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How Microsoft Optimized Tooling for Shield Metal Prototyping with Stratasys' PolyJet™ Technology

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The Stratasys J8 Series™ printers have given me a powerful tool to produce parts for both engineers and designers, a difficult gap to bridge for other 3D printing technologies

Mark Honschke
Additive Prototyping Lead, Microsoft

Press molds for sheet metal PCB shield cans

Customer Profile

Located in Redmond, Washington—Building 87 or Microsoft's Advanced Prototyping Center (APC) is a 26,000 square foot prototyping facility, home to a team of highly passionate makers that act as the translator, between concept and reality for Industrial Designers and Engineers. Utilizing a multitude of manufacturing and prototyping tools, the APC focuses on efficiently creating solutions and prototypes to answer business questions. Following the mantra of "Fail Fast" the APC is responsible for quickly generating confidence in development decisions for Microsoft's designers, engineers, and partners. 3D printing plays an integral part in Microsoft's "Fail Fast" development process and PolyJet™ models are a part of our daily routine.

Challenge: Shield Metal Prototyping

Shield cans are an essential part of modern electronic devices used to protect internal electronic components from electromagnetic and radio interference. Without these critical guards, electronic devices would be susceptible to external interferences which would cause operational issues from minor malfunctions to complete failure. As important as sheet metal components play for hardware historically prototyping them has been challenging and time-consuming. Traditional methods for prototyping shield cans have often impeded the iteration process, requiring a complete restart of the tooling whenever even simple design changes are needed. The time and money required by these older methods reduced the total number of iterations that could be accomplished during a development cycle. Sheet metal shield cans are typically made from thin metal materials like brass, nickel silver and stainless steel and, due to the thin geometries, directly 3D printing shield can prototypes is not practical. However, 3D printing the tooling form needed with PolyJet™ technology to use when producing the metal prototypes improves the lead time and has opened the use of unique geometries that would otherwise be impossible using traditional methods..

Microsoft 3D Printing Lab for Rapid Prototyping

Solution: 3D Printed Tooling

While 3D printing has been around for decades, its wide adoption for sheet metal prototyping has only recently emerged. In the past all 3D printing processes had limitations that curbed the range of useful geometries. Stratasys PolyJet™ technology has been the best option with the best balance between part quality, accuracy, and speed and the J850 Prime, renowned for its enhanced x/y accuracy, and multiple layer resolutions including a high 14-micron resolution, presents an exceptionally rapid method to produce sheet metal tooling with the precision necessary for prototyping extremely small features. The standard Vero materials, with their high compression strength, have been an amazing resin for sheet metal form prototyping. In addition, if higher flexural strength and heat deflection temperature parts are needed the J850 Prime, with its 7 material bays, has the capacity to run the Digital ABS Plus material without losing the ability to run full color parts. The dynamic features of the J850 Prime mean model makers spend less time designing around traditional manufacturing limitations and can focus on producing the best part for the need. Tooling with sharp corners, odd undercuts, or difficult surfaces to machine is no longer a concern. The time spent designing the molds is reduced, allowing engineers to embrace a new paradigm of rapid and frequent part iteration.

