



ETEC Introduction

D4K and Envision One

Andi HOXHA
andihoxha@desktopmetal.com

Overview of systems

DESKTOP METAL + ETEC PRODUCT LINEUP

Continuous fiber

Fiber™



R&D + low-volume metal / ceramics

Studio System™ 2



InnoventX



Mid-volume metal / ceramics

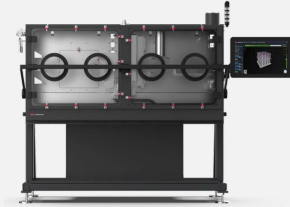
Shop System™



X25Pro



Production System™ P-1



Mass production metal / ceramics

X160Pro



Production System™ P-50



Desktop photopolymers

D4K



Mid-volume photopolymers

Envision One / XL



Envision One HT / XL



P4K Flex / Pro



Mass production photopolymers

Xtreme 8K



Turnkey solutions, industrial-grade materials, and high-throughput deliver end-use polymer parts at low cost

DESKTOP SOLUTIONS



D4K

Desktop production of high-resolution, jewelry, dental, and other small parts.



Envision One

Rapid production of strong, fully-isotropic end-use parts.

STANDALONE SOLUTIONS



P4K

24/7 production of small, ultra-high resolution end-use parts.



Xtreme 8K

High-volume production of end-use parts.

Ease of use with automated workflows and turnkey solutions

Volume production with attractive part economics

D4K

BENEFITS OF DLP

High Accuracy And Feature Detail

DLP offers some of the best accuracy and feature resolution possible with 3D printing, producing parts with micron-level accuracy

High Throughput

In stark comparison to SLA and FDM, DLP printers cure entire layers of resin in one flash of the projector (Area wide printing vs. Vector printing). This results in incredible printer speeds and can be scaled up to large build volumes for high throughput

Excellent Surface Finish

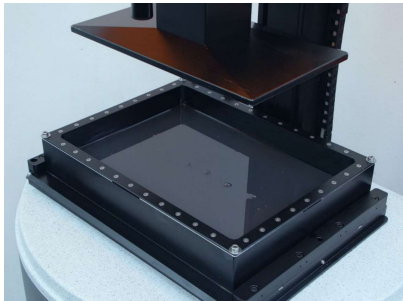
DLP allows for incredible surface finish over traditional polymer 3D printing methods



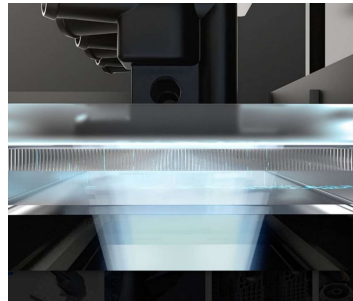
D4K PRINTING PROCESS

Bottom Up DLP Printing

Plastic 3D printing that selectively solidifies photosensitive material/resin using a DLP Projector.



Photosensitive material is developed such that when exposed to UV light the material polymerizes or converts from a liquid to a solid



A DLP projector equipped with UV light projects cross sectional images of parts.

