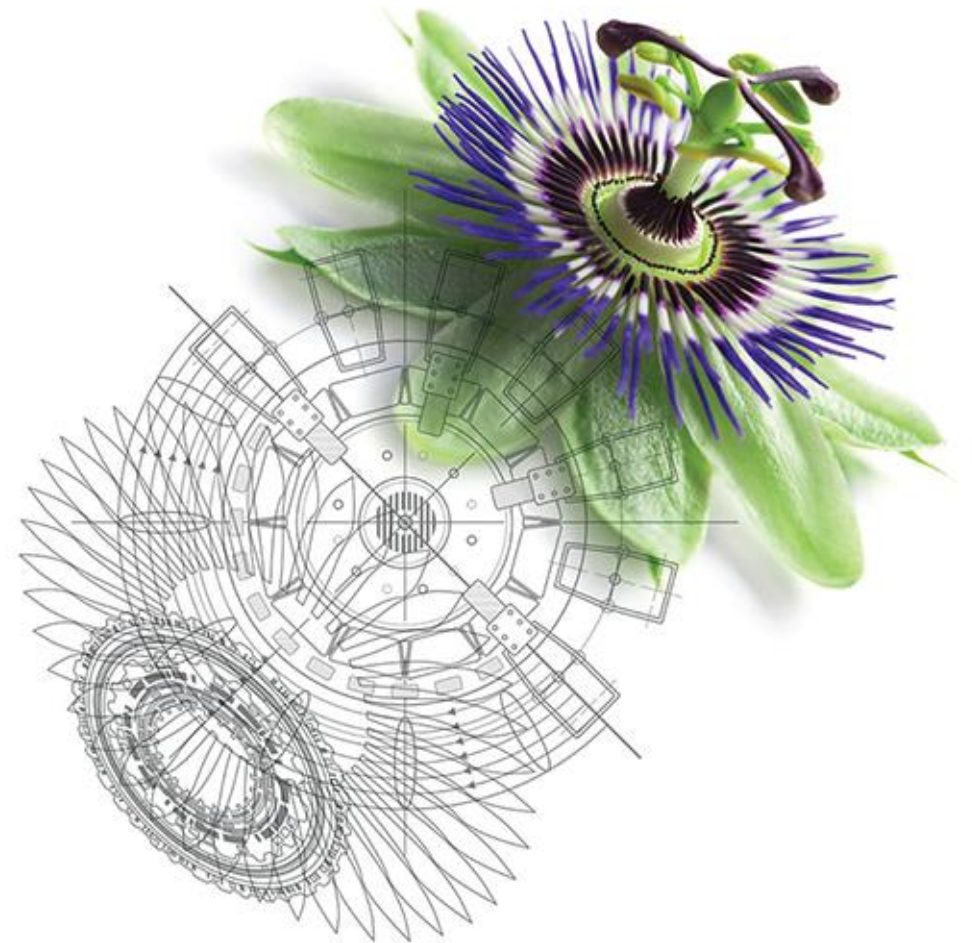# MoldJet Metal & Ceramic Additive Manufacturing
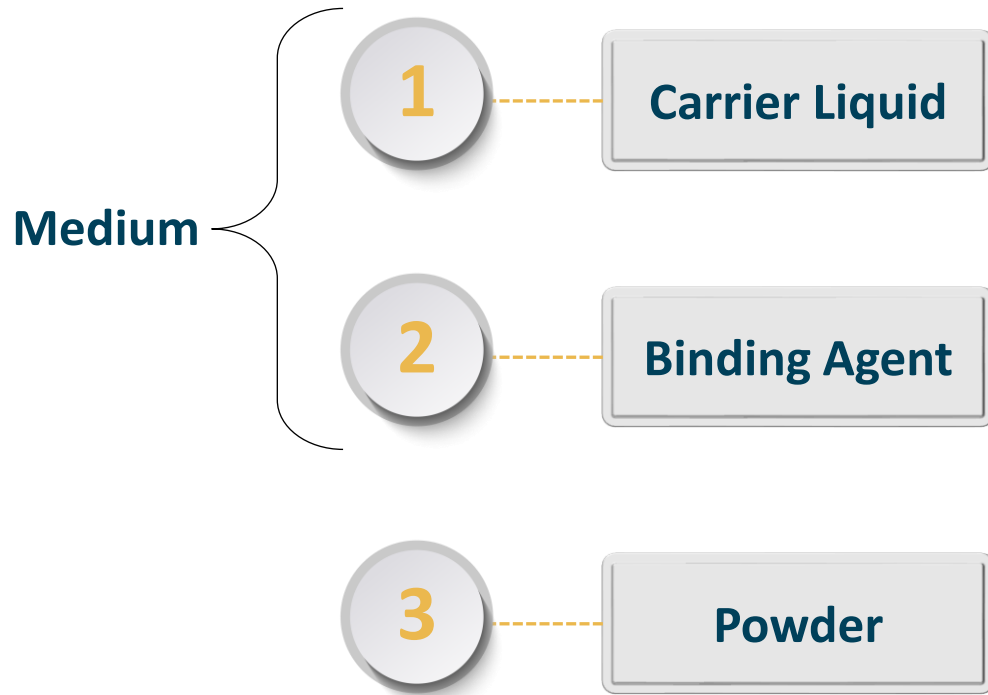
March 13, 2023

