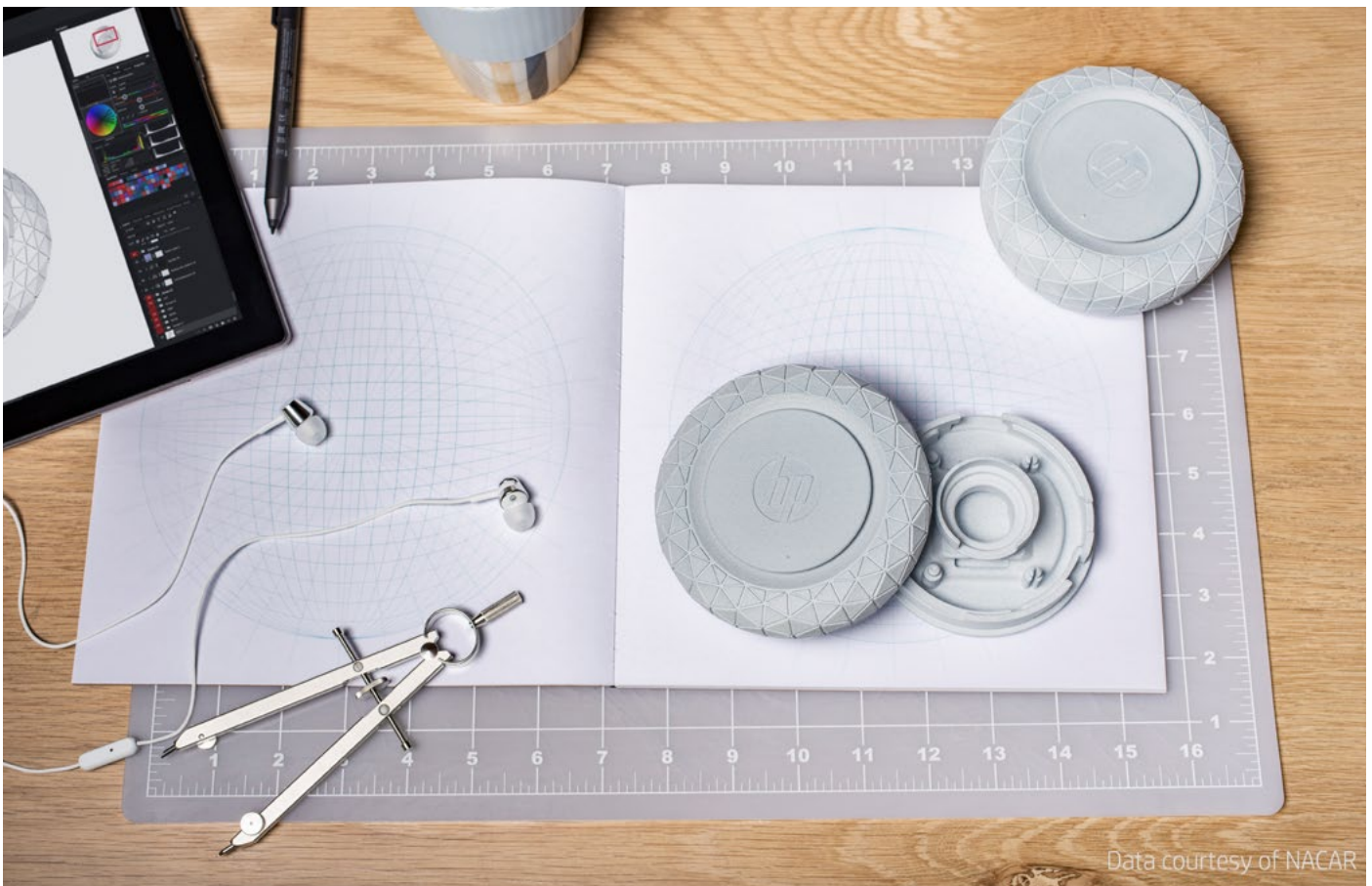




# Prototyping to Production: How HP Jet Fusion 3D Printing customers shorten their time to market



## Summary

In the mad rush to get a new product to market, every hour counts, and as time passes, competition waxes while customers wane.

In recent years, technological advances have dramatically accelerated the traditional product manufacturing lifecycle. Innovations in advanced analytics, artificial intelligence, and digitization are enabling companies to get new products to market faster than ever before.

To keep up with increasing speed to market and shorter product lifecycles, many companies are turning to 3D printing to stay ahead of the competition. While 3D printing has long been used as a prototyping tool, new advancements have helped increase the speed, helped improved the mechanical properties, and helped lower the cost of the technology. Specifically, with the introduction of HP Jet Fusion 3D Printing, companies are reaping the benefits of rapid prototyping and easier transitions to full production.

