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UNIVERSITY OF LISBON  
INTERDISCIPLINARY STUDIES  
ON SUSTAINABLE ENVIRONMENT AND SEAS



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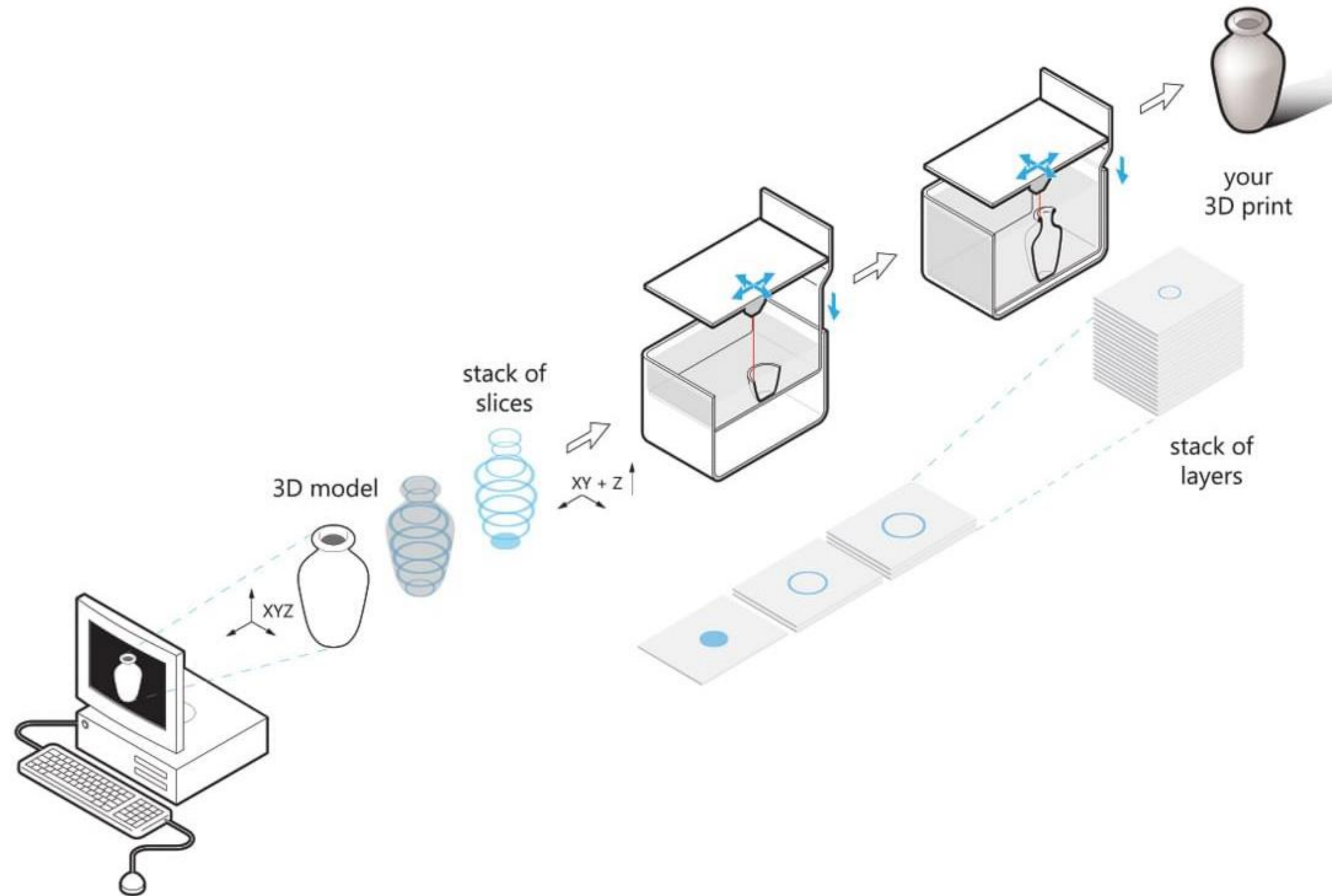


