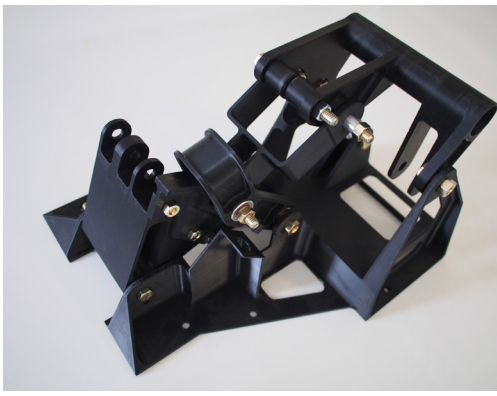
Boom Supersonic

Use Case – Rudder Limiter Prototype

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

The rudder limiter is a device that controls rudder deflection (movement), which is especially critical during supersonic flight. Large in-flight deflections could damage the aircraft. A functional prototype of the rudder limiter is required to test the design's kinematics and validate proper operation.

Manufacturing a working prototype of the rudder limiter requires separately machining each part of the assembly. However, there are several drawbacks to this process:

- Long lead time for fabrication (8 weeks)
- Material waste associated with machining
- Higher material costs

Solution

Instead of machining, Boom used additive manufacturing to make the parts with ASA, an engineering thermoplastic. This solution offered the following benefits:

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

Additive manufacturing (AM) gave Boom the ability to produce a functioning rudder limiter prototype 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 each 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 design for each part in the assembly.

Material Cost Savings

96%

Lead Time Savings

86%

Impact

FDM® additive manufacturing let Boom fabricate the rudder limiter parts in 44 hours. Traditional manufacturing would have taken eight weeks. Additionally, total cost amounted to $150 instead of $12,000 using traditional milled aluminum.