Building a next-generation materials handler with additive manufacturing

Today's shopper has high expectations for on-demand fulfillment. To meet that demand, retailers need innovative materials handling systems that can navigate tight warehouse and shelving spaces to fill orders quickly. They also need picking technologies that can handle a wide variety of product shapes, sizes, and densities without having to invest additional capital in multiple custom grippers for the picking arms.

Bastian Solutions, a leading materials handling company owned by Toyota Advanced Logistics, set out to solve this complex set of problems by engineering an improved solution. This effort resulted in the Bastian Solutions Shuttle System, an advanced, customizable electrical robot arm-and-shuttle combo that autonomously picks and moves a range of differently sized and weighted products.

Making a materials handling system unlike any other

Creating a new disruptive materials handler like the Bastian Solutions Shuttle System, required Bastian Solutions to use a disruptive method—additive manufacturing. But without on-site 3D printing capabilities, Bastian Solutions sought out a partner that could help make their vision a reality.

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Enter Fast Radius. With technology partners like HP 3D Printing and Carbon®, Fast Radius has enabled Bastian to make a truly innovative advanced materials handling robot unlike any on the market. Nearly 50 percent of the bill-of-materials was made using additive manufacturing in Fast Radius' Chicago factory. By leaning heavily into Fast Radius and additive manufacturing for this project, Bastian Solutions saw several major benefits:

1. Rapid manufacturing of custom parts
2. Unlocking new product capabilities
3. Significant project time and cost savings

Rapid manufacturing of custom parts

From a unique warehouse grid configuration to the actual products that need picking, it's hardly "one-size-fits-all" when it comes to purchasing a materials handling robot. Being able to customize a robotic arm for every customer is critical, but customization, with all of its retooling, can be expensive.

Fortunately, digital manufacturing with Fast Radius completely eliminates the need for tooling. By using 3D printing for critical parts, Bastian Solutions can quickly scale the robot arm for its customers' requirements. Once the adjusted design is submitted to Fast Radius' Virtual Warehouse, the customer receives the additive parts in days instead of weeks or months. This helps customers get their new materials handling systems up and running with little interruption to their business.

Unlocking new product capabilities

Additive manufacturing unlocked the following entirely new engineering opportunities as Bastian Solutions was designing the robot arm:

A more lightweight machine

Typically, materials handling robots are made with metal—especially the joint and shoulder parts. Because of its ability to make durable, rigid parts with high tensile strength, HP Multi Jet Fusion allowed Bastian Solutions to swap out metal components for ones made with HP 3D High Reusability (HR) PA 12 Glass Beads (a proprietary HP material). Not only did this make the parts lighter while achieving the same quality, but it also cost less to produce.

Increased energy efficiencies

A lighter robot arm means that it takes less energy to shuttle it around a warehouse or retail floor. And because many of the parts were made with materials like HP 3D HR PA 12 and HP 3D PA 12 Glass Beads instead of metal, the machine conducts less overall heat and won't require as much energy to cool.

A multi-faceted gripper

The gripper on a materials handling robot needs to be able to securely grab a wide variety of objects in a retailer's inventory. Bastian Solutions tapped into Fast Radius' broad additive technology capabilities to develop a proprietary "Shark Fin" adaptive gripper using Carbon® Digital Light Synthesis™ and EPU 40 material. Carbon's material enabled Bastian Solutions to develop a very unique set of fingers that are strong but pliable — capable of picking up anything from a laundry detergent bottle to a tube of lip gloss.

Enhanced protective parts

Much of the plating and parts built for support or protection were made using Carbon DLS. Bastian Solutions tapped into Carbon's extensive material library, including EPU 40 and RPU 70 to experiment with many different textures, durometers, and lattice designs until they found the exact fit for their product.

Significant project time and cost savings

Making almost half of their BOM with additive manufacturing not only improved the final product, but it also saved Bastian Solutions considerable time and money. By using Fast Radius' manufacturing platform and team of application engineers, Bastian Solutions was able to:

- Design, produce and test over hundreds of prototypes in fewer than 20 months
- Cut two years off the project development cycle
- Save $100,000 in production costs

These time and cost efficiencies were great for Bastian Solutions, but even better for their customers. The savings meant that the Bastian Solutions Shuttle System can be offered at a very competitive price.

Ready to make your next industry-changing product?

Committing to additive manufacturing was Bastian Solutions' first step towards creating a breakthrough product. Working with Fast Radius was the second. If you're ready to make new things possible for your business, contact the team at Fast Radius today. Or, if you're trying to figure out how to get started, talk to us about our Application Launch Program.

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