatings Key Services



Göteborgs-Posten

Nyheter

Göteborg

Borås

Sport

Ekonomi

Kultur

Ledare

Debatt



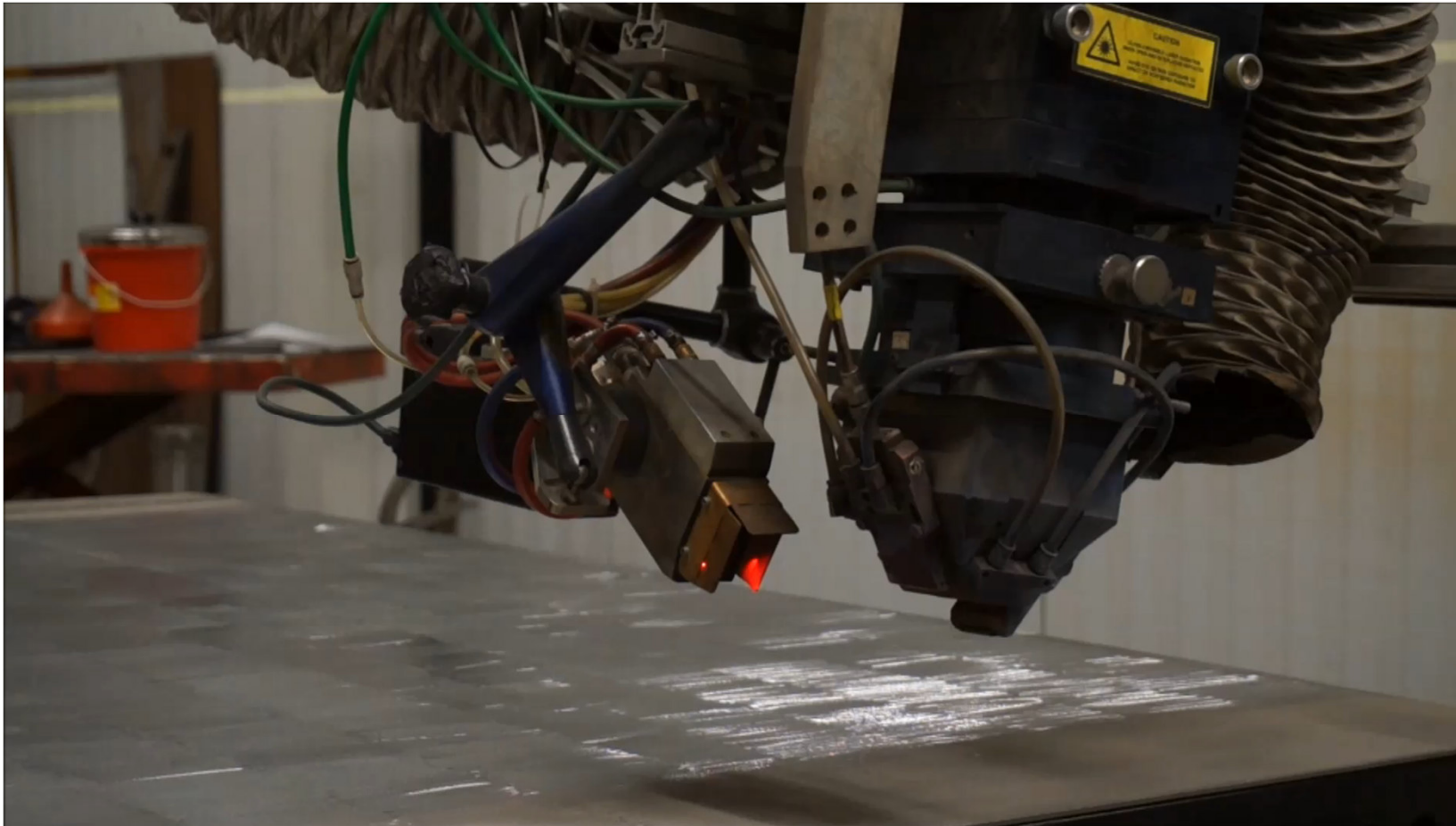
HMS Queen Elizabeth är brittiska flottans största örlogsfartyg någonsin. Hon är ett 280 meter långt hangarfartyg, och används som mobil flygplats för både stridsflygplan och helikoptrar. – Den rör sig vanligtvis i grupp med eskortfartyg, vilket gör att den har stor kapacitet för att verka inom ett stort område. Så det är en kraftig signal som kan projiceras, säger Fredrik Herlitz, chefen för Älvsborgs Amfibieregemente.

