

DDM PULLS ITS OWN WEIGHT

Manufacturer Uses Direct Digital Manufacturing to Keep Material Production Running Smoothly

“Direct digital manufacturing eliminates all the time-consuming steps in fixture making — documenting, quoting, tool-path design, machining, and assembly.”

– Paul Sollie, Stratasys Director of Manufacturing

Stratasys uses direct digital manufacturing to produce fixtures for testing and assembly of its machines and materials.



Real Challenge

Fixtures for assembly, calibration, and inspection are used in Stratasys' manufacturing processes, as it produces new machines and plastic build materials. When design changes or production problems occur, manufacturing engineers scramble to produce new fixtures. The pressure can be intense, and delay is undesirable. To avoid production halts and quality problems, new fixtures must be designed, manufactured, and put into service quickly. To produce the fixtures, engineers use FDM (fused deposition modeling) machines. This tool slashes weeks from the response time of conventional machining and fabrication.

In its materials production lab, Stratasys employs a pull-force test fixture that is used for quality control of its material canisters. The unit tests the pull force required to withdraw plastic filament from the canister and feed it into the extrusion mechanism of its additive fabrication machines. An engineer identified a problem with the test fixture: it was causing false pull-force readings. The problem was that the radius of a material transport wheel was too small, throwing off the readings. The engineer drew up a new material transport wheel design in CAD and manufactured the complex portion on a Fortus FDM additive fabrication machine to save time, while the easy portion was machined. Within 24 hours, the problem was solved, and the test fixture was giving accurate readings.

Real Solution

“The engineer did a great job handling the problem. She had a solution in place before it negatively affected production,” says director of manufacturing Paul Sollie. “It would be nice if all manufacturing challenges could be handled that quickly. If we would have had the new fixture component machined, we would have spent more time than we did – just to get a quote from a machine shop.”

Accelerating construction of the fixtures and simplifying the process are what make short lead-times possible. “Direct digital manufacturing eliminates all the time-consuming steps in fixture making — documenting, quoting, tool-path design, machining, and even some assembly,” Sollie says. “This allows us to respond faster with accurate and durable fixtures. Without the additive fabrication machines, we had two- to six-week lead times for fixtures,” says Sollie. “While waiting for them, we had to put Band-Aids on the problem. Now our team is putting new fixtures in service in just one day.”

Since employing FDM to create fixtures at Stratasy, the manufacturing engineering department is responding faster and increasing its productivity. "What used to be a major project is now a simple task," says Sollie. "This means that we're getting more work done without increasing our headcount." From design CAD data, engineers extract contact points and surfaces to make fixtures with perfect fits. The new design is then processed, downloaded, and manufactured with only a few minutes of labor. "It's easy for engineers to make their own fixtures. The process is automated, so it doesn't take much of their time. It makes fixture-production a 'self-serve' function that is accessible and available. You don't have that when you're relying on a machine shop."

Easy and accessible, direct digital manufacturing also promotes design iterations and innovations. "We're testing alternative fixture designs that have a direct impact on quality, productivity, and efficiency," says Sollie. Since there's no time or cost penalty for complexity, the manufacturing engineering department is conceiving designs that would have been impractical with conventional machining. "Our engineers are designing purely for the function of the fixture instead of designing around the limitations of forming, fabricating, and machining."

"When new products, design revisions, and manufacturing problems are handed to us, we're in control, and the team is more proactive. This means that quality products are delivered to schedule, which makes life in manufacturing less chaotic and much more pleasant."



The pull-force test fixture uses the wheel on the left to give the material filament the proper radius.

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