



3D METAL HUB

Additive Manufacturing Services
for the Luxury Industry

WE PRINT YOUR IDEAS

Legor 3D Metal Hub: the sustainable innovation centre dedicated to 3D printing for the luxury goods industry

From the forty-year experience of **Legor**, progress, innovation and sustainability meld to create the Legor 3D Metal Hub: an innovative centre aimed at experimenting and **producing precious and non-precious components** through revolutionary **3D Metal Binder Jet technology**.

3D printing represents an **alternative approach** to traditional investment casting, with the advantage that **it does not require the combustion** of waxes or resins, **nor the use of gypsum**, meaning a great step towards **increasingly sustainable production processes**.

Legor is the first company to experiment with utilising revolutionary 3D Metal Binder Jet technology to cater for needs of the jewellery and fashion accessories markets.

Choosing Legor means

First-rate customer service

The creation of your ideal piece

A wealth of expertise in the world of jewellery manufacturing using traditional technologies

Partnerships with producers in the different jewellery and fashion sectors (gold, silver, brass, bronze)

Possibility to produce small (min. 100 PCS) or large production runs

“Project success is synonymous with client collaboration”

A business opportunity always stems from the offering of a solution to meet a need. When this is a project, the expectation is that the product created will achieve the desired need. So it's important that the client defines the **elements that characterise the product** he wishes to make and that the supplier has the resources to

achieve this.

But what's even more important is that the project is an effective partnership between the client's technical team and the Legor Team, founded on the principles of **transparency, completeness of information and ongoing collaboration.**

Working relationships flourish provided collaboration.

both parties commit to continuous



WHY CHOOSE BINDER JET TECHNOLOGY?

Binder Jet technology represents **an alternative to SLM technologies** (Selective Laser Melting) **and MIM** (Metal Injection Moulding), and offers a range of benefits:

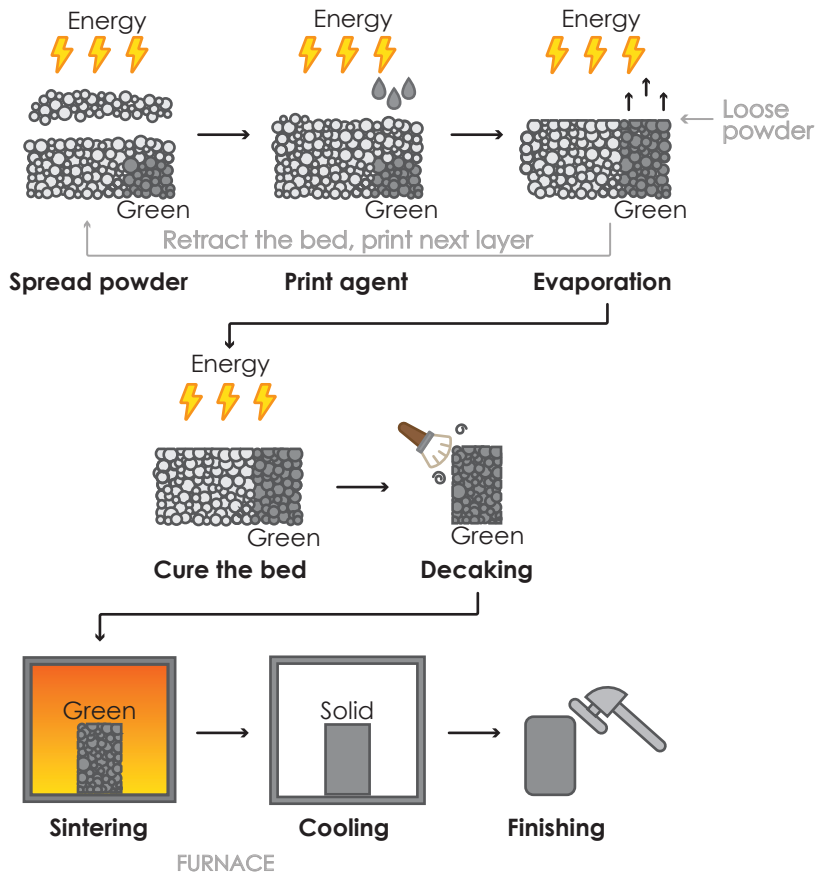
- No need for a mould
- First samples available in a just a few working days
- Simple modifications or variations to the piece using CAD
- Production of more than one piece during the same cycle, even with different designs
- Fast production times for medium runs (<10 days)
- No moulding supports necessary; any sintering supports are produced as required together with the pieces
- Dense objects even within their core
- Remaining powder can be reused at the end of the cycle
- Possibility to include personalised writing, embossing or engraving
- Production of hollow or interlocking pieces without the need for soldering
- Low process temperatures: no tension within objects
- Ability to print multiple overlapping layers to utilise the full volume available



