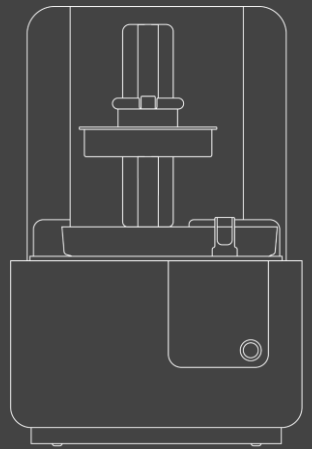
What is SLA/LFS and how does it work?



Jakob Dobberow - Pro Services Trainer

formlabs

The speaker

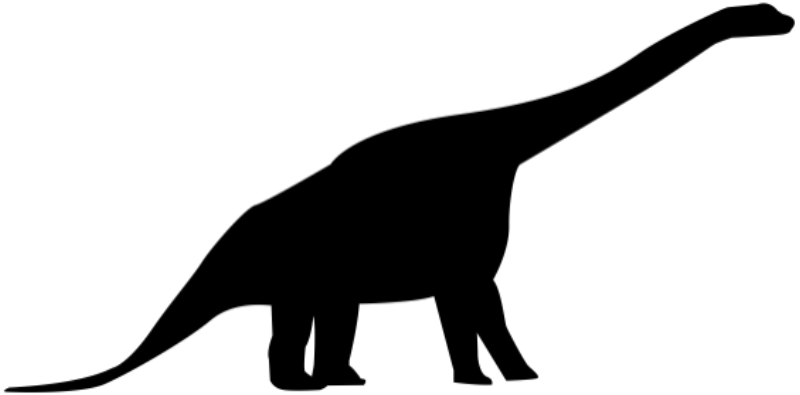
Jakob Dobberow

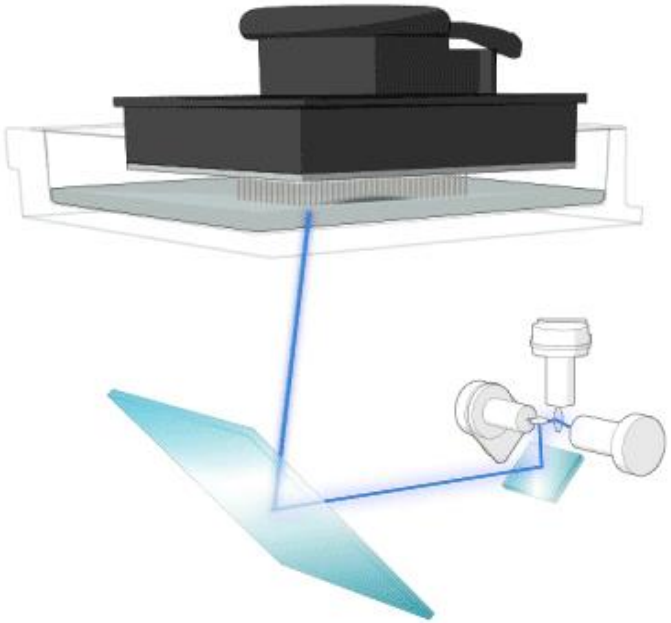
- Customer Care - Pro Services Europe
- Giving Onsite Trainings and Workshops in Berlin
- Previously: Reviews & Trainings of 3DP technologies at iGo3D

