

Aerospace company profits from breakthrough handheld scanning technology from Z Corporation

M7 Aerospace

- Leading provider of aerospace and defense services, including maintenance, repair, modification and overhaul.

Challenge

- Obtaining engineering-quality information, including the actual geometry, of customer aircraft.

Strategy

- Using a ZScanner 700 PX to quickly and efficiently capture engineering information from very large objects.

Results

- M7 quickly and easily captures ultra-detailed aircraft data to expedite maintenance, repair, modification and overhaul.
- M7 Aerospace offers customers full-plane scans for their own use.
- M7 scans provide both reverse-engineering data for a subject plane and design templates for entire fleets.
- The ZScanner 700 PX's unique combination of photogrammetry and high-resolution scanning enables cost-effective scanning of very large objects.

When a 30-year-old aircraft arrives in the hangar for retrofitting or repair, the more information you have the better. Yet engineering-quality design data can be elusive. The original plans, wherever they are, are often on paper and by definition in 2D form. Moreover, the same plane model varies from aircraft to aircraft because of manufacturing variations, modifications, damage or wear and tear. So from an engineering perspective, you don't always know exactly what you're looking at.

This information gap has always been a reality and a cost of doing business for companies like M7 Aerospace, a Texas, U.S.-based aviation services firm that provides a full range of maintenance, repair and overhaul services for civilians, military and foreign governments.



CHALLENGE

Flying blind

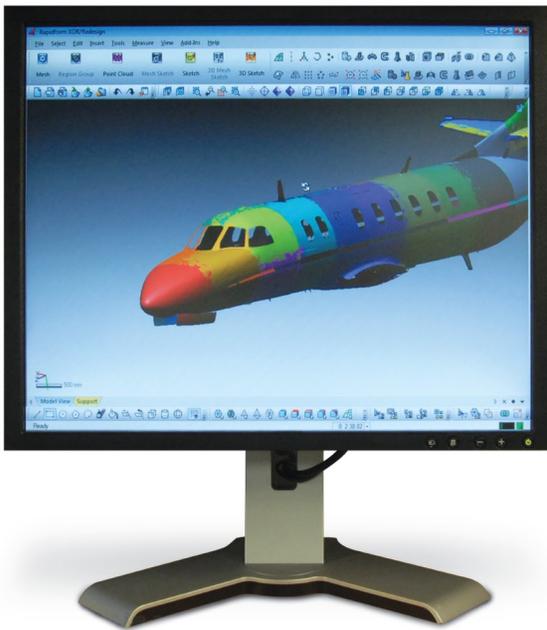
Without precise engineering data, modifications can be time-consuming and expensive. Fitting parts and installing aftermarket equipment can be a case of trial and error. Anomalies can cause delays.

Yet the need for service on older aircraft is pressing. Older, viable aircraft are often called upon to perform modern roles that may require modification such as avionics upgrades, cosmetic work, ballistic blankets, external sensor installations for missile defense systems, or all of the above.

Meanwhile, the traditional method for capturing 3D engineering data from objects — scanning — has, until recently, come with critical shortcomings. Most scanning technology still requires jigs, fixtures, tripods or mechanical arms for point of reference. Putting a plane in a jig or arranging and re-arranging tripods and mechanical arms around a large aircraft is a monumental undertaking. And after scanning the plane — which could take weeks, months or years, if attempted at all — a team has to use software to stitch together the mosaic of images, taking pains to ensure that each frame lines up with every other and is assembled in the proper order. In other words, scanning a plane has been untenable, until now.



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STRATEGY

Adopting the ZScanner 700 PX

All this changed when M7's computer-aided design (CAD) services provider, AGS 3D, Inc. (www.ags-3d.com), introduced M7 Aerospace to powerful new technology from Z Corporation, provider of uniquely portable 3D scanners.

The ZScanner® 700 PX, Z Corporation's handheld laser scanner, makes it easy for the first time to scan very large objects such as aircraft and automobiles, items that previously have been too big to capture by hand.

The ZScanner 700 PX's breakthrough in scale stems from built-in AICON™ photogrammetric software, previously available only in fixed-position 3D scanners that lack the handheld's mobility, speed and convenience. This photogrammetry capability, which provides high accuracy on very large objects, is uniquely combined with the ZScanner's laser scanning functionality for fine data capture at high resolution. The result is very high resolution and accuracy even across extremely large surfaces.

And as the world's first handheld, self-positioning 3D scanner, the ZScanner automatically determines its location in space without the need for external orienting devices. The user simply sweeps the scanner over the target surface of the aircraft, automobile, boat or other object.

RESULTS

Quick, precise scanning for reverse engineering

M7 used the ZScanner to precisely capture the entire surface of a Fairchild Metroliner, in a resolution of 0.1 mm, in just three days. The Fairchild Metroliner is a 19-seat commuter-class turboprop aircraft with a 57-foot wingspan. The team first scanned the plane to create a "macro" photogrammetry model and then scanned it again using the laser scanning function. Thus, surface data was captured at the micro level in the context of the photogrammetry framework. The digitized object appears on a laptop screen intact, eliminating costly and time-consuming post-processing. Data simply falls into place.

"Even if the team is operating multiple scanners and laptops, the ZScanner brings it all together into one point cloud," says Joe Furnish, M7 Aerospace vice president of engineering services. "No file repair is required. The software understands what it's looking at."

When the scanned file is complete, M7 imports the file into CATIA® CAD software as a parametric solid model editable just like any other part designed in CAD. "At this stage, M7 has its engineering information in hand, in 3D, and ready to use for quicker, more accurate and more economical service," says Furnish.

With the ZScanner, M7 is now able to offer a new service to scan any aircraft — exterior, interior or both, creating precise, three-dimensional portraits of entire planes down to one-thousandth of an inch. This gives both M7 Aerospace and the plane owner the precise engineering data they need as well as an approximate design template for any plane based on the same design.

"There's a growing need for both our government and commercial customers to keep their older aircraft flying and productive," says Furnish. "This new scanning capability helps us do that. By automatically capturing deep engineering data, we can more quickly and efficiently reverse-engineer aircraft and components that were originally designed in the 2D era — before 3D CAD was readily available."

AGS 3D President Richard Honey expects large-scale scanning to take off in aviation and other industries. "There's an increasing demand for large-scale scanning in every business that engages in reverse-engineering, inspection, 3D archiving, measurement, damage assessment and similar activities," he says. "The ZScanner's speed, accuracy, and ease of use translate into cost savings, new revenue and increased quality."

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Engineering Services,
M7 Aerospace



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