Watch the video to discover Legor 3D Metal Hub

Main stages of printing with Binder Jet

Standard material currently used: AISI 316L stainless steel



- 1 The **ultra-fine metal powder** (between $5\mu\text{m}$ and $25\mu\text{m}$) is the starting point for using this technology;
- 2 Once the **CAD model** of the object to be produced is received, **dimensions are scaled** to allow for volume shrinkage that occurs during processing, and **any supports or templates** are created to limit deformations;
- 3 Special software slices the pieces to obtain overlapping 2D images of the 3D objects; Inside the build unit of the printer, **a roller spreads out a layer of powder** to a predetermined thickness. Next, the printing heads selectively apply a binder corresponding to the 2D images obtained previously;
- 4 **Step 3 is then repeated** until the height of the objects to be produced has been reached;
- 5 The build unit is then placed in a **Curing Station**, where curing takes place at around $150\text{ }^{\circ}\text{C}$: the binder is activated and still-fragile **“green” objects** are obtained, immersed in a bed of powder;
- 6 After a meticulous **Decaking** and **Depowdering** process, the “green” objects are placed in the sintering furnace;
- 7 A special three-phase heating process is performed in the furnace:
Debinding: the binder evaporates completely; the pieces are composed only of dust grains;
Sintering: The particles begin to coalesce and a metallurgical bond is formed. This is the phase where the most volume shrinkage occurs;
Cooling: the pieces undergo controlled cooling to avoid residual stresses and unwanted cracks.

Design guideline

With 3D Metal Binder Jet technology it's possible to obtain "***near net shape***", ***hollow*** and ***interlocking pieces***, and the process can be adapted for both small and large production runs.

Moreover, it's possible to use **different types of metal powders** by adapting the thermal cycle and using a

compatible binder. **Processing time** depends exclusively on the height to be printed, and it's possible to print multiple objects, even of different designs, at the same time, as well as print multiple layers of objects (maximum printable height 150 mm).

Ideal characteristics of the object to be printed

Base area contained within an overall space of 85.5mm x 54 mm

Wall thickness between 1mm and 15 mm

Length/thickness ratio: maximum 5

Closed axisymmetric geometries, with at least one flat support base

Undercuts and overhangs up to 3 mm

Always radius sharp edges if possible (0.5 mm radius)

Overhangs of greater dimensions and open or non-planar geometries can still be achieved through the creation of ad-hoc bases and supports



Essential conditions: to create a winning product, you need a winning partnership!

Ongoing collaboration with our client's technical team

Sharing of a step file (not an stl file)

Clear definition of processing and post processing requirements to be carried out

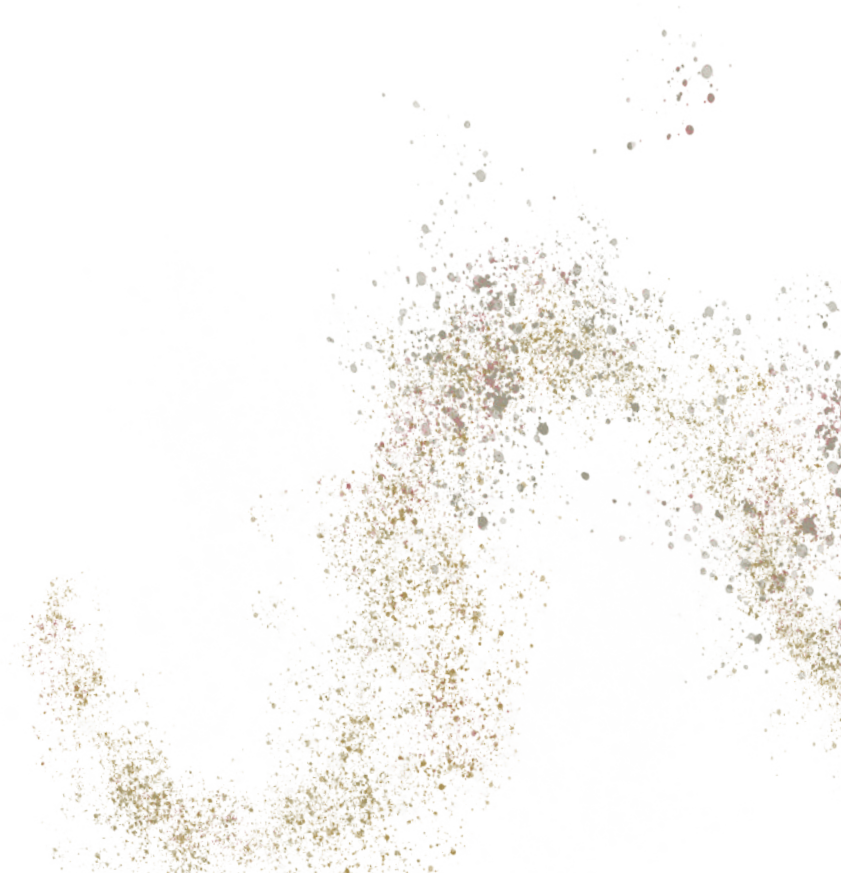
Metal powders that can be used for printing 3D with Binder Jet technology

Currently, objects can be printed using **Steel** powders. In the near future, we will be adding **Bronze** and **Silver**.



Objects printed with Binder
Jet technology





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