Castolin Eutectic
Global Coating Technology

Consumables
Equipment
Coating Services
History

Castolin Eutectic milestones in the evolution of coating technology

1906  Foundation of Castolin Eutectic in Lausanne, Switzerland by Jean-Pierre Wasserman. His stroke of genius: to discover a way to weld cast iron at a low temperature.

1940  Foundation of Eutectic Welding Alloys Corporation in New York.

1960  International consolidation under Castolin Eutectic.

1963  Launch of powder spray-fuse Eutalloy® torch for powder spraying with simultaneous fusion. More than 42,000 units were sold.

1965  Powder production by water atomisation.


1971  Launch of RotoTec® I torch for powder cold spraying. More than 17,000 units were sold.

1976  Powder production by gas atomisation.

1985  Marketed the world’s first amorphous powder for thermal spraying.

1995  Leading HVOF, Plasma and wire spraying with TAFA acquisition.

2005  Part of the Messer World gas supply company.

2006  World’s first anti-satellite gas atomiser for powder production in Ireland.

2007  Launch of EAS-4 Arc Wire Spray System.

2009  Launch of CJKS HVOF System.

2012  First Laser Cladding facility in Europe.

2013  Monitor Coatings acquired.

2014  Additional Laser Cladding facilities in Korea, Dubai, Austria.
Introduction

Total Coating Solutions

Castolin Eutectic engineers and technicians are all highly qualified to understand industrial application problems in order to recommend optimised tailored solutions. The Research and Development centre is well equipped to resolve most complex wear phenomena affecting industrial productivity, using appropriate coating technology. Customers can be confident that dedicated, in-house development staff will work to fulfill their needs and expectations under a «Total coating solutions» concept. Using state-of-the-art equipment, every batch of coating alloys produced according to strict procedures, is rigorously tested by professionals to ensure complete compliance with demanding Castolin Eutectic standards and exhaustive Quality Assurance criteria.

Overview of the wear phenomena

Classical wear phenomena that occur in industry are:

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

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. Damage caused by wear phenomena costs money, especially in lost production downtime, replacement parts, repair and ongoing maintenance.

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%. Only Castolin Eutectic has the «know-how» to identify the key critical wear problems plus the «show-how» to overcome them, thus greatly increasing your plant efficiency and profits.

R&D / Technical Support

Castolin Eutectic employs many engineers and technicians dedicated to solving the technical problems of our customers. The main Castolin Eutectic Research and Development centre for welding consumables and powder coating alloys, is in Dublin. This R&D centre is one of the most advanced coating technology laboratories in Europe. This modern facility is equipped for in-depth studies of all types of industrial welding and coating applications geared towards problem-solving solutions. Dublin not only has an automated Micro Hardness machine, G65, ICP and XRF units, but also employs a highly-trained and customer oriented technical team.

Our team has undertaken more than 3,500 metallurgical study reports over the last 15 years, to correctly identify the primary and secondary causes of complex wear problems, as well as recommending the optimum solutions. After all, as a Castolin Eutectic customer, you deserve the best analysis, care and service to guarantee the quality and efficiency of your production operations.
**Introduction**

**Wear Testing labs**

Castolin Eutectic closely co-operates with world renowned technical institutes & universities whose centres of excellence for modelling wear mechanisms include fully equipped laboratories with scanning electron microscopes and wear testing equipment. Such state-of-the-art facilities and testing equipment are essential to accurately monitor progress of wear mechanisms and to understand the complex relationship between materials, microstructures, processes and applications.

**Integrated Production performance**

The complete control of coating powder production within our own modern manufacturing plants, ensures highest quality products to precisely meet user needs. A proficient research centre, staffed by skilled engineers and technicians in daily contact with OEM producers and industrial users around the world, enables the powder plants to rapidly respond to specific customer requirements.

The latest powder production technologies are perfectly integrated and managed within the logistics supply chain to assure the best service and value to customers.

**Stringent Quality Controls**

Every stage of powder production, from raw material selection to ingredient preparation and on to the atomisation process and the final sieving operations, is subject to stringent quality assurance procedures. CEIL is ISO 9001 : 2000 certified and participates in a centralised Total Quality Management program with the primary aim of achieving complete customer satisfaction.

Only under such strict conditions can the finished product consistently conform to the highest performance demands of OEM producers and industrial users.
Introduction

Coating overview

There are many different ways to protect against wear and corrosion, each with their respective advantages and constraints. Your parts can be protected from new or repaired and rebuilt. Below you will find simplified overviews of the different coating processes, to obtain a quick initial choice for your applications.

Simplified thermal spray

<table>
<thead>
<tr>
<th>Coating families</th>
<th>Coating material</th>
<th>Base material</th>
<th>Heating of work-piece</th>
<th>Max coating thickness mm</th>
<th>Coating surface size</th>
<th>Coating structure</th>
<th>Coating micro-porosity</th>
<th>Bonding</th>
<th>Deposition rate</th>
<th>Deposition yield</th>
<th>Operating costs</th>
<th>Equipment investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVOF</td>
<td>Powder - Metals Tungsten Carbide</td>
<td>All metals</td>
<td>Low</td>
<td>0.5</td>
<td>Small to Large</td>
<td>Lamellar</td>
<td>&gt; 1%</td>
<td>Excellent-mechanical bond</td>
<td>Medium</td>
<td>Low</td>
<td>Liquid fuel, combustion gases</td>
<td>Medium to High</td>
</tr>
<tr>
<td>Laser Cladding</td>
<td>Powder - Metals Tungsten Carbide</td>
<td>All metals</td>
<td>Low</td>
<td>5 (15)</td>
<td>Small to Very Large</td>
<td>Homogeneous</td>
<td>0%</td>
<td>Excellent Fusion</td>
<td>High</td>
<td>Medium</td>
<td>Electricity</td>
<td>High</td>
</tr>
<tr>
<td>RotoTec</td>
<td>Powder - Metals &amp; polymer</td>
<td>All metals</td>
<td>Low</td>
<td>3</td>
<td>Medium to large</td>
<td>Lamellar</td>
<td>5 to 15%</td>
<td>Good, Mechanical &amp; micro-diffusion</td>
<td>Medium to high</td>
<td>Medium to high</td>
<td>Combustion gases</td>
<td>Low</td>
</tr>
<tr>
<td>ProXon</td>
<td>Powder - Metals</td>
<td>All metals</td>
<td>Low</td>
<td>2 (5)*</td>
<td>Medium to large</td>
<td>Lamellar</td>
<td>5 to 15%</td>
<td>Good, Mechanical &amp; micro-diffusion</td>
<td>Medium to high</td>
<td>Medium to high</td>
<td>Combustion gases</td>
<td>Low</td>
</tr>
<tr>
<td>Meta-Cerm</td>
<td>Powder - Ceramic</td>
<td>All metals</td>
<td>Low</td>
<td>0.4 (1)*</td>
<td>Medium</td>
<td>Lamellar</td>
<td>5 to 15%</td>
<td>Good, Mechanical &amp; micro-diffusion</td>
<td>Low</td>
<td>Medium</td>
<td>Combustion gases</td>
<td>Low</td>
</tr>
<tr>
<td>Eutalloy</td>
<td>Powder - Self-fluxing alloys</td>
<td>Steels, cast iron, (aluminium bronze)</td>
<td>Medium to high</td>
<td>2 (6)*</td>
<td>Small &amp; precise</td>
<td>Homogeneous</td>
<td>Negligible</td>
<td>Very good, Diffusion</td>
<td>Medium</td>
<td>Medium</td>
<td>Combustion gases</td>
<td>Low</td>
</tr>
<tr>
<td>Eutalloy SF</td>
<td>Powder - Self-fluxing alloys</td>
<td>Steels &amp; cast iron</td>
<td>High</td>
<td>2 (6)*</td>
<td>Medium to large</td>
<td>Homogeneous</td>
<td>Negligible</td>
<td>Very good, Diffusion</td>
<td>High</td>
<td>High</td>
<td>Combustion gases</td>
<td>Low</td>
</tr>
<tr>
<td>Eutalloy RW</td>
<td>Powder - Self-fluxing alloys</td>
<td>Steels &amp; cast iron</td>
<td>High</td>
<td>2 (6)*</td>
<td>Medium</td>
<td>Homogeneous</td>
<td>Negligible</td>
<td>Very good, Diffusion</td>
<td>Medium to high</td>
<td>Medium to high</td>
<td>Combustion gases</td>
<td>Low</td>
</tr>
<tr>
<td>EuTroLoy</td>
<td>Powder or wire - Metals</td>
<td>Steels, cast iron, (aluminium bronze)</td>
<td>Medium to high</td>
<td>2 (10)*</td>
<td>Large</td>
<td>Homogeneous</td>
<td>Negligible</td>
<td>Excellent Fusion</td>
<td>Medium to high</td>
<td>Medium</td>
<td>Electricity &amp; shielding gas</td>
<td>Medium</td>
</tr>
<tr>
<td>EuTronic Arc</td>
<td>Wire - Metals</td>
<td>All metals</td>
<td>Low</td>
<td>1 to 2</td>
<td>Very large</td>
<td>Lamellar</td>
<td>1 to 10%</td>
<td>Good-Mechanical &amp; micro-diffusion</td>
<td>High</td>
<td>Medium</td>
<td>Electricity &amp; compressed air</td>
<td>Medium</td>
</tr>
</tbody>
</table>

(…)* request special precaution or coating material

![Best](image1.png)  ![Second choice](image2.png)
Introduction

Quality Assurance

Over the last few years, the need for quality assured, thermally sprayed coatings has steadily grown. A Total Quality Management system in a general spraying workshop, education, detailed procedures and quality control testing are the key elements for success.

Education

The first step for a new operator is to complete a general training course in thermal spraying and then to gain practical experience over a period of at least 3 months. If a company is prepared to introduce a complete QA-system, the ETS (European Thermal Sprayer) course is the next step.

Detailed procedures

The best way to produce consistent, repeatable, high quality coatings is to follow a specific documented working procedure which guides the operator through all the necessary steps before, during and after spraying. The operator must detail every important step such as; work-piece data, surface cleaning method, preheating temperature, choice of spraying material, maximum temperature during spraying, final coating thickness and whether test pieces were sprayed.

They must confirm every completed step with a signature and the sprayed coating has also to be approved by the foreman before the part can be delivered.

The spray shop should store this document in a form suitable to be delivered together with the sprayed part to the customer.

Quality control

The quality control of sprayed parts can be carried out in many different ways. The most important coating properties to control are:

- bond strength
- hardness
- porosity
- microstructure

A typical spray shop can achieve a good understanding of the final coating integrity by spraying five test coupons. Four test coupons are then used for bond strength measurements and the last coupon can be used for hardness, porosity and microstructure verification purposes.

Bond strength

The coating bond strength is normally measured according to the EN 582 standard, which describes the complete procedure. It is essential to use adhesives with low penetration properties otherwise there is a risk that the glue will flow through the coating down to the substrate. This will influence the bond strength measurement and lead to incorrect values.

Hardness

The coating hardness can be measured either on a ground area of the surface or in the cross section of the coating thickness. However, due to the laminar nature of some coating structures, hardness values may vary depending on where the measurement is taken. A special Vickers hardness testing machine allows the thin cross-section of the coating to be accurately measured in HV (Hardness Vickers number). Different loading levels can be pre-selected depending on the coating hardness – the smaller the applied load, the higher the surface finish requirements.

Alternative macro hardness testing machines such as Brinell (HB) or Rockwell (HRC) use spherical and conical indenters respectively.

Porosity

The coating porosity can be measured indirectly using the water impregnation method. This involves the diffusion of water to saturate the coating under vacuum conditions. By weighing the coating before and after water impregnation, the weight increase is mathematically recalculated into volume terms, which indicates the coating porosity degree.
Introduction

Quality Assurance

Microstructure
The coating microstructure can be readily examined using an optical microscope. The operator can view directly the coating microstructure, thickness, degree of bonding, delamination effects, micro or macro cracks, approximate porosity and oxide content.

Wear test methods

ASTM G65 abrasion test
The ASTM G65 procedure simulates a three body wear system designed to generate reproducible test data in order to rank materials by their resistance to low stress abrasion.

The testing equipment uses a rotating rubber wheel and dry sand to establish the abrasion resistance of different materials by measuring the degree of wear caused by hard quartz sand particles forced to move against and across the specimen surface.

CIAT - Continuous Impact and Abrasion Test
The CIAT is a wear test to measure resistance to abrasion combined with impact using an impeller tumbler machine.

Environmental awareness & Quality standards
Reduce, re-use, recycle:
The Castolin Eutectic philosophy to conserve the earth’s precious resources and give added value to old and worn parts is acknowledged worldwide. In our production facilities we have programs to reduce our environmental impact and all our production is ISO 9001:2000 certified.
Introduction

Powder production

Overview of the Powder production processes

Castolin Eutectic has made a major investment at its Dublin (Ireland) consumables plant. In a bid to increase both efficiency and productivity, the new powder plant incorporates a substantial advance in atomisation technology. This improvement optimizes powder quality for Castolin Eutectic customers.

Historical Development of Thermal Spray Powder Atomisation

During the first half of the 20th century, the earliest thermal spray powders used to be limited to self-fluxing, nickel-based alloys. These earlier powders were very resistant to oxidation and were therefore atomised with steam, water or air and reached reasonable properties. Inert gas atomisation in earlier atomisers was carried out using nitrogen, and then quenching the particles into water. This process produced powders with less oxidation than air, steam or water atomisation, and also with excellent particle shape. This was because freezing of the spray took place within an inert gas, allowing for better spherodisation. Only with cobalt and other non self-fluxing alloys did dry, inert gas atomisation become the industry standard. However, while this avoided the risk of any oxidation by the water quench, it was found that the particle shape was sometimes inferior to water-quenched powder. Small «satellites» were often found welded to the surface of the particles. This seemed to occur more frequently when finer powders were atomised. This feature reduced packing density, flowability and could disturb the thermal spray by satellites being detached.

Cause of Satellite Formation

During dry gas atomisation, satellite formation is caused mostly when a dense dust-particle-cloud is formed in the atomising vessel. The hot plume of just-atomised droplets then passes through this cloud, causing the droplets to collide with smaller, colder particles of the cloud. Castolin Eutectic, with over 40 years of experience in water atomisation and over 15 years in gas atomisation, is concentrating its know-how at the world’s most advanced powder plant in Dublin. Leading-edge, powder production specialists were enrolled as partners to create a state-of-the-art and unique «anti-satellite» system. This system was designed using exhaustive Computational Fluid Dynamic (CFD) modelling to ensure that the intended suppression of the dust cloud is indeed achieved. The number of particles with satellites is therefore significantly reduced. As material proof of this technology’s success, the appearance of the powders under the microscope was visibly improved.

Yesterday’s Technology, Tomorrow’s Technology - today

Another advantage is the increase in the flow rate through spraying system passages, with fewer disturbances due to satellites.

The new gas atomisation allows for the production of highly alloyed powders containing reactive elements. This would be impossible with water atomisation. Such powders can be formulated to produce unique combinations of wear and corrosion resistant coatings.

