

Lightweight and Durable: UAV's Reinvented with HP 3D Printing



Data courtesy of The Eye Above

HP's Multi Jet Fusion 3D printing technology and HP 3D High Reusability PA 12 material enables The Eye Above to help deter poaching by offering a lightweight, durable drone that is purpose built to perform the world's harshest environments.

Industry

Aerospace

Sector

Unmanned aerial vehicles

Objective

Leverage 3D printing to help deter poaching by developing a drone that can survive and perform in the harshest conditions

Approach

Utilize HP MJF and PA 12 material to rapidly and cost-effectively produce strong and functional drone components

Technology

HP Multi Jet Fusion 5600 3D Printer

Material

HP High Reusability PA 12, enabled by Evonik

Introduction

"I wanted to help game warden friends put a drone up to help with their poaching problem," says The Eye Above Founder, Robert Miller. "I went to all the experts, looking for an existing drone that could work. I realized very quickly that what was out there definitely wasn't going to meet our needs."

The Eye Above isn't just another drone. It represents a breakthrough in how unmanned systems operate in the most challenging environments. Guided by a mission to deliver reliable and real-time intelligence where it matters most, the company combines rugged engineering with advanced manufacturing to build drones that excel under extreme conditions.

Whether supporting conservation efforts, search and rescue operations, environmental monitoring, or remote inspections, The Eye Above provides a drone with a lightweight, durable airframe that is purpose built to provide real-time intelligence in harsh environments.

At the core of its capabilities is HP's Multi Jet Fusion (MJF) 3D printing technology, along with HP 3D High Reusability PA 12 material. Together, they enable a robust platform that performs where traditional drones fall short.



Data courtesy of The Eye Above

Challenge

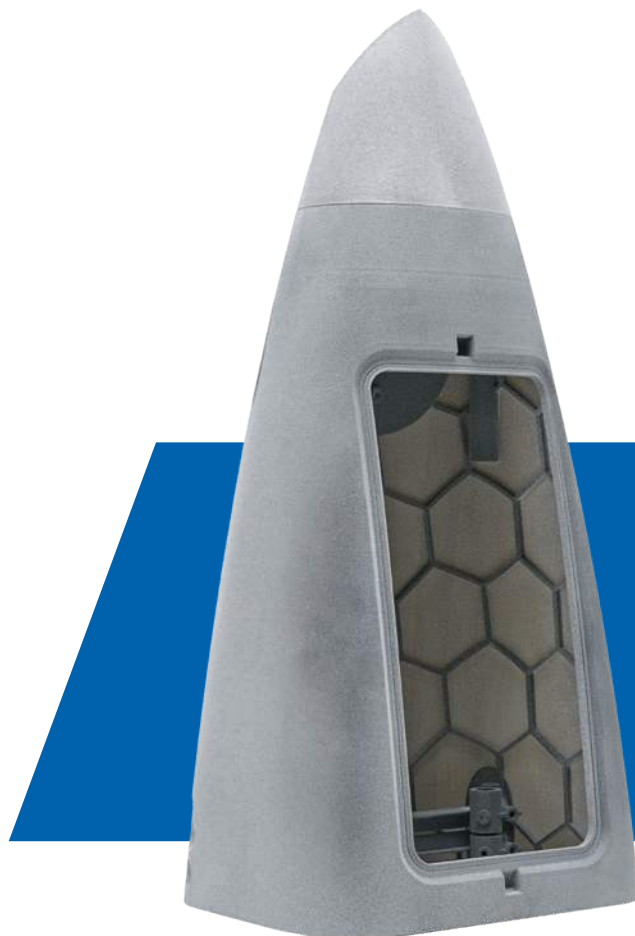
“Building a drone can be more challenging than building a full size aircraft,” says Miller. “You don’t have the luxury of excess weight, power and speed. Everything is restricted.”

Designing for the world’s toughest skies

In the design of unmanned aerial vehicles (UAV’s), plastics play a pivotal role. Thanks to their exceptional strength-to-weight ratio and resilience under impact, these materials enable engineers to create drones that are more agile, energy-efficient, and capable of carrying streamlined payloads without compromising durability. Among them, PA-12 nylon stands out as an ideal choice for flight-critical components such as airframes, gimbal mounts, and battery housings.

