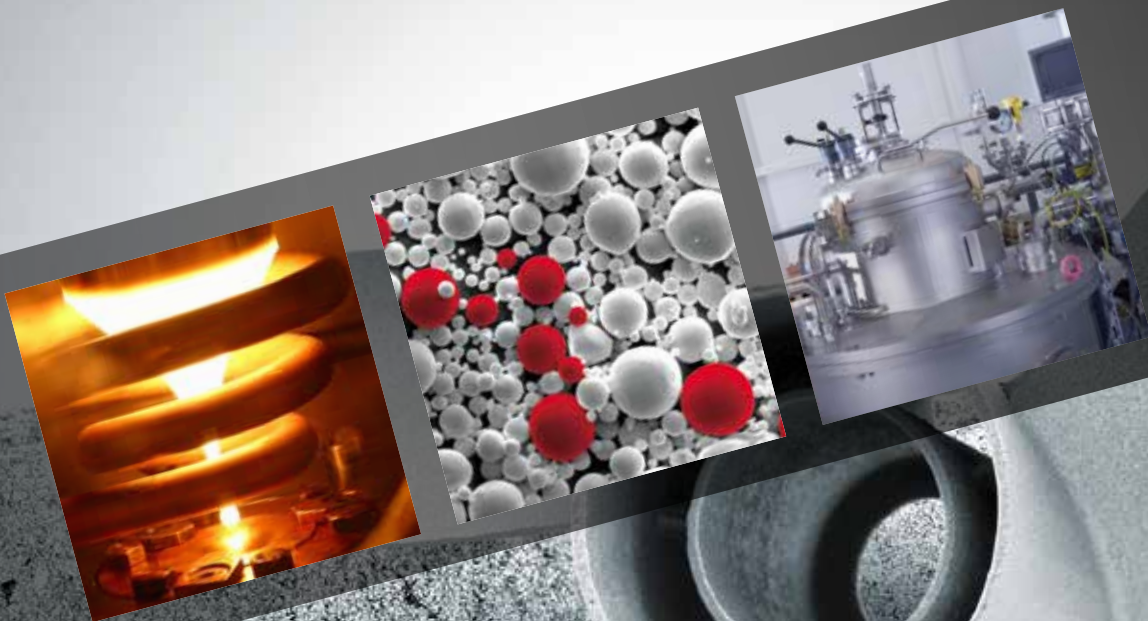


ALD Vacuum Technologies

High Tech is our Business

METAL ADDITIVE MANUFACTURING

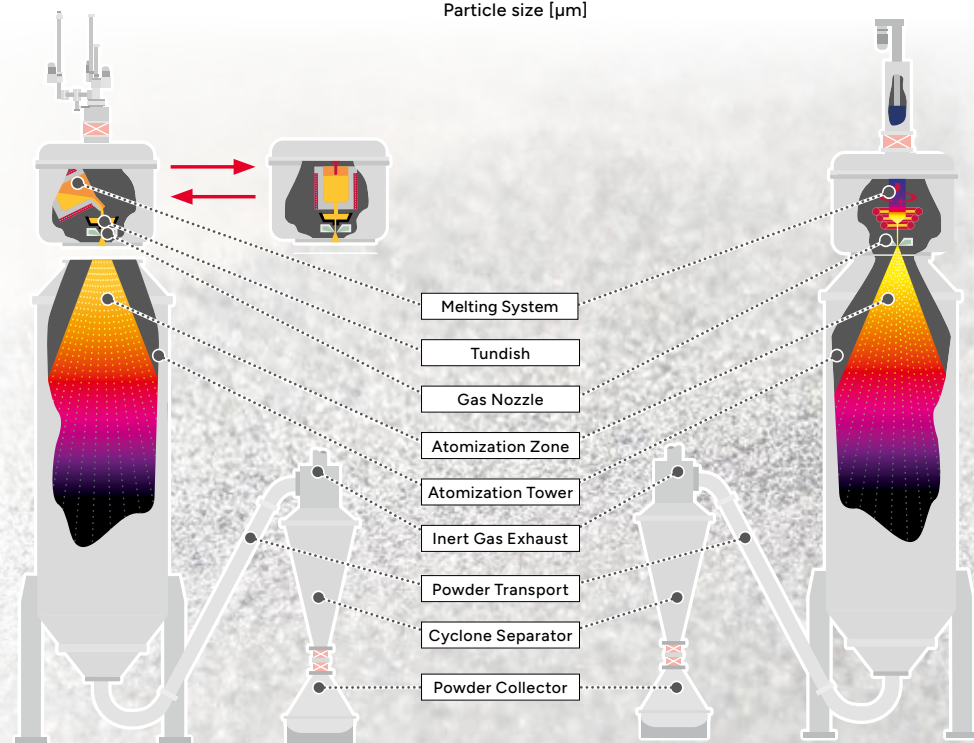
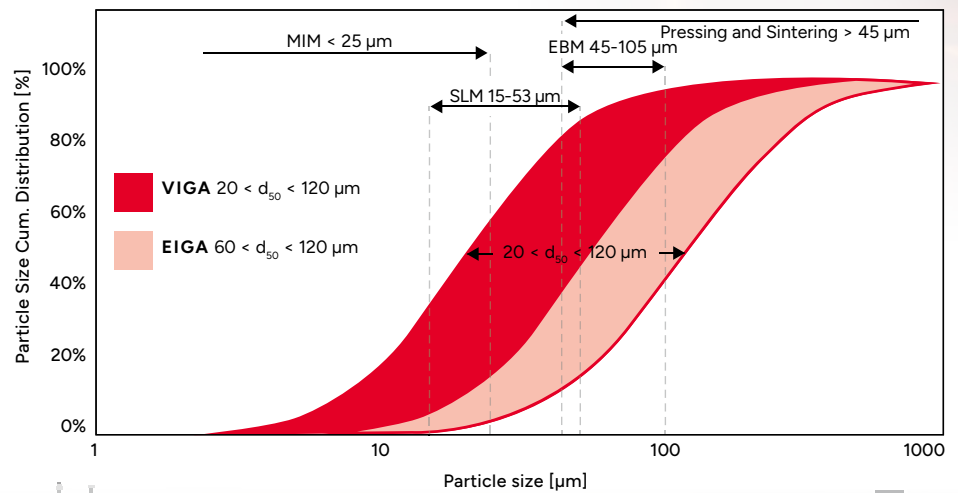
EIGA & VIGA: METAL POWDER INERT GAS ATOMIZATION EQUIPMENT