By developing and producing in-house, every step of the production is controlled. Only high quality raw materials are used and every batch is strictly controlled and tested. Additionally products can be adapted to customers needs.
Overview of the spray wire production processes

Today the vast majority of wires used for arc wire spraying are solid, extruded wires of standard compositions of zinc and aluminium. By shifting to the more advanced «cored wire», innovation in surface protection is easier to achieve. Cored wires consist of hollow metal wires filled with different powders (metal and mineral). The flexibility in choice of metal and powder compositions, have enabled us to produce wire compositions with new high-tech production equipment that are impossible to produce as solid wires. Such wires have been tuned for arc wire spraying and to produce unique combinations of wear and corrosion properties for applications in boiler protection, for example.
Our equipment DNA is ease-of-use, quality, simplicity, reliability

In the history of Castolin Eutectic, thermal spray coating equipment has been developed, designed and manufactured in-house since 1963. Since the launch of the first Eutralloy torches in 1993, Castolin Eutectic have sold more than 80,000 thermal spray units around the world encompassing also PTA, arc wire spray and HVOF in addition to the early oxyacetylene devices.

In keeping with the Swiss tradition of highest quality and precision, these thermal spray torches carry our DNA of ease of use, reliability, robustness and simplicity and are designed to bring out the best from our powders. Today, many of the key, high precision components are still manufactured in Switzerland to maintain these high standards and reproducibility.
Introduction

**Our offer**

**The complete spectrum to ensure the right Solution**

In the fight against wear and corrosion using thermal spray technologies, ultimately the only thing that counts is the end-product; the coating. Failure or success of the coating will be determined by its properties and its suitability to protect in the given harsh environment. Basically, the key properties of coatings are:

- Chemistry
- Microstructure
- Mechanical properties that keep the integrity of the coating

The above parameters need to be optimised by perfecting the quality of the powder, the quality of the deposition equipment and the quality of the spray parameters. Only when all three variables are controlled and optimised can the coating perform to its full capacity, as illustrated below.

Painstaking optimisation work with powder or wire specifications, torch design and then spray parameter optimisation must be gone through with subsequent microstructural analysis, wear testing and mechanical testing of the coating to be able to give the ultimate coating.

This is easier if you control the manufacture of the powders/wires and the design/ manufacture of the torch and delivery system. Things get easier if you understand wear and corrosion and know which microstructure, chemistry and mechanical properties are needed to succeed. This is the unique strength of Castolin Eutectic after 100 years of solving wear problems.

Many of our customers prefer that we apply this know-how directly on their parts without getting involved in the details of thermal spray coating powders, equipment and optimised parameters. For these customers we have the CastoLab Services workshops.

For the customer who wants a complete turn-key solution in order to guarantee Castolin Eutectic Quality Coatings in their own workshop or OEM production facility, we also offer a fully Integrated Thermal Spray System, based on our various technologies.

Castolin Eutectic is unique in offering such a broad range of options for obtaining quality coatings for our customers. This is our unique offer.
**Simplified overview**

<table>
<thead>
<tr>
<th>Coating families</th>
<th>Coating material</th>
<th>Base material</th>
<th>Heating of work-piece</th>
<th>Max coating thickness mm</th>
<th>Coating surface size</th>
<th>Coating structure</th>
<th>Coating micro-porosity</th>
<th>Bonding</th>
<th>Deposition rate</th>
<th>Deposition yield</th>
<th>Operating costs</th>
<th>Equipment investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eutalloy</td>
<td>Powder. Self-fluxing alloys</td>
<td>Steels, cast iron, (aluminium bronze) *</td>
<td>Medium to high</td>
<td>2 (6)*</td>
<td>Small &amp; precise</td>
<td>Homogeneous</td>
<td>Negligible</td>
<td>Very good</td>
<td>Medium</td>
<td>Medium</td>
<td>Combustion gases</td>
<td>Low</td>
</tr>
<tr>
<td>Eutalloy SF</td>
<td>Powder. Self-fluxing alloys</td>
<td>Steels &amp; cast iron</td>
<td>High</td>
<td>2 (6)*</td>
<td>Medium to large</td>
<td>Homogeneous</td>
<td>Negligible</td>
<td>Very good</td>
<td>High</td>
<td>High</td>
<td>Combustion gases</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Best  Second choice

(...)* request special precaution or coating powder
**Basic Principles of Eutalloy® process**

**Function**
The powder is introduced into the torch flame and sprayed in a semimolten state onto the preheated part, for fusion. Bonding is achieved by diffusion of the alloys into the base metal.

**Advantages**
Eutalloy® provides a wide range of benefits compared with conventional arc welding process and PTA processes:
- No dilution of the base material
- Best purity and performance of the coating alloy
- Homogeneous and pore-free coatings
- Smooth surface for low post welding machining and also when compared with cold thermal spraying
- Higher bond strength
- Better shock resistance
- Thicker coatings capabilities

**Applications**
The Eutalloy® process is designed for protective coating of machine parts and tools subject to a variety of wear phenomena. Eutalloy®-type oxy acetylene torches are capable of delivering a wide range of alloys in powder form. The Eutalloy® system has a coating dimension range from 0.10 mm to thicknesses of several millimetres. The spraying followed by fusion method can fine-coat to 0.05 mm. The hardness of a deposit can vary from 15 to 65 HRC, depending on the alloy composition. Such deposits are perfectly homogeneous and dense.

**Technical data**
- Flame temperature: 3200°C
- Particle velocity: not relevant
- Deposition rate: 2 to 6 kg/h
- Coating material: Self-fluxing Ni, Co or Fe base in powder form
- Coating thickness: 0.05 to 10 mm
- Coating density: 100%
- Noise level: 70 - 80 dB(A)
<table>
<thead>
<tr>
<th>Designations</th>
<th>Product Type</th>
<th>Applications</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eutalloy® 10009</td>
<td>Alloy Ni-Cr-B-Si-Fe</td>
<td>Resurfacing cams, pushers, stops, guide wheels, filterpress cake stone remover for sugar mill, decanting screw, steam gate components. Coating elements subject to friction.</td>
<td>~63 HRC Low friction coefficient. Good resistance to corrosion, erosion and abrasion under light load.</td>
</tr>
<tr>
<td>Eutalloy® 10011</td>
<td>Ni-Cr-B-Si-Fe alloy and tungsten carbide</td>
<td>Coating elements of chains, transport screw, wiper segments, brick die frames, claw excavators, rock drill, brush cutter rake, debarking knives</td>
<td>~65 HRC 80% tungsten carbides. Excellent resistance to abrasion by fine to coarse sized abrasives.</td>
</tr>
<tr>
<td>Eutalloy® 10112</td>
<td>Ni-Cr-B-Si-Fe alloy and tungsten carbide</td>
<td>Coating of machine parts used in the transport, handling and processing of minerals: transport screws, clay mixers, dies, segments, wipers, turbine impeller, fan impeller, pump screw, etc.</td>
<td>~64 HRC 60% tungsten carbides. Excellent resistance to erosion and abrasion by fine to coarse sized abrasives.</td>
</tr>
<tr>
<td>Eutalloy® 10185</td>
<td>Alloy Ni-B-Si</td>
<td>Coating of cast iron and steel molds for plastic material and glass. Recoating shafts, eccentrics, bearings Soldering tungsten carbide biscuits on drilling stabilizers, etc.</td>
<td>~390 HV30 Well suited for metal-to-metal friction. Excellent corrosion resistance. Machinable with cutting tool.</td>
</tr>
<tr>
<td>Eutalloy® 10224</td>
<td>Alloy Ni-B-Si</td>
<td>Repairing glass mold edges, gear teeth, exhaust manifolds, pump bodies, brakes on drawing tools. Bonding layer before welding with electrode on cast iron that is difficult to weld, etc.</td>
<td>~250 HV30 Appropriate for new or worn cast iron. Good resistance to corrosion. Machinable with cutting tool.</td>
</tr>
<tr>
<td>Eutalloy® 10611</td>
<td>Co-Ni-Cr-B-Si alloy and tungsten carbide</td>
<td>Resurfacing chemical transport screws, fan blades at cement works, augers, and extrusion screws. Blades and segments of mixers, etc.</td>
<td>~55 HRC 50% tungsten carbides. Excellent resistance to abrasion under pressure and to corrosion.</td>
</tr>
<tr>
<td>Eutalloy® 10680</td>
<td>Alloy Ni-B-Si</td>
<td>Repair of gears, cast iron valve seats, molds, keyways, bearing seating. Renewing drawing tools. Correction of machining errors, etc.</td>
<td>~240 HV30 Good resistance to shocks and oxidation while hot. Machinable with cutting tool.</td>
</tr>
<tr>
<td>Eutalloy® 15999</td>
<td>Ni-Cr-B-Si-Fe alloy and tungsten carbide</td>
<td>Coating of molds for ceramics, rasps. Distributor blades for fertilizer spreaders, cyclone blades, hopper for sand spreading machines, mouths of baggers, etc.</td>
<td>~65 HRC 15% tungsten carbides. Excellent resistance to erosion and abrasion by fine abrasives.</td>
</tr>
</tbody>
</table>
## Powder Spray-Fusing

**Eutalloy® Powders**

<table>
<thead>
<tr>
<th>Designations</th>
<th>Product Type</th>
<th>Applications</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eutalloy® LT PE 8418</td>
<td>Self-fluxing, nickel base alloy</td>
<td>Repair of mould damage on the seams or edges. Easy to machine or file.</td>
<td>~240 HV30 (~18 HRC) Grain size -106 µm. Low energy input for the fusion. Spot repairs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grain size -106 µm. Low energy input for the fusion. Spot repairs.</td>
</tr>
<tr>
<td>Eutalloy® LT PE 8422</td>
<td>Self-fluxing, nickel base alloy</td>
<td>Repair or protection of mould components: seams, blow heads, guide rings.</td>
<td>~270 HV30 (~22 HRC) Grain size -106 µm. Low energy input for the fusion. Small to medium repairs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grain size -106 µm. Low energy input for the fusion. Small to medium repairs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grain size -106 µm. Low energy input for the fusion. Fast deposition.</td>
</tr>
<tr>
<td>Eutalloy® LT PE 8431</td>
<td>Self-fluxing, nickel base alloy with addition of Cr and Mo</td>
<td>Fast repairs and extensive preventive coatings on mould edges and guides.</td>
<td>~31 HRC Grain size -106 µm. Low energy input for the fusion. Good wetting properties and fast.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grain size -106 µm. Low energy input for the fusion. Good wetting properties and fast.</td>
</tr>
<tr>
<td>Eutalloy® LT PE 8435</td>
<td>Self-fluxing, nickel base alloy with addition of Cr and Mo</td>
<td>Extensive repairs and preventive coatings on neck rings or blow head.</td>
<td>~35 HRC Grain size -106 µm. Low energy input for the fusion. Enhanced fluidity and fast.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grain size -106 µm. Low energy input for the fusion. Enhanced fluidity and fast.</td>
</tr>
<tr>
<td>Eutalloy® LT PE 8440</td>
<td>Self-fluxing, nickel base alloy with addition of Cr and Mo</td>
<td>Enhanced weldability at high hardness level on bottom plates, baffles and guide plates.</td>
<td>~40 HRC Grain size -106 µm. Low energy input for the fusion. Fast deposition with enhanced fluidity.</td>
</tr>
</tbody>
</table>
SuperJet-S-Eutalloy®

SuperJet-S-Eutalloy® is an oxy-acetylene thermal spray torch, which delivers very precise anti-wear protective coatings, thanks to its sensitive controls. Alloy powders are sprayed onto the part to be coated and are fused simultaneously. Diffusion bonding with the base metal ensures that it does not reach its melting point. The dense coating is not affected by dilution and retains all its designed properties.

Advantages
- Flexible, multi purpose and fast
- Rapid shut-off of acetylene and oxygen while maintaining setting
- Reliable and precise coatings
- Usable in all positions on a wide range of base metals, including steels, alloy steels, stainless steels and cast-iron

Contents of the equipment case:
- 1 torch with heat shield
- 6 tip assemblies for different flame sizes to be used according to the size of the part or type of coating required
- Also included are Eutalloy® powders for a wide range of applications. Alloy types: 10680 – 10009 – 10185 – 10112
- Solution R 103 to protect the adjacent areas from undesirable overspray.

Accessories such as:
- adjustable spanner
- spark lighter
- welding goggles
- hose couplings
- set of nozzle cleaners *
- set of injector cleaners
- special screwdriver *
- cleaning rad *
- set of Teflon washers *

Also included are Eutalloy® powders for a wide range of applications. Alloy types: 10680 – 10009 – 10185 – 10112

Solution R 103 to protect the adjacent areas from undesirable overspray.

Special water cooled tip assemblies called KoolTip® kits are recommended whenever the SuperJet-S-torch is subject to high duty cycle usage or prolonged thermal reflections.

C6 water-cooled tip assembly kit contents:
- assembly with cooling device
- set of connecting water hoses
- special heat shield

Accessories such as:
- spark lighter
- welding goggles
- nozzle cleaner *
- injector cleaner *
- set of Teflon washers *

* packed in a plastic box.

KoolTip

Product N°
750731 SuperJet-S- complete kit

Product N°
200102 SuperJet-S- kit with A1S, B3S and CSS
Other kits with different content are available on request. Please ask your local Castolin Eutectic company

Product N°
103857 KoolTip C6S kit

* packed in a plastic box.
C6 Air cooled Tip

The C6 Air cooled tip is for use when water cooling is not possible. The air cooled version has been specifically designed for this torch. C6 tips have become a standard feature in industry.

Nozzles

This nozzle is made out of highly alloyed Cu with structural hardening, a special wear resistant copper alloy which improves service life. It can be screwed on & off easily. Every standard kit is delivered with this nozzle type.

Heavy duty Nozzles

Reinforced with Tungsten–Carbide

This nozzle can be supplied as an option. Each type can be screwed easily onto the corresponding standard tips. It is recommended when using powders containing abrasive hard particles such as tungsten-carbides. This wear-resistant spray nozzle will help you in terms of longer service life or consistent quality coating. C6-3 is special nozzle with 3 holes for the powder outlet to coat large surfaces.

Compact heavy duty tip

Tungsten–Carbide brazed on the tube

This is the solution for all applications where access is a problem and visibility of the fusion bath is a must. It is recommended for Glass Works and all big users of powders containing hard particles. It is available as an option.

Compact heavy duty tube

Tungsten–Carbide brazed on the tube

Same as the compact heavy duty tip, however without the gas mixer. It is available as an option.
Powder Spray-Fusing

Eutalloy® SF Process - One Step Spray & Fuse for high yield

Function

The Eutalloy® SF flame spraying process is designed to deposit a range of wear resistant powder coatings with high deposit efficiency. It uses the CastoDyn DS 8000 oxy-acetylene powder spray system equipped with an SF Lance to coat onto slowly moving or stationary even surfaces of massive steel parts in a one-step Spray & Fuse operation.

