Freeform Injection Molding in the automotive industry

Performance car cable bracket

THE CHALLENGE

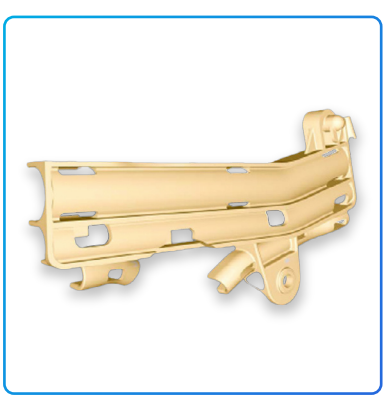
Insufficient spare parts inventory.

THE SOLUTION

Use FIM to produce spare parts using customer-specific material, BASF Ultramid® 30% glass-filled PA66.

Part design

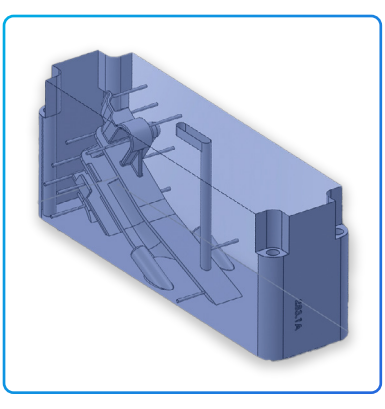
Part Design



This part design was provided by a premier global automotive manufacturer based in Germany. For FIM, STEP files are preferred.

60 minutes

Mold Design



The next step is converting the STEP file 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.

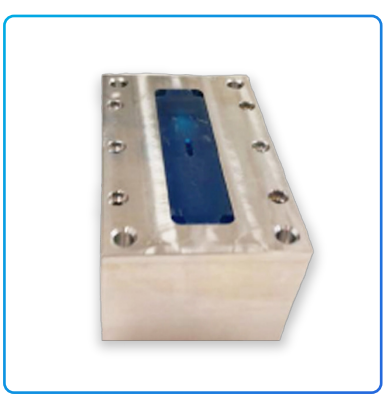
2 hours

Printed Tooling

The part design was large, so the mold was split into 2 mold units and assembled.

5 minutes

Freeform Injection Molding (FIM)

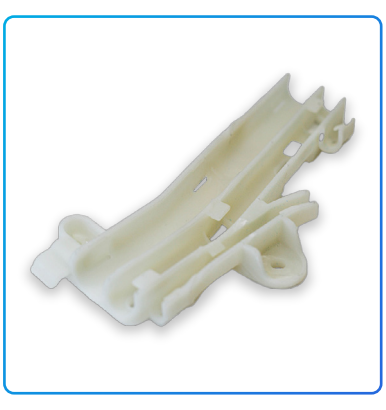


The parts were molded on a 50-ton press. FIM molds work hand-in-hand with any installed base molding unit.

An aluminum mold frame was used to hold the large mold assembly in place.

1 day

Demolding



The Nexa3D alkaline solution was used for demolding these parts, over a 2.5 day period.

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

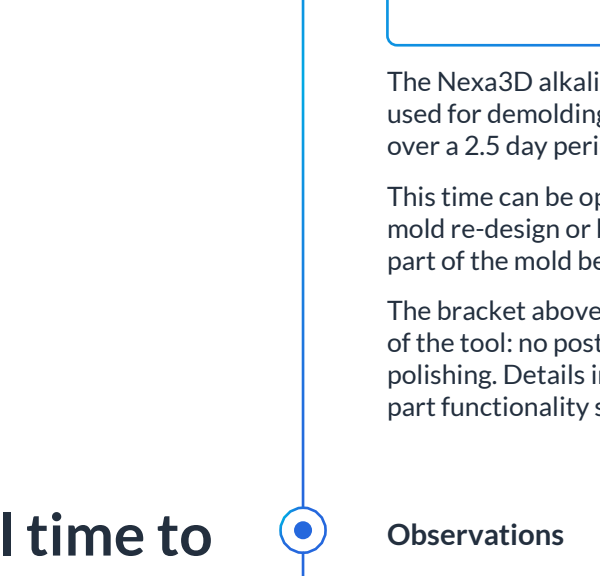
The bracket above is straight out of the tool: no post-processing, no polishing. Details in the design and part functionality stand out clearly.

Total time to injection molded part:
3 hours 5 minutes +
1 day of demolding

Observations

- The mold design is an easy process.
- The material (BASF Ultramid®) fills the molds nicely in the first test rounds.
- Optimization for demolding is always a good thing, improving subsequent iterations.
- Datasheet materials were used for molding data, settings, pressure, temperatures, and more.
- Iterating the design, changing materials, or both, based on obtained results are just some of the benefits from working with Freeform Injection Molding.

Live testing for 9 weeks:
3 days after receiving part design



THE RESULT

The parts were mounted in a range of high-end sports cars.

- The part is located directly on top of the turbo charger in the engine area.
- Multiple parts were live-tested for more than 9 weeks including:
  - Extreme temperature conditions.
  - Humidity testing.
  - UV exposure.
  - Various vibratory conditions.
  - Mechanical performance testing.

The parts passed all tests.

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