Traditional methods of manufacturing drone parts often fall short in achieving the right balance between weight and durability. Conventional methods like machining or injection molding not only limit capabilities of high-performance aerial systems, they can be time-consuming and costly. Additionally, tooling requirements and long lead times hinder innovation, making it difficult to adapt quickly to evolving mission needs or integrate new materials and design improvements.

In contrast, 3D printing streamlines production, enhances structural strength, and enables the creation of lightweight, precisely tailored components that boost performance, increase flight efficiency, and simplify maintenance. But earlier versions of the technology were expensive, slow, and limited to deficient materials.



Solution

HP's additive manufacturing technology is revolutionizing drone design by enabling high-performance parts that are both lightweight and durable, both essential qualities for aerial systems. HP Multi Jet Fusion (MJF) 3D printing also delivers unmatched design freedom and leverages advanced materials engineered to withstand the high-performance demands of modern drone applications.

Lightweight design, heavyweight capabilities

"The HP Jet Fusion 5600 Series Printing Solution was a game changer," says Miller. "The first airframes that came off the 5600 were actually usable. It was quite revolutionary."

HP's MJF technology allows engineers to utilize CAD software like SolidWorks, Creo, Fusion or Siemens NX to reduce part weight through complex internal geometries, including lattice structures and hollow reinforcements.

Every gram of weight savings contributes to longer airtime, improved maneuverability, and expanded payload capacity. HP Multi Jet Fusion technology empowers The Eye Above's engineers to create ultra-light components with complex geometries that are either impossible or too costly to produce through conventional methods. From the structural frame to sensor housings and propeller mounts, each part is carefully engineered for strength and minimal mass, giving the drone the agility required to perform with precision in real time.

In this instance, HP's Drone team collaborated closely with The Eye Above to develop high-performance drone components. By combining HP's additive manufacturing expertise with The Eye Above's aerial innovation, the partnership delivered optimized solutions for flight. HP Professional Services also provided expert design support to ensure each part was functional, manufacturable, and fully leveraged the capabilities of HP Multi Jet Fusion technology.



Streamlined assembly and simplified repair

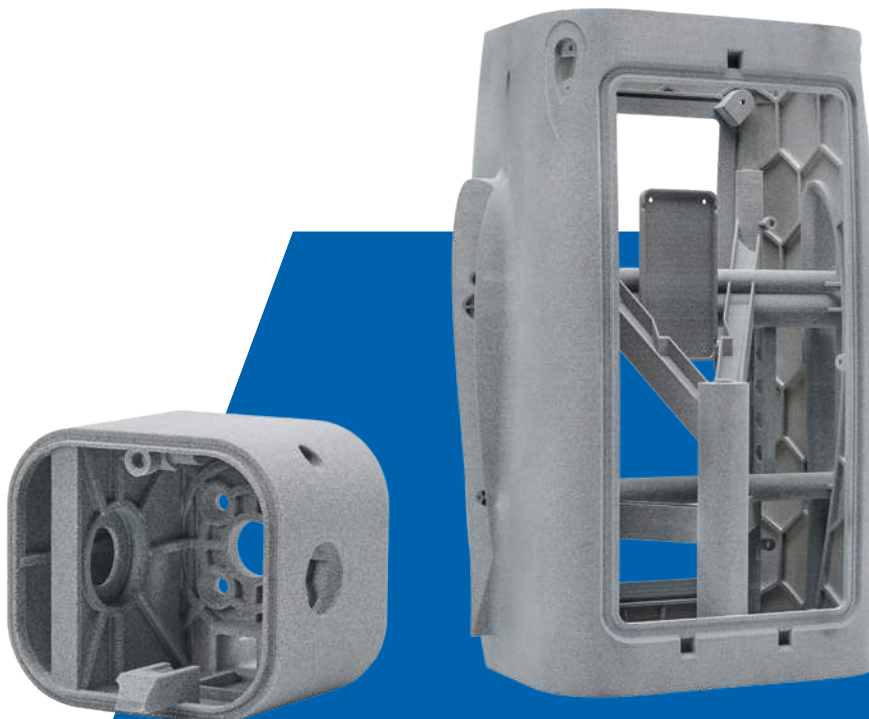
“The whole airframe is modular,” says Miller. “Not only does that simplify assembly, it also makes the drone easier to repair in the field. HP’s material also plays a pivotal role. Oftentimes, if a part breaks, you can just super glue it back together.”

