Additive Manufacturing at Northrop Grumman

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CPSG 230 · College Park Scholars Academic Showcase, May 1, 2026

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Introduction

Additive manufacturing (3D printing) is transforming aerospace production. At Northrop Grumman's Chandler, AZ facility, the additive lab produces both flight-critical and non-flight hardware for programs across the company. As a Mechanical Engineering co-op, I operated and maintained an industrial 3D printing operation while contributing to real engineering projects and taking on responsibilities beyond a typical student role.

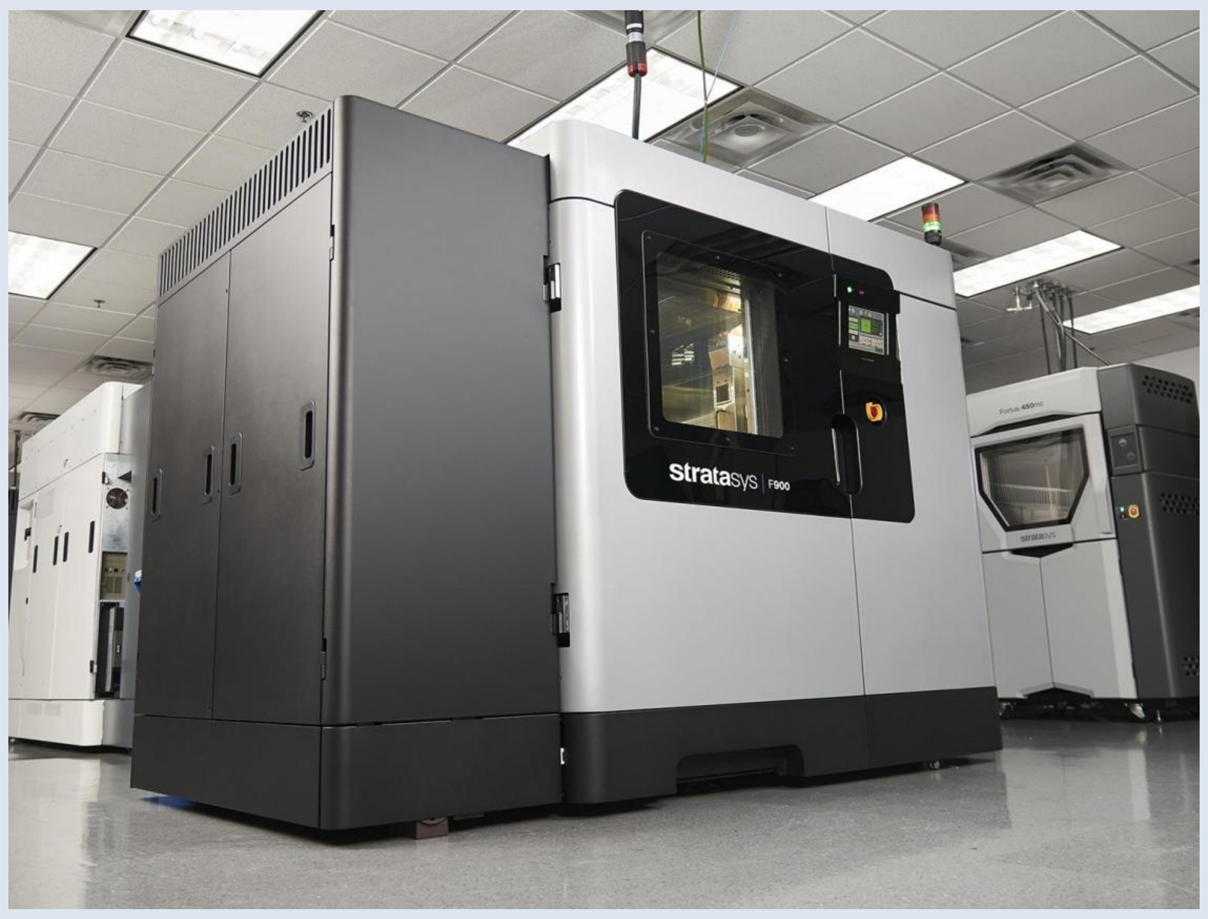

Figure 1: Stratasys F900 printer

Equipment & Materials

Stratasys machines:

- F900
- Fortus 450mc ×2
- F370 ×3
- Prusa XL
- Prusa Core One

Aerospace-grade materials:

