

Milliwave Silicon Solutions Finds Their Solution in 3D Printing with Ingeo™



SITUATION

Milliwave Silicon Solutions' mission is to accelerate the adoption of millimeter-wave (mmWave) products across a wide range of markets. A focus for Milliwave is production of equipment to measure signals from phased array radars, used in autonomous vehicles and 5G, for example. The result is their product, the MilliBox™ - it's a 2-axis, 360°, mmWave radiation pattern test chamber. The MilliBox is the most cost-effective way to perform Beamforming 3D capture, over-the-air (OTA) measurements, antenna array performance tests, beam-steering algorithm testing, in-system antenna placement, compliance testing, and a wide array of other applications.

When company owners, JeanMarc Laurent and Chinh Doan, set out to create this one-box wonder, it was important the chamber be compact yet modular,

extremely accurate yet affordable, and they had a great interest in keeping the carbon footprint of this device as low as possible.

As construction of the MilliBox began, Laurent and Doan found that 3D printing was an essential tool for creating the joints of the box as well as the gimbal inside. They liked how 3D printing made it easy for them to rapidly iterate, validate, and optimize designs for the MilliBox. Initially, they trialed generic, PLA-based 3D filament, but they found that the supply of the larger spools of filament they needed was not reliable, and the printed parts often warped when exposed to elevated temperatures during shipping. They wanted to find a filament that was more environmentally friendly, easy and precise to print with, and produced high-impact parts, able to withstand higher use-temperatures.



SOLUTION

Laurent and Doan found 3D-Fuel, a US filament company, and began a partnership with them keeping their special-order needs in mind. They found that **3D-Fuel** offered Pro PLA filament made with **NatureWorks' Ingeo™ 3D870**, which is not only derived from plants, but also offers higher impact resistance and heat deformation, at elevated temperatures, when annealed. Laurent conducted extensive temperature resistance testing with other filaments but found the Ingeo™ 3D870 based product to be the best performing at his critical threshold of 90°C, while maintaining the precise printability for which PLA is known.

STRATEGIC OBJECTIVES

- Create the Millibox™ as a mmWave radiation pattern test chamber that is nimble, modular, cost-effective, and with a low-carbon footprint.
- Find a reliable 3D filament provider who can accommodate special order needs with an environmentally friendly filament able to withstand extreme heat.

RESULTS

Laurent and Doan created the Millibox™ a 2-axis 360° mmWave radiation pattern test chamber with joints and gimbal printed with Ingeo™ PLA from 3D-Fuel. At this point, their niche market includes a strong base in the Bay Area, but also in the rest of United States and European locations.

RESOURCES

- "Cost-Effective Test Chamber to Evaluate mm-wave Radiation Patterns", EverythingRF
- Milliwave Silicon Solutions website, milliwavess.com
- Millibox™ Product Brief

KEY STAKEHOLDERS

- Milliwave
- 3D-Fuel
- NatureWorks



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