The water cooled SF Lance robust design has been engineered to perform higher powder deposition spraying rates with simultaneous fusion capabilities. This creates wear resistant requisite coatings from 0.8 mm to 3 mm thickness with strong metallurgical diffusion bonds to the steel substrate.

Advantages

- High deposition yield
- No dilution of the base material
- Best purity and performance of the coating alloy
- Homogeneous and pore free coatings
- Smooth surface for low post machining
- High bond strength
- Good shock resistance
- Thick coatings capabilities

Applications

A range of self fluxing Eutalloy® SF powder alloys has been developed to meet the precise granulometry and morphology tolerances of the SF Lance system, thus ensuring highest possible deposition rates combined with efficient yield, reliable deposit quality and ease of application. This comprehensive range of corrosion resistant nickel based Eutalloy® SF powder alloys is available to meet different hardness and machinability requirements when protecting industrial machine parts in service against wear by friction, abrasion, erosion, pressure etc.

Technical data

- Flame temperature: 3200 °C
- Particle velocity: not relevant
- Deposition rate: 2 to 10 kg/h
- Coating material: Self-fluxing Ni, Co or Fe base in powder form
- Coating thickness: 0.8 to 3 mm
- Coating density: 100%
- Noise level: 70 - 80 dB(A)

Coating with densely packed hard tungsten carbides in a matrix to form an impenetrable barrier to abrasive particles.
### Eutalloy® SF Powders

<table>
<thead>
<tr>
<th>Designations</th>
<th>Product Type</th>
<th>Applications</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eutalloy® SF 15211</strong>&lt;br&gt;&lt;br&gt;Product N°&lt;br&gt;202789 4.5kg</td>
<td>Ni-Cr-B-Si-Fe alloy and tungsten carbide</td>
<td>All round powder for anti-abrasion.</td>
<td>~60 HRC&lt;br&gt;60% tungsten carbides&lt;br&gt;Excellent resistance to erosion and abrasion by fine to coarse sized abrasives.</td>
</tr>
<tr>
<td><strong>Eutalloy® SF PE 8213</strong>&lt;br&gt;&lt;br&gt;202536 12.5kg&lt;br&gt;202537 4.5kg</td>
<td>Ni-Cr-B-Si-Fe alloy and tungsten carbide</td>
<td>For thick coatings. Stabilizer in oil and gas drilling industry.</td>
<td>~55 HRC&lt;br&gt;55% tungsten carbides. Excellent crack resistance. Abrasion and corrosion resistance.</td>
</tr>
<tr>
<td><strong>Eutalloy® SF PE 8215</strong>&lt;br&gt;&lt;br&gt;202538 4.5kg</td>
<td>Ni-Cr-B-Si-Fe alloy and tungsten carbide</td>
<td>For smooth coatings and parts subject to severe abrasion such as agriculture parts, centrifugal screws.</td>
<td>~850 HV30&lt;br&gt;60% tungsten carbides. Excellent abrasion resistance even by fine particles.</td>
</tr>
<tr>
<td><strong>Eutalloy® SF PE 8217</strong>&lt;br&gt;&lt;br&gt;205951 12.5kg</td>
<td>Ni-Cr-B-Si-Fe alloy and tungsten carbide</td>
<td>For parts needing a rough surface and subject to severe abrasion such as scraper blades, drill heads, scraper parts.</td>
<td>~62 HRC&lt;br&gt;70% tungsten carbides&lt;br&gt;Best edge build-up capability. Abrasion and corrosion resistance.</td>
</tr>
</tbody>
</table>
CastoDyn SF Lance

The CastoDyn SF Lance kit increases the already wide range of applications by allowing the CDS 8000 to perform spraying with simultaneous fusion.

Technical data

<table>
<thead>
<tr>
<th>Standard Spray Module</th>
<th>SSM 50</th>
<th>SSM 51</th>
<th>SSM 52 optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deposition rate</td>
<td>4-9 kg/h</td>
<td>2-4 kg/h</td>
<td>1-2 kg/h</td>
</tr>
<tr>
<td>Typical Yield</td>
<td>&gt;90 %</td>
<td>&gt;90 %</td>
<td>&gt;90 %</td>
</tr>
<tr>
<td>Oxygen flow rate</td>
<td>2000 NI/h</td>
<td>1000 NI/h</td>
<td>500 NI/h</td>
</tr>
<tr>
<td>Acetylene flow rate-Flame</td>
<td>1900 NL/MN</td>
<td>950 NL/MN</td>
<td>475 NL/MN</td>
</tr>
<tr>
<td>Oxygen flow rate - Carrier gas</td>
<td>330 NL/MN</td>
<td>240 NL/MN</td>
<td>80 NL/MN</td>
</tr>
<tr>
<td>Flame power</td>
<td>~ 28 KW</td>
<td>~ 14 KW</td>
<td>~ 7 KW</td>
</tr>
<tr>
<td>Deposit thickness (one pass)</td>
<td>1-3 mm</td>
<td>0,8-2,5 mm</td>
<td>0,8-2 mm</td>
</tr>
</tbody>
</table>

Advantages

- Increased energy output for highest deposition rate
- Advanced nozzle design delivers exceptional yield (>90%)
- Consumable: Eutalloy® SF powders

Schematic showing the assembly of SF Lance on CastoDyn DS 8000

Castolin Eutectic’s modular CDS 8000 torch performs more flame spraying processes, with more alloy powder types than any other comparable system. Its robust, water-cooled design permits sustained high-intensity spraying, and is ideal for both automated and manual applications.
CastoDyn® SF Lance

The kit’s two Standard Spray Modules (SSM 50 and SSM 51) offer different flame powers, so work elements of any mass or thickness can be coated.

Product N°
203766 CastoDyn SF Lance kit 500 mm
205529 CastoDyn SF Lance kit 450 mm
203780 CastoDyn SF Lance kit 350 mm
205530 CastoDyn SF Lance kit 250 mm

CastoDyn® DS 8000

The CastoDyn DS 8000 torch is delivered in a robust carrying and storage case. This CDS 8000 kit is ready to be used with an SF lance kit and contains no Standard Spray Module (SSM).

Product N°
203754 CDS 8000 kit without SSM

CastoDyn® Extra-Flat SF Lance

The CastoDyn Extra-Flat SF Lance is the solution where access is a problem. A minimum free opening of 60 mm is enough to enable the Extra-Flat SF Lance to penetrate in the gap and to apply a coating. It is typically used to apply wear resistant coatings on decanter screws.

The special Extra-Flat kit contains the SSM 51 and a SF Lance with a length of 380 mm.

Product N°
203763 CastoDyn Extra-Flat SF Lance kit
### Powder Cold or Hot Flame Spraying

#### Simplified overview

<table>
<thead>
<tr>
<th>Coating families</th>
<th>Coating material</th>
<th>Base material</th>
<th>Heating of work-piece</th>
<th>Max. coating thickness mm</th>
<th>Coating surface size</th>
<th>Coating structure</th>
<th>Coating micro-porosity</th>
<th>Bonding</th>
<th>Deposition rate</th>
<th>Deposition yield</th>
<th>Operating costs</th>
<th>Equipment investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>RotoTec</td>
<td>Powder Metals &amp; polymer</td>
<td>All metals</td>
<td>Low</td>
<td>3</td>
<td>Medium to large</td>
<td>Lamellar</td>
<td>5 to 15%</td>
<td>Good, Mechanical &amp; micro-diffusion</td>
<td>Medium to high</td>
<td>Medium to high</td>
<td>Medium to high</td>
<td>Medium to high</td>
</tr>
<tr>
<td>ProXon</td>
<td>Powder Metals</td>
<td>All metals</td>
<td>Low</td>
<td>2 (5)*</td>
<td>Medium to large</td>
<td>Lamellar</td>
<td>5 to 15%</td>
<td>Good, Mechanical &amp; micro-diffusion</td>
<td>Medium</td>
<td>Medium to high</td>
<td>Medium to high</td>
<td>Medium to high</td>
</tr>
<tr>
<td>MetaCeram</td>
<td>Powder Ceramic</td>
<td>All metals</td>
<td>Low</td>
<td>0.4 (1)*</td>
<td>Medium</td>
<td>Lamellar</td>
<td>5 to 15%</td>
<td>Good, Mechanical &amp; micro-diffusion</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium to high</td>
</tr>
<tr>
<td>Eutalloy RW</td>
<td>Powder Self-fluxing alloys</td>
<td>Steels &amp; cast iron</td>
<td>High</td>
<td>2.6*</td>
<td>Medium</td>
<td>Homogeneous</td>
<td>Negligible</td>
<td>Very good, Diffusion</td>
<td>Medium to high</td>
<td>Medium to high</td>
<td>Medium to high</td>
<td>Medium to high</td>
</tr>
</tbody>
</table>

*Best*  |  *Secondary choice*

(...)* request special precaution or spray powder
Stronger, with Castolin Eutectic

Powder Cold Flame Spraying

**RotoTec®, ProXon® & MetaCeram® Processes - Cold Spraying**

**Function**

RotoTec®, ProXon® & MetaCeram® are «cold» processes whereby a new alloy or ceramic is reliably coated onto a cylindrical surface of a metal workpiece or part. The sprayed coatings are applied to the desired thickness at temperatures that do not overly stress, change the base metal properties or create distortion. These «cold» processes mean that the part should not exceed about 150°C during coating.

These thermal spray powders are categorized into the following processes:
- ProXon® process where the self-bonding powders are «cold» sprayed in «one-step».
- RotoTec® & MetaCeram® processes where the powders are sprayed in «two-steps».

The first step is to «cold» spray a bond coat to ensure the bonding with the part. The second step is to «cold» spray a final coating with the required wear resistance properties.

**Advantages**

- Low heat input to the base metal minimizes distortion, warping and changes in the base metal.
- «Cold» is key to simplicity, efficiency, speed and reliability.
- Wide range of powders can be sprayed.
- Spraying equipment is inexpensive.
- Easy to handle.
- The low level of noise and fumes during spraying facilitates setting up a new low cost spraying facility.

**Applications**

«Cold» powder flame sprayed coatings have a very broad field of applications. Both metals and ceramics are sprayed for different application needs.

In particular, parts suitable for coating consist of those which can be rotated and require repair due to wear on surfaces which are cylindrical in shape. This represents a wide range of applications, consisting of shafts, journals, rolls and bearings on areas such as bearing seats, press fits, seal and packing zones.

**Technical data**

- Flame temperature: 3200 °C
- Particle velocity: up to 50 m/s
- Deposition rate: 1 to 6 kg/h
- Coating material: Alloys and ceramics in powder form
- Coating density: 85 - 95%
- Noise level: 70 - 80 dB(A)

These «cold» thermal spray powders are applied with a flame powder spray system, such as the oxy-acetylene CastoDyn DS 8000. The powder is fed with help of injector effect or a carrier gas (nitrogen, argon or air) into a gas flame (often acetylene/oxygen). The flame heats the powder particles and propels the droplets towards the substrate forming a dense coating with good bonding properties. Due to the moderate transfer of heat to the powder particles and to the workpiece, the base metal stays relatively cool.

**Rotor repair with RotoTec® «cold» spray process for lowest heat input**

**Microstructure of a cold sprayed coating**

1014
# RotoTec® Powders

**Powder Cold Flame Spraying**

<table>
<thead>
<tr>
<th>Designations</th>
<th>Product Type</th>
<th>Applications</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>RotoTec® 51000</td>
<td>Alloy Ni-Al-Mo</td>
<td>Bond coat for RotoTec® 19000 and MetaCeram 28000 powder families, on all metals except Cu and Mg.</td>
<td>~170 HV10 - Fusion reaction during spraying creates strong bond with substrate.</td>
</tr>
<tr>
<td>RotoTec® 19300</td>
<td>Alloy Fe-Cr-Ni-Mo</td>
<td>Pieces operating with metal-to-metal friction such as shafts, bearing surfaces, pistons, etc.</td>
<td>~250 HV10 - Machinable with tools. Good coefficient of friction. Good resistance to corrosion.</td>
</tr>
<tr>
<td>RotoTec® 19310</td>
<td>Alloy Fe-Cr-Ni</td>
<td>Pieces operating with metal-to-metal friction. Wear sleeves for pumps.</td>
<td>~335 HV10 - Machinable with tools (very good machinability by turning). Good resistance to frictional wear.</td>
</tr>
<tr>
<td>RotoTec® 19400</td>
<td>Alloy Fe-Cr-Ni</td>
<td>Protective couplings for shafts, press pistons, motor casing.</td>
<td>~420 HV10 - The best surface finish is obtained by grinding.</td>
</tr>
<tr>
<td>RotoTec® 19404</td>
<td>Alloy Fe-Cr-Co-Mo</td>
<td>Pieces operating with metal-to-metal friction and corrosion such as bearing seats, etc. For replacing hard-chrome.</td>
<td>~400 HV10 - Excellent combination of corrosion, wear resistance and low friction. Machinable with nice surface finish.</td>
</tr>
<tr>
<td>RotoTec® 19800</td>
<td>Alloy Cu-Sn-Zn</td>
<td>Guides, slides, journal bearings, bearings.</td>
<td>~100 HV10 - Very good machinability by turning. Excellent coefficient of friction. Low sensitivity to residual stress.</td>
</tr>
<tr>
<td>RotoTec® 19850</td>
<td>Alloy Cu-Al</td>
<td>Compressor pistons, trunnions and pulleys.</td>
<td>~120 HV10 - Very good machinability by turning. Low coefficient of friction.</td>
</tr>
<tr>
<td>RotoTec® 19868</td>
<td>Alloy Cu-Al-Ni</td>
<td>Interior coatings of chocks, ram slides, foundry models.</td>
<td>~150 HV10 - Good machinability by turning. Low coefficient of friction and good pressure resistance. Good corrosion resistance.</td>
</tr>
<tr>
<td>RotoTec® 19940</td>
<td>Alloy Ni-Cr-Fe-Mo</td>
<td>Wear sleeves for pumps, cylinder rods, drying cylinders for papermaking.</td>
<td>~370 HV10 - The best surface finish is obtained by grinding. Good resistance to friction under pressure.</td>
</tr>
<tr>
<td>RotoTec® 19985</td>
<td>Alloy Ni-Cr-Fe</td>
<td>Bearing seatings, pistons. Used in rebuilding worn parts.</td>
<td>~200 HV10 - Very good machinability by turning.</td>
</tr>
<tr>
<td>RotoTec® 19999</td>
<td>Alloy Ni-Cr-Fe and carbides</td>
<td>Drag roll, wear plates, gripping finger.</td>
<td>~250 HV10 - 50% carbides. High resistance to abrasion. Rough deposit.</td>
</tr>
<tr>
<td>RotoTec® LT 29230</td>
<td>Zn base</td>
<td>Sign panels, pylons, gantries, metallic structures, machine casing, port equipment, repair of accidental damage to galvanized structures.</td>
<td>Zn &gt;99% - Low melting temperature. Sacrificial layers ensuring cathodic protection of ferrous supports against corrosive atmospheric phenomena.</td>
</tr>
<tr>
<td>RotoTec® LT 29240</td>
<td>Alloy Sn-Sb-Cu</td>
<td>Antifriction alloys. Resurfacing bearings. The best adhesion is obtained by preparatory tinning using CastoTin # 1.</td>
<td>Excellent behavior under friction. Low melting temperature.</td>
</tr>
</tbody>
</table>
Powder Cold Flame Spraying

