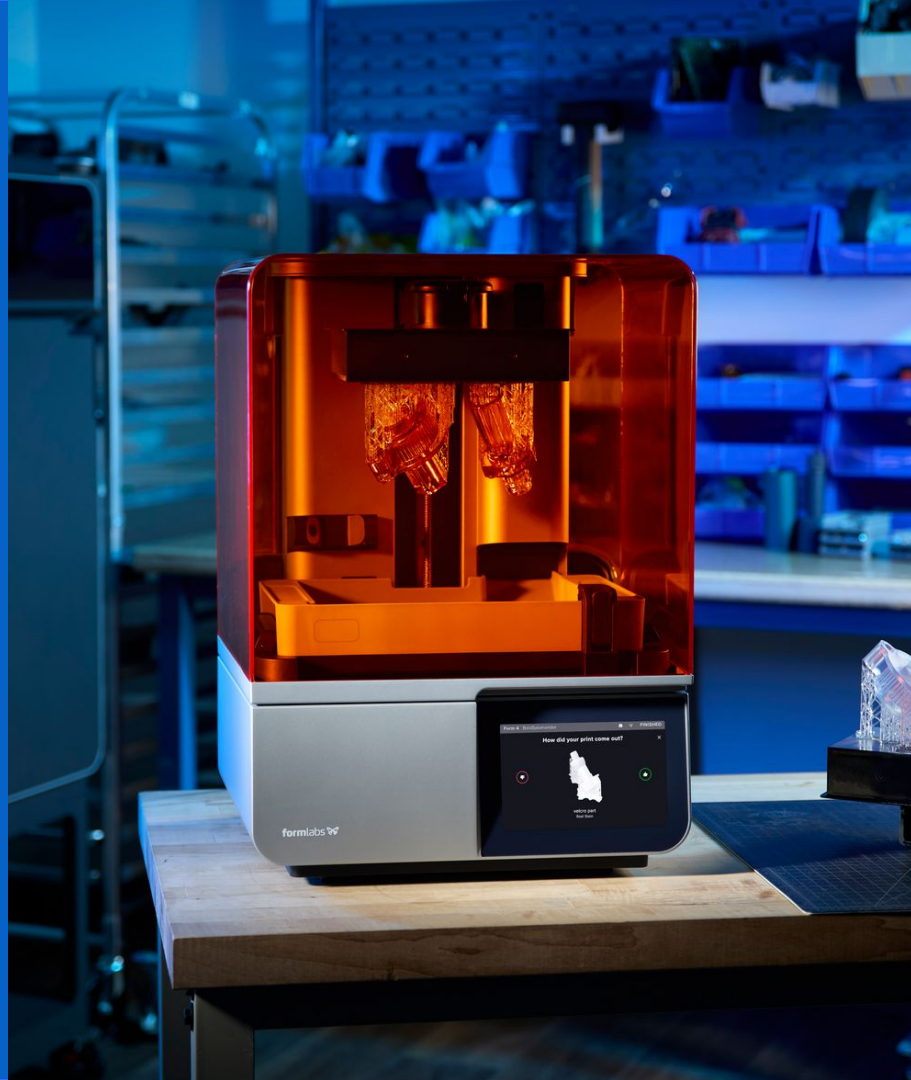
Form 4 Competitors and Battlecards

Formlabs Customer Team

Q2 2024



Agenda

1. SLA vs DLP vs MSLA (LCD)
2. Understanding LCD / Projector Resolution
3. Low Force Display (LFD) Technology
4. General competitors:
   - Industrial resin printers
   - Low cost resin printers
   - FFF/FDM Printers
   - Outsourcing
5. Battlecards

Competitors

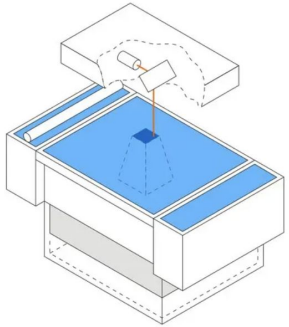
Bambu Lab
Phrozen
Creality
Anycubic
Elegoo
Markforged
Uniz
Uniontech
Ultimaker
FlashForge
Prusa
Stratasys
3D Systems
Carbon
Nexa 3D
Heygears
Raise 3D
Cubicure
Photocentric

Dental

Sprintray
Asiga

SLA vs DLP vs MSLA (LCD)

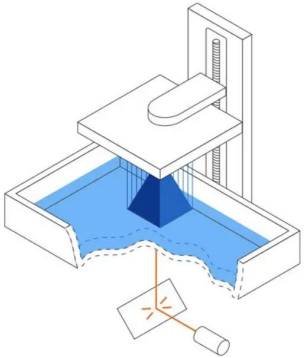
3D Printing Technologies



SLS
Selective Laser Sintering

- Laser fuses polymer powder
- Low cost per part, high productivity, and no support structures
- Excellent mechanical properties resembling injection-molded parts

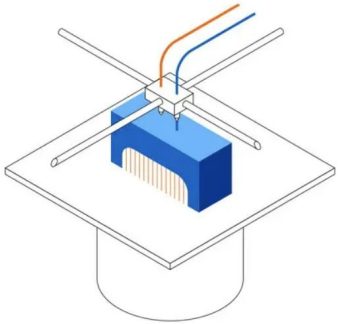
BEST FOR:
Functional prototyping and end-use production



SLA
Stereolithography

- Laser cures photopolymer resin
- Highly versatile material selection
- Highest resolution and accuracy, fine details

BEST FOR:
Functional prototyping, patterns, molds and tooling

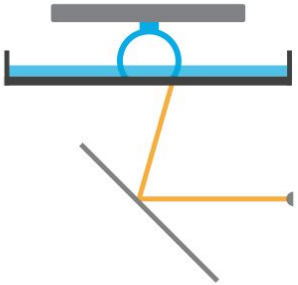
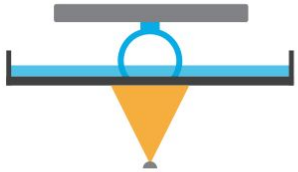
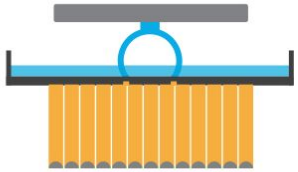
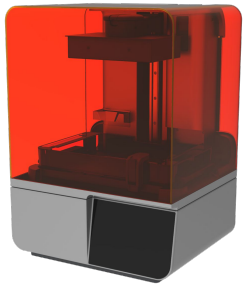


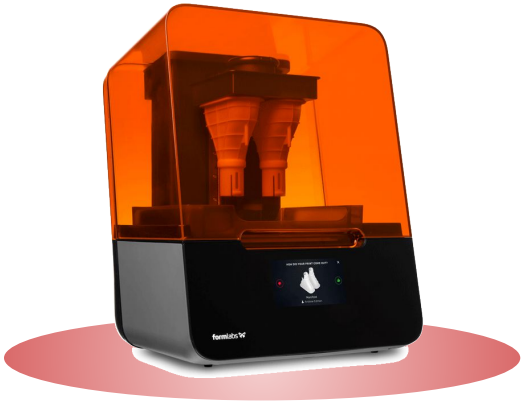
FDM
Fused Deposition Modeling

- Melts and extrudes thermoplastic filament
- Lowest price of entry and materials
- Lowest resolution and accuracy

BEST FOR:
Basic proof-of-concept models and simple prototyping

Stereolithography

Laser Stereolithography (SLA)	Digital Light Processing (DLP)	Masked Stereolithography (MSLA)
		
Selective exposure to light by laser	Selective exposure to light by projector	Selective exposure to light masked by LCD
		

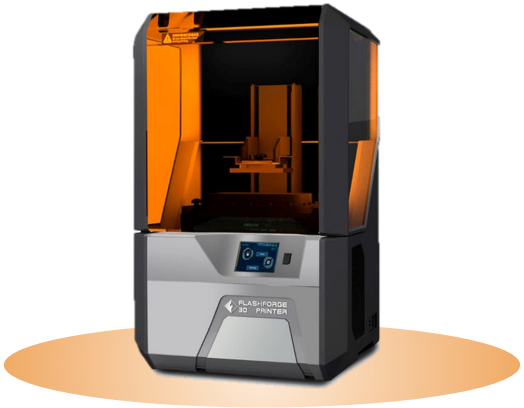


LASER BASED SLA = FORM 3

Uses a **UV laser (positive)** to draw each layer of the object.

Generally slow curing.

Resolution based on diameter of the laser beam and the positioning accuracy.

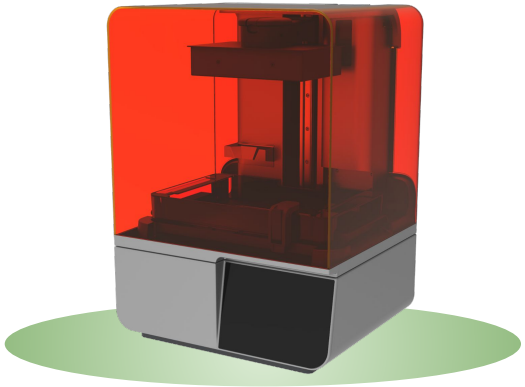


DLP-SLA = FlashForge

Uses a **digital projector (positive)** to flash a single image of each layer.

Cheaper and faster than most laser based SLA printers.

Resolution of a DLP 3D printer depends on the resolution of the LED or DMD array as well as the distance from the light source to the polymerization zone.



MSLA = FORM 4

Uses a **LED Array (positive)** + a **LCD photomask (negative)** to shape the light image from the LED Array.

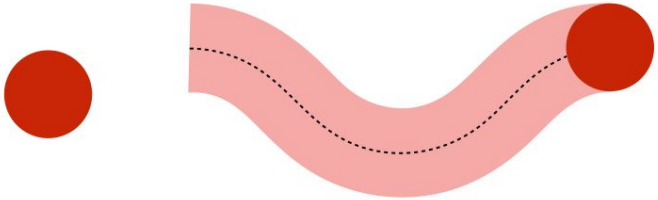
Comparable speeds and cost to DLP-SLA printers. Hardware however is generally more robust.

Resolution of a MSLA printer depends on the pixel size of the LCD screen. Common screen resolutions range from 2K - 8K (varies size and # of pixels).

Positive = UV light source that cures resin

Negative = prevents curing in certain areas

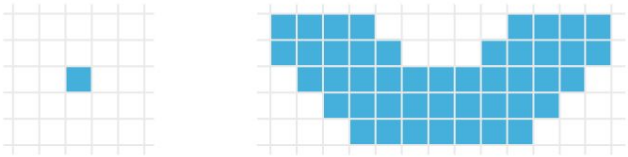
Laser Stereolithography (SLA)



Minimum laser spot size

SLA uses a UV laser to draw rounded lines

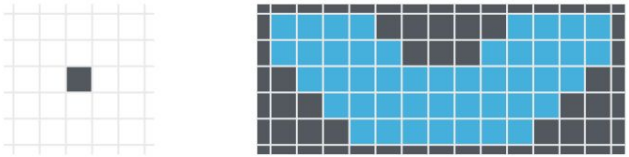
Digital Light Processing (DLP)



Minimum pixel size

DLP uses a projector to project layers of squared voxels

Masked Stereolithography (MSLA)



Minimum pixel size

MSLA deactivates pixels on a LCD photomask to allow light through

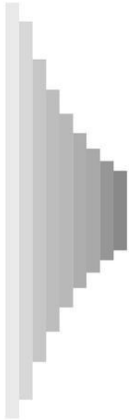
The Voxel Effect

XY view

Voxel Effect

XZ View

Voxel Side Profile

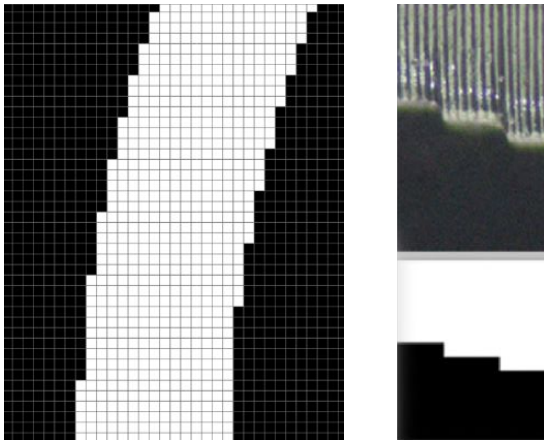


Voxels are the 3D version of pixels. Voxels in 3D prints create the same effect as layer lines do - just in the X-Y plane. Pointing out voxel artifacts is commonly used to position laser stereolithography as better than other stereolithography technologies because it creates smooth curved surfaces.

