Palette Multi-Material 3D Printing Guide

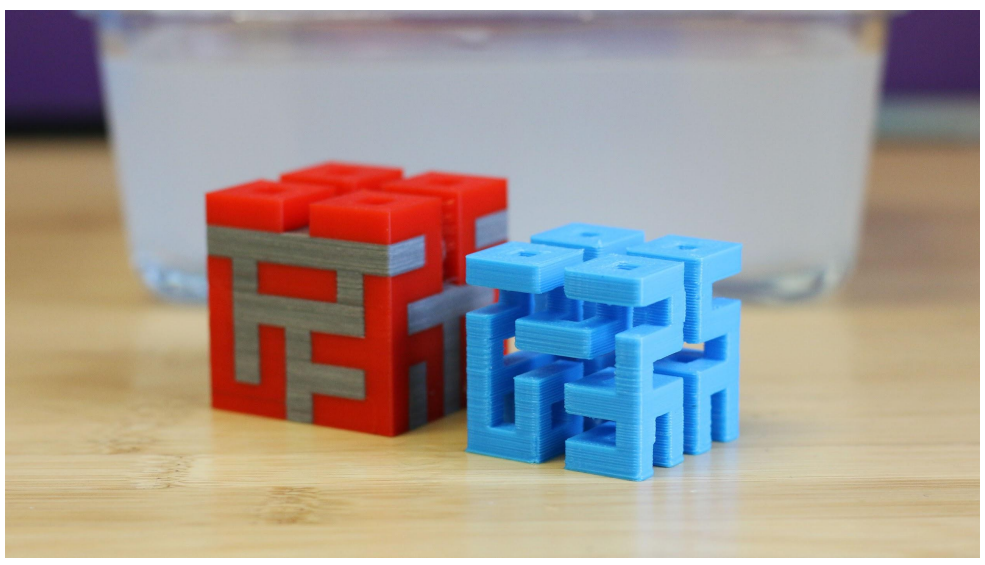
Material compatibility, print settings, tips & tricks, and best practices

Palette takes 4+ filaments and combines them into a single filament strand. This strand is then fed to 3D printers to allow them to print in multiple colors and materials! This guide shares suggested print settings and tips for using multiple materials in a single print.

Multi-Color

Settlers in Space, a Catan-style board game printed with Palette.
Files: http://mm3d.co/settlers.

Soluble



Hilbert Cubes printed with Palette using water-soluble support.
Model by “tbuser” on Thingiverse. Files: http://mm3d.co/hilbert.

Durable

Multi-color guitar picks printed in PETG for durability.
Files: http://mm3d.co/guitar-pick.

Flexible

Watch bands made from flexible TPU.
Files: http://mm3d.co/watch-band.

Material Compatibility & Suggested Print Settings (Reviewed July 3, 2018)

Palette supports different filament combinations. We're constantly experimenting to find new material combinations that work together. Share your settings or testing requests with us at filament@mosaicmfg.com. Suggested Splice Tuning settings for Palette+ can be found here and for Palette 2 (Pro) here.

Optimal print settings are different for every printer, but these values should be good to start with. If you already have good print settings with a particular material (e.g. PLA), use those settings if you are combining multiple filaments of that material (e.g. PLA + PLA + PLA + PLA).