ProXon® & MetaCeram® Powders

ProXon® – One-step alloy powders for "cold" one step spray process

<table>
<thead>
<tr>
<th>Designations</th>
<th>Product Type</th>
<th>Applications</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>ProXon® 21021</td>
<td>Ni-Al-Mo</td>
<td>Mechanical seats, feathering sides. Thin and thick anti-wear coatings.</td>
<td>~170 HV10 - Used without bonding layer. The best surface condition is obtained by grinding.</td>
</tr>
<tr>
<td>ProXon® 21023</td>
<td>Fe-Ni-Al</td>
<td>Bearing seatings, guides, slides, feathering sides.</td>
<td>~200 HV10 - Used without bonding layer. Max. service temperature 800 °C. Thick deposit capability (&lt;3mm).</td>
</tr>
<tr>
<td>ProXon® 21031</td>
<td>Ni-Cr-Al-Fe-Mo</td>
<td>For components subject to wear and corrosion such as fan blades, shaft sleeves and roller bearing seat.</td>
<td>~280 HV10 - Used without bonding layer. Thick deposit capability (&lt;3mm).</td>
</tr>
<tr>
<td>ProXon® 21071</td>
<td>Cu-Al</td>
<td>Compressor pistons, trunnions and pulleys.</td>
<td>~120 HV10 - Used without bonding layer. Good machinability. Low coefficient of friction. Thick deposit capability (&lt;4mm).</td>
</tr>
</tbody>
</table>

MetaCeram® – Ceramic and refractory powders for "cold" two step spray process

<table>
<thead>
<tr>
<th>Designations</th>
<th>On RotoTec 51000 bonding layer. Cable gland seatings, shaft protector sleeves, seam ring joint seatings, plungers, pump shafts, feed chutes.</th>
<th>Microhardness ~2400 HV10g Max. service temperature 500 °C Product density 5.2 kg/dm High hardness, excellent resistance to corrosion, low coefficient of friction.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MetaCeram® 28010</td>
<td>Cr2O3</td>
<td></td>
</tr>
<tr>
<td>Product N°</td>
<td>203008</td>
<td>1.2kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MetaCeram® 28020</td>
<td>Al2O3 TiO2(2.2%)</td>
<td>On RotoTec 51000 bonding layer. Seam ring joint seatings, cable gland seatings, shaft protector sleeves, electrical isolation of machine parts, press rings for making radial tyres, sifting plate.</td>
</tr>
<tr>
<td>Product N°</td>
<td>203009</td>
<td>1.2kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MetaCeram® 28030</td>
<td>Al2O3 TiO2(13%)</td>
<td>On RotoTec 51000 bonding layer. Printer cylinders, paper transport rollers, thread guide, wear and sliding plates, induction oven parts.</td>
</tr>
<tr>
<td>Product N°</td>
<td>203008</td>
<td>1.2kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MetaCeram® 28095</td>
<td>Mo</td>
<td>Used without bonding layer. Sliders, bearings, spindle guide, cable gland seatings, pistons for high-pressure pumps.</td>
</tr>
<tr>
<td>Product N°</td>
<td>203009</td>
<td>0.7kg</td>
</tr>
</tbody>
</table>

www.castolin.com
Function

Eutalloy® RW is a 2-step hot flame spraying process.

The first step is to «cold» spray a thin, regular layer of «RW» self-fluxing quality powder onto a precleaned, preheated steel substrate using a oxy-acetylene powder spray system such as the CastoDyn DS® 8000.

First step: Cold spraying with CastoDyn® DS 8000

The second step is then to heat the “RW” powder deposit “red hot” using a flame torch, such as the CastoFuse torch, until a reflective fused surface finish is visible locally. An induction system or an oven can also be used. Strong metallurgical diffusion bonding of the resultant wear resistant coating is thus achieved without melting or dilution with the substrate. The coating thickness may then be further increased by continuing to spray & fuse the powder simultaneously followed by controlled slow cooling to ambient temperatures.

Second step: red hot fusion using the CastoFuse® flame torch

Advantages

- Smooth surface for low or no post machining
- No dilution of the base material
- Best purity and performance of the coating alloy
- Homogeneous and pore free coatings
- High bond strength
- Good shock resistance

Applications

The Eutalloy® RW process is designed to hot flame spray a range of wear resistant powder coatings onto fast rotating or stationary even surfaces. Final «RW» pure precision coatings are characterised by smooth surface finish requiring little or no post machining operations for optimum service performance.
## Eutalloy® RW Powders

**Designations** | **Product Type** | **Applications** | **Properties**  |  
--- | --- | --- | ---  |  
Eutalloy® RW 12112 | Ni-Cr-B-Si-Fe alloy and tungsten carbide | Recoating wear pieces of agricultural machines, mixer blades, ceramic press feeder plungers. Resurfacing pump wear sleeves, steel industry transport rollers. | ~710 HV30  
35% tungsten carbides. Excellent resistance to erosion and abrasion. |  
Eutalloy® RW 12494 | Alloy Ni-Cr-B-Si-Fe | Coating incineration boiler tubes. Machine elements in food and chemistry industry. | ~310 HV30  
Very good resistance to corrosion. Suitable for friction under light loads. Machinable with cutting tool. |  
Eutalloy® RW 12495 | Alloy Ni-Cr-B-Si-Fe | Coating of wear sleeves for pumps, glassworks feed plunger, valve parts: seats, flaps, etc. | ~390 HV30  
Suitable for impact and friction. Machinable with cutting tool. |  
Eutalloy® RW 12496 | Alloy Ni-Cr-B-Si-Fe | Coating cylinder rods, wear sleeves, pump pistons and faucet parts. Resurfacing coal dust separators, etc. | ~680 HV30  
Very low coefficient of friction and good abrasion resistance. Excellent resistance to corrosion and especially to seawater. |  
Eutalloy® RW 12497 | Alloy Ni-Cr-B-Si-Fe-Mo-Cu | Coating protective couplings, cylinder rods, wear and seal sleeves, Pelton turbine, injection needle valves, etc. Coating stainless steel pieces. | ~740 HV30  
Excellent frictional and corrosion resistance. Excellent corrosion resistance. |  
Eutalloy® RW 12999 | Ni-Cr-B-Si-Fe alloy and tungsten carbide | Coating fan blades, mixers, transport screws, tensioning pulleys, guides. Wear parts for agricultural equipment, etc | ~760 HV30  
40% tungsten carbides. Excellent resistance to abrasion. |  
Eutalloy® RW 17535 | Alloy Ni-Cr-B-Si | Coating paper mill and household waste boiler tubes. Resurfacing machine parts operating in corrosive environments. | ~480 HV30  
High Cr alloy. Well suited for metal-to-metal friction. Excellent resistance to oxidation while hot. Good resistance to cracking. Machinable with cutting tool. |  
Eutalloy® RW 53606 | Alloy Ni-Cr-Mo-Si-B-Cu | Boiler tubes, shafts and sleeves in waste incineration, chemical, pulp and paper industries. | ~600 HV30  
Excellent wear and corrosion resistance to both reducing and oxidizing environments. |
CastoDyn® DS 8000

Technical data
CastoDyn® DS 8000 is an advanced modular oxy-acetylene thermal spray system, designed to spray a wide range of alloys and other materials for many different applications, from anti-abrasion coatings to thermal shielding. The CDS 8000 can be integrated into automated installations for large-scale mass-production applications.

For «hot» thermal spraying of Eutalloy® RW powders
For «cold» thermal spraying of RotoTec® and Proxon® alloy powders
For «cold» thermal spraying of MetaCeram® alloy powders
For «cold» thermal spraying of CastoPlast thermoplastic powders

Advantages
- Outstanding operator safety and ease-of-use
- Ready-for-use CDS 8000 kit in a robust carrying/storage case
- Standard Spray Modules (SSM)
- Unique rapid shut-off lever for safety and for relighting without touching any other control

<table>
<thead>
<tr>
<th>Module</th>
<th>Oxygen flow rate - Flame</th>
<th>Acetylene flow rate-Flame</th>
<th>Carrier gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSM10</td>
<td>1000</td>
<td>950</td>
<td>240</td>
</tr>
<tr>
<td>SSM20</td>
<td>1000</td>
<td>950</td>
<td>240</td>
</tr>
<tr>
<td>SSM30</td>
<td>2000</td>
<td>1800</td>
<td>80</td>
</tr>
<tr>
<td>SSM40</td>
<td>1000</td>
<td>950</td>
<td>330</td>
</tr>
</tbody>
</table>

Accessories for CastoDyn® DS 8000

Extension Neck
Spray extension neck for coating internal surfaces or difficult access areas.
Length 465 mm

CastoFuse®

Technical data
The advantage of local heating using the CastoFuse® torch is obvious compared with an oven. Local preheating and fusing prevents the dispersion of heat in the rest of the workpiece, to the surrounding area and into the oven walls. CastoFuse® offers the heat where needed. Furthermore, only a small investment is required.

Advantages
- Performance: nozzles designed specifically to fuse self-fluxing powder coatings
- Safety and ease-of-use: unique rapid shut-off lever
- Full line: assortment of lances to ensure optimum flame power

<table>
<thead>
<tr>
<th>CastoFuse Lance</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen consumption</td>
<td>0.8 - 1.1 m³/h</td>
<td>1.5 - 1.66 m³/h</td>
<td>2.3 - 3.3 m³/h</td>
</tr>
<tr>
<td>Acetylene consumption</td>
<td>0.7 - 1.0 m³/h</td>
<td>1.05 - 1.5 m³/h</td>
<td>2.1 - 3.0 m³/h</td>
</tr>
<tr>
<td>Flame power</td>
<td>~ 11 KW</td>
<td>~ 20 KW</td>
<td>~ 40 KW</td>
</tr>
<tr>
<td>Required acetylene cylinders</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Length</td>
<td>270 mm</td>
<td>320 mm</td>
<td>590 mm</td>
</tr>
</tbody>
</table>
RotoTec® 800 is an advanced modular oxy-acetylene thermal spray system, designed to spray a wide range of alloys and other materials for many different applications, from anti-abrasion coatings to thermal shielding. The RotoTec® 800 can be integrated into automated installations for large-scale mass-production applications.

For «hot» thermal spraying of Eutalloy® RW powders
For «cold» thermal spraying of RotoTec® and Proxon® alloy powders
For «cold» thermal spraying of MetaCeram® alloy powders
For «cold» thermal spraying of CastoPlast thermoplastic powders

Technical data
Connections
Fuel gas (acetylene): LH 3/8" left, Oxygen: RH 1/4" right,
Compressed air: M10 x 1

Spraying efficiency
Powder throughput: ~ 3.0 – 6.0 kg/h (depending on powder type, instrument adjustment, etc.)

Operating pressures and gas consumption values
Oxygen, 3.0 bar: 1400 NL/h ± 50 NL/h,
Acetylene, 0.7 bar: 1130 NL/h ± 50 NL/h
Fuel gas-oxygen mixture, Injection principle (gas-mixing squirting and heating nozzle) Weight approx. 1.25 kg (without powders and gas hoses)
**Simplified overview**

<table>
<thead>
<tr>
<th>Coating families</th>
<th>Coating material</th>
<th>Base material</th>
<th>Heating of work-piece</th>
<th>Max coating thickness mm</th>
<th>Coating surface size</th>
<th>Coating structure</th>
<th>Coating micro-porosity</th>
<th>Bonding</th>
<th>Deposition rate</th>
<th>Deposition yield</th>
<th>Operating costs</th>
<th>Equipment investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVOF</td>
<td>Powder - Metals Tungsten Carbide</td>
<td>All metals</td>
<td>Low</td>
<td>0.5</td>
<td>Small to Large</td>
<td>Lamellar</td>
<td>&gt; 1%</td>
<td>Excellent</td>
<td>Medium</td>
<td>Low</td>
<td>Liquid fuel, combustion gases</td>
<td>Medium to High</td>
</tr>
</tbody>
</table>
**HVOF Process**

**CastoJet® CJK5**

From our history and DNA, Castolin Eutectic's CJK5 HVOF is the easy-to-use route to the highest coating quality. During the early 1990s Castolin Eutectic Research & Development were involved in the development of a converging/diverging nozzle for its CDS 8000 torch to accelerate the particles and improve coating quality. In 1996, the world's leading technology of the day was integrated into the Castolin Eutectic history with the purchase of the company TAFA and the JP 5000 HVOF technology, which has been a reference since this date. In 2009 we launched the CJK5, which embodies all that we learned from this period of coating innovation and to which was added the Castolin Eutectic DNA of ease-of-use and high quality.

### CJK5 HVOF Function

The CJK5 HVOF is a high pressure, high velocity thermal spray process, using liquid fuel (kerosene) and oxygen which are fed into a combustion chamber, where they are ignited and continuously combusted. The resultant hot gas at a pressure close to 1 MPa, emanates through a converging-diverging nozzle and travels through a straight section. The jet velocity at the exit of the barrel (>1000 m/s) exceeds the speed of sound.

A powder feed stock is injected into the gas stream, which accelerates the powder up to 800 m/s. The stream of hot gas and powder is directed towards the surface to be coated. The powder partially melts in the stream, and deposits upon the substrate. The resulting coating consists of thin overlapping platelets, has low porosity and high bond strength.

The CastoJet® Kerosene 5 - CJK5 - is the latest Castolin Eutectic development of kerosene fuelled high pressure HVOF (High-Velocity Oxy-Fuel) systems. The CJK5 developments have focused on the gun, powder feeder and operator interface. The operator interface is simple to use with a touch screen interface. The powder feeder has mass flow controlled carrier gas and closed loop motor control for reliability and repeatability of powder feed rates.
HVOF

HVOF Advantages

Advantages:

The value is in the technology - to make it intuitive to operate, to reduce operator errors, to simplify the maintenance and to obtain repeatable high quality coatings.

- High-pressure of the combustion chamber is typically at least double that of gas fuelled HVOF, which improves the gas speed by 20% over gas fuelled HVOF.
- PC control with touch screen operator interface.
- Multilanguage software / ease of use.
- Reversible nozzle design/ provides increased life and reduced spares costs.
- Reduced footprint compared to others systems with unbundled options.
- Optional keyboard control or operator interface unit.
- Unlimited recipes and parameter recording.

- High Bond strength and low porosity coatings.
- Manual or fully sequenced start-up, operation and shut-down.
- Kerosene start-up / no hydrogen / improved safety.
- Liquid fuel = thick, low stressed coatings.
- High hardness, low oxide level coatings.
- Optimised, single point fuel injection system to promote a complete, clean burn within the combustion chamber. Superior coating quality.
- Three nozzle lengths available, 100mm, 150mm and 200mm, enable a wide range of coating properties to be achieved.
- Simple gun maintenance for reduced downtime when changing consumables.
- Steel powder feed tubes for reliable operation – do not melt in operation.
- Robust chamber pressure transducer provides accurate feedback directly from the chamber. Repeatable process control.
- Control can either be via the operator interface or directly at the powder feeder for stand-alone operation.

