

Pendant Armor®

Aftermarket part development with advanced manufacturing technology

"3 Space helped us get our initial product to market quickly and gave us a reliable, repeatable process for new product development."

- Chris Tur, President/CEO Roboworld Molded Products, LLC



The Idea

A career in technology gave Chris Tur insight into a particular problem. Teach pendants, the expensive hand-held devices used to program industrial robots, are frequently dropped and broken.

The solution that Chris devised was simple: a protective case, similar to a phone or tablet case. The difficulty lied in designing a case that was form-fit to the unique shape of each pendant model.

Before approaching 3 Space, Chris worked with a different engineering firm for the initial design. This design was ill-fitting, offered little protection and was ultimately not manufacturable.

After this failed attempt, Chris was referred to 3 Space by a colleague in the automotive industry.

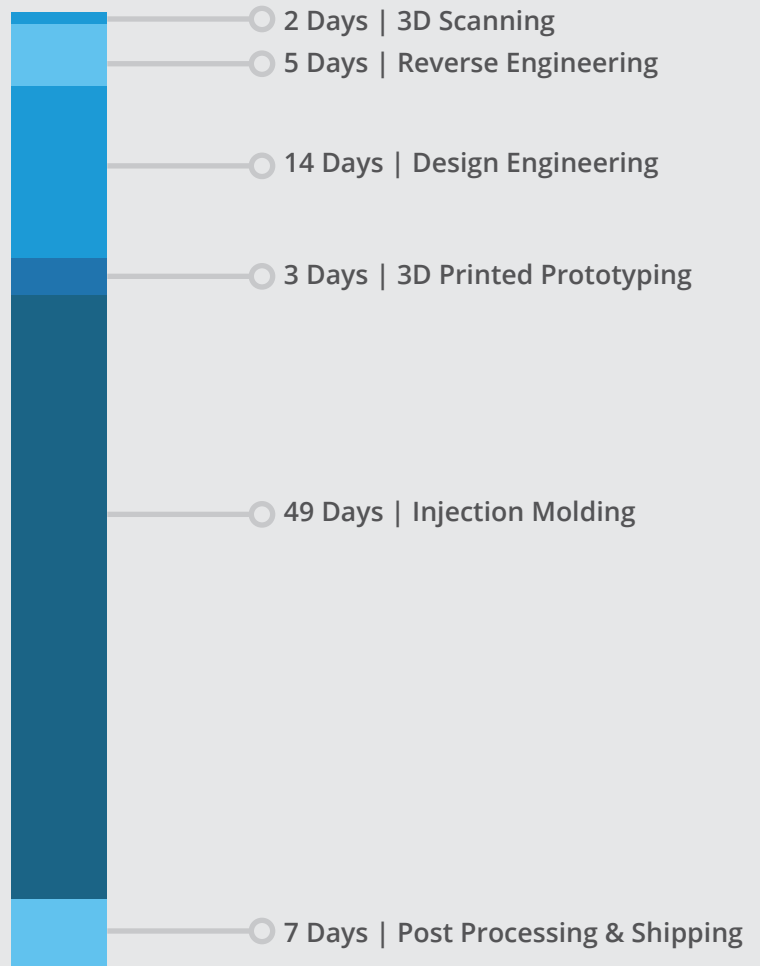
The Solution

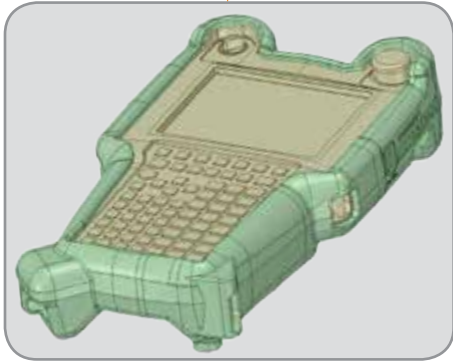
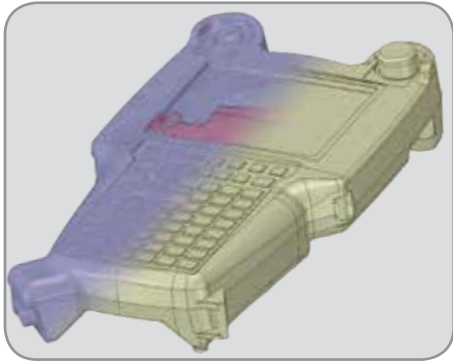
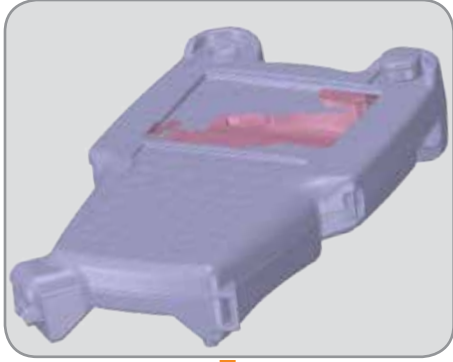
When he initially contacted us, Chris only had an idea. With our end-to-end product development services, 3 Space was able to take that idea and design, prototype and manufacture the first thousand-unit shipment of Pendant Armor® in just 80 days.