Amnon Sommer

Tritone Technologies

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'Paste' Feedstock

Medium

1 — **Carrier Liquid**

2 — **Binding Agent**

3 — **Powder**

Pure Copper Powder

Pure Copper Paste Feedstock

Medium

Carrier Liquid

- Acts as a vehicle / lubricant. Reduces interparticle friction
- Enables uniform mixture and high packing

Binding Agent

- Low content (%wt)
- Organic components that are completely thermolyzed.

- The medium protects and stabilizes sensitive powders e.g.: Titanium based, Copper, Low alloy steels

Powder

- Paste feedstock enables use of high tapped-density powders

- Wetting & drying process achieves high pack density

- A variety of sinter-able powders can be used.


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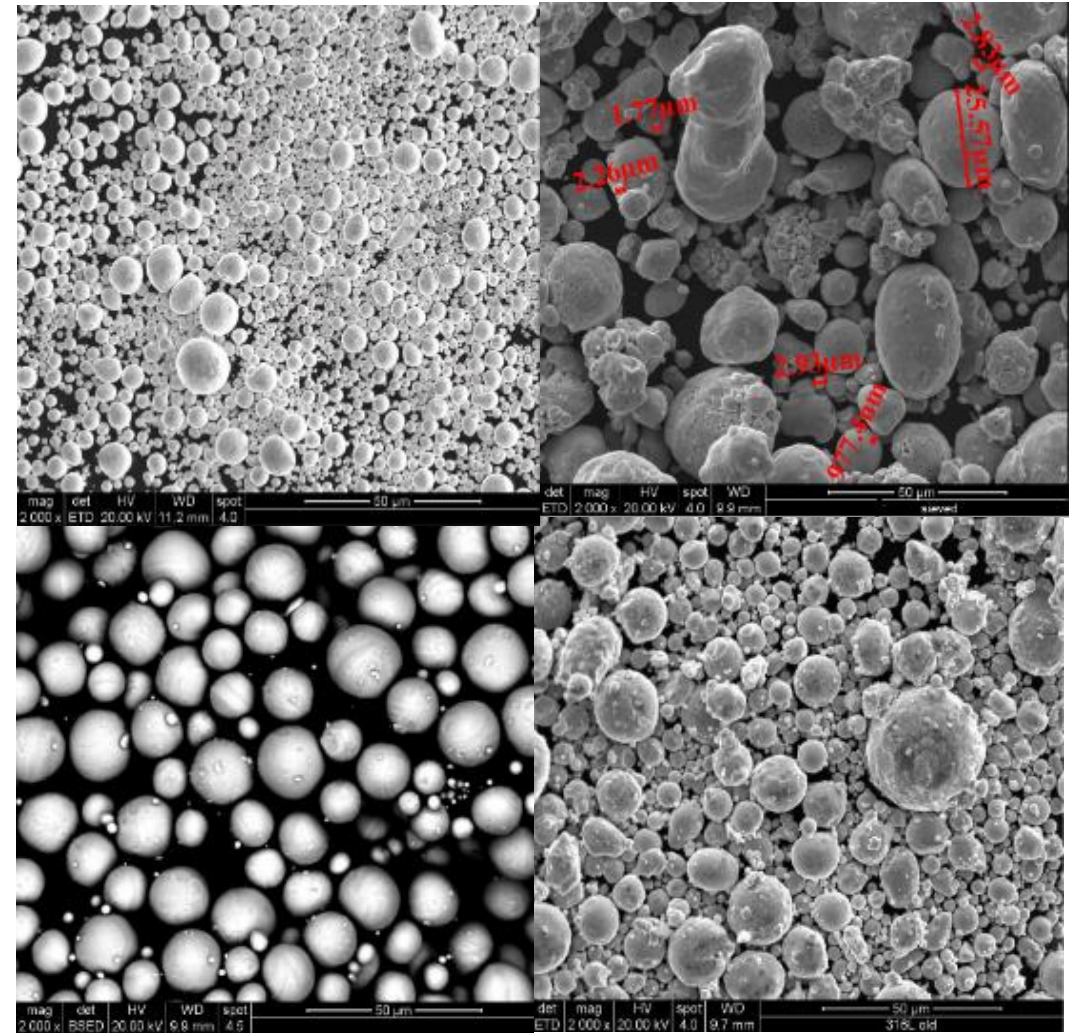
Advantages of 'Paste' Feedstock