The CJK5 control system is shown with the operator interface mounted onto the gas box for pictorial purposes only. In a typical installation, the gas box would be inside the spray booth. The powder feeder would either be inside or outside the spray booth. The operator interface would be outside the spray booth. The control system for the CJK5 HVOF consists of a PC with a touchscreen operator interface and a gas box. The PC provides a means of operator interface and overall system control. For reliability of operation, the actual control of the individual operations of the system are controlled by PLC's in the gas box and powder feeder. The PC and PLC's are all linked by serial bus to minimise wiring and increase reliability.
HVOF

HVOF Applications and Technical

Applications:
- Hard chrome plating alternative
- CGL mill rolls - steel industry
- Oil and Gas - ball and gate valves
- Down hole tools used in the oil and gas industry
- Paper rolls
- Hydraulic rams
- Aircraft Landing gear
- Suspension components
- Hydro-electric turbines
- Automotive valves
- Aero Engine Components

Technical
- Windows
- Familiar
- Unlimited recipe storage
- Industrial PC
- Stainless steel enclosure
- Dust/water ingress protection
- Standard interfaces (USB, ETHERNET, RS232)
- Connected to main control PLC by industrial serial link
- Rapid response to changes
- Mass flow control of carrier gas = repeatability.
- Volumetric feed via hopper and rotating disc design.
- Two disc variants to allow optimum feeding of a wide range of powders.
- Feed disc rotational speed is controlled via a closed loop AC inverter for improved feeding accuracy.
- Robot mounting interface.

Ball Valve Finished

Mud Motor Rotors

Aircraft Landing Gear HVOF

HV0F coating on steel roll
Castolin Eutectic provides powders for High Velocity Oxy-Fuel (HVOF) systems. These HVOF tungsten carbide powder materials offer high density, low porosity, and high bond strength.

For the best wear protection and temperatures up to 550 °C (1000 °F) we would recommend Tungsten carbide in a cobalt matrix.

Materials with a higher percentage of cobalt produce coatings with better ductility, and a lower percentage of cobalt offers greater hardness, resulting in superior wear resistance.

Applications requiring improved corrosion resistance, such as in the oil and gas industry, would need a matrix of cobalt-chromium. For high service temperatures above 550 °C (1000 °F), we would recommend chromium carbide materials, commonly used in the aerospace industry. All our carbide based powders are agglomerated and sintered and the metallic powders gas atomized and gas cooled.

The powder manufacturing process, which determines the powder characteristics, will therefore influence the properties of the deposited coating.

Important powder characteristics that Castolin Eutectic control include:
- carbide grain size in the powder particle
- homogeneity of carbide dispersion within the powder particle
- density of the powder particle
- shape of the powder particle
- particle size distribution

Check out our powder products above to find out more including typical applications.

Castojet HVOF Powder | Typical Material | Hardness Hv | Maximum operating temperature (°C) | Environment | Typical Application
--- | --- | --- | --- | --- | ---
55586C 757472 5kg | WC86/Co10/Cr4 | 1100/1200 Hv | 500°C | Excellent resistance to wear and corrosion | Rotors, Valves, Mandrels
55588C 757478 5kg | WC88/Co12 | 1000/1100 Hv | 540°C | Good wear and thermal shock resistance | Steel rolls, Wear Plates
55583C 757478 5kg | WC83/Co17 | 1000/1100 Hv | 540°C | Excellent in severe impact/sliding wear resistance | Steel rolls, Impellers, Shafts
55580C 757972 3kg | CrC-NiCr 80/20 | 900/1000 Hv | 870°C | Excellent in high temperature, corrosion and wear, resists flame impingement | Aero Engine components and Furnace rolls
55396C 757810 5kg | NiCrBSi | 750 Hv | 800°C | Good corrosion and wear properties, hard machinable coating. Good build up material | Hydraulic shafts, pump sleeves, wear rings, armature shafts
HVOF

HVOF Equipment & Accessories

The CastoJet® CJK5 kit comprises:
- CJK5 Gun
- CJK5 Control interface and gas box
- CJK5 Touch screen PC
- CJK5 Mass flow powder feeder
- Input supplies package 5 m
- Output supplies package available in 5, 10 or 14 m
- Tool kit and accessories
- Flashback arrestor

Options
- High pressure oxygen regulator
- Nitrogen regulator
- CJK5 Powder feeder cabinet
- Robot interface
- Chiller
- Spares kits (100 hours, 500 hours, powder feeder change over kit)

<table>
<thead>
<tr>
<th>Description</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canister capacity</td>
<td>2750cc</td>
</tr>
<tr>
<td>Electrical supply</td>
<td>240/110V 1ph</td>
</tr>
<tr>
<td>Weight</td>
<td>40kg</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>W-400 x D-400 x H-700</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product N°</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>753912</td>
<td>CastoJet® CJK5 kit - 5 m</td>
</tr>
<tr>
<td>758293</td>
<td>CastoJet® CJK5 kit - 10 m</td>
</tr>
<tr>
<td>758811</td>
<td>CastoJet® CJK5 kit - 14 m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product N°</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>753908</td>
<td>Toolkit and accessories</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product N°</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>754390</td>
<td>CJK5 Gun with 100 mm nozzle</td>
</tr>
<tr>
<td>756873</td>
<td>CJK5 Gun with 150 mm nozzle</td>
</tr>
<tr>
<td>754389</td>
<td>CJK5 Gun with 200 mm nozzle</td>
</tr>
</tbody>
</table>
## Simplified overview

<table>
<thead>
<tr>
<th>Coating families</th>
<th>Coating material</th>
<th>Base material</th>
<th>Heating of workpiece</th>
<th>Max coating thickness mm</th>
<th>Coating surface size</th>
<th>Coating structure</th>
<th>Coating micro-porosity</th>
<th>Bonding</th>
<th>Deposition rate</th>
<th>Deposition yield</th>
<th>Operating costs</th>
<th>Equipment investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser Cladding</td>
<td>Powder Metals/Tungsten Carbides</td>
<td>All metals</td>
<td>Low</td>
<td>5 (15)</td>
<td>Small to Very Large</td>
<td>Homogeneous</td>
<td>0%</td>
<td>Excellent Fusion</td>
<td>High</td>
<td>Medium</td>
<td>Electricity</td>
<td>High</td>
</tr>
</tbody>
</table>

- **Best**
- **Secondary application**
Laser Cladding

Laser Process

In the laser coating process, the filler alloy in powder form is injected into the laser beam, sprayed and welded onto the component in a single step. This process uses a laser beam to fuse completely the desired material onto a substrate material for superior wear resistance or for repair. A shielding gas protects the weld pool from the atmosphere. The rapid cooling rate gives the coating a homogeneous and fine microstructure that is characterised by toughness as well as hardness. The laser beam spot and the heat input can be far better controlled than a conventional electric arc. The energy is almost completely used to fuse the filler powder, leaving the least heat to melt the surface of the substrate, reducing the heat input, the Heat Affected Zone (HAZ) and dilution to the minimum.

The melt pool, formed when the laser fuses the powder, is precisely controlled in comparison to other welding or hardfacing processes.

Laser powder coating nozzles

<table>
<thead>
<tr>
<th>Coaxial ring nozzle</th>
<th>MultiJet Nozzle</th>
<th>Off-Axis Nozzle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder Spot ≥ 0,3 mm Laser Power ≤ 2000 W Oxygen Contamination ≤ 20 ppm</td>
<td>Powder Spot ≥ 1,5mm Laser Power ≤ 6000 W Oxygen Contamination ≤ 50 ppm</td>
<td>2D Nozzle for geometries with limited access Laser Power ≤ 2000 W</td>
</tr>
</tbody>
</table>
Laser Cladding

Advantages

The laser coating process is one of the cladding processes which is used to fuse a desired alloy on a substrate material. The clad material may be similar to the substrate material in the case of repairs and rapid prototyping. The clad material may have a higher performance to offer enhanced corrosion resistance or wear resistance to protect a multitude of components.

The laser process is at the cutting edge of technology in many industrial fields where modern production lines require reliable, automated and flexible systems with little maintenance that achieve optimum profitability.

There are many different coating ways to protect against wear, repair and rebuild parts, each with their respective advantages and constraints. Below, a simplified overview of different coating processes.

<table>
<thead>
<tr>
<th>Coating Processes</th>
<th>Heating of workpiece</th>
<th>Distortion of workpiece</th>
<th>Coating micro-porosity</th>
<th>Bonding</th>
<th>Deposition rate</th>
<th>Deposition yield</th>
<th>Max coating thickness mm</th>
<th>Precision of coating</th>
<th>Noise level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
<td>Excellent Fusion</td>
<td>High</td>
<td>Medium</td>
<td>5 (15)*</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Welding</td>
<td>High</td>
<td>High</td>
<td>Negligible</td>
<td>Excellent Fusion</td>
<td>High</td>
<td>Medium to high</td>
<td>5 (40)*</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>PTA</td>
<td>Medium to high</td>
<td>Medium</td>
<td>Negligible</td>
<td>Excellent Fusion</td>
<td>Medium</td>
<td>High</td>
<td>2 (10)*</td>
<td>Medium to high</td>
<td>Low to medium</td>
</tr>
<tr>
<td>Thermal spraying with fusion</td>
<td>Medium to high</td>
<td>High</td>
<td>Negligible to low</td>
<td>Very good Diffusion</td>
<td>Medium</td>
<td>Medium</td>
<td>2 (6)*</td>
<td>Medium to high</td>
<td>Medium</td>
</tr>
<tr>
<td>Thermal spraying</td>
<td>Low</td>
<td>Low</td>
<td>1 to 10%</td>
<td>Good Mechanical &amp; micro-diffusion</td>
<td>Medium to high</td>
<td>Medium</td>
<td>0.3 (10)*</td>
<td>Medium to high</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Best choice
Second choice

Laser coating: metallurgical fused bonding with minimum dilution, low heat input and controlled coating thickness.

Conventional welding process with strong dilution which degrades the purity of the coating.

Coating material
Feeding gas and powder
Laser beam
Melt Pool
Shielding Gas
Work piece
Coating direction
Laser Cladding

Advantages

The laser coating process provides a wide range of benefits compared with conventional arc and PTA welding processes:

- Heat input localized and processing time short.
- Lowest dilution of 2 to 5% for maximum purity of the coating.
- Distortions and HAZ smaller than any other welding processes. It can coat smaller and thinner pieces than conventional welding.
- Metallurgical fused bonding resulting in high bond strength.
- Very rapid coating solidification, producing very fine wear resistant microstructures.
- Dense, hard and smooth surface finish coating for high coating quality.
- Dense, hard and smooth surface finish coating for high coating quality.
- Unlimited coating thickness for rebuilding, repair or rapid prototyping.
- Precise coating thickness control and smooth surface for least post-weld machining.
- High process stability, reliable and consistent results ideal for automated processes.
- Low noise level.

Applications

There is a wide range of applications which address the corrosion and wear protection in the automotive industry (such as valve seats), the wear protection for tools in offshore oil drilling, for hydraulic cylinders in mining and for reworking expensive tools.

The laser coating process is used to repair and restore worn machine components, such as shafts, shaft ends, linings, bearing seats and other parts prone to wear.

The method is also used for new manufacture of components where the component - or parts of it - require adapted wear or friction properties.

Over the decades, Castolin Eutectic has developed many innovative powders for our established Eutalloy and PTA processes. Many of these industry proven powders have been formulated for use with the laser technology.
The complete laser powder range is available in a separate catalogue covering the latest chemistry and powder specification.

The laser coating process requires high-quality powders with spherical solid particles to achieve a constant flow in the automated laser system and high coating performance.

The powder should be without satellites which are fine particles attached to the spherical surface. These can detach during the laser process and increase the amount of fines in the feedstock. These fines will melt more quickly and can affect the coating quality. These fines will also modify the feeding rate through the laser equipment. The particles must also be solid without internal pores in order to avoid porosity in the coating.

Castolin Eutectic powders give you the best results. Solid and spherical satellite free particles with lowest oxygen content and constancy, batch after batch, are key features of Castolin Eutectic powders. Free flow in all powder feeding systems is enhanced and achieves consistent high productivity.

Precise coatings with fine wear resistant microstructure, metallurgical bonding and lowest heat input.
Laser Cladding

Our offer
Laser Powders, Laser Cladding Service, Laser Cladding Systems

The laser source and the head are the only equipment in the Castolin Eutectic Coating Equipment range that are not designed, manufactured and sold under our control. However, we have been involved with laser technology and cladding for several decades, ever increasing our experience, as the technology itself has rapidly progressed through advances in the solid state/diode lasers.

Our welding and PTA backgrounds is ideally suited to optimisation of the laser cladding process and today we have a broad offer consisting of:

- Metallic powders and Blends optimised for the Laser Cladding process
- Laser Cladding Service Workshops (in Europe and Asia)
- System Integration of Laser Cladding component for customers

The broad range of metallic powder and blends that have proven themselves against wear and corrosion in the toughest environments, previously deposited with the well-established PTA and Eutalloy processes, can also be modified and optimised for the laser cladding process. This is being done in our dedicated laser R&D facilities and also in several of our CastoLab Services workshops.

If you need laser cladding work to be done in Europe or Asia do not hesitate to contact us and can handle very large and heavy parts.

If you are looking to buy a complete integrated laser cladding facility, including laser source, head, powder feeder, optimised powder and parameters, tailored automation, off line programming and booth that complies with all safety standards, Castolin Eutectic is able to also offer this service, as we have successfully put several systems together for our own workshops and can offer this know how to such customers.

Putting a reliable, performing Package together for OEMs and Workshops
PTA Coating

Simplified overview

<table>
<thead>
<tr>
<th>Coating families</th>
<th>Coating material</th>
<th>Base material</th>
<th>Heating of work-piece</th>
<th>Max coating thickness mm</th>
<th>Coating surface size</th>
<th>Coating structure</th>
<th>Coating micro-porosity</th>
<th>Bonding</th>
<th>Deposition rate</th>
<th>Deposition yield</th>
<th>Operating costs</th>
<th>Equipment investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>EuTroLoy</td>
<td>Powder or wire.</td>
<td>Steels, cast iron, (aluminium bronze)</td>
<td>Medium to high</td>
<td>2 (10)*</td>
<td>Large</td>
<td>Homogeneous</td>
<td>Negligible</td>
<td>Excellent. Fusion</td>
<td>Medium to high</td>
<td>High</td>
<td>Electricity &amp; shielding gas</td>
<td>Medium</td>
</tr>
</tbody>
</table>

*Best  Second choice

(...)* request special precaution or PTA powder
PTA Welding
Plasma Transferred Arc Process

Plasma Transferred Arc (PTA)

Function
In the PTA process, the plasma is focused while forced through the heat resistant anode, causing a considerable increase of the arc density, energy and temperature. The filler alloy in powder form is conveyed into the plasma arc column where a shielding gas protects the weld pool from the atmosphere. The plasma arc and the heat input can be far better controlled than a conventional electric arc and the energy is almost completely spent to melt the filler metal, reducing the heat input and dilution to the minimum.