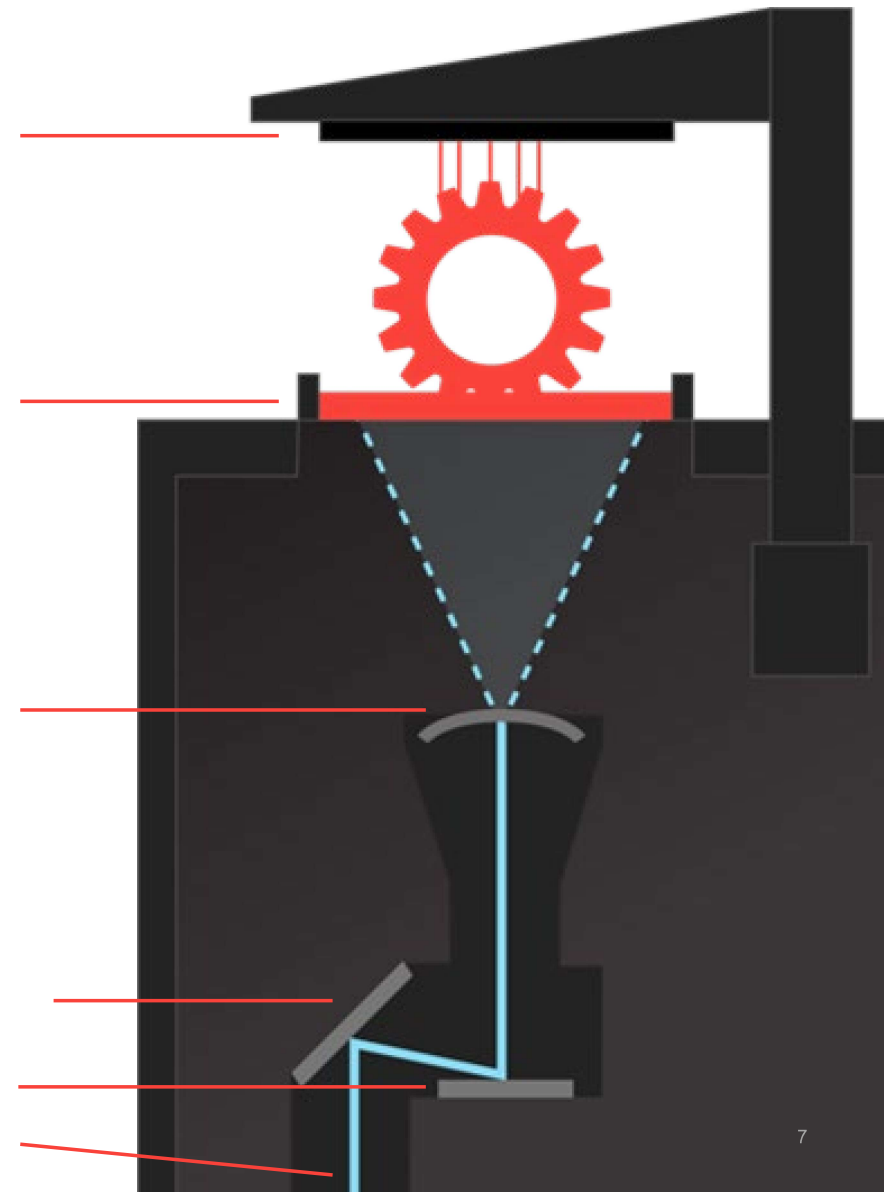
Build Platform

Material Tray

Len
s

Precision Optic

DLP
Chip
Light
Source

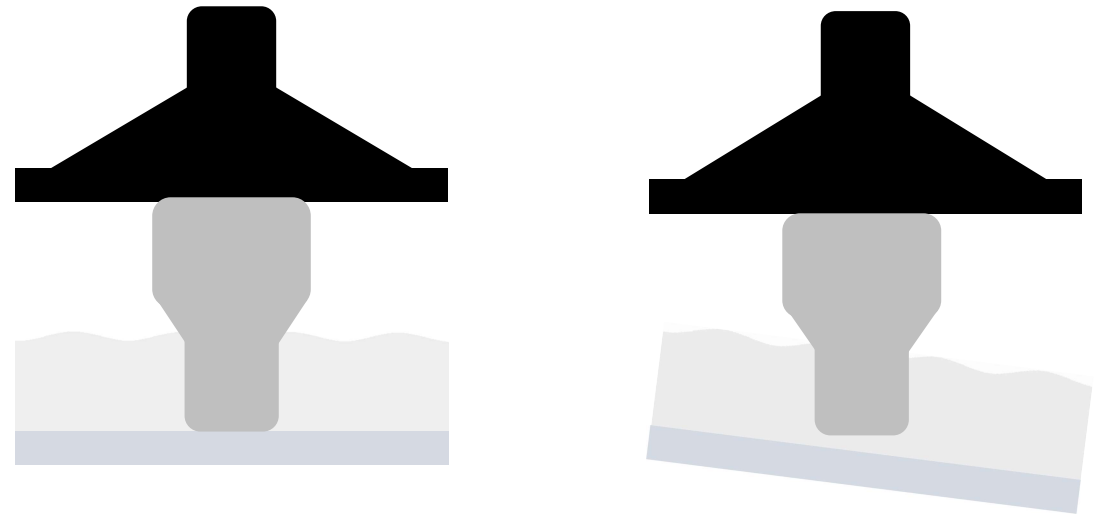


D4K

TILTING SEPARATION TECHNOLOGY

Proprietary material tray tilting technology significantly reduces separation forces. Low separation forces:

- Require less supports
- Allows for smaller and easier to remove supports
- Creates highly accurate parts
- Increases the life of your material tray

