

ABS/ASA Vapor Smoothing

1. Prerequisites

WARNING: Acetone vapor is unhealthy and is flammable! Always work in a well ventilated area and be careful with fire and electricity!

The following items are necessary for vapor smoothing ABS/ASA parts:

- **Air-tight** sealable container (~20L). Ideally transparent with a flat bottom and cubical in size.
- Paper towels, to fill the bottom of the container.
- Magnets. To hold the paper towels in place.
- Acetone (20 ml for a single smoothing cycle).
- Syringe (with > 20 ml volume), with a long (flexible) straw or thick needle.
- Power supply for fan controller and heating pad.
- Fan(s) with fan controller for circulating acetone vapor through the chamber.

WARNING: Fans must be brushless, otherwise the sparks from the brushes may ignite the acetone vapor!

- Drying rack: A rack on which the parts can be suspended inside the container. After smoothing this rack can be removed from the container to let the parts dry, without having to touch the parts.

ATTENTION: Rack must be made from a material that is NOT affected by the acetone vapor (like PETG)!

- Solid core electrical wire (~1.5mm²), used for suspending parts from the rack.

ATTENTION: Electrical wire insulation must NOT be affected by the acetone vapor (like PE, PP).

- Optional: Heating pad for underneath container to accelerate vaporization of acetone. Ideally with a thermocouple to control the heat input.
- Optional: MCU which controls the fans, heating pad and has a timer (e.g. with buzzer) to notify when smoothing is done.

2. Workflow

Use the following guideline depending on the type of part.

3D print parameters

- Layer height: ≤ 0.125 mm
- Shell thickness: ≥ 1 mm
- Infill density: $\geq 20\%$
- Infill pattern: Cubic or Gyroid (Isotropic patterns)

TIP: Add a small hole (if not already present) in the geometry to put the electrical wire through. Ideally at a location which is not important for vapor smoothing.

Vapor Smoothing parameters

	Small/Delicate part	Normal/Big part
Acetone liquid volume	1 mL / Liter	1 mL / Liter
Smoothing time	30 min (cold)	60 min (cold)
Number of cycles/repetitions	2-3x	1-2x
Active vapor circulation	Yes	Yes
Dry time	≥ 1 day	≥ 2 days

ATTENTION: During vapor smoothing the part may not look completely smooth, but this will become more smooth during drying! So do **NOT** leave parts in too long, as this will impact the part accuracy!

TIP: Vapor smooth as many (similar) parts simultaneously that will fit without parts touching or blocking the fans. This will make the parts more equal in surface finish and also saves time. **Guideline:** Parts should be spaced at least **10 mm** apart and should be distributed evenly as much as possible over the available space.