Advantages
PTA technology provides a wide range of benefits compared with conventional arc welding processes:
- Lowest dilution, heat input, distortions and HAZ than any other arc welding process
- Maximum purity and performance of the coating alloy
- Extra smooth surface for least post-weld machining
- Higher bond strength
- Pore free coating
- Thicker coatings capabilities

Applications
The EuTronic® GAP is the Castolin Eutectic Plasma Transferred Arc (PTA) process. GAP is ideal for coating and joining operations. Castolin Eutectic has developed special EuTroLoy powders for applications carried out with the EuTronic® GAP.

Technical data
- Plasma arc temperature: up to 20 000 °C
- Particle velocity: not relevant
- Deposition rate: up to 6 kg/h
- Coating material: Metals in powder or wire form
- Coating thickness: 0.1 to 20 mm
- Coating density: 100%

1) Cathode holding device
2) Plasma gas
3) Cathode
4) Cooling water
5) Shielding gas
6) Feeding gas and powder
7) Welding direction
8) Ignition
9) Double power supply

Smooth surface and spatter free coating
Wear resistant coating with metallurgical bonding and minimum dilution.
**PTA Welding**

**EuTroLoy® - PTA Powders**

<table>
<thead>
<tr>
<th>Designations</th>
<th>Product Type</th>
<th>Applications</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>EuTroLoy® 16006.04</td>
<td>Alloy Co-Cr-W-Ni-Fe (Gr. 6 Type)</td>
<td>Valve seats, protective shaft sleeves, shaft seal surfaces, tools in the wood and plastic processing industry, stirrer components, valve parts, extruder screws, buffer layer for EuTroLoy® 16001 alloy powders.</td>
<td>~40 HRC High abrasion resistance under pressure and impact stress (cavitation). Heat and corrosion resistant. Low coefficient of sliding metal friction, insensitive to adhesive wear. For operating temperatures up to 750°C.</td>
</tr>
<tr>
<td>EuTroLoy® 16008.04</td>
<td>Alloy Co-Cr-Mo-Ni (Gr. 21 Type)</td>
<td>Calibration matrices for steel forming, hot working tools such as dies and shearing blades, valve seats, seal surfaces of shafts and spindles, pump and turbine parts. Buffer layers for EuTroLoy® 16001, 16006, 16012 alloy powders.</td>
<td>~30 HRC Corrosion, oxidation, heat, cavitation, thermal shock and creep-resistant weld metal. Workhardening. Low coefficient of sliding metal friction, insensitive to adhesive wear. Nonmagnetic, easily machined and polished coatings.</td>
</tr>
<tr>
<td>EuTroLoy® 16012.04</td>
<td>Alloy Co-Cr-W-Ni-Fe (Gr. 12 Type)</td>
<td>Slide valve seats, extruder screws for plastic masses, feed screws for sawdust and hydro pulpers in the paper industry, tools in the timber industry, segments of nose rings and clinker cooling plates, tools for the paper, plastics and timber processing industries.</td>
<td>~46 HRC High abrasion resistance under pressure and impact stress (cavitation). Heat and corrosion-resistant. Low coefficient of sliding metal friction, insensitive to adhesive wear. For operating temperatures up to 750°C.</td>
</tr>
<tr>
<td>EuTroLoy® 16221.04</td>
<td>Alloy Ni-Cr-B-Si-Al</td>
<td>Highly suitable for use with molten glass. Mould bottoms, tailstocks, blowheads in cast iron and Cu-Al. Drawing matrices in cast iron, coke oven door. Bonding layer on flake and spheroidal graphite cast iron parts.</td>
<td>~30 HRC Excellent bonding with lamellar and spheroidal graphite grey cast iron, as well as steel. Excellent resistance to heat and thermal shock.</td>
</tr>
<tr>
<td>EuTroLoy® 16223.04</td>
<td>Alloy Ni-Cr-B-Si-Al</td>
<td>Gray cast iron forming tools, gray cast iron and bronze glass moulds, valve and slide valve parts, dies, anti-corrosion hardfacings on gray cast iron workpieces, buffer layers on gray and nodular cast iron.</td>
<td>~34 HRC Good wetting of the base metals. Creep resistant, thermal fatigue resistant and cavitation resistant hardfacings. Low coefficient of sliding metal friction. Good adhesive strength and corrosion resistance. Polishable.</td>
</tr>
<tr>
<td>EuTroLoy® 16316.04</td>
<td>Alloy Fe-Cr-Ni-Mo</td>
<td>Workpieces in the chemical industry and food processing industry and buffer layers for hard-facing.</td>
<td>~170 HV30 Austenitic weld metal with ~9 % ferrite and low carbon content. Resistant to pitting and intercrystalline corrosion up to temperatures of 400 °C, also scale resistant up to 800 °C. May be polished to a mirror finish.</td>
</tr>
<tr>
<td>EuTroLoy® 16454.04</td>
<td>Self-fluxing Ni base alloy</td>
<td>Hardfacing of seal surfaces in valves, sliding seals and slideways, forming tools, valves, valve flaps, pump rotors, cams and worm screw parts.</td>
<td>~53 HRC Highly creep resistant, heat and corrosion resistant weld metal. Low coefficient of sliding metal friction. High adhesive strength.</td>
</tr>
</tbody>
</table>

The suffix “.04” indicates the particle size distribution 150+53 µm
**PTA Welding**

**EuTroLoy® - PTA Powders**

<table>
<thead>
<tr>
<th>Designations</th>
<th>Product Type</th>
<th>Applications</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>EuTroLoy® 16496.04</td>
<td>Self-fluxing Ni base alloy</td>
<td>Hardfacing of seal surfaces in valves, sliding seals and slideways, forming tools, valves, valve flaps, pump rotors, cams and worm screw parts.</td>
<td>~58 HRC Highly creep resistant, heat and corrosion resistant hardfacing. Low coefficient of sliding metal friction. High adhesive strength.</td>
</tr>
<tr>
<td>204549 4kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>202863 4kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EuTroLoy® 16606A.04</td>
<td>Alloy Fe-W-Cr-Mo-V</td>
<td>Temperature-stressed dies and mandrels, cutting tools, also for natural fibres, punching, compression moulding and drawing dies, forging inserts, worm screw parts, valves, barrel extruders.</td>
<td>~58 HRC Martensitic weld metal based on cold work tool steel. Wear-resistant to abrasion and fatigue stress as well when subject to a combination of abrasion and fatigue stress. Hot wear resistant. Good tempering properties. Heat treatable.</td>
</tr>
<tr>
<td>103710 4kg, 12.5kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EuTroLoy® 16625M.04</td>
<td>Alloy Ni-Cr-Mo-Nb-Fe</td>
<td>Marine engine components, power plant components, installations on drilling rigs, valve components for mineral oil, tools for underwater work and low-temperature equipment.</td>
<td>~210 HV30 High ductility. Very good corrosion resistance (e.g. seawater). Tough at subzero temperatures, suitable for cryogenic use.</td>
</tr>
<tr>
<td>750152 4kg, 12.5kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EuTroLoy® 16800</td>
<td>Alloy Ni-Mo-Cr-W</td>
<td>Mixer arms, components in the paper industry, hot shears, hot trimming dies, extrusion dies, valve seats, pump components in the chemical industry.</td>
<td>~260 HV30 Very high resistance to intercrystalline corrosion, interfacial corrosion and stress corrosion cracking. Excellent corrosion resistance to oxidising media such as nitric, phosphoric, sulphuric and sulphurous acid. Also resistant to ethanoic, lactic, citric and fatty acids, caustic soda as well as media containing chloride.</td>
</tr>
<tr>
<td>103410 4kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EuTroLoy® PG 6503</td>
<td>Ni-B-Si-Fe alloy and tungsten carbide</td>
<td>Decanting and transport screw. Mixer pieces. Drilling tools. Brick or tile dies. Protective sleeves. Wood-working tools.</td>
<td>~60 HRC 60% tungsten carbides. Excellent resistance to abrasion.</td>
</tr>
<tr>
<td>202430 4kg, 12.5kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EuTroLoy® PG 8426.04</td>
<td>Self-fluxing Ni base alloy</td>
<td>Gray cast iron and bronze glass moulds, Floodfilling of WC/Co Tiles, buffer layers on gray cast iron and nodular cast iron.</td>
<td>~270 HV30 Low energy input for the fusion. Good wetting of the base metals. Good adhesive strength and corrosion resistance. Polishable.</td>
</tr>
<tr>
<td>750552 12.5kg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The suffix ".04" indicates the particle size distribution 150+53 µm.
PTA Welding

EuTronic GAP® - PTA Equipment

EuTronic GAP® 2501 DC

- Plasma welding, TIG welding, MMA welding
- For joining, coating and brazing
- Designed for manual & automated applications
- Versatile unit with strong 250A inverter
- User friendly touch screen control panel
- Fully compatible with all EuTronic GAP accessories

Why EuTronic® GAP 2501 DC?

The EuTronic GAP is the Castolin Eutectic Plasma Transferred Arc (PTA) process, ideal for joining and coating operations. A stream of accelerated ionized gas in electric arc is focused in plasma nozzle and generates plasma. PTA process can be started by preliminary use of inner pilot arc. The pilot arc is burn between the gas cooled cathodic tungsten electrode and liquid-cooled anodic copper nozzle. The welding filler alloy, in microatomised powder or cold wire form is conveyed into the plasma beam where the shielding gas protects the weld pool from the atmosphere. The plasma arc and the heat input can be far better controlled than a conventional electric arc and the energy is almost completely spent to melt the filler metal, reducing the heat input and dilution to the minimum. The well-arranged designed operating touch panel of the machine allows the easy adjustment of the welding parameters also with protective gloves.

PTA technology provides a wide range of benefits compared with conventional arc welding processes Major factors are:

- High energy density in an extremely focussed arc
- High deposition rates for shorter welding times
- Lowest dilution, heat input, distortions and HAZ
- Possible multipass overlays
- Smoother surface for lower machining costs
- Maximum purity and performance of the applied alloy even in the first layer.
- Metallic bond strength and impact resistance
- Optionally suitable for fully automated processes (electronically controlled gas valves and separate interface to link the unit with external controllers is giving outstanding flexibility for automation)

Focussed plasma arc allows extra control, that results also in lowest dilution among all the arc welding process. PTA process produces extra smooth and spatter free deposits, minimizing machining and filler alloy costs.

Application examples:

- Repairs on tool steels, rebuilding of cutting edges, forging, stamping dies, aluminium die casting moulds
- Repairs on cast iron, glass moulds
- Feeding screws repairs
- Hard-facing on drilling tools
- Hard-facing on valve seats and valves
- Hard-facing of mining machinery
- Hard-facing of milling tools

Table: EuTronic GAP® 2501 DC

<table>
<thead>
<tr>
<th>Article number</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>758614</td>
<td>EuTronic GAP 2501 DC</td>
</tr>
<tr>
<td>260056</td>
<td>Trolley incl. footprint for gas bottles and holders for several accessories</td>
</tr>
<tr>
<td>260058</td>
<td>Cooling GAP</td>
</tr>
<tr>
<td>754273</td>
<td>Cooling GAP Chiller</td>
</tr>
<tr>
<td>260229</td>
<td>Powder Feeder EP 2</td>
</tr>
<tr>
<td>260231</td>
<td>Remote control (hand operated) RC-H</td>
</tr>
<tr>
<td>260232</td>
<td>Remote control (foot operated) RC-F</td>
</tr>
<tr>
<td>758633</td>
<td>X30 Automation Interface extended</td>
</tr>
</tbody>
</table>

Mains voltage: 3x 400V+N ±10%
Mains frequency: 50/60 Hz
Mains fuse: 32 A
Max. power consumption: 18 kVA
RMS value of the largest main current: 20 A
Cos phi: 0.99
Protection class: IP 23 S
Open Circuit Voltage - main inverter: 800 V DC
Open Circuit Voltage - pilot inverter: 100 V DC
Max. welding current (100% duty-cycle): 160 A
Max. welding current (60% duty-cycle): 200 A
Max. welding current (35% duty-cycle): 250 A
Max. pilot current (100% duty-cycle): 30 A
Adjustment range for plasma welding: 2 – 250 A
Adjustment range of the pilot current: 0.5 – 50 A
Dimensions (L x W x H): 815 x 445 x 635 mm
Weight: 70 kg
Advantages

- Provides repeatable precision for plasma joining, coating and brazing
- Turn-key robotic cell to increase productivity
- Complete modular for immediate, tailor made configuration and cost effective adaption to application

Why GAP UniCoating V2.0?

Castolin Eutectic’s GAP UniCoating V2.0 integrates all components necessary for the overlay welding of round parts. Well suited to the Glass Mould industry for baffle and bottom plates. Also very efficient at welding various forge dies and moulds as well as engine valves. With the 200kg table the machine is capable of handling the smallest parts as well as moderately large ones.

The GAP UniCoating V2.0 incorporates a complete Plasma power source. This unit uses the latest technology in plasma welding. With fully programmable gas controls, pilot arc settings, powder delivery and welding current the GAP UniCoating can deliver a completely repeatable, precisely engineered weld overlay. The power source is fully integrated with the oscillation and arc length controller to work with the tilting turn table for simple, fast setup of welding parameters. All parameters are programmed using the dedicated control. There is no programming code to learn, all parameters are set in common welding terms for the optimum in operator friendly set-up and operation.

### GAP UniCoating V2.0

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains voltage:</td>
<td>3x 400V+N</td>
</tr>
<tr>
<td>Mains frequency:</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Mains fuse:</td>
<td>max. 35 A</td>
</tr>
<tr>
<td>Max. power consumption:</td>
<td>20 kVA</td>
</tr>
<tr>
<td>RMS value of the largest main current:</td>
<td>25 A</td>
</tr>
<tr>
<td>Cos phi:</td>
<td>0.99</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP 23</td>
</tr>
<tr>
<td>Open Circuit Voltage - main inverter:</td>
<td>85V DC</td>
</tr>
<tr>
<td>Max. welding current (100% duty-cycle):</td>
<td>160 A</td>
</tr>
<tr>
<td>Max. welding current (60% duty-cycle):</td>
<td>210 A</td>
</tr>
<tr>
<td>Max. welding current (35% duty-cycle):</td>
<td>250 A</td>
</tr>
<tr>
<td>Max. pilot current (100% duty-cycle):</td>
<td>30 A</td>
</tr>
<tr>
<td>Adjustment range for plasma welding:</td>
<td>6 ÷ 250 A</td>
</tr>
<tr>
<td>Adjustment range of the pilot current:</td>
<td>3 ÷ 60 A</td>
</tr>
<tr>
<td>Turn table Ø:</td>
<td>Ø 400 mm</td>
</tr>
<tr>
<td>Turn table - Load:</td>
<td>max. 200 kg</td>
</tr>
<tr>
<td>Dimensions L x W x H (mm):</td>
<td>2270 x 1000 x 2200</td>
</tr>
<tr>
<td>Weight:</td>
<td>ca. 650 kg</td>
</tr>
</tbody>
</table>
PTA Welding
EuTronic® GAP - Accessories

Cold Wire Feeder WF
For GAP® 2501 series / 3001 and 3002

<table>
<thead>
<tr>
<th>Description</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP23</td>
</tr>
<tr>
<td>Weight</td>
<td>25 Kg</td>
</tr>
<tr>
<td>Dimensions L x W x H (mm)</td>
<td>725 x 230 x 450</td>
</tr>
</tbody>
</table>
- Drive: efficient four roll drive with 30mm wire feeder rolls, fit in wire feeder for 16 Kg wire coils.
- Special designed pressure arms care for a smooth and reproducible pressure of the wire onto the feeder rolls within the drive.

