

# MAKING RELIABLE AUTOMOTIVE SUPPLY POSSIBLE

Ensuring quality additive production  
for automotive suppliers

**The story of Aptiv, Carbon®, and Fast Radius collaborating to solve a challenge for Ford shows what happens when multiple manufacturing partners come together to forge new paths in automotive manufacturing.**

Aptiv is a leading technology provider, delivering safer, greener, more connected solutions that enable the future of mobility. They were responsible for the design and production of a trailer-tow connector cap for Ford Super Duty trucks to protect the electrical connectors from harsh environmental exposure.

To address this challenge, Aptiv wanted to push the boundaries of what's possible in lower-volume, critical part production for a Ford trailer tow connector cap application and deliver a quality product that met Ford's expectations for the best possible cost and speedy, flexible production.

The trailer-tow connector cap needed to meet the automotive industry's standard engineering and quality requirements — specifically, USCAR-2 validation and ISO 9000 certification — to guarantee the protection of the electrical connector against external elements.

With these considerations in mind, Aptiv worked closely with Carbon, a leader in digital manufacturing technology and additive materials development, and Fast Radius, a manufacturing partner with expertise in repeatable, reliable additive production to make this possible. Their combined efforts led to serial production of the trailer-tow connector cap for the Ford Super Duty trucks using Digital Light Synthesis™ (DLS) technology. Additionally, Aptiv's additive manufacturing strategy provided a tool-free approach, speeding time-to-market by 20 weeks compared to traditional molding solutions.



## MAKING IT POSSIBLE

### Trusted materials, leading technology, and additive expertise

#### TRUSTED MATERIALS FOR AUTOMOTIVE APPLICATIONS

This project was Aptiv's first automotive production application to leverage additive polymer technology. The Carbon team worked closely with Aptiv to choose the right material to meet the product's USCAR and level 3 sealing requirements. After careful evaluation, Carbon EPX 82 was chosen as the material of best-fit to produce the trailer-tow connector cap.

#### INDUSTRIAL-GRADE DIGITAL MANUFACTURING TECHNOLOGY

Carbon DLS technology met Aptiv's expectations for speedy, reliable, and scalable production. This made Carbon DLS the right method for the project based on the estimated production volume and scale. Once the technology and materials were locked, Aptiv turned its focus to the connector cap's design, collaborating with Fast Radius and Carbon engineers to optimize for manufacturing.

#### PRODUCTION OPTIMIZATION AND EXPERTISE

Printing thousands of parts repeatedly and reliably at scale with additive manufacturing can be a challenge. Fast Radius infused their intricate knowledge of Carbon's technology to ensure production reliability. They drew on this experience and the insights gained from their proprietary digital thread software to design a build file that optimally positioned the parts on the build plate to account for subtle variances in temperature and light variation.

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#### QUALITY MANAGEMENT SYSTEM FOR ADDITIVE PRODUCTION

Aptiv conducted an extensive on-site audit process of Fast Radius. This resulted in Fast Radius becoming the first serial-approved external additive manufacturing supplier for Aptiv in the automotive industry. Fast Radius relied on its additive manufacturing expertise and software-backed digital thread capabilities to conduct and pass a Production Part Approval Process (PPAP). For production with Carbon DLS technology, Fast Radius instituted part-specific standard operating procedures across each step of the process and developed a rigorous control plan to ensure ongoing quality.

### THE RESULTS

The combination of Carbon's leading digital manufacturing technology and trusted materials, along with Fast Radius's additive manufacturing expertise and infrastructure, made it possible for Aptiv to achieve their innovative solution for Ford.

Today, the digital files for this product are stored in the Fast Radius Virtual Warehouse™ and ordered on-demand and printed as needed. Together with Fast Radius and Carbon, Aptiv used the benefits of digital manufacturing to reduce tooling expenses, get to market faster, and provide a long-term, streamlined solution to making Ford's trailer-tow connector cap with additive manufacturing.



**Jerry Rhinehart,**  
Additive Manufacturing  
Technology Manager, Aptiv

**“Fast Radius and Carbon enabled us to additively manufacture Ford’s trailer-tow connector cap, greatly improving our time to market over traditional injection molding and paving the way for future innovations in our lower-volume part production.”**

