

A SOUND SOLUTION



3D Printing Improves Harmonica Trio's Look and Sound

"With PolyJet patterns and RTV molding, we were able to produce amplifier housings that make it easier to play the harmonica, sound better and look much more professional."

— Dror Adler, Adler Trio

Michal Adler-Gronich playing a harmonica with the finished amplifier.

The Adler Trio is an integral part of Israel's cultural scene and its members regarded internationally as harmonica virtuosos. Their music can be heard all over the world in concert and on their many albums.

But one of the difficulties of performing with a harmonica is holding the microphone while also using both hands to play. This can be tiring during a prolonged concert and increases the risk of the musician missing a note. Another related problem is that the microphone tends to pick up interfering sounds from the mouth and nose.

Harmonious Solution

Dror Adler, founder and musical director of the Trio, first attacked these problems decades ago by hand-building a device made of wood and metal to affix the microphone to the harmonica. Later, he added noise-cancelling electronics to muffle conflicting noise. Although the resulting amplifier did the job, it didn't look very professional and had a tendency to come apart at inopportune moments.

After other harmonica players saw Adler using the devices, and asked him where they could buy their own, he began to consider producing a more polished product. He spoke to an engineer who recommended room temperature vulcanization (RTV) molding — the process of creating a mold by pouring liquid silicone rubber over a pattern, also called silicone molding — to construct an enclosure that would attach to the harmonica, hold the microphone, and accommodate the necessary electronics. The resulting mold could then be used to make housings with extremely complex geometry, intricate detail and tight tolerances.

How does the PolyJet 3D Printer compare to traditional methods for Adler?

Method	Production Time	Cost
CNC	14 days	\$1,000
PolyJet	0.5 day	\$100
Savings	13.5 days (96%)	\$900 (90%)



The 3D printed pattern (below) with the urethane cast part (top).

Patterns used in silicone molding are traditionally produced by CNC machining, but this approach is expensive and time-consuming because new patterns are needed for each design change and model, and to replace worn-out molds. In this case, the engineer estimated that one pattern would take in two weeks and cost \$1,000.

Fast, Precise, Affordable

The engineer connected Adler with Erez Rapid Prototyping service bureau in Holon, Israel. "We use several different rapid prototyping technologies, but selected a PolyJet™ 3D Printer to build the pattern because the ultra-low layer thickness creates fine details and smooth surfaces right off the printer. Plus, the dimensional accuracy of the resulting mold would also provide a precise fit," said Erez Sherman, president of Erez Rapid Prototyping.

An initial pattern was produced in about four hours at a cost of \$100. The service bureau then produced the RTV mold and created the finished parts.

"PolyJet 3D Printing technology was the ideal solution for the production of these molds because it provided excellent surface quality, high accuracy and fine details," Sherman said.

Adler added, "With PolyJet 3D printed patterns and RTV molding, we were able to produce amplifier enclosures that made it easier to play the harmonica, sound better and look much more professional. In addition, we have also sold a substantial number of these microphone holders to other harmonica players around the world."



The silicone mold just after casting with the molding pattern.



The urethane cast part with vents and runner next to the PolyJet master (top).



Urethane cast parts after initial painting.



The final product after finishing, painting and assembly.

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