



LPW Technology

Intelligence in powders

Tecnologie additive,
un'opportunità da
cogliere.

20 marzo 2019 - Perugia

Metal Alloy Powders
&
Metal Powder Production
Andrea Medina

To understand AM from the perspective of the powder

- 90% of sales outside the UK
- LPW powders advancing AM in over 74 countries
- PowderRange off-the-shelf rapid delivery solutions
 - Over 50 AM metal powders available for dispatch in 24 hours
- PowderLife production solutions
 - Custom powders, pioneering software, hardware and process solutions for AM production
- Quality certification AS9100, AS9120 for aerospace, ISO9001 & ISO 13485 for medical
- Servicing safety-critical sectors such as Aerospace, Defence, Medical, Automotive, Energy, Tooling



📍 LPW Technology

📍 LPW reseller

📍 LPW Joint-Ventures

October 2018 LPW joined Carpenter Technology Corporation

Enhanced industry reach with Carpenter

- Transitioned from a specialty steel to an applications focused company supported by 129+ years of metallurgical expertise
- A high-performance materials and advanced process solutions provider for critical end-use applications
- Metal technology capabilities for a wide range of next-generation products and manufacturing techniques
- Evolving to next generation end-to-end additive manufacturing solutions provider



Aluminium

- AlSi7Mg
- AlSi10Mg
- Scalmalloy®

Cobalt

- Co6
- CoCr

Steels

- Stainless Steel 15-5PH
- Stainless Steel 17-4PH
- Stainless Steel 304L
- Stainless Steel 316L
- Tool Steel H13
- Maraging M300

