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Chen Zhiyi / Eastern Airlines Technic Co., Ltd.

CEA the first domestic airline in China to have 3D-printed interior parts in commercial planes.

#### CASE STUDY

# High-Quality Flying

## CHINA EASTERN AIRLINES EXPLORES ADDITIVE MANUFACTURING FOR AIRCRAFT MAINTENANCE

China Eastern Airlines (CEA) operates a modernized fleet of over 600 aircrafts, reaching 1,062 destinations in 177 countries. To ensure flight safety, Eastern Airlines Technic Co., Ltd. shoulders the important tasks of CEA’s aircraft maintenance and part repair.

Aviation requires extremely high safety standards, so what inspired CEA to begin using additive manufacturing (AM)? In 2015, CEA’s first brand-new Boeing 777 passenger aircraft had misprinted seat signs. The cost for purchasing replacements was too expensive for such a small error, so engineers used 3D printing. The new signs were ready in three days at a much lower cost, so CEA quickly set up a dedicated AM lab to explore more applications for 3D printing.

## CEA Additive Manufacturing Lab

Eastern Airlines Technic set up the lab with a Fortus® 450mc and ULTEM™ 9085 resin, a high-performance thermoplastic material with high strength-to-weight ratio compliant to relevant FAA and CAAC25 requirements.

Since its inception, the lab has successively produced and installed more than 300 finished parts, making CEA the first domestic airline to have 3D-printed interior parts in commercial planes. By 3D printing small batches, the company cuts lead times and cost of purchasing spare parts, while still ensuring safe, comfortable flights for passengers.

“In the past, if any cabin parts were broken, we had to buy new ones from designated suppliers, which could take up to three months. Sometimes there were no available parts at all,” said Chen Zhiyi, Additive Manufacturing Lab R&D engineer. The long lead times meant broken parts couldn’t be fixed quickly, which downgraded passengers’ flying experiences. “That’s why we use 3D printing, it solves this problem in an efficient and innovative way,” said Zhiyi.

### 3D Printed Interior Parts

The AM lab has enabled Eastern Airlines Technic to transform their business from proposal submission to part design to production. The lab has developed a number of different aircraft interior parts, including seat armrests, cabin door handle cover plates, baggage holder lock catches, electronic flight bag supports and newspaper holders.

Many pilots use an electronic flight bag instead of thick flight manuals, so the AM lab designed and 3D printed a custom support device. Various aircrafts, including Airbus 330 and 320, Boeing 737 and several commercial airlines have purchased and installed this device.

Newspaper holders on the back of cabin seats are easily damaged from frequent collisions with dining carts and broken parts can injure passengers. Since lead times for ordering new parts is quite long, the lab can design, 3D print and install new ones quickly while still meeting strict approval guidelines. By creating replacement parts in house, Eastern Airlines Technic can efficiently bridge the gap in the current supply chain system and maintain a comfortable flying experience for passengers.

### Future Plans

The Additive Manufacturing Lab of Eastern Airlines Technic has transformed into an advanced manufacturing department with expanding capabilities.

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The lab plans to explore more AM applications in aviation, such as safety pin storage boxes, 3D printed molds and customized training aids, aiming for intelligent manufacturing with zero inventory, on-demand production and digital management.



Many airline pilots prefer an electronic flight bag instead of searching through thick flight manuals. Eastern Airlines Technic designed and 3D prints this electronic flight bag support device.



The 3D printed electronic flight bag support device installed by Eastern Airlines Technic AM lab.



Another type of flight bag support device 3D printed by Eastern Airlines Technic AM lab.



Purchasing spare newspaper holders could take up to three months, so the Eastern Airlines Technic AM lab 3D prints replacements instead.

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