Primal Printing

Matthew Jaster, Senior Editor

Can a technophile 3D-print a giant replica from the new Transformers film? Of course—it's 2023 and additive manufacturing is enabling engineers to test manufacturing material boundaries daily.

Paramount Pictures, Velo3D, *3D Printing Nerd,* and Adam Savage's *Tested* recently announced an amazing project that uses metal 3D printing to bring Transformers to the real world. To promote the new movie, *Transformers: Rise of the Beasts* (in theaters this summer), Velo3D 3D printed the head of the character Optimus Primal using its Sapphire XC printer.

Both the head and stand featured in the videos are made from Inconel 718, a high-performance nickel-based alloy used by some of today's most innovative space companies. The superalloy is known for its strength, toughness, and corrosion resistance—properties that make it an ideal material to build a real-life Transformer. Real life applications for this material include aerospace, aviation, and gas turbine components, nuclear reactors, and chemical processing equipment.

3D Printing Nerd host Joel Telling explores all the steps to produce a part through laser powder bed fusion—only this part is Optimus Primal's head, not a rocket engine. Telling then takes the head to The Hacksmith, a Canada-based engineer who takes fictional ideas from comics, movies, and video games and makes real, working prototypes of these products. There, they do a series of destructive tests—including stabbing Optimus Primal with a working plasma lightsaber.

"This is one hundred percent 3D-printed," said Telling. "This is using a powder-bed of metal material and the temperature within the chamber is kept subcritical and that laser goes through and brings the material that it hits just above critical so it can weld it together. The machine that printed this is Velo3D's Sapphire XC and it's like two stories tall!"

See the video here:
youtube.com/watch?v=T83P08VDTtg

In Adam Savage's *Tested* video, Savage discusses metal 3D printing and how it's being used to build next generation technologies.

See the video here:
youtube.com/watch?v=DviGCPms9go

The Sapphire XC utilizes eight 1 kW lasers for faster printing at scale. A proprietary noncontact recoater eliminates the risk of part collision, protecting both the build and the recoater while enabling thinner walls and more accurate builds. Standardized and controlled parameter sets, along with automated calibrations, ensure consistent geometric accuracy, surface finish, and validated material properties. As with all Sapphire printers, the XC provides supply chain scalability with one print file per part that works on any Sapphire printer worldwide.

Optimus Primal Statistics at a glance:

Optimus Primal was produced on a Velo3D Sapphire XC, which is capable of printing parts 600 mm in diameter by 550 mm in height. The part is made of Inconel 718, which is used by companies in space to produce rocket-engine parts. The part is shown as printed so you can see the final texture, but the base features portions that have been machine polished, like how parts would be finished after being printed.

Optimus Primal Transformers Head and Stand

Total weight: 225 lbs.
Total dimensions: 600 mm x 380 mm x 300 mm
Total layers: 9,000+
Print time: 160 cumulative hours
Slice time: 3 hours

Inconel 718 material information:

Inconel 718 is a precipitation-hardenable nickel-chromium alloy It is a high-strength, corrosion-resistant material used at temperatures ranging from -423°F to 1300°F

In the coming years, Sapphire XC printers will continue to print much larger parts for its customers in aerospace, energy, defense and even the occasional entertainment application.

velo3d.com