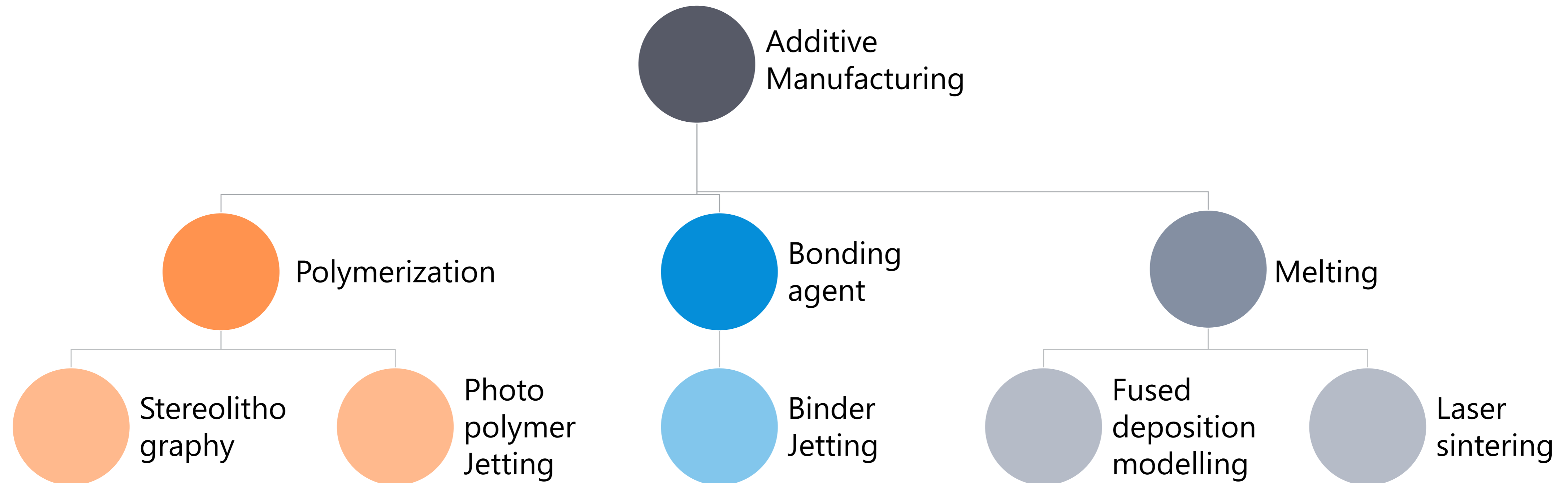


Additive manufacturing or 3D printing or rapid prototyping may be defined as a computer-controlled 3D Printing process that creates 3-D objects by depositional materials such as proper polymers, ceramics, or metals in multiple layers of equal thickness.



1. 3D CAD model
2. Tessellation
3. Slicing
4. Tool path
5. AM Process
6. Final 3D object

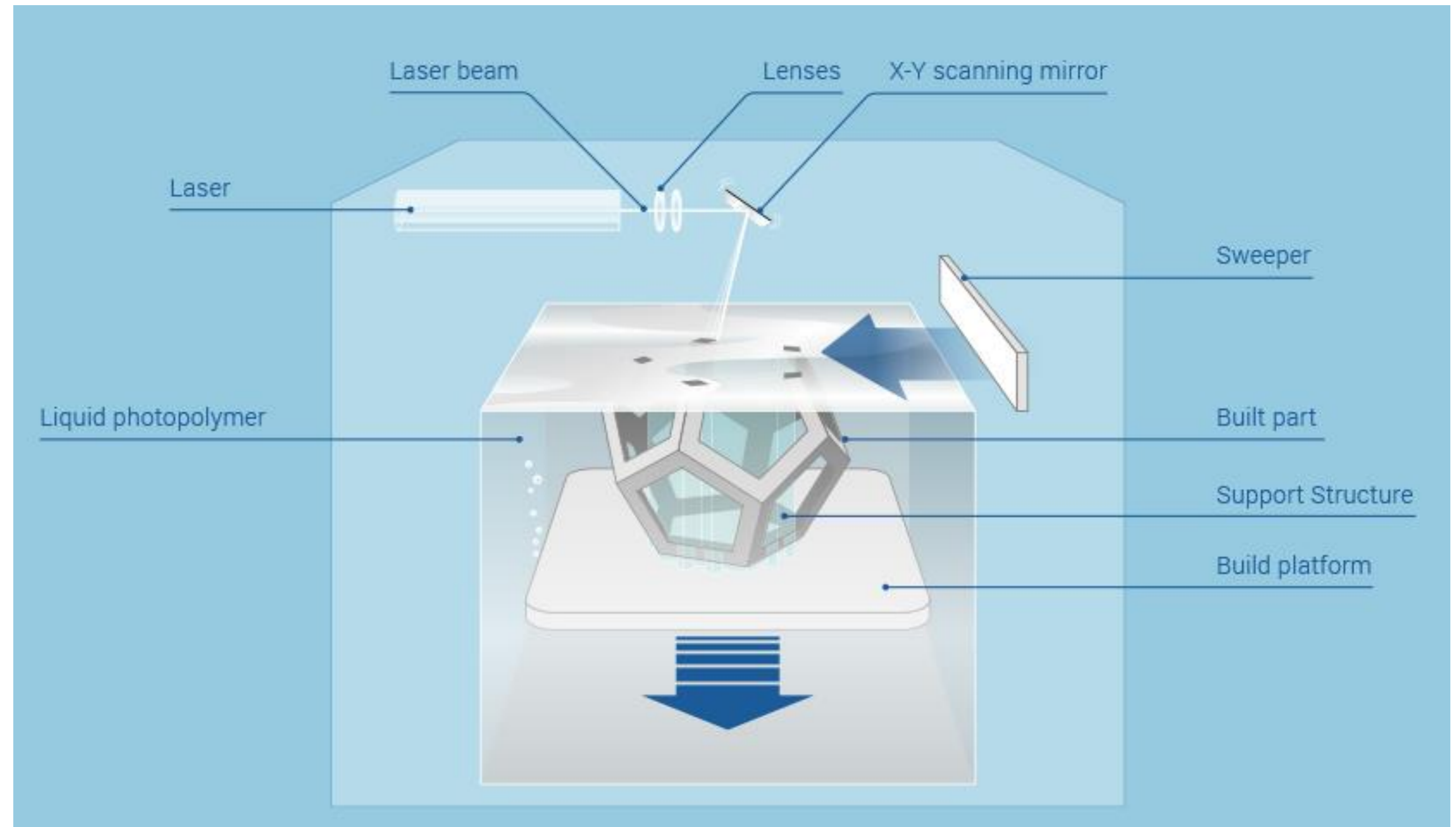




## Stereolithography, SL or SLA

A UV laser is curing a liquid photopolymer in a vat.

