

Filabot  
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## LX175 PLA Processing Report

LX175 "PLA" was extruded in the EX6 to compare the tolerances of the polymer with different Filabot Accessories. From testing, we saw that the tolerances of the material improved when using the melt filter nozzles with the Standard Stock EX6 Screw. Tighter tolerances were achieved when using the Melt Filter Nozzles. The best outcome we had when conducting the test was seen when we used both the Standard Melt Filter and the Extended (2x) Melt Filter. These had moments of tolerances of 1.75mm  $\pm$ 0.03mm diameter during testing. This was also noted during 2.85mm testing. Further testing of the material will look into printability as well as strength comparisons. Further testing will use the Chrome Screw with the EX6 Nozzles and test the polymer with different additives; lastly, 2X melt filter test is needed for the 2.85mm tolerances.

**About the material:** PLA is a biobased polymer derived from natural resources and offers a significant reduction in carbon footprint compared to oil-based plastics. Luminy LX175 is a high viscosity, low flow, amorphous, transparent PLA resin suitable for film extrusion, thermoforming or fiber spinning. (Corbion, 2020).

These pellets are usable with both our EX6 and EX2 systems for 1.75mm & 2.85mm filament with +/-0.05mm tolerance.

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**Test Technician:** Nasser Abdel-Fatah

**Test Number(s):** ET201029NA01-03 & ET201109NA01&02

**Plastic Name:** LX175

**MSDS:**

[https://cdn.shopify.com/s/files/1/0236/7897/files/luminy-pla-neat-resin\\_usa\\_en\\_17062020.pdf?v=1602685949](https://cdn.shopify.com/s/files/1/0236/7897/files/luminy-pla-neat-resin_usa_en_17062020.pdf?v=1602685949)

**TDS:**

[https://cdn.shopify.com/s/files/1/0236/7897/files/TDS\\_Luminy\\_LX175\\_Filabot.pdf?v=1602610806](https://cdn.shopify.com/s/files/1/0236/7897/files/TDS_Luminy_LX175_Filabot.pdf?v=1602610806)

**Manufacturer:** Corbion.

**Supplier:** Filabot.

**Additives:** None.

**Material Form:** Pellets Round, clear.

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## Extrusion Test Notes

**Material preparation:** None.

**Grinding:** None.

**Drying:** Yes, 4-6hours 85C.

**Extrusion Setup:** EX6. Airpath(2X)\*. Filameasure SPC Unit with Tablet, and Spooler.

\*2 Airpaths were used for 2.85mm filament production.

**Note on Extruder:** Prior to extrusion of the material the machine needs to be 100% clean (both the barrel and the nozzle).

**Extrusion Results:** The above test numbers were able to generate filament at 1.75mm & 2.85mm with a tolerance of  $\pm 0.05$ mm. The settings, speeds, and additions are in the correct range to generate filament. All Melt Filters used a 60 and a 20 Mesh insert.

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## Test Settings:

Materials were extruded in the EX6 with the following settings:

### Heat zone settings:

#### 1.75mm

- Front: 167.5 degrees Celsius
- Middle: 166 degrees Celsius
- Back: 165 degrees Celsius
- Feed: 40 degrees Celsius

#### 2.85mm

- Front: 167.5 degrees Celsius
- Middle: 166 degrees Celsius
- Back: 165 degrees Celsius
- Feed: 40 degrees Celsius

### Fans Settings: (Same for all tests)

- Front: Mid
- Middle: Mid
- Feed: Max
- Motor: Max

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**EX6 Power:**

**1.75mm**

- D.C. Volts: 20
- D.C. Amperes: 3-4

**2.85mm**

- D.C. Volts: 30
- D.C. Amperes: 4+

**Nozzle Used:**

**1.75mm**

- Standard Nozzle Test number: ET201029NA01
- Standard Melt Filter: Test number: ET201029NA02
- Extended (2X) Melt Filter Test Number: ET201029NA03
- Size: 1.75mm

**2.85mm**

- Standard Nozzle Test number: ET200709NA01
- Standard Melt Filter: Test number: ET200709NA02
- Size: 2.85mm

**Screw Used:**

- Standard Stock Screw Test number: All Tests.