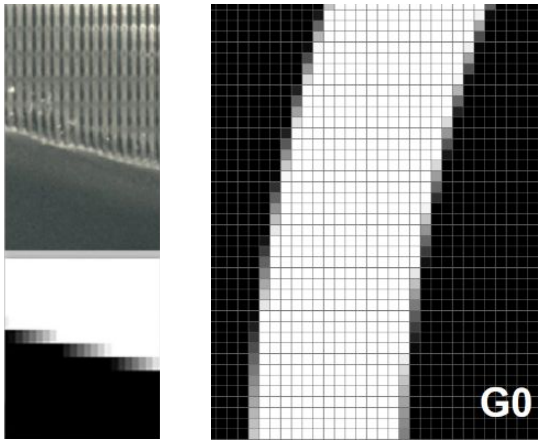
Smoothing Voxels

Sub-Pixel Accuracy Using Anti-Aliasing

Anti-Aliasing is used in computer graphics to smooth jagged on curved lines. Printer technologies using pixels to cure resin use anti-aliasing to achieve smooth curved surfaces in the X-Y plane. Masked Stereolithography (MSLA) technologies do this by partially exposing pixels.

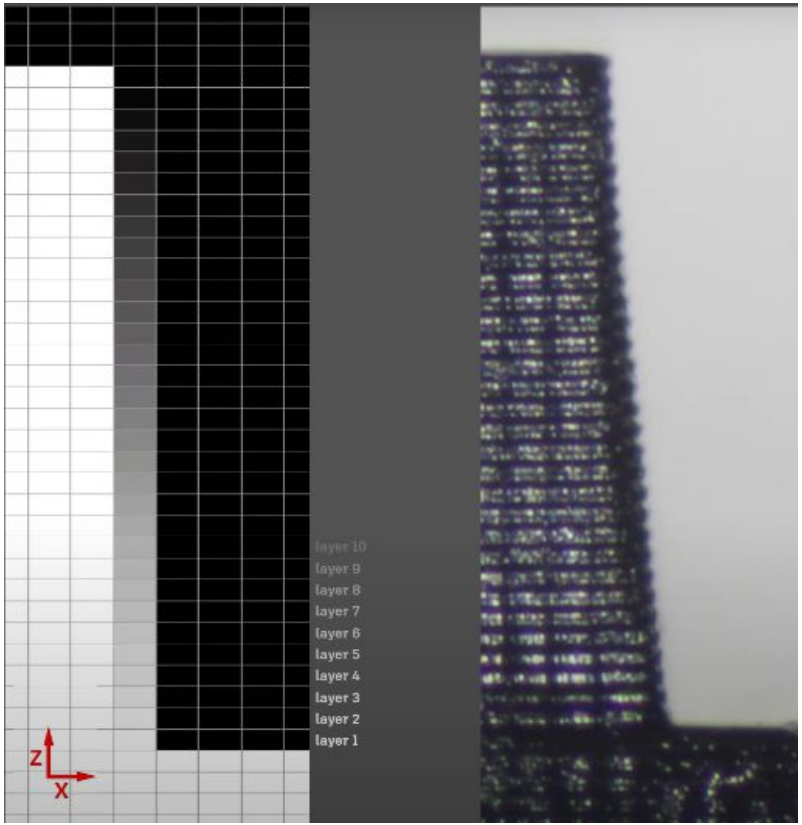


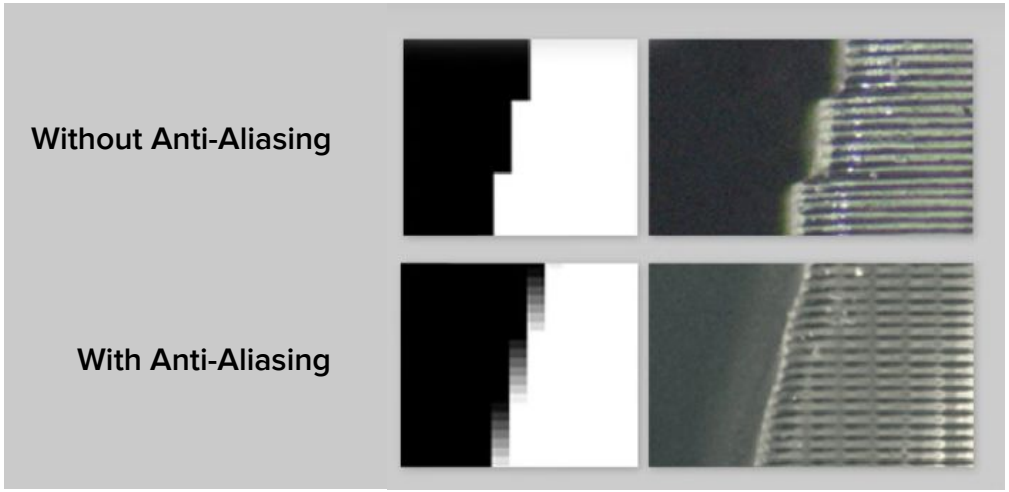
Without Anti-Aliasing

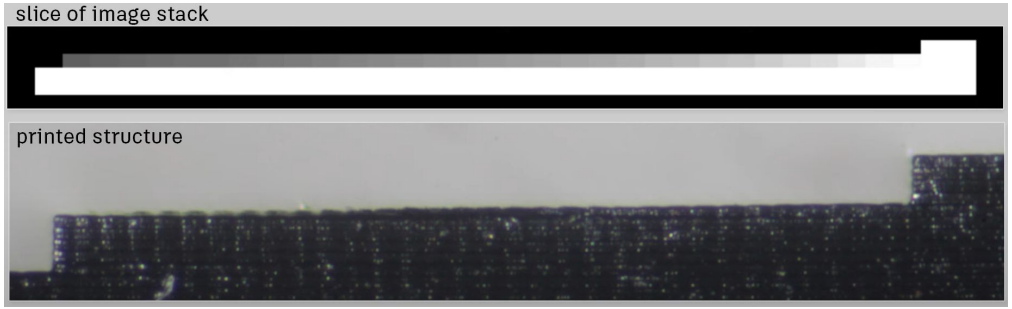


With Anti-Aliasing

Sub-Pixel Resolution





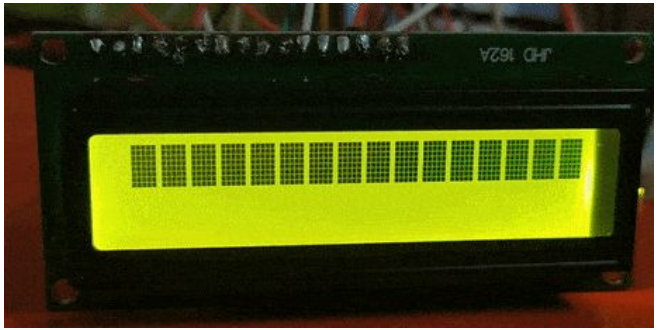


source

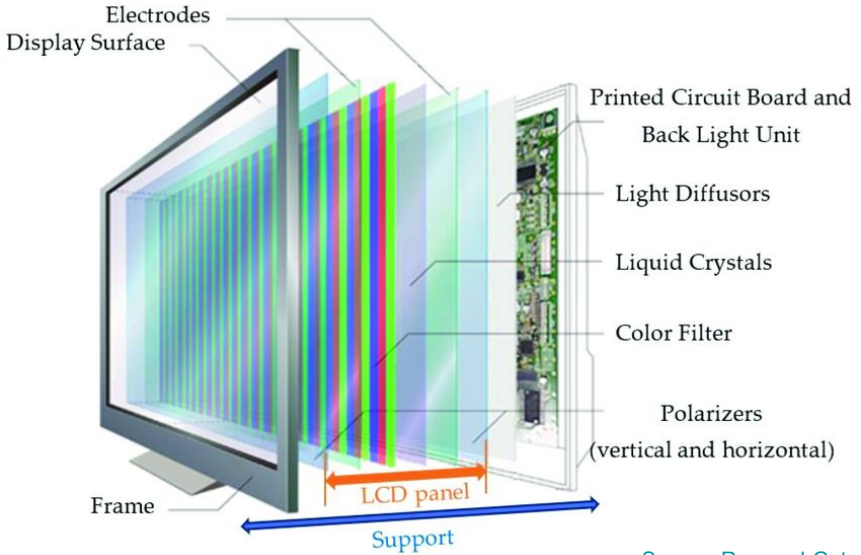
What is a Liquid Crystal Display (LCD)?

Liquid Crystal Displays

Liquid Crystal Displays (LCDs) are displays that contain liquid crystals that mask a light source by **sending electrical signals to turn pixels on and off**.



Source: Arduino forum



Source: ResearchGate

Resolution of an LCD

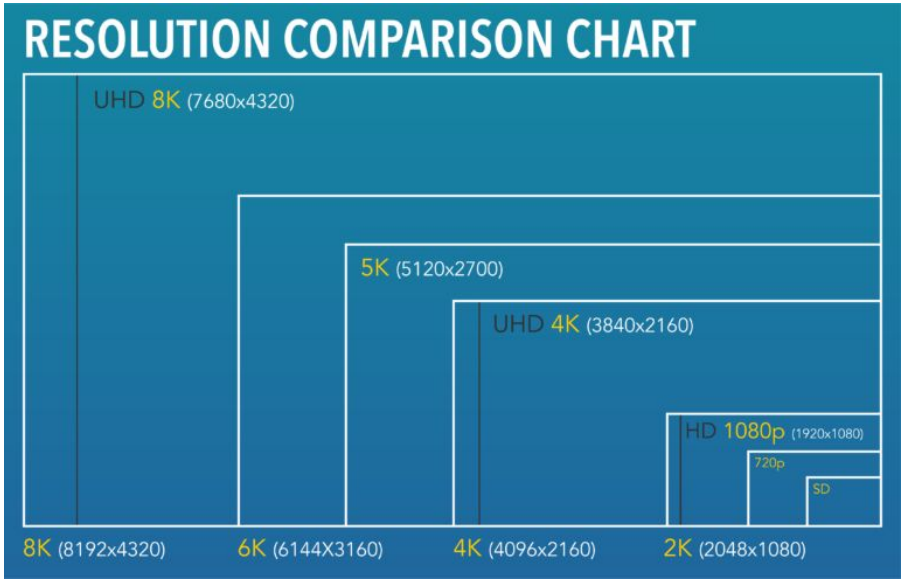
What does the “K” stand for?

When referring to screen resolution, “K” stands for Kilo meaning 1,000 pixels. A 4K LCD has ~4,000 pixels horizontally.

For TVs, laptops, and phone screens, higher resolution gives more realistic pictures and can display colors and details better. There are diminishing returns to what they eye can see unless the viewer is very close to the screen.

4K Definition 8K High Definition

Source: Samsung



Source: Jack’sBlog

Does a Higher Resolution Mean Better?

