

Consarc Confidential

Industrialisation Challenges for AM Materials  
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**Atomising Systems Limited: Specialists in Water and Gas Atomised Powder Production & Equipment**

**Consarc: World Leaders In Controlled Atmosphere Melting Equipment**



**Quality - What are the best shape, PSD (Particle Size Distribution) and purity for AM powders and how can these be reliably tested to ensure top-quality parts?**

**Price – can we increase yields from atomisers, improve their productivity and, especially for Ti, reduce costs?**

**Challenges – Quality & Price**

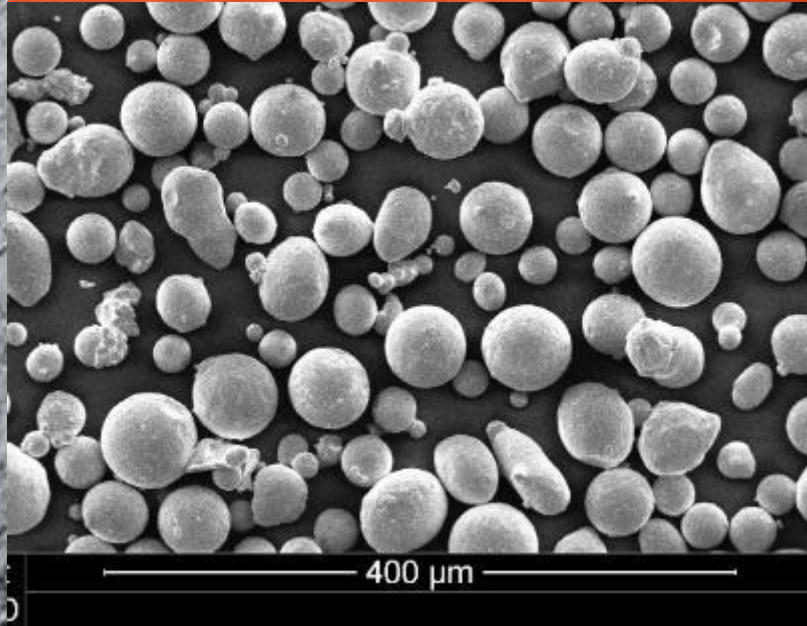
- These techniques use very fine powder, similar to MIM grade, typically  $<20\text{-}30\mu\text{m}$ .
- Post-deposition in both cases is by debinding and sintering, rather like MIM.
- These newer techniques promise much faster build times – e.g. HP just launched its HP metal jet system claiming build rates 50x faster than laser systems.
- Powder specifications will demand very consistent bulk density to control shrinkage on sintering. Good flow also vital – spherical particles needed.

## Binder-Jet and Metallic Filament

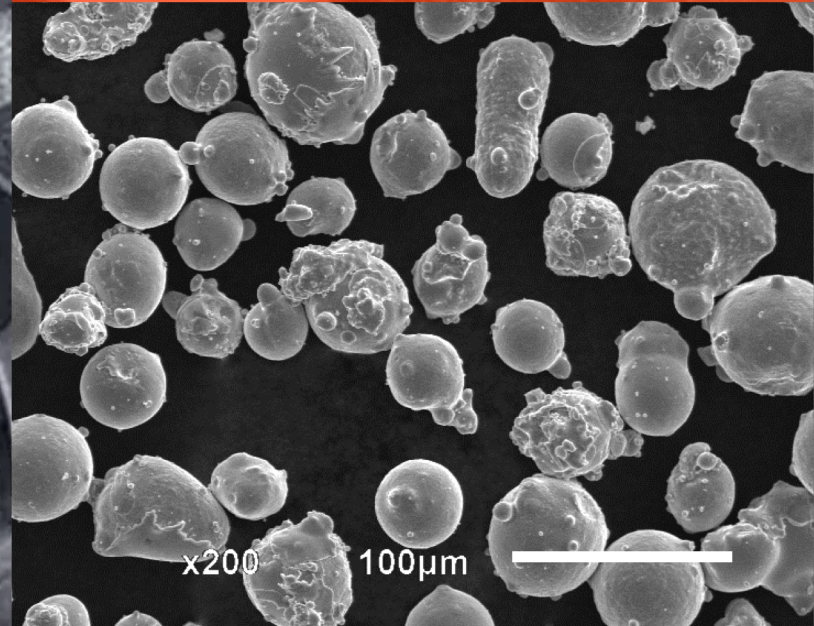


# Spherical Particle Shape Preferred

## Anti-satellite system



## Conventional VIGA product



Satellites are a problem – but how to measure?

