Smarter, Faster, Lighter:
The Economics of 3D Printed Drones

The Price of Drone Flight: Cost Considerations for UAVs

For drone manufacturers, staying competitive means balancing performance, cost, and production efficiency. Traditional manufacturing methods often introduce supply chain delays, high material expenses, and weight limitations that hinder UAV innovation. Additive manufacturing (AM) offers a powerful alternative by enabling on-demand production, lightweight designs, and lower costs. This guide explores the economic and operational advantages of 3D printing for UAVs, backed by real-world success stories from industry leaders.

Key Cost Considerations

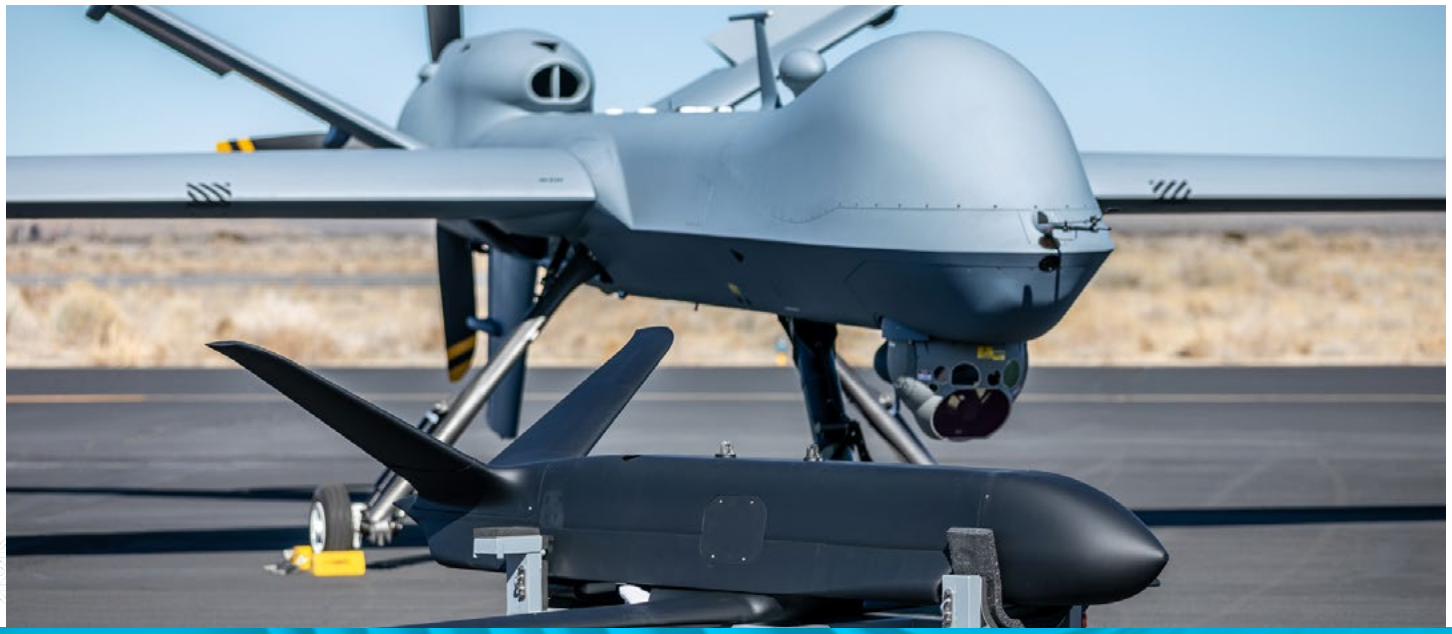
Some of the common operating costs drone manufacturers face are:

- **Raw materials and components:** The cost of materials and components is a major factor.
- **Research and development:** Investing in R&D is essential for innovation but can be costly.
- **Labor:** Labor costs, including skilled technicians and assembly, contribute significantly to overall expenses.
- **Quality control and compliance:** Ensuring product quality and meeting regulatory standards incurs considerable costs.
- **Inventory storage:** Maintaining physical inventory requires storage space and resources.

