VITAL Project Newsletter

M24 to M36

Introduction

The VITAL project focuses on development of foaming processes for biobased thermoplastic materials, to allow the production of lightweight components for various industries. We are sprinting towards our November 2025 finish line, and wanted to share our highlights of the last 12 months in overcoming the challenges of working with biobased materials to develop cleaner, circular, intelligent and more climate neutral industrial processes.

Due to delays to our initial project plan, associated with various technical challenges, we sought and were awarded a small extension to our project, taking the project end date from May 2025 to November 2025. We're delighted to have this additional time to drive forward work on our case studies and wish to thank Horizon Europe and UKRI for the opportunity to push those tasks to completion in the coming months.

Events and General Assembly Meetings

VITAL partners have attended many events in the last year, taking as many opportunities as possible to talk about our project and share technical results. Highlights included:

- Plastics Live, June 2024 UK – Floreon delivered a technical presentation
- EUBCE, June 2024, France – Several partners attended the expo and associated Biomatters side event
- 5th International Congress on Advanced Materials Science and Engineering – PIEP delivered a technical presentation entitled "Foam injection moulding applied to innovative bio-based thermoplastics".
- Formnext, November 2024, Germany – AM Technologies by Brinter attended and exhibited our 3D foam printing development
- European Bioplastics Conference, December 2024, Germany – Floreon attended
- Sustainable Materials and Processes Pilot Facilities had their grand opening at VTT Tampere in March 2025, Finland – VTT exhibited our 3D foam printing development
- Biomatters/Waste2BioComp final event, April 2025, Brussels – VTT, Meyer Werft and Iconiq Innovation attended and exhibited our latest

Co-funded by the European Union
UKRI Innovate UK

progress with practical demos of materials from our different manufacturing routes and a presentation of our project aims.

- Fraunhofer ICT hosted their Foam Technology Days during the 21st – 22nd May, demonstrating technologies for production of thermoplastic foams, such as those they have developed during VITAL project.

Finally, we held our 7th General Assembly meeting in May 2025, kindly hosted by CRF (Stellantis) at their research centre in Turin, Italy. Our partners travelled from across Europe to attend the meeting in-person and discuss their latest developments, successes and challenges within the project. During the meeting we discussed technical results, how to solve current challenges, intellectual property, exploitation plans, training plans and communication updates. We were treated to tours of both the CRF test laboratories (including environmental chambers big enough for an entire car!) and of the historic centre of Turin. Many thanks to CRF for your kind hospitality, and for booking the sunshine for our visit to Italy!

Updates on the Technical Work Packages

Work Package 2: 3D Foam Printing

Development work on both the 3D foam printing equipment and materials trials using polylactic acid (PLA) and different types of biobased thermoplastic polyurethane are largely complete. Plans for exploitation of some of the results, and publishing of others are well under way and the value chain is moving on to case study development in the marine and automotive sectors. We were able to show this demo example of the possibilities of 3D printing both foamed and unfoamed biobased thermoplastics in the same structure at the BIOMATTERS event at the end of April.

Work Package 3: Bead Foaming

Bead foaming development has experienced challenges with creating stable, consolidated foams from some of the biobased polymer grades of most interest to this project. Through a period of high effort and ingenuity, our partners at Fraunhofer are now achieving promising results with their low energy bead foaming process for a range of suitable materials and are able to supply samples to our end-user partners for selection trials. They are continuing to optimize the process and materials in parallel with the next stages of case study development in the automotive sector

Work Package 4: Foam Injection Moulding

Foam injection moulding (FIM) development for PLA is largely complete and activities are transitioning to case study development in the home appliance and automotive sectors. A comprehensive set of properties for the durable Floreon PLA grade used in the project have been measured, and recently published on MatWeb for the benefit of other product developers. We are looking forward to seeing further publications on this work, both in

the areas of the injection moulding itself, as well as the modelling and machine learning used to optimize and control the manufacturing process.