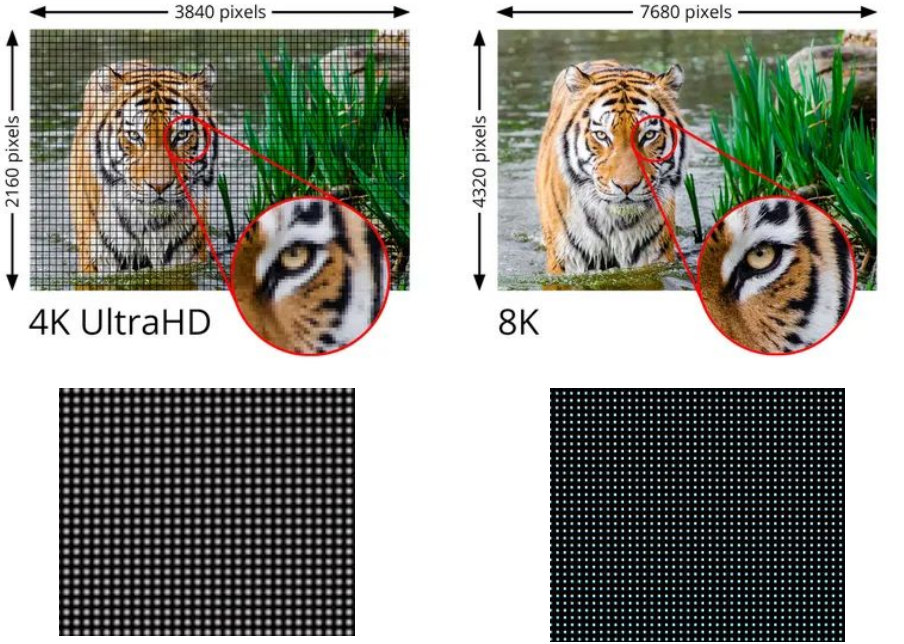
Does pixel count matter for 3D printing?

The area between pixels is static. Therefore, the more pixels you have, the more dead space you have between them as a percentage of total panel space. The size of the panel also impacts the benefits of a higher resolutions.

Optimal printing balances the amount of light the LCD panel lets through with enough resolution to produce accurate, smooth parts.

Form 4 has a 4K LCD panel because it gives us a powerful lightsource and - with our settings tuning - we are able to produce accurate, smooth parts.

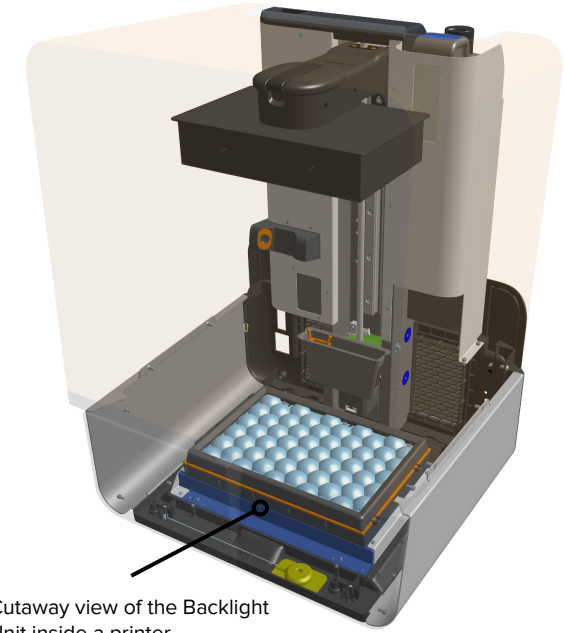
Mathias Appel/HDMI Licensing



Low Force Display (LFD) on Form 4

Low Force Display vs. The Competition

- The resolution of the LCD screen is just one factor in manufacturing reliable and accurate MSLA printers.
- The ability to produce a consistent level of light transmission and **collimate** light effectively have a greater impact on part quality and machine longevity.
- Low cost MSLA/DLP printers lead with enticing spec sheets (12K screen, very high mm/hr speeds) that do not give a full picture. Most won't be able to print at cited speeds and those that do will require consumable replacements more often than Form 4.
- The combination of components in the LFD print engine set the new standard for speed, reliability, and performance materials.



Cutaway view of the Backlight Unit inside a printer

How Does the LFD Print Engine Work?

LFD Print Engine features **six advanced subsystems** to set the new standard for extreme speed, unmatched reliability, and performance materials.

6 **Automatic Resin Handling**
Dispenses resin quickly, accurately, and with minimal waste, while making it easy to switch materials.

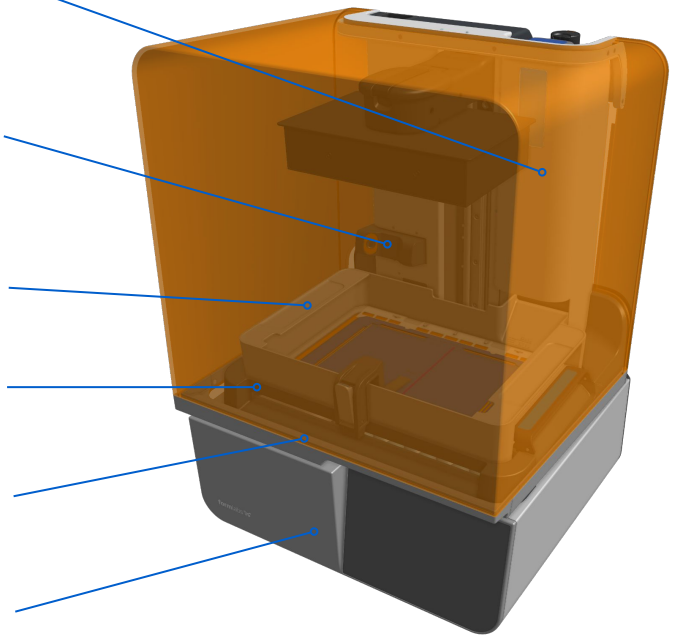
5 **Intelligent Control Systems**
6 control systems that precisely measure and maintain the temperature, resin level, print forces, and print status inside your printer.

4 **Flexible Film Resin Tank**
Durable resin tank that reduce the forces exerted on parts during printing.

3 **Release Texture**
A microtextured optical film that provides airflow and reduces the forces exerted on part during prints.

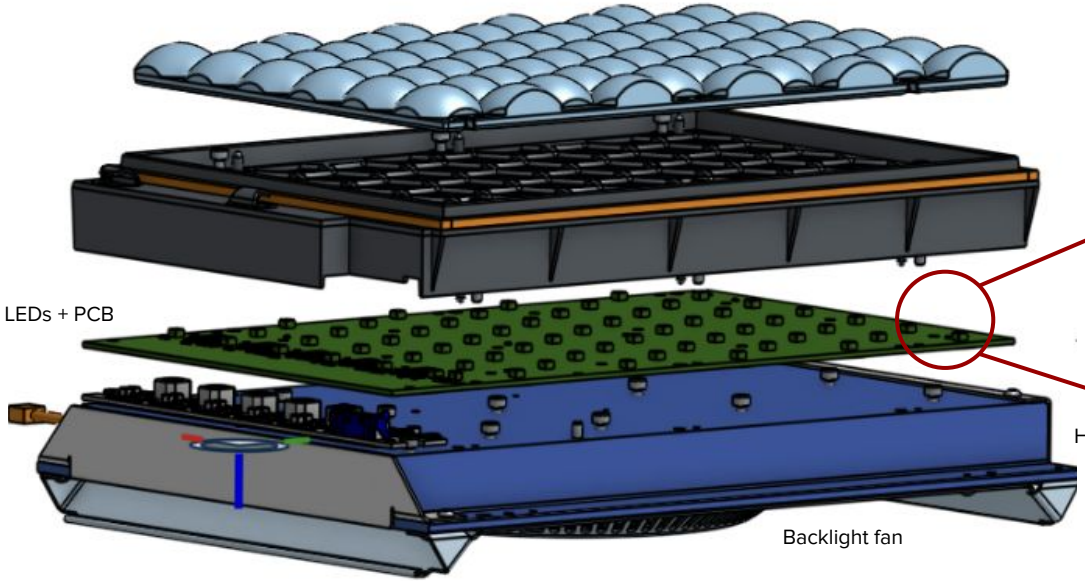
2 **Light Processing Unit 4**
Precisely masks light from the backlight unit into the shape of a printed layer.

1 **Backlight Unit**
Generates a uniform area projection of an ultra-high power light using 60 LEDs

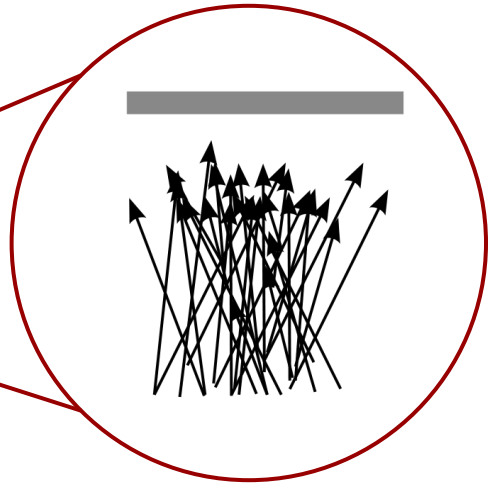


Form 4 Backlight Unit

Producing collimated, powerful light



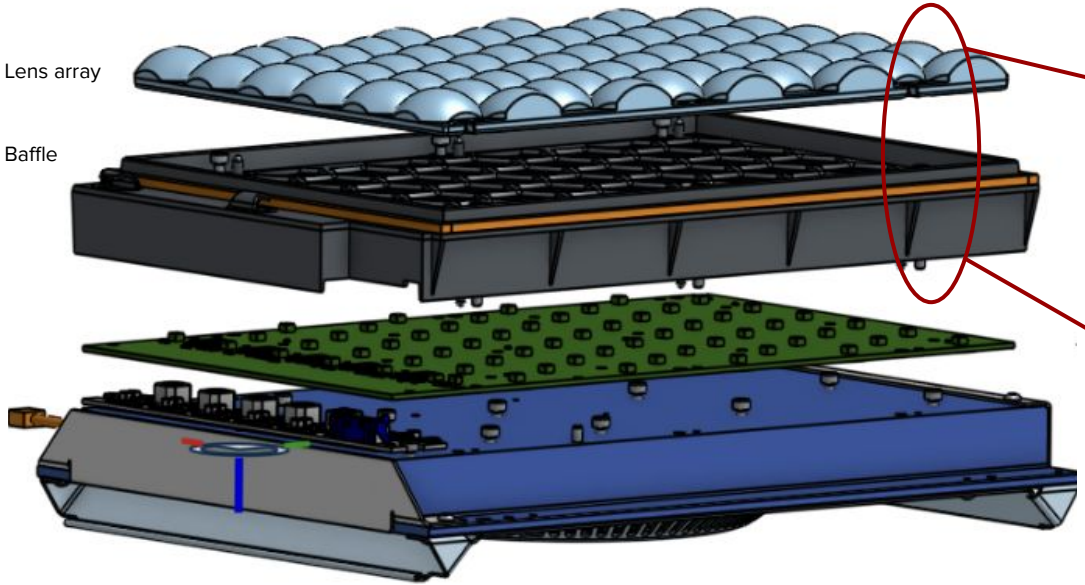
Exploded view of the Backlight Unit.