The Eye Above’s drone is engineered for rapid, frustration-free assembly. HP’s unique 3D printing solution enables integrated snap fits and interlocking joints, enabling components that join together with minimal effort and little additional hardware. This clever use of additive manufacturing not only reduces part count and weight, but also simplifies the entire build process, allowing The Eye Above to get its users airborne in record time.

Thanks to its modular design and smart use of 3D printed components, repairing The Eye Above’s drone is also easier. Unlike drone components made with carbon fiber, the Eye Above’s structural parts can be quickly mended with common superglue. Its architecture also allows damaged sections to be swapped out or reattached without disassembling the entire frame, making field repairs fast and frustration-free.

Mission ready performance with PA-12

HP’s 3D printing materials are engineered for strength, precision, and reliability, with HP 3D HR PA 12 standing out as a top choice for high-performance applications. Known for its excellent strength-to-weight ratio, this material offers exceptional durability and chemical resistance, making it ideal for drone parts that must withstand mechanical stress and harsh environmental conditions. Its fine detail resolution and smooth surface finish also support complex geometries and tight tolerances, allowing engineers to produce lightweight components that perform consistently in demanding settings. For The Eye Above, this means reliable operation in unpredictable conditions, from arctic chill to desert heat, without compromising structural integrity or mission success.



Benefits

From concept to airborne in record time

“HP MJF technology has accelerated our roll out by 12 to 14 months,” says Miller. “We’ve confirmed that the technology, methodology and structures work, and we can make changes very quickly. There’s absolutely no way we could have done this with any other solution.”

HP’s 3D Printing also empowers fast design cycles. The team behind The Eye Above was able to prototype, test, and refine components in days rather than weeks, allowing for continuous improvement and customization. This agility is critical in aerospace development, where every iteration brings new insights and performance gains. With MJF, innovation does not wait for tooling or supply chains. It happens on demand.

“With MJF technology, you have no tooling costs,” says Miller. “We’ve probably saved \$60,000 - \$80,000 in tooling alone, and close to half a million total in R&D time, product development, prototyping and part production.”

HP’s 3D Printing technology enables rapid design and development, allowing The Eye Above’s team to quickly prototype, test, and refine components in just a few days. In the drone industry, rapid manufacturing is crucial for advancing innovation, since each design iteration can lead to valuable improvements in overall performance. HP Multi Jet Fusion makes the design process more agile and efficient, removing the barriers associated with traditional manufacturing and supply chains.

Technology in flight, conservation at work

“The drone has been designed to carry a radar sensor that can detect wire snare traps from the air,” says Miller. “What took a Ranger a week to do on foot can now be accomplished in 15 minutes.”

The Eye Above will be deployed in collaboration with the Endangered Wildlife Trust and the International Crane Foundation to support conservation efforts. Using high-resolution imaging and real-time data collection, the drone will conduct aerial surveys over remote wetland habitats, tracking crane movements and nesting areas without causing disruption. Beyond wildlife monitoring, TheEyeAbove will also help identify and map snare traps, which pose serious risks to cranes and other animals.

Equipping people to soar

“Poaching often happens in remote areas where there aren’t a lot of other opportunities,” says Miller. “We can help empower those communities by training people to become drone pilots and technicians.”

