utp
by voestalpine

Tailor-Made Protectivity™

UTP METAL POWDERS FOR THERMAL SPRAYING, PTA AND LASER SURFACING

voestalpine Böhler Welding
www.voestalpine.com/welding

voestalpine
ONE STEP AHEAD.

UTP

High-quality industrial-use welding filler metals for maintenance, repair, and overlay welding. By adding the UTP and Soudokay brands to the voestalpine Böhler Welding brand network, the UTP can look back on a proud history spanning 60 years as an innovative supplier of welding technology products. UTP is the global leader in the repair, maintenance and overlay welding segment.

With roots in Bad Krozingen (Germany), Seneffe (Belgium) and Cittadella (Italy), UTP offers the world's most unique product portfolio for filler metals from its own production facilities. The Soudokay brand was established back in 1938, while the UTP brand began operations in 1953. Each of these brands therefore respectively looks back on a long history of international dimension.

By merging into the UTP brand, the collective know-how of both brands – gathered over decades in the fields of metallurgy, service and applications engineering – is now united under one umbrella. As a result, a truly unique portfolio of solutions for welding applications has been created in the fields of repair, maintenance and overlay welding.

Tailor-Made Protectivity™

UTP ensures an optimum combination of protection and productivity with innovative and tailor-made solutions. Everything revolves around the customer and their individual requirements.

That is expressed in the central performance promise: Tailor-Made Protectivity™.

Research and Development for Customized Solutions

At UTP, research and development, conducted in collaboration with customers, plays a crucial role. Because of our strong commitment to research and development, combined with our tremendous innovative capacity, we are constantly engineering new products, and improving existing ones on an ongoing basis. The result is a vast number of innovative products for solving individual problems and complex matters.

Solutions at Every Point on the Globe

UTP provides products and services through the global branches of voestalpine Böhler Welding and its dealer network in more than 150 countries throughout the world. A team of welding engineers stand at the customer's side, providing advice and support in all matters related to the challenges of welding technology.

Customized Products of Superior Quality

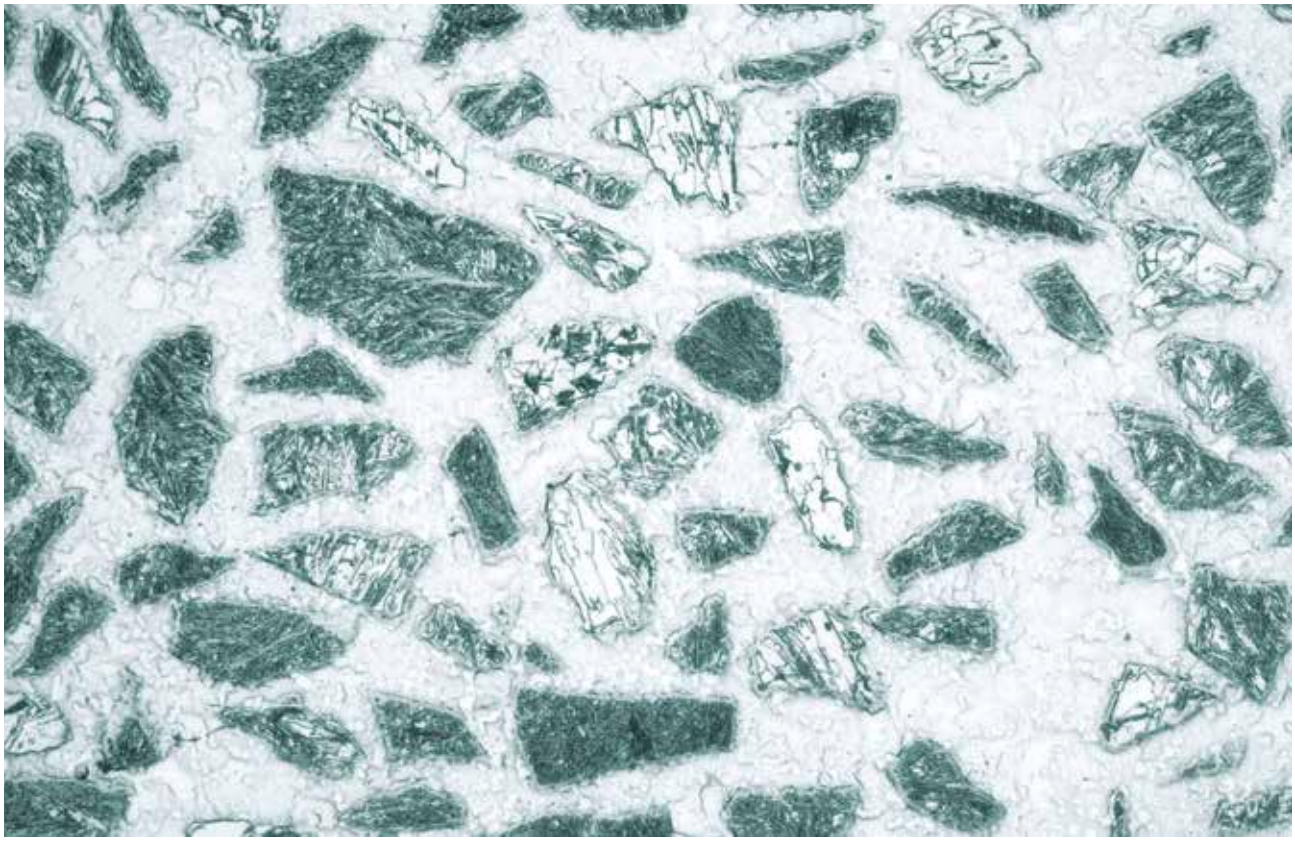
We continuously adapt our product portfolio of about 600 products to customer and industry specifications, while ensuring that we meet the highest quality specifications.

