



Key Industry Program

Boiler Coating

Stronger, with Castolin Eutectic





We are

Castolin Eutectic is a worldwide leader of application solutions in maintenance, repair and wear protection. More than 100 years of experience in welding, brazing and thermal spraying technologies stand for professional and innovative protection, repair and joining solutions.

We employ more than 1,500 people worldwide in over 100 countries. Our motto is: Quality, Service and Technical Leadership = Customer Value Added.

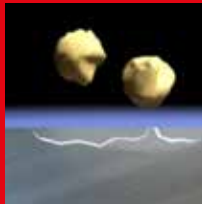
More than 700 Application Specialists care for you all over the world. Their tasks: helping you to improve the productivity of machinery and equipment, to save resources, and to provide solutions for your needs.



Erosion



Impact



Heat & Corrosion



Abrasion



Wear protection experts

Wear phenomena costs money, especially in lost production downtime, replacement parts, repair and ongoing maintenance. At Castolin Eutectic, we take the time to study industry specific wear phenomena because only when the nature of the wear is fully understood, can the correct solution be proposed. We have proved for over a century that preventive maintenance coating programs can extend the life of vital machine parts by as much as 500%.

Classical wear phenomena that occur in industry are :

- Abrasion
- Impact
- Heat
- Cavitation
- Erosion
- Friction
- Corrosion

Global Industry Team

A century at the forefront of protective materials technology has positioned Castolin Eutectic as the world's premier industrial partner. Our comprehensive know-how is unrivalled, and our industry partnerships continue to thrive.



We provide solutions to all of the major companies operating in industry with Global Industrial Programs for steel, cement, automotive, power, oil, waste & recycling, etc.

Castolin Services Workshops

Our mission is to develop applications and solve customer problems. Castolin Services can develop advanced procedures to transfer complete solutions to our customers. We offer a complete and comprehensive service for the maintenance of machine parts and major components subject to extensive service wear or needing repair. Work can either be undertaken in our workshops or alternatively on site. Often the parts being repaired or protected need to be produced on a regular basis, and here “specialist prepared parts” can be produced in our specialist workshops, from 10’s to 100,000 of parts per year. Based upon hundreds of successful applications approved by our customers across the globe, the Castolin Services can provide optimized solutions to combat specific wear and corrosion in your specific boiler.



Documented Knowledge

The unique applications database of Castolin Eutectic



The technical details of Castolin Eutectic’s worldwide casebook are available in most industrial locations where Castolin Eutectic is present, with more than 9,000 fully documented applications for immediate call-up in our multilingual Terolink® system.

The case studies include photographs, technical data, detailed descriptions of the adopted solutions and how they were applied, plus considered alternatives and cost-saving analyses where appropriate.



Our technologies for boiler coating

More than 40 years experience of spraying protective coatings in boilers has led to the evolution of our current offering of “Applied Coating Systems” rather than simple spray products. These “Applied Coating Systems”, which we call **BTC** are our most cost-effective and reliable solutions to severe wear and corrosion problems that function within the industry’s strict operating environments. These **BTC** Coating Systems are your guarantee that our complete experience in alloy design, equipment development, spray parameter optimisation and on site logistics are all utilized to provide the best coating possible in the field. These **BTC** coatings are therefore based on a number of technologies.

Eutalloy process: One step hot spraying for the densest coating

The original solution for corrosion and erosion protection in a 100% dense coating with a corrosion resistant nickel base, reinforced with tungsten carbide and with a metallurgical bond to the substrate. Such coatings are ideal for protection of small areas and local repair with minimal set up costs. Specialist powder, produced by advanced gas atomising, is “sprayed and fused” in one step onto a preheated part.



Eutalloy RW process: Two step hot spraying for larger surfaces and automation

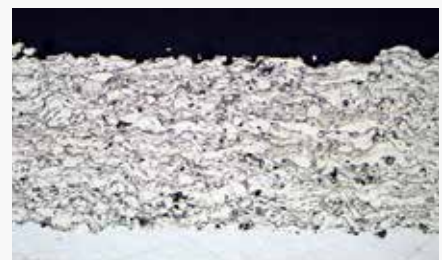
This process separated the spray and fuse steps for greater flexibility and automation. Spraying can be performed with high throughput thermal torch such as the CDS 8000 to complex or large parts. The second step consists of fusing by flame or induction the special alloy which has a lower melting point than the steel tube. Fusing ensures metallurgical bonding, zero through porosity and a smooth surface.