Introduction

1984 - 2005: The Beginning

Industrial 3D Printing





Inverted Stereolithographie

Evolution of Formlabs

Other Formlabs products

Form Cell

The Fuse 1 - SLS 3D Printer

Form 3L

formlabs

500+ people

4 offices

Boston, Berlin, Tokyo, Shenzhen

3 factories

USA, China, Hungary

150+ engineers and scientists

Many of the world's experts in 3D printing, materials science, SLA, and SLS

$1B Valuation and 50,000+ printers sold in 40+ countries

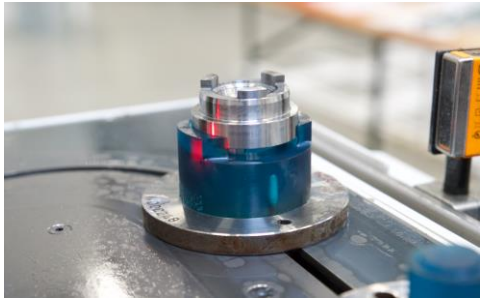
Applications

Product Design / Prototyping

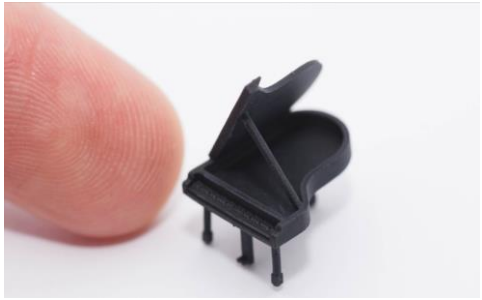
Jewelry

Dentistry

Architecture



Rapid manufacturing



Art & Entertainment

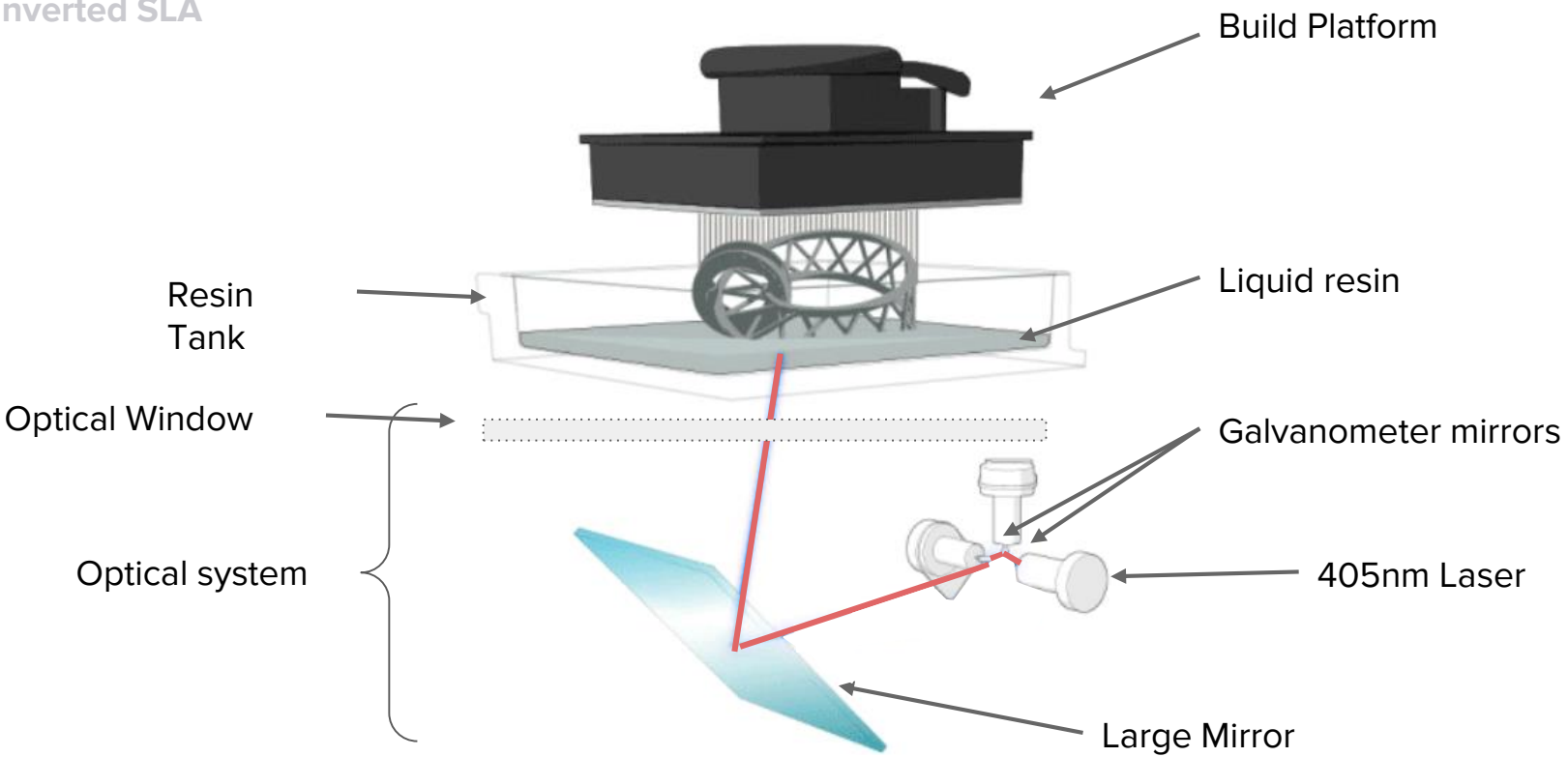
Hardware & Print Process

Form 2 Specs

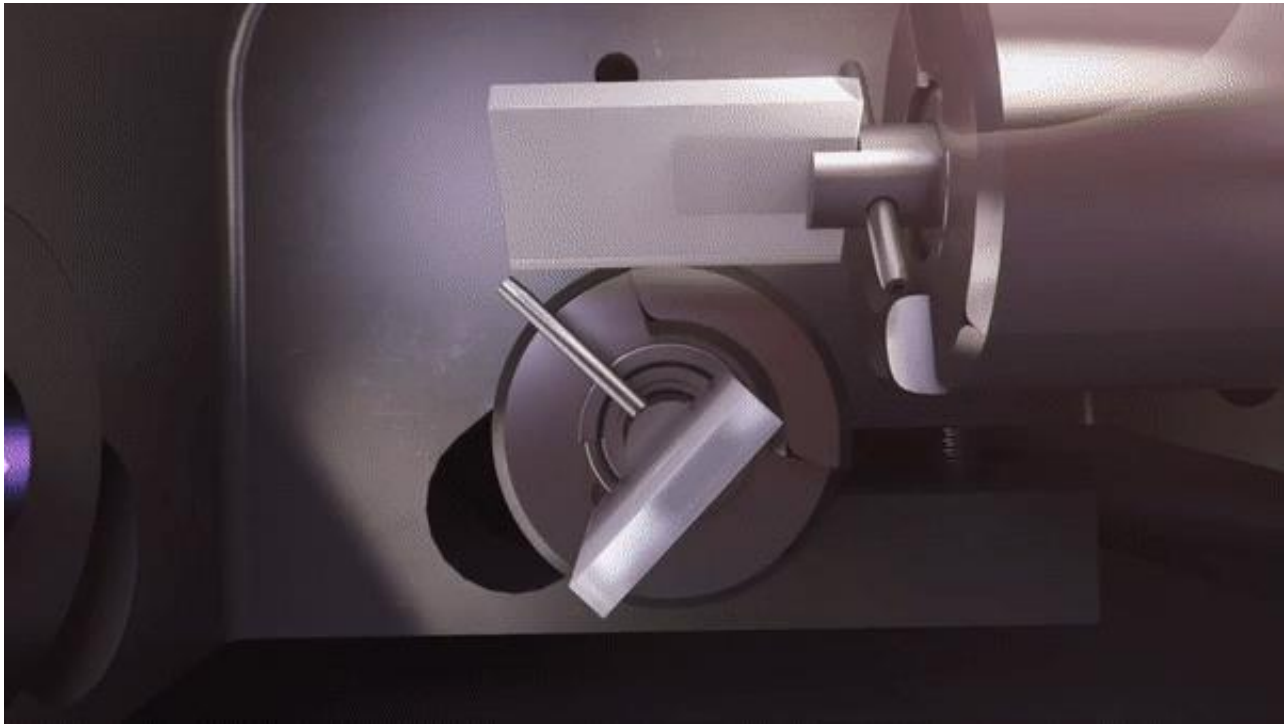
- Weight - 13 kg
- Build Volume - 145mm x 145mm x 175mm
- Laser - 250 mW 405nm violet laser
- Layer Thickness - 25, 50, 100 microns
- Laser Spot Size - 140 µm
- Power Requirements - 65 W, 100–240V AC