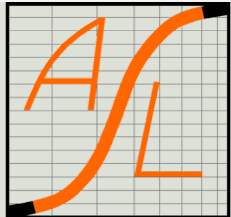
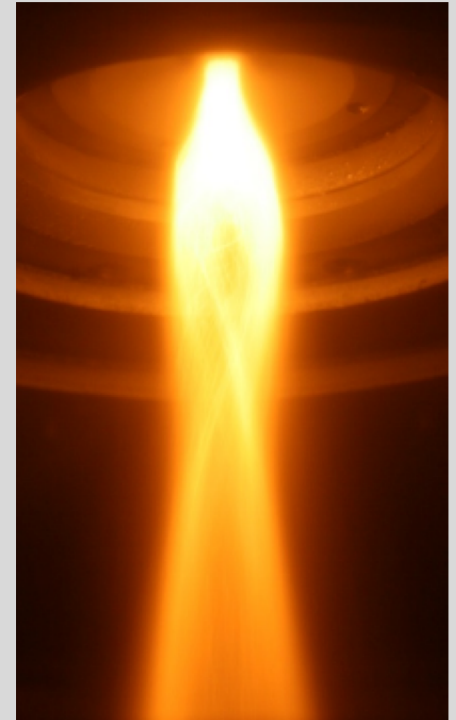
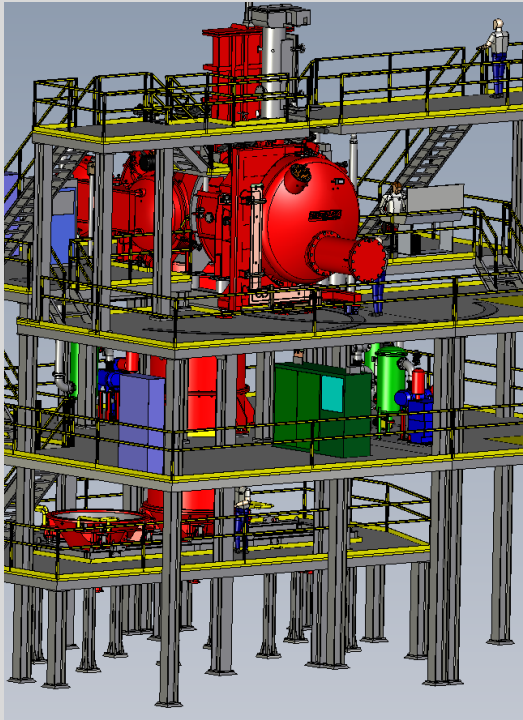
- Powder prices are much higher for AM than other markets.
  - Volumes are small – “penny packet” premiums
  - Yields are low – narrow size distributions
  - QC is expensive
- Air melting is cheaper, but oxygen content higher. ASL offer a range of (low satellite) steel powders.
- Vacuum melting is much more costly to build and lower in productivity. ASL is working with Consarc to supply improved VIGA systems with anti-satellite feature.
- So superalloys and CoCr (F75) are expensive compared with stainless and other steels

## Economics



- **Titanium reacts with almost everything**
- **Extremely difficult and costly to melt**
- **Current EIGA and Plasma Atomisation processes very low productivity – 10s of kgs/hr (compared with simple gas atomiser, 200kg/hr or more)**
- **Plasma atomisation uses costly wire feedstock**
- **EIGA uses very large volumes of argon**
- **There must be a better way**

## **Titanium Powders**



Thank You