Ultra-high powered light coming from the LED array
13-16 mW/cm^2

Form 4 Backlight Unit

Producing collimated, powerful light



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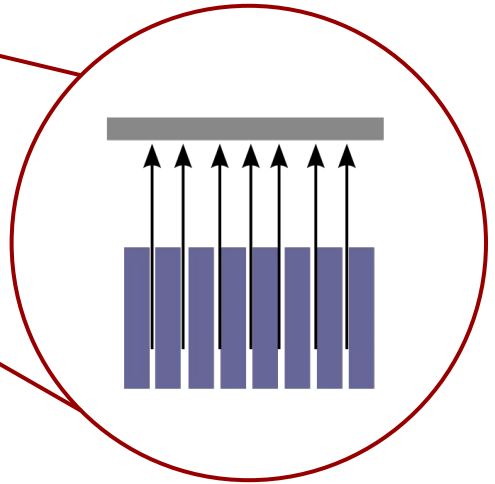
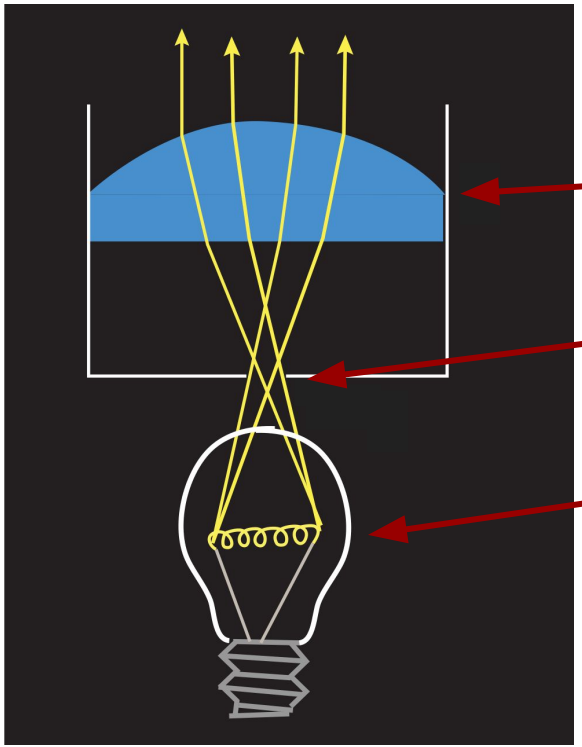
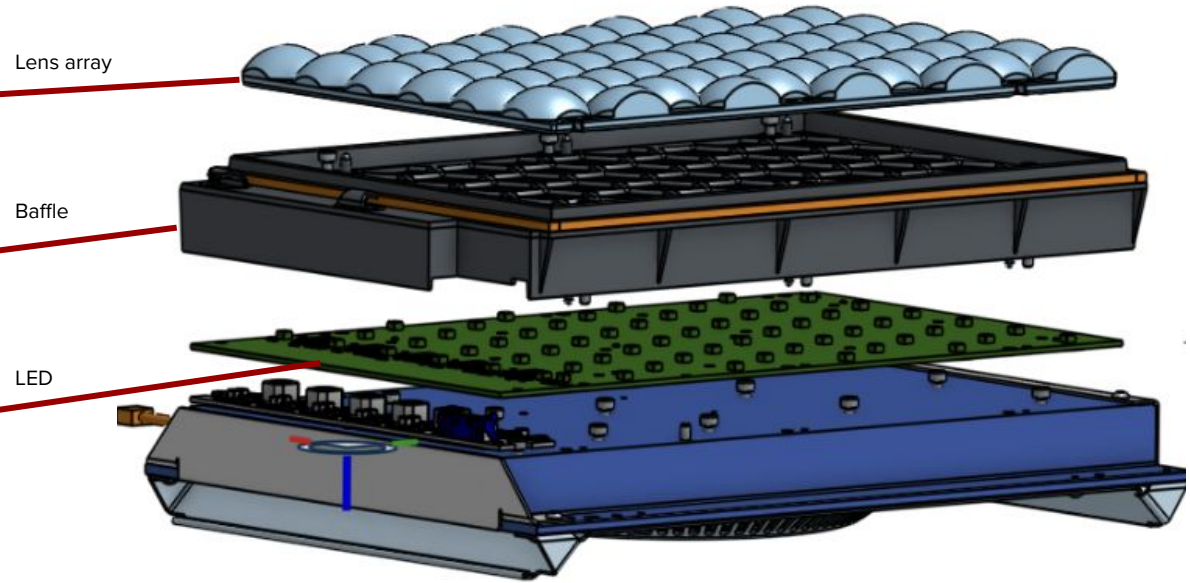


Collimated light

Form 4 Backlight Unit



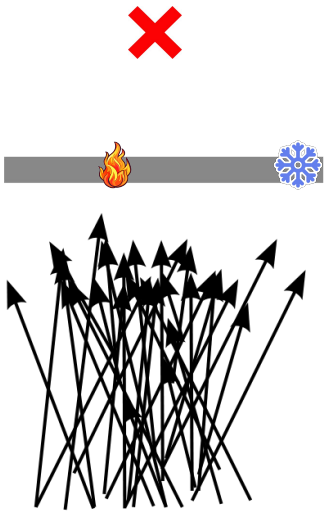
Optical Collimator

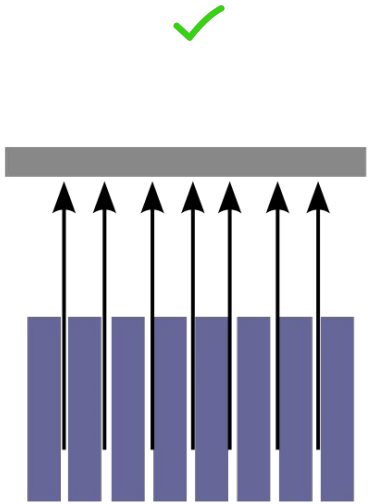


Why Does Collimated Light Matter?

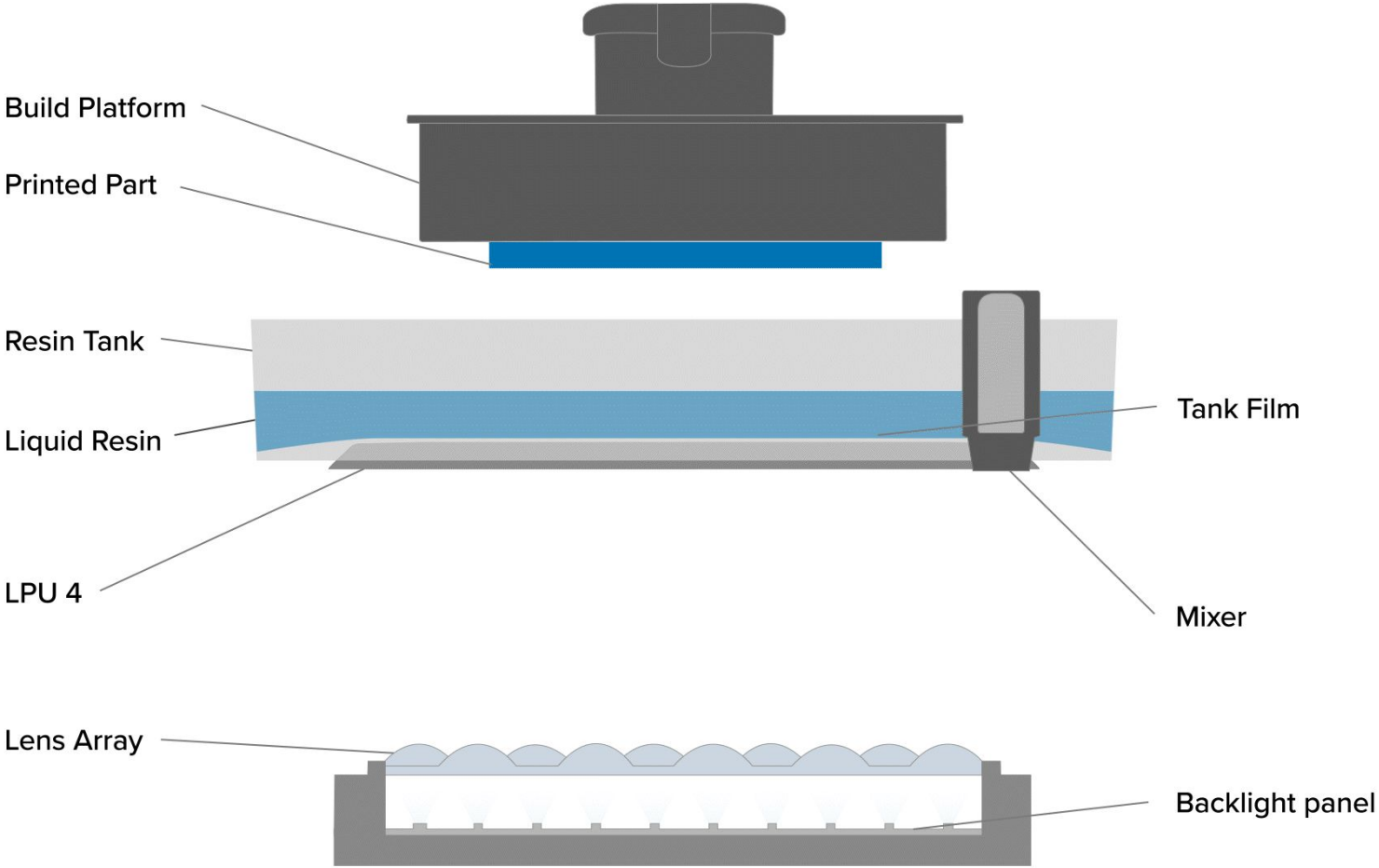
An uneven distribution of light energy leads to **hot spots and inconsistent curing**

In reality, this means some parts of the print area get more light exposure than others - leading to **over-curing** or **under-curing**





Low Force Display: Print Process



Industrial Resin Printers

Industrial Resin Printers

Why do customers choose industrial resin printers?

- Longtime industry players with proven track record, branding and imagery already centered on industrial applications
- Range of high performance materials
- Set the bar for part quality and accuracy
- Corporate relationships and partnerships

Industrial Resin Printers

Reasons to pick Form 4 over industrial resin printers?

- **Lower upfront costs**
  - Form 4's price is low enough to buy multiple machines fully covered with service for the same price as competing printers. Sample parts can showcase part quality if trust in Form 4's abilities is low.
  - Inverted SLA requires less upfront investment in resin since it lacks a large resin vat.
- **Shorter learning curve**
  - Form 4 doesn't require a dedicated, skilled operator. Formlabs offers online content, product information, and training resources to bring customers new to 3D printing up to speed quickly.
  - We put effort into customer training, technical content, and quick help. Hour long training sessions help customers feel confident in starting a print and response times are under one business day.
- **Easy material handling**
  - The build platform, tanks, and resin cartridges are easy to swap and store. Inverted SLA requires less resin than traditional SLA, making material handling quicker.

Industrial Resin Printers vs Form 4

COMPETITION	WEAKNESSES	FORM 4
Traditional SLA print process	• Large amounts of resin needed to fill vats • Time consuming to change materials	Form 4 requires only 1 liter of resin to try a new material and material swaps take less than 30 seconds - making a Form 4 more versatile than a traditional SLA machine
Require trained technicians	• Up front cost to train staff and hire trained operators • Higher operating costs from time needed from more specialized employees • Complicated software to set print parameters	Form 4 comes calibrated and ready to print without any need to tune settings or prepare software Quick Start Guide, online resources, and trainings to get up to speed quickly Extensive online and PDF guides, webinars, and other learning content
High up front machine cost	• High machine costs • Building infrastructure costs • Costs to switch materials with a larger resin vat	Form 4 is easy to install and setup without sacrificing speed or part quality
Large footprint	• Some machines require large amounts of floor space or cannot be put on multilevel shelving	Form 4 is easily deployed in a variety of workspaces and facilities Form 4 can be used with Mac and Windows with Wifi, Ethernet, or USB
Repairs and maintenance visits	• Lose production time waiting for tech to arrive • Closed systems without the ability for in-field repairs	Form 4 is reliable while maintaining an easy workflow, accurate parts, and speed User-replaceable components with a modular design and friendly support team

Low Cost Resin Printers

Low Cost Resin Printers

Why do customers choose low cost resin printers?

- Lower price point for machines and resin
- Claims about faster printing than some professional machines
- Open platform

Low Cost Resin Printers

Reasons to pick Form 4 over low cost resin printers

- **Speed**
  - Form 4 can print most parts in 2 hours and a full build in 5 hours so speed is no longer a downside to accessing the benefits of the Formlabs ecosystem.
- **Shorter learning curve**
  - Formlabs offers more online content, product information, and training resources than many other lower priced large format resin printers. Formlabs materials come with validated settings and software. Form 4 has a fully supported post-processing workflow.
- **Automatic resin handling**
  - Form 4 offers automatic material and consumable handling for printing with validated settings. Online tracking is available via Dashboard to help teams keep track of consumables and print progress.
- **Support and resources**
  - Formlabs prioritizes customer training, technical content, and quick help. Hour long training sessions help customers feel confident in starting a print and response times are under one business day.