- Green densities above > 60%:
  - Green strength
  - Surface smoothness
  - Reduced sintering shrinkage
    (lower potential to deform and crack)

- Uniformity of paste:
  - Uniform density within and between parts
  - Isotropic properties
  - Less thermal stress during sintering

- Powder-free operation

- Variety of powders (including sensitive ones)

* Courtesy of CETIM, the French Center
for Mechanical Industries

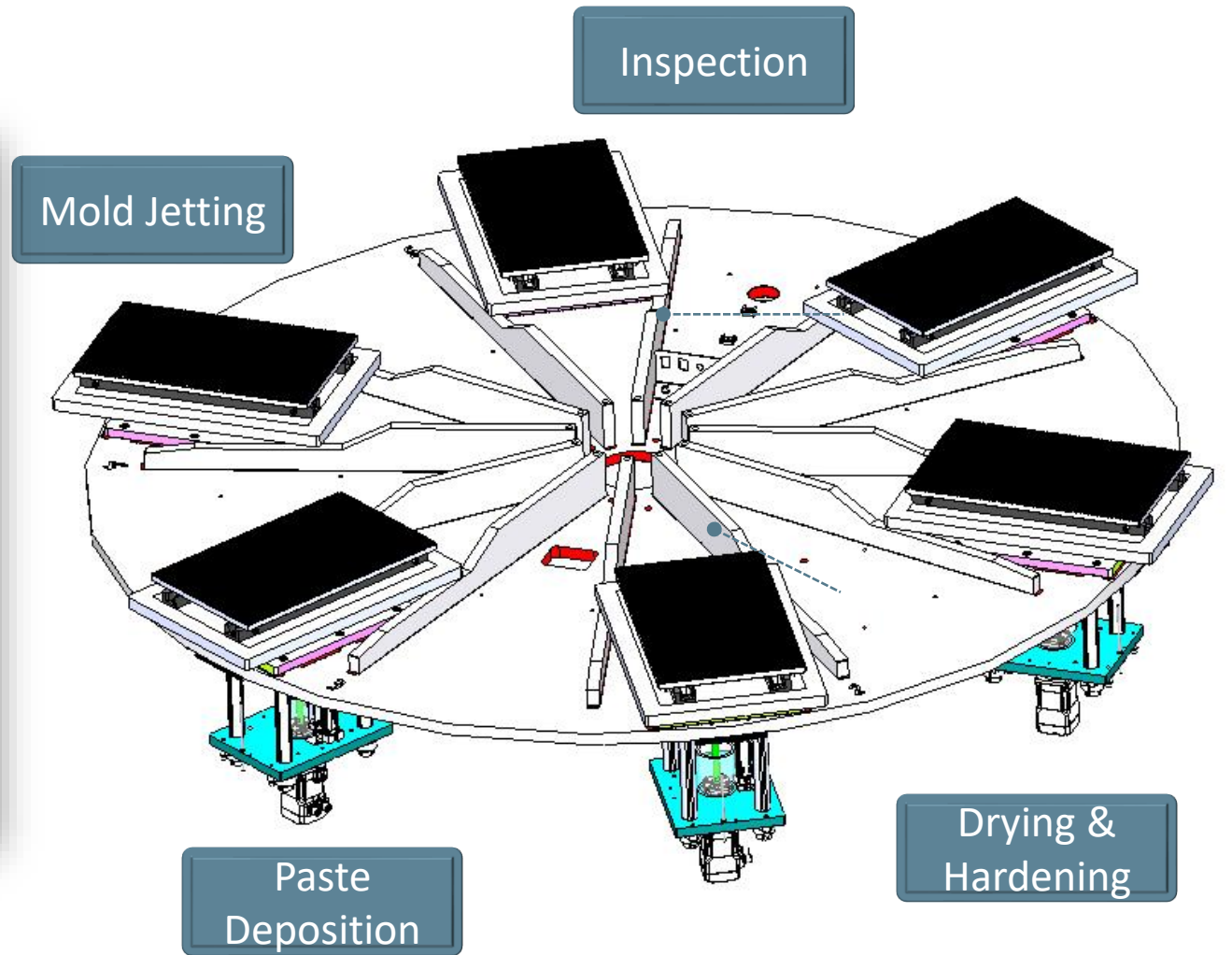Tritone

MoldJet Process

- Layer-wise process

- Mold is jetted to form geometry

- 'Paste' is deposited into mold

- 'Paste' dries & hardens as carrier liquids vaporize

- Green parts retrieved from mold by heating-up the tray

- Thermal debinding & sintering

'Paste'

