



APPLICATION BRIEF

PolyJet for Silicone Molding

Overview

Silicone molding — also known as room temperature vulcanizing (RTV) molding — creates finished products for prototyping, functional testing and short-run production. Considering tool life and cycle times, it is ideal for small quantities (25 - 100 castings) because it offers lead times and costs that are well below that of machining or injection molding.

Silicone molds are made by pouring silicone rubber over a pattern. After curing, the resulting firm but flexible mold can produce parts with extremely complex geometry, intricate detail and tight tolerances. The parts are cast from a silicone mold made with thermoset materials (commonly urethanes) that are available with a vast array of mechanical, thermal and electrical properties.

Application Outline

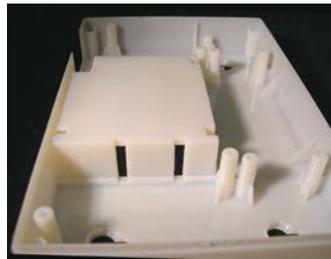
The traditional silicone mold-making process uses a machined pattern made of plastic, wood or other materials. This method is often expensive and time consuming, and as pattern complexity rises, lead time and cost also increase.

PolyJet™ 3D printing technology is an innovative alternative to machining patterns for silicone mold making. It builds patterns layer by layer, using data from computer-aided design (CAD) files. With its inkjet-like process, PolyJet delivers extremely high-resolution patterns with smooth surfaces.

As a result, PolyJet patterns are typically mold-ready and have subtle details that can be transferred to the urethane castings. For high-gloss or clear finishes, a little polishing is all that is needed. Additionally, complex and intricate patterns can be made without adding time, cost or challenges to the design process. With PolyJet, silicone molds can be ready to make parts in as little as 24 hours.



Silicone mold with PolyJet 3D printed pattern.



Smooth surfaces and crisp details make PolyJet patterns mold-ready.



A silicone mold pattern and mold box are ready for pouring.

BENEFITS OF POLYJET
Average lead time savings: <ul style="list-style-type: none"> • 70% – 90%
Average cost savings: <ul style="list-style-type: none"> • 30% – 85%
Quality: <ul style="list-style-type: none"> • Smooth, nearly mold-ready surfaces • Fine textures and details • Complex, intricate designs
Efficiency gains: <ul style="list-style-type: none"> • Automated pattern-making • Little or no pattern preparation

POLYJET IS A BEST FIT
Quantity: <ul style="list-style-type: none"> • Small volume (5 – 250 castings)
Size: <ul style="list-style-type: none"> • 6 mm – 300 mm (0.25 in – 12 in)
Design: <ul style="list-style-type: none"> • Complex, intricate and highly detailed
Revisions: <ul style="list-style-type: none"> • Design modifications are likely.
Multiples: <ul style="list-style-type: none"> • Family or duplicate molds for multi-piece casting

POLYJET FOR SILICONE MOLDING

For larger quantities of castings or multi-part assemblies, family molds are ideal. These multi-cavity tools can produce several pieces with each casting cycle, but each cavity needs its own pattern. Since machined patterns are made in a series, the mold is delayed. Numerous PolyJet patterns — as long as they don't exceed the capacity of the 3D printer — may be produced in one build, and at a fraction of the time required to make them individually.

Customer Story

Over the past 50 years the Adler Trio has become the leading harmonica group in the world. To add richness and vibrancy to its performances, the trio wanted to employ custom harmonica amplifiers.

The amplifiers went through several design iterations, each accompanied by a PolyJet 3D printed prototype. Then, because only 10 finished amplifiers were needed, the designers chose to create them using silicone molding and a PolyJet pattern rather than CNC machining.

The first amplifiers were ready to use in less than a day — and at cost which was 80% less than that of CNC — without sacrificing any details in the housing design. Every rib, boss, attachment point and style line was preserved. Plus, the trio's signature logo was as crisp and sharp on each piece as the music it would later amplify.

Today, the Adler Trio custom harmonica amplifiers can be seen and heard during all of their worldwide concerts.



Raw urethane castings from a silicone mold.



Concert-ready harmonica with silicone-molded amplifier.

POLYJET FOR SILICONE MOLDING

How does PolyJet compare to traditional methods for Adler?

METHOD	COST	PRODUCTION TIME
CNC	\$1,000	14 days
PolyJet	\$100	0.5 day
Savings	\$900 (90%)	13.5 days (96%)

BENEFITS

Forward-thinking designers and manufacturers of plastic parts that use silicone molding.

Applications:

- Functional prototyping
- Sales and marketing samples
- Low-volume production

Characteristics:

- Thermoset resins are desirable or acceptable.
- Possess or have access to silicone molding assets.
 - Expertise
 - Tools and equipment

Traditional technology obstacles:

- CNC machining is cost or time prohibitive for:
 - Patterns
 - Injection molds

REFERENCE COMPANIES

Damvig Develop
RAPID PROTOTYPING SOLUTIONS

Nypro
Healthcare

Design Reality
ideas at work

Application compatibility: (0 – N/A, 1 – Low, 5 – High)

- PolyJet: Design (5)
- FDM®: Idea (2), Design (3), Production (3)

Companion and reference materials:

- Technical application guide – Document
- Application brief – Document
- Video
 - Commercial
 - Success story
 - How It's Used

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