How 3D Printing Reduces UAV Manufacturing Costs

Drone manufacturers face rising costs in raw materials, labor, and compliance. 3D printing provides a streamlined solution. Stratasys Direct has worked with top drone manufacturers for years and seen these benefits proven again and again, including:

- **Saving on time and money with faster production** by building parts in days vs. weeks with flight-worthy materials tested and proven by industry leading companies and 3D printing experts.
- **Faster iterating** that grants design teams the chance to optimize for minimial breakage and target common failure components for longer service life.
- **Up to 70% weight reduction** with robust AM materials and the freedom build efficient designs inaccessible with conventional manufacturing methods.
- **Less supply chain constraints** by enabling production for legacy or high-cost components with a qualified supplier like Stratasys Direct.
- **Custom, ergonomic 3D printed jig and fixtures** that reduce worker fatigue and improve life expectancy of the tool.
- **Digital inventories** of designs and part iterations that can quickly be produced and shipped to customers in days.



From Prototype to Flight, Faster than Ever

Scale Production from Prototype to Production

3D printing reduces the time required to design, iterate, and produce prototypes faster than traditional manufacturing. It's a much faster way of achieving an optimal design and getting it into service.

AM is a toolless process, eliminating tooling costs and the lead time opportunity cost typical with procuring new tools. It also makes on-demand production economically viable, enabling a virtual inventory that avoids the cost of warehousing physical stock.

Mitigating Supply Chain Risks

Faster prototyping lets you vet designs more thoroughly and identify problems before full-scale production, avoiding future rework. The ability to quickly make parts on demand minimizes downtime risks and lets you deploy parts when and where needed.

Stratasys Direct offers a comprehensive suite of 3D printing materials tailored for the aerospace industry with high chemical, wear, and cold resistance ideal for the UAV environments, while remaining lightweight. Working with Stratasys Direct ensures these materials meet your project needs and that your parts will go through a thorough quality check.

Why 3D Printing Outperforms Traditional UAV Manufacturing

Traditionally Manufactured UAVs	3D Printed UAVs
High costs of materials, suppliers, tooling, and labor slow down the product development life cycle.	**Rapid prototyping and iterating that can drastically reduce costs as parts are designed and produced for final flight.**
Long production times adding inefficiencies to the supply chain, limiting innovation, and adding to production costs.	**Accelerated R&D and production schedule with the chance to try different materials and 3DP methods helps reduce costs.**
Heavy UAVs with high part numbers or components and risk of multiple failure points increase costs of production.	**Light-weight, optimized designs that incorporate components into a single part and ultimately costs less.**

Flying High with Innovation: 3D Printed Drones Success Stories

Stratasys Direct and our parent company, Stratasys, have seen astounding results from top UAV manufacturers whose innovative designers take advantage of the benefits of 3D printing.

NTU's 3D printed drone with embedded electronics

- NTU (Nanyang Technological University) Singapore created a 400mm class drone 3D printed using FDM™ 3D printing technology.
- The quadcopter can survive in temperatures that exceed the limits of commercially available drones with ULTEM™ 9085 resin material.
- The drone can carry a 17kg load and the main structure and electronics can survive over 150°C.
- The electronics were embedded during the FDM 3D printing process by pausing the print, a special feature unique to the technology that ensures fit and strength.

Aurora Flight Science's jet powered 3D printed drone

- Aurora Flight produced a UAV with a 2.74 meters wing space that was 80% 3D printed by weight.
- The drone has a max speed of 150 MPh.
- By utilizing 3D printing and cutting design and build time, Aurora Flight's team reduced time-to-market 50%.
- By incorporating a sparse infield for the wings and an organic structure for the main body, the team yielded a significantly lighter drone. The total weight including the turbine 7 electronics was 13.6kg.

