

**belotti**

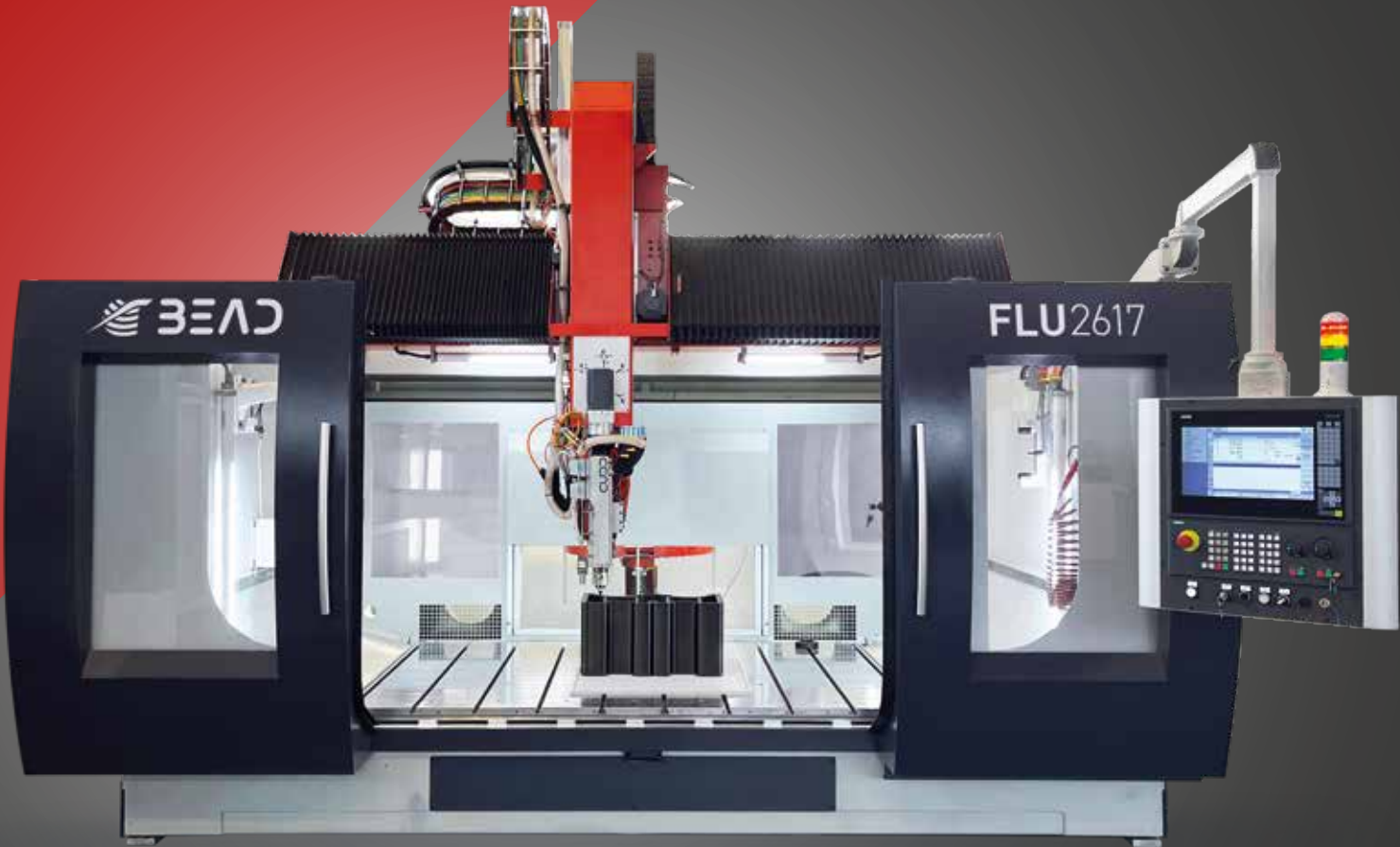
in partnership with

**CEAD**

**BEAD**

The all-in-one gantry solution  
for large format additive and  
subtractive manufacturing

EXTRACT





# THE ALL-IN-ONE GANTRY SOLUTION

As a result of the collaboration between Belotti and CEAD, we are proud to introduce BEAD, a **hybrid technology** that seamlessly integrates **Large Scale Additive Manufacturing with precision milling process** in a single gantry milling machine.