Material Combinations	Uses	Print temp. (°C)	Print speed (mm/s)	Difficulty	Notes/Tips
PLA + PLA	- Multi-color	185 - 210	30 - 75	Standard	- Your normal PLA settings (temperature, speed).
PLA + Enabler	- Soluble (Enabler in water)	215	~50	Standard	- Your normal PLA settings (temperature, speed). - Decrease the first layer speed if you experience adhesion issues. Successful PLA + Enabler print.
PLA + Scaffold	- Soluble (Scaffold in water)	215	~50	Standard	- Decrease the first layer speed if you experience adhesion issues. - Infill ~15% (Can go lower if printer is good at bridging). More print tips here. Successful PLA + Scaffold prints: 1, 2, 3.
PETG + PETG	- Multi-color - Durable	230	30 - 75	Standard	- Your normal PETG settings (temperature, speed). - Your nozzle should be slightly further away from your bed (~0.1mm) when printing in PETG. More PETG tips here.
PLA + PVA	- Soluble (PVA in water)	215	~50	Experimental	- PVA filaments can be finnicky, and not all brands of PVA work effectively with Palette+. However, some customers are using PVA successfully with their Palette+s (example).
ABS + ABS	- Durable	230	30 - 75	Experimental	- While most ABS filaments are not effective with Palette+, one customer has been using Palette+ successfully with eSUN ABS using Palette+'s default splice settings. A few others are also using ABS.
PLA + HIPS	- Soluble (HIPS in limonene)	230	~50	Experimental	- HIPS is an affordable soluble material but requires dissolving in limonene. HIPS is pliable until it is fully cooled, so avoid removing parts until it has cooled. - Splices with PLA and HIPS look quite good.
PLA + PolySmooth	- Soluble (PolySmooth in alcohol)	215	~50	Experimental	- PolySmooth can be used as a soluble support material. It's more affordable than most water-soluble filaments but must be dissolved in alcohol (Polymaker suggests 70%+; we use 90%.) - PLA + PolySmooth splices look very good. - Heat & Compression at 1 and 1.
PolySmooth + PolySmooth	- Multi-color - Smoothable (with alcohol vapor using Polysher)	215	~50	Experimental	- Your normal PolySmooth settings (temperature, speed). - PolySmooth splices well with Palette+, but we still experience the occasional jam – it is not as reliable as PLA. We printed this vase using PolySmooth and Gradient Mode. - Polymaker recommends using a Palette+ Heat Factor of 1 and Compression Factor of 1.
PETG + TPU	- Multi-color - Functional (stiff & flexible in same print)	235	PETG: ~50 TPU: ~25	Experimental & Advanced	- A Palette+ owner has printed in PETG and TPU. More info here. - It is important to master printing TPU before combining it with other materials. TPU can be challenging to print.
TPU + TPU	- Multi-color flexible	235	~25	Advanced	- Your normal TPU settings (temperature, speed). - We highly suggest mastering printing with a single flexible filament on its own before combining multiple TPUs in Palette+. - With the modifications detailed in the Advanced/Flexibles section below, we're seeing great splices when combining multiple flexible filaments.
PLA + TPU	- Multi-color - Functional (stiff & flexible in same print)	235	~25	Advanced	- It is important to master printing with TPU on its own before experimenting with PLA and TPU together. TPU can be very challenging to print.
PolySupport + TPU	- Multi-color TPU with supports	235	~25	Advanced	- It is important to master printing with TPU on its own before experimenting with PLA and PolySupport together. TPU can be very challenging to print. - We've begun using PolySupport with TPU for models that require supports. The splices look great. We're still honing print settings.