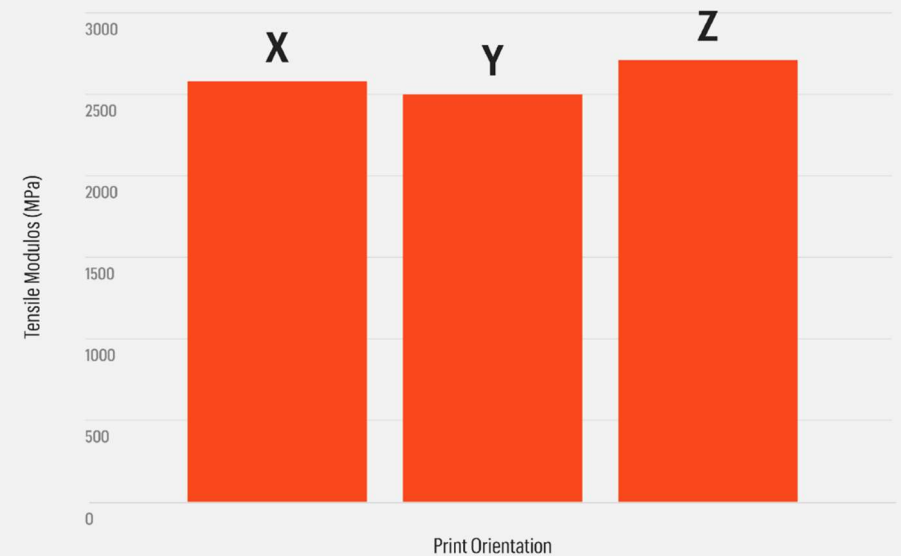


SUPERIOR PART PROPERTIES

ISOTROPIC MATERIAL PROPERTIES

- Isotropic material properties are essential for end-use components, but until recently have rarely been achievable with polymer 3D printing.
- With FDM printing, very weak mechanical – not chemical – bonds form between each layer, resulting in anisotropic properties, or greater weakness along the Z axis than on the X or Y axes. This lack of uniformity has long kept FDM parts from being used as end-use parts.
- With DLP printing, by comparison, each layer is left in a slightly uncured state, allowing it to chemically bond with the next layer as it prints. That bonding helps to create long chain polymers throughout parts, resulting in truly isotropic parts which are strong enough for end-use applications, and rival the properties of injection molded parts.

**Tensile Modulus
Across Print Orientation (MPa)**



D4K

EASY MATERIAL SWITCHING

- With the ability to swap between any of ETEC's materials in just minutes, users can tailor their material choice to each specific application.
- All ETEC materials come in a single pot, with **no two-pot mixing required**, simplifying the process of adding resin to the printer.
- While the short shelf life of many competitor resins means they must be used within hours of being opened, all ETEC materials feature shelf lives of more than a year, ensuring no material ever goes to waste.