BEAD harnesses the strengths of both **3D printing and CNC machining**, combining the speed and creative potential of additive manufacturing with the precision and reliability of CNC technology in one cohesive system.

By incorporating a **CEAD extruder** for additive manufacturing (of variable dimensions and capacity) into a **Belotti 5-axis CNC gantry milling machine**, **BEAD** enables the production of parts that are initially oversized and then finished to precise tolerances. This process significantly reduces both production time and raw material consumption compared to traditional methods.

The application potential of this innovative solution is vast, with initial targets in the marine, automotive, and aerospace sectors, where it has already been used to produce molds, patterns, tools, and final parts. **BEAD** not only opens up new and innovative production scenarios but also enhances the return on investment.

This new solution requires **less space and programming effort** than two separate systems. Additionally, because the workpiece does not need to be transferred between machines, machining and handling times are significantly reduced.

## APPLICATION SECTORS

AEROSPACE



AUTOMOTIVE



MARINE



RAILWAY



DESIGN AND FURNITURE



PATTERNS AND MOULDS



THERMOFORMING



CHECKING FIXTURES



### 3D PRINTING

Design freedom

Near net shape

Automation

Recyclable materials

### CNC MILLING

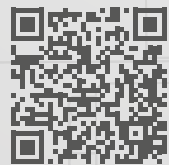
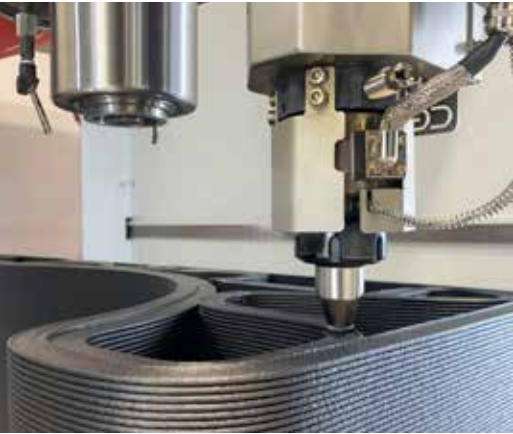
High Surface quality

High Tolerances

Automation

Accuracy





WATCH THE VIDEO

## TOP FEATURES

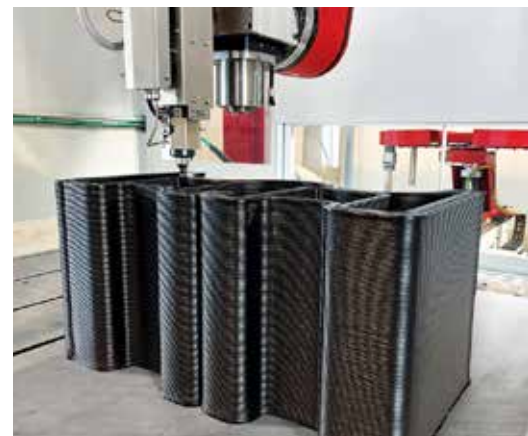
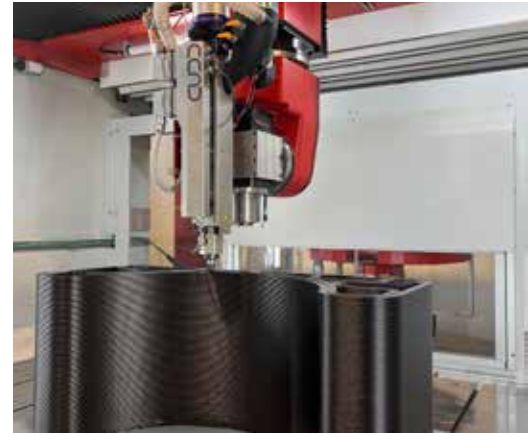
- **Integration of Additive and Milling Processes:** A single hybrid solution that combines both additive manufacturing and milling processes.
- **5-Axis Printing Capability:** Allows the printing of complex geometries. The 45-degree orientation of the extruder enables the printing of fully closed shapes without supports for undercuts, reducing printing time and improving interlayer adhesion, and allowing adjustment of mechanical and thermal properties as needed.
- **Extrusion Output:** Ranges from 26.5 lbs/h to 176 lbs/h (12 kg/h to 80 kg/h) to meet different industry needs and their respective build volumes.
- **High Performance Materials:** Capable of printing at extrusion temperatures up to 752°F (400°C).
- **Powerful Electrospindle:** Available from 20 HP to 56 HP (15 kW to 42 kW).
- **Milling Accuracy:** Achieves up to 0.0004 in/ft (0.01 mm/m) for linear accuracy and +/- 12 arcseconds for rotational accuracy.
- **Versatile Tool Change:** ATC with tool change positions ranging from 8 to 60.
- **Advanced Integration:** Full integration with Siemens Sinumerik ONE for both milling and additive processes, compatible with the most advanced and comprehensive slicing software on the market.
- **High Customization:** Customizable gantry for printing and milling operations, with the extruder system also available as a retrofit on existing Belotti machines.



