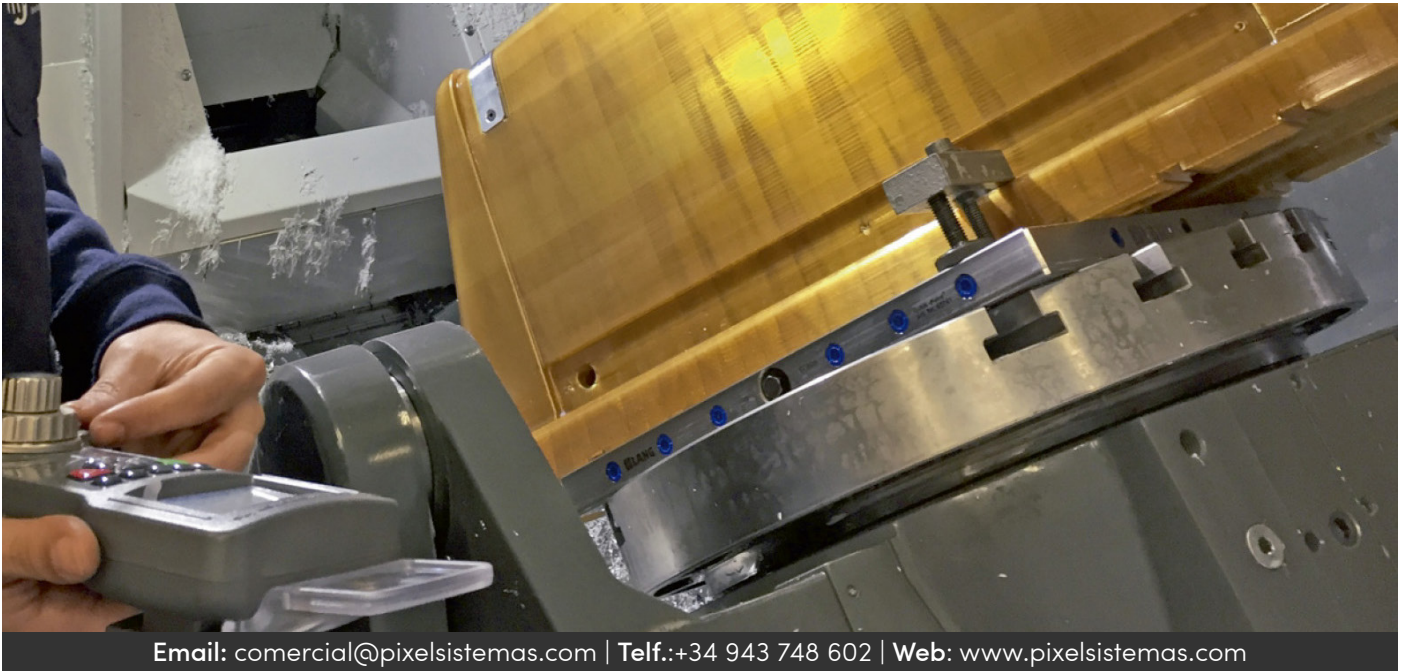


## IDEC and Wehl & Partner Reinvent composite Molding With FDM Additive Manufacturing

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**Sector:** Aerospace

**Challenge:** Increase the competitiveness by reducing the time, cost and material waste of traditional composite molding.

**Solution:** The use of additive manufacturing slashed the production lead- time on the preform tool and also expedited the whole traditional composite molding process.

### CHALLENGE

IDEC is a leading Spanish provider of composite solutions for the aerospace industry, servicing its customers' design and manufacturing needs. With the help of Wehl & Partner, an advanced manufacturing service bureau, the company embarked on a project to increase its competitiveness by reducing the time, cost and material waste of traditional composite molding.

The project focused on exploring the capabilities of resin transfer molding (RTM) technology for testing new composite material and the molding process to manufacture a curved aircraft wing. easibility tests took place throughout the process to assess how production could be accelerated, starting with the manufacture of a conventional preform tool, which is typically made of metal, such as aluminum, or an epoxy resin.



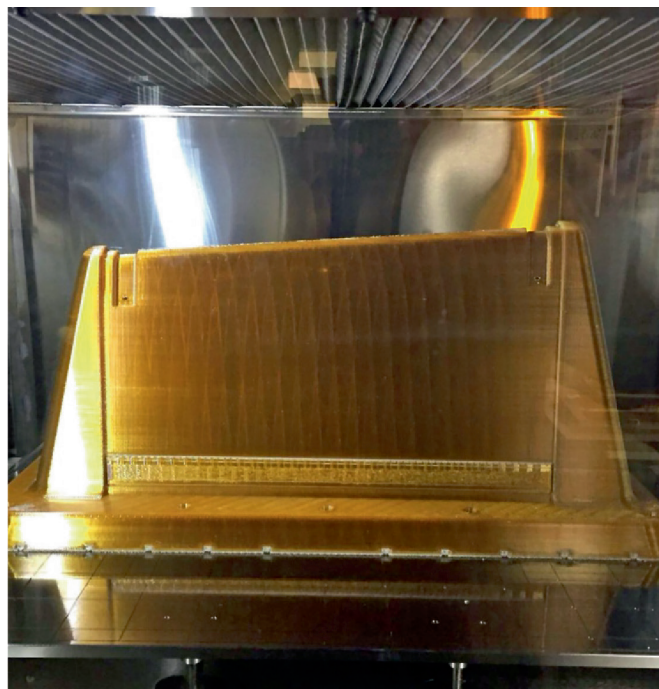
*The preform tool produced with the Stratasys F900 Production System using ULTEM™ 1010 resin.*

### SOLUTION

IDEC engineering team quickly realized of the limitations of metals and epoxy materials during the heating phase of the process which required high temperatures of between 150° and 180 °C. With Wehl & Partner's help, IDEC found an alternative solution in FDM additive manufacturing, which enabled them to test the suitability of the RTM process in conjunction with the aircraft wing project. ULTEM™ 1010 resin was chosen to produce the preform tool. The material's excellent chemical and high heat-resistance enables it to withstand temperatures exceeding 150 °C and required pressures simplifying the preform production process.

The material was also an excellent option to replace metals, thanks to its superior tensile strength and non-conductive properties, vital for the electrical heating application. The result offered a smooth surface finish, enabling optimal adherence with the carbon fiber material and a perfect molding.

Using a Stratasys F900 FDM 3D printer acquired through Pixel Sistemas, Wehl & Partner was able to manufacture a large-scale preform tool using the system's large build tray. The tool was produced in just 60 hours – significantly less time than if the team had selected a more traditional method of manufacture.



*The preform tool offered perfect mechanical properties to resist high temperatures, enabling the reduction of the carbon fiber heating stage.*

### ADVANTAGES

Thanks to the use of ULTEM™ 1010 resin, they have obtained a preform tool with perfect mechanical properties and have been able to deploy an innovative step in the RTM process. This has reduced the composite heating stage from one hour to only ten minutes by flowing the electrical current directly through composite fabrics, which would not have been possible without FDM additive manufacturing.

The team has also been able to save up to 67% of the costs of CNC machining aluminum, a technical innovation which met the initial objective to reduce manufacturing costs.

In conclusion, the solution provided by Wehl & Partner has contributed to IDEC's competitive RTM innovation. It also demonstrates the many possibilities FDM additive manufacturing offers composite molding applications, while adhering to the rigorous technical requirements of the aerospace industry.



*The final composite part of a curved aircraft wing produced with the FDM tooling.*