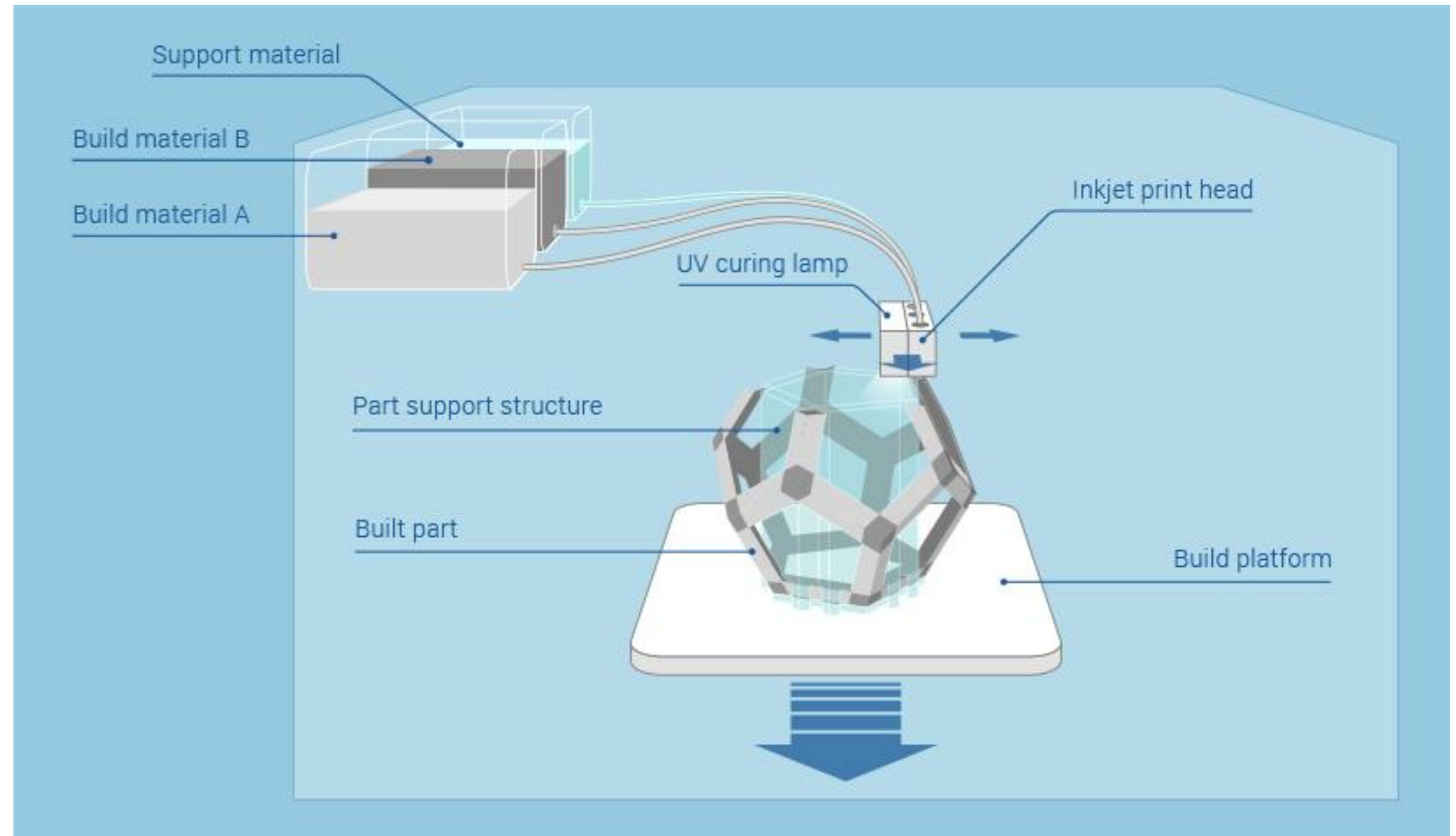
The part is built by lowering the build platform.