Getting started: your first multi-color & multi-material prints

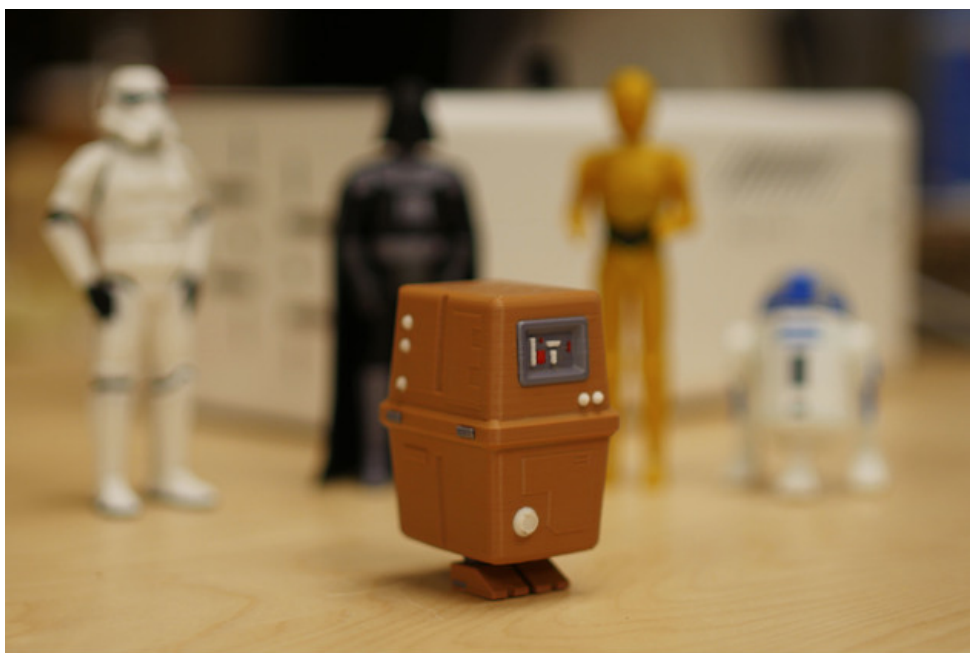
Models

Material Combinations	Models (organized by printing difficulty) Easiest <----------> Hardest
Multi-Color PLA + PLA, PETG + PETG	Citrus Coaster, Earbud Case, GONK Droid, Dragon, Parrot, Fidget Cube (Tolerances), Bookmark, Poker Chips, Fuze Planter, Settlers in Space (Lots), Cathedral (Huge), Modern Chess, Money Clip, Headphone Stand (3-Color)
Soluble PLA + Scaffold, PLA + HIPS, PLA + PolySmooth™	TV Picture Frame, Dissolvable Gears, Hilbert Cube, Ball in a Cube
Smoothable PolySmooth + PolySmooth	Earbud Case, Fuze Planter, Headphone Stand (3-Color), Money Clip, Dragon, Parrot, Hex Planter
Flexible PLA + TPU	Flexible Pliers

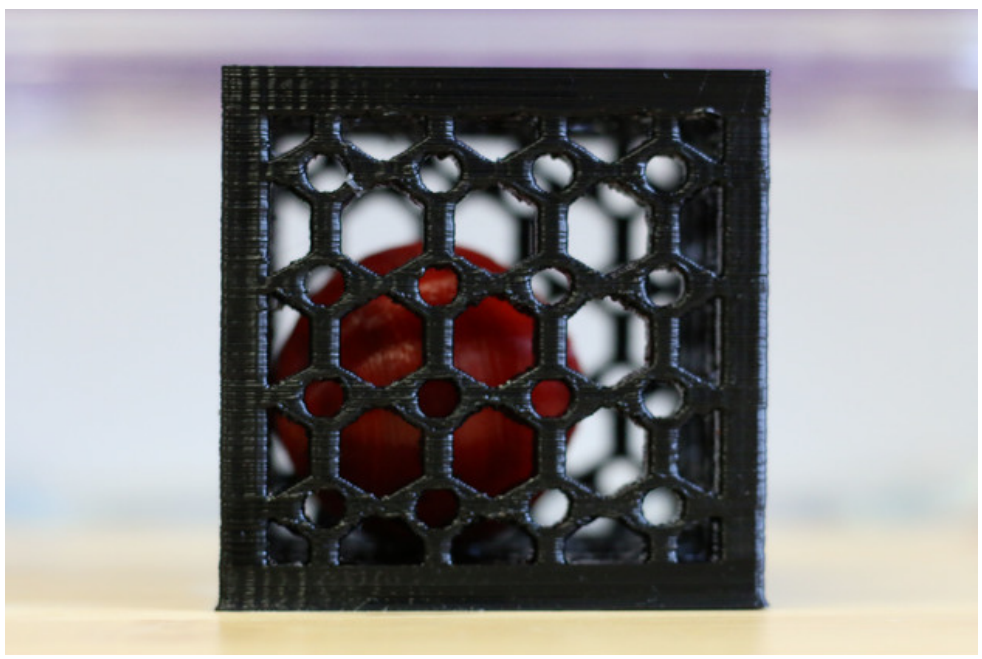
Citrus Coaster (Easy)

Modern Chess Set (Medium Easy)

GONK Droid (Medium)



Ball in a Cube (Hard)



