Markforged

Cabin Management Solutions

INDUSTRY	Aerospace
APPLICATION	End-Use Parts
LOCATION	Texas, USA
CUSTOMER SINCE	2019
MATERIALS	Onyx FR, Carbon Fiber

CMS
CABIN MANAGEMENT SOLUTIONS

THE CUSTOMER

Launched in 2019, Cabin Management Solutions (CMS) is a small, privately held in-flight cabin management and entertainment systems company in Conroe, Texas.

CMS works with aircraft maintenance, repair, and overhaul (MRO) companies and private owners to design and develop cabin control and entertainment systems for luxury private and business jets. The company was founded to provide a cost-effective, quick-turn alternative to the long lead times and high costs associated with cabin management maintenance, upgrades, and replacements.

Though CMS is relatively new, two of its founders, Jeff Pike and Jeff McCormick, have over 35 years of experience in the avionics industry between them. The company has quickly developed a reputation for its fast time to market, high-quality deliverables, and rigorous testing and certification process. The CMS team credits much of their success with the decision to keep most of their product design, engineering, manufacturing, and certification under one roof at their East Texas headquarters.

1. The CMS team designed and 3D printed hundreds of parts for a single aircraft.

2. CMS electroplates custom decorative bezels made from Markforged Onyx FR with continuous carbon fiber.

3. All parts and materials used on any aircraft must be FAA compliant and approved before they can be installed.

CMS works with aircraft maintenance, repair, and overhaul (MRO) companies and individual aircraft owners to design and develop cabin control and entertainment systems for luxury private and business jets.

The CMS team uses their on-site RTCA/DO 160 test lab to test all parts for temperature variation, humidity, shock, vibe, centrifuge, magnetic effect, power input, voltage spike, flammability, and more.

THE CHALLENGE

CMS is often asked to replace or repair aging cabin systems in luxury jets. Many projects involve discontinued parts and components originally produced by now-defunct manufacturers. The majority of these projects require CMS to create low-volume, high-value parts from scratch. Specific items can range from overhead reading lights, thermostats, panel switches, USB chargers, custom mounting brackets, in-seat entertainment screens, and everything in between. Many of these completed parts will be visible to the naked eye, so retaining and maintaining their upscale aesthetics is almost as important as ensuring functionality.

One-off projects can be time and labor intensive to manufacture. They are also fairly complex as they often involve fitting new designs into pre-existing layouts. It's not unusual for customer requests to change mid-production. As such, the CMS team frequently needs to be prepared for last-minute, on-the-fly modifications. Most importantly, all aircraft materials and parts must be thoroughly tested and traceable in order to qualify for Federal Aviation Administration (FAA) approval.

> "Markforged printers have helped us get to the point where we can compete with the big companies in this industry."

JEFF PIKE
VICE PRESIDENT OF ENGINEERING
CABIN MANAGEMENT SOLUTIONS

CMS has a reputation for its fast time to market, high-quality deliverables, and rigorous testing and certification process.

CMS creates numerous low-volume, high-value parts from scratch including overhead reading lights, thermostats, panel switches, USB chargers, in-seat entertainment screens, and everything in between.

“In the aerospace industry, quality and on-the-fly adaptability are crucial to success. Markforged more than delivers on both fronts.”

JEFF PIKE
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THE SOLUTION

Soon after CMS opened its doors in 2019, the team purchased two Markforged industrial X7 3D printers. They immediately saw the value of 3D printing when compared with conventional manufacturing and materials. Additive manufacturing made it possible for CMS to keep the majority of its operation in-house rather than outsourcing production, as so often happens when using traditional methods. This has been hugely beneficial to the company in terms of the number of jobs they take on and the speed at which they are able to complete them. “Other printers don’t generate as high quality a finish, leading to additional post-processing that the CMS team is able to avoid when using the X7,” says Pike.

CMS prints all their parts on their two Markforged X7 printers using Onyx FR, a certified UL 94 V-0 rated flame-retardant nylon filled with chopped carbon fiber. With Onyx FR, CMS delivers custom parts, such as in-flight entertainment retrofits, that are high-strength, low-weight, and flame-retardant. In order to meet the specific demands of its luxury-oriented customers, the team then adds an extra level of customization via overlays that mimic upscale cabin surfaces including gold electroplating, wood veneer, and more. This ensures the end product is FAA compliant while going above and beyond customer aesthetics and expectations.

On one jet in particular, the CMS team printed at least 100 different parts using the X7. This included roughly 29 light switch panels, a cabin climate controller, latches, release buttons, USB-C and drop-in USB-A chargers, adjustable touch screen brackets, and more. The majority of those printed parts were then electroplated with gold-plated bezels to match the preexisting interior design of the cabin. This resulted in more durable parts that looked and felt as upscale as the originals.

The CMS team frequently adds extra customization via overlays that mimic upscale cabin surfaces such as gold metal electroplating, wood veneer, and more.

CMS uses Onyx FR to deliver custom parts that are high-strength, low-weight, and flame-retardant.

The Future

CMS has big plans for the future, especially with Markforged's recent release of two new materials: Onyx FR-A and Carbon Fiber FR-A. Both materials come with with full material traceability and are undergoing qualification on the Markforged X7 printer via a program conducted by the National Center for Advanced Materials Performance (NCAMP), one of two bodies authorized by the FAA to qualify materials for flight. Once this process is complete, CMS will be able to leverage the data to push printed parts into critical applications with confidence.

Markforged / MLC CAD Systems LLC

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