

Sand Printing

 MACHINA



What is Sand Printing?

Sand Printing is Binder Jetting Additive Manufacturing

- ▶ The binder jetting process is an additive manufacturing process that uses two materials – a powder-based material (*FS 001 sand*) and a binding material (*furan*).
- ▶ In sand printing, sand is bound using a polymer binding agent spread from **200 nozzles**. The binder acts as an adhesive between each of the **0.28 mm** layers of sand. A special recoater deposits alternating layers of the build material with **a vibrating blade** to ensure perfect planer layers.
- ▶ The object is **self-supported** within a powder bed and is removed from the unbound sand upon 3D printing completion.



Advantages of Sand Printing

✓ High Complexity

Allows for much more complex, voids and intricate details

✓ Large Parts

Large build volumes for sand printing

✓ Assembly Required

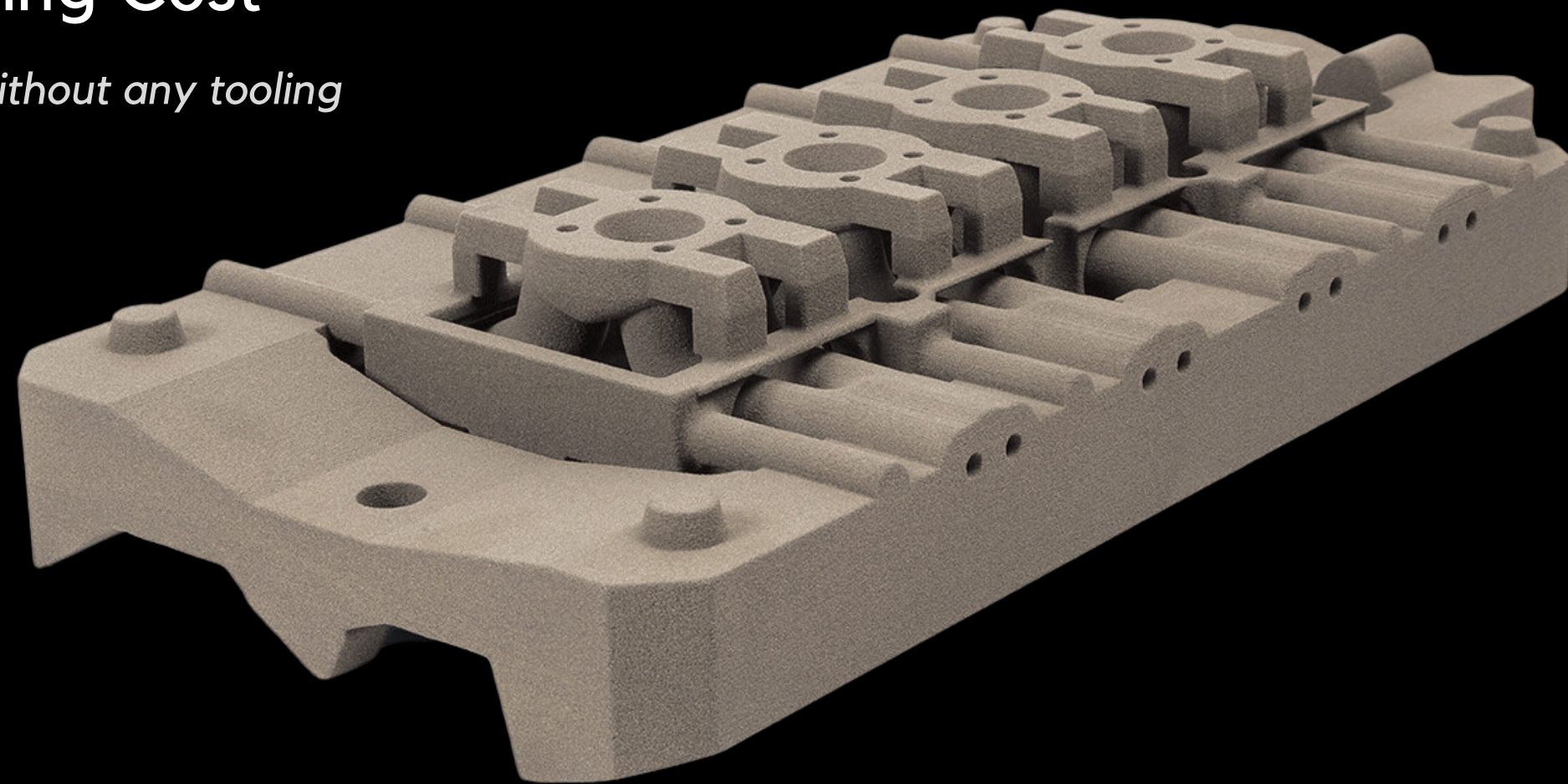
Consolidate the several cores and eliminate the assembling procedure

