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mercury

Mercury Systems Slashes Cost by 95% Using Essentium Solutions

LEADING AEROSPACE AND DEFENSE TECH COMPANY UTILIZES ESSENTIUM'S MACHINES AND MATERIALS TO CUT COST AND SAVE TIME IN ITS CONFORMAL COATING PROCESS

EXECUTIVE SUMMARY

For electronics manufacturers like Mercury Systems, the conformal coating process presents a challenge. To protect parts, manufacturers must either:

- Manually tape over sensitive areas, which can be time-consuming
- Use injection-molded boots, which has unsustainable lead times and cost

Learn how Mercury solved this challenge using Essentium materials and machines to:

- Reduce cost by 95%
- Decrease lead-time by nearly 85%

SITUATION OVERVIEW

Mercury Systems is at the intersection of high tech and defense, serving customers from government agencies and defense contractors to commercial aerospace businesses and tech companies. This unique positioning, paired with its commitment to purpose-built solutions, has made it a leader in making secure mission-critical technologies profoundly more accessible to aerospace and defense companies. Creating these innovative solutions requires countless moving parts. One of the drivers in these efforts is Mercury's U.S. Manufacturing Operation (USMO).

"USMO provides printed circuit board assemblies to Mercury's internal businesses across the globe," explained John Rolando, USMO Senior Manufacturing Engineering Manager, Mercury Systems. "There, we run a low volume, high mix operation that focuses on rapid new product introduction (NPI) for our customers. To support this effort, it is paramount that we maximize turnaround in every step of our process."

THE CHALLENGE

As a company with a commitment to creating purpose-built solutions, every step of its manufacturing process is subject to innovative intervention. In this case, major bottlenecks in the conformal coating manufacturing process for printed circuit boards (PCB) needed to be addressed. For any PCB manufacturer, conformal coating presents a familiar but difficult challenge.

"In this process, it is critical to prevent the conformal coating from getting into connectors in the PCB," explained Rolando. "In the past, we approached this in one of two ways. We either manually masked each part with tape or bought injection molded boots from an outside provider to cover the connectors."

Both of these methods present unique challenges. The taping method is a cost-effective way to mask parts, but the time required creates serious bottlenecks in the manufacturing process. The injection-molded boots allow technicians to quickly protect PCBs which eliminates labor bottlenecks, but the lead time and cost often prove to be unsustainable. On a single product order for PCBs, Mercury spent $9,000 on tooling and parts and faced a 12-week lead time.

THE SOLUTION

To solve this issue, Mercury decided to pursue additive manufacturing technology as a solution and began exploring possible materials to match or improve on injection-molded materials. The right fit needed to be flexible, chemically resistant, and ESD-safe, a crucial property for electrostatically sensitive environments like Mercury. Testing quickly revealed that Essentium's TPU 74D-Z met each requirement while significantly reducing cost and lead time.

DESKTOP PRINTER VS. HSE 3D PRINTER

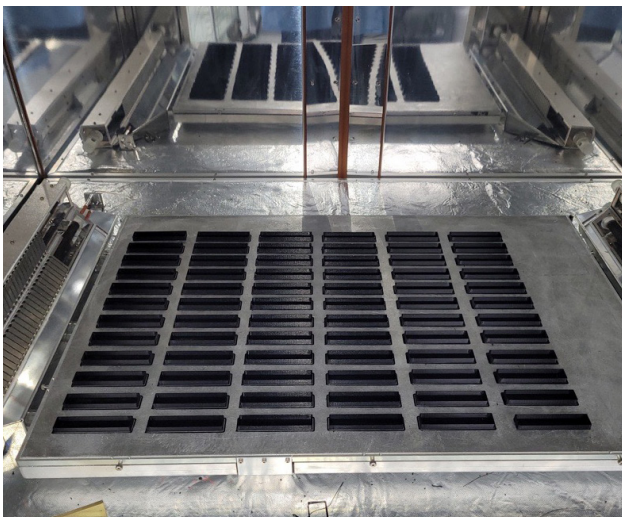
"When we first started printing with Essentium TPU-Z we were using a desktop 3D printer. However, we quickly realized it couldn't keep up with production. Switching to the HSE 180•S 3D Printer allowed us to scale."

John Rolando, USMO Senior Manufacturing Engineering Manager, Mercury Systems

The next step was finding the right technology. After using a desktop printer, Mercury realized that the size and speed of the machine were a poor match for production needs and began scoping the market for a new 3D printer. In the Essentium HSE 3D Printer, Mercury attained the power to scale. To best support NPI, Mercury needed the ability to produce quality parts at a moment's notice. Essentium machines and materials made that possible.

BUSINESS OUTCOMES

This proved to be a winning combination for Mercury. For the same PCB product order that cost Mercury $9,000 on tooling and parts, it estimates the 3D printed equivalent was $500, **reducing cost by 95%**.



Additionally, lead times for the injection-molded boots for this order were 12 weeks. Using the Essentium HSE, Mercury was able to design, iterate, and print enough boots for production use in one day, **decreasing lead-time by nearly 85%**.

On top of cost and lead time savings, the lifespan of these 3D-printed boots is much longer. Essentium TPU 74D-Z is resistant to heat and abrasive chemicals, allowing boots to endure cycle after cycle, unlike the injection-molded boots that would degrade in under 10 cycles and would have to be thrown away and replaced.

Fortunately, the benefits don't end with this use case. According to Mercury, using Essentium's HSE 180•S 3D Printer and ESD-safe materials for boots for any conformal coating process saves an average of 90% in cost and lead time. For Rolando, this case is just the jumping-off point for Mercury's partnership with Essentium.

"This case is just the beginning of what we can do. Essentium's partnership approach has led to revelations of applications and potential opportunities that we wouldn't have thought of. We have been successful thus far and I do not doubt that we will continue to be successful into the future," he concluded.

Essentium, Inc. provides industrial 3D printing solutions that are disrupting traditional manufacturing processes by bringing product strength and production speed together, at scale, with an open ecosystem and material set. Essentium manufactures and delivers innovative industrial 3D printers and materials enabling the world's top manufacturers to bridge the gap between 3D printing and machining and embrace the future of additive manufacturing.