METAL ADDITIVE MANUFACTURING

EIGA and VIGA: Metal Powder Inert Gas Atomization Equipment
VIGA

Vacuum Induction-melting Inert Gas Atomization

- **Leading process** for production of powder feedstock for Metal Additive Manufacturing of superalloys and dental alloys such as In738, In718, In625, CoCr
- **Superclean powder** due to melting under vacuum/inert conditions
- **Spherical powder morphology** with high tap density due to inert gas atomization
- **Plant sizes from 20 t up to 2000 t p.a.**
- **Repeatable product quality and particle size distribution**

---

**Dental part CoCr alloy**

**Turbine blade Inconel 718**

*Courtesy of SLM Solutions*
EIGA

Electrode Induction-melting Inert Gas Atomization

- Leading process for production of powder feedstock for Metal Additive Manufacturing of refractory and reactive alloys such as CP-Ti, TiAl6V4, TiAl, Zr702 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

An alloy barstick is fed at constant speed vertically from the top into a conical induction coil.
A high-frequency electromagnetic field induces Eddy-currents in the barstick which starts to form a melt film at the conical surface.

The melt film flows to the cone tip and melt drops separate.
A constant melt flow evolves after start-up and flows vertically into the inert gas nozzle.

The process enables melting and inert gas atomizing of refractory and/or reactive alloys without a ceramic liner or cold wall.
**ALD**

**High value and high standards**

- Many years of experience in design and manufacturing of vacuum inert gas atomizers in the superalloys, thermal spray, titanium, precious metals and electronics industries
- Worldwide sales and service network
- Testing facilities for powder production available in Germany

### Technical Data

#### ATOMIZER EQUIPMENT

<table>
<thead>
<tr>
<th>Equipment</th>
<th>VIGA</th>
<th>EIGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Height</td>
<td>9 - 16 m</td>
<td>7 - 10 m</td>
</tr>
<tr>
<td>Footprint</td>
<td>8 x 8 m</td>
<td>5 x 5 m</td>
</tr>
<tr>
<td>Connected Power</td>
<td>80 - 1500 kVA</td>
<td>80 - 300 kVA</td>
</tr>
<tr>
<td>Ultimate Vacuum</td>
<td>5 Pa</td>
<td>5 Pa</td>
</tr>
<tr>
<td>Leak Rate</td>
<td>5 Pa l/s</td>
<td>5 Pa l/s</td>
</tr>
</tbody>
</table>

#### ATOMIZATION PROCESS

<table>
<thead>
<tr>
<th></th>
<th>VIGA</th>
<th>EIGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Powder Production Capacity</td>
<td>50 - 2000 MT</td>
<td>50 - 250 MT</td>
</tr>
<tr>
<td>Atomization Gas</td>
<td>N₂ or Ar</td>
<td>Ar or N₂</td>
</tr>
<tr>
<td>Atomization Gas Pressure</td>
<td>20 - 60 bar</td>
<td>15 - 35 bar</td>
</tr>
<tr>
<td>Atomization Gas Flowrate</td>
<td>15 - 40 m³/min (STP)</td>
<td>8 - 18 m³/min (STP)</td>
</tr>
<tr>
<td>Min. Batch Size</td>
<td>5 - 2000 kg</td>
<td>5 - 100 kg</td>
</tr>
</tbody>
</table>

#### METAL POWDER

<table>
<thead>
<tr>
<th>Typical Powder Alloys for Metal AM</th>
<th>VIGA</th>
<th>EIGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder Morphology</td>
<td>spherical</td>
<td>spherical</td>
</tr>
<tr>
<td>d₅₀ (PSD Mass Median)</td>
<td>35 - 70 μm</td>
<td>60 - 100 μm</td>
</tr>
<tr>
<td>Typical/ Available Size Classes for Metal AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 45 μm</td>
<td>+10 - 45 μm</td>
<td>- 45 μm</td>
</tr>
<tr>
<td>+10 - 45 μm</td>
<td>+25 - 45 μm</td>
<td>+10 - 45 μm</td>
</tr>
<tr>
<td>+25 - 45 μm</td>
<td>+45 - 63 μm</td>
<td>+25 - 45 μm</td>
</tr>
<tr>
<td>+45 - 63 μm</td>
<td>+45 - 105 μm</td>
<td>+45 - 63 μm</td>
</tr>
</tbody>
</table>

**ALD Vacuum Technologies GmbH**

Otto-von-Guericke Platz 1
63457 Hanau, Germany
Phone +49 (0) 6181 307-0
Fax +49 (0) 6181 307-3290
E-Mail info@ald-vt.de
Internet www.ald-vt.com

**USA/Canada**

ALD Vacuum Technologies Inc.
18 Thomson Road
East Windsor, CT 06088, USA
Phone +1 (860) 386 7227
E-Mail info@ald-usa.com

**Far East (Japan/Korea/Taiwan)**

ALD Thermo Technologies
Far East Co., Ltd.
Shinjuku Nomura Bldg. 6F
1-28-2 Nishi Shinjuku
Shinjuku-ku
Tokyo 163-0558, Japan
Phone +81 (3) 3340 3726
E-Mail peter.lang@ald-vt.de

**China**

ALD-C&K Vacuum Technologies (Suzhou) Co. Ltd.
333 Yegang Road
Wujiang Economic and Technological Development Zone
Suzhou, 215200, P. R. China
Phone +86 512 6385 8833
E-Mail info@ald-cnk.com

**Russia**

ALD Vacuum Technologies GmbH
Daev per., 20
Moskau, Russia
Phone +7 (495) 787 6733
E-Mail ald@metallurgy.com.ru