

# BOATS FROM 3D PRINTER?

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Design Centre MUOVA is exploring how boat industry can benefit from large scale 3D printing, and what potential printable biocomposites hold for product development.

# The potential of large 3D prints in the boat industry

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Design Centre MUOVA is researching in Eco-Boat project how boat industries can benefit from large scale 3D printing and what potential do printable biocomposites hold for product development.

The Eco-Boat project will implement 3D printed product demonstrations which address the needs of consumer segments identified in consumer research.

We collaborate with Centria University of Applied Sciences by combining their expertise on materials and latest technologies, with MUOVA's product design and consumer research expertise.

**Are you interested in trying how large scale 3D prints could be utilized in your production?**

Contact our team!

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# Cost-effectiveness by printing

Large scale 3D printing can be utilized variously in the boat industry. It scales to the production process from manufacturing jigs to complete products. It can be utilized as a component manufacturing unit or as a link to support other manufacturing processes. For example, a 3D printed lamination mold finished with CNC machining streamlines production, reducing steps and need of labor, resulting lower production costs.

Cost-effective and more efficient mold manufacturing creates an opportunity for flexible serial production, that can respond to rapidly changing customer needs.

Larger components can be printed with new multi-axis printers, and even the printing of entire boat hulls is actively tested. By integrating 3D printer to a robotic arm, larger components can be printed faster and more flexibly and even the most organic shapes are possible to produce. The 3D printed object is produced without molds, therefore each piece can be uniquely designed.



**Mass production  
of unique  
products  
corresponds  
precisely to  
consumer needs**

*For example, ergonomics based on the user's individual needs in seats, cockpit or even on stairs leading to berth, allows everyone to enjoy the independence that boating has to offer. If the boat is designed as modular, it can always be converted based on the needs of the new owner.*

As 3D printers become more common, there will be interesting opportunities to prototype large-scale products. Previously, product performance was verified, for example, by calculations. Now the functionality and design features can be tested with consumers by using 3D printed prototypes. Both physical characteristics and consumers' perceptions can be tested with the same prototype. 3D printed prototypes may decrease financial risks as well as save considerable amount of time compared to hand-crafted prototypes.

# Look & feel of 3D printed biocomposite

The bio-based print material developed by Centria can be recycled numerous times. The look & feel properties of the printed biocomposite surfaces are rather similar to wood. The basic color of the material is brown and it feels pleasantly warm when touched. The object is printed layer by layer, and the layer line texture is a distinguishable feature.

The layer line texture may be perceived as too dominant for some applications. The Eco-Boat project will experiment with fading the layer lines, for example, with different post-processing methods. In addition, experiments with the color tones of the print material will be performed. Consumer perceptions will be gathered about the acceptability of the visual properties, such as layer line texture and color. Such consumer response to color variations and distinctive textures will further assist in the process of creating products that match desired user experiences in boating.

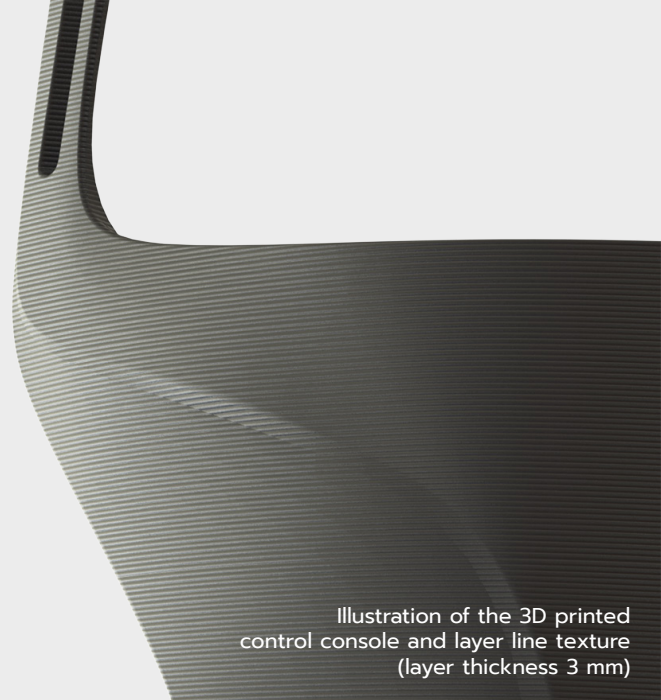


Illustration of the 3D printed control console and layer line texture (layer thickness 3 mm)

## Object is formed layer by layer

Layer line texture can be utilized as an interesting, storytelling feature in a product tailored for the customer. In terms of design, the layer line texture surface has aesthetic and functional possibilities that can be used to improve safety and acoustics or to create a distinctive and personal grain pattern.



The rendered image shows layer line texture of 3D-printed seats and consoles.



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ISSN 2489-4508 | ISBN 978-952-5784-55-8 | Publisher Vaasa University of Applied Sciences, Design Centre MUOVA | Place of publication Vaasa

**ECOBOAT**  
Keula kohti kiertotaloutta

Vipuvoimaa  
**EU:lta**  
2014–2020



The project is funded by the REACT-EU instrument as a part of the European Union's crisis response measures to the COVID-19 pandemic.