Powder Feeder EP2
Carrier gas
- Ar, Ar-H2
Carrier gas flow rate
- 0 - 4 l/min
Powder reservoir
- 2 l capacity
Degree of protection
- IP 23
Weight (without powder)
- 7.5 kg
Dimensions L x W x H (mm)
- 200 x 170 x 470 mm
- Stepless feeding rate control via feeding wheel speed directly from GAP unit.
- Powder feed rate 1.5 - 95 g/min, depending on feeding wheel configuration, torch, anode and powder density.
- Two EP2 units can be driven in parallel (optional second motor control card) for applications that require feeding of different powders into the weld pool; i.e. matrix and carbides.

Cooling GAP®
Weight
- 40 kg
Dimensions L x W x H (mm)
- 900 x 445 x 360 mm
(*) Use only Castolin Eutectic dedicated cooling liquid
- Cooling with air/water heat exchanger.
- Additional water-water heat exchanger available.

Cooling GAP® Chiller
Weight
- 50 kg
Dimensions L x W x H (mm)
- 915 x 445 x 400 mm
(*) Use only Castolin Eutectic dedicated cooling liquid
- Cooling with integrated chiller.
### GAP® E12N
- **Description**: Construction horizontal
- **Characteristics**:
  - Max current at 100%: 100A
  - Weight with hose pack: 1.9 kg (4m)
  - Liquid cooled manual torch, available also with 70° and 180° neck
  - Hose pack: 4 metres, longer hose packs on request
  - Cold wire holder available

### GAP® E15N
- **Description**: Construction horizontal
- **Characteristics**:
  - Max current at 100%: 150A
  - Weight with hose pack: ca. 2.5 kg (4m)
  - Liquid cooled manual torch, available also with 70° and 180° neck
  - Hose pack: 4 metres, longer hose packs on request
  - Cold wire holder available

### GAP® E20N
- **Description**: Construction horizontal
- **Characteristics**:
  - Max current at 100%: 200A
  - Powder flow rate: N.A
  - Weight with hose pack: 1.6 kg (4m)
  - Liquid cooled manual torch, available also with 70° and 180° neck

### GAP® E150P
- **Description**: Construction horizontal
- **Characteristics**:
  - Max current at 100%: 150A
  - Powder flow rate: 5-20 g/min
  - Weight with hose pack: 2.0 kg (3m)
  - 3m hose pack
  - Liquid cooled
  - Powder manual torch

### GAP® E54 S-M-D-DL
- **Description**: Construction horizontal
- **Characteristics**:
  - Max current at 100%: 200A
  - Powder flow rate: 10 - 40 g/min
  - Powder machine torch for inner coatings of parts with diameter > 80mm
  - Available in four different lengths (models): 330(S), 550(M), 920(D) and 1770(DL)mm
  - Longer hose packs on request
  - Built on request, please ask for delivery time

### GAP® E52
- **Description**: Construction vertical
- **Characteristics**:
  - Max current at 100%: 200A
  - Powder flow rate: 3 - 80 g/min
  - Weight with hose pack: 4.8 kg (4m)
  - Liquid cooled powder machine torch for general applications
  - Cold wire holder available
  - Hose pack: 4 metres, longer hose packs on request
  - Wide range of anodes and powder nozzles

### GAP® E200P
- **Description**: Construction vertical
- **Characteristics**:
  - Max current at 100%: 200A
  - Powder flow rate: up to 80 g/min
  - Weight with hose pack: 2.7 kg (4m)
  - Liquid cooled powder machine torch for general applications
  - Hose pack: 4 metres, longer hose packs on request
  - Wide range of anodes and powder nozzles
Wire Spraying

Simplified overview

<table>
<thead>
<tr>
<th>Coating families</th>
<th>Coating material</th>
<th>Base material</th>
<th>Heating of work-piece</th>
<th>Max coating thickness mm</th>
<th>Coating surface size</th>
<th>Coating structure</th>
<th>Coating micro-porosity</th>
<th>Bonding</th>
<th>Deposition rate</th>
<th>Deposition yield</th>
<th>Operating costs</th>
<th>Equipment investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>EuTronic Arc</td>
<td>Wire, Metals</td>
<td>All metals</td>
<td>Low</td>
<td>1 to 2</td>
<td>Very large</td>
<td>Lamellar</td>
<td>1 to 10%</td>
<td>Good</td>
<td>Mechanical &amp; micro-diffusion</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Best | Second choice

(…)* request special precaution or coating material
Wire Spraying

**EuTronic® Arc Process**

**Function**
EuTronic® Arc is the highest productivity thermal spraying process. EuTronic® Arc is an Arc Spray Process using a pair of wires which are melted by an electric arc.

The arc has a temperature of 5,000 - 6,000°C that melts the wires continuously. Compressed gas - most often air - is used to atomise the molten wire tips and to propel the droplets towards the substrate at velocities exceeding 100 meters per second. This molten material is atomised by compressed gas and propelled towards the workpiece 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 often produces large amounts of fume and high noise levels.

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 work piece is not exposed to any metallurgical changes or distortion.

**Advantages**
The arc spraying process is the thermal spraying process that has the highest spray rates and lowest running costs.

- Safe process
- No flammable gases used
- Cold spray process
- Does not require the use of oxygen, kerosene or a combustible gas which means more economic coatings
- Operator can use two different wires during spraying to produce new suitable coatings.

**Applications**
The main applications of the arc spray process are anti-corrosion coatings of zinc and aluminium and spraying work on large components. The material to be sprayed must be electrically conductive. The most common materials are metallic material or cored wires. Low running costs, high spray rates and efficiency make it a good tool for spraying extensive areas or a large number of parts.

**Technical data**

- Arc temperature: up to 6000 °C
- Particle velocity: 150 - 300 m/s
- Deposition rate: 2.5 to 40 kg/h
- Coating material: Metals or metal alloys in solid and cored wires form
- Coating thickness: 0.1 to 20 mm
- Coating density: 90 - 97%
- Noise level: 100 - 120 dB(A)
## EuTronic® Arc Spray Wires

<table>
<thead>
<tr>
<th>Designations</th>
<th>Product Type</th>
<th>Applications</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EuTronic® Arc 502</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EuTronic® Arc 509</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EuTronic® Arc 532</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EuTronic® Arc 579</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EuTronic® Arc 595</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EuTronic® Arc 502
- **Product Type**: Fe-Cr-Ti-Si-Mn
- **Applications**: Cement cooler plates, boiler water wall protection, pulp production digesters, steam turbine casings, cracking installations, high temperature cyclone, fume extractors etc.
- **Properties**: Hardness ~860 HV0.3
  Self bonding alloy with enhanced surface wear resistance properties to combat erosion, thermal shock up to 650°C.

### EuTronic® Arc 509
- **Product Type**: Fe-Cr-Al-Mo
- **Applications**: Corrosion and erosion resistant protective coatings in boiler equipment up to 900°C.
- **Properties**: Hardness ~260 HV0.3
  Self bonding alloy with enhanced surface wear resistance properties to combat corrosion, erosion up to 900°C and oxidation.

### EuTronic® Arc 532
- **Product Type**: Fe-Cr-Mn-C
- **Applications**: Alternative to 13%Cr-steel. Hard chrome replacement on hydraulic pistons. Wear resistant layers for rollers in paper machines, bearing- and sealing seats.
- **Properties**: Hardness ~640 HV0.3
  Self bonding alloy with enhanced surface wear resistance properties to combat metal-to-metal friction, corrosion and oxidation.

### EuTronic® Arc 579
- **Product Type**: Fe-Ni-Cr-Si-Mn
- **Applications**: Worn general engineering components, undersize external or internal diameters, bearing seats and faces, housings, shrink or force fit areas, flat surfaces etc. Hot gas corrosion protective coatings in heat exchangers, process piping, etc.
- **Properties**: Hardness ~230 HV0.3
  Self bonding alloy for thick or thin coatings with good corrosion resistance. Easy machinability, like machining solid mild steel.

### EuTronic® Arc 595
- **Product Type**: Fe-Cr-B-Si-Mn-C
- **Applications**: Exhaust fans, pump components, coal-fired boilers, super-heaters, economiser waterwalls, boiler tubes, boiler installations, lamella seals and «Füller» cooler plates in cement works etc.
- **Properties**: Hardness ~965 HV0.3
  Self bonding alloy with enhanced surface wear resistance properties to slurry erosion, corrosion and low stress abrasion. Withstands service environment up to 925°C.
**EuTronic® Arc Spray Equipment**

**EuTronic® Arc Spray 4 system**

The EuTronic® Arc Spray 4 is robust, reliable and easy to use. The Arc Gun and the drive system are coupled to a 350 amp, switched voltage power source.

This power source features sealed electronics for excellent reliability in the harshest spray environments.

The wire feeder unit is neatly mounted on the power source, leaving it free to swivel and follow the operator whilst spraying.

Other options include either floor or trolley mounting. There is no motor in the gun. Instead, the Gun 4 uses a patented ‘Synchrodrive’ system, where a single, sealed motor with a flexible drive arrangement, powers a reliable, positive drive push/pull up to a distance of 20 m.

This results in a long reach and lightweight flexibility of the gun and supplies.

For the operator, working conditions are more comfortable and productive.

- Sealed 350 amp power source for reliability
- 1.6 mm wires standard. From 1.6 mm to 2.5 mm optional
- Air cooled cables for low weight
- Excellent gun manoeuvrability
- 5 m / 10 m supplies packages standard
- Steel reinforced, PTFE lined wire conduits
- Easy to maintain for lower downtime costs
- Wire spool, coil and drum feeder option capabilities
- Soft start for smooth start ups

---

**EuTronic® Arc Spray Supplies Setup**

**Standard Configuration (Push/Pull)**

- Power source, push/pull drive & wire feeder.
- Arc Spray Gun.
- Drive unit position: On power source or floor.
- 5 m / 10 m Push/Pull from Wire.
- Supplies package includes power and control cables, air hose, wire conduits and flexible drive.

**Product N°**

- 263000, complete kit 5m
- 758550, complete kit 10 m
Wire Spraying
EuTronic® Arc Spray Equipment

EuTronic® Arc Spray Gun 4

The Gun has been designed to give consistent throughputs with high coating quality. It is a lightweight, heavy-duty unit with robust but compact construction.

Optional conversions of wire size

The Gun can also be converted to use other wire diameters by using the following parts in the front end assembly:

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>Nozzle X 1</th>
<th>Air Cap 1</th>
<th>Contact Tubes X 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6 mm</td>
<td>263245</td>
<td>263063</td>
<td>263252</td>
</tr>
<tr>
<td>2.0 mm</td>
<td>263244</td>
<td>263242</td>
<td>263133</td>
</tr>
<tr>
<td>2.3 mm</td>
<td>263071</td>
<td>263241</td>
<td>263134</td>
</tr>
<tr>
<td>2.5 mm</td>
<td>263072</td>
<td>263241</td>
<td>263144</td>
</tr>
</tbody>
</table>

Power Source

Power & air requirements

<table>
<thead>
<tr>
<th>Description</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Requirements</td>
<td>380/440 V 50-60 Hz 3 Phase</td>
</tr>
<tr>
<td>Power Option</td>
<td>220 V 50-60 Hz 3 Phase</td>
</tr>
<tr>
<td>Fuses Required</td>
<td>32 A/Phase (415 V input)</td>
</tr>
<tr>
<td>Fuses Required Option</td>
<td>40 A/Phase (220 V input)</td>
</tr>
<tr>
<td>Max Power Consumption</td>
<td>18 KVA</td>
</tr>
<tr>
<td>Duty cycle (100%)</td>
<td>0-350 Amps</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>0-50 Vdc (nominal) Switched High/Low &amp; 1 - 5</td>
</tr>
<tr>
<td>Air Requirements</td>
<td>1.56 m³/min @ 6 bar (55 cfm @ 90 psi)</td>
</tr>
</tbody>
</table>

Power source specification

<table>
<thead>
<tr>
<th>Description</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>215 Kg</td>
</tr>
<tr>
<td>Width</td>
<td>665 mm</td>
</tr>
<tr>
<td>Length</td>
<td>900 mm</td>
</tr>
<tr>
<td>Height</td>
<td>913 mm</td>
</tr>
</tbody>
</table>

Wire Feeder and Drive

The wire feeder unit can be neatly mounted on the power source, leaving it free to swivel and follow the operator whilst spraying.
Wire Spraying
EuTronic® Arc Spray Accessories

Accessories for EuTronic Arc

Supplies packages

Standard Supplies Package includes
The supplies packages consisting of cables and conduits are available in different lengths 5, 10 and 20 meters.

<table>
<thead>
<tr>
<th>Product No.</th>
<th>Description</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>263273</td>
<td>5 m supplies package</td>
<td></td>
</tr>
<tr>
<td>263272</td>
<td>10 m supplies package</td>
<td></td>
</tr>
<tr>
<td>263274</td>
<td>20 m supplies package</td>
<td></td>
</tr>
<tr>
<td>263275</td>
<td>Extension from 10 to 20 m supplies package</td>
<td></td>
</tr>
</tbody>
</table>

ArcJet

The ArcJet fits on the gun to inject air in front of the nozzle. The ArcJet constricts the spray pattern thus reducing overspray and allowing more confined areas such as deep slots, to be sprayed. Therefore significant improvements in deposit efficiency can be made especially on small diameter components.

Technical overview

- Reduces Arc Spray footprint
- Improved deposit efficiency when spraying onto small components.
- Finer coatings.
- Less apparent porosity.
- Improved hardness.

<table>
<thead>
<tr>
<th>Description</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Current</td>
<td>350 Amps</td>
</tr>
<tr>
<td>Compressed Air</td>
<td>0.7 m³/ min @ 3.5 Bar</td>
</tr>
</tbody>
</table>

Arc Spray Extension neck

The Arc Spray extension neck enables an improved access to awkward areas such as deep bores with a minimum diameter of 75 mm and rear sides of welded stiffeners etc. The extension neck allows for spraying either straight ahead or at an angle and for applications using power up to 200 amps.