From its in-house production facilities, UTP delivers innovative, tailor-made welding filler metals for: unalloyed and fine-grained structural steel, low-grade alloyed steels, rust-proof, acid-proof, and heat-proof steels, nickel-based alloys, cast iron, copper and copper alloys, manganese steels, tool steels, and cobalt alloys.
The product portfolio comprises:

- Stick electrodes
- Solid wires and rods
- Flux-cored wires
- Submerged arc wires and fluxes
- Submerged arc and electroslag strips & fluxes
- Spraying and PTA-powders

POWDER FLAME SPRAYING

Flame spraying is one of a number of thermal coating processes. In powder flame spraying, the spray material, in powder form, is melted with an oxy-fuel gas flame, accelerated towards a component by the combustion gases and sprayed on to the surface of the component.

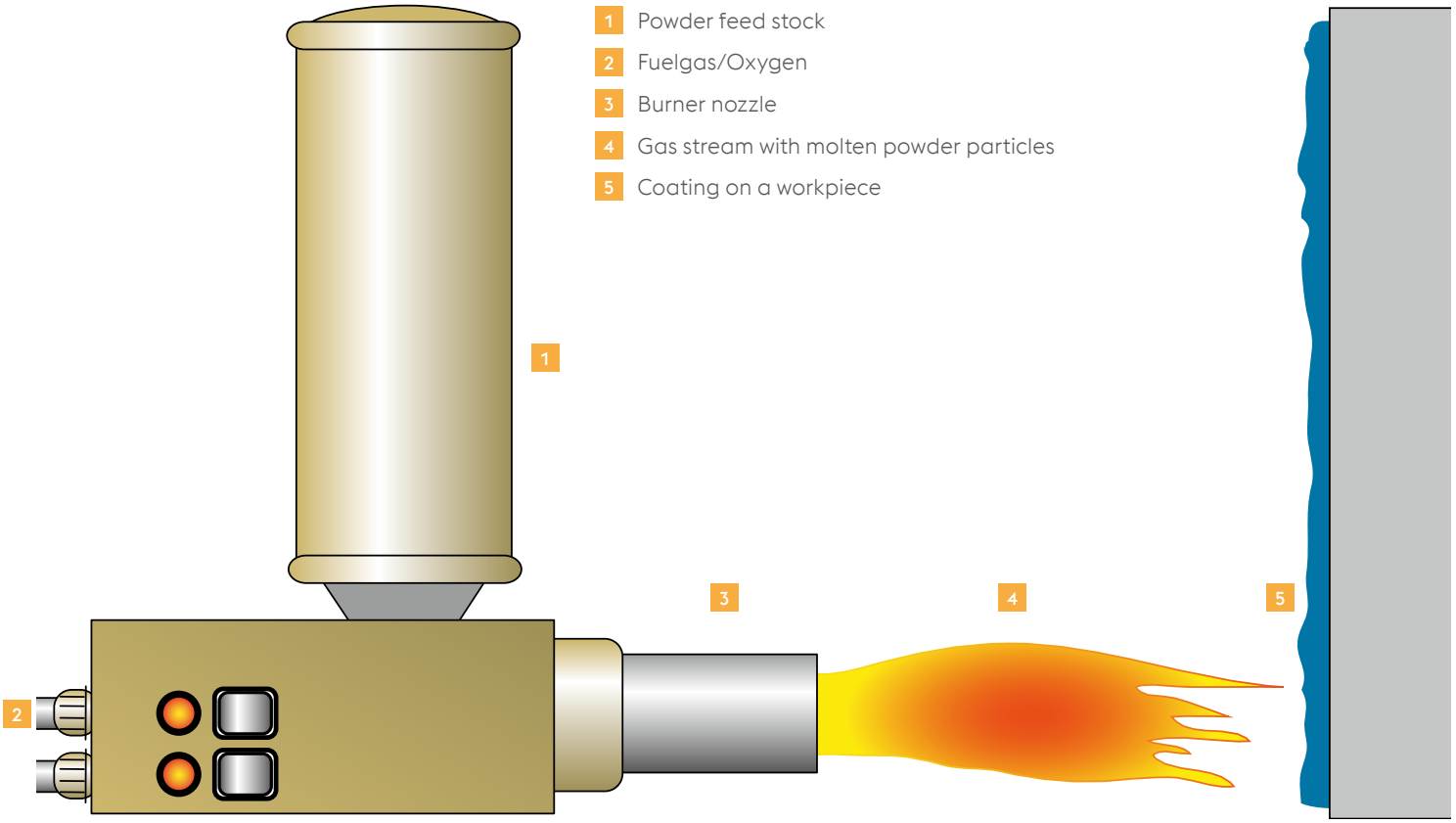


Sprayed on and melted down – micrograph of UTP SIMmelt™ NiBasW35

Metallic, oxide ceramic, carbide and plastic powders can be processed using spray guns specifically designed for those materials. Spray guns that frequently take the form of manual torches, preferably using acetylene as a fuel gas because of its high flame temperature, are chosen for metallic alloys based on nickel, iron or cobalt. The powder particles, which are partially melted by the flame, deform on impact with the surface of the component and are deposited there to form a spray coating with a lamellar structure.

The main areas of application for thermal coatings are corrosion protection and wear protection. Powder flame spraying may be subdivided into cold and hot processes. In cold processes, the powders are only applied by the spray gun, and the spray coating is not subjected to any subsequent thermal treatment. UTP has, accordingly, designated these powders as COLDmelt; these coatings typically have a porosity of between about 5 and 15%, depending on the process used. In hot processes, metal powders of materials known as self-fluxing alloys, based on Ni-B-Si, are employed.

The layer that has been sprayed on is melted down by an additional subsequent thermal treatment; this thermal compaction makes it possible to obtain coatings that are virtually free of pores.