The Optical Path

Inverted SLA



Optical system



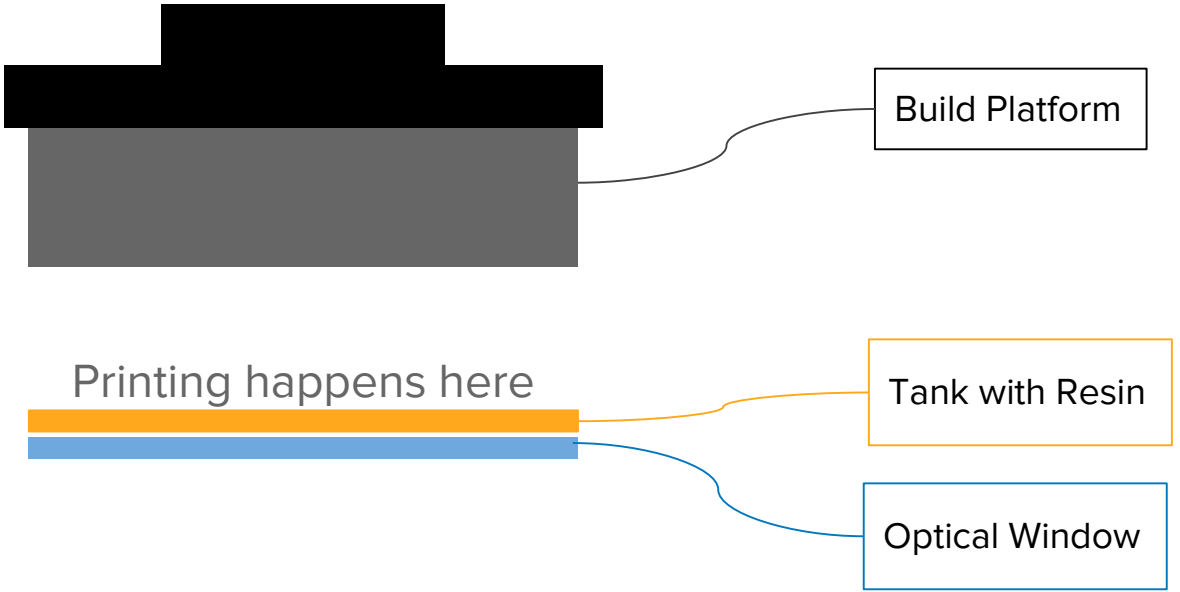
The Print Process

Squish, Expose, Peel, Wipe

formlabs

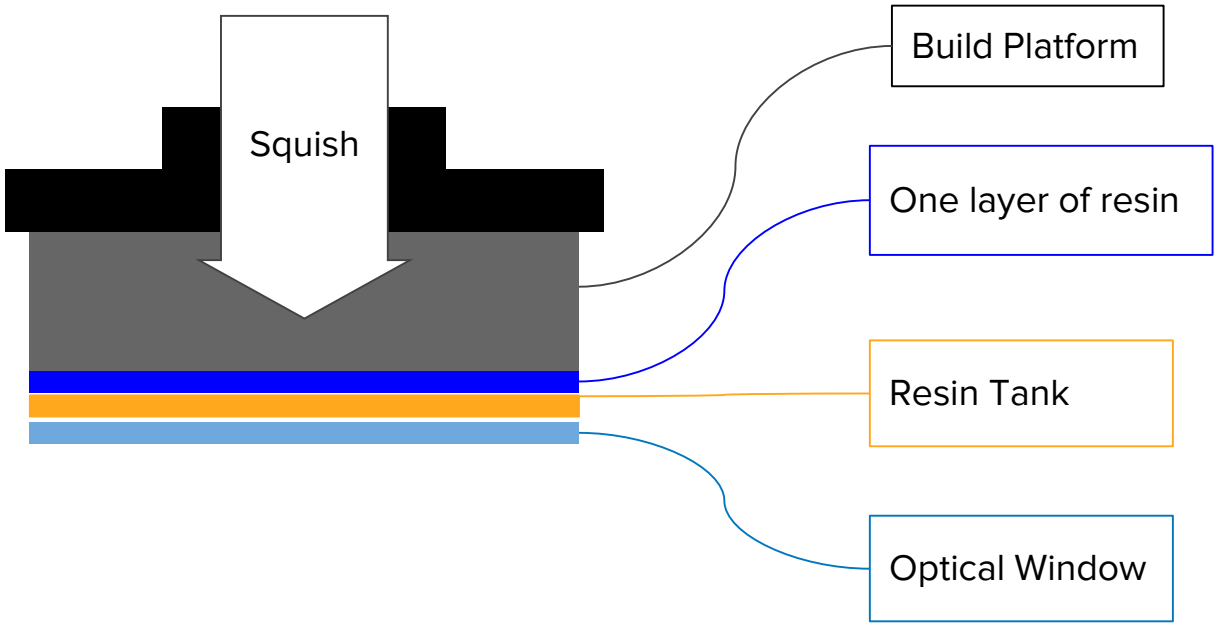
The Printing Process

Before Printing



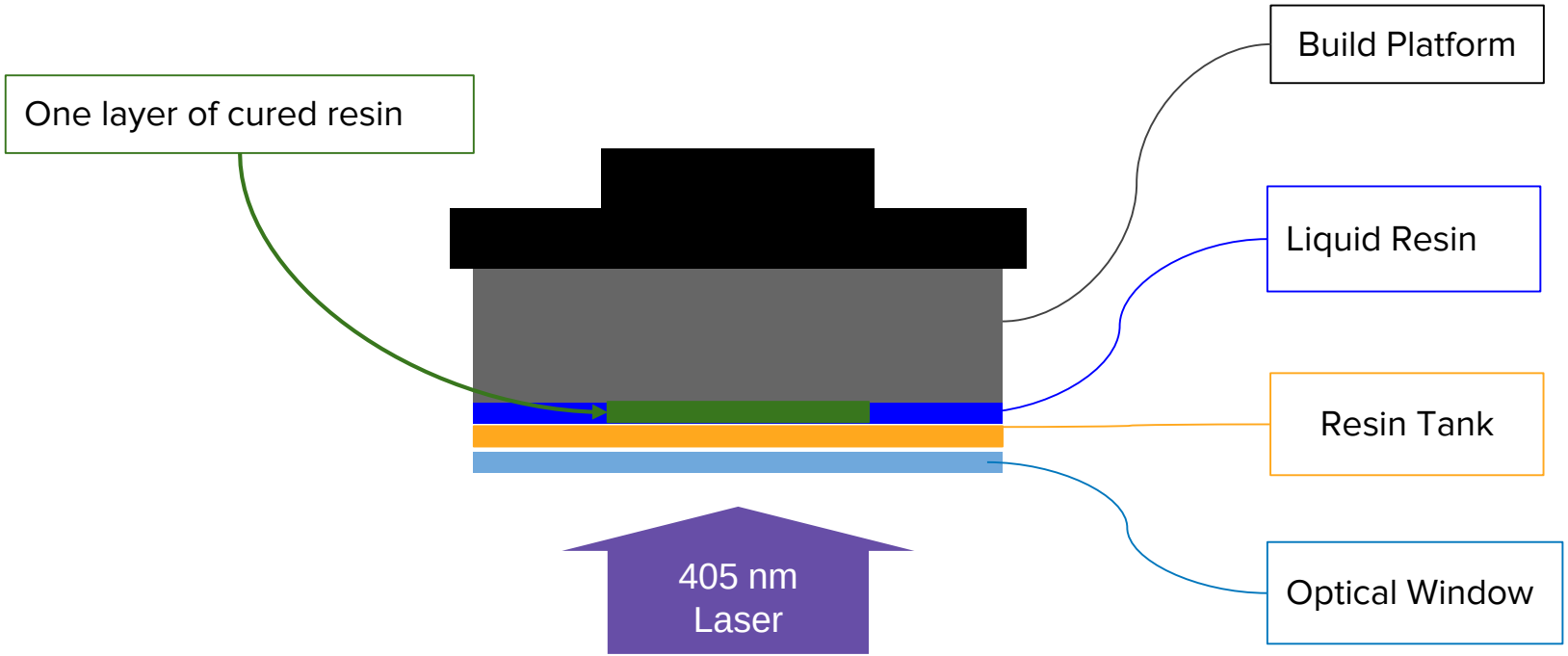
Squish

Moving the Platform into the Resin



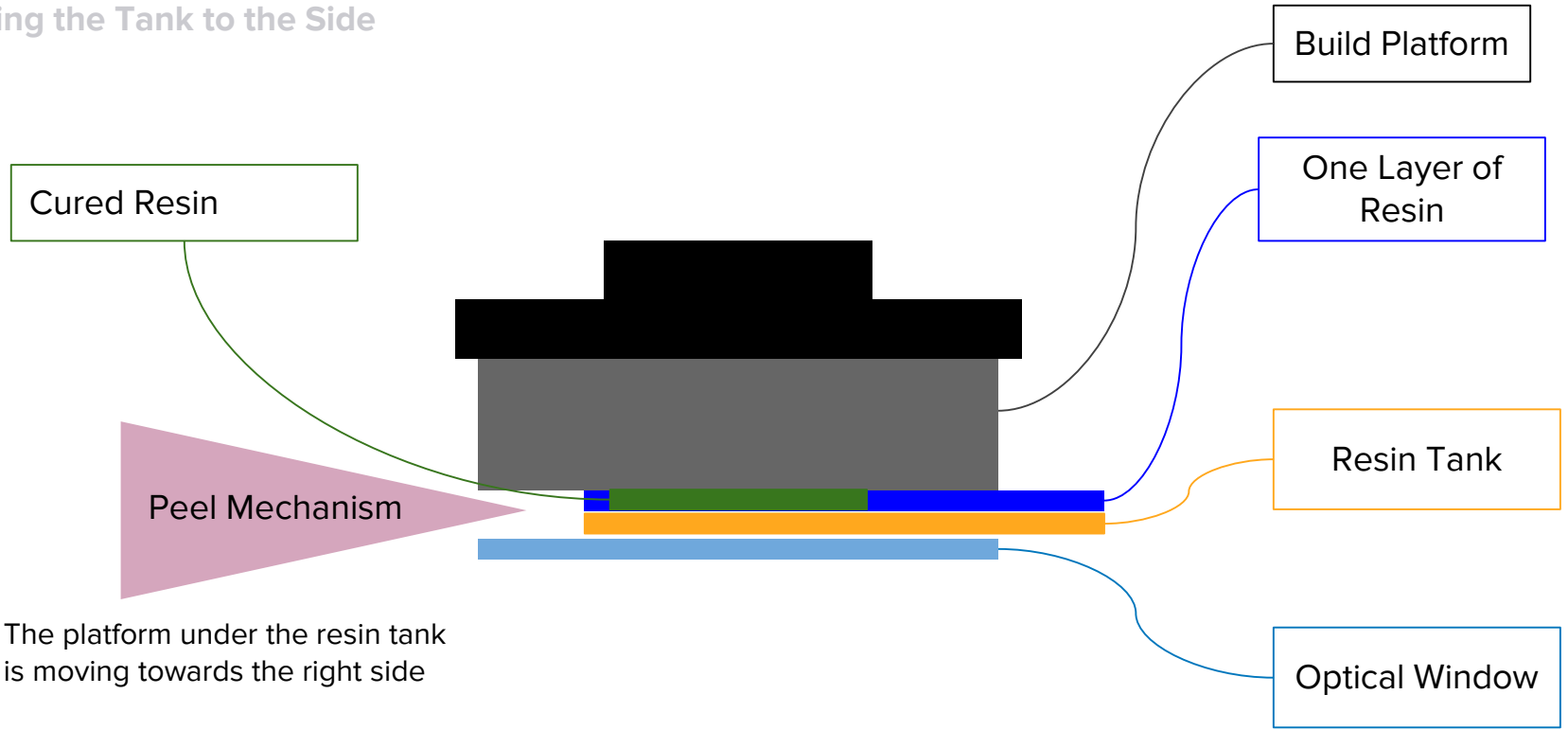
The Print Process - Expose

Solidifying the Resin



The Peel Process

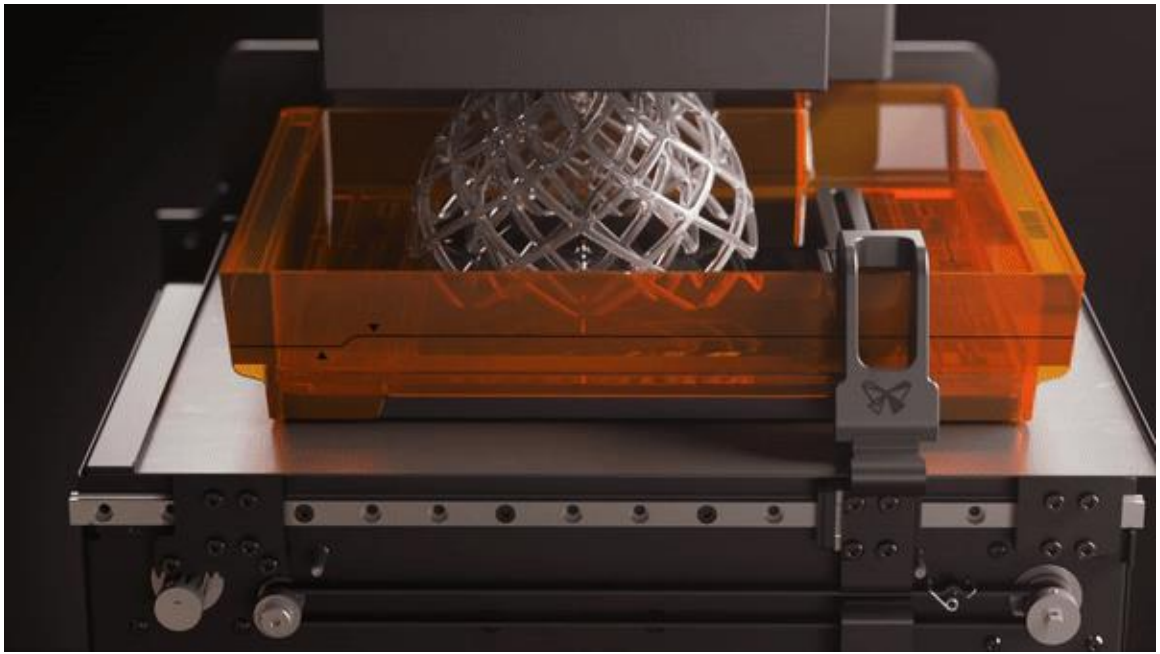
Moving the Tank to the Side



The platform under the resin tank is moving towards the right side

