

# Rewriting the rules for producing rubber parts: Aerosport Additive turns to ETEC and Adaptive3D

CASE STUDY / AEROSPORT ADDITIVE



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## 01 / Overview

Founded in 1996, Aerosport Additive is an Ohio-based service bureau that produces prototypes and working models for customers in the automotive, aerospace, military, electronics and consumer industries. Over more than two decades, the company has consistently invested in the most advanced manufacturing technologies, and is now turning to DLP technology to expand their portfolio.

## 02 / The Challenge

Like other manufacturers, Aerosport Additive has long had only two options to choose from when it comes to producing rubber parts - urethane casting for prototyping and low-volume production and injection molding for mass production.

Both, however, also come with significant challenges. The multiple steps involved in urethane casting - creating the mold master, creating the silicone mold, then casting parts - mean the process is slow and labor intensive, resulting in relatively high per-part costs.

Injection molding, meanwhile, involves long lead times and high costs - tooling can easily require a month or more to fabricate and cost thousands of dollars - limiting the opportunities to change or refine part design.

For many manufacturers, additive manufacturing offered a solution to those challenges - its tooling-free nature eliminated the long lead times associated with traditional manufacturing, and the ability to quickly print functional prototypes enabled far more opportunities for design iteration.

For additive manufacturing, however, rubber parts are a challenge. While many materials, like TPU and TPA, could be used to produce flexible parts, matching the look, feel and performance of real rubber was all but impossible - until now.

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## 03 / Revolutionizing Rubber Parts Production

With the introduction of Elastic ToughRubber - a family of one-part, fast-curing photopolymer resins - those rules are being rewritten.

Developed by Adaptive3D, ETR makes it possible for Aerosport Additive to print a wide variety of rubber parts, from baffles to lattices to end of arm tooling and more.

To produce those parts, the company is starting with ETR 70, so named because it delivers parts with a shore A70 hardness - similarly to shoe soles or automobile tire treads.

That measure - tough enough for consistent use, yet soft enough to be pliable - marks a "sweet spot" for a broad range of applications, making it highly desired by many customers.

The ability to print Elastic ToughRubber, however, is only the start when it comes to Aerosport Additive's advanced manufacturing capabilities.

That's because the material is available exclusively on the ETEC Xtreme 8K printer. Featuring the largest build volume of any production-grade DLP printer, the system allows Aerosport Additive to print everything from very large parts to thousands of small parts in a single build.

That flexibility allows the company to quote jobs in a variety of ways, and win more business by tailoring the production method to each customer's precise needs.

The Xtreme 8K's benefits, though, don't end there. The system's innovative, top-down printing method eliminates the peeling step required in traditional DLP, allowing the Xtreme 8K to deliver exceptionally fast print speeds, helping to dramatically reduce lead times, a key consideration for many customers.

By comparison, urethane casting may require as much as 10 days before a single part is poured, and months of lead time can be required to fabricate injection molding tooling.

With the Xtreme 8K, however, Aerosport Additive can deliver parts in just days, potentially allowing the company to save enough time to add two full builds per day and take on additional jobs with the increased production capacity.

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## 04 / Why ETEC?

While Aerosport Additive has years of experience with different additive technologies - including multi-jet fusion and SLA printers - their decision to invest in the ETEC Xtreme 8K largely boiled down to one factor: materials.

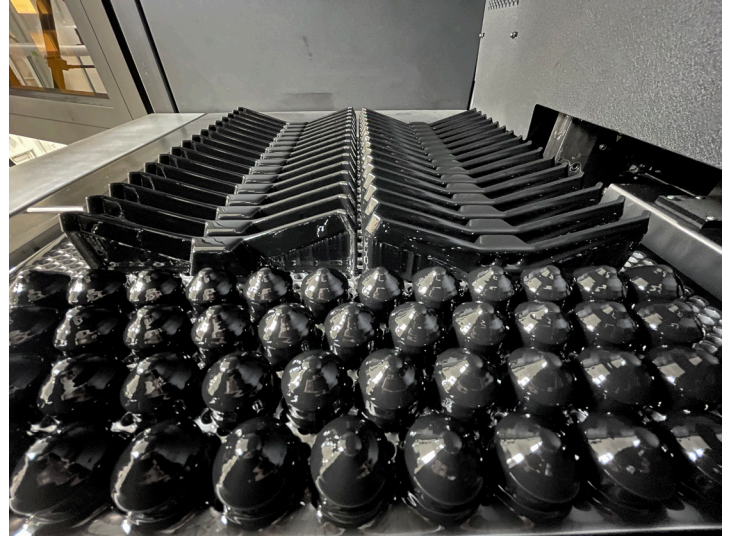
To print rubber parts that could compete with traditionally-manufactured parts, the company needed to use Adaptive3D's Elastic ToughRubber, which is only available on the Xtreme 8K.



While materials were key, they weren't the only factor driving Aerosport Additive's choice. Using DLP technology and a top-down printing process, the Xtreme 8K can deliver print speeds that allow the company not only shorten lead times for parts, but also reduce per-part costs - both key considerations for customers.



XTREME 8K BUILD OF FOUR WAY SWITCHES AND  
HIGH PRESSURE BELT HOLDER



## 05 / Part Fabrication & Comparison



FOUR WAY SWITCH

### FOUR-WAY SWITCH

This four-way switch is attached to the control stick on an airplane and used to make fine adjustments to the plane's trim controls.

