Shaping Adaptability

MONARCH BUILDS APPLICATION-FOCUSED DRONES WITH 3D PRINTING

“Our ability to produce a wide range of drones for specialized applications and build custom drones in a short period of time gives us a tremendous advantage over our competition.”

– Eileen Shibley / Monarch

CASE STUDY

A 3D printed cocoon housing hangs between the legs of Monarch agricultural drone.

Before Monarch began manufacturing drones, founder Eileen Shibley researched the industry and found the market to be segmented into many applications, each requiring its own model. She also found many individual businesses and clients needed custom drones. These customized applications require unique sensor combinations that need a special cocoon housing, a key component of a drone.

More Customization With 3D Printing

Most drone manufacturers use injection molding to make the cocoon housing parts, or they purchase parts from suppliers. But the tooling for injection molded parts costs about $40,000 per component, with a typical lead time of four weeks. This approach limits the number of drone models a manufacturer can offer, making it necessary to sell many of the same model in order to make a profit.

That's why even before Monarch opened its doors, Shibley brought 3D printing in-house to build most of the components for the company's drones.

"Building most of our drones internally eliminates fixed tooling costs so we can build many different models and make a profit even if most of them sell in small numbers," Shibley said.

Shibley selected the Fortus 400mc™ 3D printer because of its ability to build large parts that are strong and rugged enough to fly on their drones. This machine is used to print most of the drone including the cocoon housing, motor housing and speed controller.

The 3D printer is also used to make the gimbal, which is used instead of a cocoon housing in drones that need the sensors to be pointed at different angles. The four arms on the drone require higher structural strength than can be achieved with 3D printing so they are made of carbon fiber. Other parts such as the motor, electronics, and hardware are purchased off the shelf.

This special Monarch drone plays audio recordings of predators to scare away birds from crops.

A sample of 3D printed parts (not including the camera shown at top) that make up a Monarch drone.

Building Drones for Special Applications

Monarch has taken advantage of these capabilities to design and build drones for special applications including crop inspection, wind turbines and solar panels, aerial surveying, accident and crime scene mapping, historical building documentation, and many others. For example, a typical Monarch agricultural drone supports two sensors – an electro-optical (EO) sensor that provides visual images and an infrared (IR) sensor that measures the wavelengths of light emitted, absorbed and reflected by green plants.

"We can even design and build a new model in a quantity of one to meet special customer needs," Shibley said. "For example, one customer wanted a drone with a special sensor and a video recorder. We designed and printed a new cocoon housing and shipped the drone in a day and a half. Our ability to produce a wide range of drones for specialized applications and build custom drones in a short period of time gives us a tremendous advantage over our competition."

TYPICAL TIME AND COST TO PRODUCE FIRST PART	TIME	COST
Injection molding	28 days	$40,000
3D printing	1 day	$50
Savings	27 days **96%**	$39,950 **99%**

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