

Printing Process Guide For Funmat PRO 410

| | PLA | ABS | ASA | PC | NYLON | PA-CF | PEEK | PEEK-CF | PEKK | PEI 1010 | PEI 9085 | PPSU | PVA | HIPS | SP5000 |
|--------------------------------------|--|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|-----------|
| Nozzle temp.(°C) | 210 | 260 | 255 | 265 | 265 | 270 | 400 | 410 | 380 | 370 | 360 | 390 | 220 | 250 | 300 |
| Build plate temp. (°C) | 40 | 90 | 90 | 100 | 40 | 40 | 130 | 130 | 150 | 160 | 160 | 160 | 40 | 90 | 130 |
| Chamber temp.(°C) | 0 | 80 | 80 | 90 | 40 | 40 | 90 | 90 | 90 | 90 | 90 | 90 | 0 | 80 | 90 |
| Fan speed | 100% | 50% | 50% | 50% | 0-25% | 0-25% | 50% | 50% | 0-25% | 0 | 0 | 0 | 0-25% | 0-25% | 0 |
| Print speed(mm/s) | 30-80 | 25-60 | 25-60 | 25-60 | 25-60 | 25-60 | 20-50 | 20-50 | 20-50 | 20-50 | 20-50 | 20-50 | 20-50 | 25-60 | 52-60 |
| Filament dry condition | 50°C/10h | 80°C/4h | 80°C/4h | 80°C/12h | 80°C/10h | 80°C/10h | 150°C/5h | 150°C/5h | 130°C/6h | 150°C/6h | 130°C/6h | 150°C/6h | 80°C/12h | 80°C/4h | 100°C/12h |
| Max filament chamber temp | 40°C | 70°C | 70°C | 70°C | 70°C | 70°C | 70°C | 70°C | 70°C | 70°C | 70°C | 70°C | 35°C | 70°C | 70°C |
| Annealing | No | No | No | No | 70°C/2h | No | Yes | Yes | Yes | Yes | Yes | Yes | -- | -- | -- |
| Support Materials | PVA | HIPS | HIPS | HIPS | PVA | PVA | SP5000 | SP5000 | SP5000 | SP5000 | SP5000 | SP5000 | -- | -- | -- |
| Layer thickness (mm) | 0.25~0.75*nozzle diameter (0.1~0.3mm layer height for 0.4mm nozzle). | | | | | | | | | | | | | | |
| Build plate leveling | Build plate leveling is very important. After completed leveling, user may proceed with printing. There are two methods of bed leveling: Manual Leveling and Auto Leveling. Only need to choose one method to do the leveling once. Manual Leveling is much recommended because of higher precision. | | | | | | | | | | | | | | |
| Build plate treatment | Glass plate + PVP glue, Apply no less than 4 layers of glue when glass plate is cold; OR Glass plate + NANO POLYMER ADHENSIVE from VISIONMINER (https://visionminer.com/), please follow the instructions; OR Glass plate + Magigoo Adhesive from Thought 3D (https://magigoo.com/), please follow the instructions. | | | | | | | | | | | | | | |
| Build plate adhesion type | Raft is recommended to get better first layer adhesion. | | | | | | | | | | | | | | |
| Print part remove | Once your 3D print is completed, it must be removed from the build plate when its temperature is still high. Removing a print after it is cooled may cause the glass plate to break. | | | | | | | | | | | | | | |
| Nozzle separately use | Use separately nozzle for high and normal temp material. Because residual high material cannot melt when printing normal materials, which may clog the nozzle. | | | | | | | | | | | | | | |
| Nozzle comparison and recommendation | Thermal conductivity: CuCrZr>Harden Steel; Abrasive resistance: Harden Steel>CuCrZr. CuCrZr is the default nozzle material for INTAMSYS Funmat PRO 410 nozzle set. Harden Steel has poor thermal conductivity, so the recommended cooling fan speed should be off. CF-reinforced or GF-reinforced materials, recommended nozzle diameter≥0.4mm. Choose higher abrasive resistance nozzle for higher reinforced fiber content. | | | | | | | | | | | | | | |
| Filament care | Thread the filament into the small holes in the side of the spool after removing from the printer to avoid twisting. And ensure the filament is not twisted before printing. It is strongly recommended that filaments should be stored in a sealed container and with desiccant. A convection or vacuum oven can be used to dry filaments if residual moisture level is high. | | | | | | | | | | | | | | |
| Others | Wear gloves when move the glass plate with high temperature. All guides above are only applicable for 3D printing with INTAMSYS filaments | | | | | | | | | | | | | | |
| Support material method | Please refer to Annex 1. | | | | | | | | | | | | | | |
| High temp materials print Guide | Please refer to Annex 2. | | | | | | | | | | | | | | |