Low Cost Resin Printers vs Form 4

COMPETITION	WEAKNESSES	FORM 4
Manual fill with bottled resin	• Need to “babysit” the printer • More mess	Form 4’s automatic resin handling and easy to swap cartridges allow for mess free operation without manually refiling resin during a job
FEP tank films need to be replaced manually in the tank frame	• Requires tools and partial disassembly • Needs to be completed on a regular basis	Changing the tank on Form 4 is easy and takes less than 30 seconds with no tools required
Require initial calibration of the build platform height/print plane	• Added hassle and margin for error	Form 4 comes calibrated and ready to print without any need to tune settings or prepare software on the printer
Various software options, many of which are provided by separate companies and require more tinkering and knowledge to fully utilize (Cura, Chitubox, Asura, Meshmixer, etc.)	• Require more tinkering and knowledge to fully utilize • Potential for incompatibility upon updates • Option to select settings incompatible with printer/resins or print files without sufficient supports	PreForm software prepares files for printing using tested settings designed specifically for Formlabs prints and resins Resin and printability alerts plus monitoring on Dashboard
Limited ongoing customer success/services and infrastructure	• Can be difficult to find the source of truth for technical advice	Quick Start Guide, online resources, and trainings to get up to speed quickly. Extensive online and PDF guides, webinars, and other learning content

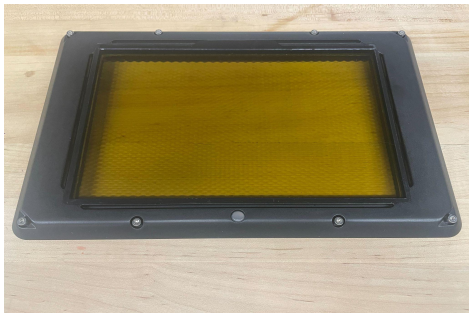
Material Handling

Many of our film tank competitors do not prioritize dispensing, switching, and storing materials.

Resin must be manually filled and poured back into the container.

LCD Screen vs LPU 4

Light Processing Unit (ULPU) 4 is robust



LCD screen

Easy to damage
Often requires tape to install
No integrated heating

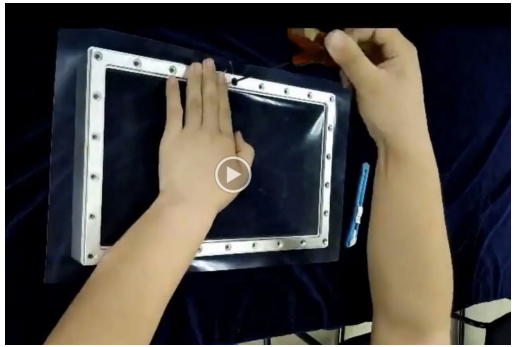
Light Processing Unit (LPU) 4

Robust
Screws into place
Integrated heating

Replacing FEP Film

Many of film tank competitors feature metal tank frames with replaceable FEP film.It takes time to unscrew the film, cut it, and properly tension the film.

FEP film



Peopoly YouTube Channel

Formlabs Resin Tank

Form 4 tanks are easy to swap and have an integrated, flexible film

FFF/FDM Printers

FFF/FDM Printers

Why do customers choose FFF/FDM printers?

- Lower price point
- Open materials
- Lower material cost
- Printing in end use materials like TPU, PLA, and ABS

An FFF/FDM printer is a great compliment to Form 4 for lower fidelity parts

FFF/FDM Printers

Reasons to pick Form 4 over FFF/FDM printers

- **Smoother part finish**
  - Form 4's LFD technology produces beautiful parts in hours
- **Mechanically isotropic properties**
  - Form 4's LFD technology produces parts with mechanically isotropic properties because layers are chemically bonded. Choose Form 4 when parts need to withstand forces in multiple planes.
- **Support and resources**
  - We put effort into customer training, technical content, and quick help. Hour long training sessions help customers feel confident in starting a print and response times are under one business day.
- **Speed**
  - Form 4 can print most parts in 2 hours and a full build in 5 hours so speed is no longer a downside to accessing the benefits of the Formlabs ecosystem.

FFF/FDM Printers vs. Form 4

COMPETITION	WEAKNESSES	FORM 4
FDM print process	• Anisotropic parts • Rough surface finish	Form 4 produces mechanically isotropic, watertight parts with smooth surface finish
Filament management can be difficult	• Time consuming filament changes • Some materials moisture control or additional fans	Changing the tank on Form 4 is easy and takes less than 30 seconds with no tools required
Various software options, many of which are provided by separate companies and require more tinkering and knowledge to fully utilize	• Added hassle and margin for error • Require more tinkering and knowledge to fully utilize • Option to select settings incompatible with printer/resins or print files without sufficient supports	Form 4 comes calibrated and ready to print without any need to tune settings or prepare software PreForm software prepares files for printing using tested settings designed specifically for Formlabs prints and resins
Limited digestible quick start material*	• Require more tinkering and knowledge to fully utilize • Can require more time to get up to speed	Quick Start Guide, online resources, and trainings to get up to speed quickly
Limited ongoing customer success/services and infrastructure	• Can be difficult to find the source of truth for technical advice	Extensive online and PDF guides, webinars, and other learning content

Outsourcing

Outsourcing

Why do customers choose outsourcing?

- Lower up front costs and commitment
- Range of high performance materials
- Less frequent printing
- Easy to switch between printer technology (i.e. SLA vs. SLS) or to choose materials like metal
- Can include access to consulting services

We also want service bureaus to buy our machines so we need to be careful to make the benefits of in-house clear without alienating them

Outsourcing

Reasons to pick Form 4 over outsourcing?

- **Lower long term cost**
  - Outsourcing offers attractive pricing if you only need a couple parts but with more demand and the markup bureaus charge, investing in Form 4 is less expensive. New tank and resin pricing offer lower operating cost than Form 3.
- **Faster turnaround time**
  - Form 4 is our fastest printer - printing most parts in 2 hours. Outsourcing can take days or weeks.
- **More control and access**
  - Form 4 allows customers to design for the printer size and materials while maintaining control over how parts are printed. More access to the printer means critical surfaces can be prioritized when setting up parts.

Outsourcing vs Form 4

COMPETITION	WEAKNESSES	FORM 4
Higher per part cost	• Service bureaus have significant markups to cover unexpected costs because of the wide range of customer parts • Charge for shipping and rush jobs	Form 4 provides lower long term costs and per part costs for consistent printing - now with lower consumable costs for tanks and select resins
Longer turnaround time	• Waiting for parts can delay projects and lead to costly delays	Form 4 can print most parts in 2 hours and filling the build platform doesn’t decrease speed
Less exposure to the manufacturing technology	• More difficult to design for additive manufacturing • Threshold for sending parts out is higher	With a printer in-house, it allows experimentation and the ability to use it for projects that wouldn't be feasible for outsourcing Try new materials easily in house and stay tuned for future materials with exciting characteristics

Outsourcing

Main talking points/Objection handling

- **Lower long term cost**
  - Outsourcing offers attractive pricing compared to investing in an in house solution but when there is consistent demand for parts, internal printing cuts costs.
    - How often do you outsource parts? What are those parts costing you? What does waiting for outsourced parts cost you? What does the CapEx approval process look like for purchasing outsourced parts?
- **Faster turnaround time**
  - Form 4 can print most parts in 2 hours depending on material and setup. Outsourcing can take days or weeks.
- **More control and access**
  - Form 4 allows customers to design for the printer size and materials while maintaining control over how parts are printed. More access to the printer means critical surfaces can be prioritized when setting up parts.
    - Do you think you or your team would print more if you had access to printing in house?
    - What projects or capabilities would you like to pursue that outsourcing isn't feasible for?
    - Pricing on outsourced parts can be dependant on the build envelope of bureau printers. An extra half inch of size can make the parts significantly more expensive. Knowing the build volume and designing for the build volume helps keeps costs under control.

Battlecards

Anycubic

Anycubic started in 2015 selling filament printer. After growing rapidly and expanding into resin printers - they became one of the top 3 low cost resin 3D printer by unit sales in 2023. Despite a focus on consumer grade printers, their numbers continue to rise within the professional market. Anycubic now offers LCD and DLP printers. Based in Shenzhen, China.

TARGET MARKET(S): Hobbyist, Engineering

WHERE FORMLABS WINS

- Intuitive workflow
- Customer support and reliability
- Engineering-grade materials

COMPETITOR STRENGTHS

- Inexpensive printer and resin
- Auto-feed resin pump
- Good print quality for price
- Water washable resin

OBJECTION HANDLING

- **Why are you less affordable?** Formlabs printers have been designed to be easy to use and reliable. Lower cost printers can require manual settings tuning and do not offer robust customer support or training. When I talk to customers purchasing printers for professional use, they often evaluate more than machine cost. What other factors are you evaluating?
- **The Anycubic printer is just as fast**. On Form 4, most parts print in 2 hours and a full build volume can be printed in 5 hours. On any printer, speed depends on layer height and material. Do you have an example of a part you would like to print? We can discuss material opinions and estimate print times for your files. What makes speed an important factor to you in choosing a printer?

Photon Mono M5s

~$600

link

LCD

12K screen

19 micron pixel size

Print speed avg. w/ high speed resin:
105 mm/hr

MAIN TALKING POINTS

- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials.
- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
- **Reliable and robust.** Form 4 Resin Tanks and Light Processing Unit (LPU) below the tank are durable and resist accidental damage. Our LPU also has a Release Texture to help reduce peel forces on parts when they peel from the tank film.

Phrozen

Founded in 2016 this Taiwanese 3D printing company has now expanded to the US, EMEA, Japan, and South Korea. Phrozen is a leader in low cost resin printing.

TARGET MARKET(S): Hobbyist, Industrial, Medical, Dental, Jewelry

WHERE FORMLABS WINS

- Intuitive workflow
- Customer support and reliability
- Engineering-grade materials
- Automatic resin handling

COMPETITOR STRENGTHS

- Inexpensive printer and resin
- Also offer a wash and cure
- Offer anti-aliasing for smooth surface finish

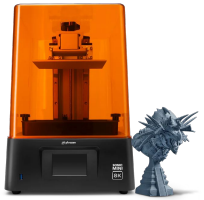
Wash & Cure Kit

Sonic Mini 8K

~$700 full package

link

LCD



8K screen

22 micron pixel size

Print speed:
Up to 80 mm/hr

Light intensity: 2.7-3.3 mW/cm2

OBJECTION HANDLING

- **Why are you less affordable?** Formlabs printers have been designed to be easy to use and reliable. Lower cost printers can require manual settings tuning and do not offer robust customer support or training. When I talk to customers purchasing printers for professional use, they often evaluate more than machine cost. What other factors are you evaluating?
- **The Phrozen printer is also fast**. On Form 4, most parts print in 2 hours and a full build volume can be printed in 5 hours. On any printer, speed depends on layer height and material. Do you have an example of a part you would like to print? We can discuss material opinions and estimate print times for your files. What makes speed an important factor to you in choosing a printer?

MAIN TALKING POINTS

- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
- **Reliable and robust.** Form 4 Resin Tanks and Light Processing Unit (LPU) below the tank are durable and resist accidental damage. Our LPU also has a Release Texture to help reduce peel forces on parts when they peel from the tank film.
    - No need to unscrew multiple screws to replace tank film or cut film sheets.
- **Speed.** On Form 4, most parts print in 2 hours and a full build volume can be printed in 5 hours. Print speeds up to 100 mm/ hour using Fast Model v1 Resin and 200um layer height. Based on actual print times from a collection of test parts covering common engineering, product design, manufacturing, and dental applications.
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials.

Elegoo

Started in 2011 and based in Shenzhen, Elegoo is a strong player in lower cost resin printers. They are among the top sellers of low cost resin printers by unit sales. Elegoo sells both resin based printers and FDM printers.

TARGET MARKET(S): Hobbyist, Engineering

WHERE FORMLABS WINS

- Intuitive workflow
- Customer support and reliability
- Engineering-grade materials
- Automatic resin handling

COMPETITOR STRENGTHS

- Inexpensive printer and resin

OBJECTION HANDLING

- **Why are you less affordable?** Formlabs printers have been designed to be easy to use and reliable. Lower cost printers can require manual settings tuning and do not offer robust customer support or training. When I talk to customers purchasing printers for professional use, they often evaluate more than machine cost. What other factors are you evaluating?
- **Is your print quality better?** Form 4 can print minimum features of 50 microns. Low Force Display (LFD) technology provides a consistent, powerful light source for curing resin in the tank. What types of features are you looking to print?
    - Offer standard or custom samples

Elegoo Saturn S 4K

~$300

LCD

4K screen

48 micron pixel size

Print speed:
40 mm/hr

Light intensity: 2.07 mW/cm^2

MAIN TALKING POINTS

- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
- **Reliable and robust.** Form 4 Resin Tanks and Light Processing Unit (LPU) below the tank are durable and resist accidental damage. Our LPU also has a Release Texture to help reduce peel forces on parts when they peel from the tank film.
- **Validated Biocompatible workflows.** Formlabs biomedical and medical device resins are designed and manufactured within our robust Quality Management System that is ISO 13485 and EU MDR certified in our certified FDA Registered facility.
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials.