**Airpath Settings:**

- Number of Airpath's: 1 (Note 2 were used for 2.85mm results).
- Fan Speed: 100%
- Magnets: 5 used along Airpath. End, Center, Front.
- Tape: No.

**Spooler Settings (0.5kg spool):**

- Drive: mid
- Traverse: 30%

**Notes on Equipment**

**The positioning of Equipment:**

**1.75mm**

When extruding the polymer space the EX6 50mm (2in) away from the first Airpath. Space the Airpath and the Spooler 60cm (2-feet) between each other.

**2.85mm**

When extruding the polymer space the EX6 50mm (2in) away from the first Airpath. Have no space between Airpath 1 and Airpath 2. And space the Spooler 30cm (1-foot) between Airpath 2 and the Spooler.

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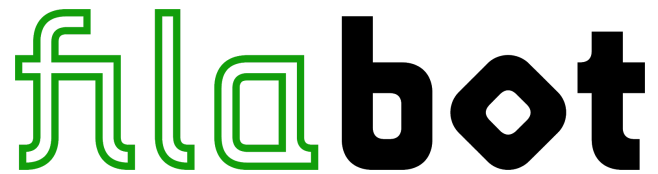


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**About the Standard Melt Filter Nozzle:** The Filabot Melt Filter Nozzle is used to help decontaminate your recycled materials for a clean, consistent filament. This nozzle includes a stainless steel mesh screen to filter small contaminants that have slipped through the cleaning and grinding process. The filtering of these contaminants reduces the chances of clogging the printer nozzle.

**About the Extended 2x Melt Filter Nozzle:** This "extra length" improves output consistency, keeping your filament extrusion to the appropriate range. Use 2X Melt Filter Nozzle to help decontaminate your recycled materials for a clean, consistent filament. The 2x nozzle improves laminar flow (less die stress at exit) and allows the filament to cool slightly during exit compared to stock. The 2x nozzle works best up to 50 volts.

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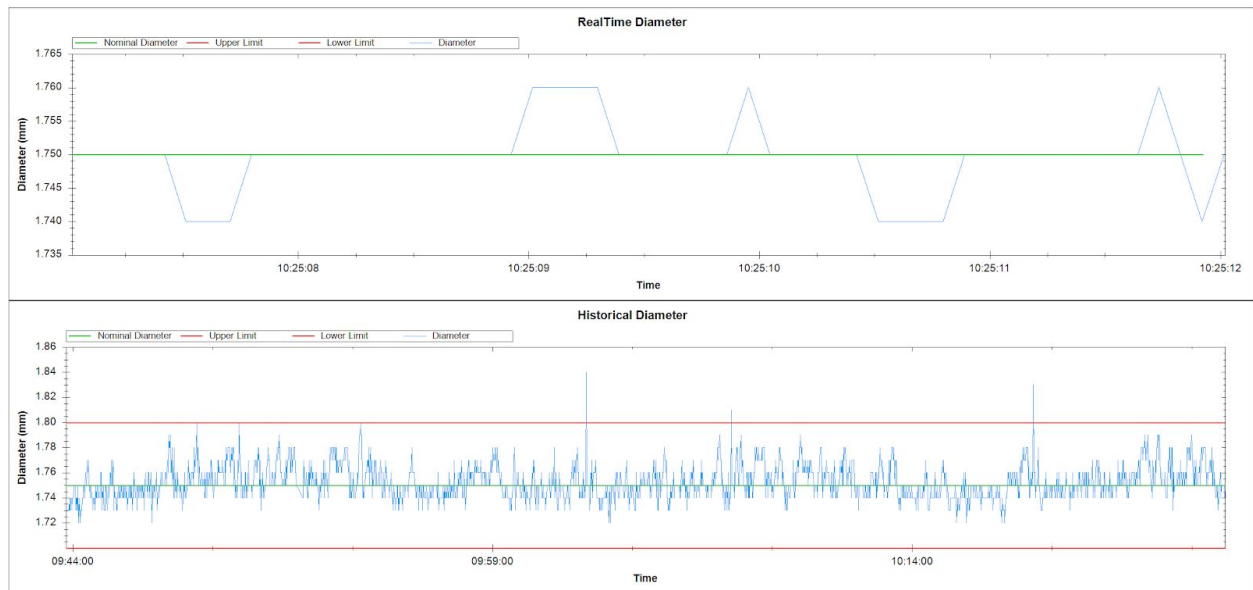
**Results:**  
**1.75mm**