✓ Speed and Tight Deadline

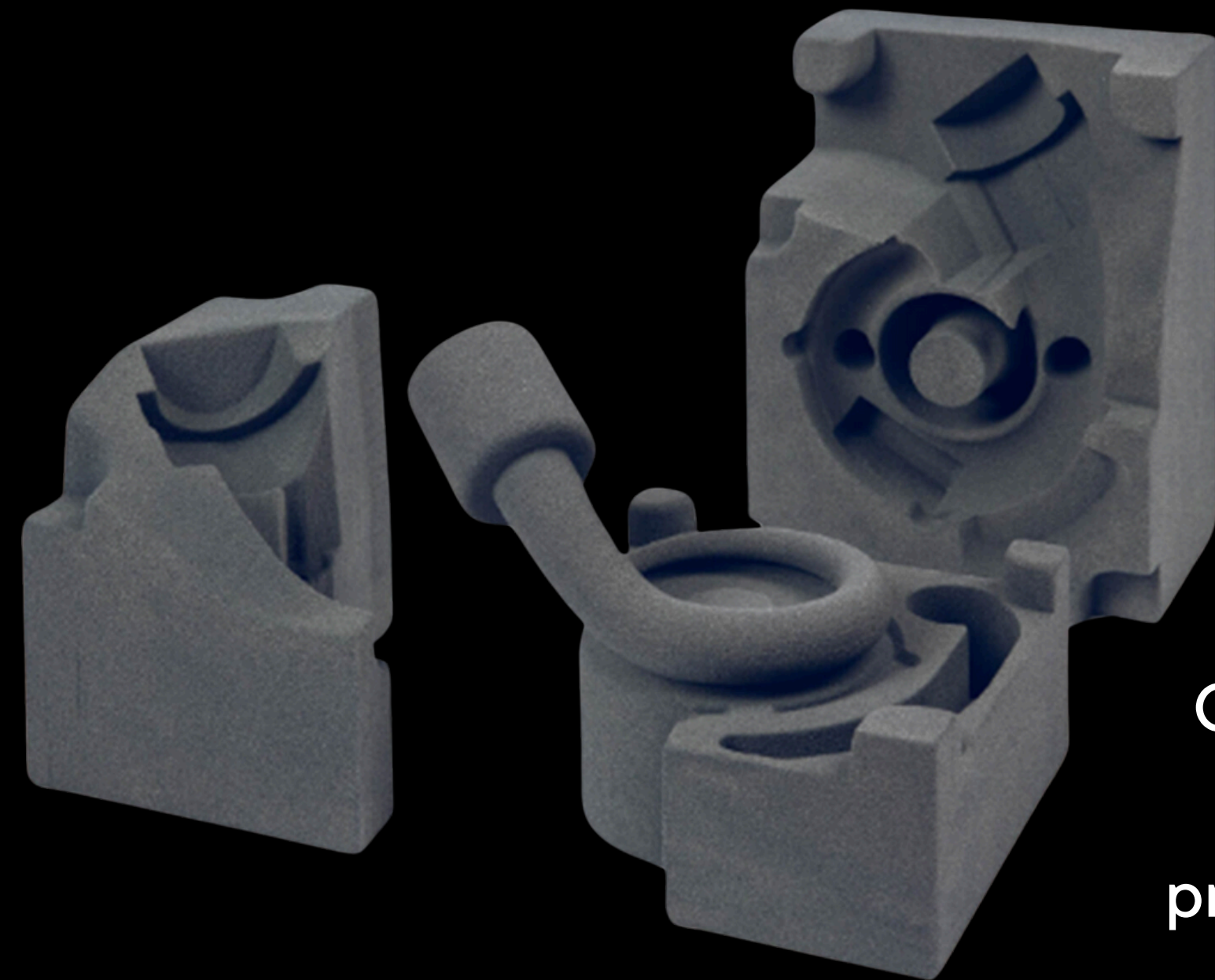
Turn lead times from weeks or months into days.