FlashForge

Flashforge mostly focuses on filament printers but has a handful of resin based lines. Founded in 2011 and based in China.

TARGET MARKET(S): Dental , Jewelry

WHERE FORMLABS WINS

- Automatic resin handling
- Easy to use workflow

COMPETITOR STRENGTHS

- Name recognition from filament printers
- Open platform comes standard

OBJECTION HANDLING

- **They are an open platform.** Form 4 print settings for Formlabs materials can be tuned using PreForm's Print Settings Editor. Form 4 can also support 3rd party materials through Open Material License.
- **Is your print quality better?** Form 4 can print minimum features of 50 microns. Low Force Display (LFD) technology provides a consistent, powerful light source for curing resin in the tank. What types of features are you looking to print?
    - Offer standard or custom samples

Hunter

~4,000

link

DLP

62.5 micron pixel size

Print speed:
Up to 30mm/h*

*Hunter S Dental Machine

MAIN TALKING POINTS

- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
    - Flashforge does not offer washing and curing solutions.
- **Reliable and robust.** Form 4 Resin Tanks and Light Processing Unit (LPU) below the tank are durable and resist accidental damage. Our LPU also has a Release Texture to help reduce peel forces on parts when they peel from the tank film.
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials.
- **Speed.** On Form 4, most parts print in 2 hours and a full build volume can be printed in 5 hours. Print speeds up to 100 mm/ hour using Fast Model v1 Resin and 200um layer height. Based on actual print times from a collection of test parts covering common engineering, product design, manufacturing, and dental applications.

Nexa 3D

Nexa3D has developed a unique proprietary technology called Lubricant Sublayer Photo-curing (LSPc) that enables ultra-fast 3D printing. Founded in 2016.

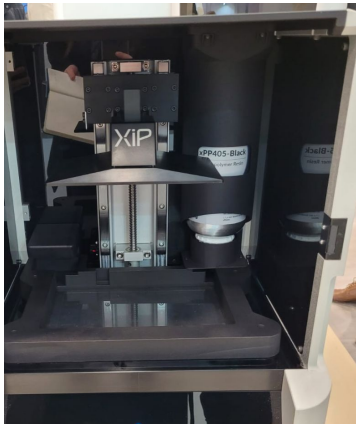
TARGET MARKET(S): Engineering and Manufacturing, Dental

WHERE FORMLABS WINS

- Automatic resin handling
- Affordability

COMPETITOR STRENGTHS

- Dissolvable Injection Molding resin
- Open system standard



OBJECTION HANDLING

- **Nexa can stack prints in the Z**. While stacking parts in your CAD software is possible, stacking parts leads to longer prints and more support structures to clean from parts. Form 4 prints most parts in 2 hours and a full build volume in 5 hours in most materials. No need to stack parts.
- **They are an open platform.** Form 4 print settings for Formlabs materials can be tuned using PreForm's Print Settings Editor. Form 4 can also support 3rd party materials through Open Material License.
- **Nexa XiP is faster**. On Form 4, most parts print in 2 hours and a full build volume can be printed in 5 hours. On any printer, speed depends on layer height and material. Do you have an example of a part you would like to print? We can discuss material opinions and estimate print times for your files. What makes speed an important factor to you in choosing a printer?
- **Is your print quality better?** Form 4 can print minimum features of 50 microns. Low Force Display (LFD) technology provides a consistent, powerful light source for curing resin in the tank. What types of features are you looking to print?
    - Offer standard or custom samples

XiP

Full package ~$10,000

MSLA

4K screen

52 micron pixel size

Print speed:
Up to 180 mm/hr

MAIN TALKING POINTS

- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
- **Reliable and robust.** Form 4 Resin Tanks and Light Processing Unit (LPU) below the tank are durable and resist accidental damage. Our LPU also has a Release Texture to help reduce peel forces on parts when they peel from the tank film. Print parts with 50 micron minimum feature size.
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials.
- **Speed.** On Form 4, most parts print in 2 hours and a full build volume can be printed in 5 hours. Print speeds up to 100 mm/ hour using Fast Model v1 Resin and 200um layer height. Based on actual print times from a collection of test parts covering common engineering, product design, manufacturing, and dental applications.

Photocentric

Photocentric, headquartered in the UK, is a pioneer in resin-based 3D printing technology since 2002. Their innovative processes, including patented LCD technology, offer high-resolution prints for various industries globally. Printers page.

TARGET MARKET(S): Engineering, Industrial, Product Design

WHERE FORMLABS WINS

- More affordable
- Faster print speeds
- Automatic resin handling

COMPETITOR STRENGTHS

- Open materials
- Has a wash and cure system

OBJECTION HANDLING

- **They are an open platform.** Form 4 print settings for Formlabs materials can be tuned using PreForm's Print Settings Editor. Form 4 can also support 3rd party materials through Open Material License.
- **Is your print quality better?** Form 4 can print minimum features of 50 microns. Low Force Display (LFD) technology provides a consistent, powerful light source for curing resin in the tank. What types of features are you looking to print?
    - Offer standard or custom samples

Liquid Crystal Opus

~$9,000

LCD

4K screen

81 micron pixel size

Print speed:
Up to 18 mm/hr

MAIN TALKING POINTS

- **Speed.** On Form 4, most parts print in 2 hours and a full build volume can be printed in 5 hours. Print speeds up to 100 mm/ hour using Fast Model v1 Resin and 200um layer height. Based on actual print times from a collection of test parts covering common engineering, product design, manufacturing, and dental applications.
- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
- **Reliable and robust.** Form 4 Resin Tanks and Light Processing Unit (LPU) below the tank are durable and resist accidental damage. Our LPU also has a Release Texture to help reduce peel forces on parts when they peel from the tank film. Print parts with 50 micron minimum feature size.
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials.

Raise 3D

“As a leading manufacturer of industrial grade 3D printers, Raise3D is dedicated to pioneering flexible manufacturing, which helps our customers improve their competitive advantage through utilizing the benefits of Additive Manufacturing.” Founded in 2012 in Shanghai they have a strong FFF product line and one SLA printer.

TARGET MARKET(S): Manufacturing & Engineering, Education, Medical

DF2

$4,999

Print speed: 25 mm/h

DLP

WHERE FORMLABS WINS

- Marketing outreach via webinars and long list of customer stories
- Larger services team and customer base
- Complete workflow

COMPETITOR STRENGTHS

- Unique FFF portfolio - dual extrusion technology (mirror printing)
- Extensive spare parts store

OBJECTION HANDLING

- **“I want to have access to 3rd party materials”**
  - Start with PreForm Settings Editor, move onto Open Material License (OML) for 3rd party materials. If we allowed customers to change internal systems it would cause an increase in print failures and negatively affect usability.
- **Raise 3D and other companies have a model sharing community - where is Formlabs’?**
  - Raise 3D uses their website to upload material profiles for 3rd party materials. While Formlabs does own Pinshape, the majority of our customers are professional users who use CAD modeling softwares. We also use other online repositories like Thingiverse to find files online. Formlabs Community Forum is a great resource for asking other customers about their experience.

MAIN TALKING POINTS

DF2 is currently available for preorder and available “Q1 2024” - could mean long lead times. Currently offering Tough 2K and Rigid 3K (as of April 2024).

- **Speed.** On Form 4, most parts print in 2 hours and a full build volume can be printed in 5 hours. Print speeds up to 100 mm/ hour using Fast Model v1 Resin and 200um layer height. Based on actual print times from a collection of test parts covering common engineering, product design, manufacturing, and dental applications.
- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
  - Raise 3D positions itself both to hobbyist / DIY customers and prosumers based on the cost of the systems and the ability to use 3rd party materials. Users can also make hardware changes to their existing systems. Ultimately this can hurt their brand perception towards much larger customers that prefer a hands off solution.
  - Raise 3D does have washing and curing hardware. It’s more expensive than our Form Wash and Form Cure.

Prusa

Prusa Research was founded as a one-man startup in 2012 by Josef Prusa, a Czech hobbyist, maker and inventor. Today, Prusa Research has grown to a 700+ team and they ship more than 10,000 Original Prusa printers per month to over 160 countries directly from Prague. Mainly low cost FDM and have dipped into low cost SLA.

TARGET MARKET(S): Autotive, Manufacturing, Healthcare, EDU, Film industry

WHERE FORMLABS WINS

- Professional quality machine and print process
- Validated, reliable materials
- Usability

COMPETITOR STRENGTHS

- Printables (CAD sharing community driven website)
- Large online presence via podcasts and viral marketing videos
- Price

OBJECTION HANDLING

- **Why can't I upgrade my Form 3 to Form 4 like my MK3 to MK4**
  - Formlabs designs machines that are easy to use and reliable. The printers that we release are meant to be used consistently for years. Previous models are still able to print our portfolio of validated, engineering materials.
- **Can you print multiple materials?**
  - No - it is a technology limitation with SLA but we can print parts accurately enough to fit multiple materials/parts together as an assembly.

MK4

$1100

FDM

SL1S

$2,000

LCD

MAIN TALKING POINTS

Prusa is built for hobbyists that want to take their 3D printing to the next level. Purchase printers pre-assembled or DIY kits. They also offer purchasable or even 3D-printable upgrades to the latest and greatest.

The SLA printer is relatively new to market and has not done as well as their FDM product line.

Position Form 4 as a complement to other products in a makerspace or innovation lab. Makerspaces will often have a:
Laser cutter ✅
CNC machine ✅
Cheap FDM ✅
Reliable SLA ✅

- **Mechanically isotropic parts (over FDM).** Form 4's LFD technology produces mechanically isotropic parts with a smooth surface finish. *Drill down on failures in applications where FDM parts have separated.*

Creality 3D

Chinese based company. Creality also owns Ender - a manufacturer of other makerspace equipment. Established in 2014, their business strategy, termed "One Core with Two Wings," has propelled their rapid growth. Specifically, 3D printing products are at the “Core” of the business, assisted by the first “Wing” of ecosystem products like 3D scanners, laser engravers, filaments, and accessories. The second “Wing” is a cloud based 3DP platform called “Creality Cloud.”

TARGET MARKET(S): Hobbyist, Engineering. Stays away from end-use applications and aerospace

WHERE FORMLABS WINS

- Creality has a very limited SLA resin portfolio
- Our marketing, case studies, and 3DP resources vastly exceed Crealities online presence. We are more “available”

COMPETITOR STRENGTHS

- 2 million Ender 3’s shipped since 2018
- FDM, SLA, laser cutter, 3DP platform. One-stop-shop

Creality Falcon2 40W

Learn More >

CR-Scan Ferret SE

Learn More >

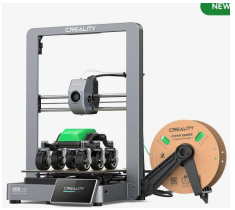
OBJECTION HANDLING

- **I can buy everything from Creality** - why don’t you sell XYZ…
  - Formlabs is hyper focused on very few SKU’s so whatever we put out will be top of the line upon release date. We are happy to recommend other OEMs that we have used in the past. Depending on our customers need we may have XYZ in the future.
- **Halot is an 8K printer and they spec 170 mm/hr** - why are you not that fast?
  - 1. That is usually highest speed possible on the worst settings on a special material that can’t do much mechanically. 2. It may do it but not for very long and not consistently enough for it to matter. 3. Form 4 pairs print speed, accuracy, reliability, and longevity into one so your total TCO is cheaper. Less time fine tuning settings per job

Halot-Mage Pro // Ender 3

$509

MSLA



$389

FDM

MAIN TALKING POINTS

Quality over quantity. Focus on Form 4s easy to use ecosystem, less expensive tanks, and General Purpose resins.

Reliable and robust. Form 4 Resin Tanks and Light Processing Unit (LPU) below the tank are durable and resist accidental damage. Our LPU also has a Release Texture to help reduce peel forces on parts when they peel from the tank film. Print parts with 50 micron minimum feature size.

