

# How to Anneal American Filament Tough Pro PLA+

Made with NatureWorks Ingeo 3D870 resin, Tough Pro PLA+ can be annealed after printing to further crystalize the material, improving its thermal and mechanical properties. This engineering-grade PLA is significantly tougher than standard PLA, offering 8.8x higher impact strength right off the print bed. After annealing, the impact strength goes up to 12.2x standard PLA and heat deflection temperature (HDT) exceeds that of PETG!

This innovative material delivers thermal and mechanical properties comparable to ABS, but in an eco-friendly PLA package. For unmatched performance, unlock even greater strength and heat resistance through annealing – we've included instruction in this handy guide!

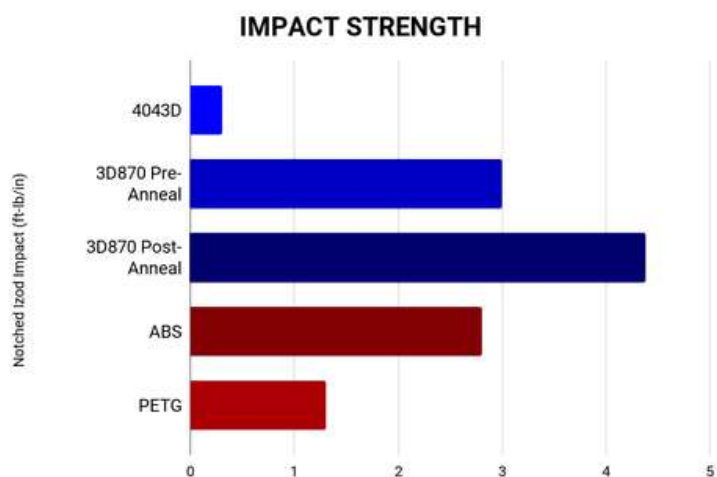


Figure 1 - Bar graph showing impact strength for a selection of 3D Printing filament types.

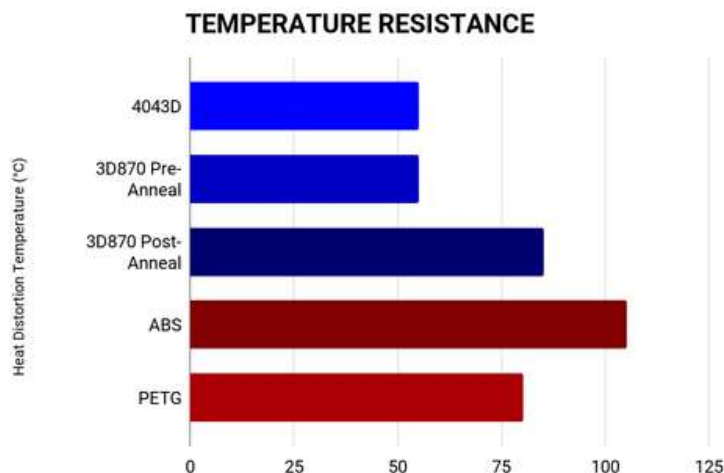


Figure 2 - Bar graph showing heat deflection temperature for a selection of 3D Printing filament types.

## How to anneal your Tough Pro PLA+ parts:

1. The most reliable method is to use either an oven or toaster oven.
2. Preheat your oven to 110 - 120°C (230 - 248°F).
3. Place your print on a baking sheet or baking dish, and place this in the oven.
4. Allow your part to anneal for 30 - 60 minutes. Parts printed with near solid infill, or many walls may require slightly longer for the heat to penetrate all the way to the core of the part.
5. Turn the oven off.
6. It is best to allow the part to slowly cool back down inside the oven, rather than removing it immediately, to prevent rapid temperature change causing warping.

\*Shrinkage and/or warping may occur; the degree of which will be dependent on part geometry.

To mitigate warpage, the part may be buried in a sand bed in a suitable container (metal or glass) prior to placement in the oven. The recommended procedure is as follows:

1. Use an oven-safe container, such as a glass or metal bowl, that is larger than your 3D-printed part and provides at least two inches of space around it on all sides (including the top).
2. Add a layer of fine sand at least two inches thick to the bottom of the container, then place your part on top. Carefully pour sand around the part, ensuring it fills all gaps and voids. Keep pouring until the part has at least two inches of sand on top.
3. Preheat your oven to 110–120°C (230–248°F) and let it maintain the set temperature for about 10 minutes to stabilize and prevent temperature overshooting.
4. Place the sand-filled container in the oven and allow it to heat for one hour. This ensures the sand has sufficient time to fully heat and transfer evenly to the part.
5. Once the hour has passed, turn off the oven and leave the container inside, allowing the sand and part to cool gradually to room temperature before removing them.