Depending on the application, two processes have emerged for this: simultaneous and subsequent melting.



UTP HAS DESIGNATED THESE POWDERS ACCORDING TO THE PROCESS USED:

Simultaneous Melting > SIMmelt™
Subsequent Melting > SUBmelt™

Rotationally symmetrical parts are frequently coated using a two-stage process (subsequent melting), while a single-stage process (simultaneous melting) is often used for surfaces and edges.

SIMmelt

POWDERS FOR SIMULTANEOUS MELTING

Powder description

- Powders for flame spraying with simultaneous melting
- Self-fluxing alloys
- Powder types based on NiBSi C+Cr+Co+Cu + tungsten carbides

Powder characterization

- Alloyed metal powder (some with hard additives)
- Round grains (matrix)
- Smooth surface
- Gas atomized (except hard material additives)
- Typical grain size: 20 - 106 µm, adjusted to the torch
- Spraying layer hardness ~ 150 HV up to > 60 HRC

Spray and fuse process from cast repair with UTP SIMmelt™ Nibas25

Description	Grain Size	Chemical Composition	Hardness	Properties and applications
SIMmelt Nibas20G	20 – 106 µm	NiCuBSi	~ 20 HRC	Excellent machinability; Repairs of glass moulds
SIMmelt Nibas25	20 – 106 µm	NiBSi	205-260 HV	Repair surfacing, high impact resistance, press moulds, bearings, pump vanes
SIMmelt Nibas30G	20 – 106 µm	NiCuCrMoBSi	~ 30 HRC	Protection and repairs of glass moulds
SIMmelt Nibas40	20 – 106 µm	NiCrBSiFe	40 HRC	Good resistance to corrosion and wear even at high operating temperatures; drawing dies, forging dies, tools in the plastics industry, ejector pins
SIMmelt Nibas60	20 – 106 µm	NiCrBSiFe	60 HRC	Good resistance to corrosion and wear even at high operating temperatures; pump rings, friction bearing surfaces, knife edges, press moulds, camshafts
SIMmelt NibasW35	20 – 106 µm *	NiCrBSiFe+ 35 WSC **	MATRIX 60 HRC	High level of protection against abrasive wear; slicing machine blades, conveyor chains, kneader parts
SIMmelt NibasW55	20 – 106 µm *	NiCrCoBSiFe+ 55 WSC **	MATRIX 60 HRC	Highest abrasion resistance; mixer-settler parts and kneaders in the ceramics industry, die drawing tools, chopping blades, scrapers
SIMmelt NibasW60	20 – 106 µm *	NiCrBSiFe+ 60 WSC **	MATRIX 60 HRC	Highest abrasion resistance; well suitable for automated spraying processes; separator screws, mixing shovels

