

Ubi Maior creates light-yet-sturdy parts for boats and yachts with HP Multi Jet Fusion technology



Data courtesy of Ubi Maior Italia



HP 3D Printing's design freedom allows for quality, custom prototypes and final parts that can withstand nautical environments



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Introduction

Ubi Maior Italia (“Ubi Maior”) is a sailing equipment company that designs and produces first-class equipment using the highest grade of structural materials to ensure easy management and optimal performance of boats. Ubi Maior’s highly skilled professionals from the Production Division as well as the Engineering and Design Division work in close collaboration to create a wide range of custom-made products for their customers.

All Ubi Maior parts are ISO 9001–certified for quality, are tested in Ubi Maior’s plant by external certified laboratories, and endure sea trials. Their sail, block, and deck hardware lines include standard pieces and parts as well as customized options to meet the unique needs of customers’ boats.

- **Industry**

Mobility and transportation

- **Sector**

Boats and yachts

- **Objective**

To transition prototyping and production of parts for sailboats from CNC milling to 3D printing technology.

- **Approach**

Using HP Multi Jet Fusion technology to create parts for sailboats, Ubi Maior experienced improvements in part quality, decreased weight, and customization possibilities to enhance the aesthetics of their parts.

- **Technology | Solution**

HP Multi Jet Fusion technology,
HP Jet Fusion 4200 3D Printing Solution

- **Material**

HP 3D High Reusability¹ (HR) PA 12

1. HP Jet Fusion 3D Printing Solutions using HP 3D High Reusability PA 12 provide up to 80% powder reusability ratio, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for reusability). Parts are then made from each generation and tested for mechanical properties and accuracy.

Challenge

Parts for high-performing racing sailboats must be lightweight and highly durable to tolerate the harsh environments that boats endure. The roller bearing blocks—part of Ubi Maior’s “Regatta (RT)” line—support high loads and are used to trim sails and tension the mast-supporting cables. These blocks, which are typically made from titanium or steel, must be able to withstand up to 13 tons by absorbing direct and side forces to minimize rotation friction.

The sails on racing sailboats need to be able to adapt quickly depending on the weather and sailing conditions. Sailors use furlers affixed to the bow of the boat to control the sail, which are composed of a drum and a swivel that rotates a rod, allowing sailors to furl the sail when necessary.

Ubi Maior has used CNC milling to produce parts for these assemblies and, therefore, had been operating their machines at full capacity.

Some features and shapes of the newer parts were impossible to make using CNC due to the limited capacity of milling tools to shape complex geometries and create holes. Therefore, Ubi Maior looked for other ways to produce these parts, which were redesigned by Yacht Designer Vieri Abolaffio.

“In 2019, we decided to use 3D printing technology to expand our production and to optimize the work of our CNC milling,” said Raffaele Di Russo, Corporate Brand Manager at Ubi Maior. **“In studying the various technologies on the market, we realized that HP Multi Jet Fusion (MJF) technology was the right one for us.”**

Solution

Ubi Maior began using HP Multi Jet Fusion technology through external suppliers to make prototypes of parts that were previously made using CNC milling. Because the parts would eventually be used on sailboats, they needed to be able to withstand exposure to water, ultraviolet rays, and heat.

The first device to be printed with HP Multi Jet Fusion was a conical roller cage that holds titanium rollers in place as part of the overall shuttle assembly. The shuttle assembly is a component of structural furlers and provides tension on the front side of the headsail.

Parts for this high-resistance pulley assembly can be made from aluminum, titanium, or steel, but also with HP 3D HR PA 12. While the main load is absorbed by titanium rollers, the cage that holds these rollers is made from an assembly of two HP 3D HR PA 12–produced parts.

By 3D printing these roller cages with HP 3D HR PA 12, Ubi Maior found that the assembly exhibited low rotation friction and can withstand heavy loads produced by the tension of the boat’s mast and sails.



Data courtesy of Ubi Maior Italia

Result

Ubi Maior found the pieces produced with HP Multi Jet Fusion technology and HP 3D HR PA 12 material to be more lightweight but also less stiff than those produced by milling, which helped reduce the overall weight of the boat, contributing to better performance without compromising functionality.

“After using [HP] MJF, we moved almost all production from the mills to HP 3D Printing,” said di Russo.

“In addition to optimizing production with small batches, we can also think of making pieces with shapes that CNC milling is unable to achieve,” di Russo said, alluding to the design

freedom made possible by HP Multi Jet Fusion technology. Design freedom also has allowed Ubi Maior to engrave their logo and dye a curved surface in black, enhancing the overall appearance of the part.

The general function of the parts also improved, according to di Russo: **“With [HP] MJF, we were no longer limited by the lathe tools in terms of overhang and flexibility, and were able to stiffen the structure by creating a geometry that would be very hard to do with a lathe. With [HP] MJF, I don’t need to make internal radiuses in cuts—I can have variable thickness right where I need it.”**



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