

Boom Supersonic

Use Case – Bleed Air Duct

Customer Profile

Boom Supersonic is redefining what it means to fly. As builder of Overture, the world's fastest commercial airliner, Boom's vision is to make the world dramatically more accessible through supersonic travel. Boom is currently developing the XB-1, a one-third scale demonstrator to prove key technologies for safe, efficient supersonic travel. XB-1 will help refine the design and engineering of Overture.

Challenge

A test requirement for the XB-1's J85 engines includes backpressure testing. This is accomplished by rerouting core engine compressor bleed air through a series of ducts. Although the parts used for the test will not be flight hardware, they are required to supply engineers with the necessary test data.

Traditional construction of these ducts involves machining them from aluminum bar stock. However, there are several drawbacks to this process:

- Long lead time for fabrication (7 weeks)
- Material waste due to the bulk of the material being machined away
- Higher material costs

Solution

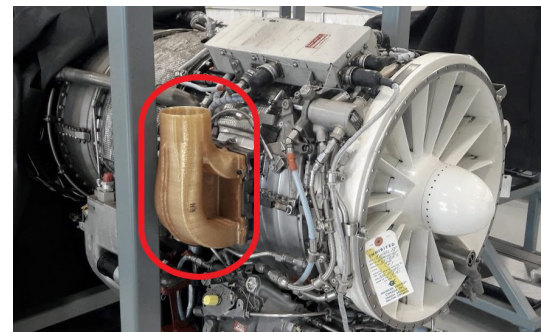
Instead of machining, Boom used additive manufacturing to make the ducts with heat resistant ULTEM™ 1010 resin. This solution provided a number of benefits:

- Significantly reduced lead time
- Lower material cost
- Greater design freedom

Additive manufacturing (AM) gave Boom the ability to produce the ducts more quickly by avoiding the typical machining backlog queue and machine setup. Material cost was reduced because AM uses only the amount of material needed to build the part. This contrasts with the high percentage of material waste associated with CNC machining. AM also eliminated design-for-manufacturability constraints inherent with machining, allowing engineers the freedom to achieve the optimal duct design.

Impact

FDM® additive manufacturing let Boom fabricate the ducts in 14 hours. Traditional manufacturing would have taken seven weeks. Additionally, total cost amounted to only \$150 instead of \$9000 for conventional machining, a 98% savings.



Material Cost Savings



98%

Lead Time Savings



95%