Nickel superalloys

- LPW 718
- LPW 247LC
- LPW 625 NiCr
- LPW Hast-X

Titanium

- CP Ti Grades 1 & 2
- Ti-6Al-4V Grades 5 & 23

Tungsten Carbide

- LPW WC CoCr
- LPW WC

Copper

- LPW Cu

Refractory metals

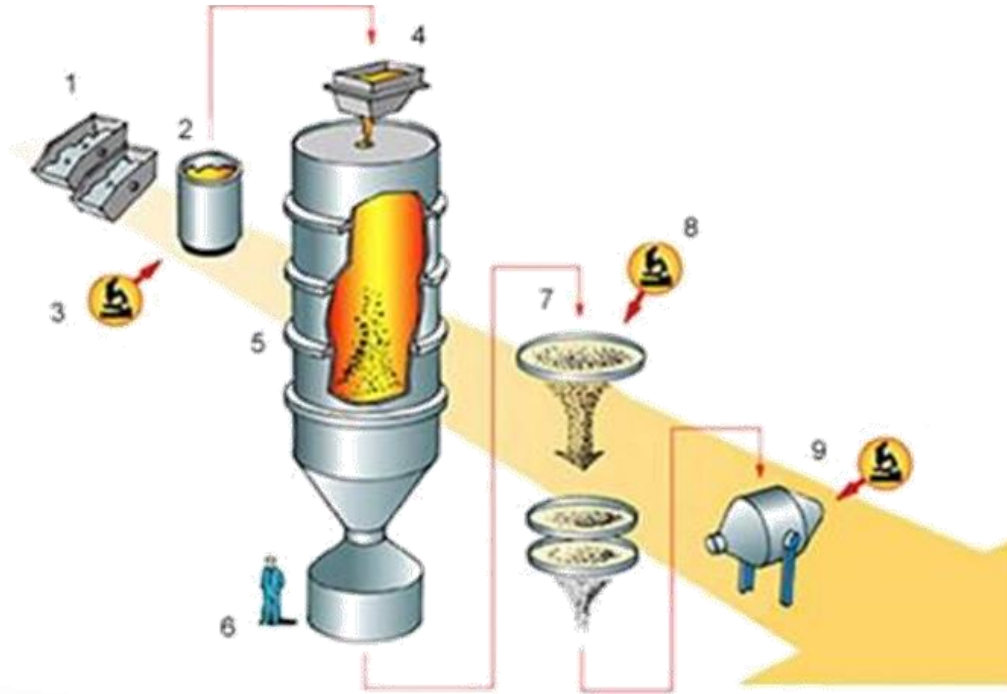
- LPW Ta
- LPW W



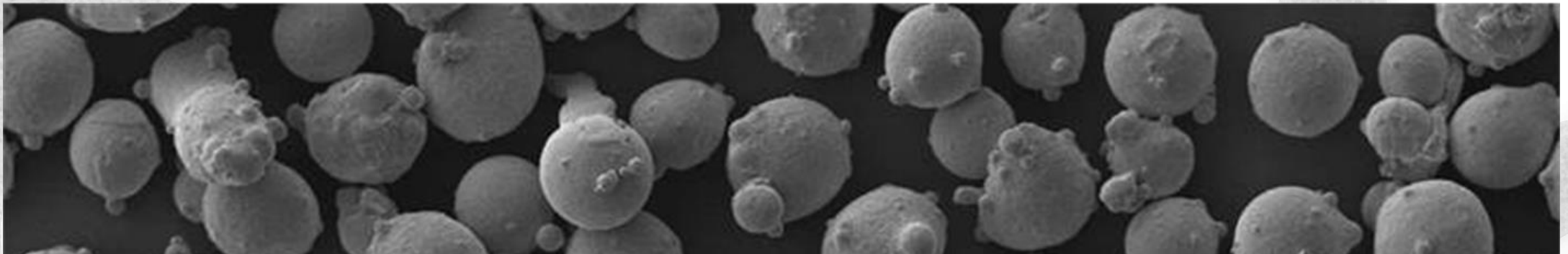
Tecnologie additive, un'opportunità da cogliere

- 1 Metal Powder Production – Introduction**
- 2 Metal Powder Production – Gas Atomization
- 3 Metal Powder Production – Plasma Atomization
- 4 Additive Materials

Powder Production Schematic



1. Starting raw material input.
2. Melting in induction furnaces, either open, gas-shielded, or under vacuum.
3. Chemical composition check
4. Transfer to atomisation tundish.
5. A fine jet of molten metal is atomized into small droplets by high-pressure gas.
6. The solidified particles are collected under the inert atomization gas.
7. The powder is screened and/or classified.
8. Chemical analysis.
9. Blending (and analysis).

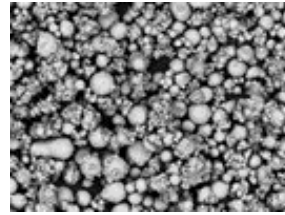


ALL POWDERS ARE NOT THE SAME

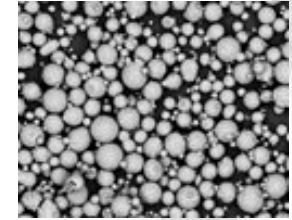
TYPES OF PRODUCTION METHODS:

A. GAS ATOMIZATION

Gas Atomization
Vacuum or Air Melt

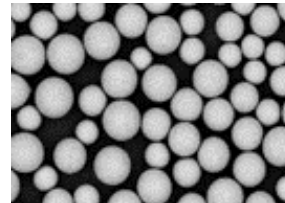


Electrode Induction
Melting Gas
Atomization (EIGA)