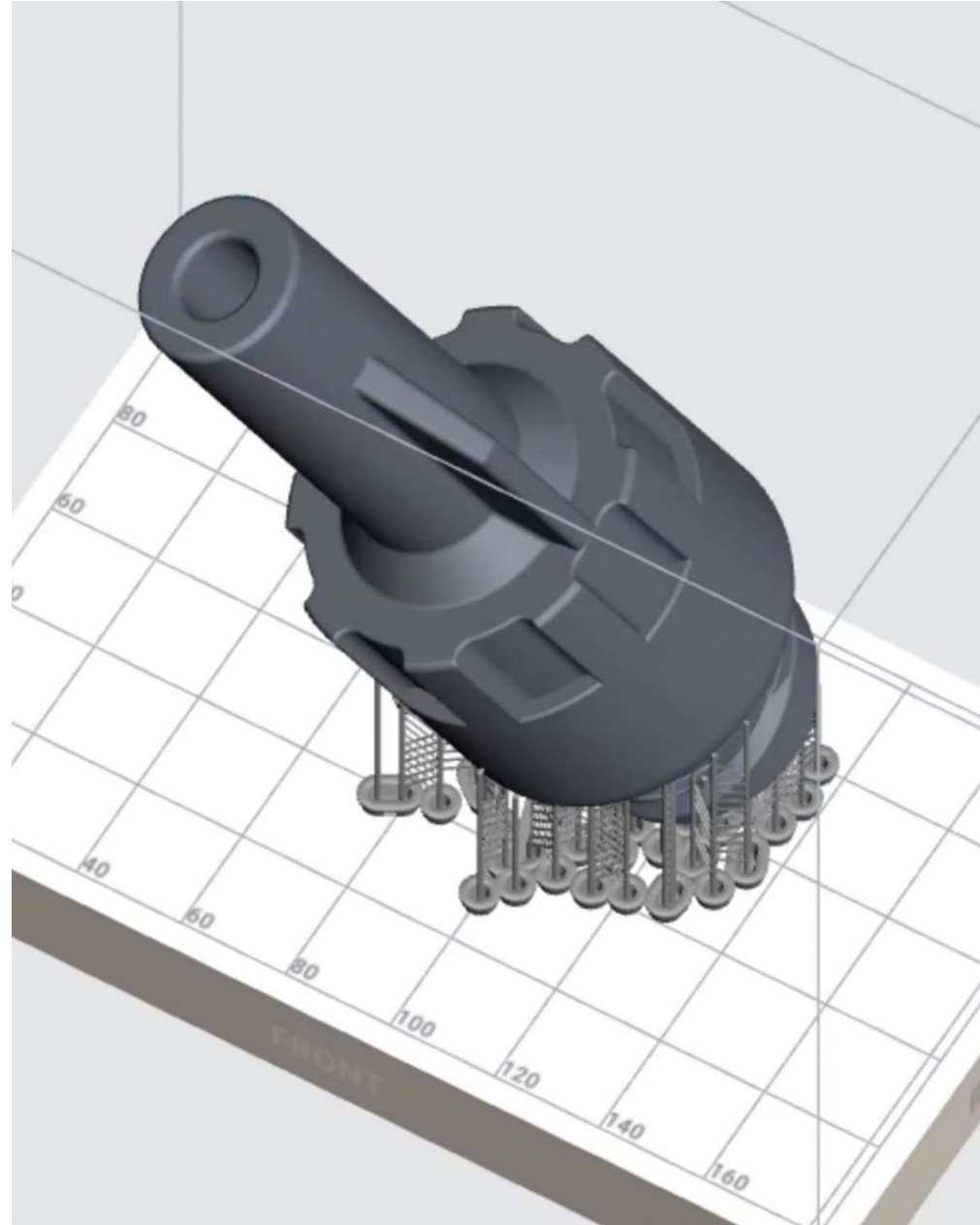


EASY-TO-USE SOFTWARE CONTROLLED WORKFLOW

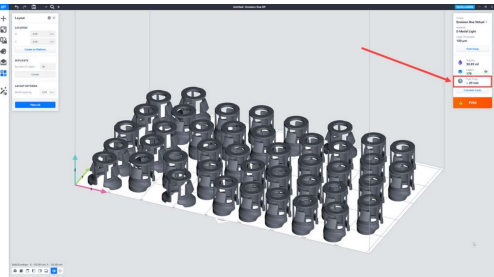
The software that powers all ETEC printers, Envision One Rapid Prototype (RP) simplifies the process of setting up and starting a print.

With optimized support strategies for every material and automatic part orientation calculation, Envision One RP helps ensure printing success. For users who want more control over prints, the software allows for manual editing of a range of support parameters, including tip thickness, beam thickness, beam spacing and more.

To help increase productivity, prints can even be started remotely.



WORKFLOW OVERVIEW



NESTING



PRINT



WASH



CURE



FINAL PART

D4K

DESKTOP PRODUCTION OF HIGH-RESOLUTION END-USE PARTS.

	D4K
PRINTER TECHNOLOGY	Digital Light Processing (DLP)
BUILD ENVELOPE (MAX PART SIZE)	148 x 83 x 175 mm
MODELS	Standard
XY RESOLUTION	25 μm with patented Pixel Tuning
Z RESOLUTION (MATERIAL DEPENDENT)	25–150 μm



ENVISION ONE RP HARDWARE REQUIREMENTS

Envision One RP

- Operating System: Windows 7 64-bit or Windows 10 64-bit
- RAM: ≥ 8 GB RAM
- Hard Drive: 500GB HDD, 7200 RPM or better. 100 GB free memory (dependent on amount of .stl data and job files stored)
- CPU: Multi-Core Processor e.g. Core i5, ≥ 3 GHz, ≥ 6 MB Cache
- Graphics: Dedicated 3D graphics card with ≥ 1 GB memory and OpenGL 2.0 support
- Network: Gigabit Ethernet

D4K / MATERIALS

MATERIALS	APPLICATIONS
E-RigidForm	Polyurethane-like resin with high strength and stiffness
RC70, 90 (nanocure)	Silicone molding, pump housings, blades, test parts for wind tunnels, light reflectors and various automotive applications
HTM140	Molding material designed for high-temperature and high-pressure applications
E-ToughFlex	High flexural modulus and strength for producing extremely tough parts
E-glass V2	Glass like material, very clear and stiff material
EPIC	Direct investment casting with excellent burn out properties and builds with the highest quality and crisp detail
WIC100	High-resolution, castable material with nano-wax for clean burn out



D4K

WHAT MAKES IT DIFFERENT?

