

## Lightweight Polylactide (LW-PLA)

### General

Lightweight polyactide is a polymer that expands during 3D printing. With the active foaming technology, parts can be achieved with a weight reduction of up to 70%. From a temperature of approx. 200 ° C, the material begins to foam. The expansion effect increases with increasing temperature. The maximum expansion is achieved at a printing temperature of approx. 250-260 ° C. With optimal settings, the flow factor can be reduced to a value of 0.3, which leads to extremely light PLA components. Use the foaming technology to produce parts with a low density, print parts with a single layer, which has a width of up to 1.2mm (with a 0.4mm nozzle) and thus reduce the printing time by a factor of 3 or you increase the layer height and can thus also achieve a reduction in printing time.

A heating bed is advantageous for LW-PLA filament, but not absolutely necessary.

#### advantageous

- Ideal material for model airplanes
- Weight reduction by up to 70%
- Expansion by a factor of 3
- Printing possible directly on the glass plate
- With a spool of LW-PLA you can print up to 3 times more parts than with a spool of standard PLA due to the reduced flow factor

#### disadvantageous

- Can become soft again from 60 degrees
- Optimal print settings must be tested individually for each printer model
- Thread formation during empty runs can practically not be prevented
- Color becomes paler after expansion

### Processing data

#### Printing temperature

200-260 °C

#### Heated bed temperature

50-70 °C

#### Drying temperature

80°C

#### Drying time

2-4h

### Technical specifications

Shrinkage (ISO 294-4, 2577)	-	%
MFR (ASTM D1238)	6	g/10min
Yield stress (ASTM D638)	60	MPa
Elongation at yield (ASTM D882)	6	%
Elongation at break (ASTM D882)	6	%
Tensile modulus (ASTM D790)	-	MPa
Heat deflection temperature 0.45 MPa (ASTM E2092)	55	°C
Vicat softening temperature A (ASTM D1525)	-	°C
Thermal conductivity 23°C	-	W/(K*m)
Flammability (UL 94)	HB	
Density (ASTM D792)	0.35*-1.24	g/cm <sup>3</sup>

## Processing

In order to be able to process the LW-PLA successfully, a few parameters should be determined once for the respective printer. Please note the following sections.

The component [«Parameter test LW-PLA»](#)

The component is designed for a 0.4mm nozzle. With a different nozzle diameter, the wall thickness of the component should be adjusted accordingly so that only one layer is printed at a time.

### Find the optimal printing temperature

Start at a temperature of 200 ° C and print the component «Parameter test LW-PLA» with the usual parameters. We recommend a printing speed of 30mm / s and a layer height of 0.2mm.

Next, print the same component at 210 ° C, 220 ° C, 230 ° C, 240 ° C, 250 ° C and possibly 260 ° C.



In our test with a Longer3D LK1, the material reaches the greatest expansion at 250 ° C with a layer width of approx. 1.24mm.

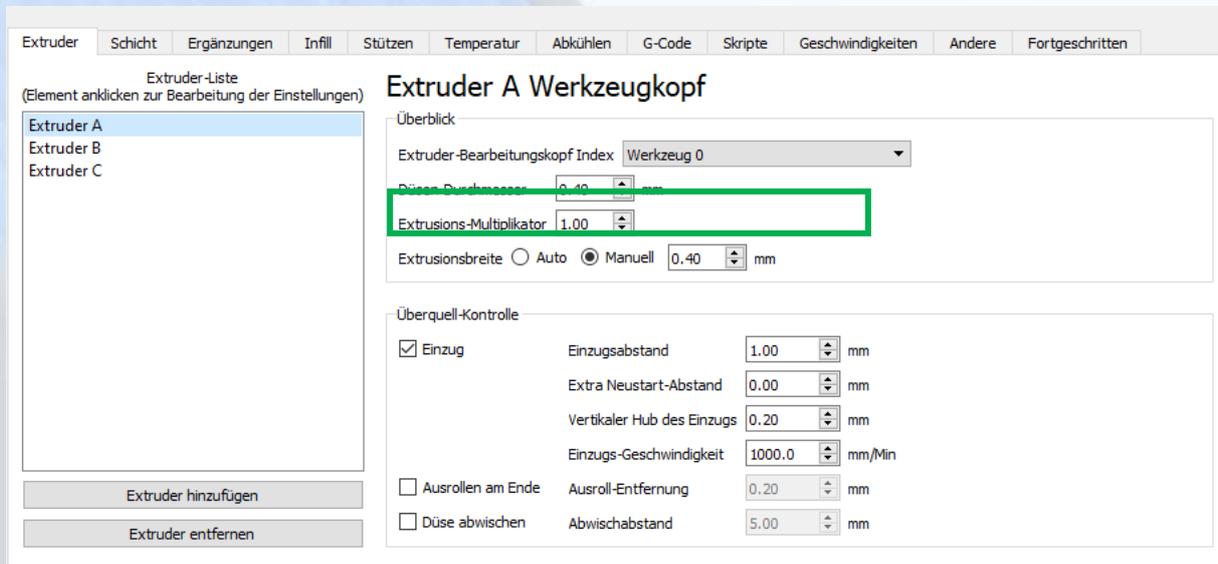
There are now two options for taking this expansion into account in the print parameters:

1. The extrusion width is adjusted in the slicing software.
2. The flow is reduced.

## Set the extrusion width

Depending on the software, you will find the extrusion width at a different point in the software. We show you the two settings for Simplify3D here. With other software, you may find the extrusion width in a different location.

At Simplify3D you can find the extrusion width in the menu "Extruder"



## Reduce flow or extrusion multiplier

The goal of reducing the flow is to bring the width of the layer back to the usual 0.4mm. The optimal extrusion multiplier must be determined by means of tests.

The same component «LW-PLA parameter test» is used again for this purpose. Now the extrusion multiplier is reduced step by step. We'll start with an extrusion multiplier of 0.5.



With an extrusion multiplier of 0.3, we achieve a layer width of 0.42mm. So we print the parts with a reduced flow of 70%.

Now you have successfully set all the important parameters for 3D printing with LW-PLA and you can start printing your particularly light parts made of LW-PLA. We wish you a lot of success!