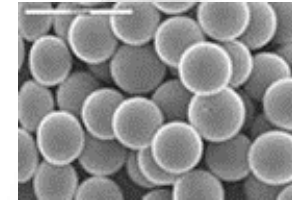


B. PLASMA ATOMIZATION

Plasma Atomization



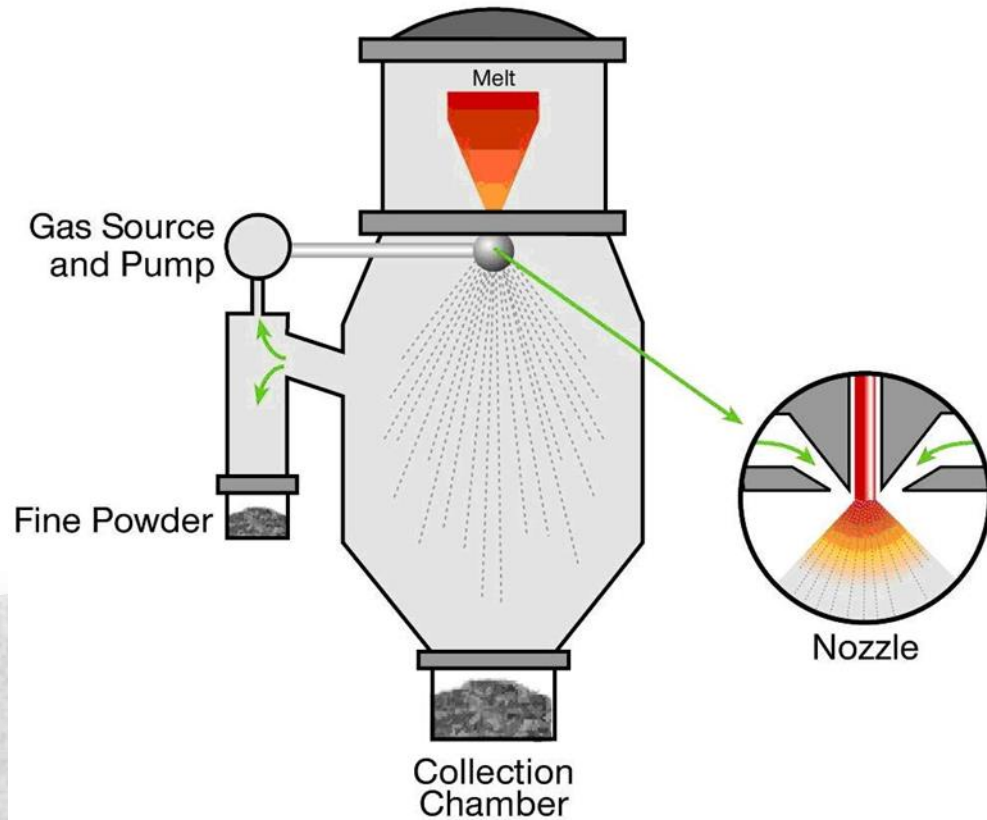
Plasma Rotating
Electrode Process
(PREP)



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Gas Atomization



Most common atomization process

Atmospheric or vacuum melting

Ar or N gas used for atomization

Yield within 20-125 Microns (+600/-120 Mesh) = Approx 50%

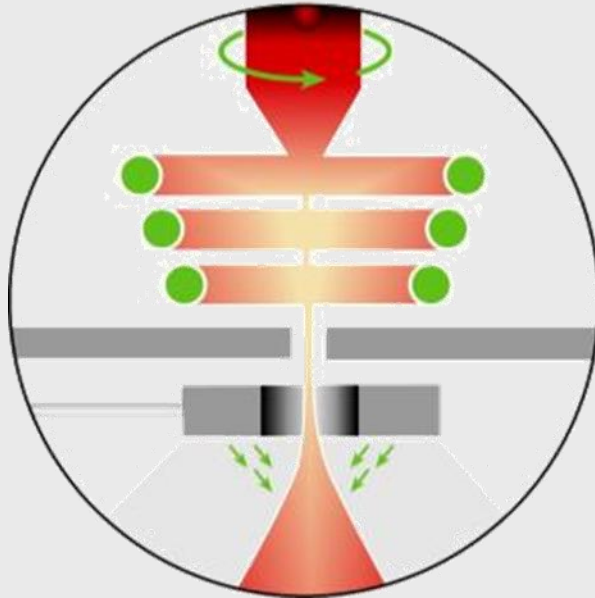
Feedstock = Scrap, revert, virgin materials

Satellites

Internal porosity

Not economical for small production runs

ELECTRODE INDUCTION MELTING GAS ATOMISATION (EIGA)



No Crucible

Ar or N Gas used for Atomization

20 -125 micron, (+600 / -120 mesh) PSD,

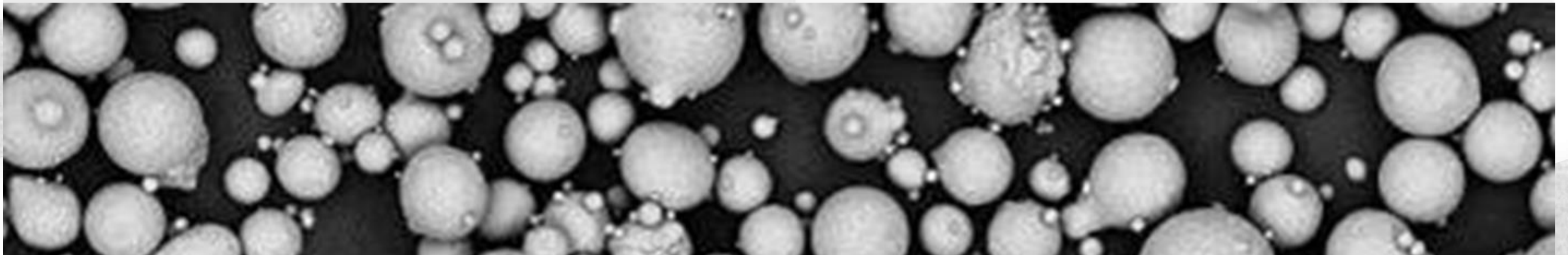
Approximately 50-60% yield

Suitable for small runs of reactive materials,

Potential for continuous atomization, (vs. batch)

