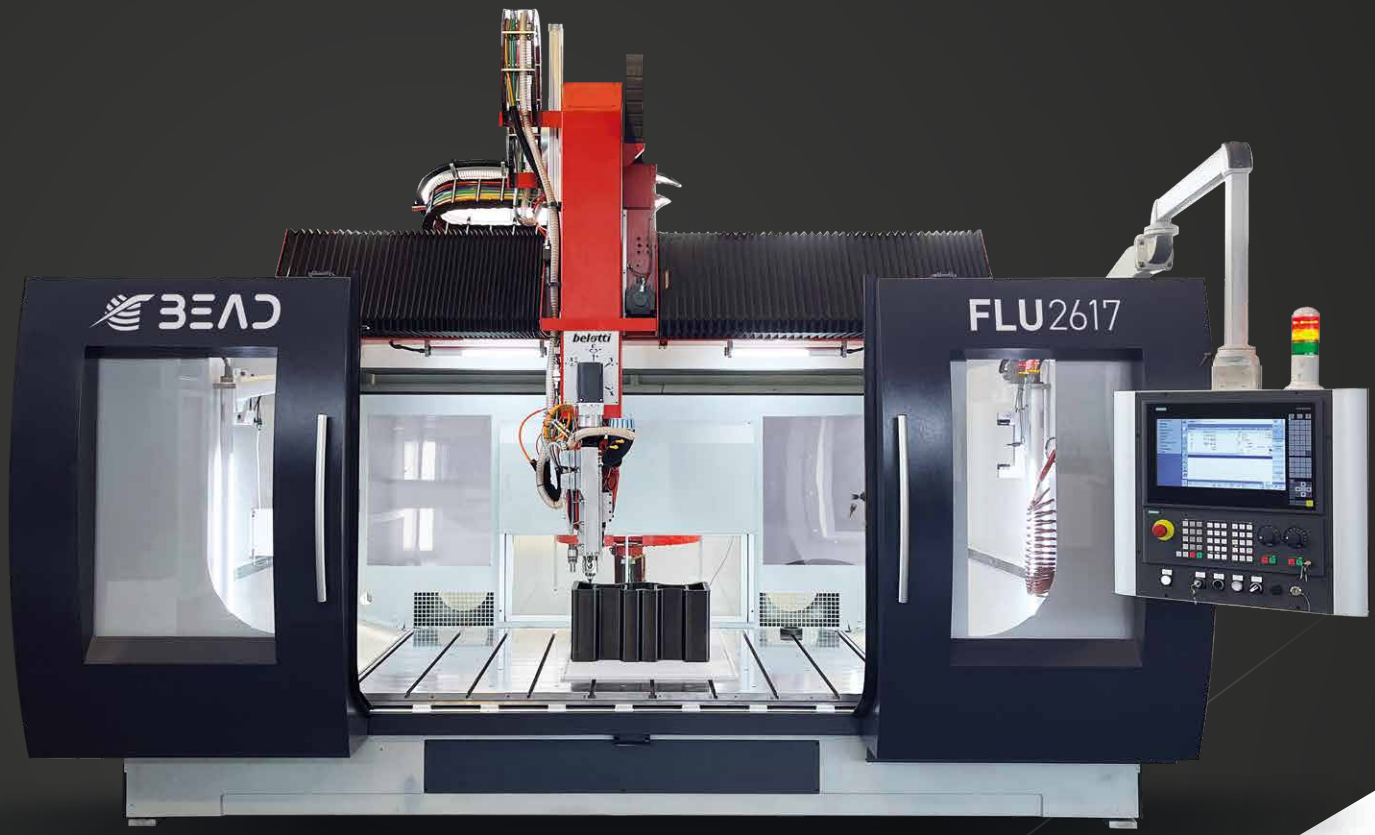
ENGLISH

BEAD

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



belotti

The all-in-one gantry solution

BEAD is the hybrid technology that integrates **Large Format Additive Manufacturing** with **precision CNC milling** into a single machining centre.