The Print Process

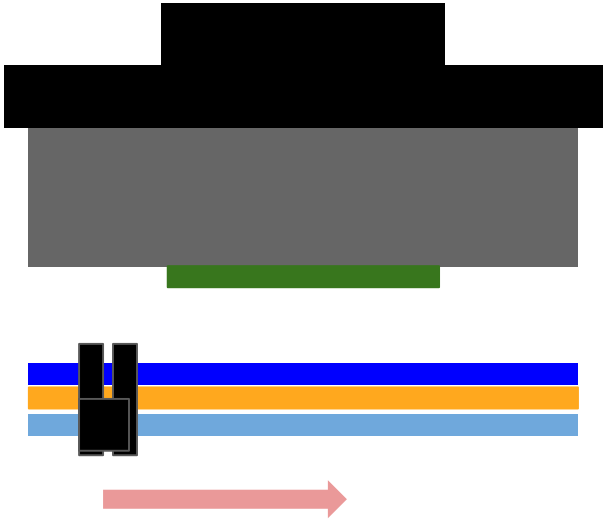
The Wiper



The Wiper

Keeping resin conditions

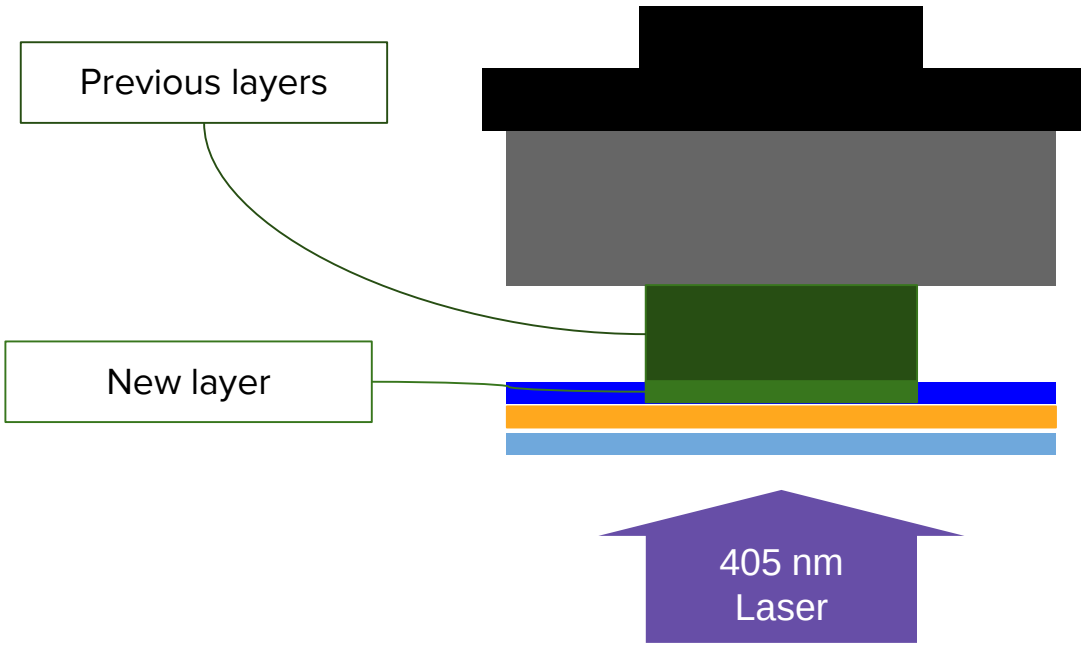
Stirring the resin



Removing residue
and debris

The Printing Process

Rinse & Repeat

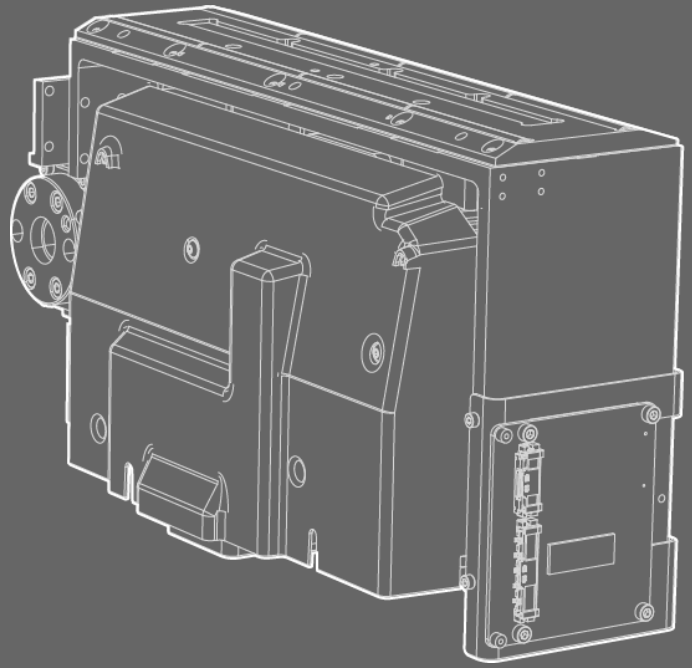


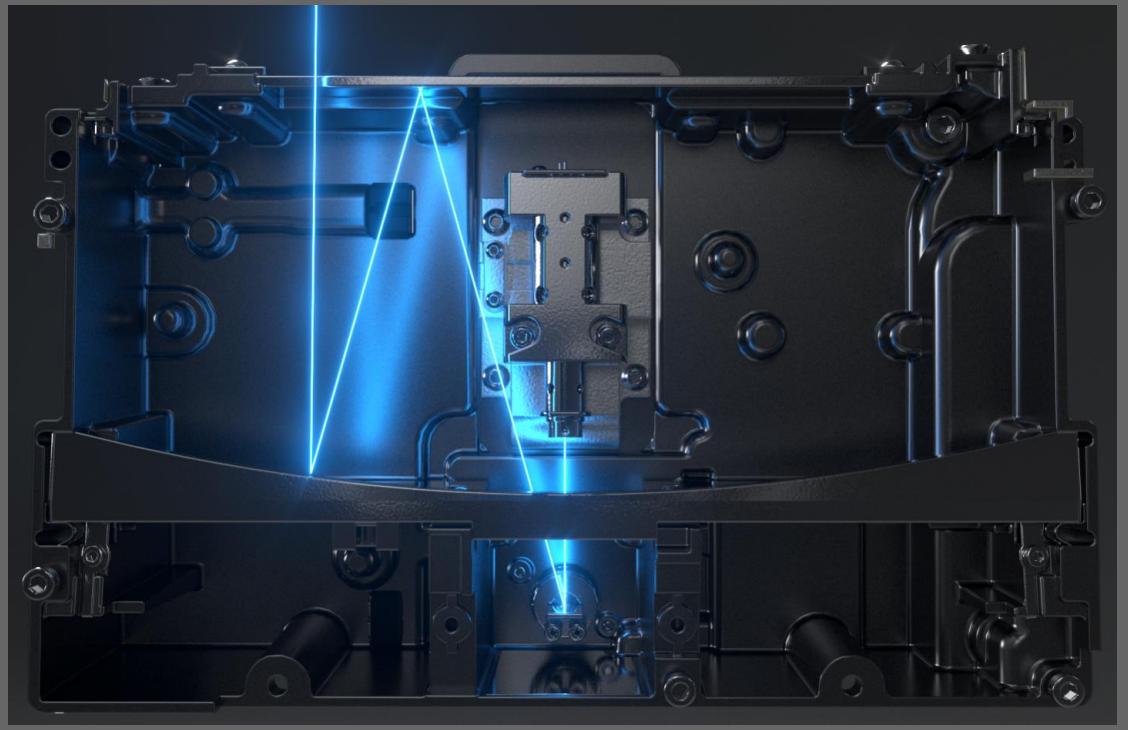
Der Form 3

Komponenten und Besonderheiten

- 4te Generation Formlabs Drucker
- 145mm x 145mm x 185mm Bauvolumen
- LFS
- LPU
- Durchmesser des Laserspunktes - 85 µm
- 250 mW Laser
- Austauschbares optisches System