- Support for Creality and Ender printers is primary self-service. They are a Chinese company and offer little US direct support for larger customers.

Similar concept to Bambu labs. The Ender 3 is not a direct competitor to the Form 4 but is a complementary tool to any 3D printing shop that wants to provide all options for end users to choose from.

Bambu Lab

Chinese company (Shenzhen) started in 2020 launched with a massive kickstarter campaign and shipped 6,000 units in 2022. Starting with the X1 they have taken over the “fast, cheap, easy to use” FDM market pushing out some incumbents like Prusa, Ultimaker, and Markforged.

TARGET MARKET(S): Everything but medical / dental due to filament constraints

WHERE FORMLABS WINS

- Smooth, mechanically isotropic parts
- We haven’t had any recalls
- US based company, local service and longer tenure in industry

COMPETITOR STRENGTHS

- CNET and Time best 3D printer / invention in 2022/2023
- Relatively fast FDM printer well worth the $$
- Next great thing that every lab is looking for

Bambu Lab A1 Review: Game-Changer or Hype

YouTube · CNC Kitchen
Dec 14, 2023

10 key moments in this video

The New York Times

The 3 Best 3D Printers of 2024 | Reviews by Wirecutter

The Bambu Lab A1 Mini is the fastest and easiest-to-use 3D printer we've found that is also compact enough to fit on a desk.

OBJECTION HANDLING

- **They have material changeovers mid print - allowing printing in 2+ materials at once.** Form 4 has easy to remove support touchpoints and unlocks access to a library of engineering grade materials.
- **Resin is sticky** - very standard FDM vs. SLA tradeoff. Compare our easy to use wash and cure vs. other cheap competitors and show how relatively simple it is to use. Safety data sheets and other info regarding TMP/IPA will prevent any surprises when the customer is building out a space and works with their local environmental health and safety rep.
- **I can print 3x the speed with one Bambu.** On Form 4, most parts print in 2 hours and a full build volume can be printed in 5 hours. On any printer, speed depends on layer height and material. Do you have an example of a part you would like to print? We can discuss material opinions and estimate print times for your files. What makes speed an important factor to you in choosing a printer? Form 4 also has smooth, mechanically isotropic parts with 20+ validated materials to choose from.

Bambu Lab X1-Carbon 3D Printer

$1,199 price

store

FDM

256 mm^3 build volume

A1 mini = >$400
1 kg of filament under $30 (PLA)

Print speed:
Max 500 mm/s

MAIN TALKING POINTS

Bambu Labs can be positioned as another critical component in any makerspace or innovation lab. A FFF/FDM printer can be a great complement to resin printing. Many makerspaces and innovation labs have:

- Laser cutter ✅
- CNC machine ✅
- Cheap FDM ✅
- Reliable SLA ✅

- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
- **Reliable and robust.** Form 4 Resin Tanks and Light Processing Unit (LPU) below the tank are durable and resist accidental damage. Our LPU also has a Release Texture to help reduce peel forces on parts when they peel from the tank film. Print parts with 50 micron minimum feature size.
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials.

Ultimaker

Ultimaker, based in the Netherlands, is a leading provider of professional desktop 3D printers since 2011. Known for their reliability, precision, and user-friendly software like Ultimaker Cura, they cater to various industries and embrace an open-source philosophy, fostering innovation and community collaboration.

TARGET MARKET(S): Engineering, Product Design, Education, Makerspaces

S3

~$4,500

FFF

WHERE FORMLABS WINS

- Mechanically isotropic parts
- Easy material switching the
- Surface finish

COMPETITOR STRENGTHS

- Printing in end use plastics like PLA, TPU, and ABS

OBJECTION HANDLING

- **They have a dual extruder - allowing printing in two materials at once.** Dual extruders are used for adding support material or multiple colors.
  - Form 4 has easy to remove support touchpoints and unlocks access to a library of engineering grade materials.
- **Resin parts are sticky**. Form 4 supports the full workflow from print prep to post curing seamlessly with easy to use post-processing machines. Parts can remain on the Build Platform during washing to help keep your space clean.
- **I'm not confident resin parts can withstand my application.** Formlabs has 20+ resin materials to choose from - including reinforced, engineering-grade materials. How will your part be used? Which material characteristics are you most concerned about?
  - Pitch custom samples
  - Compare TDSs between relevant material
  - Discuss SLS printing with Fuse 1+ 30W

MAIN TALKING POINTS

- **Mechanically isotropic parts**. Form 4's LFD technology produces mechanically isotropic parts with a smooth surface finish. *Drill down on failures in applications where FDM parts have separated.*
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds.
- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.

Markforged

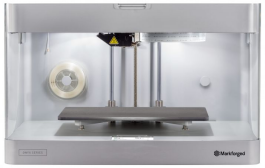
Markforged has professional, accessible filament printers and metal binder jetting technology. The company has focuses on industrial quality 3D printed parts and mechanical characteristics - like continuous carbon fiber reinforcement. Founded in 2011 and headquartered in Waltham, Massachusetts.

TARGET MARKET(S): Aerospace, automotive, industrial

Onyx Pro

$8,990

FFF



WHERE FORMLABS WINS

- Surface finish
- Mechanically isotropic parts

COMPETITOR STRENGTHS

- Traditional thermoplastics
- Carbon reinforced materials

OBJECTION HANDLING

- **Resin parts are sticky**. Form 4 supports the full workflow from print prep to post curing seamlessly with easy to use post-processing machines. Parts can remain on the Build Platform during washing to help keep your space clean.
- **I'm not confident resin parts can withstand my application.** Formlabs has 20+ resin materials to choose from - including reinforced, engineering-grade materials. How will your part be used? Which material characteristics are you most concerned about?
    - Pitch custom samples
    - Compare TDSs between relevant materials
    - Discuss SLS printing with Fuse 1+ 30W
    - Continuous Carbon Fiber reinforcement requires a minimum feature size to lay down material within the nylon shell of a part and add strength. See more here. Resin part will maintain strength in thin features.

MAIN TALKING POINTS

- **Mechanically isotropic parts**. Form 4's LFD technology produces mechanically isotropic parts with a smooth surface finish. *Drill down on failures in applications where FDM parts have separated.*
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds.
- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.

Uniz

“Worlds Fastest Dental Printing Solutions” - Headquartered in Beijing, it has set up overseas service centers in the United States and the Netherlands, and a manufacturing base in Guangxi, forming a market layout covering the whole world.

TARGET MARKET(S): Dental industry only

Uniz NBEE 3D printer

$11,000

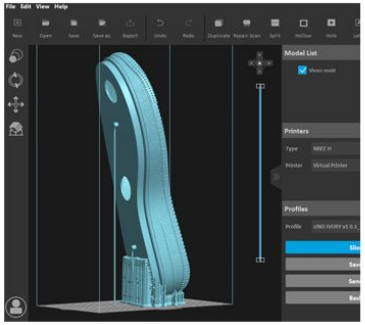
MSLA

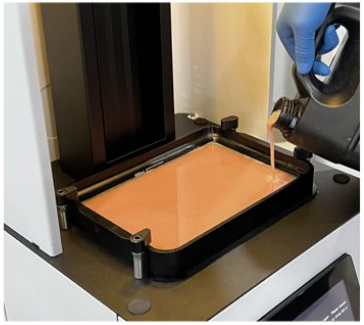
WHERE FORMLABS WINS

- We have more than just dental materials available

COMPETITOR STRENGTHS

- On paper they are faster and more accurate than Form 4





OBJECTION HANDLING

- **Why does Formlabs not have a dental only machine?**
  - We do in the Form 4B - there are dedicated service and sales representatives for this industry and an array of materials covering all major dental applications.
- **Your build volume isn’t large enough**
  - Most dental models do not require anything larger than what we offer. The Form 4 has a longer X axis to allow for wider parts to fit and more parts to fit per build. We can run 11 dental models in under 10 minutes

MAIN TALKING POINTS

On paper this company is worth looking into further and gathering customer feedback. It does have some of the standard drawbacks such as manual resin pouring and a lack of intelligent control systems

Chinese company = little US direct support for larger customers

Formlabs also has a larger internet presence with actual webinars, case studies, and whitepapers going over specific projects that customers can use to feel more comfortable about purchasing our systems.

Carbon

The Carbon DLS™ process combines versatile printers, advanced software, and best-in-class materials to deliver functional parts with end-use performance and aesthetics, helping engineers and designers to create products that outperform. From prototyping and low-volume production to production-at-scale, hundreds of global organizations, including adidas, Ford, and Becton Dickinson, use the Carbon process to create a wide range of functional end-use parts and print them reliably wherever and whenever they need them through our production network partners.

TARGET MARKET(S): Automotive, Dental, Engineering

M1

$132K*

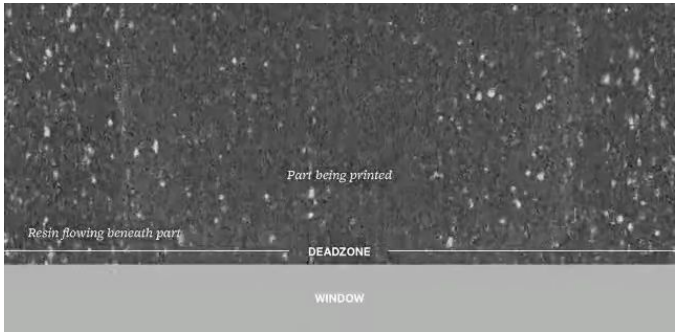
DLS

WHERE FORMLABS WINS

- Lower cost of ownership
- Easier material handling

COMPETITOR STRENGTHS

- Generally higher performing materials
- Faster throughput



OBJECTION HANDLING

- **Carbon offers XYZ material that is great but you don't have it - what do I do?**
  - Break down the application and create a checklist of requirements. Often times the customer only needs one or two key material properties to make the part work.
- **The Carbon M1 fast and has a larger build volume**
  - Compare to the Form 4 or use the TCO of a small fleet of printers vs. one M1 and it will be obvious which system can produce more parts for less money.

MAIN TALKING POINTS

Carbon's technology is complex and extremely fast when done correctly. For customers like Adidas or Amgen this works well with the price point and production rate of the printer. For the vast majority of Formlab's customers this is not going to be the case.

Carbon materials are often a two-part hybrid solution that need to be mixed with a paint mixer shortly before printing which can be frustrating for some customers. Upside is that many materials far exceed what we have to offer. PU 650/1000 is the closest however our workflow is not as clean.

*Carbon printers are leased with high yearly fees. Choose Formlabs products for ownership of your printer hardware.

Stratasys

Global leaders in 3D printing. Started in 1989 Minnesota, they have grown to be the dominant player in large format FDM printers and boast a healthy polyjet, SLA, and SAF (their version of SLS) product lines. Stratasys Direct is one of the largest on-demand manufacturing services in the world. They use 3rd party equipment to keep their customers under one roof to maximize mindshare.

TARGET MARKET(S): Aerospace, Automotive, Consumer Products, Dental, Medical, Education, Art and Fashion

WHERE FORMLABS WINS

- Lower cost per printer
- No subscription based models when introducing new materials
- Easy to use

COMPETITOR STRENGTHS

- 640m in revenue 2023
- Large parts business
- Wider range of 3DP technologies

stratasys
DIRECT MANUFACTURING

OBJECTION HANDLING

- **Form 4 is too cheap, there's no way it can be a good product**
  - Short Answer - it is. Long Answer - Formlabs invested heavily into R&D to make the most affordable, easy to use printer while still providing high repeatability, reliability, and high performance materials.
    - Offer standard or custom samples
- **SLA cannot produce parts for my "industrial" or "high performance" applications**
  - We have a number of examples of our materials being used for applications in space/aerospace and other high performance applications. While SLA resins are differing compared to SSYS FDM (the most common technology they sell) they can still perform as good or better than FDM.

Origin One

$99,000

DLP

MAIN TALKING POINTS

- **Lower upfront machine cost.** Form 4 costs a fraction of what a Stratasys machine does.
  - PreForm is free of charge and doesn't require a subscription.
  - Form 4 ships with access to 23+ materials (Form 4B: 37+) without requiring a subscription to access engineering materials.
- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 23+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials. Choose the Open Materials License for access to 3rd party materials.
  - Focus on a niche application that Stratasys customers do not want to devote a $100k printer to. It will get us in the door and lead more Formlabs adoption in the future.