✓ No Additional Tooling Cost

Print sand cores and molds without any tooling



Applications



Mold Printing

3D printing sand casting molds ensure cost-effectiveness for manufacturing



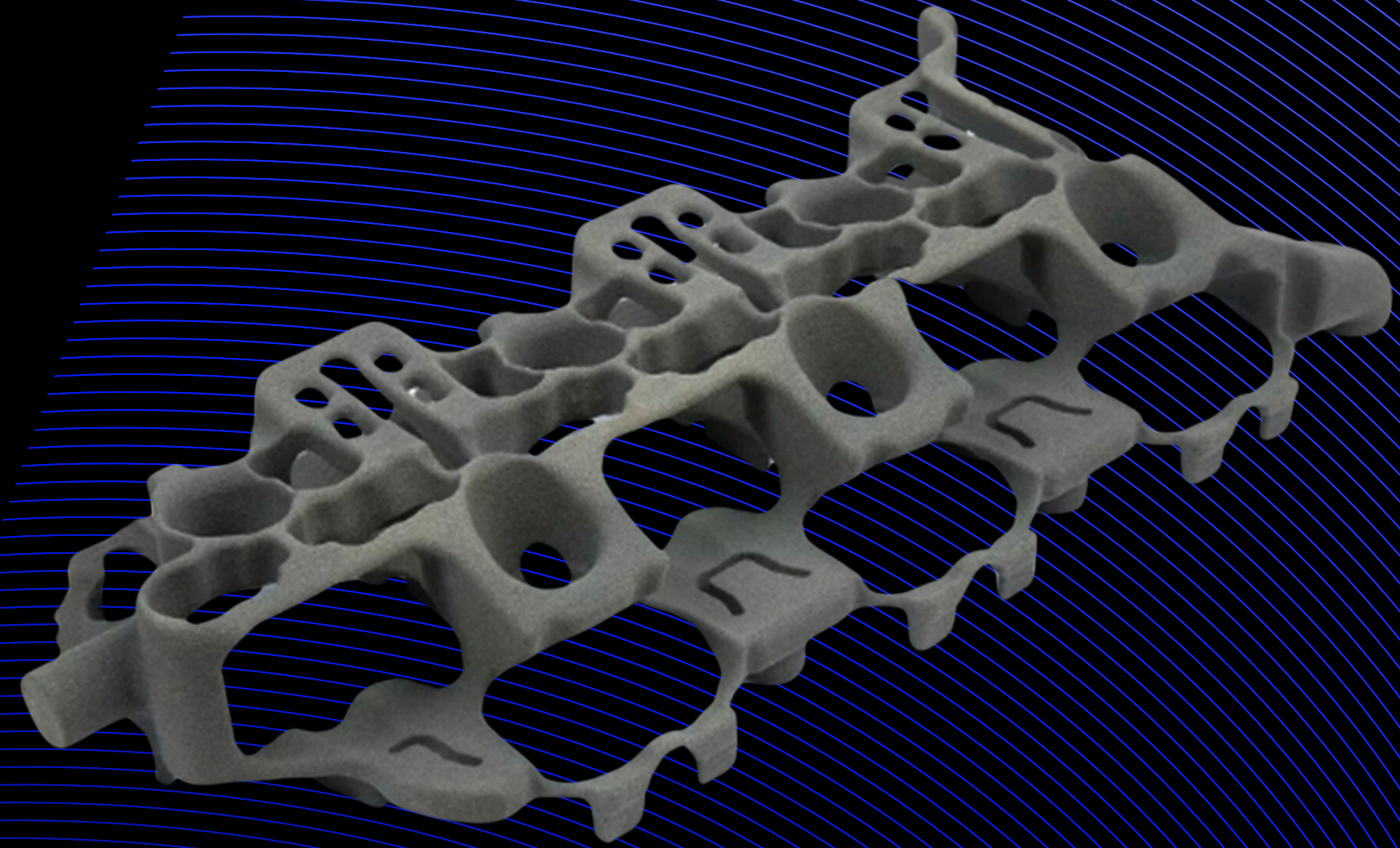
Geometric freedom, tool-less production and the high printing speed of binder jetting 3D printers reduce delivery times from prototype to final part significantly.