Further powders on demand

* Grain size of matrix

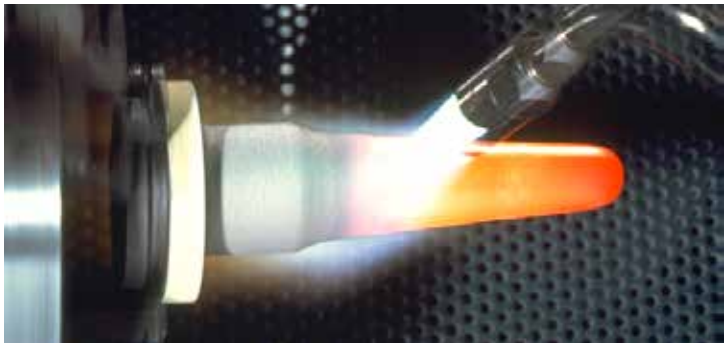
** WSC: tungsten carbides

SUBmelt

POWDERS FOR SUBSEQUENT MELTING

Powder description

- Powders for flame spraying with subsequent melting
- Self-fluxing alloys
- Powders types based on NiBSi (+Cr +Co + tungsten carbide)



Spraying on a plunger with UTP SUBmelt Nibas40

Powder characterization

- Alloyed metal powders (some with hard additives)
- Round grains (matrix)
- Smooth surface
- Gas atomized (except hard material additives)
- Typical grain size: 45 - 125 µm
- Spray coating hardness ~200 HV to >60 HRC

Description	Grain Size	Chemical Composition	Hardness	Properties and applications
SUBmelt Nibas40	45 – 125 µm	NiCrBSiFe	40 HRC	Good resistance to corrosion and wear even at high operating temperatures; valve discs, conveyour chains, mixer parts, friction bearings, moulds in the glass industry, feed screws
SUBmelt Nibas60	45 – 125 µm	NiCrBSiFe	60 HRC	Excellent resistance to wear and corrosion, high level of hardness with moderate dynamic compression stress; feed screws, running and sealing surfaces in valves, fittings and bearing seats
SUBmelt NibasW50	45 – 125 µm *	NiCrBSiFe+ 50 WSC **	MATRIX 60 HRC	Highest abrasion resistance; stirrer, mixing shovels, screw shafts

* Grain size of matrix

** WSC: tungsten carbides

COLDmelt

POWDERS WITHOUT MELTING (COLD PROCESS)

Cold Spray process with
UTP COLDmelt™ stainless 18

Powder description

- Powder for thermal spraying without melting (cold process)
- Metal alloys, hard alloys, hard material additives, usually with bond layer

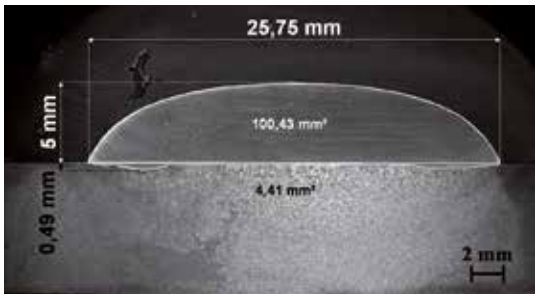
Powder characterization

- Metal or metal alloyed (some with hard additives)
- Round grains (gas atomized)
- Smooth surface
- Spattered grain, uniform grain structure, water atomized (except for hard material additives)
- Typical grain size: 36 - 125 µm
- Spray coating hardness ~23 HB to >60 HRC

