

Smooth, Concave Tray for Spinning Tops



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Summary

A novel way to print a smooth, shallow, concave dish for spinning tops on an FDM printer without layer lines.

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Tags: [tray](#) [spinning](#) [compliant](#) [spinningtop](#) [threadedinsert](#)
[concave](#)

The best way to maximize run-time for any particular spinning top is to keep it centered in a stable position by spinning it using a **shallow, concave dish with a very smooth surface**.

Simple **glass concave lenses** or magnifying bathroom mirrors are excellent for this. **Best practices** suggest a concave radius of 800 mm for a 100-mm diameter dish, or perhaps 1500 mm for a 150 mm dish. At these sizes, this amounts to only 1.4 to 1.7 mm of depth in the center of the dish.

This shallow curvature makes FDM printing poorly suited to the task if directly printed. Even using a high-detail 0.1 mm layer setting, layer lines will be evident and destabilize the spinning top.

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I set out to solve this with a mildly-compliant multi-part design. The upper spinning surface (i.e., the “dish” part) is printed **flat**, upside-down, on a build plate. The dish's graduated thin-wall geometry and a threaded insert at the center of the underside allows it to be deflected into a concave shape with an M3 screw tightened against the stiff plate underneath (i.e., the “base” part). An outer ring can additionally be glued into place around the upper surface as an accent – it also helps to retain unruly spins.


The hole in the underside of the dish is sized for an M3x4mm brass threaded insert. I used [these ones](#). Be cautious scaling this part to other overall dimensions – the threaded insert dimension may need tweaking to a compatible size.


For flexibility, I recommend printing the dish in PETG. Use a satin plate (instead of “textured”) for the best finish compatible with PETG. Don't use a PEI-coated smooth plate!


For stiffness, I recommend printing the base plate and ring in PLA.


No supports are required.

Model files

 **150 mm Diameter (M3x4 Insert)** 3 files

**150-mm-spinning-tray-dish.stl**

**150-mm-spinning-tray-base.stl**

**150-mm-spinning-tray-ring.stl**

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