FORWARD AM
Innovating Additive Manufacturing

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V2.0 – 01/2021

Processing Guideline

For Farsoon (25xP and 40xP)

The purpose of this guideline is to provide users of Farsoon equipment with initial printing parameters. This guideline is only a recommendation. Printing parameters may vary and have to be fine-tuned/validated individually for each machine and application. In view of the many factors that may affect the processing behavior, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the processability of the product on the equipment.

Materials	Part bed temp.	Cylinder temp.	Piston temp.	Feeder temp.	Energy density (100µm)	Recycling rate old/new in %	Notes
Ultrasint PA6 LM	≈ 175 °C	≈ 150 °C	≈ 150 °C	≈ 120 °C	≈ 22 mJ/mm²	60/40	Good inertization required.
Ultrasint PA6 (neat, FR, MF)	≈ 200 °C	≈ 185 °C	≈ 185 °C	≈ 160 °C	≈ 20 mJ/mm²	60/40; occasionally 70/30 is also possible	Only “HT” and “ST” machine models. Inertization < 0.2% O_2 required.
Please note: To produce parts with the UL94 requirement certain parameters are specifically defined. For more information please have a look at the Blue Cards: https://iq.ul.com/ul/cert.aspx?ULID=104291443.							
Ultrasint PA11 (neat, CF, GB30, ESD)	≈ 185°C	≈ 150 °C	≈ 155°C	≈ 145 °C	≈ 30 mJ/mm²	70/30; for CF, GB30 and ESD 60/40	
Ultrasint PP nat 01	≈ 135 °C	≈ 120 °C	≈ 120 °C	≈ 100 °C	≈ 17 mJ/mm²	60/40	Decrease part bed temp by K at 3 mm and by another 1 K at 10 mm total build height.
Ultrasint TPU 88A	≈ 107 °C	≈ 70 °C	≈ 60 °C	≈ 50 °C	≈ 26 mJ/mm²	80/20	We recommend layer thickness 120µm and double scanning (2x13 mJ/mm²)

All values given above are starting parameters that must be further adjusted depending on observations during processing or related to part quality (see page 2). The individual setting may depend on the exact machine model, the machine condition as well as potential machine modifications.

The Energy Density (ED) for laser exposure is determined by

$$ED\left(\frac{mJ}{mm^2}\right) = \frac{\text{Laser power (W)}}{\text{scan speed}\left(\frac{m}{s}\right) \cdot \text{scan spacing (mm)}}$$

The recommended layer thickness is 100-120 µm. The minimum warm-up time should be 2-3 h and the warm-up height should be 15mm.

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Observation	Possible solution(s)
Slight bending of last sintered layers (curling)	Slightly increase bed temperature and/or slightly increase ED level
Cracks or lumps appearing on powder bed during construction or warm-up	Slightly decrease bed temperature and/or decrease the maximum heater power and/or roughen the roller.
Bending of finished parts in the bed leading to distortion of the part (warpage)	Increase cylinder and piston temperature and/or cool down longer and slower before removing/unpacking and/or build parts at an angle.
Yellowing of parts	Ensure cool down of part cake is slow and with a steady decrease of temperature under an inert atmosphere, avoiding moisture and oxygen.
Brittleness of parts / tensile specimens	Check laser exposure parameters and ensure ED level is appropriate. Increase ED. For Polyamides, ductility increases with water uptake (conditioning).
Spreading/Flowability of the powder	Increase feed and/or decrease recoater speed and/or store the powder in a dry environment to avoid moisture uptake.
Over-melting of parts	Reduce ED level and/or slightly decrease bed temperature.