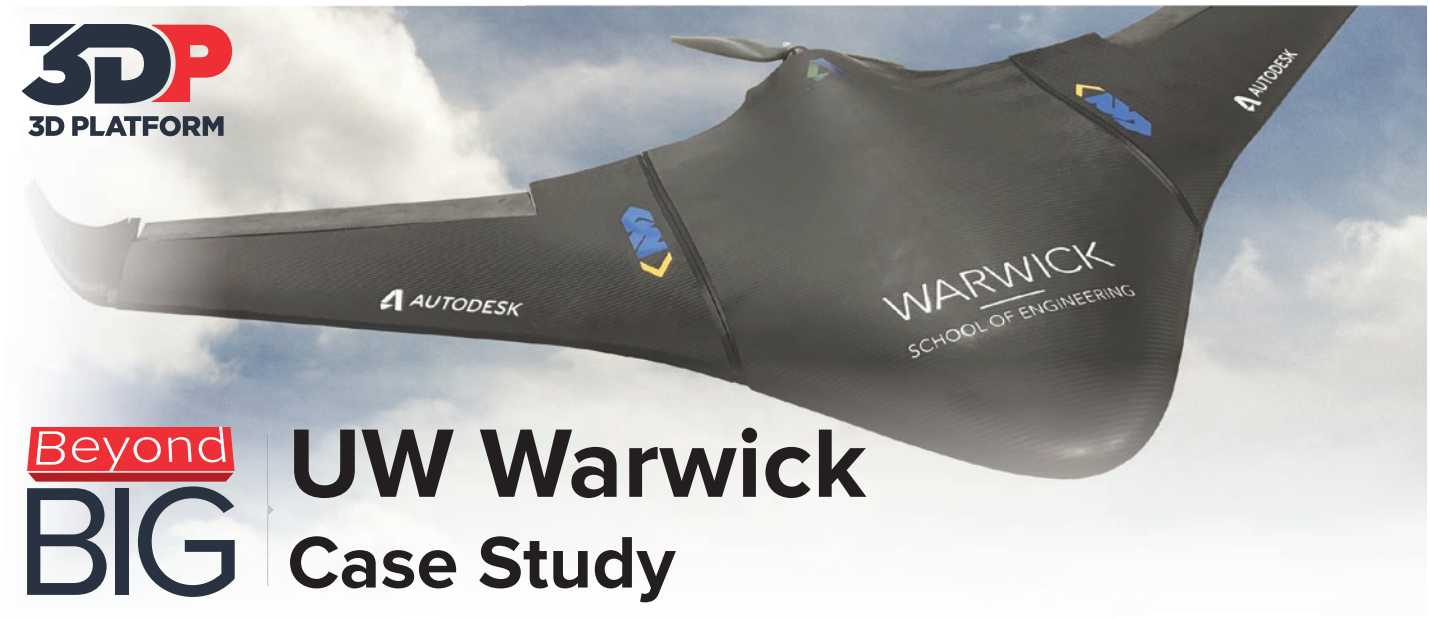


Beyond BIG

# UW Warwick Case Study

## UW Warwick Uses 3D Platform's Printer for Humanitarian Project

In an effort to give drones a more humane reputation, seven fourth-year students from different engineering disciplines have come together in a real-world product-development environment. Their project is part of an industry- and government-backed program called Horizon (AM), which aims to leverage additive-manufacturing techniques in aerospace innovation. The mission of their unmanned aerial vehicle (UAV) is to deliver immediate aid and equipment to emergency situations that have limited accessibility or require more urgency than can be provided – such as a mountain rescue.

## Why BIG

Utilizing a WorkSeries large format 3D printer from 3D Platform, the students were able to print the mold masters required for the drone in one piece. This eliminated the need for heavy fasteners or connectors to hold pieces together, and helped the craft to remain light enough in order to generate speed. The larger format also allowed for a larger wing span to generate more lift.

WARWICK
THE UNIVERSITY OF WARWICK

University of Warwick is a prestigious university located in Coventry, England. Their academic and research staff work with industry and partner organizations to conduct inquiry-driven, fundamental and pioneering research. Utilizing their alliance with GKN Aerospace and a 3D Printer from 3D Platform, a team of students in the UW School of Engineering were able to design and build an Unmanned Aerial Vehicle (UAV) that will be used in emergency situations.

GKN AEROSPACE

https://warwick.ac.uk/

## Why 3DP

3D Platform's open source philosophy also aids in the printing and development process as it frees the user and allows for experimentation with various software and materials.

For example, the engineering team's design for the UAV didn't have a stabilizing tail, so the project's design lead Ed Barlow (recently graduated) and his team had to carefully calculate the sweep and twist of its wings so that it would still glide. "There's a whole plethora of geometry that you have to modify," Barlow said, "which was part of the advantage of using Autodesk Fusion 360." This ability to use an open source application allowed project members to simulate and discover optimal drag ratios, lift figures, and the correct shape for the drone, producing a more stable and lightweight flight.



## Results/ROI

Warwick Associate Professor of Engineering Simon Leigh, who specializes in additive manufacturing, guided the multi-disciplined engineering team throughout the entire project. The goal was to 3D-print reusable molds of the UAV body parts and then use them to create resin-infused, strong-yet-light carbon fiber for the finished body components. Leigh says it took about one month of continuous 3D printing to finish all the molds. After that, completing the layup of infused carbon fiber material proved a challenging.

The details of the techniques and inventions used in the development and build process were part of a coordinated effort with their industry partner GKN Aerospace, which may commercialize in the future. "To exercise that kind of innovative thinking while working with an expert company was a great experience and opportunity for the students," Leigh says. The project and goals are ongoing as they continue to employ 3D printing and creative thinking toward making parts of the UAV multi-functional to minimize its weight.


### This is not your neighbor's toy!

With a 7-foot wingspan, a payload of about 5 kilograms, and an 80 kilometer range, the UAV's main function will be to search for casualties on a mountain, land next to them by parachute, and deliver supplies. The dual purpose parachutes can be used as emergency blankets for those in need, and additional equipment can be built into the aircraft. Customized software can even tailor the payload for the needs of each emergency. These types of practical applications are exactly how large format 3D printers are helping to drive innovative solutions to unique problems.

## Tips/Community

In a search and rescue operation, the drone's built-in software suggests the load-out needed, and how to balance it to get the right center of gravity. The team first cataloged the supplies they wanted to put in the UAV, and then worked out where those supplies might sit in the airframe. Next, they explored Netfabb, an additive-manufacturing software made by Autodesk. This software allowed them to optimize aspects of the UAV design and provide a 3D-print friendly product with reduced weight.