Satellites

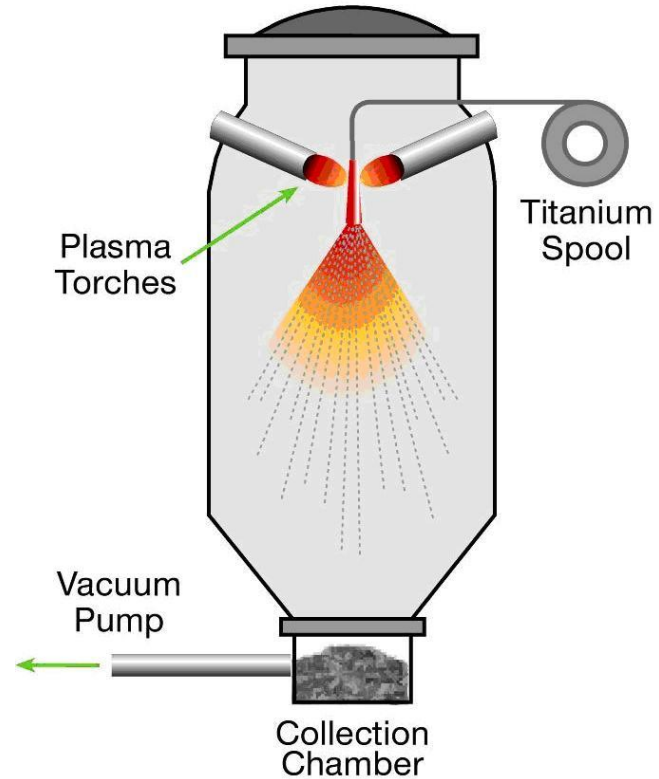
Internal Porosity



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Plasma Atomization



Spherical Powder

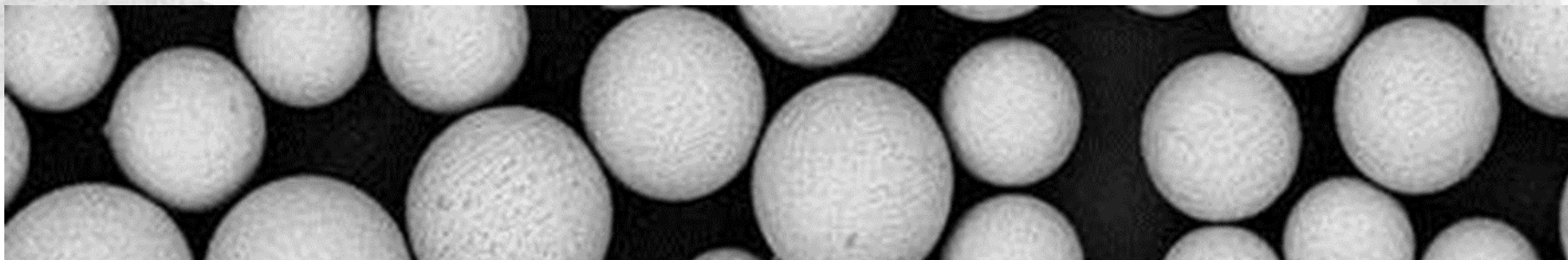
Low Porosity

Size yield is adjustable within 20 – 125 microns,
(+600/-120Mesh)