BEAD exploits the best of both processes, combining the **speed and creative potential** of 3D printing with the **precision and reliability** of a cnc centre in a single system.

By integrating an extruder for additive manufacturing into a Belotti 5-axis CNC gantry milling machine, BEAD enables the production of parts with variable printing output and sizes. Components are first **additively manufactured to near-net shape** and then **milled to precise tolerances.** This hybrid process significantly **reduces both production time** and **raw material consumption** compared to traditional manufacturing 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 **moulds, patterns, tools,** and **final parts. BEAD** not only opens up new and innovative production scenarios but also **enhances the return on investment.**

This 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

MATERIALS

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

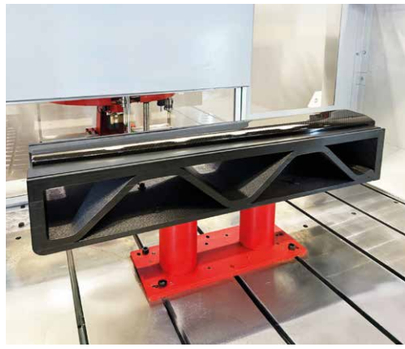
Polymers range from commodity (e.g., PP, PETG) to high-performance fibre-reinforced polymers (e.g., PESU, PEI). Unlike thermosetting materials, **thermoplastics are recyclable and can be reused**, enhancing sustainability and reducing environmental impact.

APPLICATIONS

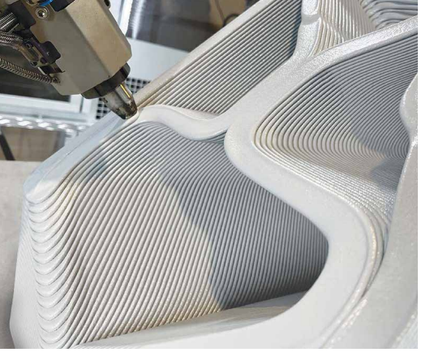
BEAD finds application in key sectors such as the aerospace, automotive, marine, and design industries.

MAIN APPLICATIONS

- Models and production tools: plugs, moulds, autoclave tools for composite production.
- Non-structural end parts for different application industries.



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



TOP FEATURES

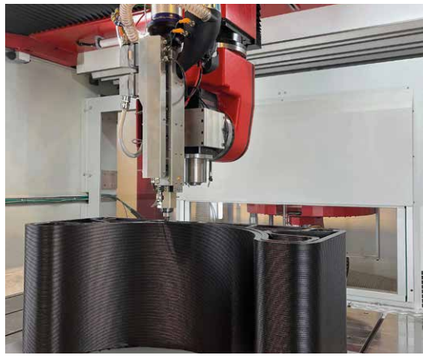
- **Integration of Additive and Milling Processes:** A single hybrid solution that combines both additive manufacturing and milling operations.
- **5-Axis Printing Capability:** Allows the printing of complex geometries. The variable orientation of the extruder enables the printing of fully closed shapes 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 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 400°C.
- **Powerful Electrospindle:** Available from 15 kW to 42 kW.
- **Milling Accuracy:** Achieves up to 0.01 mm/m for linear accuracy and +/- 12 arcsec 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 like AdaOne by ADAXIS and Aibuild Software.
- **High Customisation:** Customisable gantry for printing and milling operations, with the extruder system also available as a retrofit on existing Belotti machines.

WATCH
THE **VIDEO**

KEY ADVANTAGES

- **Manual Labour Elimination:** Transitioning from CAD geometry directly to mould production without the need for creating a model.
- **Lower Investment and Space Optimisation:** Achieved compared to using single technologies separately.
- **Shorter Lead Times and Reduced Production Costs:** 3D printing enables the production of highly accurate, intricate, and optimised 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



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