Fused Deposition Modelling (FDM)

In FDM, a spool of filament is loaded into the printer and then fed to the extrusion head, which is equipped with a heated nozzle. Once the nozzle reaches the desired temperature, a motor drives the filament through it, melting it. The printer moves the extrusion head, laying down melted material at precise locations, where it cools and solidifies (like a very precise hot-glue gun).

When a layer is finished, the build platform moves down and the process repeats until the part is complete. After printing is done, the part is usually ready to use but it might require some post-processing, such as removal of the support strucures or surface smoothing.

FDM is the most cost-effective way of producing custom thermoplastic parts and prototypes. It also has the shortest lead times - as fast as next-day-delivery - due to the high availability of the technology.

A wide range of thermoplastic materials is available for FDM, suitable for both prototyping and some functional applications.

As of limitations, FDM has the lowest dimensional accuracy and resolution compared to the other 3D printing technologies. FDM parts are likely to have visible layer lines, so post-processing is often required for a smooth surface finish.

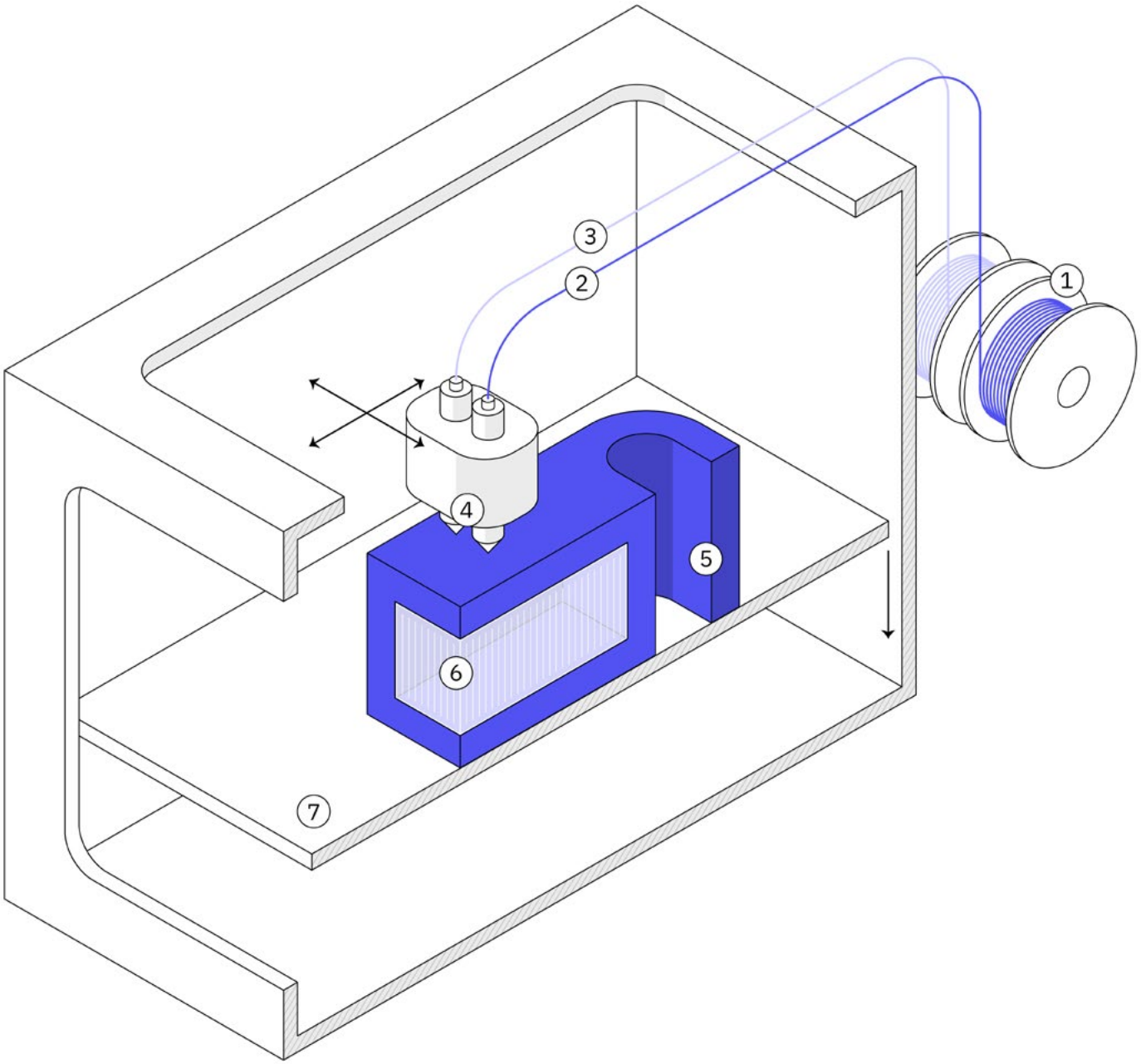
Additionally, the layer adhesion mechanism makes FDM parts inherently anisotropic. This means that they will be weaker in one direction and are generally unsuitable for critical applications.

Learn more about FDM 3D printing →

Popular FDM materials

FDM is the most widely available 3D printing process, mainly used in low-cost prototyping and for design verification with very fast turn around times.

> PLA > ABS > Nylon > TPU > ASA > PEI



1. Filament spools
2. Main filament
3. Support filament
4. Extrusion head
5. Printed part
6. Support structure
7. Build platform

Pros

+ Low-cost prototyping
+ Fast turn-around (less than 24 h)
+ Functional applications (non-critical load)

Cons

- Limited dimensional accuracy
- Visible layer lines (can be post-processed)
- Anisotropic mechanical properties