Other places to find models & inspiration

- Multi-Filament Prints group on Thingiverse
  - http://mm3d.co/stuff-to-print
- Mosaic's PalettePrinted Twitter page
  - https://twitter.com/PalettePrinted

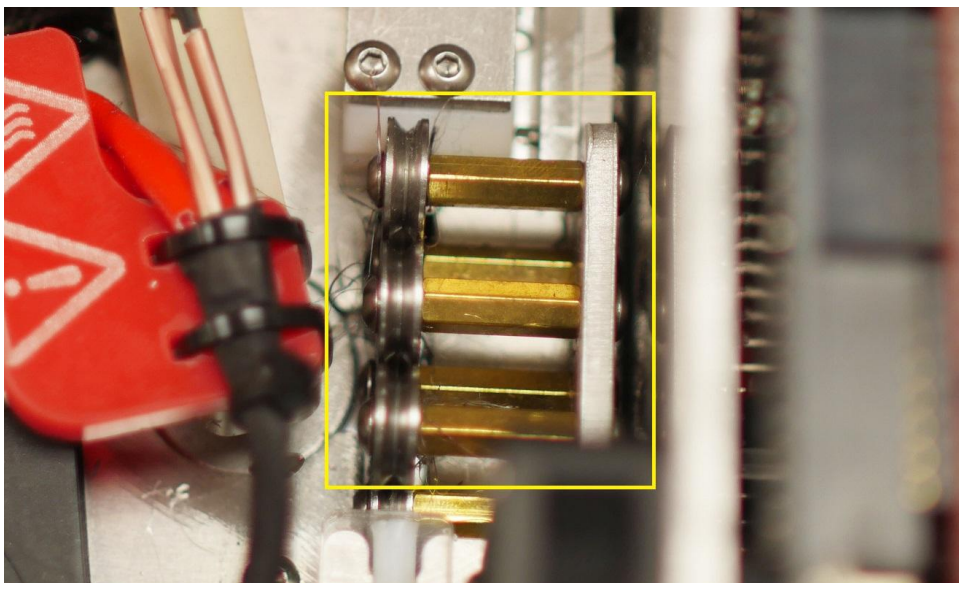
Questions? Feel free to reach out to filament@mosaicmanufacturing.com!

Advanced: Palette printing with flexibles (TPU, TPE)

If you've printed with flexible filaments before, you're probably familiar with the challenges of using flexibles (like TPU wrapping around drive gears, finding its way into every nook and cranny, and causing jams).

Palette shares some similarities with 3D printers: it has drives, drive gears and idler bearings, PTFE tubing, and other channels through which filament passes. And, as with printing flexible filaments with 3D printers, these flexible filaments can find their way into nooks and crannies in Palette.

Early versions of **Palette+** experienced these issues frequently, which led to a TPU Conversion kit that enabled users to install printable pieces to the filament path that assisted with printing with flexibles. Palette+ units shipped after January 2018 will have TPU Conversion hardware pre-installed. If you're not sure if you need to install the conversion kit, please check if your unit contains the cooling rollers (located right after the splice block). If it does, then you would need to install the TPU conversion kit:



There's no need to worry about printing with flexibles when it comes to **Palette 2 (Pro)**. The hardware has been designed to splice rigid and flexible filaments and there is no maintenance needed to create flexible splices. Here's a video of Palette 2 splicing together NinjaTek Cheetah filaments: http://mm3d.co/flexible

We've further upgraded Palette 2's hardware with the S-upgrade, with re-designed drive arms and switch positioning to help with creating consistent and reliable splices with flexibles. You can find more information about this here.

Once you have your TPU moving through your Palette effectively, you can access Splice Tuning on Palette's screen to tune and test your splices so they have the right diameter and strength. You can change the heat, compression, and cooling used in order to make the optimal splices. Learn more about *Splice Tuning* here:

- For Palette 2 (Pro) - http://mm3d.co/p2splice-tuning
- For Palette+ - http://mm3d.co/splice-tuning

Any questions? Please don't hesitate to reach out to support@mosaicmfg.com!