SUCCESS STORY | **LIFESTYLE**

INNOVATIVE AFTER-MARKET AUTOMOTIVE LIGHTING WITH FARSOON FLIGHT TECHNOLOGY

Figure 1: Henvvei After-market customized automotive lighting housing & assembly produced with Farsoon Flight Technology. Image courtesy: Henvvei

Project Overview

CHALLENGES

- Structural & performance optimization
- Customized Designs
- Accelerated design to market circle
- Reduce cost of manufacturing

SOLUTION

- Farsoon plastic LPBF system
- Flight HT403P

KEY BENEFITS

- Improved performance with affordable cost
- Advanced Manufacturing Tool
- Shorter lead-time
- Alternative supply chain

FARSOON TECHNOLOGIES

Accelerating Innovation & Manufacturing on Large-scale Automotive Functional Applications - Through Additive Manufacturing.

According to EMERGEN Research 2021, the global automotive intelligent lighting market is estimated to reach USD 37.26 Billion at a steady CAGR of 4.4% in 2027. Being one of the fastest growing markets, the Asia-Pacific region has several key driving factors for intelligent lighting -- including long-term user energy saving, increased performance and safety requirements, as well as a rising after-market lighting scene driven by emerging technologies.

Henvvei Automotive -- located in Zhenjiang City, Jiangsu province, is a technology innovator specialized in customized intelligence LED Matrix and Laser headlight design and manufacturing. Conveniently located in the Yangtze delta --- an area with a profound history of automobile manufacturing infrastructure and established auto parts supply chain, now has become the capital of China's EV Car industry. Thanks to the rapid urbanization in the area and the increasing sales of luxury cars due to growing purchasing power of customers, Henvvei has been rapidly growing to meet the trend in passenger EV cars segment for the adoption of intelligent customized Laser and LED headlight systems.

Watch Video: Henvvei After-market Automotive Lighting produced with Farsoon Flight Technology.

Challenge

The starting point of the project is to enhance the current lighting systems equipped on the mass-produced factory models, which usually have limitations in brightness, stability, energy consumption and weather dynamics. Besides the functionality & safety, the manufacturing quality & design aesthetics also needs to meet the highest standards in this niche market.

From the very beginning, the Henvvei design team realized that the traditional Xenon technology can not fit into the latest car model headlight bracket frames; while the latest Matrix LED and Laser technology opens up more possibilities with enhanced performances; However, it bringing up some new challenges:

Fitting issue. The current modular sizes of Matrix LED and Laser system are limited compared to the varied headlight space available in customer products;

Functionality. Customized headlights usually come with new premium lighting features that requires structural adjustments to achieve the designed functionalities.

Development Iteration. With the increasing number of new car models and customer projects every year, it often requires a long lead time to go through the design-verification-production cycle with the traditional process, which result in a high cost in labor and material.

Cost control. Many customized projects often require small volume batch production while making it very difficult to reach the price target with the traditional manufacturing process.

Solution

With continuous dedication to innovation, the Henvvei design team started leveraging various industrial additive manufacturing solutions as a tool for both R&D and production in this field. During the evaluation process, the key component of the headlight system -- the Matrix light housing was selected as a benchmark. Thanks to the design flexibility brought by 3D printing, the Henvvei design team used an innovative integrated structure to create a customized housing to hold each lighting module. To realize their design Henvvei decided to invest in additive manufacturing with the purchase of a Farsoon Flight HT403P system in early 2021.

In pursuit of the best design, functionality and quality for each project, a few design iterations and prototypes are needed to find the best fit solution. Thanks to the high production speed of Farsoon's Flight plastic laser sintering technology and the expanded build envelope,

"We are very excited to see the increasing market demands for innovative automotive lighting solutions. While due to the limited number of modified vehicles, it is impossible to follow the conventional manufacturing processes to make molds that targets mass production. We are looking to go further with a new manufacturing tool that enables our design team the complete freedom to innovate, as well as rapid fabrication of high-quality end-use parts that improves our project lead times. We are thankful to partner with Farsoon 3D printing experts during this challenging journey and distinguished ourselves on market with a Flight HT403P plastic Laser PBF machine." - Henvvei Automotive

Figure 2: Henvvei After-market customized automotive lighting housing & assembly produced with Farsoon Flight Technology. Image courtesy: Henvvei

these prototypes can be produced in one single batch in less than one day – making the verification process much easier and faster. After the verification process operated by R&D team, the settled design will be further examined by Henvvei's quality team for more defined acceptance criteria, including surface quality, detail resolution and size accuracy, and forward these requirements to production team. Thanks to the truly open Farsoon additive machine platform, production engineers are able to fine tune on specific parameters to determine the best suited laser sintering strategy used for final end-use part fabrication.

Result

***"Thanks to the quality, flexibility and economics achieved by small batch additive manufacturing, we are receiving increasing inquiries and projects for both limited editions and modified vehicles. Farsoon 3D printing helped us to achieved an in-house closed loop of accelerated design to production iteration without the need for the time-consuming mold making process. Meanwhile, the additive technology also enables us to conduct multiple customized projects and product lines development at the same time – to offer more diverse, advanced products to the market with a competitive edge."*- Henvvei Automotive**

According to Henvvei, the CNC & mold development required in traditional headlight manufacturing can typically take around 45 days. Any minor changes in design or mold modification will take another 7-10 days. Now thanks to the Flight HT403P system, each design iteration cycle can achieve a significant reduction of 97% compared to before; and multiple units can be manufactured at the same time. This helps optimize the production process and reduced the manufacturing costs to a minimum – only 2% compared to the previous process.

Henvvei also sees more benefits in future product innovation with Farsoon 3D printing: ***"With traditional CNC & molding process we are only able to manufacture one single headlight structure for assembly; while additive technology opens more possibilities in functionality, dynamic controls and aesthetical appearance, such as special design for best light reflection and distribution; Adaptive light projection performance under a variety of weather conditions; Unique lightguide styling and integration of customized ancillary structure for individual branding. With this perfect additive production tool at hand, there are endless possibilities for us to explore."***

About Flight Technology

Farsoon's Flight Technology™ or Fiber Light Technology takes advantage of powerful fiber lasers in place of the standard CO_2 lasers found in standard laser sintering systems. A fiber system is capable of delivering greatly increased power to the powder bed. Due to the more robust and stable nature of a fiber laser system as compared to a CO_2 system Flight Technology™ also provides increased laser longevity which is key when considering ROI for manufacturing applications. In addition, with its increased power and energy absorption characteristics Flight Technology™ will be capable of accessing a much different range of process-able materials and operational flexibility as compared to standard laser sintering systems, which allows for increased freedom for future AM material and application development.

	CNC & Molding Process	Farsoon 3D Printing	Improvements
Design + Mold Making	30 days	Approx. 1 day	Design-Production cycle reduced by 97%
Manufacturing + Modification	Approx. 7 days		
Overall Manufacturing Cost	8000 USD	150 USD	Manufacturing cost reduction by 98%

Figure 3: Traditional & 3D printing process comparison, based on development of a typical After-market customized automotive lighting housing. Image courtesy: Henvvei

Farsoon's Plastic Laser PBF Systems

HT1001P | 403P Series | FLIGHT 403P Series | FLIGHT 252P Series | 252P Series | eForm

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