Filallogger - Filament Diameter Measurement  
Diameter 1.74 mm  
Highest Value 1.91 mm  
Lowest Value 1.71 mm  
Spool Number 2  
Batch Number 0  
Duration 0:41:12



Start Capture

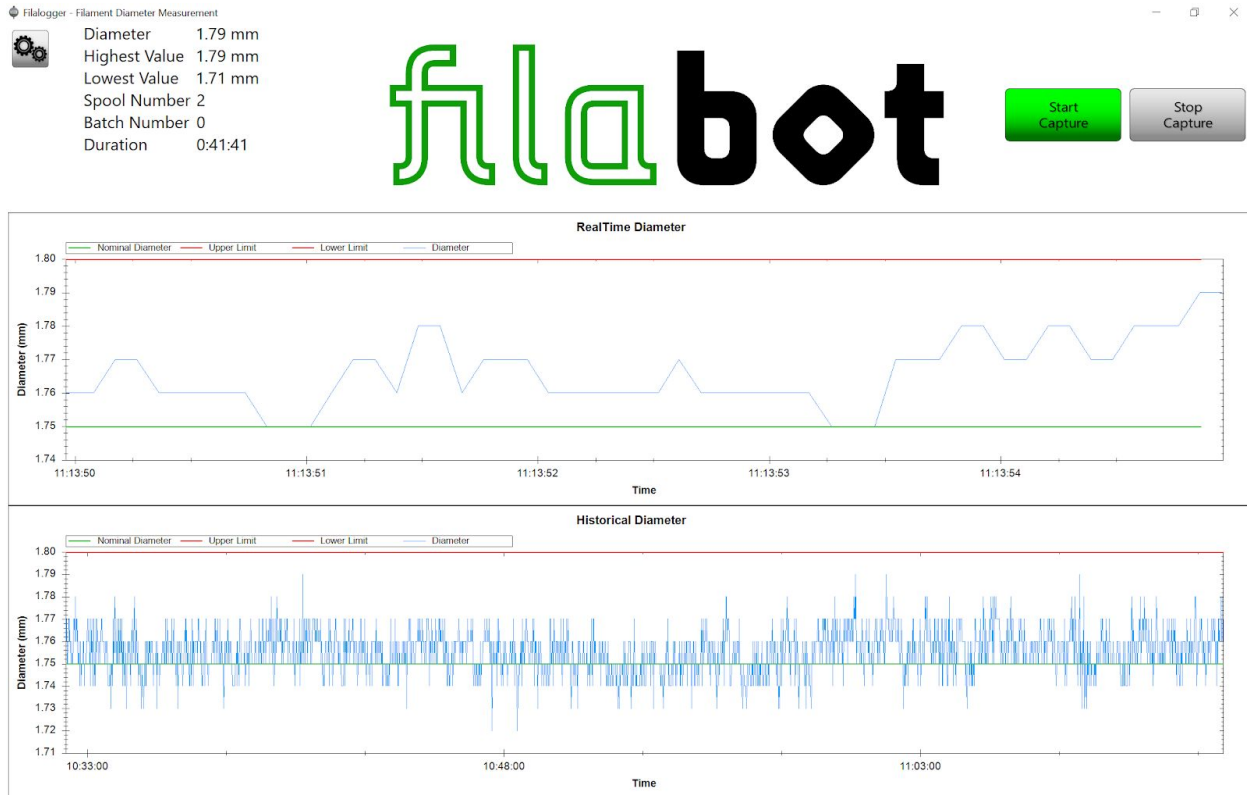
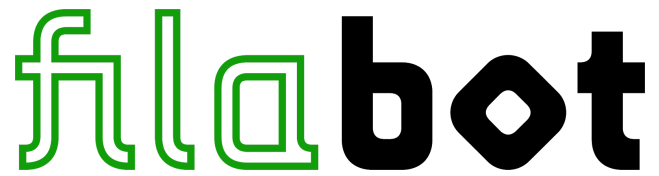
Stop Capture



Graph 1. Test: ET201029NA01. Stock Extrusion Testing Nozzle and Screw.

