

Case study

Materialise takes 3D printing to end-part production

3D printing services



Industry Sector

3D software development print services

Business name

Materialise NV

Testimonials from

Bart Van der Schueren, Chief Technology Officer, Materialise
Giovanni Vleminckx, Research Project Manager in Materials and Processes, Materialise

Objective

Make 3D printing part of certified manufacturing workflows

Approach

Benchmarking, testing

Technology

HP Multi Jet Fusion

Solution

HP Jet Fusion 3D Printing Solution



Summary

Headquartered in Belgium with branches worldwide, Materialise combines one of the biggest groups of 3D software developers with one of the world's largest 3D printing facilities. For 27 years, Materialise has pioneered innovations in 3D printing, pursuing a mission to improve product development and contribute to a better, healthier world. With HP Multi Jet Fusion technology, Materialise is achieving both parts of its mission: ramping its capability to produce end-use parts with the HP Multi Jet Fusion technology, and reducing the environmental impact of manufacturing along the way.



Challenge

When Materialise opened its doors in 1990, it professed an audacious belief: that it could create an end-to-end solution for turning ideas into reality with 3D printed parts. With a commitment to co-creation and business partnerships, the company developed a robust 3D prototyping business backed by original software solutions. Now, Materialise is blazing a trail from 3D prototyping to 3D end-part production. But the path is wrought with challenges.

“There are significant differences in making a prototype versus serial production,” said Bart Van der Schueren, Materialise’s Chief Technology Officer. For one, becoming a manufacturing facility requires higher standards for part quality and consistency, he said. “And it’s also very important that the process is traceable, to make sure the parts you are printing are printed according to the exact standards and data sets you promised.”

In addition to the process-related challenges of printing end-use parts, 3D printing also presents challenges that stem from limited material options, part quality, and printer efficiency. “The market is expecting that 3D printing will make use of the same engineering plastics used in conventional manufacturing,” Van der Schueren explained. “We believe this is not absolutely necessary. With the available materials in 3D printing now, you can solve a lot by engineering products in a different way.”

Solution

After a lengthy benchmarking project to identify parts that could be targeted by the properties of HP Multi Jet Fusion, Materialise put the HP Jet Fusion 3D Printing Solution at the center of its New Product Introduction (NPI) process. “We have begun setting up certified manufacturing environments where we are looking at how a new technology like HP’s Multi Jet Fusion can result in serial production,” Van der Schueren said. “We are combining our software expertise to create the necessary traceability, and taking new products through the whole manufacturing process.”

In addition to HP’s Multi Jet Fusion technology, Materialise uses a number of other plastics-based technologies, such as stereolithography, selective laser sintering, FDM, and polyjet; and metal technologies such as selective laser melting.

“Early in the process, we had a good feeling about HP’s Multi Jet Fusion process efficiency, mechanical properties, and surface quality,” said Giovanni Vleminckx, Materialise’s Research Manager. He said Materialise is currently targeting the HP 3D printer for applications where the customer requires a large amount of detailing, high accuracy, thinner walls, surface texturing, labeling, or engraving. “I don’t think there is a limit to the industries that can benefit from this.”

“Mass manufacturing with 3D is really not possible today, but mass customization really is,” he said. In addition to mass customization, Van der Schueren said Materialise has identified at least two other priority use cases for HP’s Multi Jet Fusion—manufacturing for production volumes up to “a few thousand” parts, and the production of “intrinsic plastic parts” that are part of complex products.

HP 3D High Reusability PA 12 material is enabling higher quality products, Van der Schueren said. “The thin layers of the HP Multi Jet Fusion technology—at 80 micrometers—results in more isotropic behavior of parts than what we see with other plastic technologies. This is especially important when you think about end-use parts.”

Applying this new technology to products requires a balance of speed and cost, he said.

“The speed of the HP technology is not limited by the complexity of the product you are printing,” Van der Schueren said.

Materialise calculates costs by looking at the end-to-end process of making a part. “The real cost drivers are materials usage and machine costs,” Vleminckx said. “This is why we believe design and engineering is so important—to optimize material usage and build volume.”



“What HP is making possible that others are not is the ability to make high-performance parts that look very good coming straight out of the machine.”

—Bart Van der Schueren, Chief Technology Officer



Materialise Headquarters in Belgium

Result

Print quality and consistency represent the top criteria for both Van der Schueren and Vleminckx, because it's what matters most to customers. "What HP is making possible that others are not is the ability to make high-performance parts that look very good coming straight out of the machine," Van der Schueren said.

HP's integration of the processing station and build unit, combined with the high reusability of the PA 12 powder, contribute to an overall increase in the efficiency of production at Materialise. "The re-usability of the HP 3D High Reusability PA 12 powder material is higher than what we see in laser-based systems," Van der Schueren said.

"The HP Jet Fusion 3D Printing Solution tackles both speed and quality. Having a fully integrated solution is where the real efficiency and cost savings are." He noted that speed is measured in more ways than print time and cooling time. "With HP's surface texturing, for example, you can improve the quality of parts and avoid post-processing that you would otherwise need to do. In parts where you have a high degree of complexity, the speed of the HP Jet Fusion 3D Printing Solution is very high—and that's where the costs go down."

"User friendly" is how Van der Schueren and Vleminckx describe the experience of operating the HP Multi Jet Fusion 3D Printing

Solution. "It's a solution that is very easy to use. It's a fairly straight-forward machine from an engineering perspective. It's a stable machine; it doesn't have failures throughout the process. This makes the technology more valuable, and contributes to the speed of production," Van der Schueren said.

Vleminckx concurred. "My favorite thing is that the whole solution is an integrated system. You have two devices that are complementing each other, and you have everything from powder handling to printing, unpacking, and cooldown integrated into the whole HP Jet Fusion 3D Printing Solution."

Looking ahead, Van der Schueren is excited for opportunities that the HP Jet Fusion 3D Printing Solution unlocks. "You have—with the ink jetting of the fusing agents—the ability to go into multi-colored parts, or even to add other material properties. This is really a differentiator that I see versus other suppliers. I envision quite a few machines that will continuously produce end-use parts."

Growing its stable of HP Jet Fusion 3D printers will move Materialise closer to its vision of business growth and global responsibility. "3D printing will change the world because it allows us to produce much lower volumes—and this reflects a change in the world, where production needs to happen closer to the site of consumption to reduce the environmental impact of manufacturing."

Customer at a glance

Application

3D printing for prototyping and short-run manufacturing

Hardware

- HP Jet Fusion 3D 4200 Printer

Accessories

- HP Jet Fusion 3D 4200 Processing Station with Fast Cooling
- HP Jet Fusion 3D Build Unit
- HP Jet Fusion 3D External Tank 5 units Bundle

Software

- HP SmartStream 3D Build Manager
- HP SmartStream 3D Command Center
- Autodesk® Netfabb® Engine for HP
- Materialise Build Processor for HP Multi Jet Fusion
- 3MF

HP services

- Next-business-day onsite support¹
- Next-business-day spare parts availability,¹ thanks to HP's global reach
- 3D printing productivity and professional services

Footnotes:

¹ Available in most countries, subject to Terms & Conditions of HP Limited Warranty and/or Service Agreement. Please consult your local sales representatives for further details.



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–Giovanni Vleminckx, Research Project Manager in Materials and Processes

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