

VDM Metals

A company of ACERINOX

Additive Manufacturing Powder



We develop materials for the future

As a world market leader, VDM Metals benefits from decades of experience in the production of nickel alloys and high-alloyed stainless steels. The company has made a name of itself in conventional manufacturing methods such as melting, casting, rolling or forging during the production of semi-finished products as primary material, having extended its production facilities for the manufacture of powder materials for Additive Manufacturing methods.

VDM Metals produces high-performance alloys for the use in extreme conditions. Our materials resist high mechanical, thermal and chemical stresses – in some cases all three at once. Very often they help us turning new ideas into reality, with future-oriented and eco-friendly designs and solutions geared to conserving natural resources.

Our nickel alloys as well as our high-alloyed special stainless steels are made from a wide spectrum of elements from the periodic table, because the solutions we develop are just as wide-ranging as the demands for which they are required.

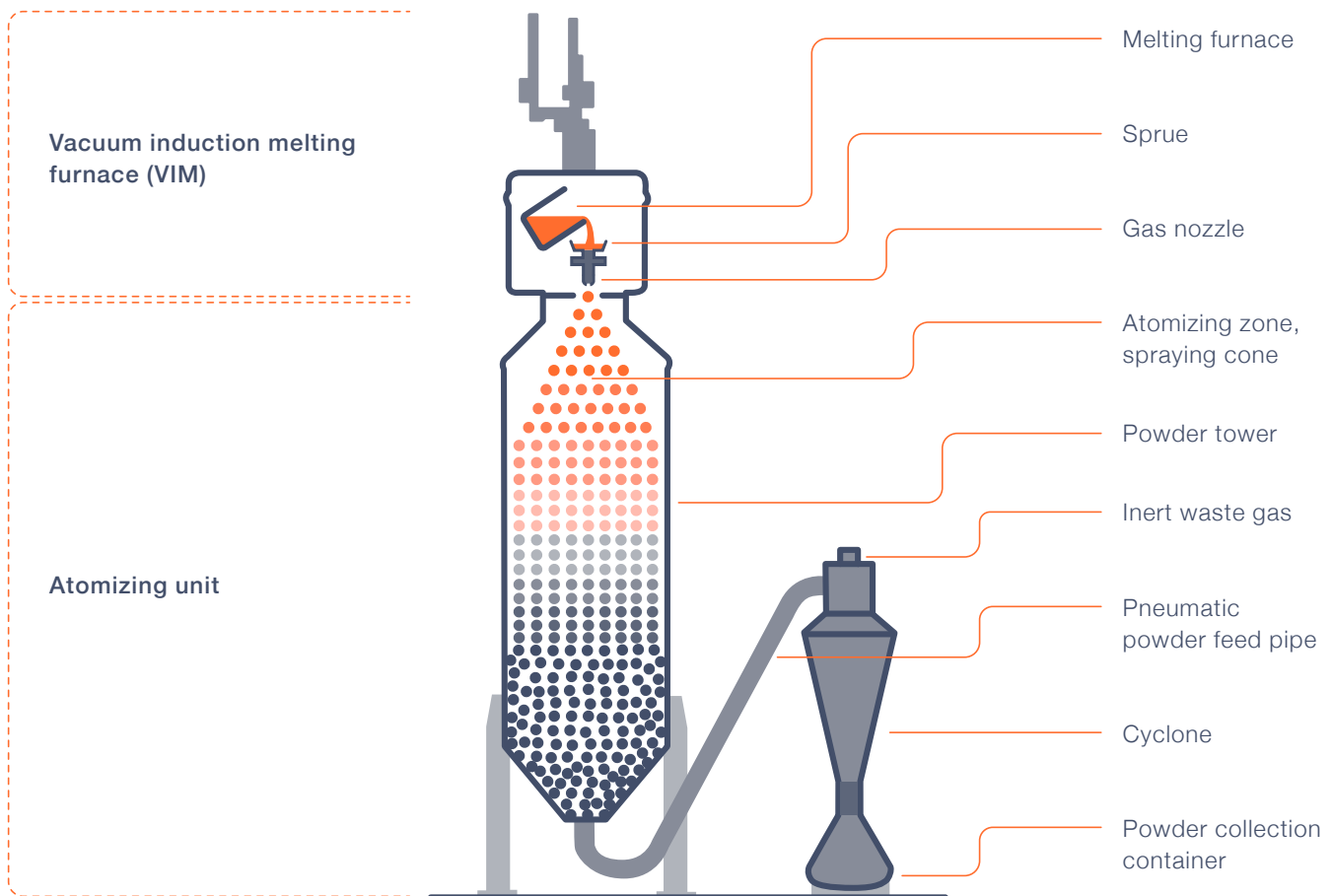
Materials are delivered as powder, strip, wire, rod and bar, plate and sheet, forgings or welding consumables. Our processing plants and machinery are tailored to specific production requirements and local conditions and equipped with state-of-the-art process data acquisition systems, ensuring high productivity and production reliability. Our integrated manufacturing chain means that all major production steps are in our own hands – a vital prerequisite for a robust and stable manufacturing process. The result of our efforts: maximum purity, homogeneity, reproducibility and optimum further processing characteristics of our products.