- ULTEM 9085
- ABS-M30
- ASA
- TPU
- Polycarbonate
- Nylon 12CF
- Antero

Site Information

Northrop Grumman Corporation
Additive Manufacturing Lab · Chandler, AZ

Supervisor: Blaine Baker

Mission: Design, develop, and produce advanced aerospace and defense systems

Focus: Industrial additive manufacturing for flight and non-flight hardware production

SCIENCE AND GLOBAL CHANGE

Activities

Printer maintenance: Tip & head swaps, spool changes, filament jam clearing, and calibrations across all platforms

Print setup: Sliced and prepared jobs using GrabCAD Print and Insight software

Post-processing: Operated support-dissolving tanks; ran compressed air purge cycles and vacuum chamber processing

Hardware finishing: Manually tapped and installed steel helicoil inserts into printed parts

Production: Manufactured flight and non-flight hardware for all programs at Northrop Grumman, on request from each program team

Impact

7+ Printer platforms operated	**7** Aerospace-grade materials
~40hrs Solo lab management	**Multi-$k** Cost analyses completed

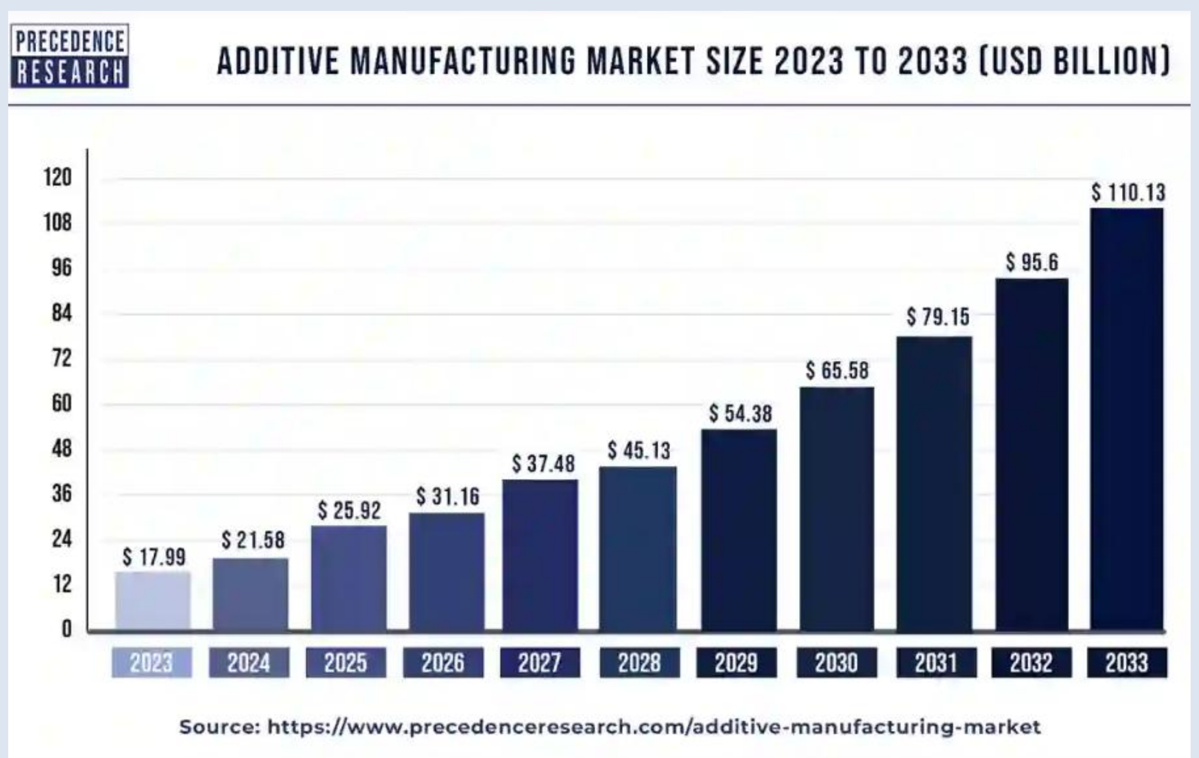

Figure 2: Predicted additive manufacturing growth

Discussion

This practicum provided hands-on experience with industrial-scale additive manufacturing in an aerospace defense environment. Working alongside experienced engineers, I developed both technical skills and engineering judgment for flight hardware, including material tradeoffs, post-processing, cost, and safety. Independently managing the lab for a week reinforced real-world accountability that goes beyond education. This experience positions me to contribute to the growing role of additive manufacturing in aerospace and develop valuable insight into the manufacturing process.