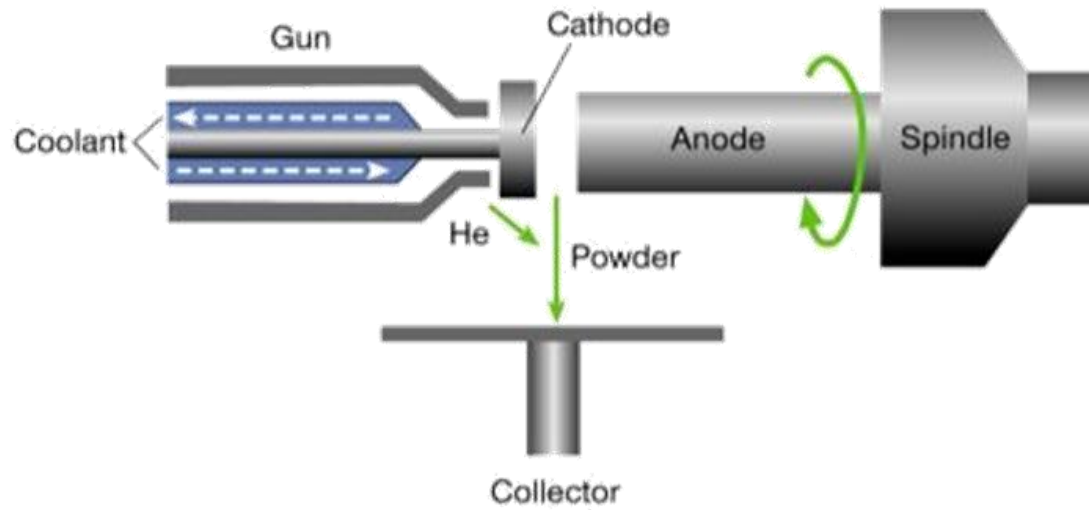
Suitable for repeat production of reactive metals

Wire feedstock required

Low production rate



Plasma Atomization - PREP



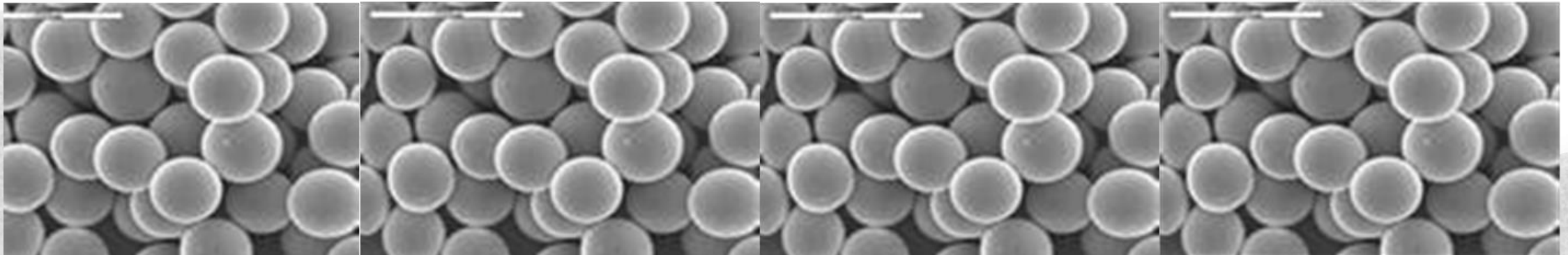
Low porosity powder

Spherical powder

'Niche' low volume process

Feedstock is very expensive

Yield less than 149 microns (-100 Mesh) = Approx. 15%



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Additive Materials

Current

- Co Alloys: CoCrMo
- Fe alloys: 316L, 15-5PH, 17-4PH; Maragingsteel 18Ni300, Corrax
- Ni alloys: IN718, IN625, 263, Hastelloy X, H188, CM247LC
- Al alloys: AlSi10, AlSi7, Scalmalloy
- Ti Alloys: CpTi , Ti 6-4

Near Future

- Al Alloys: A205
- Nickel: Haynes 282
- Cu: Cu, CuNi
- WC

Materials Selection Compared (metals)

Traditional Data Sources

- ASTM Metals Handbooks
- SAE Handbooks
- Structural Alloys Handbook
- Grey and Ductile Iron Handbook
- Steel Castings Handbook
- Woldman's Engineering Alloys
- Mil Standards
- Aerospace Materials Standards

Additive Data Sources

- SenvolDatabase –400 alloys
- Manufacturer data sheets –100?

COMING SOON:
ASTM standards
SAE AMS standards

Limited data available



With AM metal powder manufacture in the UK, processing facilities in the UK and USA, and sales offices around the world, we add support to your metal Additive Manufacturing processes wherever you are.

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