Applications

Core Printing

- 💡 Sand Casting cores can easily be integrated and combined with conventional sand molds.
- 💡 This hybrid approach ensures a high degree of cost efficiency and production streamlining. Only the most complex structure, the sand core is 3D printed.





Our Services for Casting

01. 3D Scanning

Reverse Engineering, rapid digitalization with high accuracy
Fast spare parts production without redesigning
Advanced quality process, high dimensional reliability

02. Mold Design

Advanced spur and riser design
Shell type cost-effective and rapid mold design
Practical module-mold splitting strategy

03. Sand Printing

Higher surface details and accuracy
Mold and cores without tooling efforts
Low CO2 casting without ant pattern and tooling efforts



3D Scanning



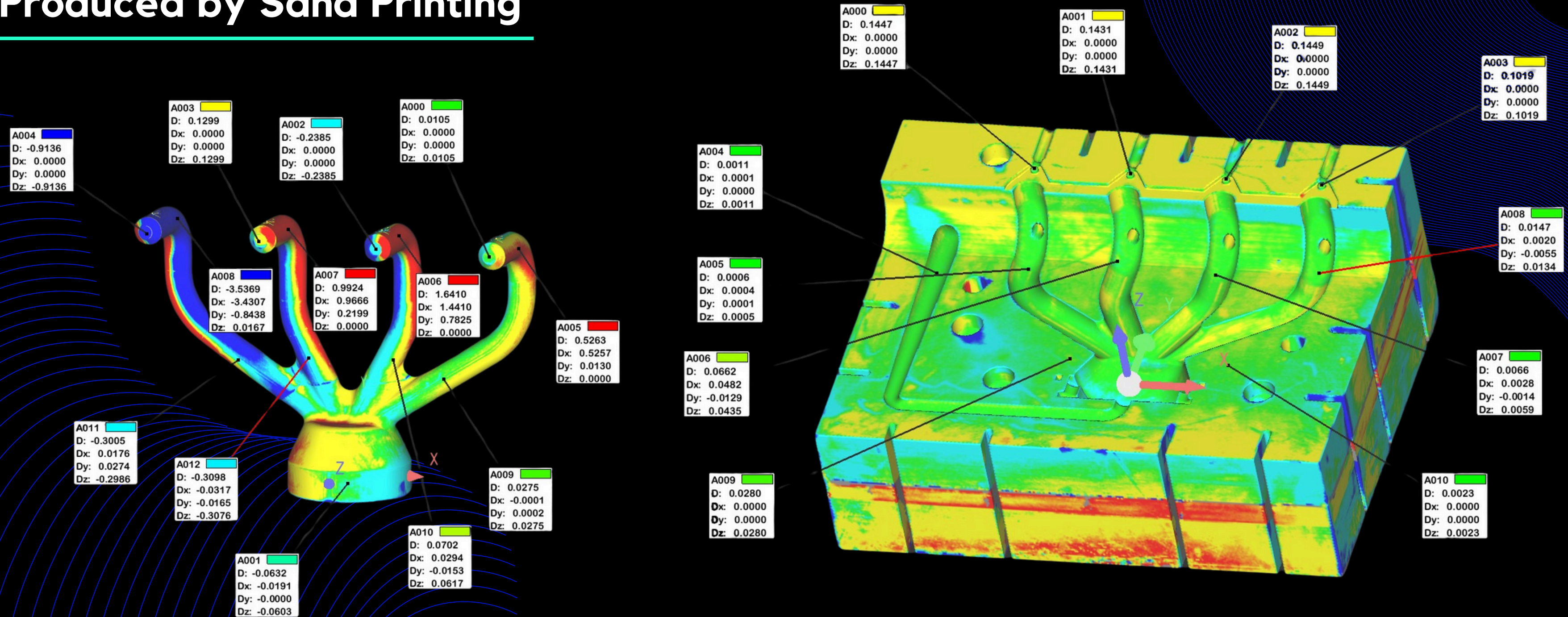
Scanning for Production

- Machina uses **Scantech Simscan 3D Scanner** to capture every detail of a part's geometry, ensuring that the design and production process is both accurate and efficient.
- Simscan 3D is capable of scanning area up to **700 mm * 600 mm** with **0.02 mm dimensional accuracy**
- With our expertise and the Simscan 3D scanner, we empower our clients to achieve superior quality in their casting projects, ensuring that each part is produced to the **highest standards of precision and accuracy**