EuTronic Arc process

EuTronic® Arc is the highest productivity thermal spraying process. EuTronic® Arc is an arc spray process using a pair of wires which are continuously melted by an electric arc. Compressed gas, usually air, is used

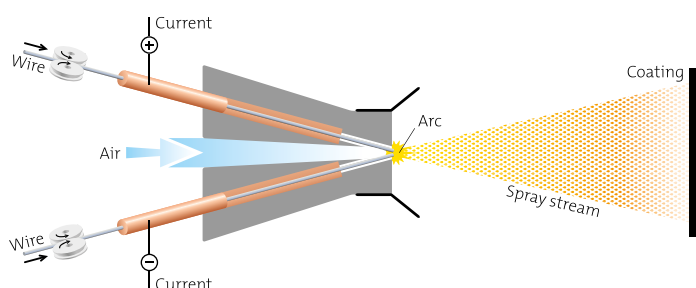
to atomise the molten wire tips and to propel the droplets towards the substrate at velocities exceeding 100 meters per second to form a coating. This combination of high temperature and high particle velocities gives arc sprayed coatings very good coating properties with high bond



strengths and low porosity.

Arc spraying is a cold thermal spraying process where the temperature of the substrate is held below 150°C. Because of the low temperature, the boiler tubes have no metallurgical changes or distortion.

It is possible to spray a wide range of metals, alloys and metal matrix composites in wire form.



Densification process

It is well known that arc spray coatings have micro-structural defects that allow corrosive species to migrate through the coating down to the steel substrate where they can react and create bonding issues. This process rapidly degrades the corrosion protection of such coatings.

“Densification” is a proprietary Castolin Eutectic process that ensures the arc spray coating integrity. Complex chemical reactions between the densifier and the metallic coating create an exceptional barrier against corrosion and improve the overall coating resistance by neutralizing these defects.



The “densified” arc spray coatings can sustain boiler temperatures in excess of 1200°C and associated thermal cycling. These important chemical reactions can only be fully controlled under a specific set of conditions, which includes the preparation, the spraying of the coating and the densification. Consequently, “densified” BTC coatings can only be produced by qualified and certified Castolin Services staff.

Our applications

Based upon hundreds of successful applications approved by our clients across the globe, Castolin Eutectic can provide optimized solutions with a wide range of products and technologies to combat wear in Coal Power Plant, Waste Incineration, Pulp and Paper, Recovery Boilers, Fluidized Bed Boilers and Biomass Boilers, of every major wear problem and can provide industry-tested application solutions.

BTW wire range

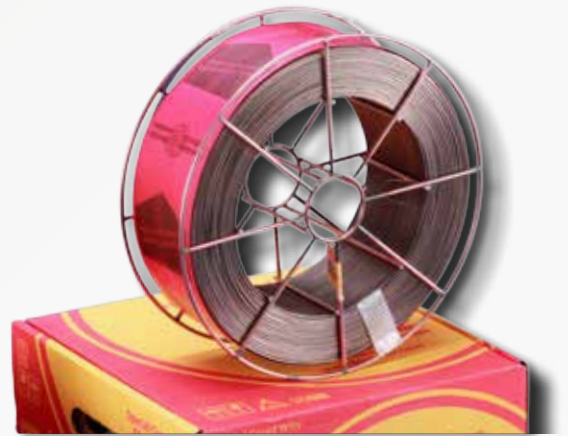
A full range of BTW wires have been specially designed and optimised to be used with the arc wire and densification process. Their selection depends on the boiler conditions. Corrosion, erosion or both at the same time will require different alloys.

BTW 55: Iron-based alloy resistant to erosive and moderate corrosive conditions

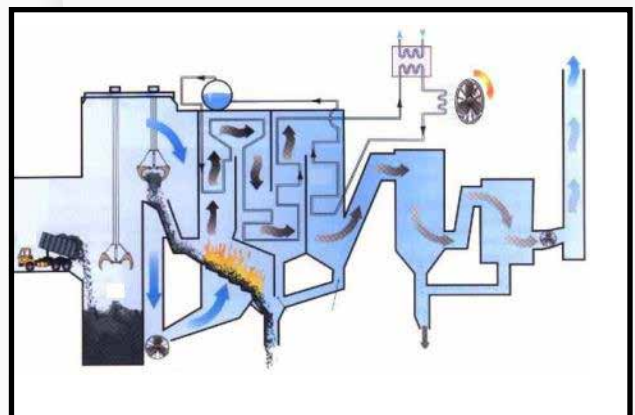
BTW 58: Iron-based alloy resistant to extreme erosive and moderate corrosive conditions

BTW 65: Nickel-based alloy resistant to severe corrosive conditions

BTW 66: Nickel-based alloy resistant to severe corrosive and erosive/abrasive conditions



Our Castolin Eutectic specialists will analyse the wear and corrosion mechanisms that occur in your boiler and propose the best solution available. A selection of a suitable BTW wire and the appropriate densification procedure will be made to ensure that the highest quality coating will be applied as per our strict Castolin Services procedures.



