CLEAN SWEEP

Stratasys®
3D Printers and Production Systems

FDM Fixture Helps Bring Vacuum Cleaners to Market One Month Faster

"FDM fixtures enable us to start production one month earlier than in the past."
—— — Craig Ulmer, Senior QA Labs Technician, Oreck

The Oreck Corporation is a family-owned business that began by manufacturing upright vacuum cleaners for the U.S. hotel industry and now sells vacuums used in hotels and homes throughout North and South America, Europe and Asia. Oreck produces lightweight and easy-to-use cleaning products for every room in the house with exceptional durability.

Every Oreck product incorporates 20 to 30 complex injection molded parts; each part must meet specific dimensional tolerance requirements to ensure proper assembly and performance. Before a new product can begin production, molds used to produce these parts are tested by producing first articles. Oreck's quality assurance (QA) department uses a coordinate measuring machine (CMM) to inspect a first article part before each mold is shipped to their manufacturing plant and again once the mold has been put into production at their facility. During this inspection process the first articles must be positioned level. If the part is not held level, when the CMM probe reaches to inspect a deep feature such as a pocket or a hole, the probe shank will hit the wall before the probe touches the bottom of the feature. The CMM will then report that the feature is too shallow and the first article will be rejected even if it is correct.

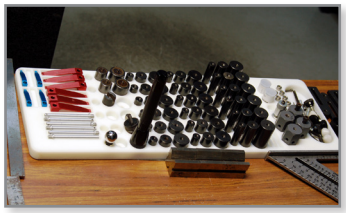
How Did FDM Compare to Traditional Tooling Methods for Oreck?

Method	Tool Production Time	Tool Cost	Inspection Set Up Time Savings
Traditional (CNC)	7 days	$250	30 days
FDM	3.5 hours	$55	1 day
SAVINGS	3.5 days (50%)	$195 (78%)	29 days (97%)

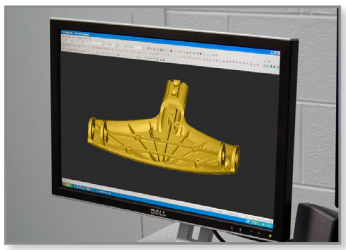
Traditionally, combinations of modular aluminum clamps in different sizes were used to hold the first articles during inspection. For parts that were organic in shape and lacked the suitable surfaces required to hold the part level, fixtures were manufactured using traditional machining methods to hold the part consistently and avoid measurement errors and false rejections. On average, it took about 30 minutes to set up the clamps to hold a single first article. Programming of the CMM, which took an additional two to four hours, could begin only after the first article had been received and the fixture had been properly set up. Each new product introduction typically required that 20 to 30 unique first articles be set up on the machine, programmed and inspected. Typically, this entire process would take about three weeks to complete. Meanwhile, these production molds could not be approved and shipped until they had each passed their first article inspection.

In addition, sometimes errors could be introduced into the setup due to the manual nature of the process. In these situations, the part would fail the inspection. The quality control department then had to perform an investigation, rebuild the fixture, reprogram the CMM and re-measure the part. In the past, this happened about once per month and it typically took up to eight hours to correct. As Oreck attempted to push its product to market faster, it became obvious that the inspection of first article parts was creating a bottleneck.

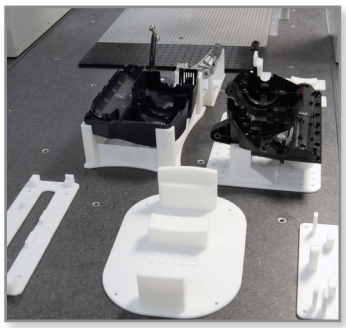
During a discussion in the model shop, an interesting idea arose for a potential solution



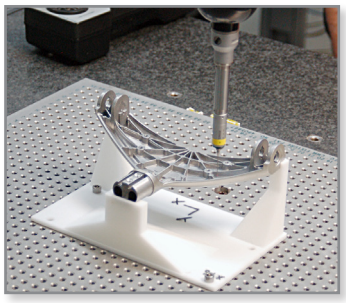
Modular clamps were used in the past to hold first articles during inspection



CAD drawing of a first article.



First articles mounted in FDM fixtures on CMM table.



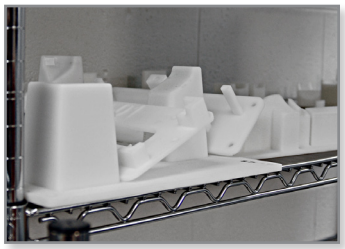
Inspection lead time of this first article was reduced from 30 days to 1 day by switching to an FDM fixture.

to this bottleneck. Oreck was already building Fused Deposition Modeling (FDM) prototypes in its model shop; the head of the model shop suggested using FDM to build custom fixtures for first article inspection. FDM technology is an additive manufacturing process that builds plastic parts layer by layer, using data from computer aided design (CAD) files. “I found it was very easy to design the fixtures in CAD software based on the CAD drawing of the part to be inspected,” said Craig Ulmer, Senior Quality Assurance Labs Technician for Oreck. “It costs between $50 and $200 to make each FDM fixture depending on the size of the part, and it only takes minutes to set up the first article in the fixture for the inspection.”

Ulmer said the biggest advantage of using FDM is that he can now build the fixture after the design has been finalized but before the first articles are built. He then can use the fixture along with an FDM prototype part to program the CMM machine to inspect the first article. The result is that when he receives the first articles for a new product he has already built FDM fixtures and has already programmed the CMM to inspect each of the first articles. FDM fixtures hold the first articles consistently and perfectly level so no time is lost for investigation and re-measuring.

“I can now easily inspect all of the first articles for a new product in one day as opposed to weeks in the past,” Ulmer said. “This means we can give the go-ahead to start production weeks earlier than in the past. The accuracy and consistency of FDM allows them to move the programming stage up in the process, and essentially remove the first article inspection process from the critical path of their new product development schedule. This makes it possible to start production faster.”

First article shown as part of assembly



Oreck has built many FDM fixtures for CMM inspection.

Stratasys | www.stratasys.com | info@stratasys.com

7665 Commerce Way
Eden Prairie, MN 55344
+1 888 480 3548 (US Toll Free)
+1 952 937 3000 (Intl)
+1 952 937 0070 (Fax)

2 Holtzman St.,
Science Park, PO Box 2496
Rehovot 76124, Israel
+972 74 745-4000
+972 74 745-5000 (Fax)

ISO 9001:2008 Certified

For more information about Stratasys systems, materials and applications, contact Stratasys Application Engineering at 1-855-693-0073 (toll free), +1 952-294-3888 (local/international) or ApplicationSupport@Stratasys.com.