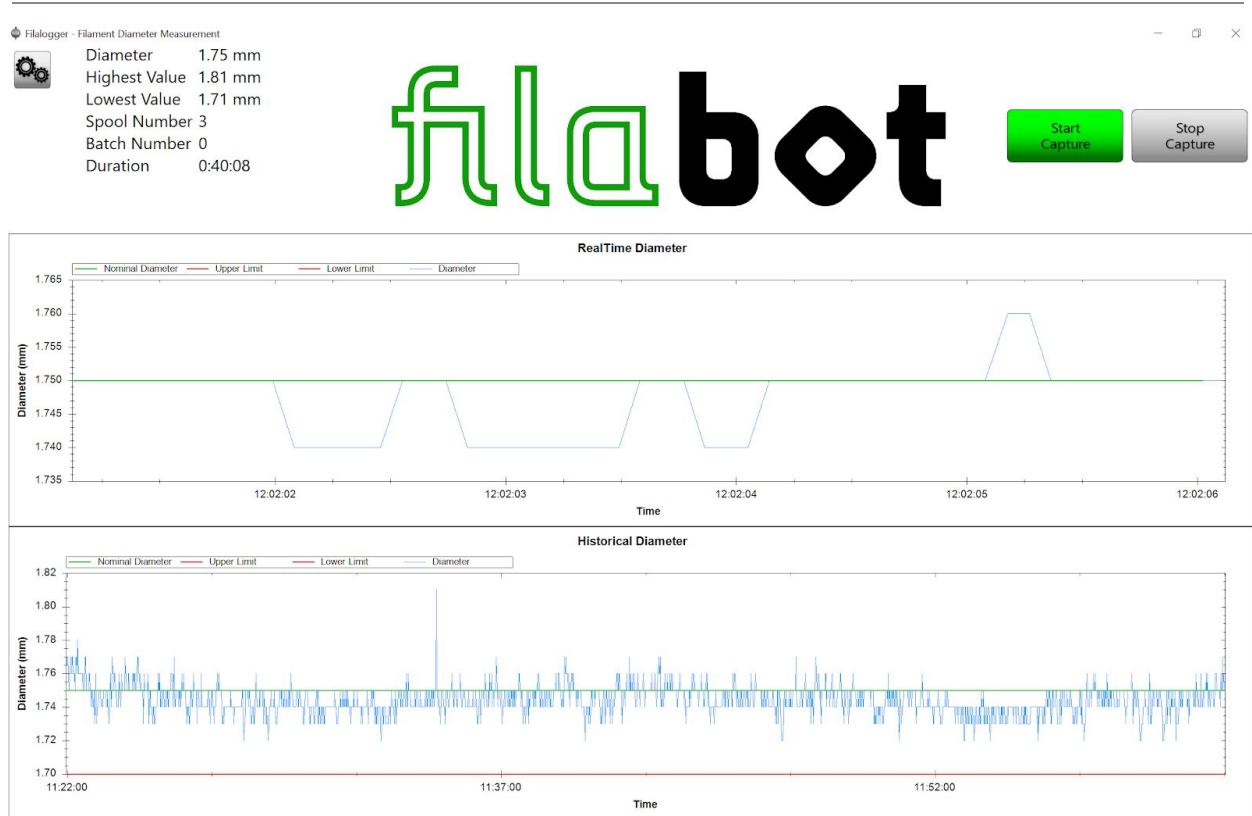
Once temperatures and power were determined on the EX6 adjustments were made to the Spooler "drive" to improve the tolerances. The material stayed in +/-0.05mm tolerance. There were two moments on the graph where it exceeded 1.8mm these two bumps were not noticed when the filament was extruded.

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Graph 2. Test: ET201029NA02. LX175PLA with the Standard Melt Filter and Stock Screw. Filament maintained range of 1.75 +/- 0.04mm.

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Graph 3. Test: ET201029NA03. 2X Melt Filter: With tolerances of  $\pm 0.05$ mm and moments of  $\pm 0.05$ mm 1.75mm.

The material stayed in  $\pm 0.05$ mm tolerance. There was one moment on the graph where it exceeded 1.8mm this moment was not observed during testing. This test produced the tightest tolerances.