Stronger, with
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Services - Laser Cladding Applications Castolin Workshop



Movies from Castolin workshop - Austria



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- Castolin Eutectic Service Center
- Experts in repair and maintenance, our aim is to repair instead of replace
- Specializing in different methods for repair such as:
 - Laser Metal Deposition (LMD)
 - Thermal spray
 - Electroplating
 - Welding
 - Brazing
 - Machining



HVOF

Improve wear resistance,
corrosion protection,
build up and repair of
worn parts

HVOF Process

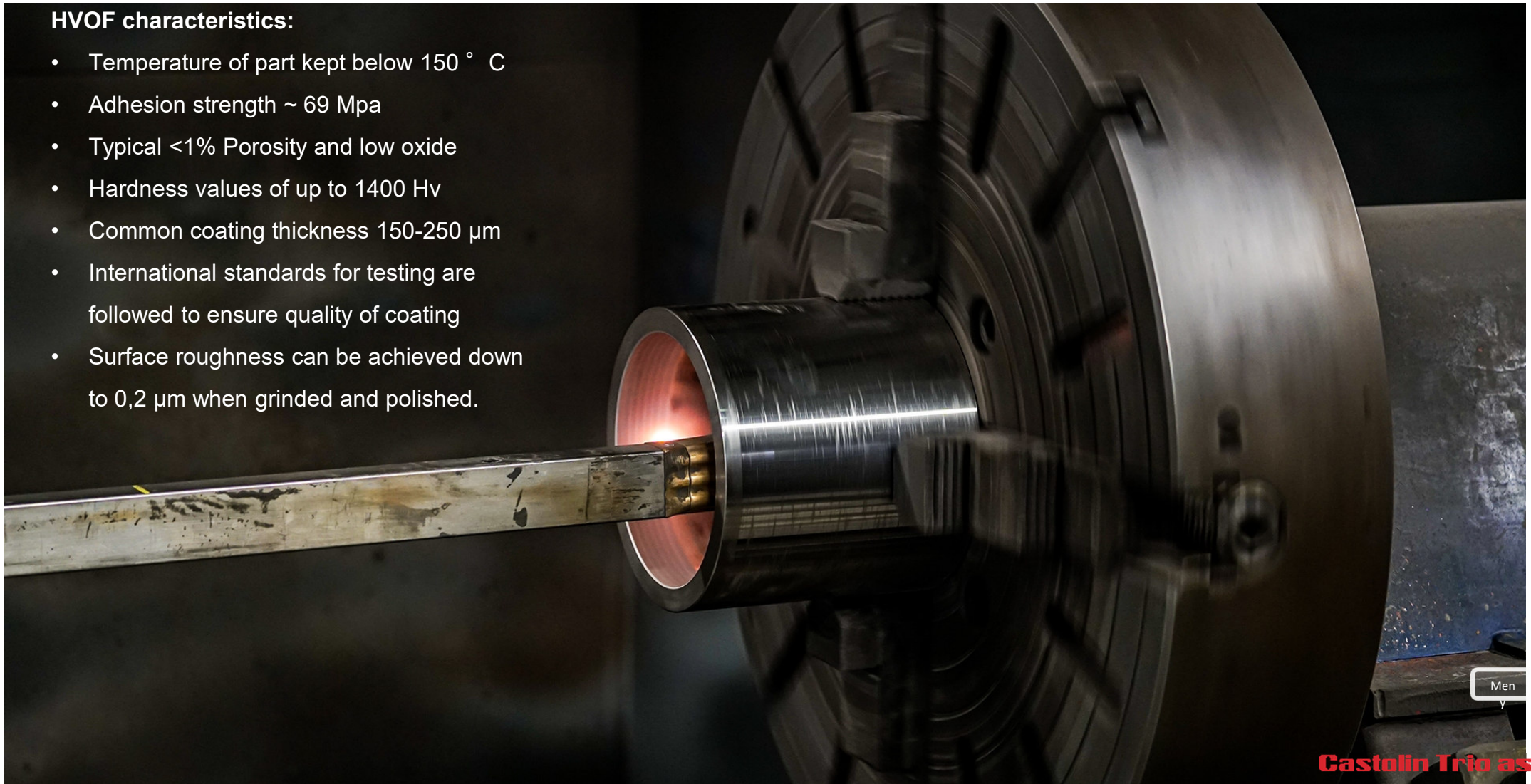
Oxygen and kerosene ignites in combustion chamber. Combustion gases accelerates through nozzle. Fine metal powder is injected into gas stream. Gas exists nozzle at up to 2200 m/s, particle velocity 600 m/s. Particles becomes partially melted in flame and impact substrate at high velocity. Resulting in a dense coating.

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Castolin Eutectic*

Services - Castolin Trio Norway

HVOF characteristics:

- Temperature of part kept below 150 ° C
- Adhesion strength ~ 69 Mpa
- Typical <1% Porosity and low oxide
- Hardness values of up to 1400 Hv
- Common coating thickness 150-250 µm
- International standards for testing are followed to ensure quality of coating
- Surface roughness can be achieved down to 0,2 µm when grinded and polished.