3D Scanning and Inspection

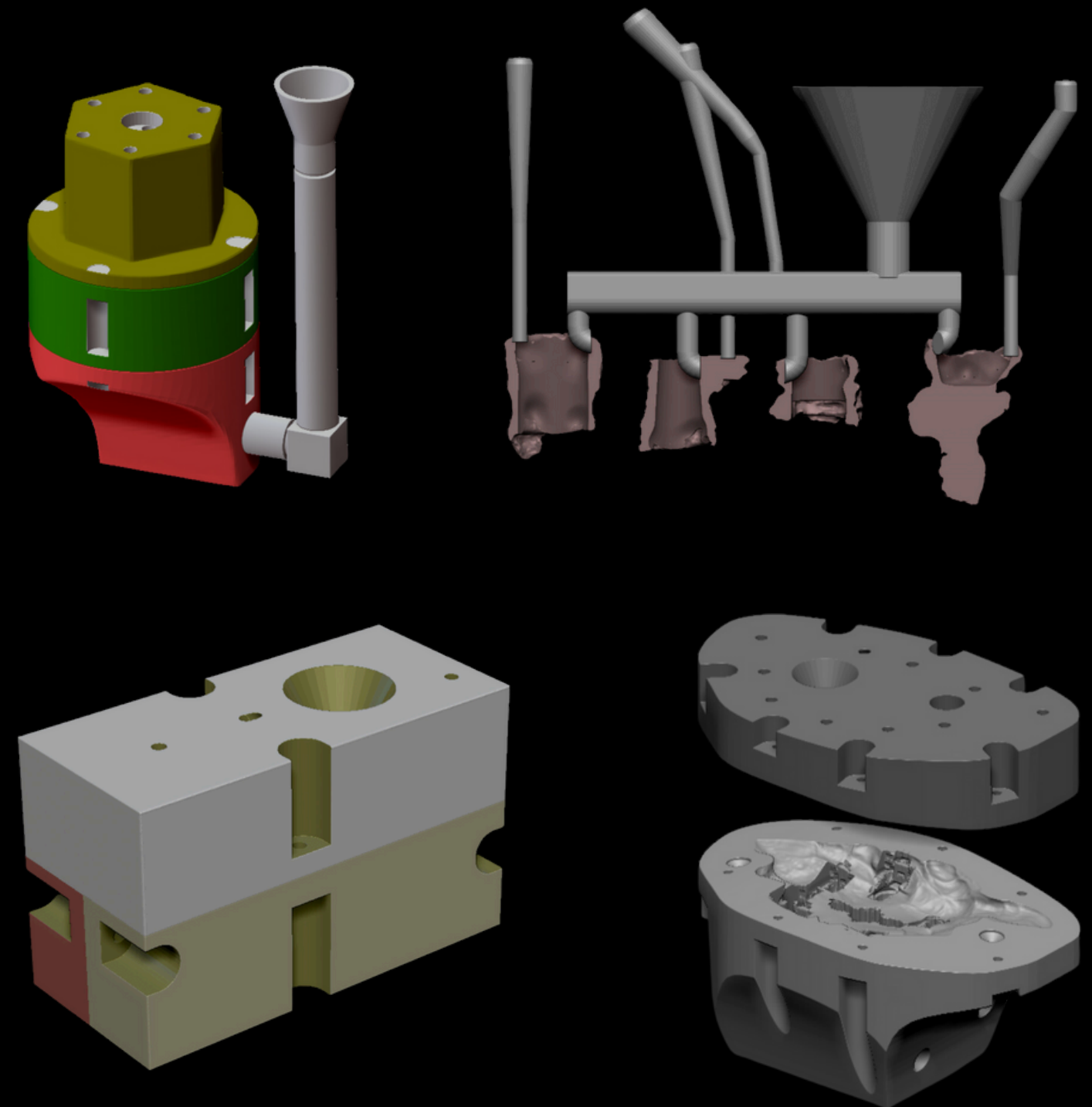
Dimensional Accuracy of Molds and Core Produced by Sand Printing