More than 45.000 elbows coated till today for new boilers



Coating in our Workshops

For over 40 years we have been coating boiler tubes in our dedicated Castolin Services workshops. Today we have 15 Castolin Services workshops in Europe who are coating boiler tubes, with a variety of technologies and with a variety of experience and capabilities. Certain workshops have large spray cabins for OEM spraying of tubes and elbows with arc wire spraying and densification, others have fully automated spray and fuse facilities including induction fusing and some are specialist on complex geometries that require the flexibility and reproducibility of a robot for the spraying.

All Castolin Services workshops are whole owned by Castolin and are run to the highest standards of safety and environmental concerns, with trained Castolin staff and written procedures.

All Castolin BTC coatings used have been optimised in terms of consumable and process to guarantee the best properties are realised, with Castolin consumables and Castolin spray equipments. Boiler component geometries such as panels, elbows, straight tubes, bundle assembly, etc as well as welding, straightening are all possible in our workshops.



Pre coated tubes assembled into boiler

Coated panel

Automated coating process



On-site Coating

All 15 Castolin Services workshops in Europe also have experience with applying boiler coatings in the very demanding conditions of an actual boiler. Their experience varies from small surface area trials in single tubes with Eutalloy powders, to full scale refurbishment of 100 m² walls with arc spray and densification.



On-site boiler coating work demands additional organisational and practical skills than workshop coating. Such logistic demands include the need to have all the coating equipment transported into the boiler often through a small hole, to have specially designed robust, transportable spray equipment, specialist protection suits for operators, automated spray systems for large areas, in situ quality control, full safety and operation documentation, etc.

All operators are trained and certified in thermal spraying. All arc wire spray equipment is Castolin “boiler designed” to give high performance under the most demanding environments and to be easy to use.



On-site coating

Arc spray



Fume cooling tower



Excellent references

Together with our partners, during the last decades we have proved that preventive maintenance on boilers can extend the lifetime by as much as 2 to 3 times. Such maintenance operations are undertaken every day by our technician specialists, with 80% of them being on-site repairs the rest being repairs in our workshops. Our specialists are highly adaptable experts having worked on **a broad range of boiler designs for more than 40 years** throughout the world. From pulverized fuel fired boilers to fluidized bed boilers, we have also been successful in supplying boiler manufacturers with new OEM parts produced on a regular basis with the unique Castolin Eutectic **BTC** protective coatings.

The table below offers an illustration of the applications, solutions and successes of our products, around the world. Some of our boiler partners and power plant end users are also listed.

| Protected surface | Castolin Eutectic solutions | Previous lifetime | Lifetime prolonging factor |
|--------------------------------------|---------------------------------------|-------------------|----------------------------|
| Economizer tubes | EuTronic® Arc Spray | 3 years | x2 |
| Water wall panel | EuTronic® Arc Spray | 2 years | x3 |
| Super heather pipes | EuTronic® Arc Spray | 1 year | x6 |
| Super heather pipes near soothblower | Spray and Fuse coating | 2 years | x3 |
| Air preheater tubes | Spray and Fuse coating | 2 years | x3 |
| Fluidized bed nozzles | HVOF coating | 1 year | x6 |
| Membrane roof in WTE boiler | Eutronic Arc Spray with densification | 3 years | x2 |
| Butterfly valve | Eutronic Arc Spray with densification | 2 years | x2 |
| Fume cooling tower | Eutronic Arc Spray with densification | 3 years | x2 |
| Exhaust Fan | Eutronic Arc Spray | 2 years | x2 |
| Screw for ash transport | Eutalloy + TeroCote | 1 week | x12 |
| Bottom of chain conveyor | CDP strips | 1 year | x10 |
| Vertical Roller Mill | TeromaTec welding | 1 year | x2 |
| Fluidized bed nozzles | Nano alloy welding | 1 year | x6 |



Research & Development

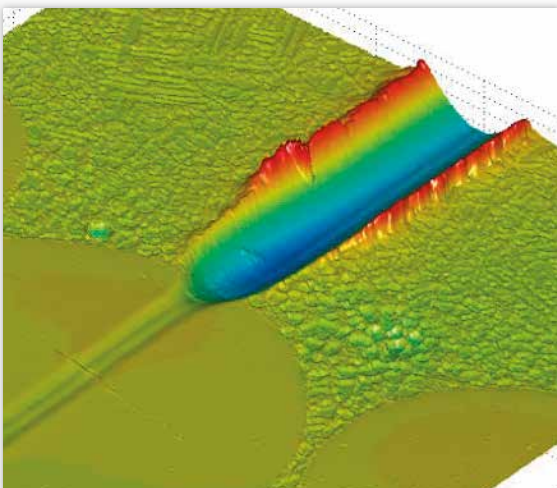
Research and Development is an important part of our goal to deliver the best wear and corrosion protection solutions to our customers' problems. Castolin has the complete range of advanced microstructural and analytical equipments in house and trained, dedicated staff to run them. The right engineered solutions are ensured by the optimisation of the materials and the coating processes by qualified scientific staff.