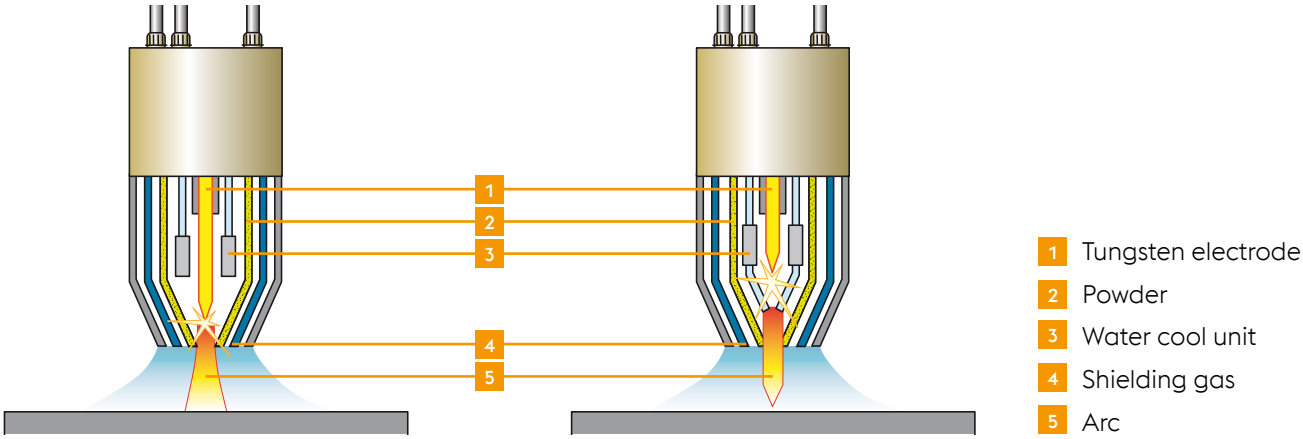
Description	Grain Size	Chemical Composition	Hardness	Properties and applications
COLDmelt Base 17	36 – 106 µm	NiAl	150-190 HV	Bond coat, base powder for initial layer under further coats of wear resistant CrNi- and Cu-alloys
COLDmelt Zn	90 µm	Zn	23 HB	Active corrosion protection on steel under atmospheric stresses
COLDmelt CuAl	36 – 120 µm	CuAl	130 HV	Good sliding and emergency running properties; rollers, bearing journals, slideways

PLASMA POWDER SURFACING (PPS/PTA)

Plasma powder surfacing (PPS), also known as the plasma transferred arc (PTA) process, is a thermal coating process. In contrast to the spraying processes, this method is a welding process and so involves metallurgical bonding of the applied material to the base material.



Cross section of PTA surfacing with PLASweld™ Ledurit 60



1 Tungsten electrode
2 Powder
3 Water cool unit
4 Shielding gas
5 Arc

Schematic diagram of PTA process

If the parameters are set optimally, the degree of dilution can be reduced to a minimum. The PTA process is employed primarily for surfacing of wear resistant and corrosion resistant coatings onto a base material. The process is characterized by the use of a copper nozzle to concentrate the arc. This arc burns with a high energy density between the electrode and the workpiece. With the aid of the electric arc, both the base material and the metal powder that serves as the welding consumable are fused together, which then gives rise to the deposited protective coating. Ar, H_2, He, or mixtures of gas are employed as a processing gas. This serves, firstly, as a plasma gas and, secondly, as a shielding gas and as a carrier gas for the powder. Because of its high degree of automation, the PTA process is clearly most suitable for series parts and offers advantages here with regard to:

- High reproducibility
- Low degree of dilution with base material
- Small concentrated heat-affected zone
- High surfacing rates possible
- Alloy multiplicity in powder form
- Material combinations with hard additives

UTP offers these PTA powders as nickel-based, cobalt-based and iron-based alloys. The powders are designated PLASweld in keeping with the process for which they are intended. The grain sizes should be chosen according to the type of system; powder grain sizes between 50 and 210 µm are selected for the standard range of PTA.