Ultimately, with HP Multi Jet Fusion technology, customers are embracing a technology that enables them to move at the speed of their ideas.

## Accelerating design & iteration

Innovation requires iteration: Designers can cycle through dozens of ideas before deciding on a final design, making iterations time consuming and expensive.

Thankfully, with HP Multi Jet Fusion technology, designers have the freedom to produce multiple prototypes in the same time it takes to produce a single part. This can accelerate prototype testing and, in turn, accelerate the final product design. Compared with other 3D printing technologies that print parts point by point instead of layer by layer, the HP Jet Fusion 580/380 Color and 540/340 3D Printers can print parts in a fraction of the time.<sup>1</sup> These parts can then be used to make on-the-spot design decisions.

**“Reduced time to print, design freedom and better part quality have all enhanced our design process,”** says Andy Boyes, Program Manager of SIGMADESIGN. **“The ability to manufacture strong nylon parts quickly has improved our design abilities. We have made many components with HP MJF technology; in the process we have saved thousands of dollars when compared to traditional manufacturing methods. Design constraints are lifted when you are printing parts using the HP MJF technology.”**

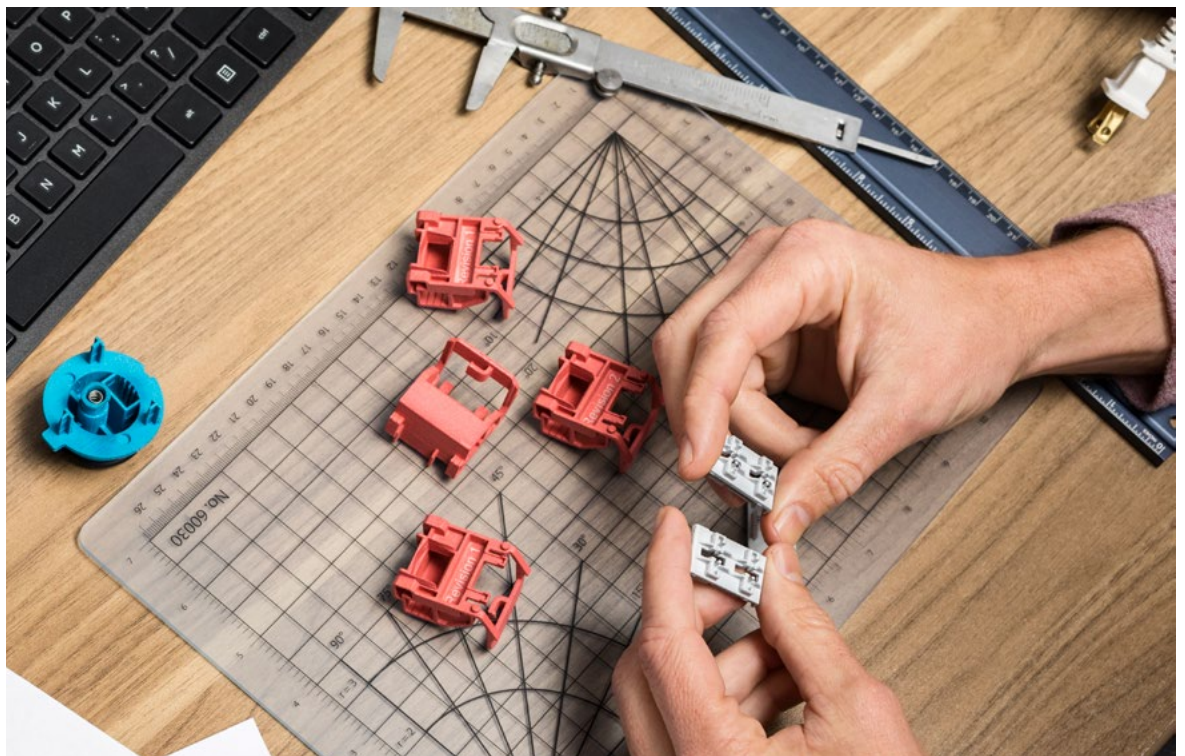
## The value of functional prototypes

In addition to print speed, the material properties of parts from HP Jet Fusion 3D Printing Solutions are ideal for prototyping and enable customers to make decisions about their final parts.

HP Multi Jet Fusion technology allows for the creation of highly isotropic parts, or parts that have similar properties when measured in the X, Y, and Z dimensions.

**“Isotropy is important so that the designer does not need to take the time to communicate extra design intents, like where strength and dimensional accuracy are most important in the part,”** says Boyes. **“In other additive processes, it is important to orient the part such that the strength is not needed between layers. In terms of strength, parts produced with HP MJF technology are not as sensitive to orientation, so less time is spent from engineering to getting the parts in hand that can be used in production.”**

Furthermore, HP prints with engineering-grade thermoplastic and has the capability to print with high dimensional accuracy. This enables customers to create parts that can undergo rigorous design tests to test for final fit and form and ultimately prepare for production with fewer design iterations.