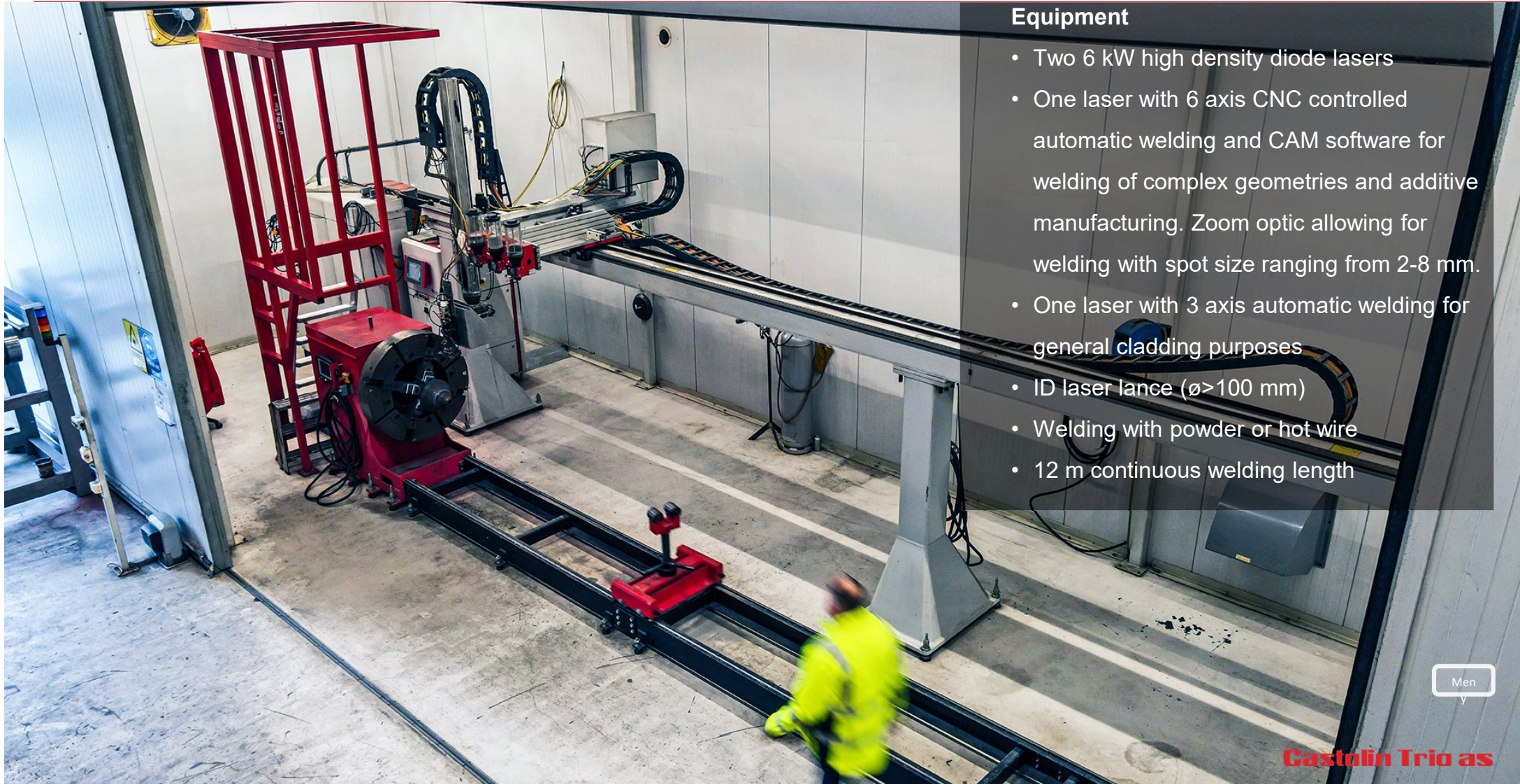
Services - Castolin Trio Norway - HVOF

Applications

- Wear protection
- Corrosion protection
- Low friction surfaces
- High temperature oxidation resistance
- Repair and restoration of damaged components
- ID coating down to $\varnothing 127\text{mm}$ qualified



Services - Castolin Trio Norway - HVOF



Equipment

- Two 6 kW high density diode lasers
- One laser with 6 axis CNC controlled automatic welding and CAM software for welding of complex geometries and additive manufacturing. Zoom optic allowing for welding with spot size ranging from 2-8 mm.
- One laser with 3 axis automatic welding for general cladding purposes
- ID laser lance ($\phi > 100$ mm)
- Welding with powder or hot wire
- 12 m continuous welding length

Men

Castolin Trio as

Services - Castolin Trio Norway - HVOF



ID laser:

- Minimum ID: 100 mm
- Maximum inside range: 1,5 m (longer range on request)
- Welding with powder, any powder available for laser welding

Men
y

Castolin Trio as



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

www.castolin.com www.eutectic.com