STICKING TO THEIR GUNS

FORTUS 3D PRODUCTION SYSTEMS

Production Fixture is Built in Under a Day Using FDM Direct Digital Manufacturing

"[FDM] actually paid for itself in only seven months."

- Matt Colpitts, Thermal Dynamics

Plasma-cutting equipment maker Thermal Dynamics (West Lebanon, NH), a unit of Thermadyne, is one of the largest suppliers of manual and automated advanced plasma-cutting equipment globally and has been a premier name in the business for more than half a century.

Plasma cutting involves blowing a gas at high speed from a nozzle and forming an electrical arc through that gas to the surface being cut. The gas turns to plasma — a state in which the molecules break apart into ions. The plasma is hot enough to melt the metal and fast enough to blow the metal away from the cut. Plasma cutting is extremely fast, and it creates a clean cut that requires little cleanup.

Plasma cutting systems use considerable electrical power, and as a result their power supplies generate a lot of heat. Thermal Dynamics power supplies use a special thermal-interface material to protect electronic components by transferring the heat from the components. The thermal-interface material is applied to the heat-generating components using hand-held air-powered pumps that are commonly called "goo guns."

How Did FDM Compare to Traditional Methods for Thermal Dynamics?

Method	Cost Estimate	Time Estimate
Conventional machining and fabricating (6 fixtures)	$12,000	7 Days
Direct digital manufacturing with FDM (6 fixtures)	$2,040	4 Days
SAVINGS	**$9,960 (83%)**	**3 Days (42%)**

Real Challenge

As part of their job, assemblers repeatedly pick up the goo guns, apply the viscous thermal-interface material and set the guns down. In the past, the assemblers expended considerable effort to continually pick up and set down the heavy guns. After each material application, a small amount of the expensive material was lost when it leaked from each gun, creating a sticky mess that required cleaning. Production workers tried building several makeshift fixtures to make the guns more accessible and capture the leaking material, but they did not provide satisfactory performance.

Recently Thermal Dynamics' R & D department purchased an FDM-based Fortus 3D Production System, which it uses for the rapid prototyping of injection molded parts.

Thermal Dynamics is one of the leading suppliers of plasma-cutting equipment.

In production, the "goo guns" dispense thermal interface material, which protects electronic components from heat.

After each application, expensive material would leak out of the guns, making a mess.

The department's goal was to perfect product designs before they reached tooling, thus reducing the need for mold rework.

Real Solution

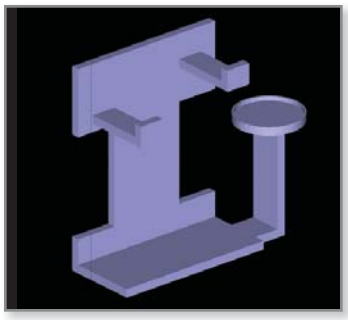
Although the Fortus system was put to work building prototypes, engineers quickly realized its potential for direct digital manufacturing. Thermal Dynamics Manufacturing Engineer Jill Markowski designed a fixture especially for the task of making the guns easily accessible and capturing leaking material on a tray for collection and reuse. R&D Engineering Associate Matthew Colpitts suggested building the fixture from thermoplastic using the Fortus machine rather than metal.

Colpitts estimated it would have cost at least $2,000 and taken one week to build the fixture from aluminum using conventional machining and fabricating. Instead, the company employed direct digital manufacturing to produce the fixture overnight. With the Fortus system, Colpitts built the fixture from polycarbonate in just 17 hours at a cost of $20 per hour, totaling about $340. The assemblers liked the racks but had a few suggested changes. Colpitts integrated the improvements and manufactured five more of the fixtures. It takes only about 4 days to build a total of six fixtures. "We saved about $10,000 on the cost of building these fixtures," he says. "And we may not have built them at all if we didn't have the FDM direct digital manufacturing tool."

"The new fixtures speed up the assembly process by making the gun more accessible, and they reduce material costs by capturing essentially all of the thermal-interface material," Colpitts says. "The assemblers like the fixture because it makes their job easier and their workplace cleaner."

Colpitts has since used the Fortus system to build other fabrication and assembly tools, such as a screw jig that holds eight M6 screws in place as they are fastened to printed-circuit boards. By holding the screws in exactly the right position, the screw jig reduces the time required to run the screws down, and it prevents damage to electronic components.

The Fortus FDM system has also been extremely effective in its original role of producing prototypes of injection molded parts. "When we originally purchased the machine, our president said that he wanted to see it pay for itself in one year," says Colpitts. "But it actually paid for itself in only seven months by avoiding a tremendous number of changes to molds."



This fixture was designed to hold a production goo gun and capture any material that dripped.

An FDM-built fixture cradles a goo-gun.

For more information about Fortus systems, materials and applications, call **888.480.3548** or visit **www.fortus.com**

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