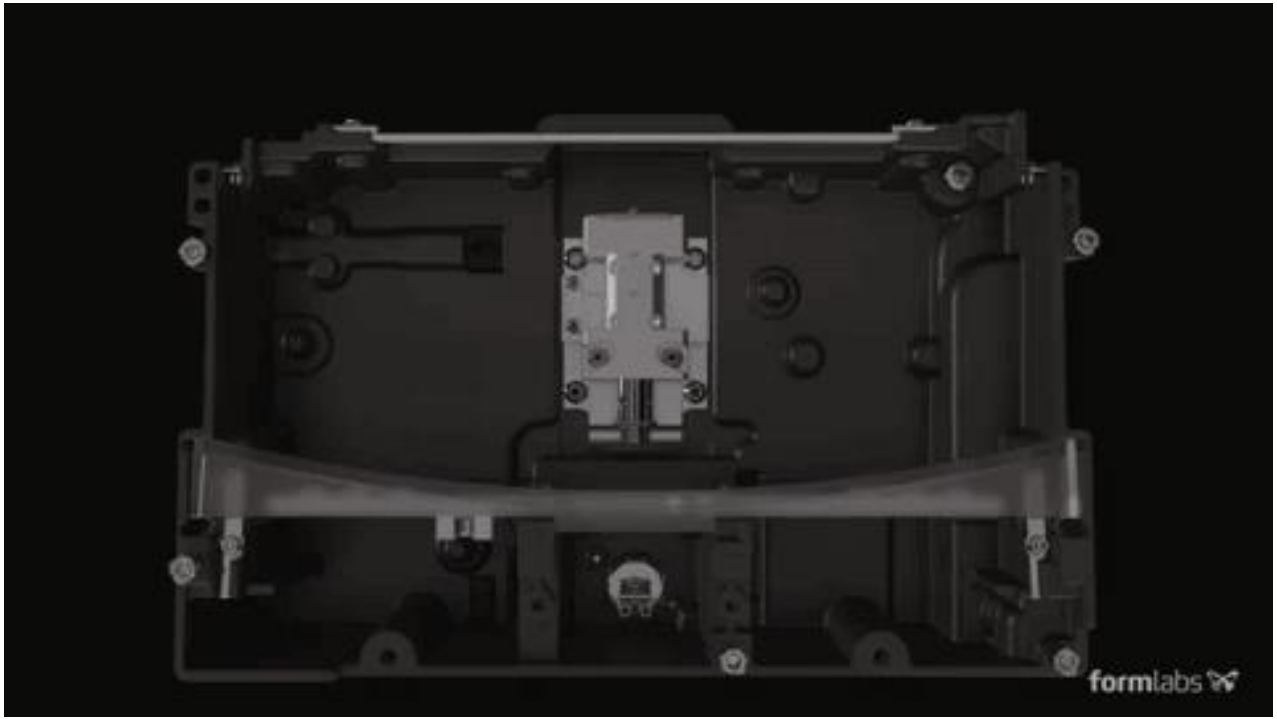
Der Optische Pfad



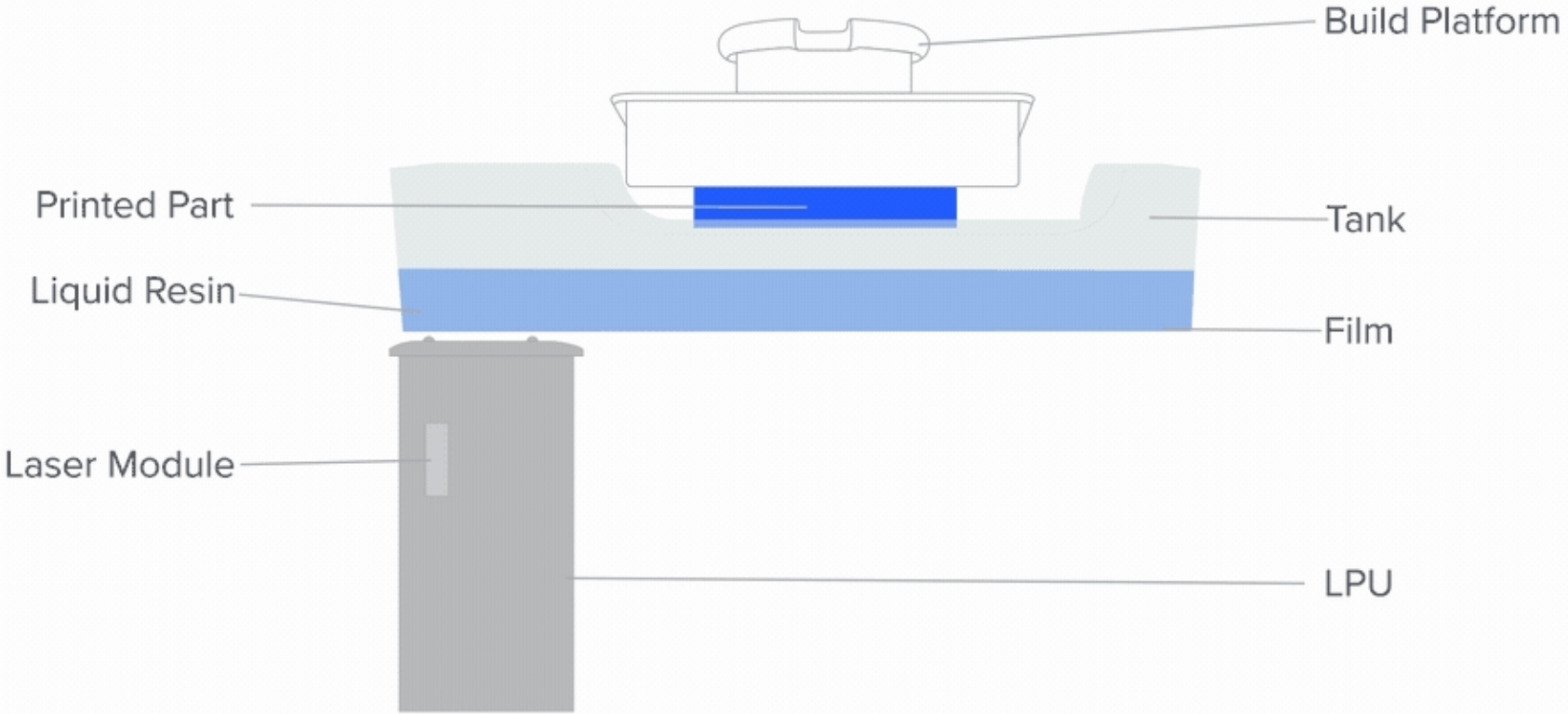


Form 3: LFS

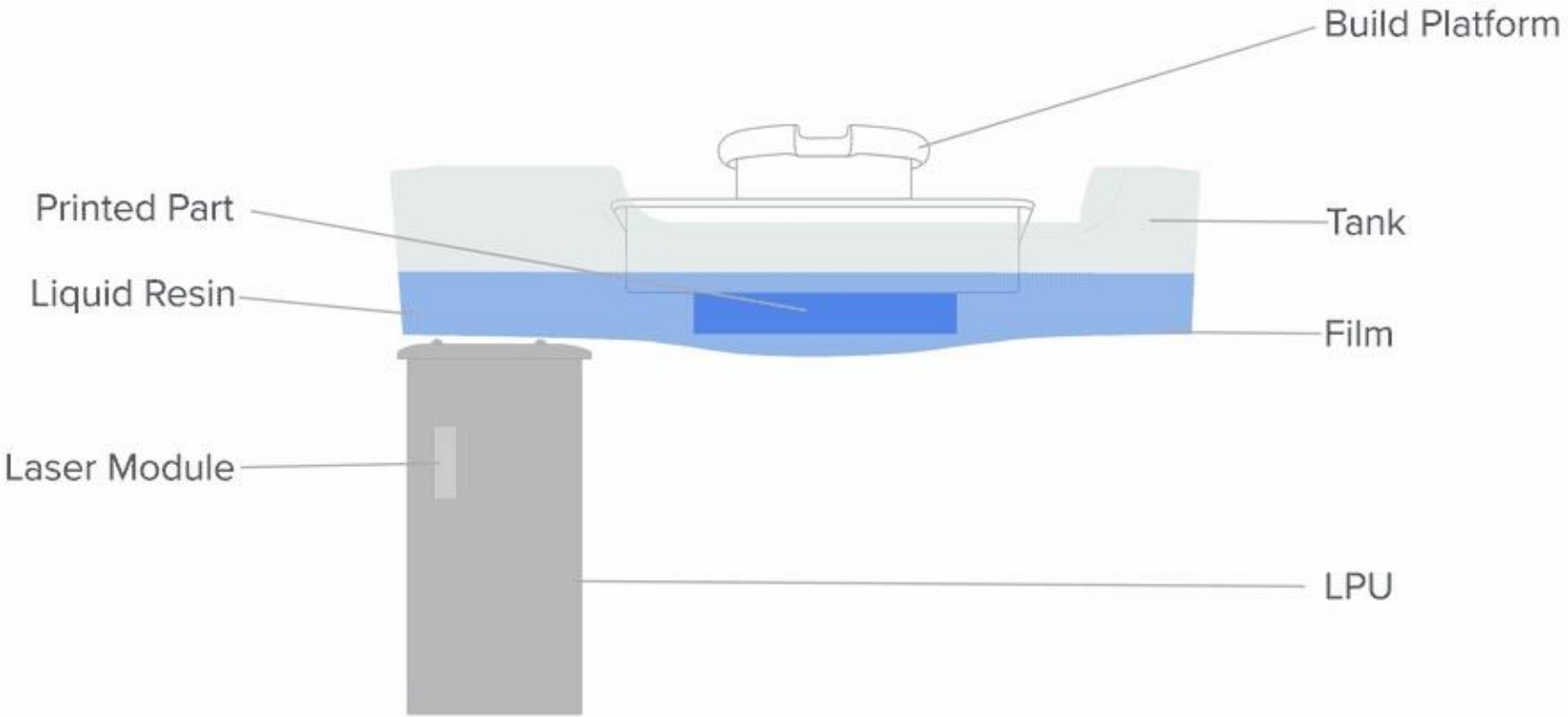
Low Force Stereolithography



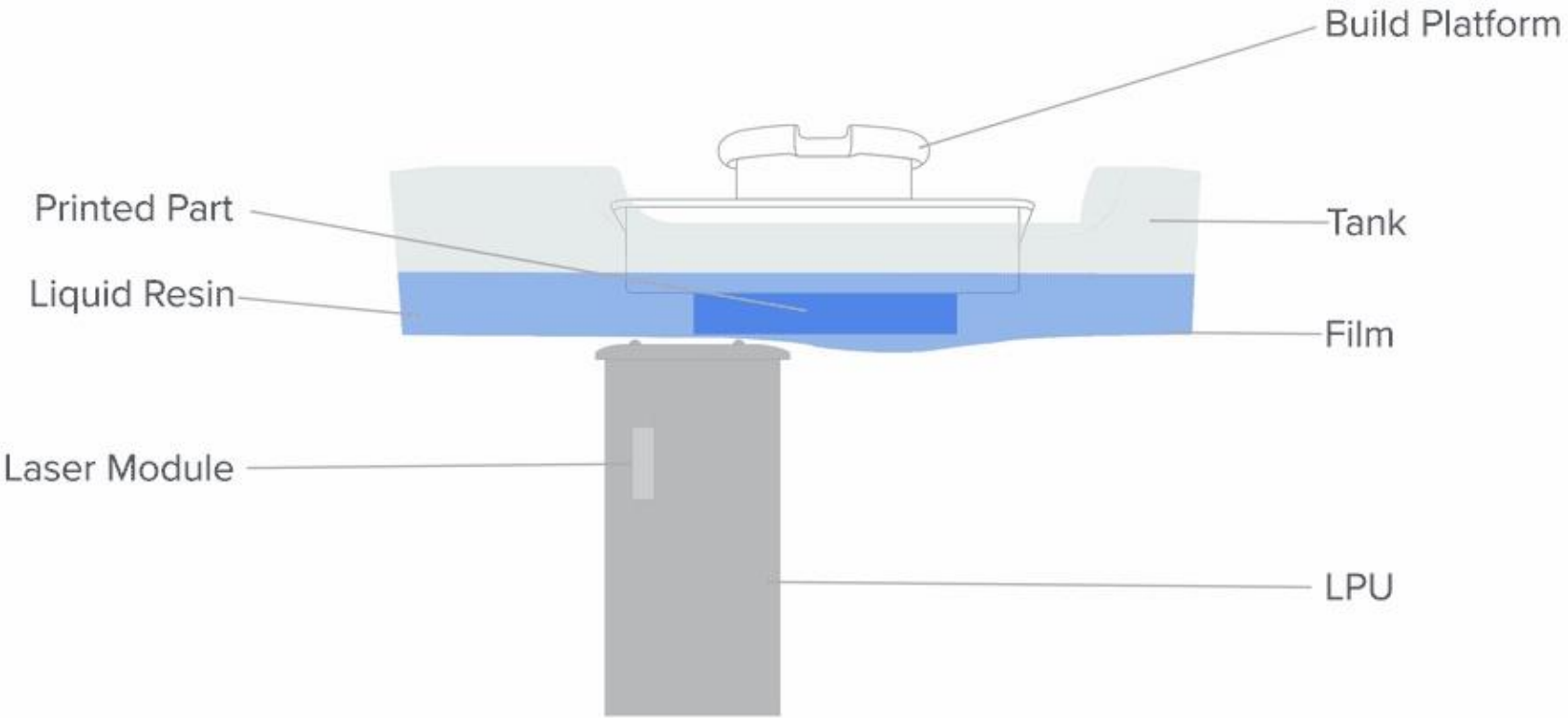
Before Printing



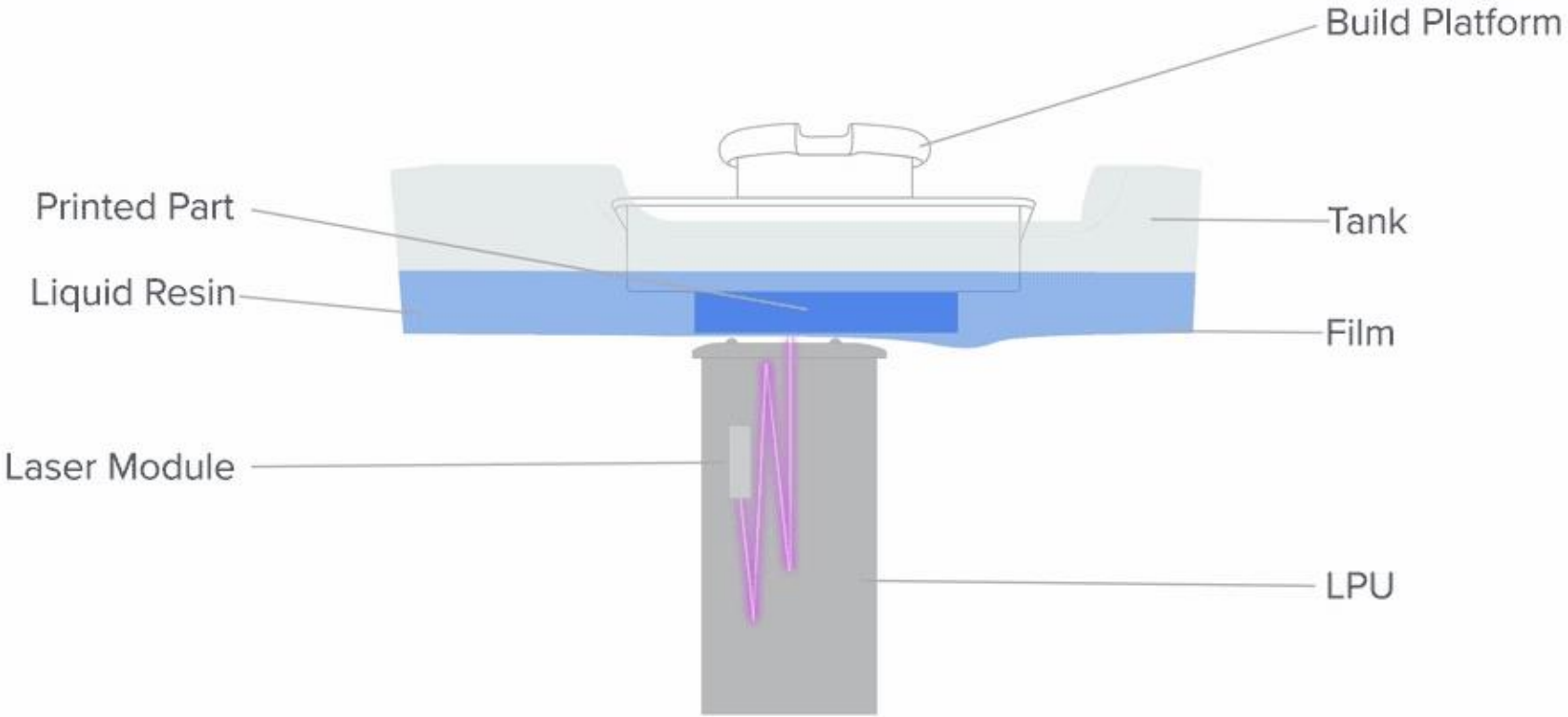
Squish


Build Platform
Printed Part
Tank
Liquid Resin
Film
Laser Module
LPU

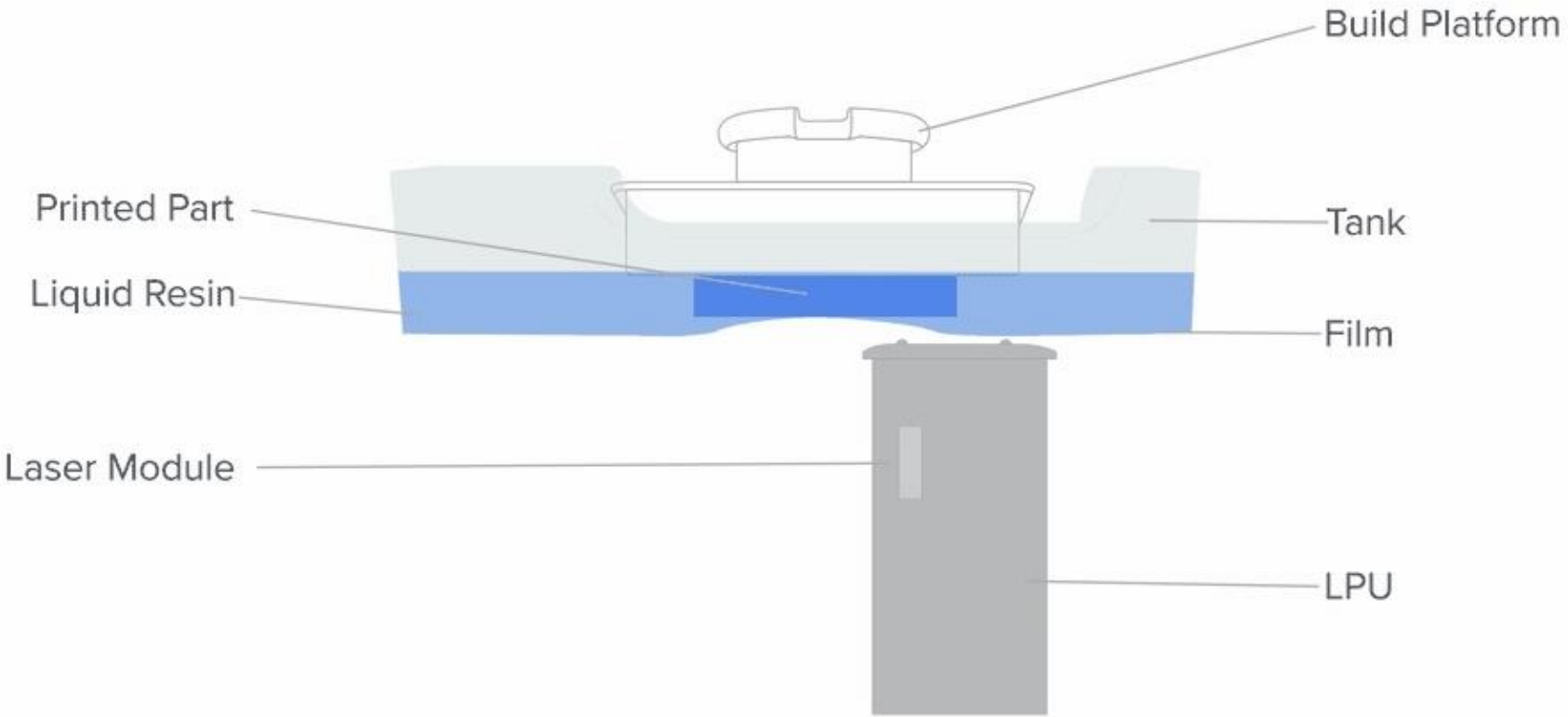
Squish