# KEY ADVANTAGES

- **Manual Labor Elimination:** Transitioning from CAD geometry directly to mold production without the need for creating a model.
- **Lower Investment and Space Optimization:** Achieved compared to using single technologies separately.
- **Shorter Lead Times and Reduced Production Costs:** 3D printing enables the production of highly accurate, intricate, and optimized geometries.
- **Reduced Material Waste:** Enhances production efficiency with less material usage and waste.
- **Greater Sustainability:** Achieved with reusable and recyclable materials.

- > Less manual labour
- > Shorter lead times
- > Lower investment
- > More sustainable process



# MATERIALS

The 3D printing process utilizes composite pellets composed of a thermoplastic polymer matrix reinforced with various types of fibers, including glass, carbon, and natural fibers.

Polymers range from commodity (e.g., PP, PETG) to high-performance fiber-reinforced polymers (e.g., PESU, PEEK). Unlike thermosetting materials, thermoplastics are recyclable and can be reused, enhancing sustainability and reducing environmental impact.



# APPLICATIONS

- **Aerospace Prototyping:** Verify form, fit, and function of components before production.
- **Manufacturing Tooling:** Create jigs, fixtures, plugs, moulds and autoclave tooling for composite production.
- **Complex Components:** Make intricate and geometrically complex parts.
- **Lightweight Structures:** Manufacture optimized lightweight parts.
- **Satellite Components:** Fabricate customized parts for satellites.
- **Repair and Maintenance:** Quickly produce replacement parts.
- **Space Exploration:** Manufacture parts for space stations.
- **Electronics and Avionics:** Produce housings and mounts.
- **Medical:** MRI parts and instruments.
- **Architecture:** Build models and architectural structures.
- **Education and Research:** Develop educational models and research prototypes.
- **Art and Design:** Produce sculptures and art installations.
- **Consumer Goods:** Make household gadgets and electronic components.
- **Structural Components:** Create strong components for aerospace.



The BEAD solution can be implemented in various configurations with adjustable build volumes, extrusion outputs, and printing orientations.





belotti.com

**BELOTTI SpA**

**HQ and Operations 1**

Via San G. Bosco, 12 - 24040 Suisio (BG) - ITALY  
Tel. +39 035 4934411 - sales@belotti.com

**Innovation Hub and Operations 2**

Via G. Cassiani, 173 - 41122 Modena - ITALY



**Belotti Centro Sud**

Via Casale Ferranti, 85  
00173 Roma - ITALY  
Tel. +39 06 93020906

**Belotti Deutschland GmbH**

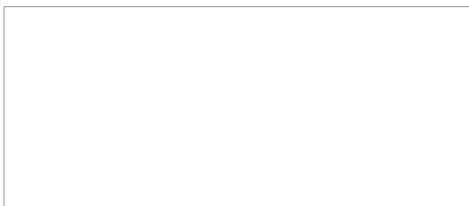
Kalterer Straße 9  
86165 Augsburg / Bayern - GERMANY  
Tel. +49 172 5223805

**Belotti (Shanghai) Machine Tools Trade Co. Ltd**

Room A105, 4th floor (East)  
999 Changning Road  
Changning District - CHINA

**Belotti America, Inc.**

411 University Ridge - Suite B2  
Greenville, SC 29601 - USA  
belottiamerica@belotti.com



**CEAD B.V.**

Schieweg 25 - 2627 AN Delft - NL  
Tel. +31 15 737 0183 - info@ceadgroup.com - www.ceadgroup.com