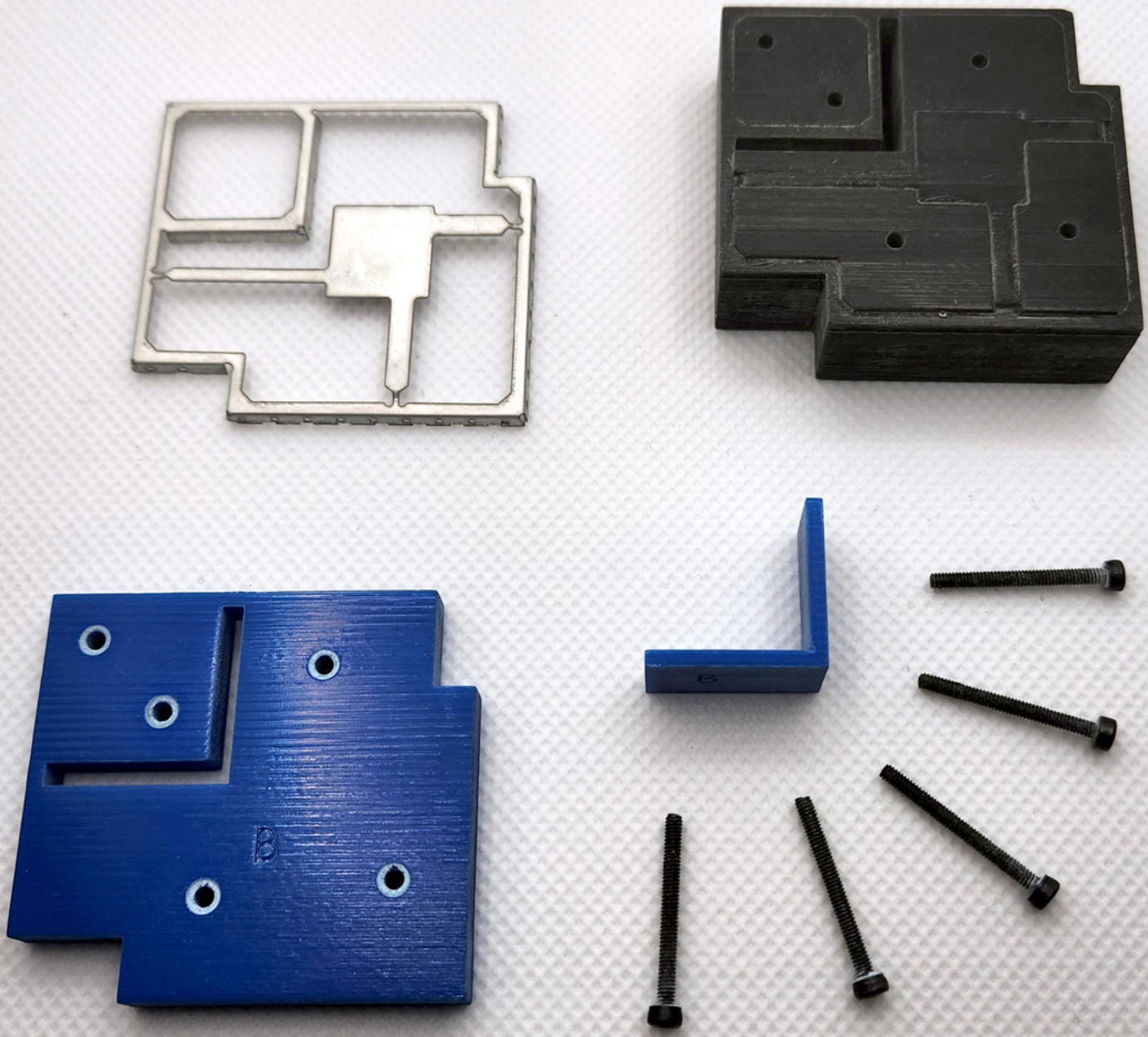
Impact

In hardware development it is necessary to continue to find faster solutions for replacing traditional prototype processes with newer fabrication techniques using modern technology to enable continuous improvement. Shield can prototyping at Microsoft's Advanced Prototyping Center using the Stratasys J850 Prime has given our model-makers the capacity to supply engineers with highly accurate models swiftly, and with far fewer design limitations than the traditional techniques, significantly accelerating the development process and leading to more innovative product solutions.

> While 3D printing has undoubtedly revolutionized hardware design, its transformative impact extends beyond mere part creation. Stepping back, we can appreciate its role in eliminating previously cumbersome processes involved in producing actual parts. The inclusion of printed tooling introduces a powerful dimension, amplifying efficiency and creativity in the development process.

Mike Oldani
Model Maker, Microsoft

Assembled press mold for shield can frame



Exploded view of press mold for shield can frame

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