Mold Design

Optimized Design for Sand Printing

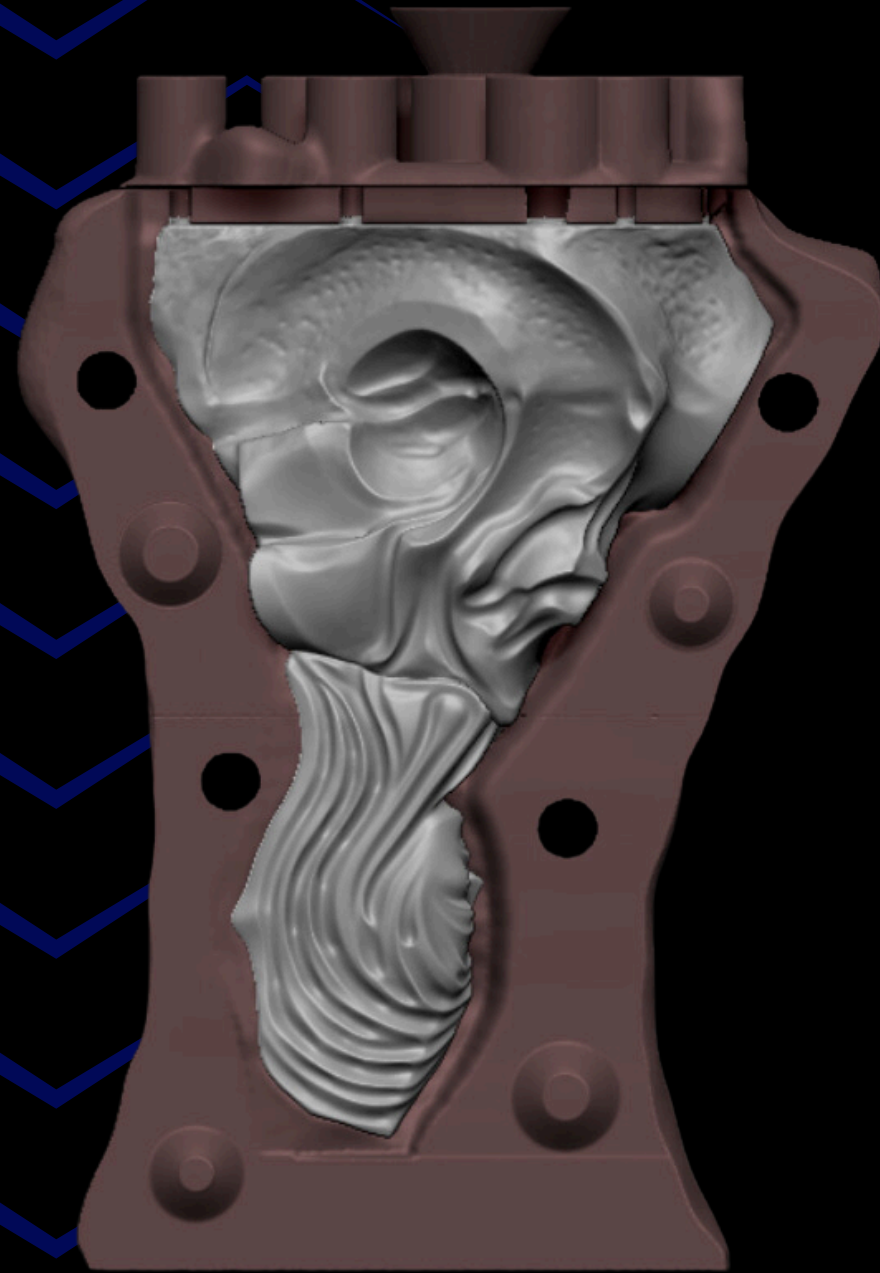
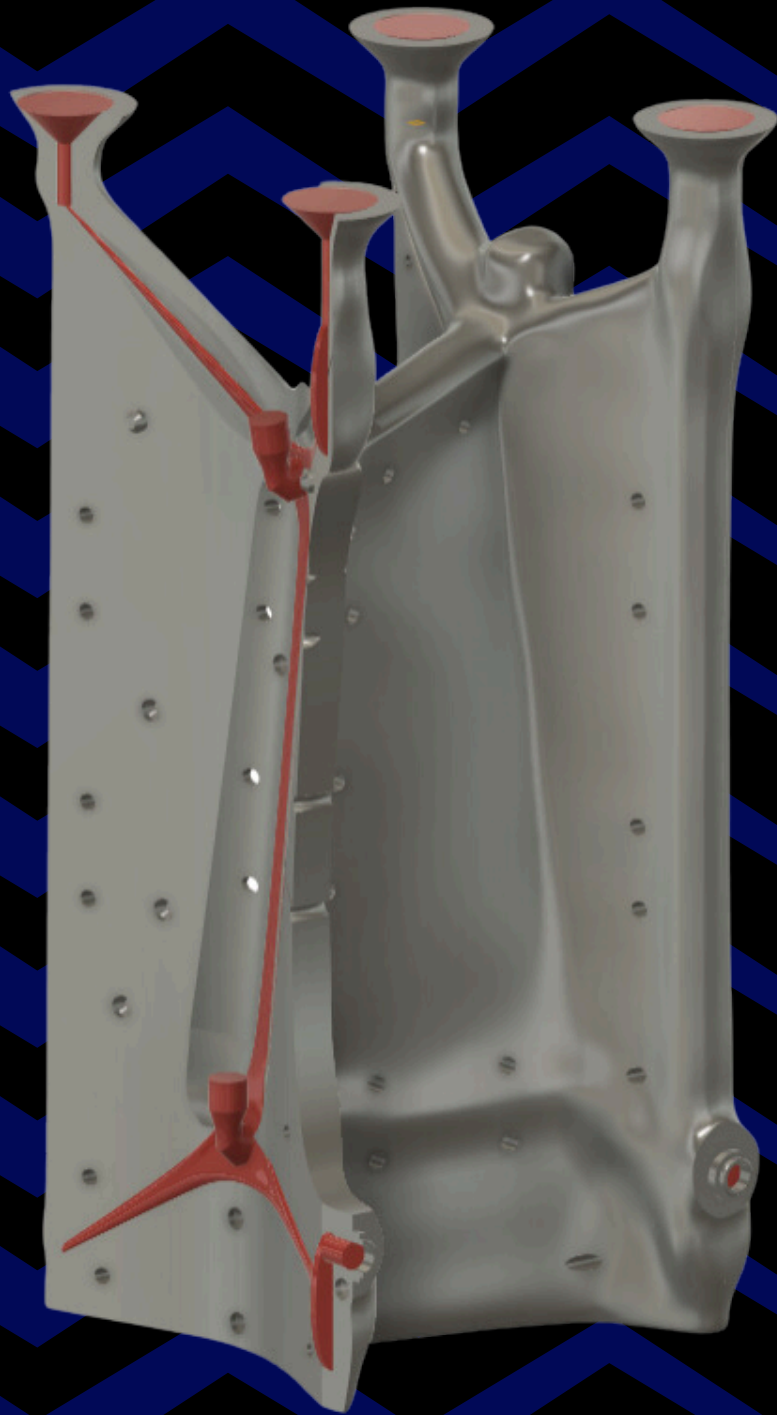
- In the design step, Machina considers the material properties, print resolution, and the critical aspects of mold design such as **spur, riser, gating**, and the thermal properties of the mold material.
- Machina ensures that each mold not only meets the geometric specifications of the intended cast parts but also **optimizes the casting process for efficiency, quality, and reliability**.
- This approach significantly **reduces the lead time and costs** associated with traditional mold manufacturing, while also providing the flexibility to **produce complex geometries** that would be challenging or impossible to achieve with conventional methods.



