GKN ADDITIVE
FORECAST 3D

General Motors

Customer Case Study

Bridge Manufacturing Helps GM Deliver Vehicles on Time

Collaboration, Creativity Get the Job Done

If you ask John Sutterfield how GKN Additive (Forecast 3D) produced 60,000 parts for General Motors in just five weeks, he likens the process to finding just the right recipe. In his role as director of project management, he was coordinating between a mix of vendors, with some experimentation to get just the right conditions — and knowing when to turn up the heat.

AM Supports Last-Minute Design Change

In September 2021 GM decided to add a spoiler closeout seal to some of its 2022 full-size SUV passenger vehicles to improve aerodynamics and increase fuel efficiency. However, the design change came late in the development process. As a result, GM would need 60,000 parts manufactured quickly or risk delaying delivery of 30,000 vehicles to dealerships.

Developing, producing, and installing an injection molding tool to create the part using conventional manufacturing could take up to 12 weeks. GM needed the parts in six.

Christine Bardsley, one of GM's design release engineers, began evaluating options that would allow GM to meet its delivery deadline while also replicating the design as closely as possible. The company's additive manufacturing team recommended using HP's Multi Jet Fusion (MJF) technology, which yielded a 3D-printed sample comparable to its injection-molded counterpart in both function and appearance.

GM Taps GKN Additive (Forecast 3D) to Produce Part

Bardsley's colleague, Additive Manufacturing Application Engineer Adam Campbell, suggested possible suppliers. After receiving multiple quotes, GM selected GKN Additive (Forecast 3D), which has provided GM with 3D-printed parts in the past — either directly or through a tier one supplier.

GKN Additive (Forecast 3D) supplied 60,000 of these spoiler closeout seals to GM.

Partner Relationships Yield Success

According to Steve Richardson, business development manager for GKN Additive (Forecast 3D), the team was able to act quickly thanks to the company's strong ties with its partners. In addition to HP, GKN Additive (Forecast 3D) called on two key suppliers: BASF Forward AM, which provided its Ultrasint® TPU01 thermoplastic polyurethane powder for the closeout seals, and Additive Manufacturing Technologies (AMT), which provided the vapor smoothing necessary for creating the right finish.

"Since we've been in the industry for 27 years, we have connections with top manufacturers," Richardson says. "We can work very quickly to align with an organization and work out a value stream that's successful for launch."

Collaboration Conquers Obstacles

The GKN Additive (Forecast 3D) team was prepared to dedicate significant resources to print 60,000 parts and thereby meet GM's deadline. But the supply-chain issues due to the COVID-19 pandemic created an additional wrinkle.

"On top of the time constraints, we had material stuck on ships," Richardson explains. "It was a global

Project Partners

- **HP: Manufacturer of Multi Jet Fusion (MJF) machine**
- **BASF Forward AM: Supplier of Ultrasint® TPU01 (thermoplastic polyurethane) material for spoiler closeout seal**
- **Additive Manufacturing Technologies (AMT): Vapor smoothing supplier**

feat to scale the material and tackle the postprocessing in such a short period, which we could only do thanks to a collaborative ecosystem between ourselves and BASF, HP, and AMT."

BASF Forward AM Business Development Manager Jeremy Vos says his team identified workarounds to make sure GKN Additive (Forecast 3D) would have enough Ultrasint® TPU01 for the seal (including procuring extra material from a plant in Germany).

AMT's Luis Folgar credits colleagues Brad Duermit and Daryl Abell, saying that an extended network of production partners — including a customer support team at AMT's innovation center in Austin, Texas — helped AMT meet the supply needs for the project.

According to Sutterfield, GKN Additive (Forecast 3D) stayed on track via daily calls with its partners as well as the GM team. Bardsley worked on-site at the GM plant, sometimes staying for consecutive shifts to train people to do the rework while the assembly line ran three shifts a day, five days a week.

Postprocessing Requires Tinkering With Formula

Outside of the supply chain, optimizing the workflow presented the largest hurdle. The production team had to experiment before finding the most efficient approach for the vapor smoothing process.

"If I give five people the same recipe, the results will all come out slightly differently," Sutterfield says. "Vapor smoothing is the same way. A heated chamber uses a chemical vapor to slightly melt or reflow microns from the surface of parts in a controlled manner, sealing and achieving a polished finish. So it requires a combination of enough material and enough cycles to fine-tune the process, then getting the cycle time down."

Bridge Solution Gets Cars Into Showrooms

Richardson lists some "firsts" that came out of this project: the first time Ultrasint® TPU01 material was scaled to this type of volume and the first time the vapor smoothing process was used to meet this specific color — and weatherability — requirement.

Campbell notes the importance of implementing a viable solution until GM could ramp up production at high volume through traditional injection-molded seals.

"These vehicles were rolling right off the production line, right into dealerships and into customers' hands," he says. "Delaying that would have left a lot of dissatisfied customers. So to be able to do this was huge."

"There was a 'one team' mindset," says GM's Bardsley. "Everyone was working toward a common goal and understood how critical it was, to get things going. GKN Additive (Forecast 3D) did what they had to do, but they also exceeded expectations."

Thanks to the role of GKN Additive (Forecast 3D) in the industry, our team was able to collaborate with our partners to get the job done.

Front Cover
Left: Demonstrating the flexibility of BASF Ultrasint® TPU01
Right: GM spoiler closeout seals, created with HP's Multi Jet Fusion (MJF) technology, viewed from both sides

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