An aftermarket part, these switches are produced in relatively small volumes - only a few hundred annually. Rubber is preferred for these parts because its non-slip texture ensures pilots can make trim adjustments even if their hands become sweaty.

These parts would typically be produced via urethane casting, a slow and expensive process which requires several weeks to create a mold and limits production to only a few pieces at a time.

With the Xtreme 8K, by comparison, Aerosport Additive can produce as many as 150 switches in a single, 2.5-hour build.

The inherent flexibility of additive manufacturing means the company can easily change or fine-tune the switch design to fit the needs of different customers, or customize parts to include a company's logo simply by updating the digital file and sending it to the printer.



FLEXIBLE TUBE

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### FLEXIBLE TUBE

Designed as a pass-through to allow wires to run through a door that has a range of motion, the baffling on these tubes is extremely difficult to create via casting and requires specialized mold cores.

After casting, those cores are difficult to remove without damage, making them effectively disposable, adding to the cost and lead time to produce the parts.

Using the Xtreme 8K, the process is far easier. As many as 30 of the parts can be printed in hours in a single build, with no need for internal supports, as opposed to producing a single part per day using traditional methods.

The ability to quickly print prototype and other test parts using Adaptive 3D's Elastic ToughRubber material may also help Aerosport Additive expand into other markets - particularly the automotive industry - where tubes like these are widely used.



HIGH PRESSURE BELT HOLDER



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### HIGH PRESSURE BELT HOLDER

A holder for aircraft seatbelts, this part mounts to the roof of the cockpit, and serves as a hanger for seatbelts that are not in use.

Though normally created via urethane casting, printing this part offers the chance for extreme customization, allowing Aerosport Additive to include the tail number of a customer's plane or a company logo into the design with ease.

Using the Xtreme 8K, the company can produce as many as 45 parts in a single build, and - in some cases - have parts ready for same-day delivery.

Traditional methods, by comparison, would require creating custom masters and molds, a process that could take up to a week or more before a single part is poured.



THREADED DUST SEAL

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### THREADED DUST SEAL

Part of a suspension assembly, this part is designed to prevent dust and other debris from damaging the suspension.

Though normally created via urethane casting, the threading in this part creates challenges to traditional manufacturing.

To create the threads requires the use of complex molds and cores, which can lead to challenges in unmolding the part without damaging it. Those molds and cores are also often costly and can take weeks to produce, resulting in long lead times.

With printing, by comparison, complex designs - like threaded parts, undercuts and complex curves - can be created with ease. And because no tooling is required, parts can easily be refined or customized to meet customers' precise needs with virtually no impact on cost or lead times.

The ability to print dust seals like this one also opens the door to new markets - particularly the automotive industry, where similar dust seals are a common component - for Aerosport Additive.



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### RC TRUCK TIRE

Designed for a remote-controlled truck, this tire highlights some of the challenges with casting complex rubber parts.

Though the intricate geometry of the tire can be difficult to create, the real challenge comes in creating the tire tread.

Because the tread runs perpendicular to the rest of the part, it is difficult to remove the cast tire without damaging the mold.



RC TRUCK TIRE



Printing, by comparison, effectively eliminates the problem. Using the Xtreme 8K, Aerosport Additive can print as many as eight tires in a single build, all of which can be customized with customers' logos, as well as different lattice or tread patterns.

By printing the tires using Adaptive3D Elastic ToughRubber materials, Aerosport Additive can also tailor the material properties of the tires to customer needs, from relatively hard, less flexible rubber to more soft, pliable tires.

Printing the tires also dramatically reduces lead times, from weeks needed to create molds for urethane casting to as little as three days.

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## 06 / Evaluation

For Aerosport Additive, the combination of the Xtreme 8K printer and Elastic ToughRubber material has been a success.

Used together, they allow the company for the first time to print a wide range of parts - from small switches to complex, threaded dust seals - with the look, feel and performance of real rubber.

With ETR 70, the company can produce parts with a Shore A70 hardness - a highly sought after characteristic for many applications in which parts are tough enough for consistent use, yet still pliable.

With the largest build volume of any production-grade DLP printer and incredibly fast print speeds, the Xtreme 8K allows the company to dramatically reduce lead times and per part costs, even when printing parts at high volumes.

The flexibility of the system - with its large build volume, the Xtreme 8K can print very large parts, thousands of small parts, or a combination of both - has enabled Aerosport Additive to expand their production capacity and grow their business by tailoring production to each customer's needs.

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## 07 / About Aerosport Additive

Founded in 1996, Aerosport Additive was established to produce the highest-quality prototypes, appearance models, working models and machined parts. Over 25 years, the company has served thousands of customers in the automotive, medical, electronic, military, aviation and consumer industries. To ensure they deliver the best possible parts to customers, Aerosport Additive is dedicated to investing in the most advanced manufacturing technologies, and today offers a variety of 3D printing approaches, along with traditional model making, blow molding, urethane casting, vacuum forming and more.

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## 08 / About ETEC

ETEC is a leading global provider of professional-grade 3D printing solutions. Founded in 2002 with its pioneering commercial DLP printing technology, ETEC now sells more than 30 printer configurations based on five distinct technologies that build objects from digital design files.

The company's premium 3D printers serve a variety of medical, professional and industrial markets, and are valued for precision, surface quality, functionality and speed. For more information, visit [www.envisiontec.com](http://www.envisiontec.com).