



ADDITIVE MANUFACTURED ULTEM 9085 AUXILIARY POWER UNIT (APU) DUCT

**OVER THREE YEARS ON A C-5
AIRCRAFT AND STILL FLYING HIGH**

PROBLEM

High-speed air flow from the exhaust of a C-5 was causing the suction of outside air through the APU inlet duct for cooling. The previous fiberglass and rubber assembly design was failing in the field due to the center rubber coupling imploding during use, causing restricted air flow to the system.

SOLUTION

The Air Force Rapid Sustainment Office's (RSO) Advanced Manufacturing Program Office (AMPO) and the C-5 System Program Office developed a 3D printed solution using ULTEM 9085. The duct was redesigned to have less flexibility by removing the center rubber coupling and printing it as a three-piece assembly, enhancing the performance of the component by allowing it to withstand high vacuum loads under extreme environmental conditions. The 3D printed ULTEM 9085 duct was installed on a C-5 aircraft in December 2021 and has been in service since.

IMPACT

Using ULTEM 9085 strengthened the APU inlet duct and reduced potential failure modes, ultimately improving aircraft availability. Additive manufacture of the duct also resulted in significant cost avoidance and reduced procurement lead times by an estimated 247 days.

OPERATIONAL IMPERATIVE

5. Defining optimized resilient basing, sustainment, and communications in a contested environment

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