## Color capabilities

There are many ways to improve the value of a prototype, but one that is often overlooked is the addition of color. With the HP Jet Fusion 580/380 Color 3D Printers, it is now possible to print fully functional, color 3D parts.

Adding color to prototypes is one way to test final part colors, but there are other ways to use color in prototypes.

**“One application we see is in aerospace,”** said Ken Burns, the Technical Sales Director for Forecast 3D, a custom manufacturing and 3D printing service bureau. **“Color can be used to differentiate the functional and the placeholder parts in an assembly. Red would be a great indicator for this since it draws attention.”**

Color also can be used to easily label or differentiate segments of a prototype, for example, in a part where fluids flow through different channels. Even simple text labels like a prototype revision number or the name of the designer who created the part can be incredibly valuable in offices where there could be dozens of similar-looking prototypes.

**“Adding color adds an important visual context to a part,”** Burns said. **“Anything that allows customers to better understand their final part is useful.”**

Color is just another tool to leverage when using HP 3D Printing for rapid prototyping.

**“Color helps communicate: Whether it’s a visualization of FEA results, highlighting important features, or revealing suggested changes, color adds another layer of metadata that remains with the physical part,”** says Boyes from SIGMADESIGN.

## Scaling to production

When creating a new product, there are often two sets of designs: One set is for 3D printing prototypes while the other is for producing the part. However, most designers only think in terms of the latter.

**“When you’re developing a product, at each moment of the design, it is a final part,”** said Gabriel Boutin, CEO of Syncro Innovation, an industrial design firm in Quebec, Canada, and the founder of Kupol, a new company that designs and produces bike helmets.

Kupol designed some of its earliest prototypes of bike helmets using HP Multi Jet Fusion technology, and now it has ramped up to produce them on an HP Jet Fusion 4200 3D Printer in partnership with Sculpteo, a 3D printing service bureau that owns the machine. Boutin explained that not only has HP 3D Printing saved him time to market, but it also has allowed him to be more creative.

**“When you don’t have to think in two different ways—for prototyping and production—and can just focus on one thing, you can allow for more creativity,”** Boutin said. **“With the speed of innovation and the speed of HP 3D Printing, we saved at least one-third of the time compared with other methods. I can’t think of a better way to create a product.”**

For companies like Kupol that have short production runs and need to produce strong or complex parts, HP Jet Fusion 3D Printing can be a fast, affordable production solution.

**“We are doing a lot of prototyping and producing at the same time,”** said Burns. **“Their intent may not have originally been to produce with 3D printing, but the economics and the design flexibility of HP 3D Printing allows for it.”**



The HP Multi Jet Fusion technology platform allows customers to take advantage of a prototyping-to-production workflow.

HP Jet Fusion 580/380 Color and 540/340 3D Printers provide a convenient, in-house solution for prototypes and smaller builds while the HP Jet Fusion 4200 3D Printers are ideal for production and throughput. All HP 3D Printers use Multi Jet Fusion technology, which ensures that part quality, strength, and dimensional accuracy remain consistent. This enables customers to prototype and iterate using HP Jet Fusion 580/380 Color and 540/340 3D Printers and then seamlessly transition their designs to full production using HP Jet Fusion 4200 3D Printing Solution.

A process that took months of design iterations, re-machining injection molds, and shipment to and from factories across the world can now take a matter of weeks with HP 3D Printing.

**“In a traditional design cycle, the designer needs to account for function of the part, beginning with a prototype and then adjusting to meet manufacturability requirements,”** says Boyes from SIGMADESIGN. **“This cycle can take days or weeks. When the same technology is used for initial prototypes and final production parts, the designer can focus more on the function and less on the manufacturability, because the prototype performance is equivalent to the production. This saves time and enables the engineer to focus on the ‘what’ and less on the ‘how.’”**

## References

1. Based on internal and third-party testing for HP Jet Fusion 580 and 540 3D Printers, printing and cooling time is a fraction of the time of the printing times of comparable plastic fused deposition modeling (FDM), stereolithography (SLA), and material jetting solutions from \$20,000 USD to \$120,000 USD on market as of June, 2017. Testing variables for the HP Jet Fusion 580 3D Printer: Part quantity: 1 full build chamber of parts from HP Jet Fusion 3D at 10% of packing density versus same number of parts on above-mentioned competitive devices; Part size: 30 cm<sup>3</sup>; Layer thickness: .08 mm/0.003 inches. Competitor testing variables are comparable.

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