explore ... Stereolithography

Teccluster
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SL for INVESTMENT CASTING

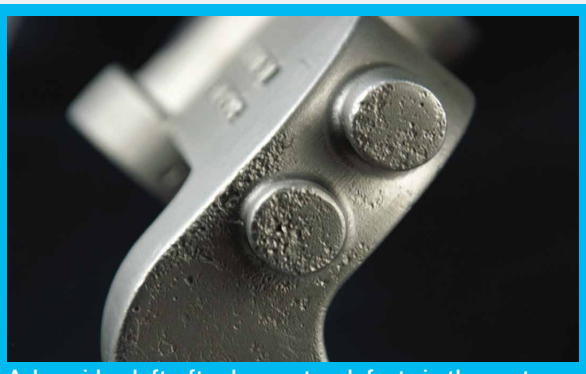
Investment casting is one of the oldest metal-forming techniques based on the principles of “lost-wax” casting.

What is investment casting?

A wax pattern is surrounded by a refractory material,
like ceramic, and the pattern is removed via a melt process. This creates a cavity that molten metal can then be cast into. High-volume production typically uses metal tooling to create wax patterns. Stereolithography has been used for over 20 years (adapted for burn-out instead of melt-out) to create patterns when production volumes are low or parts are large, contain very high detail, or are complex in design.

Stereolithography (SL) is the AM process of choice for investment casting patterns based on high accuracy, surface smoothness, and the ability to produce a wide range of part sizes from large-frame SL machines

The key ingredients to successful investment casting patterns



Credit to DSM for photos

Ash residue left after burnout = defects in the part

Prior industrystandard SL material

New generation antimony-free SL material

Teccluster SL equipment

Open design facilitates collaboration and innovation for investment casting patterns that offer the opportunity for better metal castings (see back).

Somos® Element

An SL resin that creates dimensionally stable patterns during processing. The antimony-free formula leads to lowest ash after burn-out, which equals higher accuracy and fewer defects (see photo to the right).

Materialise software solutions

Creates an interior lattice structure (TetraShell™) for the pattern that is an alternative to traditional honeycomb SL build styles. Potential for reducing pattern weight = potential for fewer ash-induced defects (see back).

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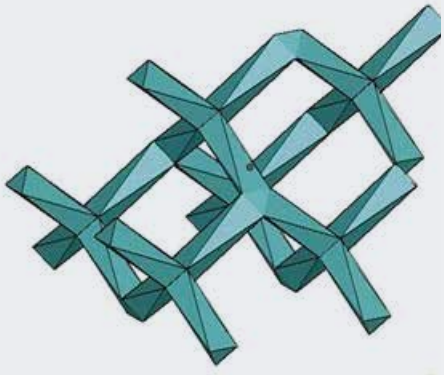
Advantages to TetraShell™ software solution



TetraShell is a foundry-proven alternative to traditional honeycomb build styles. It is a module of the widely available Materialise Magics software. Advantages of TetraShell over typical honeycomb buildstyle approach:

- Geometries that are STL files, not a build style
- User-defined walls, structure size, and drain hole position
- Internal structure that provides equal strength in each axis
- Better drainage in tight corners (e.g. airfoils, thin surfaces, etc.)

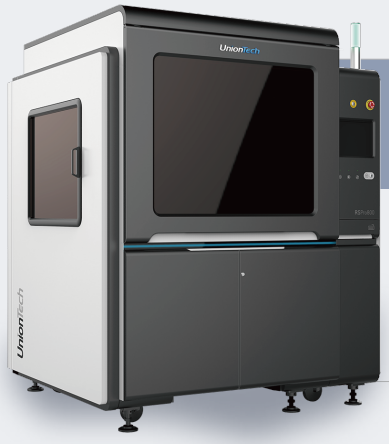
*TetraLattice™ is a trademark of the Milwaukee School of Engineering

Note: The "STL in an STL" approach of TetraShell can create very large file sizes. Refer to the Teccluster bulletin "Light-Weighting" for insights into further software innovations that address file size issues.

Innovation enabled by Teccluster's open design

While Somos® materials are available for use on all 355nm SL equipment, not all equipment allows the use of third-party materials. TetraShell™ is a module of the widely available Materialise Magics software, yet some equipment manufacturers prefer promotion of their equipment-specific solutions. The open design approach of Teccluster equipment allows OEMs and service providers to fully utilize their equipment investment to create optimal application solutions.

Credit to Materialise for photos



Teccluster Industrial SL Equipment

- Platform sizes ranging from 250 mm sq. to 800 mm sq.
- Exceptionally smooth sidewalls with layer thickness capability of 0.05 mm to 0.15 mm
- High accuracy and precision

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