Mold Material

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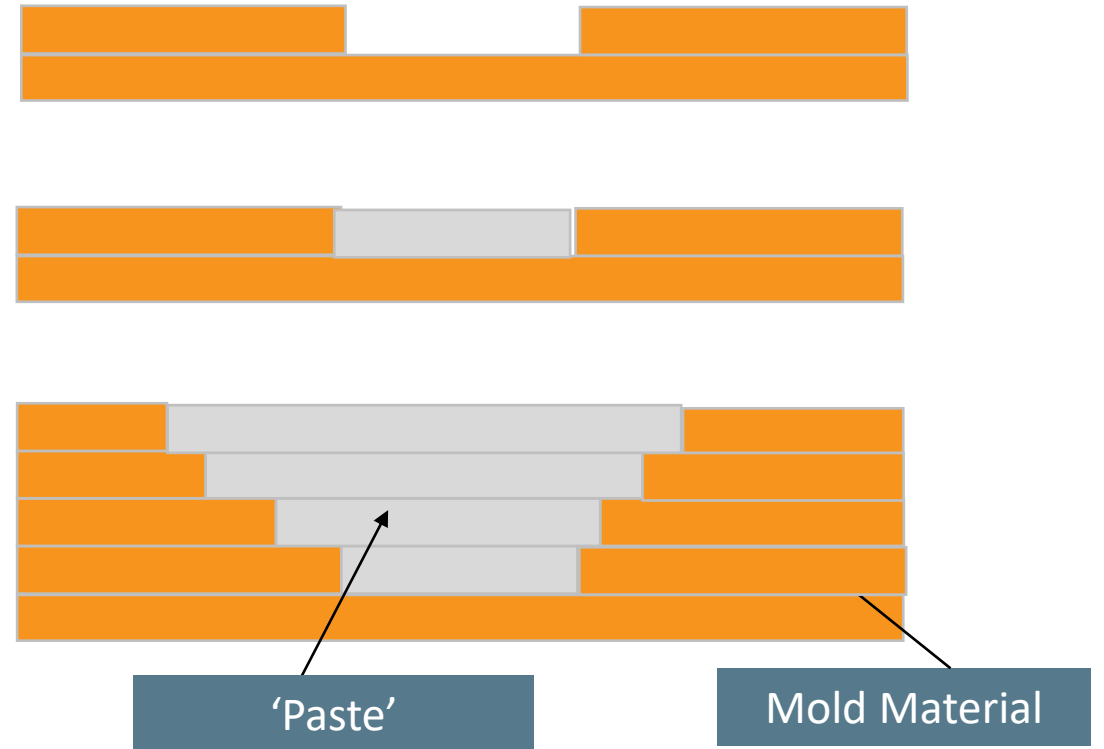
System Architecture
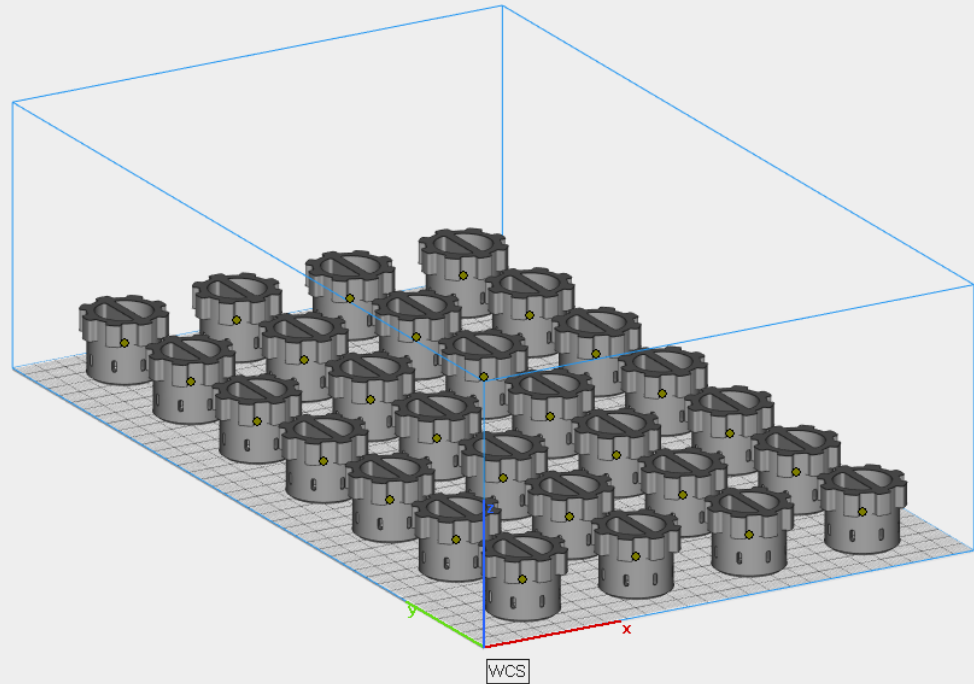
Build Size [mm]:
400 x 240 x 120

Inspection

Mold Jetting

Paste Deposition

Drying & Hardening

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Unique Process Characteristics

- High throughput industrial process
- Parallel production of multiple build trays
- Instant loading / removal of trays
- Mix jobs & parts
- Full support of parts in mold
- Dynamic Layer Thickness
- Material changeover – quick & simple
- Full image logging and quality control
- Remove defective layer