3D Systems

The first 3D printing company started in 1986. Headquartered in Rock Hill, South Carolina, with offices, manufacturing facilities, and Customer Innovation Centers around the globe, 3D Systems has the expertise and resources to advance industries.

TARGET MARKET(S): Everything - they have metal, SLA and SLS equipment

WHERE FORMLABS WINS

- Price point compared to most of their systems

COMPETITOR STRENGTHS

- Age of the company / experience
- 2nd largest public 3DP company

SLA 750

$400,000

SLA

Right side up SLA

MAIN TALKING POINTS

Customers often gravitate toward these machines when they have high budgets and high production needs.

- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
    - Option to run multiple materials and specialty engineering materials without switching over a larger vat of resin.
    - No trained operator needed for Form 4
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds.
    - Offer standard or custom samples to showcase material properties.

OBJECTION HANDLING

- **I can buy everything from 3DS** - why don't you sell XYZ...
    - Formlabs is hyper focused on very few SKU's so whatever we put out will be top of the line upon release date. We are happy to recommend other OEMs that we have used in the past. Depending on our customers need we may have XYZ in the future.
- **Your machines are so cheap** - are you sure they are reliable?
    - Some customers lump us in with cheap hobbyist printers like Elagoo or Ender which is a bad thing. Focus on our install base, if they were they bad how could 130K printers produce 400m+ parts? Also mention print success rate (91%+ 3L, 93-95% F3+)

Uniontech

Based in Shanghai and started in 2000 - markets towards industrial SLA, DLP, LCD, and SLM equipment. They also offer 3D printing and CNC services. Website is sparse and they do not have many materials available. Compared to other large companies they have few resources.

TARGET MARKET(S): Consumer electronics, dental, automotive, aerospace (same as Formlabs)

WHERE FORMLABS WINS

- Larger customer base
- Customer stories and webinars
- Easy to use
- Customer support and knowledge site

COMPETITOR STRENGTHS

- Large build volumes
- Slightly wider range of technology capabilities

OBJECTION HANDLING

- **I can buy everything from Uniontech** - why don't you sell XYZ...
  - Formlabs focuses on designing easy to use, professional machines with attention to detail. We sell products we stand behind and add value for customers. What capabilities are you looking for that we don't offer? We are happy to recommend other OEMs that we have used in the past. Depending on our customers need we may offer it in the future.

Matrix520

$500

MSLA

MAIN TALKING POINTS

- **Resources and customer support.** Formlabs has many more customers and positive testimonials to build confidence in our new prospects before purchasing. There are very few unique value propositions to Uniontech over other similarly marketing Chinese brands.
- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials.

HeyGears (Reflex series)

HeyGears was founded in 2015 as an innovative company devoted to providing digital manufacturing solutions across various industries. They are focused on 3D printing, software development, materials, and big-data handling. Based in Guangzhou and Shenzen.

TARGET MARKET(S): Dental labs, consumer products, O&P labs

WHERE FORMLABS WINS

- Wider range of engineering resins
- Large US presence

COMPETITOR STRENGTHS

- Professional looking full ecosystem for under $2500 (as of Q2 2024)

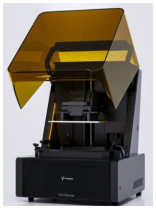
OBJECTION HANDLING

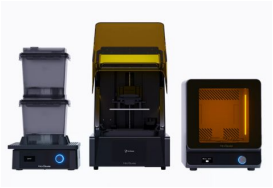
- **It is difficult to get my reflex serviced - how does Formlabs fix their machines?**
  - Service teams are based in offices all around the world to give direct email and phone support for all customers according to service plan type. They are trained on all of our equipment and materials. RMA and DOA rates are extremely low and many parts are customer replaceable vs. hot swapping machines.

UltraCraft Reflex

$1400

MSLA

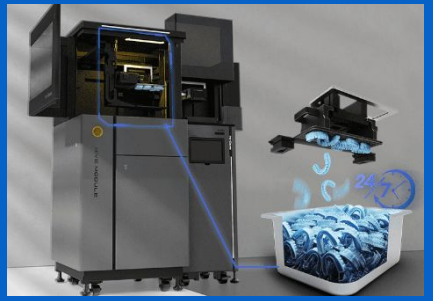




MAIN TALKING POINTS

It has similar technologies “Smart peeling force management” and resin level detection but not the customer base or longevity of the Formlab’s ecosystem.

HeyGears focuses heavily on dental automation in the “Hive” which is very large and cumbersome compared to the Form Auto. Talk about Form 4’s speed to address questions about automation and throughput.



Cubicure

Cubicure GmbH develops, produces and distributes industrial 3D printing solutions for polymer parts. With the ambition to help shape the digital future of manufacturing, they have been setting the course for digital series production from Vienna since 2015. Their "Hot" Lithography process enables the unprecedented additive manufacturing of resilient precision components.

Cubicure is the opposite of a transactional business model. Very few deals but each deal is going to be a few hundred thousand dollars.

TARGET MARKET(S): Large scale production of small parts in engineering materials

WHERE FORMLABS WINS

- Scalable systems as production need changes
- Wider range of materials

COMPETITOR STRENGTHS

- True production scale printers and materials (within photopolymer landscape)

OBJECTION HANDLING

- **I don't want to micromanage 20 printers to keep up with one Cerion (their production system)**
  - Focus on true cost of ownership and the cost for downtime. 1/20 printers down vs. 1/1 printers down is a much bigger deal. They also limit themselves to only 1 printer and 1 file at a time. A fleet provides flexibility and redundancy.

Caligma

~200K

SLA

Reliable prototyping and small series production for a toolless future.

MAIN TALKING POINTS

- **Intuitive workflow.** Anyone can learn to use Form 4 in 15 minutes. Formlabs provides everything you need to get started - from PreForm slicing software to washing and curing hardware.
  - Emphasize the scalability of our systems and ease of use. You do not need a dedicated operator nor skilled end users to run the machine.
- **Validated, engineering-grade materials**. Access a diverse library of functional materials to support many applications on one platform. Tested print settings for 20+ materials. Easily change materials in under 30 seconds. Mixer and heater allow more advanced engineering materials.
  - Formlabs has a wider range of materials / applications. Use Form 4 as a stepping stone to production (injection molding or even SLS). Send customer stories and whitepapers.

Normally not a direct competitor, but will come up as we spec out a fleet of Form 4's vs. one or two of their systems. Small presence globally but shows up more in the EU.

Sprintray

Founded in 2014 and initially known for their Moonray printer. In 2019 Sprintray announced the Pro 95 printer and started focusing exclusively on dental practices. Sprintray is known to spend a lot of money on marketing (e.g., Usain Bolt is their main influencer and they do spend a lot of money on tradeshows and paid marketing).

TARGET MARKET(S): Dental practices.

WHERE FORMLABS WINS

- Build Platform Size
- Speed
- Accuracy
- Ease-of-use
- No lab presence - Sprintray doesn't target labs, only practices
- Dental Service Plan

COMPETITOR STRENGTHS

- Dialed in full clinic focused workflow including design surfaces and AI. Well integrated, contained and efficient wash and cure solutions
- Fast material innovation i.e Onx tough, Apex dentures, Ceramic Crown backed by aggressive marketing
- Sprintray distribution channel in NA is very effective, they work with all the big distributors
- Big budget for marketing and education

OBJECTION HANDLING

- **Sprintray is a dental only 3D printing company, Formlabs is not.**
  - Serving users from different industries doesn't mean that Formlabs is not focused on dental. In fact, Formlabs has a dedicated dental business unit with 100+ employees focused only on dental across sales, services, R&D, product and marketing, in addition to an ISO certified facility for manufacturing biocomp resins in Ohio. Furthermore, catering for different industries allows us to create economies of scale which we can then share with customers like you.
- **Sprintray offers design services, Formlabs doesn't.**
  - There are plenty of design services and AI solutions we could recommend to you so you're not tide to one specific provider. Some examples: 3Shape Automate, CADflowAI, 3Shape Design Services, Evident, DSD. We also recommend asking your lab if they're willing to design for you in return for a fee.
- **Why is Formlabs so cheaper than Sprintray?**
  - We sell more printers in a month than most 3D dental printing companies sell in a year. With that volume comes economies-of-scale, which we can then share with customers like you.
  - We also develop and manufacture most of our resins. Not only does this allow us to control the quality of our product with our ISO certified manufacturing facility, but it also allows us to offer affordable resins.

Pro 95S and Pro 55S

$9,495

DLP

MAIN TALKING POINTS

Unless the user really wants to spend more money.

The Form 4B wins on:

✅**Speed.** Form 4B prints **1.35x faster than Pro 95S** for major applications* (Sprintray has special kits (crown and arch kit) that might print equally fast)

✅**Accuracy.** Sprintray printers have lower XY resolution 95, 55um than Form 4B's 50 um. Parts printed on sprintray have poor surface finish.

✅**Throughput.** Form 4B Build Platform surface is 1.35x larger than Pro 95S and 3x larger than the Pro 55S

✅**Price & running costs.** Sprintray printers are 2x more expensive than Form 4B and tanks are 3x more expensive at $300

✅**Ease of use.** Resin handling system and Build Platform Flex. **Dental Service Plan** includes hot swaps compared to Sprintray services plans with tiers that discounts for parts

Asiga

In 2011, Asiga launched the world's first LED based DLP 3D printer. All products are designed and manufactured in Sydney, Australia. Asiga has built its reputation on word of mouth and is known for its reliability and open material platform.

TARGET MARKET(S): Main focus is dental. Secondary: jewelry and hearing aids. Less focus on manufacturing and engineering

WHERE FORMLABS WINS

- Speed
- Complete ecosystem - Resin handling system and Build Platform Flex
- Accuracy
- Price
- Dental Service Plan
- Build platform size

COMPETITOR STRENGTHS

- Reputation of reliability and accuracy
- Open platform with 500+ resins

OBJECTION HANDLING

- **Asiga is fully open, is Formlabs a closed system?**
  - Would you mind telling me why is that a concern of yours? Is there a particular application or a resin you're looking for?
  - Formlabs takes pride in optimizing and validating all of our resins to perform and print reliably on our printers so you don't have to worry about it.
  - Formlabs resins portfolio covers all dental indications, and our resins are competitively priced in fact our Fast Model resin costs $99/L compared to Asiga DentaModel at $160/L
  - We also offer certified material where we add new 3rd party resin to our portfolio i.e (Bego resin)
  - Lastly if you still see value in having a fully open system, we offer an "Open Materials License" that allows you to print any material on your printer.
- **Why is Formlabs cheaper than Asiga?**
  - We sell more printers in a month than most 3D dental printing companies sell in a year. With that volume comes economies-of-scale, which we can then share with customers like you.
  - We also develop and manufacture most of our resins. Not only does this allow us to control the quality of our product with our ISO certified manufacturing facility, but it also allows us to offer affordable resins.

UV Max, Ultra, Pro4K80

$9,900 Max UV
$14,900 Ultra
$24,900 Pro4K80

DLP

MAIN TALKING POINTS

Asiga is a respectable company with a great reputation, but has now a weak offering compared to the Form 4B.

The Form 4B wins on:

✅**Speed**. **Form 4B prints are 1.5x to 2x faster than Asiga printers** for major applications.

✅**Accuracy** (at least on par). Asiga best XY resolution is the Max UV's at 62um. In real life tests, Form 4B was consistently on par or slightly better than the Max UV, and considerably better than the Pro4k80.

✅**Throughput.** Form 4B **Build Platform surface** is 2.1x larger than UV Max, 1.2x larger than the Ultra and 5% smaller than the Pro4k80.

✅**Price, hardware and consumables**.

- Asiga's are 2-5x more expensive than Form 4B and tanks cost $43 per liter on average more than Form 4B tanks.
- Entry price for model resins $160 vs $99

✅**Ease of use (resin handling system, BP Flex, Post-processing, PreForm)**. No proper wash or cure, Asiga composer software is a real pain

✅Running costs