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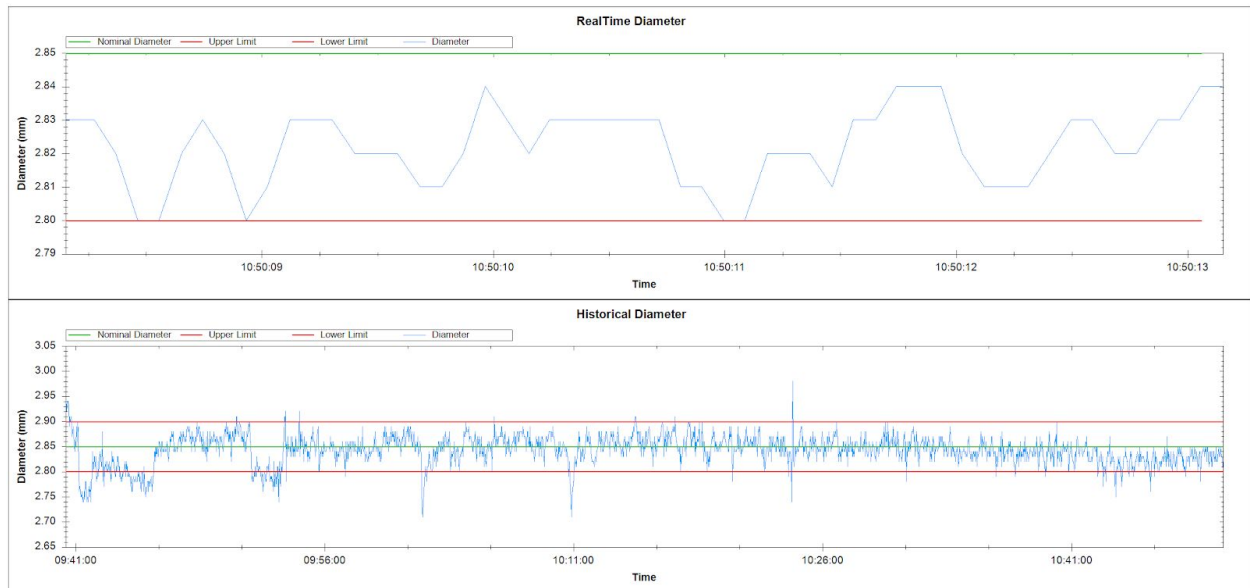
**Results:**  
**2.85mm**

Filallogger - Filament Diameter Measurement  
Diameter 0.00 mm  
Highest Value 3.00 mm  
Lowest Value 2.64 mm  
Spool Number 2  
Batch Number 0  
Duration 1:09:45