- **Easy-to-use** desktop production of high-resolution, professional-quality parts with under 2-minute materials changeover and easy job creation.
- **Accuracy down to 25 microns** and superior surface finish, all in a desktop-sized package.
- **Highest resolution** of any 4K desktop 3D printer on the market.
- **Accessible to all** – professional-grade 3D printing at one-third the operating cost of comparable systems
- **Long material shelf life** – uncured resin can be stored and reused for months, enabling economic material usage.
- **Easy material switching**
- **Low force technology** – Using a patented tilting mechanism, the separation forces are minimal, thereby eliminating any distortion during the build process.

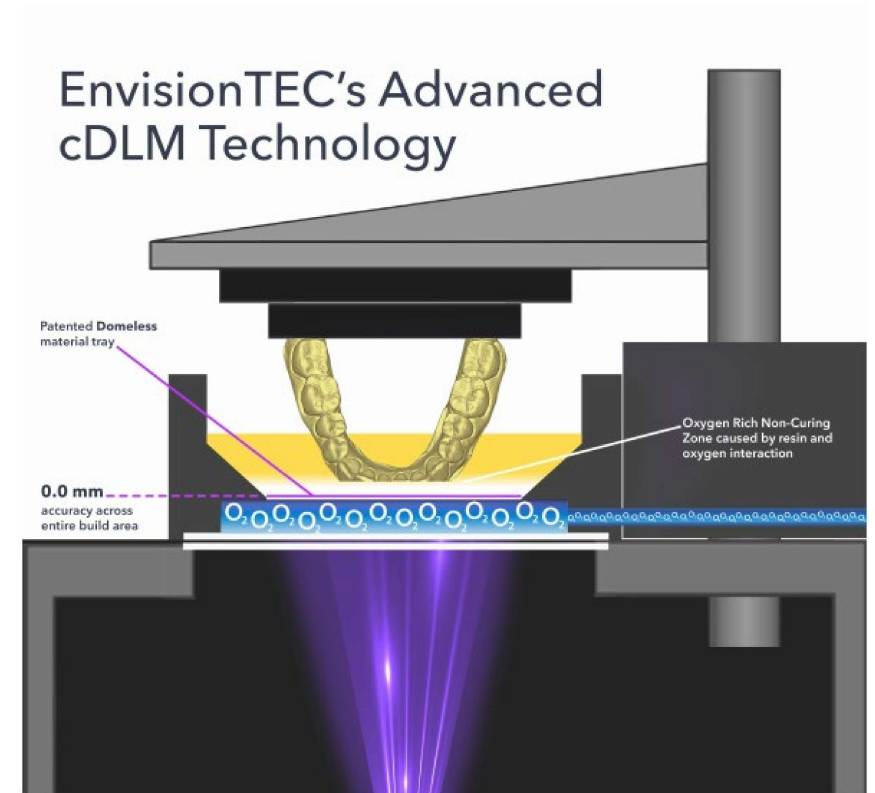


Envision One Series

HIGH RESOLUTION PRINTING WITH CDLM DOMELESS PRINTING

To print continuously (without peeling) requires flowing oxygen through a permeable film just above the print bed to create a “dead zone”.

ETEC’s CDLM (continuous digital light manufacturing) technology uses over 200 thousand pillars to hold the film perfectly flat, resulting in significantly better Z-axis resolution and allowing for the printing of flat parts straight to the bed with no supports.



UNDERSTANDING OXYGEN

- Fundamentally, oxygen inhibits the curing process. In other words, resin saturated with oxygen **will not solidify**.
- To take advantage of this effect, CDLM printers pump oxygen through the material tray and allow oxygen to slowly diffuse through the oxygen permeable window. When this occurs, a small layer of material above the window becomes saturated with oxygen.
- This oxygen saturated layer allows you to print just above the window. This keeps parts from sticking to the window and allows liquid resin to flow freely into the build area.



Why CDLM?