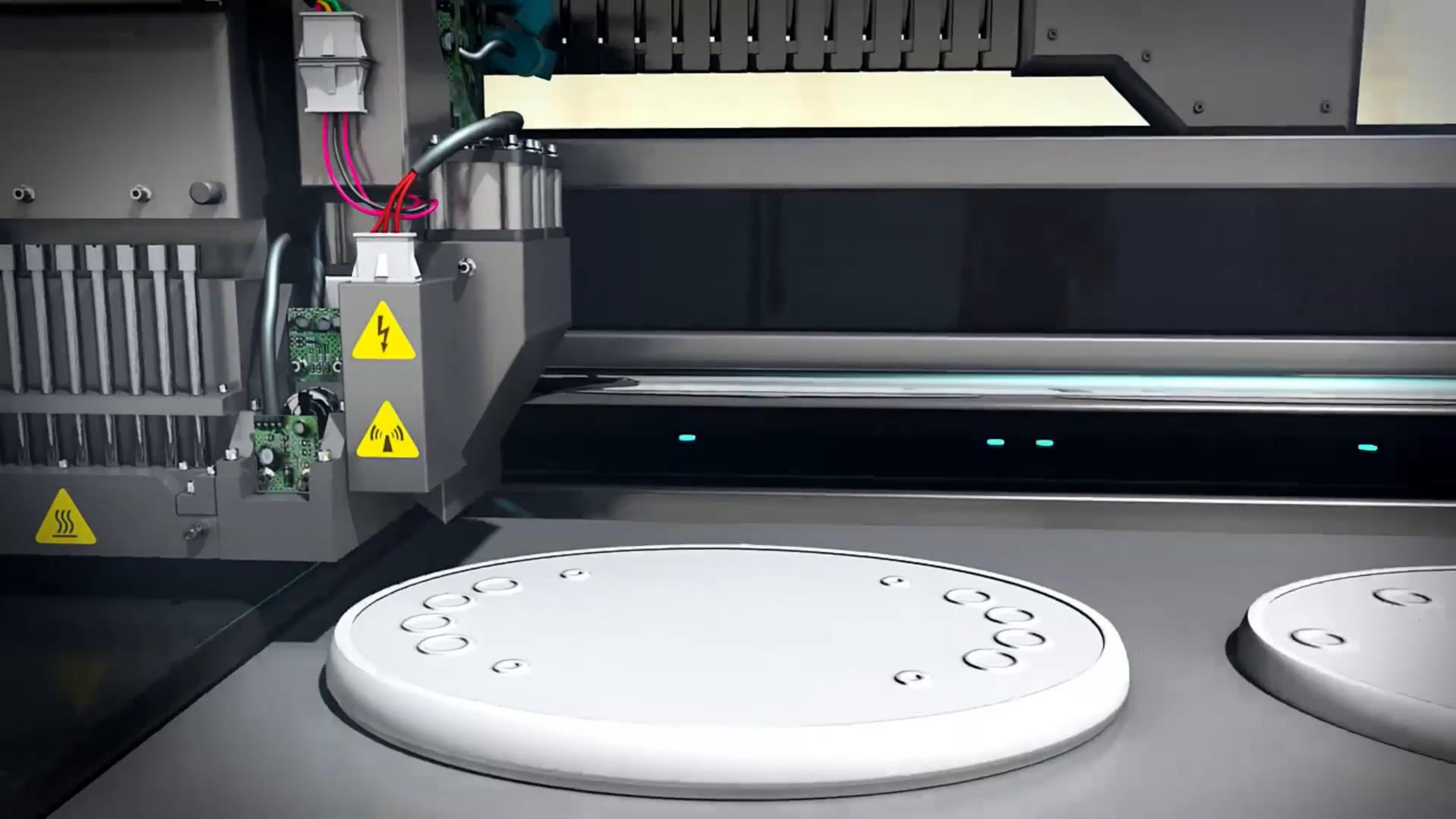




## Photopolymer Jetting or Polyjet

Inkjet print heads are used to jet liquid photopolymers onto a build platform. The material is immediately cured by UV lamps.