Every ALD atomizer is tailored to meet your requirements and applications

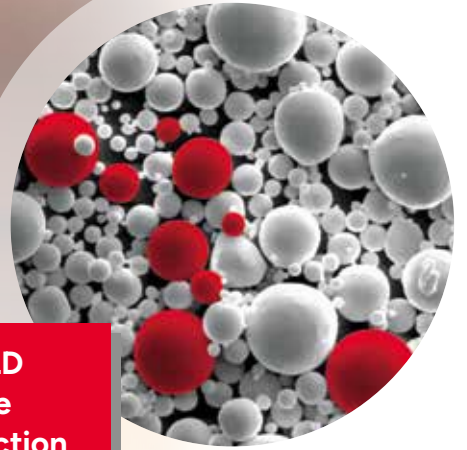
- ▶ ALD equipment produces metal powder for bright specter of processes & applications
- ▶ System choice depends on feedstock and metallurgical requirements to final product
- ▶ High-purity and excellent morphology powder meets requirements for various powder processing technologies



Combination of Melting Technologies and Inert Gas Atomization



**EIGA patented by ALD
in 1991: Ceramic-Free
Metal Powder Production**



Excellent References from Leading Powder Producers

EIGA - Electrode Induction-Melting Inert Gas Atomization

- ▶ Leading process for production of powder feedstock for Metal Additive Manufacturing of refractory, reactive alloys and precious metals
- ▶ Superclean powder due to induction ceramic-free melting
- ▶ Spherical powder morphology with high tap density due to inert gas atomization
- ▶ Melting and atomization without refractory consumable crucible
- ▶ Robust, repeatable process



Quality Key Features

- ▶ Engage of supersonic effects provides the finest powder
- ▶ Heating of atomizing gas up to 500°C makes it even finer
- ▶ Gas Recirculation improves powder sphericity suppressing satellites formation, even for finest powders at the same gas consumption
- ▶ Repeatable product quality and particle size distribution



The Most Effective and Flexible Tool

VIGA - Vacuum Induction-Melting Inert Gas Atomization

- ▶ The best solution for atomization of steels, superalloys, CoCr, Cu etc. from vast variety of feedstocks
- ▶ Most of AM-applicable steel & superalloy powder is atomized on VIGAs by ALD
- ▶ VIGA concept enables in-situ back-charging, alloying, probing, temperature control
- ▶ VIGA productivity from lab size up to 20,000 mt annually with perfect reproducibility independent on size



World Class Equipment Solutions for High Quality Metal Powder Production & Additive Manufacturing

- ▶ Many years of experience in design and manufacturing of vacuum inert gas atomizers in the superalloys, thermal spray, titanium, precious metals and electronics industries.
- ▶ Our company has successfully commissioned over 100 inert gas atomization systems and maintains a global sales and service network.
- ▶ Testing facilities for powder production are available in Germany.

Technical Data Atomizer Equipment	EIGA	VIGA
Equipment Overall Height	7 - 10 m	9 - 16 m
Equipment Footprint	5 x 5 m	8 x 8 m
Connected Power	80 - 300 kVA	80 - 1500 kVA
Ultimate Vacuum	5 Pa	5 Pa
Leak Rate	5 Pa l/s	5 Pa l/s
Technical Data Atomization Process		
Annual Powder Production Capacity	50 - 250 MT	50 - 2000 MT
Atomization Gas	Ar or N ₂	N ₂ or Ar
Atomization Gas Pressure	15 - 35 bar	20 - 60 bar
Atomization Gas Flowrate	8 - 18 m ³ /min (STP)	15 - 40 m ³ /min (STP)
Min. Batch Size	5 - 100 kg	5 - 2000 kg
Technical Data Metal Powder		
Typical Powder Alloys for Metal AM	CP-Ti, TiAl6V4, TiAl, C103 precious metals	CoCrMo(W), In625, In718, In738
Powder Morphology	spherical	spherical
d ₅₀ (PSD Mass Median)	60 - 100 µm	35 - 70 µm
Typical/ Available Size Classes for Metal AM	- 45 µm +10 - 45 µm +25 - 45 µm +45 - 63 µm +45 - 105 µm	- 45 µm +10 - 45 µm +25 - 45 µm +45 - 63 µm +45 - 105 µm



ALD – Leading Supplier for Advanced Vacuum Furnaces

Being one of the leading suppliers of vacuum plants and process technology we supply the entire vacuum metallurgy and vacuum heat treatment sector with our high-tech products and processes. ALD offers individual solutions for the best economic performance. We offer worldwide support and maintenance service for our high-quality plants during their entire lifecycle. Each newly delivered ALD plant meets the latest digital standards and is characterized by a particularly high level of environmental compatibility.

150+ YEARS EXPERIENCE – A Young Company with History



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