Tool Steel H13

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MoldJet Process Results

- Green strength
- Density & Shrinkage
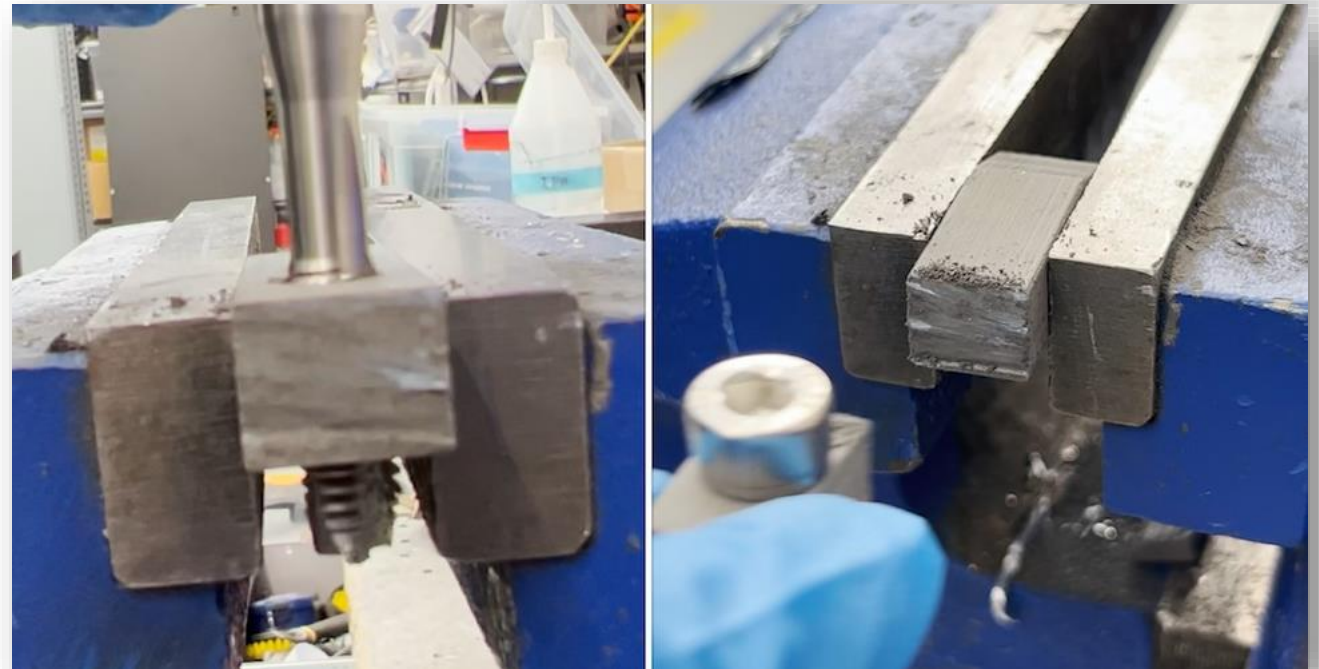
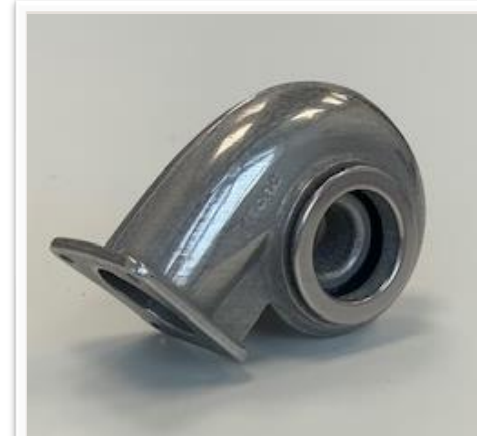# MoldJet Process Results

Sintered properties:

- No trace of a layer-wise process

- Mechanical properties exceed MIM standards

* Courtesy of **Fraunhofer** IFAM   Branch Lab Dresden

MoldJet Process Results

- Part size: up to 40 cm / 5 Kg
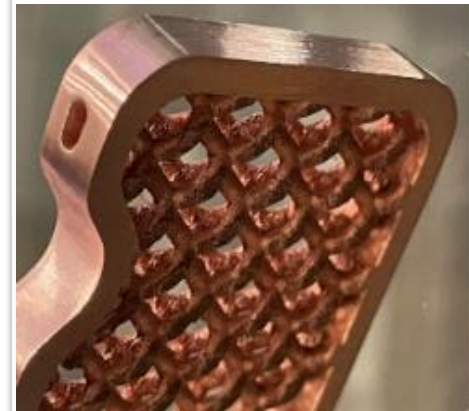- Wall thickness: 0.2 – 15 mm

Inconel 718

Stainless Steel 316L

Pure Copper

17-4PH

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Thank you