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Compounding solutions for 3D filament production

Optimize formulation and production in fewer steps

With the popularity of 3D printing new polymer formulations need to be tested in order to meet the demands of new product applications for industries such as aerospace, medical devices, and automotive. Consequently, polymer compounding for the production of novel 3D filaments becomes a critical step in the workflow for designing successful 3D printing applications.

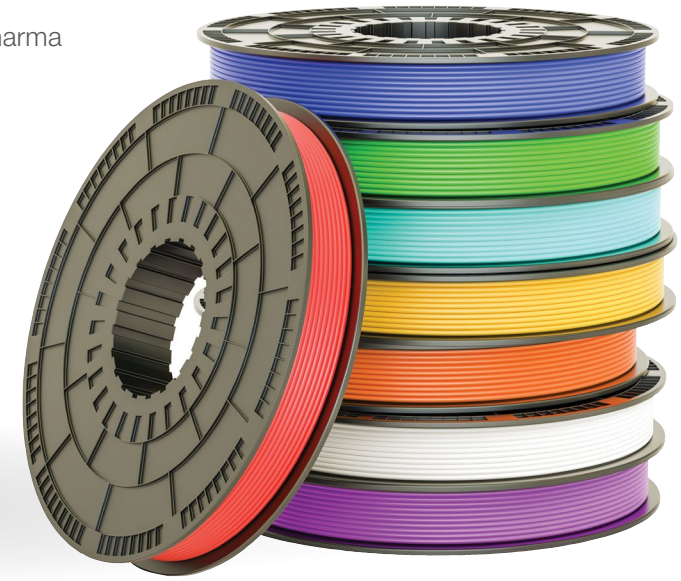
Advantages of twin-screw extrusion for fused filament fabrication (FFF)

The Thermo Scientific™ Process 11 Twin-screw Extruder and the Thermo Scientific™ HAAKE™ PolyLab OS Rheomex PTW Twin-screw Extruder offer significant benefits over single-screw extruders for 3D filament development to help:

- Minimize or eliminate the effects of coalescence to maintain particle size distribution
- Avoid a second heat history when processing heat sensitive polymers
- Improve layer-to-layer adhesion with uniform binder dispersion
- Avoid time and energy consumption by eliminating the need to dry hygroscopic materials
- Reduce waste of expensive additives like pharma excipients, graphene and metals

Reduce 3D filament development time

Streamline 3D filament development by combining compounding and filament formation in one system. Based on our twin-screw extruders, we have designed two systems that allow you to quickly test different formulations and produce spooled 3D filaments in fewer steps than traditional workflows. Both systems produce filaments directly from the compounding process by using a melt pump for pulsation-free output, which ensures a precise filament diameter and significantly reduces time and labor costs. The thermal stress on the filament material is also reduced by eliminating unnecessary heat-cool cycles that occur if mixing and filament production are separated.



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Thermo Scientific™ Process 11 Lab-scale 3D Filament Production System

Use this compact benchtop solution for research-scale formulation and process development. Figure 1 shows this system with:

- Process 11 Twin-screw Extruder
- Thermo Scientific™ Process 11 Melt Pump
- Filament spooler

From 20 g/h up to 2 kg/h throughput, this system is ideal for development of new compounding processes. Easy to operate this system provides process data that supports the scaling up of your 3D filament production process, while reducing the amount of expensive raw material during formulation development.

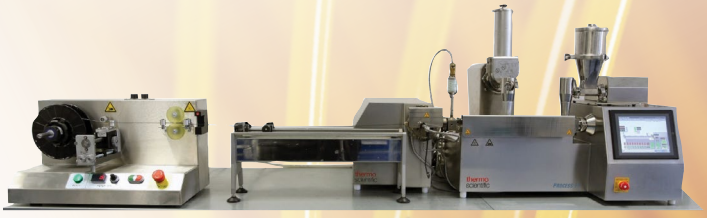

Figure 1: Process 11 Lab-scale 3D Filament System with melt pump, water bath and spooler.

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Thermo Scientific™ HAAKE™ PolyLab Pilot-scale 3D Filament Production System

Use this system for lab-to-small scale process development and production. Figure 2 shows this system with:

- HAAKE PolyLab OS Rheomex PTW Twin-screw Extruder
- Thermo Scientific™ Melt Pump for the OS Rheomex Extruder
- Filament spooler on a mobile bench

Reach material throughputs of up to 5 kg/h with this system that includes the ability to characterize new material compounds with mixer tests and capillary rheology.

Figure 2: HAAKE PolyLab Pilot-scale 3D Filament Production System.

Already own one of our twin-screw extruders?

Simply ask about our 3D accessories for twin-screw extruders, and build your own 3D filament production system for research and small-scale production.

Find out more at **thermofisher.com/3Dfilament**

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