Start Capture

Stop Capture

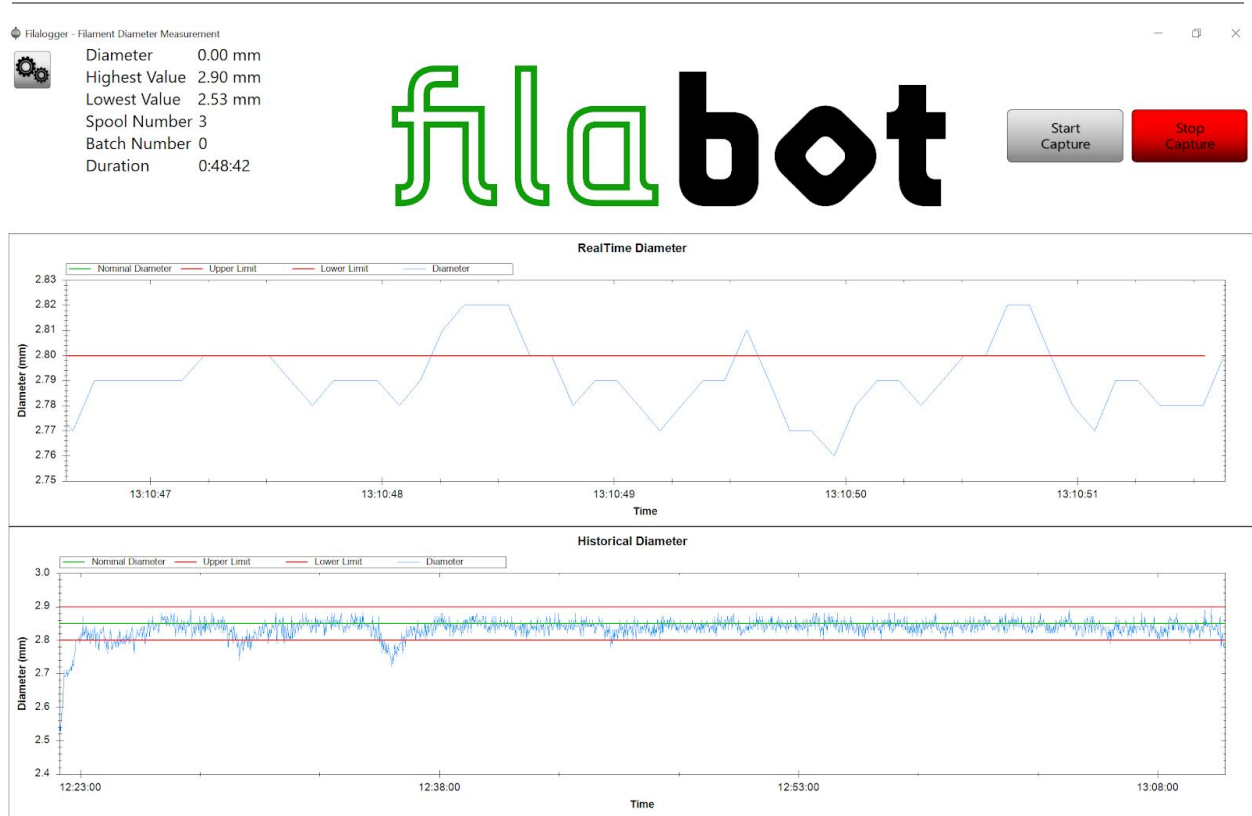
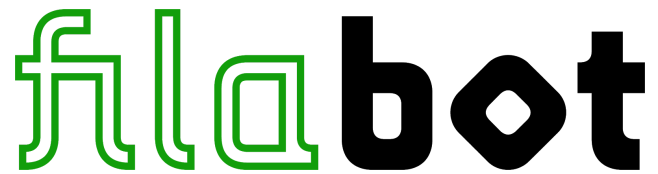


Graph 4. Test: ET201105NA01. Standard Stock Set up. With tolerances of  $\pm 0.05\text{mm}$  2.85mm.

Once temperatures and power were determined on the EX6 adjustments were made to the Spooler “drive” to improve the tolerances. From 09:41:00 to tick marker 09:56:00 on the graph was before the material was placed on a spool. When spooled the material had to be readjusted. Once the polymer was in a suitable range we stopped adjusting the “drive” on the Spooler. Throughout the test we noticed that there were dropouts and a moment 3mm. These moments we have noticed correlate to when the screw or barrel was not fully cleaned, this is an important step to make sure that your equipment and machine is cleaned.



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Graph 5. Test: ET201105NA02. 2X Melt Filter Nozzle with Stock EX6 Set up. With tolerances of  $\pm 0.05\text{mm}$  and moments of  $\pm 0.03\text{mm}$  2.85mm.

Once temperatures and power were determined on the EX6 adjustments were made to the Spooler “drive” to improve the tolerances. From 12:23:00 to tick marker 12:38:00 min on the graph the material was placed on a spool and readjusted. From tick marker 12:38:00 to the end of the test the material was in perfect range. The best outcome was seen with the melt filter nozzle.

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**Links for More Information & Equipment:**

PLA LX175: <https://www.filabot.com/collections/filament/products/lx175-pla>

Standard Melt Filter:

<https://www.filabot.com/collections/components/products/ex6-melt-filter-nozzle-style-x>

Extended Melt Filter:

<https://www.filabot.com/collections/components/products/extended-melt-filter-nozzle>

EX6 Bundle: <https://www.filabot.com/products/ex6-bundle>

Filalogger Bundle:

<https://www.filabot.com/collections/spooler/products/filameasure-inline-filament-measurement>

**Want to see more?** Send us an email at [contact@filabot.com](mailto:contact@filabot.com) if you have any questions.