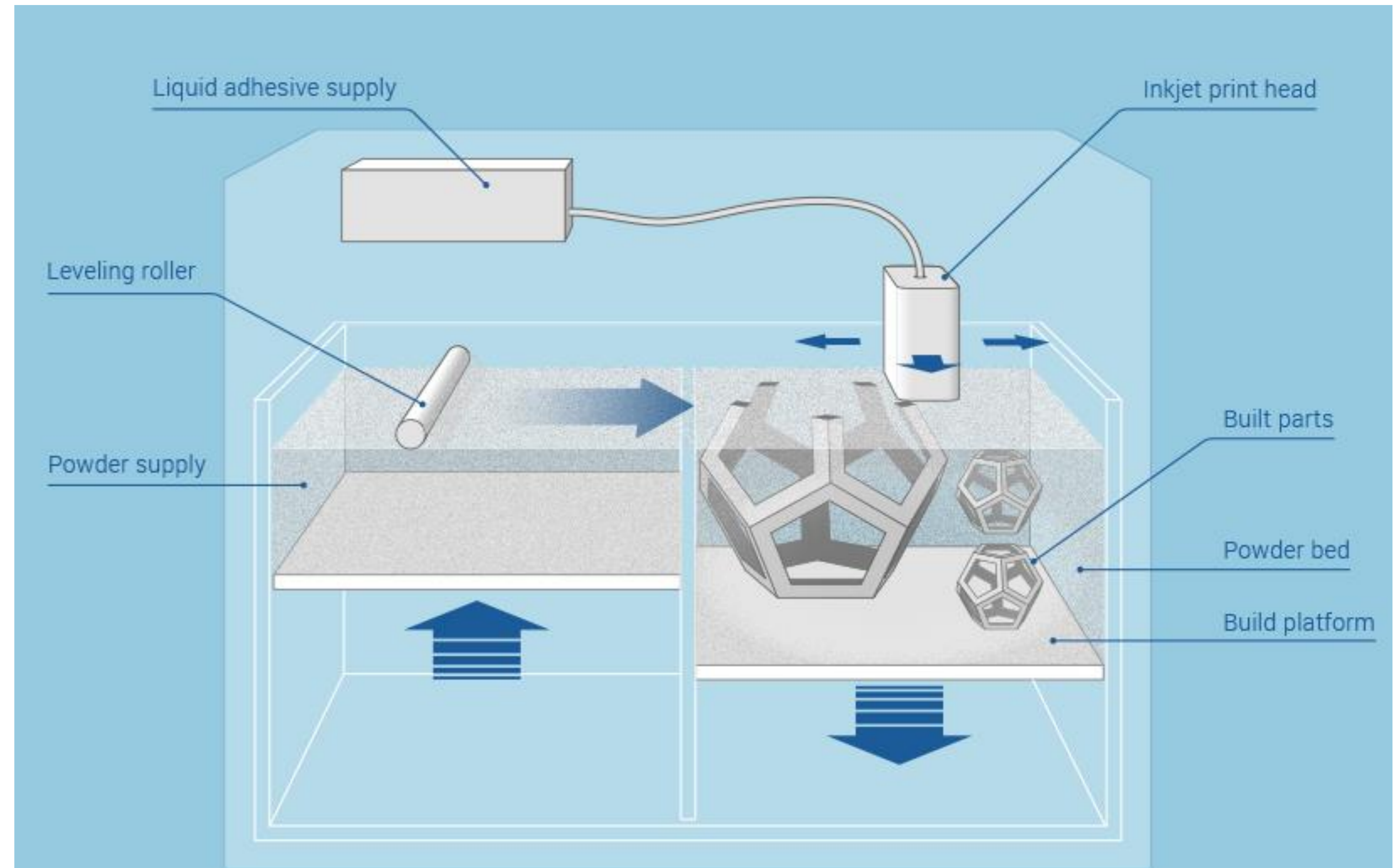




## Binder Jetting, BJ

Inkjet print heads apply a liquid bonding agent onto thin layers of powder.

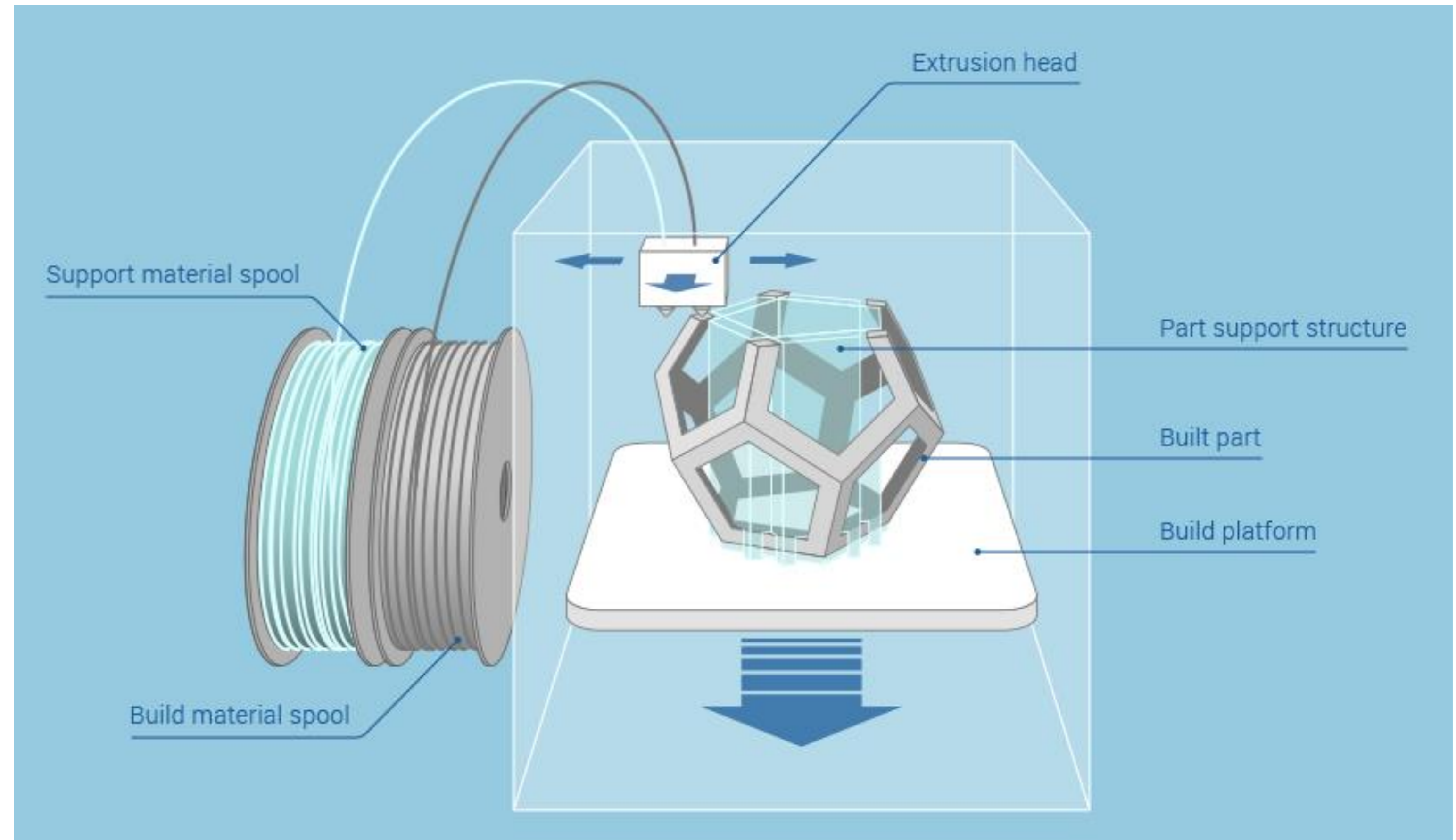
By gluing the particles together, the part is built up layer by layer.