Engineering Projects

Outlet cover design (safety initiative)

Designed and prototyped a custom outlet cover to mitigate fire risk from metal chips in the machine shop; final version is installed and in use.

FCDC manifold redesign (in progress)

Leading a redesign of FCDC manifolds to improve manufacturability with additive methods, considering print constraints, materials, and production timelines.

Cost analysis for programs

Performed detailed cost breakdowns for internal programs, estimating model material, support material, machine time, and labor, enabling programs to accurately budget 3D printing requests.

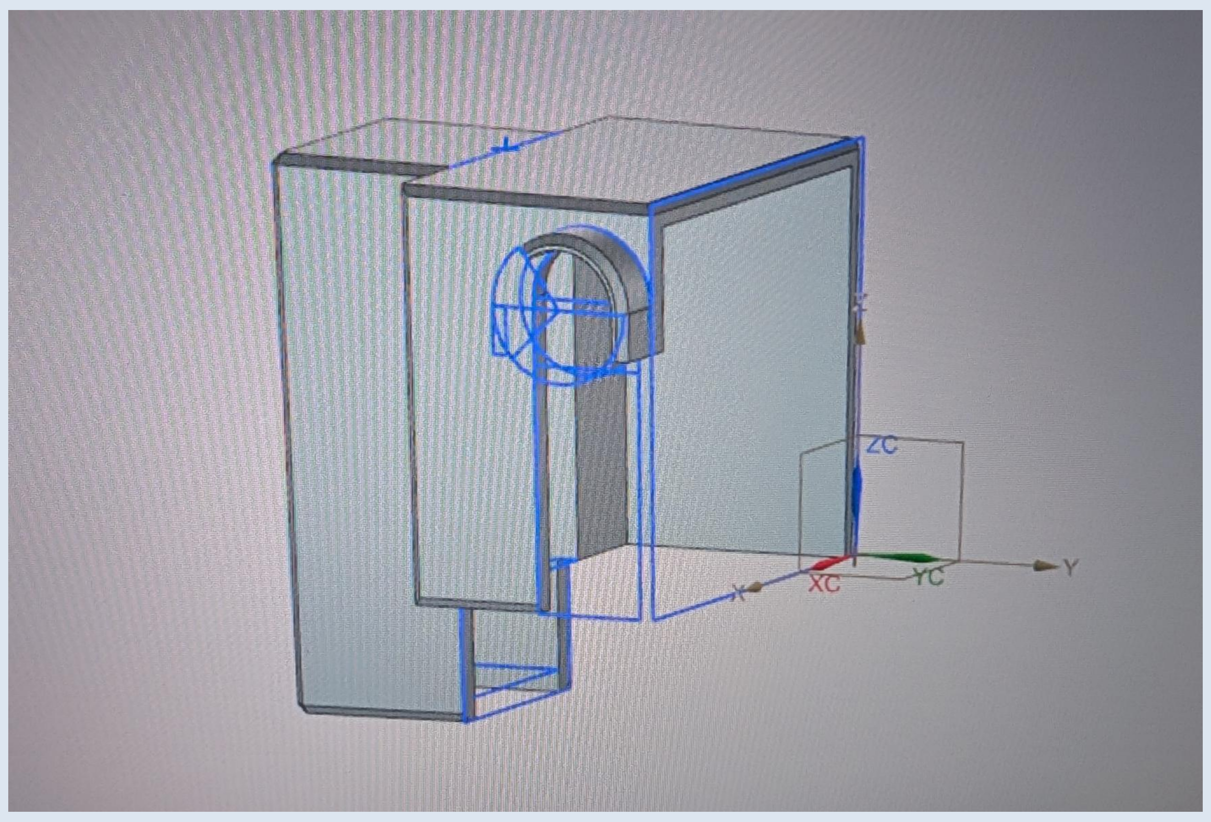

Figure 3: Outlet cover design

Future Work

- Complete the FCDC manifold redesign and validate printability with current equipment
- Develop streamlined material usage modeling tools to reduce manual analysis time

Issues Confronting Site

The additive lab must balance speed, cost, and material certification requirements across dozens of concurrent program requests. Ensuring flight hardware meets strict tolerances while managing equipment uptime and consumable costs presents ongoing operational and engineering challenges.

Acknowledgments

Thank you to my supervisor and colleagues at Northrop Grumman Chandler for their mentorship and for entrusting me with real responsibilities on live programs. Special thanks to Drs. Holtz & Merck and the College Park Scholars Science & Global Change Program.