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# FAST CYCLE

Senior Content Producer **Sam Davies** speaks to Mantle CEO **Ted Sorom** & CCO **Paul DiLaura** about the company's TrueShape technology.

**F**or a company emerging from its stealth status with what it believes to be a disruptive technology, there is no greater validation than seeing investors put their hands in their pockets to support that initial thrust into the market. Except, perhaps, one of those investors being former Apple inventor Tony Fadell, and Tony Fadell saying that he wishes he had what Mantle is bringing to the table when he was working on the Nest, iPod and iPhone projects.

Quite understandably, it has buoyed the company, reinforcing its belief that its TrueShape technology is going to take months out of manufacturing development cycles and allow customers a much greater speed to market.

"Anyone that truly understands the product development process, what it takes to go from finished design and then to have everything slow to a halt as you have weeks, if not months, of time when it's tooled up and you're trying to get it right for manufacturing before you can get it to your customers, gets excited about what we're doing," Mantle CEO Ted Sorom begins. "Tony is an outsized figure that understands this. That's why he invested in us and why he's involved in the company because he understands that delivering speed and improvements to product quality in the manufacturing has a huge impact on the products we see around us."

TrueShape combines an extrusion additive manufacturing technique with subtractive finishing in a hybrid process. It sees Mantle's Flowable Metal Paste material printed in the shape of the part using a precise positioning system and extrusion print-head before

the deposited layers are automatically shaped using high-speed cutting to enhance the surface finish and detail. Parts are then heated to a temperature just below melting point inside a high-temperature furnace, before being fused into dense, solid components.

Mantle says its process adds higher precision in the part prior to sintering than many of its competitors, with its shrinkage rates closer to 9-11% compared to their 17-20%, and is capable of achieving 'extremely smooth' two-micron RA surface finishes without bead blasting or external finishing. Parts are typically ready for use once cleaned with soap and water. It is this, the removal of arduous post-processing steps and delivery of tooling components at quick speeds, that has drawn the interest of such big-name companies.

"We're able to not just reduce the cost of new product introduction, but more importantly, speed products to market," Sorom says. "That's where the major OEMs we're working with get

**"We're able to not just reduce the cost but speed products to market."**

really excited, because folks like NASA, Apple, Tony Fadell, they have funds to be able to tool up their products, but they don't have a way to speed up that cycle today and to dramatically improve the time to market."

Currently, Mantle offers H13 and P2X (a P20-like material with improved corrosion and abrasion resistance) tool steel materials, placing its initial focus on high hardness tool steels with additional materials 'relevant to the tooling industry' in the pipeline. On the software side, Mantle's offering can automatically process both the additive and subtractive components of the process, meaning users don't have to swap between separate software packages to prepare their CAD/CAM files. By doing this, Mantle believes it is offering a technology that covers the 'hardest, most time-consuming and costly portion of the mould build' and does it much faster than any other company can.

Though Mantle has been operating in stealth, it has already begun working with several manufacturers to put these claims to the test. Among them is leading cosmetics brand L'Oreal who has helped Mantle to validate the technology through the printing of precision moulds. As Mantle launched ▶



**SHOWN:**  
MEDICAL DEVICE MOULD PRODUCED  
WITH TRUESHAPE TECHNOLOGY

## “Lead time and cycle time drives their interest. If they can reduce lead time by weeks or months, that's a game-changer.”

earlier this year, L'Oreal's Director of Product Conception Blake Soeters was quoted as saying that TrueShape 'delivered the dimensional tolerances and surface finish' required and that the company is excited about the 'positive impact this technology will have on our ability to rapidly bring new products to market.'

“The lead time and cycle time drives their interest,” Mantle Chief Commercial Officer Paul DiLaura says. “If they can reduce lead time by weeks or months, that's a game-changer for them. If they can go from six weeks to two weeks to get a unit mould or prototype tool or production tool made, they can compress that and launch it, hit a holiday season, for example. That has a huge impact. Then [there's the] cycle time. They're dealing with such high volumes that if they can reduce the amount of time it takes to produce the part and cycle through their moulding process, it has a very big impact on their business.”

Another of Mantle's early partners is an unnamed consumer appliance manufacturer who has used Mantle's TrueShape technology to replace a plastic injection mould component that supported the manufacture of a dishwasher part. Using TrueShape, the part was produced with P2X material at a dimensional tolerance within 0.001" and in a timeframe of 46 hours (22 for the print, 24 for sintering). This was a 71% saving on the week-long lead time of the conventional method. What's more, no additional surface

finishing is said to have been required to achieve 2 µm Ra and the tool was used in a full production run of 200,000 units. Having recorded only minor wear at 'expected points' the insert has been reinstalled for another production run of 200,000 units. To add to the time saving, the consumer appliance firm also achieved a 67% cost saving and is targeting the production of more than 500,000 units with the tool, which would match the expected lifetime of traditionally manufactured inserts.



A global medical device manufacturer, meanwhile, used TrueShape to produce cavity and core tool-steel mould inserts within a week: Two and a half days to print the parts, and five and a half days to prepare the mould and insert. Compared to a traditional lead time of seven weeks, this represented a time saving of more than 80%. Again using the P2X material, TrueShape delivered tight dimensional tolerances within 0.001" and a smooth matte surface finish of 1.6 µm Ra 'similar to that found on parts after Electric Discharge Machining.' Before being installed into the moulding press, ejector pin holes and tap mounting holes were added. Once installed in the moulding machine, parts were produced using Radel polyphenylsulfone (PPSU) at a mould temperature of 315°C and using acetal at a mould temperature of 199°C, with the resulting parts passing all visual and dimensional requirements.

In addition to consumer appliances and medical device manufacturers, Mantle is also targeting OEMs in the automotive and electronics spaces, while toolmakers and contractors are other obvious suitors for TrueShape. The company has hinted that there will be more information on the 'intimate use' of TrueShape by 'major OEMs' to come later this year as it harnesses the \$30m capital it has raised and seeks to fulfil its mission.

“While other people in additive are focused on these high-end applications that no normal consumer will ever see the result of – I mean, how many rockets have you stood next to or jet engines have you looked inside of recently? – I look around and there are injection moulded consumer electronics, packaging, and products all around me every day,” Sorom finishes. “And this is a technology that will start to move additive manufacturing from prototyping and niche applications into having a huge impact on how the products that we all use every day are made and brought to market.”

**SHOWN:**  
MOULD TOOL PRODUCED  
WITH TRUESHAPE