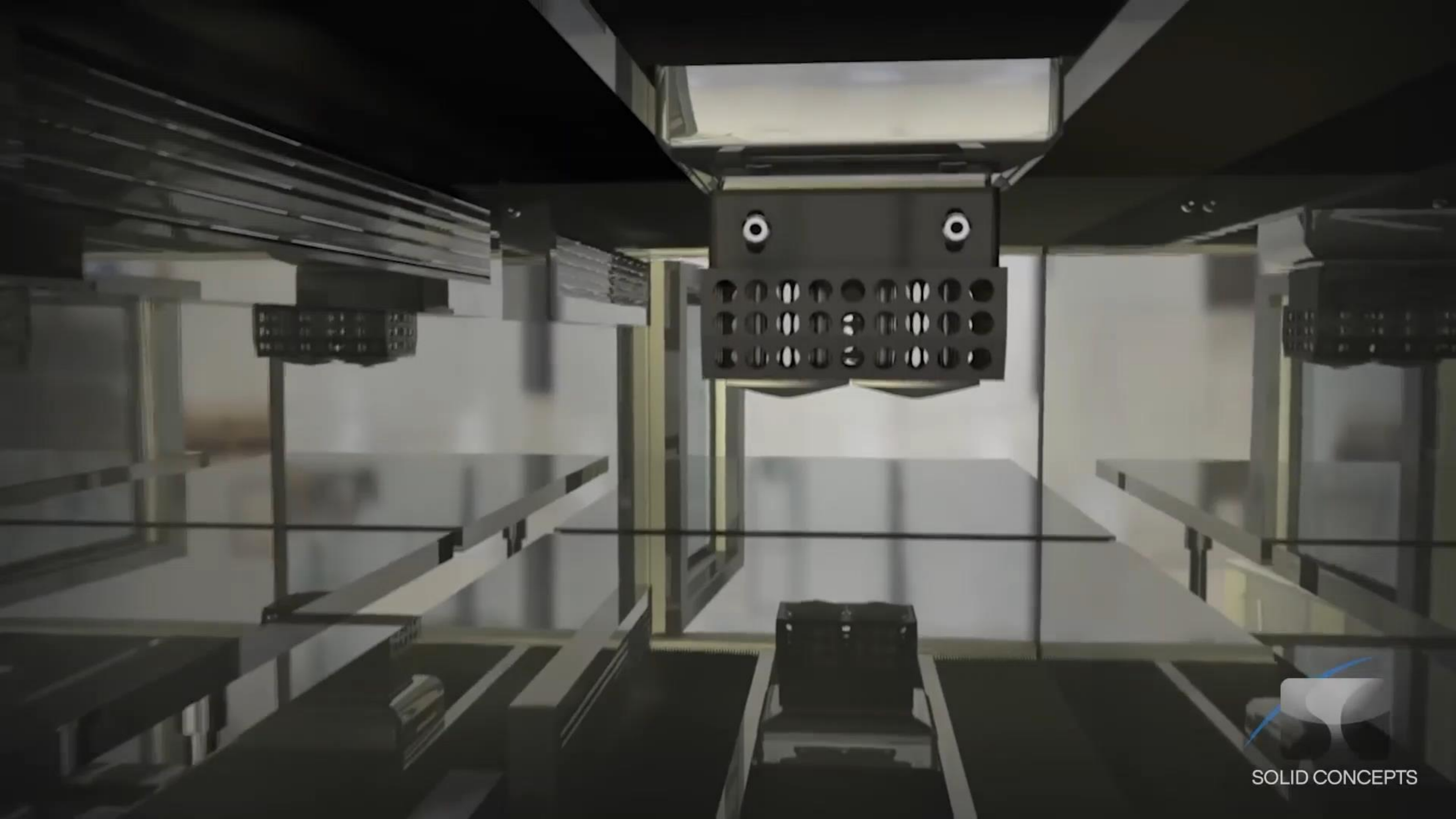




## Fused Deposition Modelling, FDM

A plastic filament is melted and extruded through a nozzle. Parts are built by laying down layer-by-layer.