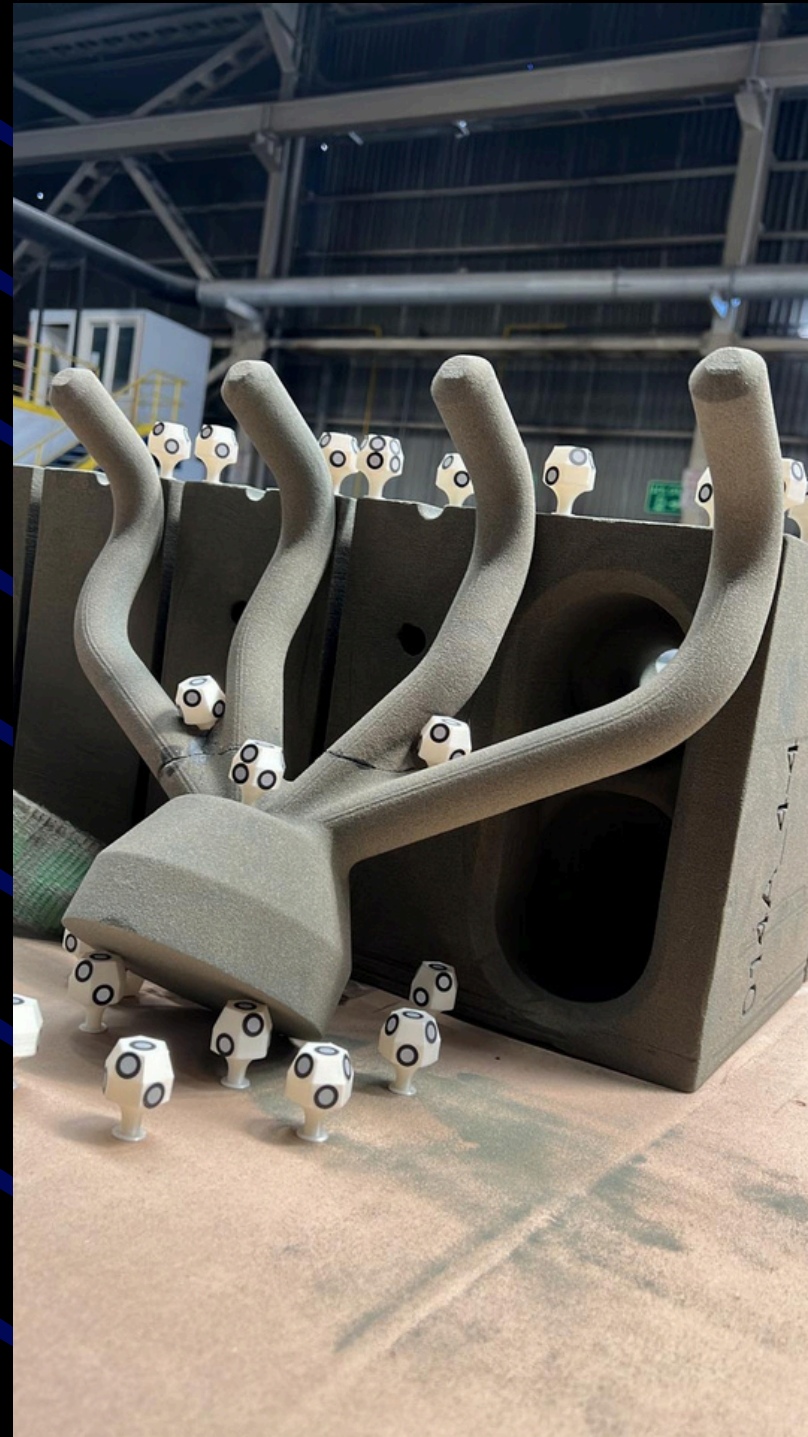
Example Molds designed by Machina in according to produced in Sand Printers



Mold Design Examples



Mold Design Examples



Sand Printing

Advanced Mold and Core Manufacturing

➤ Machina utilizes the **ExOne S-Max Pro** for the manufacturing of sand cores and molds

➤ The precision of the ExOne S-Max Pro allows for the creation of intricate designs that meet the exacting requirements of modern manufacturing processes. This capability is particularly beneficial in producing components with **complex internal geometries** that are difficult, if not impossible, to create using traditional manufacturing methods.



Depowdering process of produced sand molds



ExOne S-Max

✔ **Large Build Dimensions**

1800 x 1000 x 700 mm (1260 liter)

✔ **Sand Options**

FS 001 & FS 003

✔ **Superior Build Rate**

Up to 125 l/h

✔ **High Complexity**

Resolution up to 0.28 mm

✔ **Furan Binders**

High strength cores & molds

✔ **Continues Production**

Interchangeable job box



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