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# VITAL Fact Sheet: 3D Foam Printing of Biobased Thermoplastics

## The Challenge

While the use of biobased thermoplastics (b-bTP) in biodegradable packaging applications is now well-established, their adoption in more durable applications has been slower due to challenges such as:

- Limited large-scale **availability**;
- Higher **cost**;
- **Processing** difficulties;
- **Performance** limitations in some areas.

Despite these challenges, use of b-bTP has clear benefits for reduction of environmental footprint of products, and manufacturing processes. Furthermore, the anticipated **near-term increase in global production capacity** is expected to mitigate current limitations related to supply and cost.

Within this context, the VITAL project addressed the outstanding challenges associated with material performance and processing. We focused on the development of **lightweight, thermoplastic products**, where foaming is used to reduce raw material consumption. Thermoplastics are also much easier to recycle compared to conventional foamed materials such as thermosets.

### Project at a Glance:

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| **Project Name:** | **VITAL** |
| **Type:** | Research & Innovation Action |
| **Funding:** | Horizon Europe CL4 "Twin Transition" |
| **Timeline:** | June 2022-Nov 2025 |
| **Technology:** | Biobased Thermoplastic Foams |
| **Industry Sectors:** | Automotive, White Goods, Marine Leisure |
| **No of Partners:** | 14 |

## The 3D Foam Printing Solution

A **3D printer and foam printing head** combination was developed for 3D foam printing using b-bTP.

The 3D foam printer is fed material in a **standard granulate form** (similar to injection moulding machines), and extrudes **adjustable foam filament layer by layer**, based on the desired final product shape and size

Key innovations include:

- end products with **lower weight**
- possibility to use **thermoplastic biopolymers**
- **faster production** times
- **distributed manufacturing** possibilities.

All of these improve the sustainability of the whole product life cycle.

This project has received funding from the European Union's Horizon Europe research & innovation programme under grant agreement #101058328

Co-funded by the European Union

UKRI Innovate UK

## Key Achievements

- Prototype machine including foam printing head
- Possibility to adjust the gas based on the material and wanted porosity
    - Testing shows **up to 66% lighter foam print product compared to a non-foamed product**
- Simulation software
- Piloting with **new biomaterial formulations**
- TRL progression from 3 to 5-6

## Benefits & Impacts

- The technology is best applied for manufacturing of lightweight and customised components

**Automotive**

Lighter parts improve fuel efficiency and reduce emissions

**Marine Leisure**

One-off designs in recyclable materials

- Societal & economic benefit
    - Material **cost savings**
    - **Custom**-shaped products
    - **Fast production**
    - **Vast selection of processable thermoplastic materials**


## Next Steps

- Further development of 3D foam printing towards commercial applications
- Further development of b-BTPs in regard to foamability and applicability to 3D foam printing

## Contact Us

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