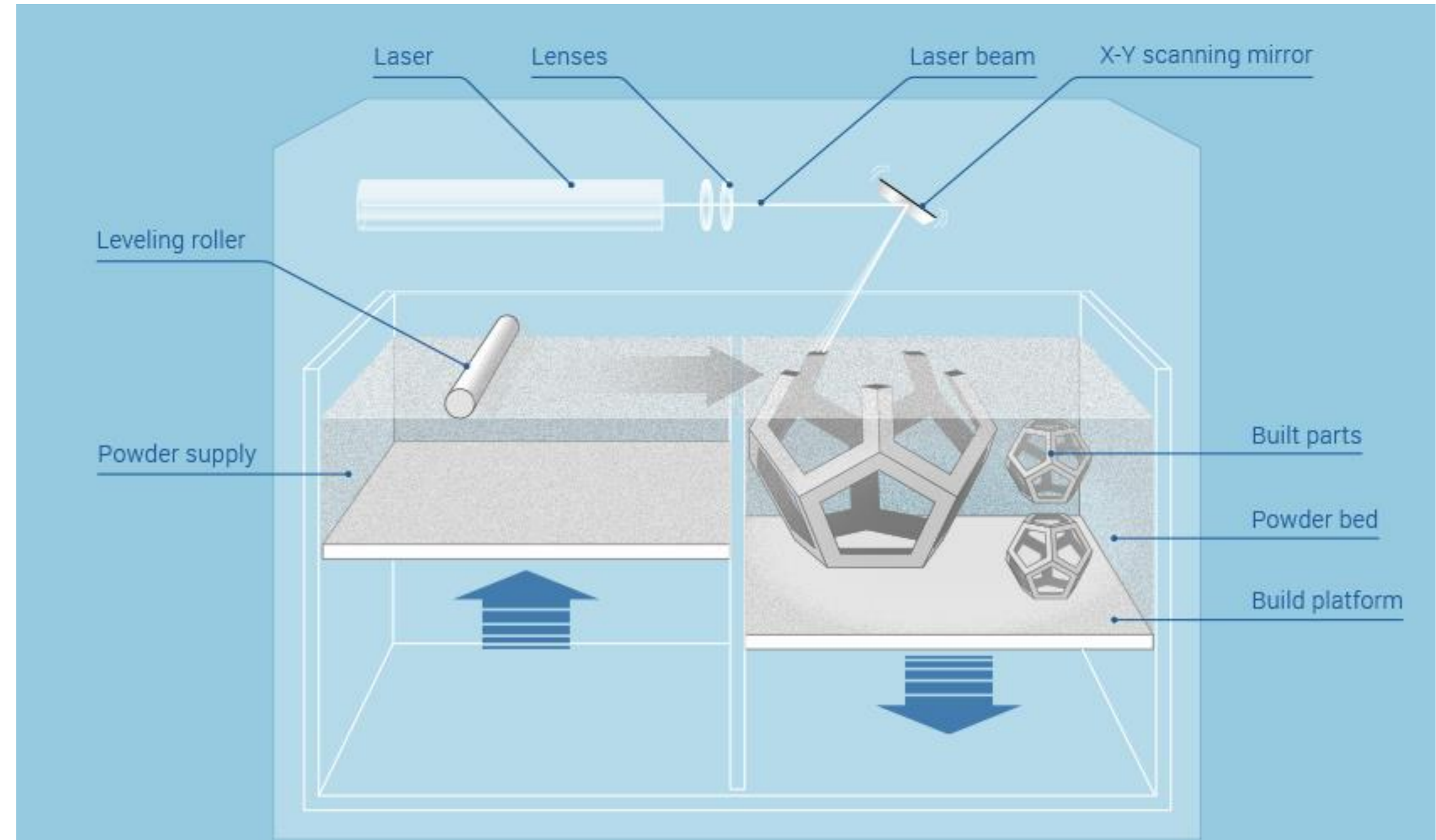


SOLID CONCEPTS

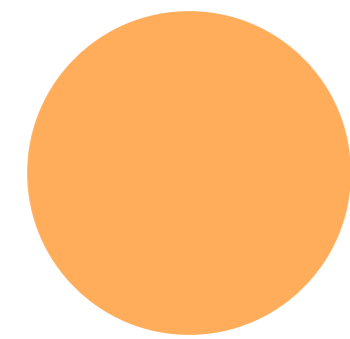
## Laser Sintering, LS

A thin layer of plastic powder is selectively melted by a laser.

The parts are built up layer by layer in the powder bed.



