Sandia National Laboratories

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Printing an 8-Day Wind Turbine Blade Tip Right the First Time

Use Case – How the Fortus FDC Material Delivery and Drying Cabinet Enabled First-Time Print Success at Scale

The Challenge:

An 8-Day Print That Could Not Fail

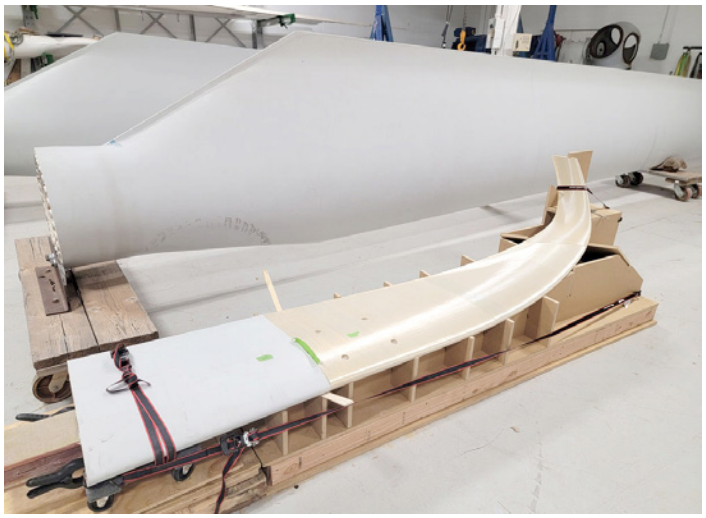
As part of a U.S. Department of Energy–funded initiative, Sandia National Laboratories needed to produce a nearly 2-meter aerodynamic wind turbine blade tip, with no room for failure.

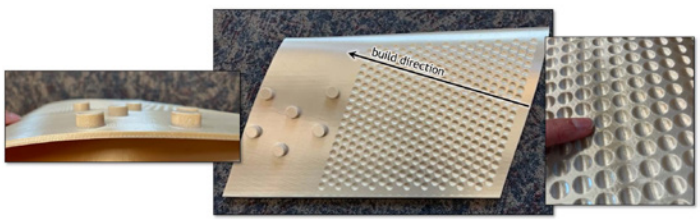
The build required:

- 185 hours of continuous printing
- Eight spools of material
- Multiple automatic material changeovers

Although the part could be printed using Fused Deposition Modeling (FDM) technology, automatic filament changeovers introduced variability across three attempts, affecting surface quality and consistency. With each build consuming more than a week of machine time, failures were costly. The team needed to reduce changeovers and stabilize the process without redesigning the part.

Sandia enlisted the help of Stratasys Direct Manufacturing (SDM). For over 30 years, Stratasys Direct™ has led the way in FDM® 3D printing, helping customers solve complex design and manufacturing challenges. They have a successful track record of delivering reliable, high performance parts for them most demanding applications.





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The Solution:

Fortus FDC with the F900 3D Printer

Working with SDM, the team paired the Fortus FDC material delivery and drying cabinet with the F900® industrial 3D printer to reliably produce the large blade tip in high-performance ULTEM™ 9085 resin. The Fortus FDC increases material capacity while maintaining controlled filament conditioning.

For such a large, complex part, the Fortus FDC reduced material changeovers from seven to just two during the 8-day build. Fewer interventions meant:

- Fewer transition-related defects
- Reduced operator intervention
- Greater material stability during long-duration prints

The Result:

A More Stable, Predictable Production Process

With the Fortus FDC, the team printed the blade tip successfully on the first attempt. The part met quality expectations without the transition defects seen in previous builds, eliminating the cost and risk of additional eight-day reprints.

In large-format additive manufacturing, long builds magnify variability. Changeovers and moisture instability can quickly lead to lost capacity, delays, and waste. By reducing changeovers and stabilizing filament conditioning, the Fortus FDC delivered mission-critical manufacturing confidence.

For more information, this work was highlighted by Sandia National Laboratories in the following article:

https://www.sandia.gov/labnews/2024/08/08/3d-printed-part-adds-value-to-wind-power/