Freeform Injection Molding PepsiCo Bottle Cap

PEPSICO

The Bottle Cap

THE CHALLENGE

Conventional tooling lacking design freedom and speed.

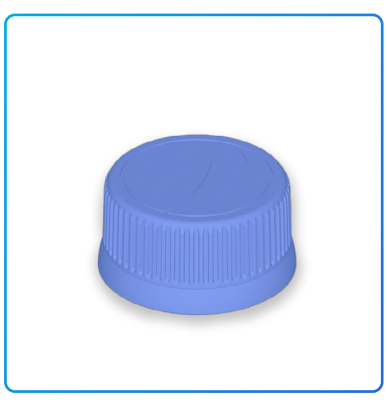
THE SOLUTION

3D printed tooling enabling unseen speed and design freedom in the desired customer specific materials.

A classic bottle cap for your beloved Pepsi. The material used for this project is PepsiCo blue HDPE.

Part design

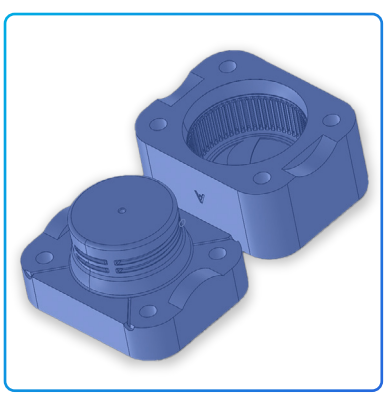
Part Design



A bottle cap design often comes in unique brand-specific designs with the added challenge of critical features around the inner part of the cap.

60 minutes

Mold Design



After the design is completed, the digital design (STEP file) in converted into a mold design which is done by inverting the part into a cavity, in a block of material, and then adding the inlet gate(s) and initial venting.

The 2-part initial design allows for quick visual Quality Assurance.

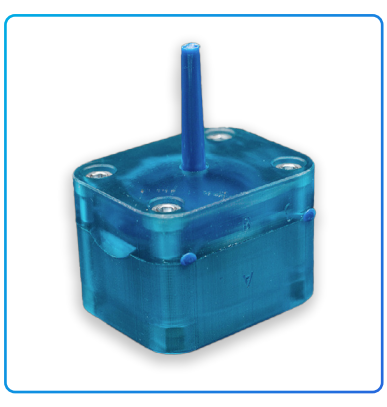
24 minutes

Printed Tooling

The molds were printed at a 100µm resolution to ensure good mold quality while optimizing the build for fast production.

5 minutes

Freeform Injection Molding (FIM)



The parts were molded on a 7-ton Babyplast. However, the molds work hand-in-hand with any installed base molding unit.

An aluminum mold frame was used to hold the assembled mold, cycle time per part was around 5 minutes, and 1 minute cooling time was needed after each shot.

1 day

Demolding

The Nexa3D alkaline solution was used for demolding these parts in just one day.

This time can be optimized through mold re-design, by removing a part of the mold before demolding, or direct removal of the part if possible.

Total time to injection molded part:

89 minutes + 1 day of demolding

Observations

- The mold design is an easy process; similar to building a mold box around the design, and then make it a cavity.
- The PepsiCo blue HDPE material filled the molds nicely. We tested other materials as well such as PEEK and carbon-filled nylon.
- Optimization of the demolding process is recommended when running further iterations. The more material that can be removed or reused, the faster the process will be.
- Standard material data used for molding, settings, pressure, temperatures, and more.
- Early hands-on testing for verification of assembly and performance using first-out-of-tool parts is valuable for most team members.

  This includes materials, design, process, and regulatory compliance.

  Should you need, the Freeform Injection Molding process enables further same day iterations.

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