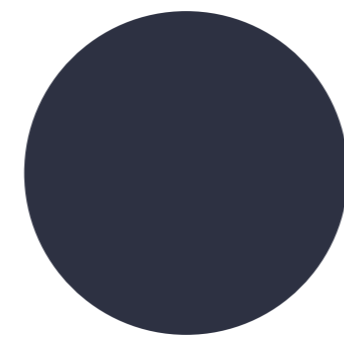




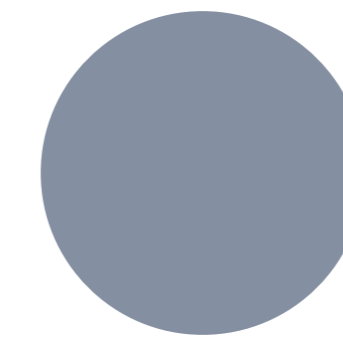
Stereolitho  
graphy



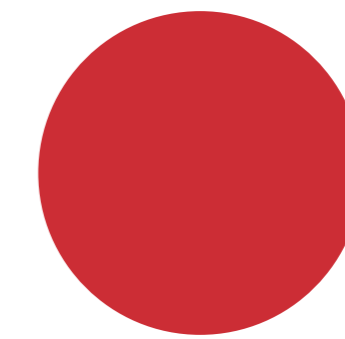
Photo  
polymer  
Jetting



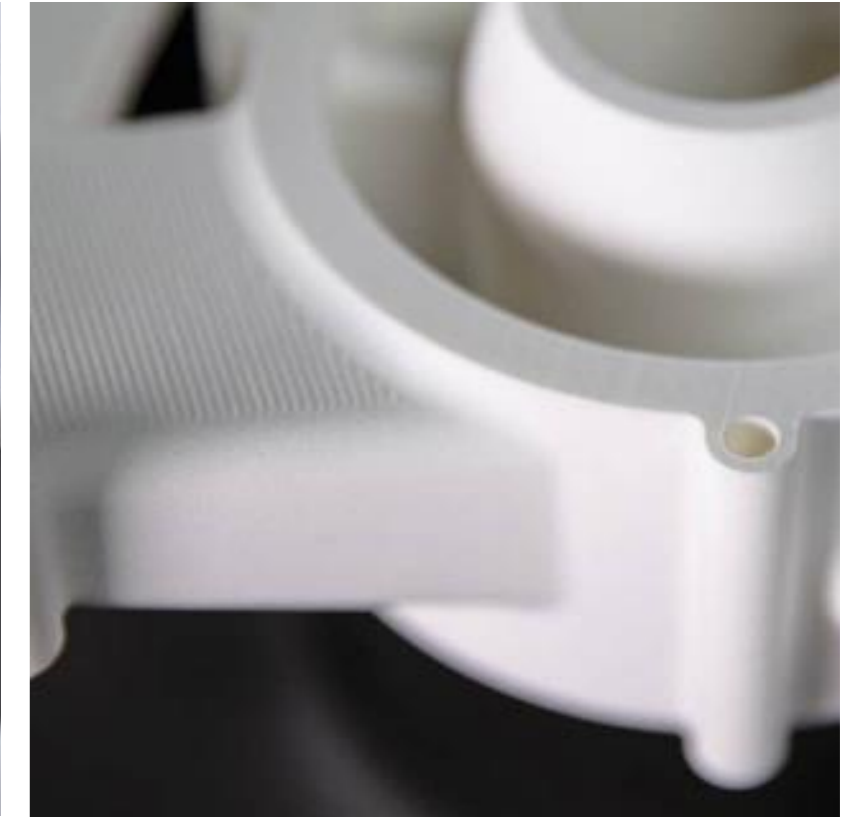
Binder  
Jetting

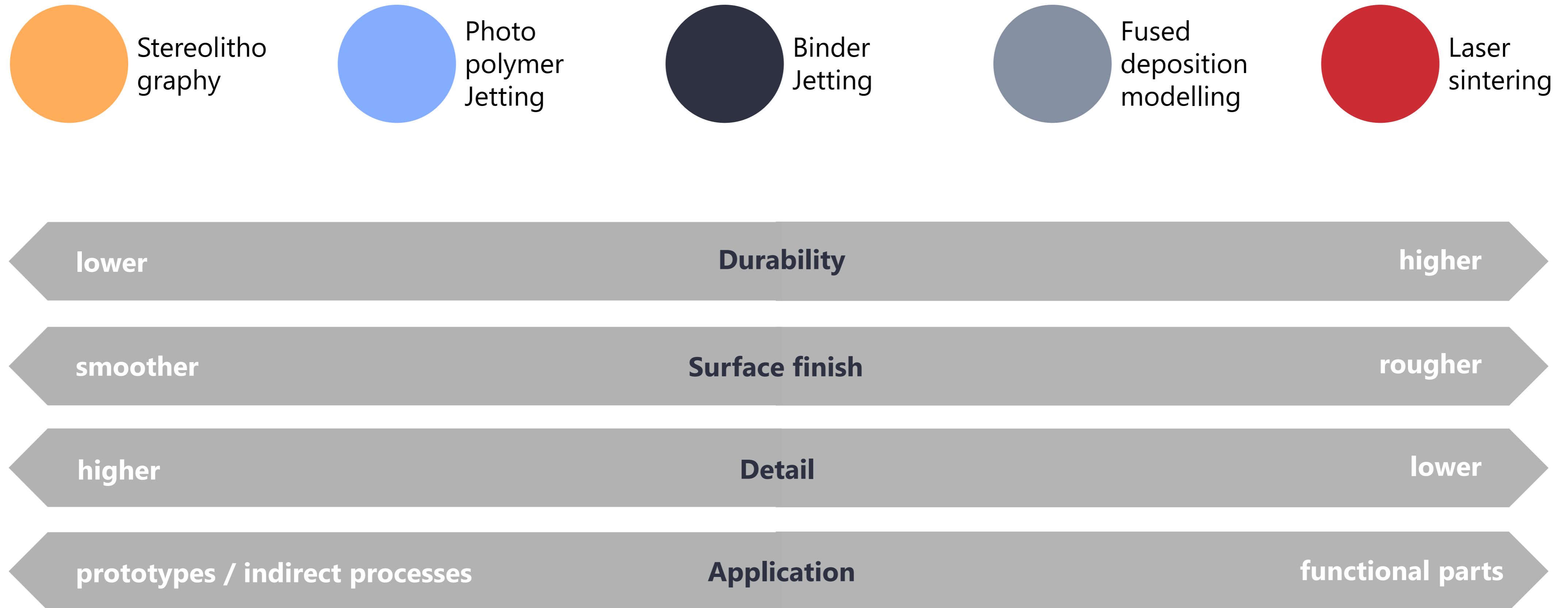


Fused  
deposition  
modelling



Laser  
sintering





## Conventional

- Geometric limitations
- Subsequent processes for multiple geometries
- Needs stocks and creates waste
- Efficient for mass production

## Additive Manufacturing

- Geometric freedom and complexity (some constraints for large size parts)
- Final geometry in a unique process
- Layout simplification in flexible productive scenarios
- Zero stocks and waste
- Efficient for mass customization

An underwater scene with a sea turtle swimming towards the left. The water is filled with various types of plastic pollution, including bags, bottles, and debris. The scene is dimly lit, with a blue-green tint.

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