ENVISION ONE CDLM - IT'S FAST

Average build speed for full envelope*

- Finish an entire 3L build volume in just 4.5 hours
- 30% faster than competing systems ⁽¹⁾
- 10x faster than desktop SLA.
- And as little as 20% of the price of comparable systems

*Material viscosity and layer thickness dependent



ENVISION ONE CDLM - IT'S ACCURATE!

- Better fitting form and fit models
- Bigger parts from a compact desktop 3D printer
- More accuracy for everything you do
- 50% reduction in support structure on average

Unlike many low-cost systems in the field, EnvisionTEC uses the 385nm wavelength for our industrial projectors.

This delivers very high accuracy when compared to low-cost lasers and projectors running 405nm LED light sources.



ENVISION ONE

RAPID PRODUCTION OF STRONG, FULLY ISOTROPIC END-USE PARTS.

	Envision One	Envision One XL
PRINTER TECHNOLOGY	Continuous Digital Light Manufacturing (CDLM)	Continuous Digital Light Manufacturing (CDLM)
BUILD ENVELOPE (MAX PART SIZE)	180 x 101 x 175 mm	180 x 101 x 330 mm
MODELS	<ul style="list-style-type: none"> • LT • HT 	<ul style="list-style-type: none"> • LT XL • HT XL
XY RESOLUTION	60 μm with patented Pixel Tuning	60 μm with patented Pixel Tuning
Z RESOLUTION (MATERIAL DEPENDENT)	50–150 μm	50–150 μm



ENVISION ONE RP

HARDWARE REQUIREMENTS

Envision One RP

- Operating System: Windows 7 64-bit or Windows 10 64-bit
- RAM: ≥ 8 GB RAM
- Hard Drive: 500GB HDD, 7200 RPM or better. 100 GB free memory (dependent on amount of .stl data and job files stored)
- CPU: Multi-Core Processor e.g. Core i5, ≥ 3 GHz, ≥ 6 MB Cache
- Graphics: Dedicated 3D graphics card with ≥ 1 GB memory and OpenGL 2.0 support
- Network: Gigabit Ethernet

MATERIALS

HARD MATERIALS

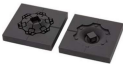
High Impact Resistant: PP-like



3172 HDT50 High Impact
IND405 HDT50 High Elongation



3843 HDT60 High Toughness
IND406 HDT100 High Modulus



LOCTITE IND147 HDT230 Tough



LOCTITE 3955 HDT280 FST

High Temperature Resistant: PEEK-like

ELASTOMERS



IND402 A70 High Rebound Black

BIOCOMPATIBLE RESINS



MED413 Tough High Accuracy
*ISO 10993-5 & -10 standards

3843™ HDT60 High Toughness Photoplastic
*ISO 10993-5, ISO 10993-23

ENVISION ONE / MATERIALS

MATERIALS	APPLICATIONS
E-clear	Transparent material
E-RigidForm	Polyurethane-like resin with high strength and stiffness
E-ToughFlex	High flexural modulus and strength for producing extremely tough parts
HTM 140	designed for high-temperature and high-pressure applications
LOCTITE IND402	Consumer products, lattice structures for sportswear
LOCTITE IND406	High-strength and high-elongation plastic with good impact resistance and an HDT of 100°C
LOCTITE E-3843	Semi-flexible ABS-like material with high impact strength and excellent surface finish
LOCTITE IND 405	High-strength engineering plastic, good for end-use part and tooling
LOCTITE MED 413	Tough, medical-grade photopolymer capable of meeting biocompatibility standards
LOCTITE 3955 HDT280 FST	High-performance, flame-retardant material, ideal for the most demanding applications, including aerospace
LOCTITE IND147 HDT230 Tough	High-temperature resistant material for end use parts and tooling, including molds



Envision One

Rapid production of strong, fully isotropic end-use parts.

- **High-speed continuous printing.** Finish an entire 3L build volume in just 4.5 hours – 30% faster than competing systems and 10x faster than desktop SLA.
- **Exceptional part strength and quality.** The Envision One leverages long-chain polymer chemistry to produce strong, stable parts. The result is isotropic parts suitable for end-use applications and capable of standing up to the most demanding conditions.
- **Enhanced accuracy and resolution.** Featuring patented “domeless” printing technology, the Envision One eliminates any concerns about how “doming” may impact accuracy on the Z axis. High-resolution (60 um XY) printing and patented pixel tuning technology make it easy to create fine features and smooth surface finishes suitable for end-use parts.
- **Intuitive software** automates support generation and part orientation, while an integrated file repair tool patches holes and readies parts for print.