For more information on the properties of the Floreon PLA grade we are using, check out the MatWeb data sheet here:

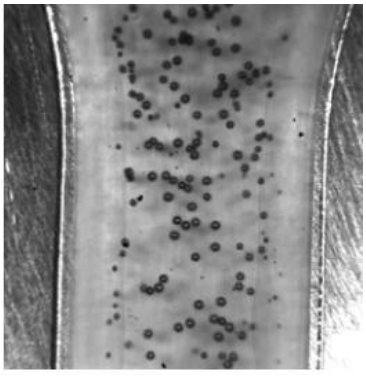
Floreon FlmDT 07 PLA-based Compound

Regarding the digital tools developed to support FIM manufacturing processes, two AI-based predictive models to anticipate potential defects and part properties have been validated and integrated within a FIM Smart control system. This system serves as a decision support system for the fine tuning of FIM processing parameters.

In combination with a Human-machine-interface, the VITAL control system has been validated in PIEP shopfloor under real operating conditions thus demonstrating its performance.

To support broader process understanding beyond the control model, an advanced optical imaging setup was developed to enable in situ monitoring of cell nucleation and growth during foam injection moulding. Using a mould fitted with an optical window, tests were successfully carried out with both a Chemical Blowing Agent (CBA) and a Physical Blowing Agent (PBA) at varying concentrations. This setup provides valuable insights into foaming dynamics under real processing conditions, enhancing process understanding and control.

Experimental setup for image acquisition.



Sample with 0.4% of Chemical Blowing Agent

Updates on the Case Studies

Automotive

The first FIM part for the Fiat Doblo has been prepared by Farplas, with a modest weight reduction – further optimization is underway with the support of partners Floreon, Avient and PIEP. In addition, initial validation was performed by Tofaş, and validation activities will continue for the parts produced in the upcoming trials.

Design and testing of novel 3D-printed seat cushioning elements has been carried out using conventional materials by CRF. Now that suitable biobased materials are available from WP2 and WP3 partners, the case study development can proceed with these.

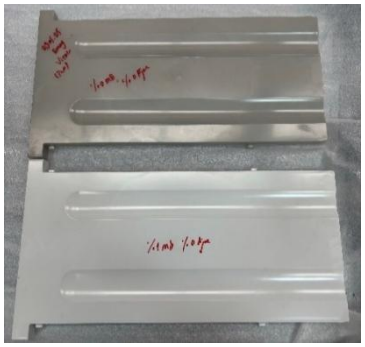
Marine

As part of the ongoing mission to develop biobased PLA material tailored for cruise ship applications, we've reached an exciting milestone: the final design of the marine demonstrator unit is now complete. This material aims to replace conventional, non-recyclable composites—such as gypsum-based panels—with a sustainable, circular alternative suitable for both interior and exterior use at sea.

In collaboration with AM Technologies by Brinter, initial 3D foam printing trials were conducted to produce prototypes of the connection elements. These trials provided valuable insights that led to refinements in the CAD models—enhancing print quality, assembly precision, and overall component performance.

With these advancements, we're charting a course toward a more sustainable future for maritime design.

Home Appliances



In common with project partners, Arçelik has initiated initial trials for the foam injection molding (FIM) of refrigerator components, beginning with a small, non-critical shelf part to assess the processability of PLA. As with previous activities, further adaptation and optimization of both the formulation and processing parameters are necessary to accommodate the specific equipment and application requirements.

These efforts are being actively supported by Floreon and Avient through material supply and technical guidance, while PIEP is contributing with detailed foam injection simulations using Moldex3D, tailored to Arçelik's production setup. Initial results with neat PLA and PLA containing a white masterbatch have been promising; however, trials with the addition of foaming agent have revealed some challenges. The work will continue with further optimization trials on smaller parts before progressing to larger demo components like the EVA cover and vegetable tray.

Sustainability

Experiments with PLA to develop methods and additives with the aim of preventing degradation during processing and allow mechanical recycling are complete and have achieved promising results. The testing methodology used modelling and machine learning to find new insights into the recyclability of PLA. Once final characterization of the test samples has been completed, we hope that results can be shared more widely to support the bioplastics community.

Development of the FIM learning factory is underway and is aimed for launch in October. Delegates on the training will be able to learn from our experiences in developing and implementing FIM manufacturing techniques for PLA.

Life Cycle Analysis (LCA) models are waiting for real data on raw material and energy usage from the case study development before the final analysis can be conducted.

Upcoming Events

We expect to have project partners exhibiting at K 2025 in October, Formnext in November, and are discussing several options for hosting a final dissemination event to

close out the project. Contact us if you'd like to receive more details of where to meet with us later this year.

Contact Us...

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