> "3D printers can produce parts with complex shapes– for us a highly sought after requirement and a principle differentiator that sets Stratasys' proposition apart from that of other providers." -Jean Marc Masenelli, Managing Director, Survey Copter

Survey Copter's UAV camera housing

- Survey Copter 3D printed optical turrets, structural elements of an aircraft, battery compartment housing, supporting structure, as well as scale models for their UAV.
- They utilized a range of materials PC, ABS and ULTEM™ 9085 resin, an aerospace-grade material, ideal for even the toughest environments due to its high durability and lightweight qualities.

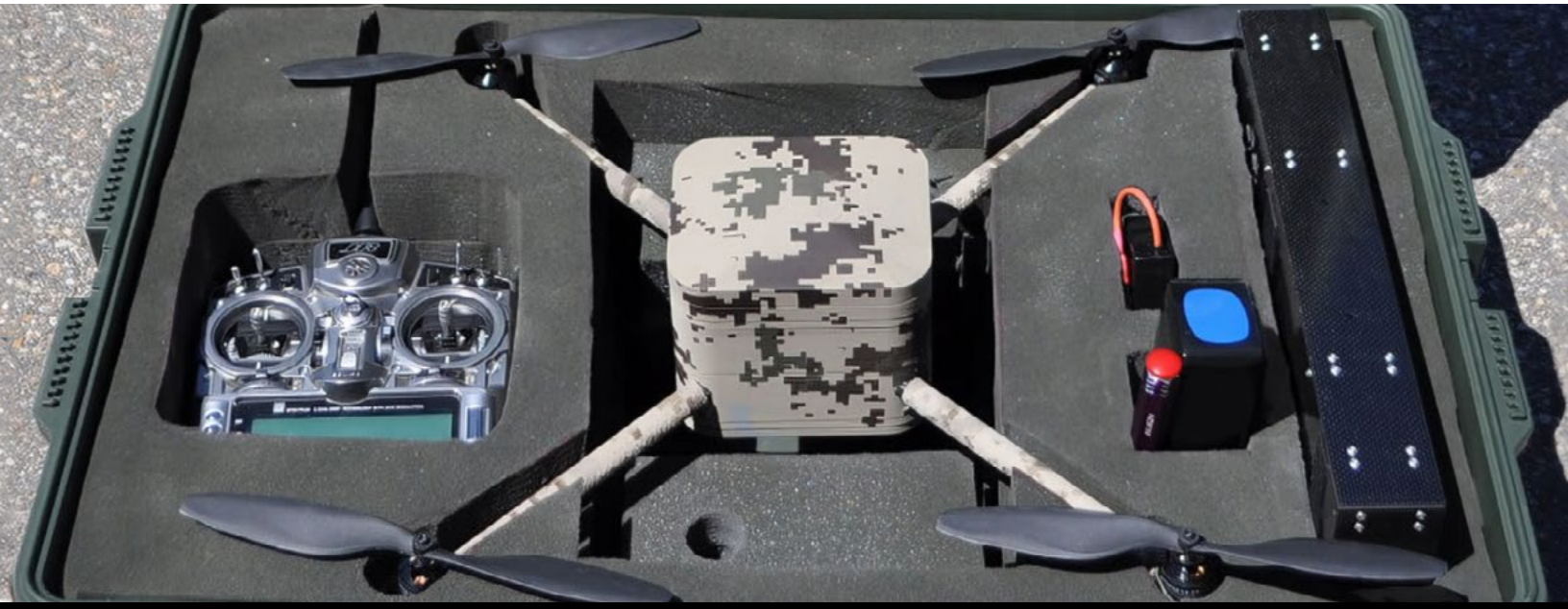
The Sky's the Limit with Stratasys Direct

With 200+ printers spanning 7 available AM technologies and a wide variety of post-processing operations available, Stratasys Direct is more than ready to take on your drone project. Our 30 years of experience with additive manufacturing has led us to develop top certified systems (AS9100 and ISO 9001) with ITAR registration that ensures high-performance parts in a secure operation.

Ready to get started?

Request a Quote

Contact Us



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