

MANN+HUMMEL: ADVANCED AUTOMOTIVE FILTRATION MANUFACTURING WITH FARSOON PLASTIC LASER PBF SYSTEM



Figure 2: Filtration media structure produced by Farsoon 403P. Image courtesy: MANN+HUMMEL

↓ Project Overview

CHALLENGES	Design-to-product cycle Cost-control of product development process Customer-specific solutions
SOLUTION	Farsoon plastic LPBF system 403P with FS3300PA material
KEY BENEFITS	Flexible internal manufacturing supply chain Increased profitability with savings in tool-making Significantly reduced part lead-time

Innovation on High-performance Filtration System - Through Additive Manufacturing.



↓ Customer Profile

MANN+HUMMEL is a global expert in filtration. The Original Equipment Division develops high-performance products for a wide range of applications with different operating conditions - from passenger cars and commercial vehicles to construction and agricultural machinery, rail vehicles, machine tools and other industrial applications.

Learn more: www.mann-hummel.com

Figure 1: Farsoon 403P in operation at MANN+HUMMEL Filter (Shanghai) Co., Ltd. Image courtesy: MANN+HUMMEL

In order to continue its leading role in the global filtration market, MANN+HUMMEL has been enhancing the capability of advanced technology; and sees additive manufacturing as a key tool for both product innovation and end-parts production. Starting early 2019, MANN+HUMMEL Filter (Shanghai) Co., Ltd decided to partner with Farsoon industrial 3D printing by investing in a [403P plastic laser powder bed fusion system](#).

With the increasing competitive pressure and the rapidly evolving automotive market, MANN+HUMMEL has been faced with three major challenges: demand for accelerated design to product cycle, cost-control and customer-specific solutions for particular application.

↓ Challenges

Design-to-product cycle:

Confronted with the market demand of faster new vehicle release cycle, many passenger car manufacturers has reduced their product development time frame to only 18 months, compared to previously

36 months – this significant reduction in time has had a huge influence on major filtration system supplier MANN+HUMMEL, which means much shorter time frame for product planning and development. However, a new functional part in filtration systems used to require an average of 3-4 weeks, or even months to produce one prototyping by traditional tooling. A new design with only 10% change of structure will need another 10 days in lead time for the next prototype iteration.

Cost-Control:

Besides the pressure of the accelerated design-to-product cycle, overall cost-control from planning, development, prototyping, testing to manufacturing process is also a critical criterion to ensure the profitability of the project. Prototyping and small-batch production by traditional manufacturing requires tools and molds fabrication for each product iteration, with a glaring investment cost. Take the components in automotive filter systems for example, the mold production cost for each part ranges from 30K – 150K USD; this number will continually grow with multiple design iterations and increasing development models. For some specific applications such as filtration



Figure 3: Functional prototype of intake pipe in passenger vehicle engine system. Image courtesy: MANN+HUMMEL

media (figure 2), the featured complex micro irregular structural design, making it extremely difficult and expensive to build by traditional methods.

Customer-specific solutions:

With the emerging electric vehicle market and the increasing demand for customized solutions, MANN+HUMMEL has kept expanding various customer-specific programs besides the standard product development. Different from the mass production off-the-shelf parts, very limited numbers of parts are required; however, the company is often forced to produce a much higher volume to meet the break-even point of the mold cost – which frequently led to over-stock and warehousing issues.

↓ Solution

Since adopting Farsoon's 403P platform in 2019, MANN+HUMMEL has fully integrated industrial 3D printing in both product development and direct parts production. **As of today, the company has produced over 5000 functional parts for design prototypes and verification test, with a completely full machine operation schedule.**

"Farsoon industrial 3D printing has opened many possibilities for us," Explained Mr. Wang Huaigu, testing & prototyping manager of MANN+HUMMEL Shanghai, "we are able to achieve significantly shorter new product development cycle thanks to Farsoon 3D printing; it offers us a great, flexible internal supply chain alternative which perfectly covers our closed-loop of design-prototyping-verification-manufacturing, while also improved sustainability that can help increase profitability."

Taking the example of the intake pipe (figure 3) – this part required a fast design iteration for functional testing by the customer. Features a large size of 600mm (23.6 inches) with a new customized locking mechanism design, the functional prototyping part is able to be 3D printed in one single day, and shows excellent strength, good resistance under temperature, humidity and chemical corrosion conditions. Compared to the traditional process, the 403P produced part also helped saving investment in tool-making while significantly reduced lead time.

↓ Results

*"Thanks to the high quality parts produced with Farsoon 403P, we are able to further implement additive manufacturing in our business sector of end-use production." Says Mr. Wang Huaigu, "Functional parts with complex geometries now are able to be produced with simplified manufacturing process and increase the structural integrity by combining multiple parts to only 1. The high resolution, size-accuracy and optimal mechanical performance of the build parts requires much less post-processing before delivered to customer. **As of today, more than 30% of our SLS parts are produced for end-use applications – and the number is still growing.**"*

Farsoon's laser powder bed fusion technology also enables MANN+HUMMEL to develop and produce highly customized, and innovative solutions to best suit application's needs. The company sees many benefits in production flexibility with additive manufacturing: **"By integrating Farsoon 3D printing in our customer-oriented solutions, we are able to save up to 80% cost by switching to on-demand small batch manufacturing in order to avoid the warehousing and tool-making cost caused by over-production."**

↓ Farsoon's Plastic Laser PBF Systems

▼ HT1001P

▼ 403P Series

▼ FLIGHT 403P Series

▼ FLIGHT 252P Series

▼ 252P Series

▼ eForm



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