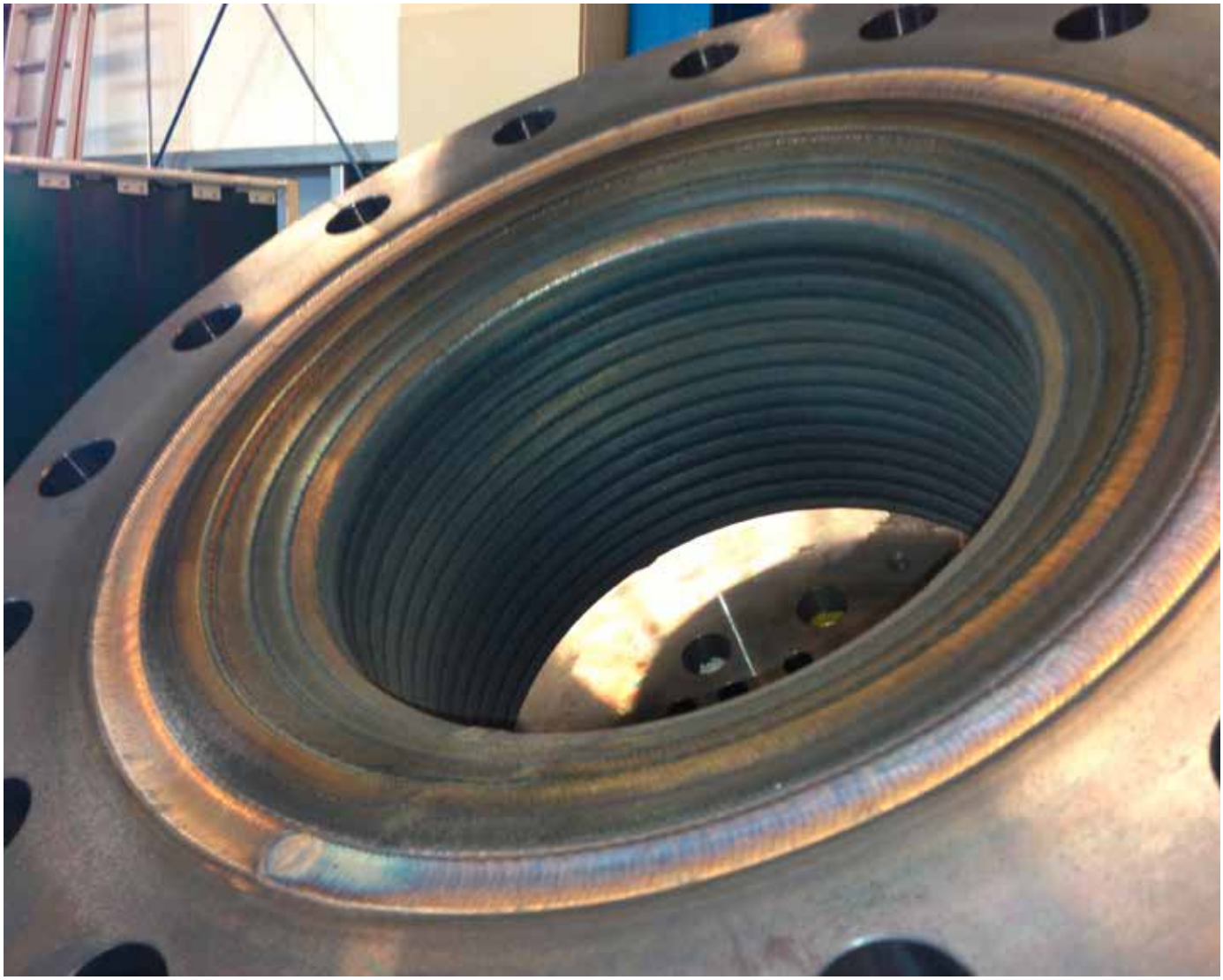
Another method of using metal powder as a welding consumable is provided by laser powder surfacing. Here, a laser serves as the source of heat for partially melting the surface of the workpiece and fusing the welding consumable in powder form. The high-energy focus of the laser allows precisely targeted surfacing, which makes it possible to provide wear protection at specific places without negatively affecting (e.g. through a high heat input) the properties of the rest of the component. Because the coating thicknesses are usually small and the processing times short for laser powder surfacing, PLASweld™ powder of a finer grain size, typically 45 - 106 µm, can be used here.

PLASweld

POWDERS FOR PTA AND LASER SURFACING

Powder description

- Alloyed metal powder (some with hard additives)
- Round grain, smooth surface, gas atomized (except hard material additives)
- Typical particle size: 50 - 150 µm or 63 - 200 µm
- Surface hardening of about 180 HV (buffer layers) up to 60 HRC