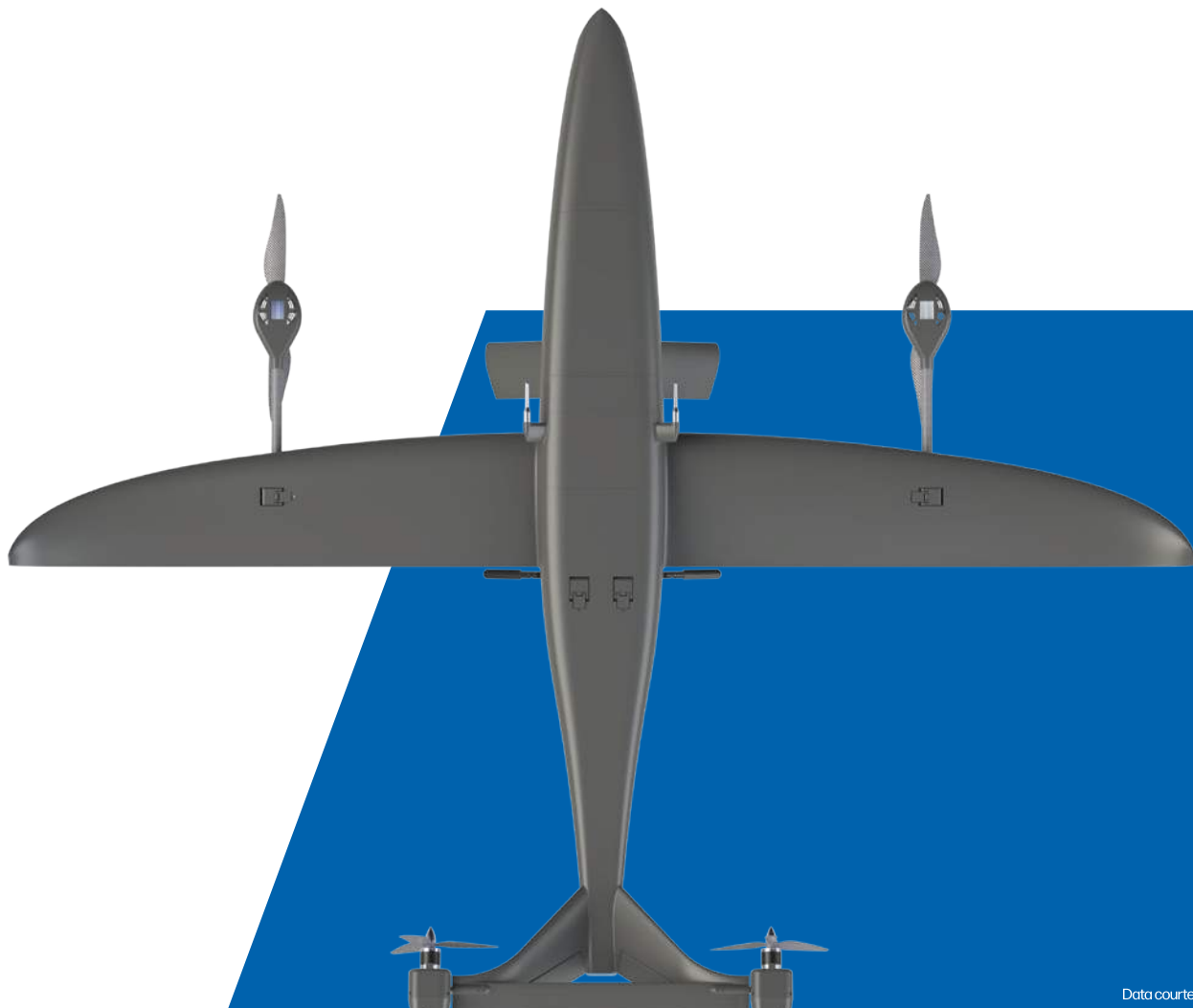
The Eye Above is dedicated to equipping users with practical, hands-on expertise. In addition to flight control and mission planning, they teach participants how to troubleshoot issues and carry out fast, field-ready repairs. By combining technical instruction with real-world problem-solving, The Eye Above is focused on developing a skilled community of confident, self-sufficient drone operators.

Pushing innovation to new altitudes

“HP’s MJF technology is uniquely suited to solving the problems we have in aerospace right now,” says Miller. “Anyone that is getting into aerospace or planning to develop new aircraft, and wants to succeed, especially if they are a start-up, should leverage HP’s 3D Printing technology.”

The Eye Above showcases what can be achieved when bold design is combined with advanced technology. With HP’s Multi Jet Fusion technology and the proven strength of PA-12, the drone achieves a powerful blend of low weight and high durability, making it well suited for demanding aerial missions in harsh, unforgiving environments. As unmanned aerial technology, artificial intelligence, and HP’s Multi Jet Fusion advance, new improvements in drone capabilities and performance will accelerate.

The future of drone innovation is taking off, and the industry is only just beginning to explore what is possible. Stay tuned for HP’s upcoming webinar, where they’ll deep-dive this exciting sector, share key insights and explore how HP’s 3D printing technology is shaping the next generation of UAVs.





The Eye Above builds drones for world's harshest environments. Visit them at: <https://theeyeabove.co.za/>

To discover more about HP Multi Jet Fusion 3D printing technology, and how it helps aerospace companies unlock innovation to develop high performance drones, visit: hp.com/drones

HP Professional Services offers expert guidance to help turn concepts into functional, manufacturable parts. See what's possible by visiting: <https://www.hp.com/us-en/printers/3d-printers/services/3d-professional-services.html>

