



LIVING HINGES

Flip top cap

OVERVIEW

Living hinges are features integrated into a part to facilitate opening and closing. They are typically manufactured in an injection molding process that creates a single part with the features integrated.

A living hinge is a thin flexible hinge (flexure bearing) made from the same material as the two rigid pieces it connects. A living hinge is typically designed to flex more than a million cycles without failure and lasting throughout a product's lifetime. Polyolefins, specifically Polypropylene, are considered the ideal materials because they flow well through thin areas and do not stress crack when flexed.

Living hinges can be found in many common product designs, such as:

- Food packaging (condiments, sauces, candies)
- Cosmetics (makeup compacts)
- Toiletries (shampoos, liquid soaps, body wash)
- Clips & clasps (wire harnesses)
- Reusable packaging (containers, enclosures)

WHY 3D PRINTING? | WHY THE FREEFORMER?

Living hinge designs are challenging and need to be tested before committing to build a mold. The hinge normally allows a part to fold or bend from 1 to 180 degrees. If the plastic is too thin, it may tear. However, if it is too thick, the part may fracture. Testing your design by creating a functional prototype is necessary to avoid costly mistakes.

Common testing methods are to create a prototype mold. These types of molds can usually be produced faster and are cheaper than the final mold for series production. However to get a part in hand can still take weeks and cost thousands of dollars.

More companies are turning to 3D printing for a faster, more cost effective way to get a test part. The ability to 3D print the best material for the application makes the freeformer the right tool for living hinge prototyping and testing. Processing polypropylene on the freeformer allows users to print living hinges without augmenting the original design. These 3D printed hinges can withstand thousands of cycles or more.



Flip top cap prototype
printed on the freeformer



EXAMPLE: FLIP TOP CAP

A well-known packaging company challenged ARBURG to cut their prototyping cost and time for a new flip top cap design. The company needed ten prototype parts to show the design to their customer. Functional performance was an important part of the new design, so the hinge needed to work properly.

The manufacturer typically uses an online prototype molding company that creates an aluminum mold and shoots the ten parts. Delivery is usually within ten to 14 days. The average molds cost from \$5,000 to \$7,000,

with the per part cost being quite low. This particular job was quoted at \$5,134 for an aluminum mold and ten parts with a delivery time of ten days.

ARBURG was able to use the 3D files for the freeformer with no file augmentation and print the ten parts from LyondellBasell Adsyl 5C30F Polypropylene in 35 hours. The parts were delivered to the customer in two days at a significantly lower cost. By speeding up part delivery, the project was green-lighted a week early.



Method	Cost	Time
Aluminum mold	\$5,134	10 days
freeformer	\$380	2 days
Savings	\$4,754	8 days

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