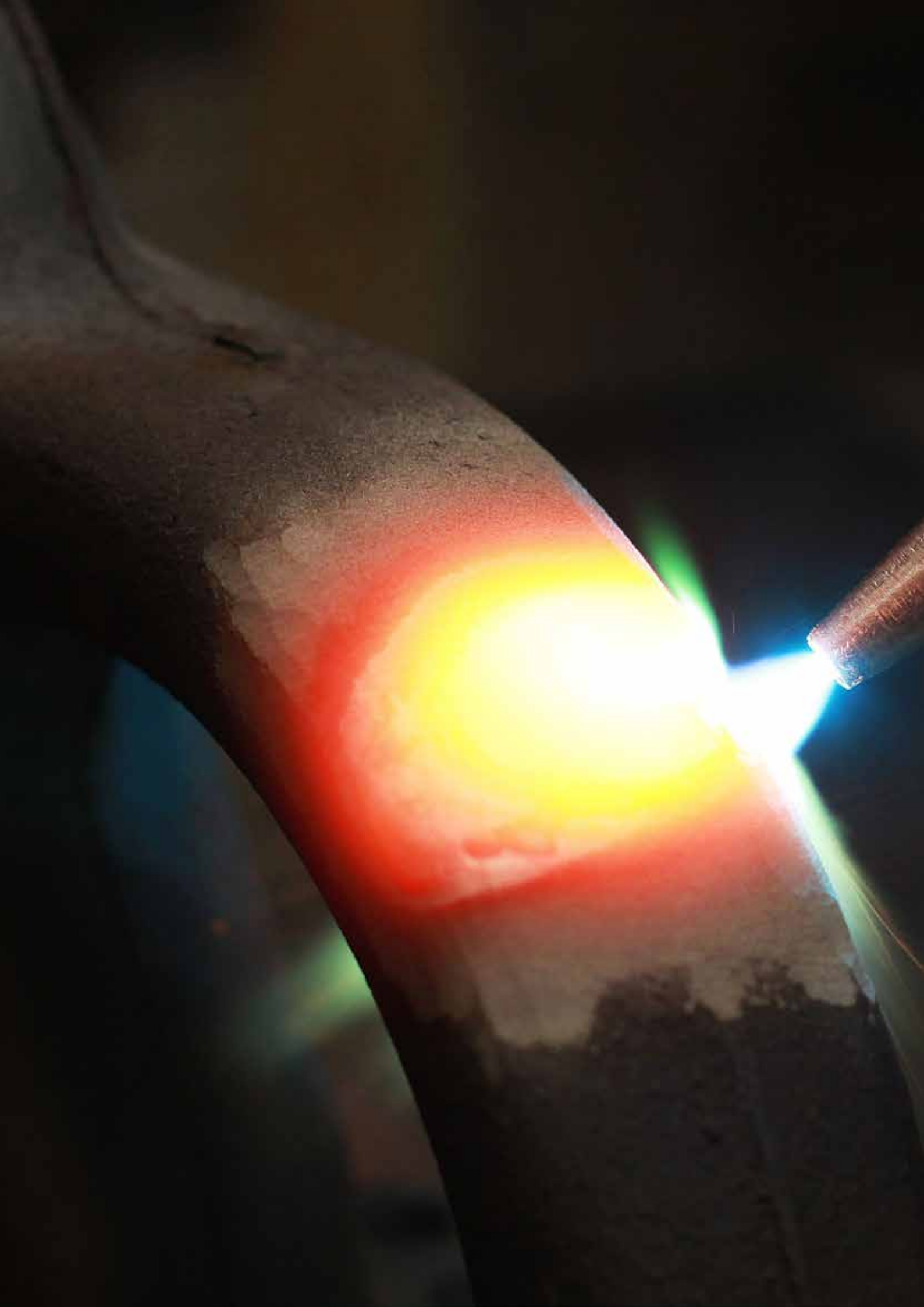


	Description	Grain Size	Chemical Composition	Hardness	Properties and applications
Cobalt-Base	**PLASweld Celsit 706**	50 – 150 µm *	CoCrWC	41 HRC	Qualities to protect against adhesive and abrasive wear, high-temperature resistant; hardsurfacing of running and sealing surfaces in valves carrying gas, water and acid, hot-working tools subject to high stresses, valve seats, valve collets for combustion engines, grinding, mixing, carrying and drilling tools, dies and press moulds
	PLASweld Celsit 712	50 – 150 µm *	CoCrWC	48 HRC	
	PLASweld Celsit 721	50 – 150 µm *	CoCrMoNiC	32 HRC	High corrosion resistance and resistance to adhesive (metal-to-metal) wear, buffer material for hard stellite qualities; medical engineering
Ferrum-Base	**PLASweld Ferro 55**	50 – 150 µm *	FeCrMo	55 HRC	Ferreous based alloy combining high strength, toughness and temperature resistance up to 550°C. Applicable on hot and cold work steels. Cutting tools, forging tools, roller, mandrel. Powder also available for laser welding with finer grain size (e.g. 45-106 µm)
	PLASweld Ferro 45	50 – 150 µm *	FeCrMo	45 HRC	
	PLASweld Ferro 39	50 – 150 µm *	FeCrMo	39 HRC	
	PLASweld Ferro 44	38 – 125 µm *	FeCrMoCo	~ 44 HRC	Specially developped for laser surfacing of tough and crack resistant build-ups on high-strenth nodular cast iron
	PLASweld FerroV03	45 – 125 µm *	FeCrMoV		Designed for laser surfacing of similar workpieces and for laser additive manufacturing applications: power generation, pressure vessels & pipe construction
	PLASweld FerroV1	45 – 125 µm *	FeCrMoWV	50-60 HRC	Powder with spherical particles developped for good fatigue strength & temperature wear resistance. Typical applications: cutting & punching tolls, press moulds & forming dies.
	PLASweld FerroV12	63 – 180 µm *	FeCrV	61 HRC	Ferrous alloy with finely distributed Vanadium carbides in a martensitic matrix. High resistance against abrasion. Hardfacing on highly loaded edges
	PLASweld FerroV15	63 – 180 µm *	FeCrV	61 HRC	Martensitic alloy with high Vanadium and Chromium content against a combination of wear and corrosion. Cutting tools, scraper
Nickel-Base	**PLASweld NiBasW60**	63 – 180 µm *	NIBSI+ 60 WSC **	MATRIX 60 HRC	Specially developed nickel base matrix for highest abrasion stresses, rolling and mineralic wear, sliding abrasion, impact demand applications. For excavator parts, drilling tools, screws in the plastic industry and mining
	PLASweld Nibas 776	50 – 150 µm *	NiCrMoW	170 HV	Corrosion and high-temperature resistant coatings, forging hammers, saddles, continuous cast rollers/ buffer layer, mixer blades
	PLASweld Nibas776W40	50 – 150 µm *	NiCrMoW+ 40 WSC **	-	Powder with high carbide content, specially designed for overlays subject to corrosion & abrasive wear such as separator screws or mining tools. Can be used for additive manufacturing