Build Platform
Printed Part
Tank
Liquid Resin
Film
Laser Module
LPU

Expose

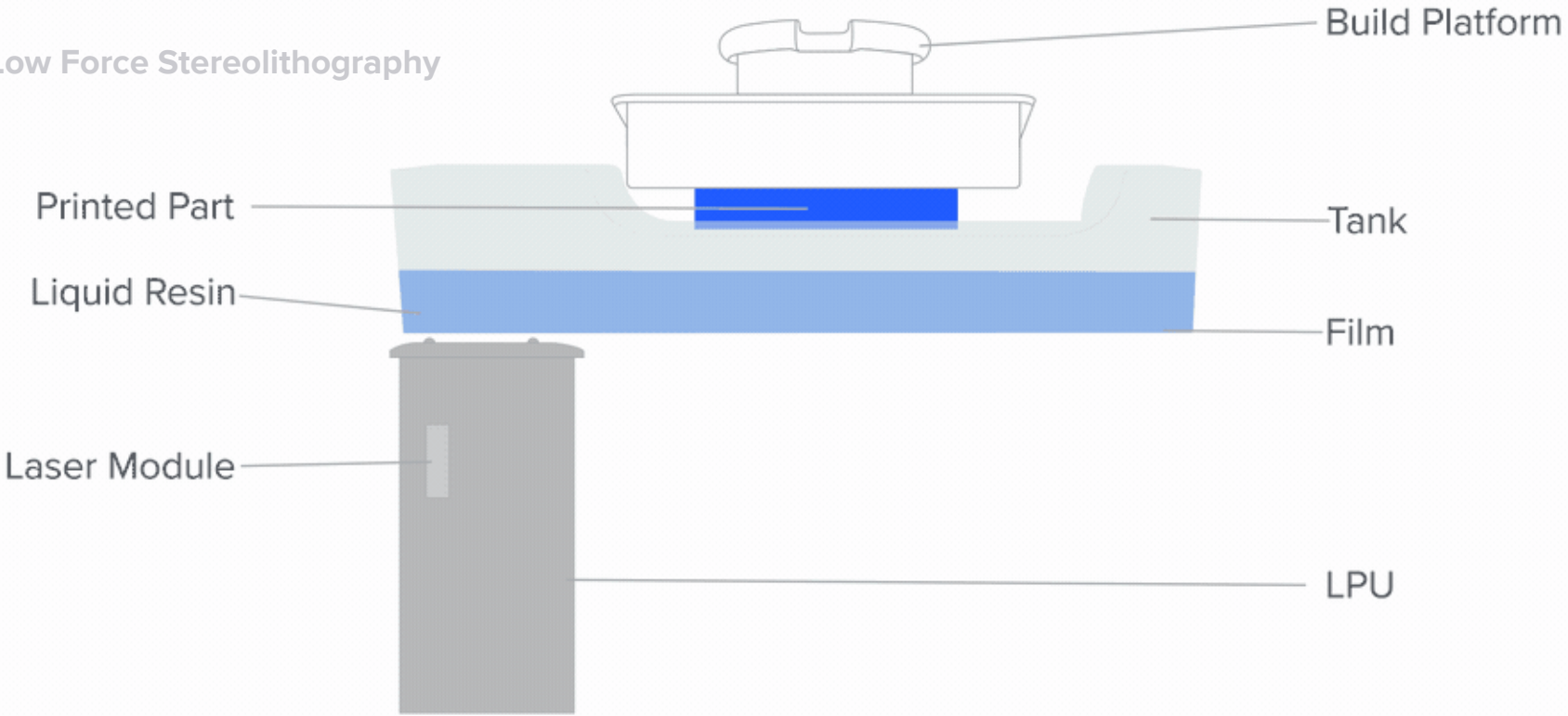

Build Platform
Printed Part
Tank
Liquid Resin
Film
Laser Module
LPU

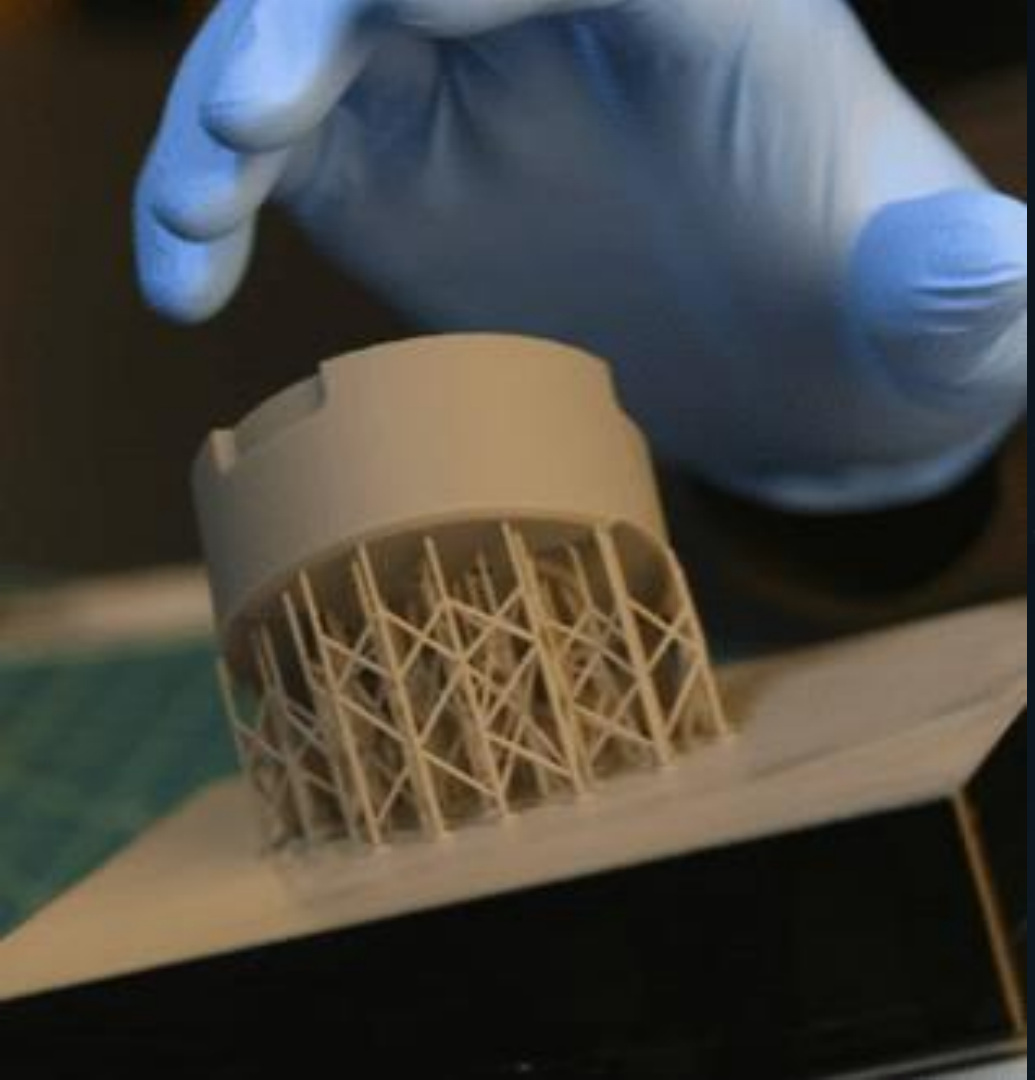
Peel

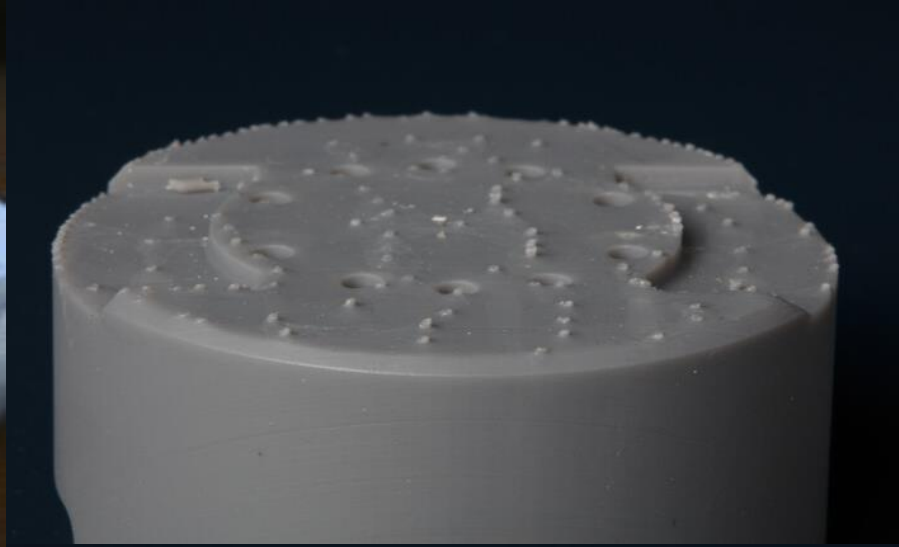

Build Platform
Printed Part
Tank
Liquid Resin
Film
Laser Module
LPU

Form 3: LFS

Low Force Stereolithography

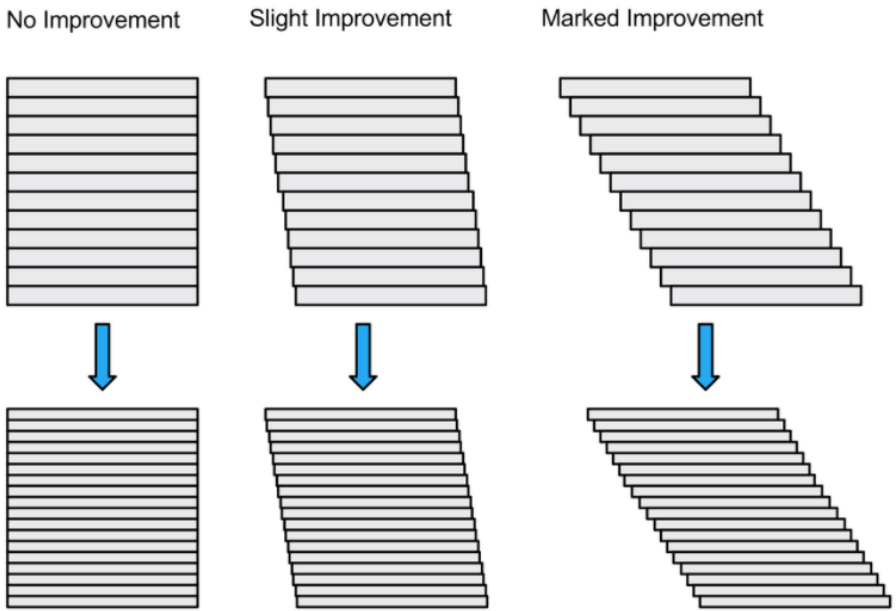