Annex 1

Support & Raft Setting

| | Single-nozzle print | Dual-nozzle print |
|----------------------------|------------------------|-------------------|
| Support Interface Extruder | — | Support material |
| Support Z Distance | 0.1mm/one layer height | 0 |
| Raft Air Gap | 0~Initial Layer Height | 0 |

Support Material Treatment

| Support Material | Type | For model material | Treatment process and others |
|------------------|------------------|-------------------------------|---|
| PVA | Water soluble | PLA, NYLON, PA-CF, TPU | Immerse the print part in tap water until all support dissolved. It is highly recommended to store the filament in the resealable bag because its strong hygroscopicity. |
| HIPS | Breakaway | ABS | Manually breakaway. |
| | Limonene soluble | PC | Immerse the print part in Limonene solvent for more than 12h. Then take the print part out and clean it. |
| SP-5000 | Breakaway | PEEK, PEEK-CF, PEI, PPSU, PPS | Immerse the print part in Ethyl Acetate solvent for more than 12h. After that the support material will become soften. Then manually remove the soften support. |

Take goggles when removing support and operating chemical solvent.

Annex 2

High Temperature Materials (PEEK, PEKK, PEI and PPSU) Print Guide

1. Filament Drying

PEEK, PEKK, PEI and PPSU are moisture-sensitive materials. It is vital to keep the filaments away from moisture before and during printing. PEI and PPSU are More Sensitive to Moisture than PEEK.

Prior to printing, it is necessary to keep residual moisture of filaments to below 0.02% to prevent foamy extrudate due to high vapor pressure caused by trace of moisture at high printing temperature. If the filament is sufficiently dry, the extrudate should be transparent and without bubbles. Otherwise, it would result in foamy extrudate.

An air circulating oven can be used to dry filaments before printing. PEEK, 150°C/3-5h; PEKK, 130°C/4-8h; PEI 1010, 150°C/4-6h; PEI 9085, 130°C/4-6h; PPSU, 160°C/4-6h. These IMTAMSYS filament spools can withstand high temperature.

Please ensure several bags of desiccant are placed inside the filament chamber when printing. Store filaments in sealed bag with desiccant after printing.

2. Build Plate Treatment

For PEEK, PEKK, PEI and PPSU printings, PVP glue is desired for glass plate gluing. Correct way of gluing is important to ensure good adhesion of your print to the glass plate. The following steps are recommended for gluing:

- (1) Cleaning. Clean the glass surface with water, and wipe to dry;
- (2) Gluing. Evenly apply no less than 4 layers of glue on the glass.
- (3) The treated glass plate is now ready for printing;
- (4) After printing, remove the print and clean the glass plate with water.

Other glue products, like NANO POLYMER ADHENSIVE from VISIONMINER (<https://visionminer.com/>), Magigoo Adhesive from Thought3D (<https://magigoo.com>), are also recommended. Please follow the instructions when using.

3. Removing A Print After Completion

Once your 3D print is completed, it must be removed from the build plate when its temperature is still high. Removing a print after it is cooled may cause the glass plate to break because the print may shrink more rapidly than the glass plate.

4. Annealing After Completion

- (1) Set the oven temperature (PEEK/150°C, PEKK/130°C, PEI 1010/150°C, PEI 9085/130°C, PPSU/160°C) and place the print in the oven immediately for an hour.
- (2) Increase the temperature (PEEK/200°C, PEKK/150°C, PEI 1010/200°C, PEI 9085/160°C, PPSU/200°C) and leave it for 2 hours.
- (3) Lower the temperature (PEEK/150°C, PEKK/130°C, PEI 1010/150°C, PEI 9085/130°C, PPSU/160°C) and leave it for 30 minutes.
- (4) Finally, turn off the oven and leave it to cool down to room temperature before removing the print.