<table>
<thead>
<tr>
<th>Description</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Current</td>
<td>200 Amps</td>
</tr>
<tr>
<td>Compressed Air</td>
<td>0.6 m³/ min @ 4.5 Bar</td>
</tr>
</tbody>
</table>

Remote Control

The 5 meters remote control allows a remote operation of the EuTronic Arc® Spray 4 system with robust design for use on semi-automatic installations. The remote control buttons and switch mimic those of the Gun.
Integrated Systems / Putting a reliable, performing Package together for OEMs and Workshops

Castolin Eutectic has been at the forefront of the coatings industry for more than 30 years. Industry demand for better coating consistency, enhanced safety and lower costs continues to drive the trend towards system integration.

There is an increasing requirement to utilize computer technology to improve consistency and system performance. There is also a need to mitigate risks associated with direct operator contact which further supports this trend toward automated turnkey systems.

Castolin Eutectic Turnkey Systems

Castolin Eutectic has designed, manufactured and commissioned many Turnkey Integrated Systems on a global basis. We have serviced several industries and applications with tailored made system solutions that are fully engineered, cost efficient, flexible and have state of the art safe operating features. Typical designs include control equipment, sound-proof cabins, robots, turn tables, extraction, etc.

These components are fully integrated for operation in automatic mode. As well as providing full monitoring with operational status and alarms, the systems also allow manual intervention for further development and optimisation of parameters.

Safety and Quality

Castolin Eutectic is committed to the highest safety and quality standards for the design, manufacture and installation of our turnkey systems.

The software design ensures a user-friendly interface that can be easily upgraded. Following installation we provide engineering support, risk assessments and training on a global basis.
Services

Industry partner

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 glass, steel, cement, automotive, power, oil, waste & recycling.

TeroLink®

The unique TeroLink® database of Castolin Eutectic contains over 7,600 fully documented approved applications from around the globe. The case studies include photographs, technical data, detailed descriptions and cost-saving analyses.

Further information available via E+C Brasil, Technique & Marketing, Tel. +55 11 247 5655, Fax. +55 11 521 0545
CastoLab® Services

We believe in making our extensive know-how fully available to our customers, but for situations where technology transfer is complex or requires a rapid turn-around, we have our own maintenance service workshops. These fully resourced skill centers develop advanced procedures for transfer to end users.

Castolin Eutectic workshops are located in several countries around the world, and are best contacted via our website. In countries without Castolabs, Castolin Eutectic collaborates with approved workshops who are in close contact with Castolin Eutectic’s specialists and technologies.

*These are some coating applications examples from the wide range of services provided by our CastoLab® Services.*

Training

At Castolin Eutectic, we offer a wide range of welding, brazing, and thermal spray training courses. These courses can be designed according to the needs of each customer. There are training sessions for managers, engineers and technicians.

Each course is composed of both theoretical as well as practical training. Castolin Eutectic can offer these courses in almost every European country. The courses are carried out in our own in-house training facilities, with qualified instructors or with our trainers at your location.

For more information about training, please contact your local Castolin Eutectic company.

Contact information can be found in our website.
### Hardness Conversion Table in accordance with DIN 50150 (Extract)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>720</td>
<td>225</td>
<td>214</td>
<td></td>
</tr>
<tr>
<td>740</td>
<td>230</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>755</td>
<td>235</td>
<td>223</td>
<td></td>
</tr>
<tr>
<td>770</td>
<td>240</td>
<td>228</td>
<td>20.3</td>
</tr>
<tr>
<td>785</td>
<td>245</td>
<td>233</td>
<td>21.3</td>
</tr>
<tr>
<td>320</td>
<td>100</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>325</td>
<td>105</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>330</td>
<td>110</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>335</td>
<td>115</td>
<td>109</td>
<td></td>
</tr>
<tr>
<td>340</td>
<td>120</td>
<td>115</td>
<td></td>
</tr>
<tr>
<td>345</td>
<td>125</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>350</td>
<td>130</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>355</td>
<td>135</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>360</td>
<td>140</td>
<td>133</td>
<td></td>
</tr>
<tr>
<td>365</td>
<td>145</td>
<td>138</td>
<td></td>
</tr>
<tr>
<td>370</td>
<td>150</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>375</td>
<td>155</td>
<td>147</td>
<td></td>
</tr>
<tr>
<td>380</td>
<td>160</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>385</td>
<td>165</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>390</td>
<td>170</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td>395</td>
<td>175</td>
<td>166</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>180</td>
<td>171</td>
<td></td>
</tr>
<tr>
<td>405</td>
<td>185</td>
<td>176</td>
<td></td>
</tr>
<tr>
<td>410</td>
<td>190</td>
<td>181</td>
<td></td>
</tr>
<tr>
<td>415</td>
<td>195</td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>420</td>
<td>200</td>
<td>190</td>
<td></td>
</tr>
<tr>
<td>425</td>
<td>205</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>430</td>
<td>210</td>
<td>199</td>
<td></td>
</tr>
<tr>
<td>435</td>
<td>215</td>
<td>204</td>
<td></td>
</tr>
<tr>
<td>440</td>
<td>220</td>
<td>209</td>
<td></td>
</tr>
</tbody>
</table>

### Particle size conversion table

<table>
<thead>
<tr>
<th>Microns</th>
<th>Inches</th>
<th>Mesh per inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12500</td>
<td>(theoretical)</td>
</tr>
<tr>
<td>2</td>
<td>6250</td>
<td>(theoretical)</td>
</tr>
<tr>
<td>5</td>
<td>2500</td>
<td>(theoretical)</td>
</tr>
<tr>
<td>10</td>
<td>1250</td>
<td>(theoretical)</td>
</tr>
<tr>
<td>15</td>
<td>800</td>
<td>(theoretical)</td>
</tr>
<tr>
<td>20</td>
<td>625</td>
<td>(theoretical)</td>
</tr>
<tr>
<td>25</td>
<td>500</td>
<td>(theoretical)</td>
</tr>
<tr>
<td>33</td>
<td>0.0013</td>
<td>[425]</td>
</tr>
<tr>
<td>38</td>
<td>0.0015</td>
<td>400</td>
</tr>
<tr>
<td>41</td>
<td>0.0016</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>0.0017</td>
<td>325 (325)</td>
</tr>
<tr>
<td>50</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>0.0021</td>
<td>270 (270)</td>
</tr>
<tr>
<td>56</td>
<td>0.0022</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>0.0025</td>
<td>230 (250)</td>
</tr>
<tr>
<td>66</td>
<td>0.0026</td>
<td>240</td>
</tr>
<tr>
<td>71</td>
<td>0.0028</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>0.0029</td>
<td>200 200</td>
</tr>
</tbody>
</table>

*standard
Periodic Table of the Elements

<table>
<thead>
<tr>
<th>Group</th>
<th>Period</th>
<th>Element</th>
<th>Symbol</th>
<th>Atomic Number</th>
<th>Mass (amu)</th>
<th>Electron Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>H</td>
<td>H</td>
<td>1</td>
<td>1.008</td>
<td>[He] 2s²</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>He</td>
<td>He</td>
<td>2</td>
<td>4.0026</td>
<td>[He] 2s² 2p⁰</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Li</td>
<td>Li</td>
<td>3</td>
<td>6.941</td>
<td>[He] 2s² 2p¹</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Be</td>
<td>Be</td>
<td>4</td>
<td>9.0122</td>
<td>[He] 2s² 2p²</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>B</td>
<td>B</td>
<td>5</td>
<td>10.811</td>
<td>[He] 2s² 2p³</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>C</td>
<td>C</td>
<td>6</td>
<td>12.011</td>
<td>[He] 2s² 2p⁴</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>N</td>
<td>N</td>
<td>7</td>
<td>14.007</td>
<td>[He] 2s² 2p⁵</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>O</td>
<td>O</td>
<td>8</td>
<td>15.9994</td>
<td>[He] 2s² 2p⁶</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>F</td>
<td>F</td>
<td>9</td>
<td>18.9984</td>
<td>[He] 2s² 2p⁷</td>
</tr>
</tbody>
</table>

---

Source: Castolin Eutectic

For more information, visit www.eutectic.com
Global with local support

Castolin Eutectic has a presence in almost all European countries.

With over 350 sales engineers travelling around Europe everyday, we are able to provide unbeatable service to our customers. We can literally be at 90% of customers in Europe within 2 hours; this allows us to give unsurpassed service and support.

We supply all technical documentation and material safety data sheets in local languages. Our salesmen all live locally and speak the language of our customers, understand the local cultures. We manage warehouses and keep stocks adapted to local requirements in every European country.

Our 350 sales engineers are supported by over 50 process and application experts. These experts are multi-lingual and communicate daily with our 4 production centers and research laboratories.

For more information or addresses of Castolin Eutectic companies, please visit our websites www.castolin.com or www.eutectic.com

For more information or contact addresses, please visit our website

www.castolin.com/contact
**Index**

**Total Coating Solutions**
- Overview of the wear phenomena p. 4
- R&D Technical support p. 4
- Wear testing labs p. 5
- Integrated production p. 5
- Stringent quality controls p. 5
- Coating Overview p. 6
- Quality Assurance p. 7
- Powder production p. 9
- Spray Wire Production p. 10
- Equipment Production p. 11
- Our offer p. 12

**Eutalloy Spray and Fuse**
- Eutalloy Process p. 14

**Eutalloy® Powders**
- Eutalloy 10009 p. 15
- Eutalloy 10011 p. 15
- Eutalloy 10124 p. 15
- Eutalloy 10680 p. 15
- Eutalloy 15999 p. 16
- Eutalloy LT PE 8418 p. 16
- Eutalloy LT PE 8422 p. 16
- Eutalloy LT PE 8426 p. 16
- Eutalloy LT PE 8431 p. 16
- Eutalloy LT PE 8435 p. 16
- Eutalloy LT PE 8440 p. 16

**Eutalloy® Equipment**
- SuperJet-S - Eutalloy® p. 17
- SuperJet-S - Eutalloy® kit p. 17
- KoolTip p. 17

**Eutalloy® Accessories**
- C6 Air Cooled Tip p. 18
- Nozzles p. 18
- Heavy duty Nozzles p. 18
- Compact heavy duty tip p. 18
- Compact heavy duty tube p. 18

**Eutalloy® SF**
- Eutalloy SF Process p. 19

**Eutalloy® SF Powders**
- Eutalloy SF 15211 p. 20
- Eutalloy SF PE 8213 p. 20
- Eutalloy SF PE 8215 p. 20
- Eutalloy SF PE 8217 p. 20

**Eutalloy® SF Equipment**
- CastoDyn SF Lance p. 21
- CastoDyn Extra Flat SF Lance p. 22

**RotoTec®, ProXon® & MetaCeram®**
- Cold Spray Process p. 24

**RotoTec® & ProXon® powders**
- RotoTec 19850 p. 25
- RotoTec 19868 p. 25
- RotoTec 19940 p. 25
- RotoTec 19985 p. 25
- RotoTec 19999 p. 25
- RotoTec LT 29230 p. 25
- RotoTec LT 29240 p. 25
- ProXon 21021 p. 26
- ProXon 21023 p. 26
- ProXon 21071 p. 26
- MetaCeram 28010 p. 26
- MetaCeram 28020 p. 26
- MetaCeram 28030 p. 26
- MetaCeram 28095 p. 26

**Eutalloy® RW**
- Hot Spray Process - 2 step p. 27

**Eutalloy® RW Powders**
- Eutalloy RW 12112 p. 28
- Eutalloy RW 12494 p. 28
- Eutalloy RW 12495 p. 28
- Eutalloy RW 12496 p. 28
- Eutalloy RW 12497 p. 28
- Eutalloy RW 12999 p. 28
- Eutalloy RW 17535 p. 28
- Eutalloy RW 53606 p. 28

**Flame Thermal Spray Equipment**
- CastoDyn DS 8000 p. 29
- RotoTec 800 p. 30

**CastoDyn DS 8000® Accessories**
- Extension Neck p. 29
- CastoFuse p. 29

**CastoFuse Accessories**
- Konstantherm p. 30
- Line Heating Torch p. 30
- Ring Torches p. 30

**HVOF Thermal Spray**
- HVOF Process p. 32
- HVOF Applications p. 34

**HVOF Powders**
- 55586C p. 35
- 55588C p. 35
- 55583C p. 35
- 55580C p. 35
- 55396 C p. 35

**HVOF Thermal Spray equipment**
- CastoJet CJKS p. 36

**CIKS Accessories**
- Toolkit p. 36
- CJKS Gun p. 36

**Laser Cladding**
- Laser Process and advantages p. 38
- Laser Powders p. 41
- Powders p. 41
- Laser Offer, Service, Systems p. 42

**Eutrloy PTA Welding**
- Eutrloy Process p. 44

**Eutrloy Powders**
- Eutrloy 16006.04 p. 45
- Eutrloy 16008.04 p. 45
- Eutrloy 16012.04 p. 45
- Eutrloy 16221.04 p. 45
- Eutrloy 16223.04 p. 45
- Eutrloy 16316.04 p. 45
- Eutrloy 16454.04 p. 45
- Eutrloy 16496.04 p. 46
- Eutrloy 16604 p. 46
- Eutrloy 16606A.04 p. 46
- Eutrloy 16625M.04 p. 46
- Eutrloy 16800 p. 46
- Eutrloy PG 6503 p. 46
- Eutrloy PG 8426.04 p. 46

**Eutrlic GAP® PTA Equipment**
- Eutrlic GAP 2501 DC with touch screen p. 47
- GAP® Unicoating V2.0 p. 48

**Eutrlic GAP® Accessories**
- Cold Wire Feeder p. 49
- Powder Feeder EP2 p. 49
- Cooling GAP p. 49
- Cooling GAP chiller p. 49
- GAP E12N p. 50
- GAP E15N p. 50
- GAP E150P p. 50
- GAP E54 S-M-D-DL p. 50
- GAP E52 p. 50
- GAP E200P p. 50

**Eutrlic Arc Spray**
- EuTronic Process p. 52

**Eutrlic Arc Spray Wires**
- EuTronic Arc 502 p. 53
- EuTronic Arc 509 p. 53
- EuTronic Arc 532 p. 53
- EuTronic Arc 579 p. 53
- EuTronic Arc 595 p. 53

**Eutrlic Arc Spray Equipment**
- EuTronic Arc Spray 4 system p. 54
- EuTronic Arc Spray Gun 4 p. 55
- Power Source p. 55
- Wire Feeder and Drive p. 55

**Eutrlic Arc Accessories**
- Supplies packages p. 56
- Arclet p. 56
- Arc Spray Extension neck p. 56
- Remote Control p. 56

- Integrated Systems p. 57
- Industry partners p. 58
- Terolink p. 58
- CastoLab Services p. 59
- Training p. 59
- Hardness Conversion p. 60
- Particle Size Conversion p. 60
- Periodic table p. 61
- Contact Adresses p. 62
Wear protection...

Stronger, with

Castolin Eutectic