Even today, over 90 years after its foundation, the VDM Metals Group is able to meet the requirements of a continually changing world through innovation, experience and expertise. The area of Additive Manufacturing represents a production method with infinite opportunities. This method along with the subsequent use of the components manufactured in this way is subject to high requirements, which the material needs to comply with.

VDM Metals produces powders from proven alloys and also optimizes conventional materials for the powder production. What is more, the company develops new materials together with its customers, which are required as powder for further manufacturing methods.

Our team with its broad spectrum of knowledge and skills supports this development and refinement of alloys. Our material experts from the areas of Research and Development along with Technical Customer Service will be pleased to help you. We also offer our customers an outstanding service backed by a global sales network, aiming to ensure optimal availability of our materials.

Manufacturing process



Additive Manufacturing

Additive Manufacturing is a technology of the future, as it enables the production of metallic components with complex structures accompanied by weight reduction at the same time. It is frequently impossible to manufacture such components with conventional technologies, or such production is very complicated and involved. 3D printing methods therefore represent an enormous step in technological development, which is still far from having realized its full potential. This technology – meanwhile used in many sophisticated industries such as medical technology, the automotive industry, the chemical process industry, oil & gas as well as aerospace – is based on high-quality precursor products in powder form.

VDM Metals has long manufactured high-alloyed materials as semi-finished products in the form of rods, sheets, strips and wires – all having proven their reliability, quality and durability. VDM Metals is now taking the next step towards the future by developing powders jointly with its customers made from high-alloyed materials, such as nickel-based materials, cobalt alloys and ferro-alloys for the Additive Manufacturing.

Plant setup

The powder is produced in a standardized production process. A vacuum inert gas atomization plant (VIGA) forms the core of the powder manufacturing facilities. This plant is made up of a vacuum induction melting furnace (VIM) and the atomization unit, which comprises an atomization zone and powder tower as well as a cyclone connected to this with



the powder collecting tank. In the plant the high-purity powder is produced by means of vacuum induction melting and inert gas atomization. The individual steps of the powder production are precisely coordinated to each other, as they affect the composition and purity of the powder. The entire process occurs in vacuum and inert gas conditions, so as to ensure as high a purity as possible.

Process steps

The production process follows the scheme outlined below: In the VIM furnace, the various alloy components for the material are melted and liquefied. This molten mass is then routed into a sprue. The sprue leads to a gas nozzle, which atomizes the metal by high pressure with inert gas. The rapid cooling means the resultant particles solidify in spherical

form. The finest metal particles are formed by means of this complete process. In the cyclone, the gas phase is separated from the metal powder, which is then prepared in line with customer specifications. The entire process occurs in an inert gas atmosphere. The powder is then packed into containers.

The advantage of this plant is the high purity of the powder obtained. Its composition, such as grain size and microstructure, can also be set very precisely.

Powder materials

Our product portfolio comprises cobalt alloys, corrosion-resistant nickel alloys, superalloys and specialty stainless steels.

Product portfolio

VDM Metals designation	UNS	DIN EN	Kind of material	Specification	Application
VDM® Powder 718	N07718	2.4668	Superalloy		Aerospace, Turbines, Oil and Gas Industry
VDM® Powder 718 CTP	N07718	2.4668	Superalloy		Oil and Gas Industry
VDM® Powder X	N06002	2.4665	Superalloy		Turbines, Industrial Furnace Construction
VDM® Powder 780	–	2.4960	Superalloy		Aerospace Industry
VDM® Powder 738 LC	–	2.4654	Superalloy		Aerospace & Turbines
VDM® Powder CM 247 LC	–	2.4740	Superalloy		Aerospace & Turbines
VDM® Powder 625	N06625	2.4856	Corrosion resistant alloy		Chemical Process Industry
VDM® Powder C-276	N10276	2.4819	Corrosion resistant alloy		Chemical Process Industry
VDM® Powder 59	N06059	2.4605	Corrosion resistant alloy		Chemical Process Industry and consumer goods
VDM® Powder 2120	N06058	2.4700	Corrosion resistant alloy		Chemical Process Industry, Energy and Environmental Engineering
VDM® Powder 31 Plus	N08034	2.4692	Corrosion resistant alloy		Chemical Process Industry, Energy and Environmental Engineering
VDM® Powder 926 L	N08926	1.4529	Special stainless steel	ASTM A240	Chemical Process Industry consumer goods
VDM® Powder CoCr F75	R31538	2.4978	Cobalt-chrome alloy	ASTM F75	Dental and medical Industry
VDM® Powder CoCr 6	R30006	–	Cobalt-chrome alloy		Chemical Process Industry
VDM® Powder 602 CA	N06025	2.4633	High-temperature alloy		Chemical Process Industry, Automotive & Power plant
VDM® Powder 699 XA	N06699	2.4842	High-temperature alloy		Chemical Process Industry