Wear and corrosion analysis

The latest state-of-the-art testing machines and facilities are essential to accurately measure and understand the complex relationship between chemistry, microstructure and application. Our laboratories are equipped with different wear testing machines and corrosion testing cells.

We also work with world experts in technical universities for high temperature testing and modelling of anti-wear solutions of the materials and the coating processes by qualified scientific staff.



Our innovations for power generation

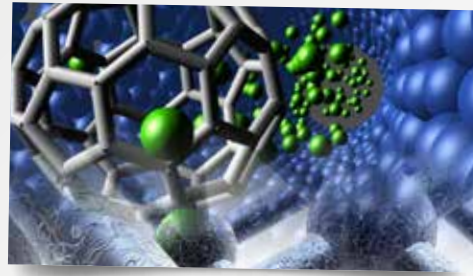
New materials development

NanoAlloy®: Castolin Eutectic has a powerful weapon in the wire alloys for its war on erosion by using a new approach. The world's first NanoAlloy® formulation was developed to provide outstanding abrasion and erosion resistance. This was achieved by using an iron-based alloy with bulk hardness values reaching 71 HRC!

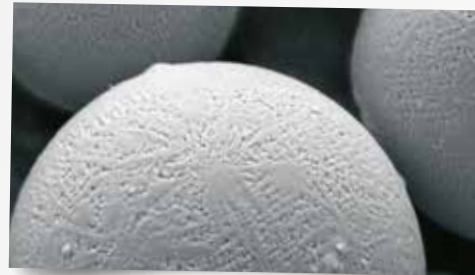
Industry proven spray and Fuse alloys: A high molybdenum, high silicon alloy was developed and patented for severe corrosive environments. This solution combined the inherent properties of such fused coatings (such as diffusion bonding, zero through porosity) with improved performance over even welded 625 alloys. The increasing demands of waste incineration environments are leading to new developments.

EuTronic® Arc Wires: Through development since the early 1990s with leading power companies and high temperature wear and corrosion institutes a family of boiler coating alloys was developed for arc wire spraying.

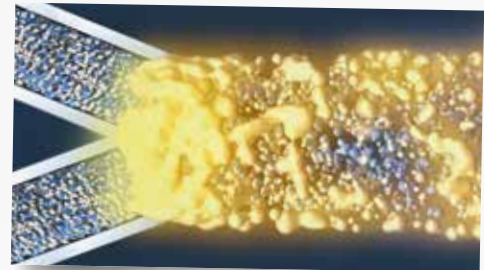
HVOF: The unique quality and properties of HVOF are attractive to boiler coating. The experience gained in arc wire and powder alloy developments is being modified to bring a new generation of Fe and Ni alloy powders for HVOF spraying.



Nano
Microstructure



Tomorrow's
Technology-
today



Fusion of
arc spray wires



HVOF
coating
trials



CJ15 HVOF system



CDS 8000



EuTronic Arc



Our Service Teams world wide - Close to your mills



Manufacturing

A century at the forefront of protective materials technology has positioned Castolin Eutectic as the world's premier industrial partner. Our comprehensive know-how is unrivalled, and our industry partnerships continue to thrive. We provide solutions to all of the major companies operating in industry with global industrial programs for steel, cement, automotive, power, oil, waste & recycling, etc.

Product Range

The Castolin Eutectic has been a pioneer in developing solutions for maintenance and repair to OEM's - Original Equipment Manufacturer - and we have a wide range of processes available to our customers.

Our product range combines quality with high performance and is easy to use. We offer 5 different technology solutions:

- Welding: cored wires and flux coated electrodes
- Brazing: consumables with tungsten carbide base
- Coating: equipment and consumables for metallization
- Wear Plates: ready for use and specifically designed plates
- Welding Equipment: Inverters, Rectifiers, TIG, MIG / MAG, PTA and Plasma Cutting.

Product Range - Widest in the Industry



Stronger, with Castolin Eutectic



Your resource for protection, repair and joining solutions

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