	PLASweld Nibas776W60	50 – 150 µm *	NiCrMoW+ 60 WSC **	-	Developed as a powder with spherical particles for laser surfacing on cutting and punching tools, press moulds and forming dies. Good resistance against abrasion, compression and impact.
	PLASweld Nibas 068HH	50 – 150 µm *	NiCrFeNb	170 HV	Buffer layer preferred for stellite qualities, corrosion-resistant; pressure vessel construction, petrochemical industry, power plants
	PLASweld NiBas 6222Mo	50 – 150 µm *	NiCrMoNb	200 HV	Nickel base powder for cladding, similar corrosion and temperature resistant alloys and for surfacing on mild steels. Chemical and petrochemical industries and for repair purposes (valve cladding in ship engines)

Other grain sizes on request

* Also available in grain size 63 - 200 µm or according to customers requirements

** WSC: tungsten carbides



JOIN! voestalpine Böhler Welding

We are a leader in the welding industry with over 100 years of experience, more than 50 subsidiaries and more than 4,000 distribution partners around the world. Our extensive product portfolio and welding expertise combined with our global presence guarantees we are close when you need us. Having a profound understanding of your needs enables us to solve your demanding challenges with Full Welding Solutions - perfectly synchronized and as unique as your company.

Lasting Connections – Perfect alignment of welding machines, consumables and technologies combined with our renowned application and process know-how provide the best solution for your requirements: A true and proven connection between people, products and technologies. The result is what we promise: Full Welding Solutions for Lasting Connections.

Tailor-Made Protectivity™ – Proven under the toughest conditions: Our products protect metal surfaces from wear and corrosion. With over 70 years of experience and the broadest product portfolio in the industry, we are your preferred partner for Surface Protection solutions. We deliver what we promise: Surface Protection tailored to your needs.

In-Depth Know-How – As a manufacturer of soldering and brazing consumables, we offer proven solutions based on 60 years of industrial experience, tested processes and methods, made in Germany. This in-depth know-how makes us the internationally preferred partner to solve your soldering and brazing challenge through innovative solutions. The result is what we promise: Innovation based on in-depth know-how.

The Management System of voestalpine Böhler Welding Group GmbH, Peter-Mueller-Strasse 14-14a, 40469 Duesseldorf, Germany has been approved by Lloyd's Register Quality Assurance to: ISO 9001:2015, ISO 14001:2015, OHSAS 18001:2007, applicable to: Development, Manufacturing and Supply of Welding and Brazing Consumables.
More information: www.voestalpine.com/welding

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