Accuracy and Precision

When can we benefit of thin layer heights?



Materials

Introduction to Polymerisation

Polymerisation

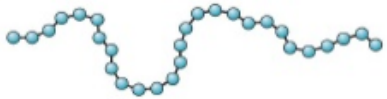
Liquid

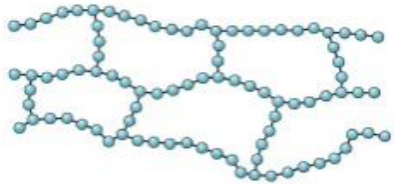
Solid
vastly different properties

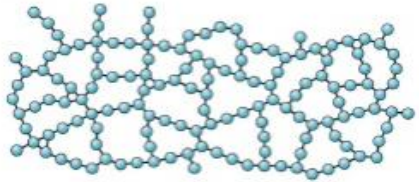
The World of Polymers

The World of Polymers

Basic chemical principle







MER = parts / units

POLY = many

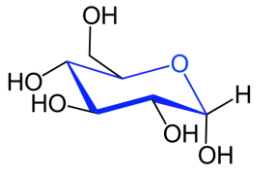
Building blocks: Monomers, Oligomers

The World of Polymers

Example glucose

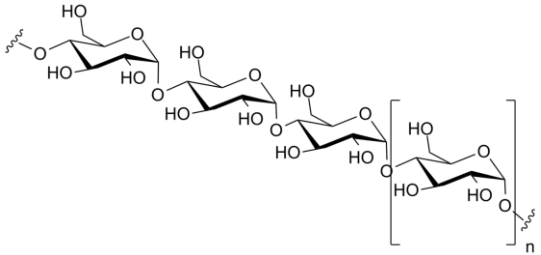
Monomer

Simple sugar (glucose)



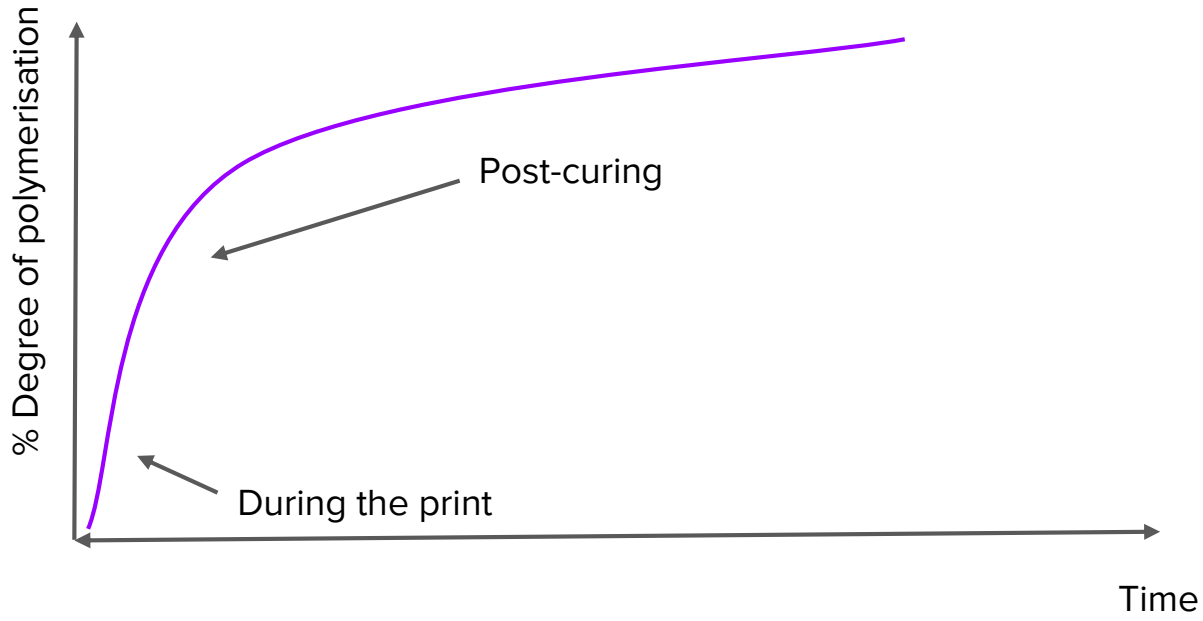
Polymer

Multiple sugars (starch)



The Dark Reaction

Post-curing without light



Resins and their properties







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Resins and their properties

Q&A