3D scanning and reverse engineering the original pendant allowed us to eliminate guesswork while designing the bumper. And with our in-house 3D printing capabilities, we were able to produce rubber-like prototypes for fit-testing and quickly make any necessary design changes.

Project Timeline

80 days from concept to parts in-hand





3D Scanning

The easiest way to eliminate guesswork in the design process and ensure that our initial bumper design would be a close fit was to start with a CAD model of the pendant. With 3D scanning and reverse engineering, we were able to create a model of the pendant to serve as the basis of our design.

Our in-house, high-resolution 3D scanning capabilities allowed us to quickly capture the basic external geometry of the pendant. 3D scanning offers a faster and more reliable solution for digitizing a physical object than the traditional process of taking measurements and modeling from scratch.

Reverse Engineering

The model produced by 3D scanning is a mesh, which is essentially a point map of an object's surface that makes no distinction between features such as faces or holes. While a mesh is suitable for some applications, it is not ideal for use in design engineering.

In order to create a model we could use as the basis for our design, we had to convert our mesh to a solid model, such as an IGES or STEP file. Reverse engineering software helps our engineers create a solid from a mesh by detecting features such as faces, profiles and contours, and converting them into sketches, surfaces and solids.

Design Engineering

Using the reverse engineered pendant model as the basis for our design, we were able to complete our first design iteration in just a few days. And thanks to both our reverse engineered pendant and our in-house 3D printing capabilities, we were able to produce a completed design in just three iterations.

3 Space engineers have direct access to a variety of state-of-the art 3D printing technologies and materials. Typically, they can prototype their design, test and make revisions within a work week. This kind of direct access has greatly accelerated our design process.

3D Printed Prototypes

PolyJet 3D printing has the unique ability to combine varying mixtures of rigid and rubber-like materials in a single part. As we searched for a balance between fit and protection, this ability allowed us to test prototypes of varying durometer. These tests ultimately helped us select our final production material, Santoprene TPV.

Because our design was based on the reverse engineered pendant model, our prototypes fit well and the initial design required only two additional rounds of minor revisions.



Injection Molding

To keep production costs down, we leveraged our network of trusted offshore manufacturing contacts. Our vendor machined the tooling in under 30 days and delivered the first samples three days later. These production samples were 3D scanned and compared to our original design to ensure dimensional accuracy.

After ensuring that the sample parts were accurate, our vendor completed the first production run of 1,000 units in less than one week.

Post Processing & Shipping

In order to reduce tooling cost, we opted to die stamp most of the holes in the production bumpers rather than including expensive cams in the mold. After we designed and machined the dies, our production team stamped the entire shipment in two working days.

Offering drop-shipping for our production customers saves time and money and gives them one less process to manage in their business. Our team packaged the shipment in Pendant Armor® branded boxes and drop-shipped it directly to the final customer.

Outcomes

Pendant Armor® bumpers have been proven to be effective at protecting teach pendants from being damaged. Independent lab testing confirmed that teach pendants protected by Pendant Armor® experience up to 70% less force on impact when dropped.

Since Pendant Armor® began marketing its product, it has received numerous requests for new models both from end-users and directly from OEM robot manufacturers. We have used this same process and technologies to design, prototype and manufacture Pendant Armor® for 11 different teach pendant models from ABB, Fanuc, Yaskawa and others.

By continuing to rely on our advanced manufacturing capabilities, Pendant Armor® has been able to fulfill each of these requests in less than 90 days, closing the gap between demand and supply, and staying one step ahead of competitors.

To learn more about Pendant Armor®, visit www.PendantArmor.com.