Standard particle fraction

Particle size distribution µm	Oxygen content %	Pore area (porosity) in % for pores with a diameter >5µm
15 - 53	0.02	< 0.5
53 - 150		

According to the AM process requirements of our customers, our atomized powder is available in a wide range of particle fractions from 10 to 250 µm. Additional particle fractions are available on request.

If you require materials in powder form that are not listed in our portfolio, please feel free to get in touch with us. VDM Metals optimizes conventional materials for Additive Manufacturing and develops new alloys jointly with customers.

Thanks to our powder preparation, we can produce a wide variety of particle sizes and particle size distributions beyond the standard for our customers.

Talk it over with us:

powder.vdm@vdm-metals.com

Packaging

Type of packaging	Packaging unit
Plastic bottle	1 l
	5 l
Metal bucket	5 kg
Steel drum	100 kg
	200 kg

Our target industries

The application of Additive Manufacturing and 3D printing methods is increasingly becoming a standard across the production chains in most sectors of the industry.

As a producer of high-alloyed and wrought materials, VDM Metals is partner of very demanding industries; so as a matter of course we are focusing on the development and production of powder alloys for different sectors.

Target industries are:

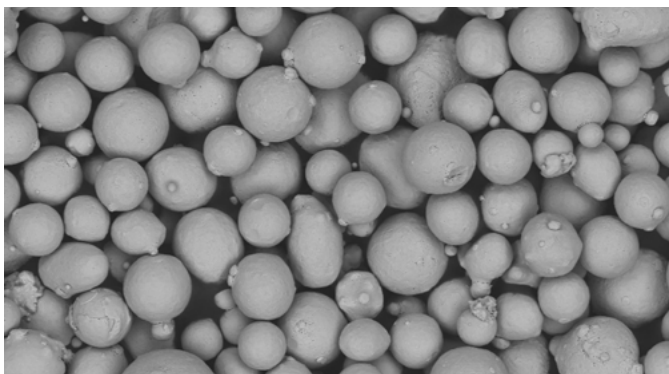
- Aerospace / Turbines
- Land Based Gas Turbines
- Oil and Gas Industry
- Chemical Process Industry
- Automotive Industry
- Medical Device Industry

Processing methods:

- Laser based additive manufacturing
- Electron beam based additive manufacturing
- Coatings
- Direct energy deposition
- Overlay welding
- Cold and hot isostatic pressing (CIP / HIP)



Example: VDM® Powder 738 LC



20 µm
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EHT = 10.00 kV
WD = 8.5 mm

Signal A = NTS BSD
Mag = 1.00 K X

Strength and Powder characteristics:

- Strong R&D
- Know-How in Alloy optimization for AM
- Spherical particles with low level of satellites
- High purity and reproducibility level
- Low oxygen content
- Small amount of porosity
- Good flowability
- High apparent and tap density

Comprehensive customer support

Customer relationships with VDM Metals mean access to a variety of first class services – services that really make the difference.

Research and Development (R&D)

New and more efficient processes and technologies often entail modified material requirements. Together with its customers, VDM Metals develops materials that correspond to these requirements. In doing so, we not only develop new materials but also retrieve new potentials for market approved alloys, which we qualify for new applications or convert into new product forms such as powder for instance. Our materials experts in the area of Research and Development accompany these projects from introduction through to series production. We support our customers in the optimization and refinement of existing high-alloyed materials or in the new development of powder for the area of Additive Manufacturing.

Technical Customer Support

From selecting suitable material for a definite application through to clarifying detailed questions regarding specifications, material properties and further processing – our technical customer advisors, all experts with a metallurgical background and experience in further processing, will be pleased to help.

Quality Assurance

Quality is a top priority at VDM Metals. Extensive product tests and examinations are carried out in our on-site laboratories. This includes our metallography, our spectral laboratory, our chemical laboratory, our corrosion laboratory or our mechanical laboratory. We adapted our quality assurance to the special needs of powder and its further processing. This comprises amongst others spectral analysis of melt samples, moisture and porosity analysis of powder, particle size analysis or measurement of flowability, apparent and tap density. In addition to the approvals for individual plants, all quality management systems of the different VDM Metals locations are certified according to ISO 9001 and AS 9100.

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