Conquering Hurdles in Fabrication with the Mark One

Comparing the Numbers

<table>
<thead>
<tr>
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<th>Cost</th>
<th>Time</th>
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<tbody>
<tr>
<td>Markforged Tool Changer</td>
<td>$84.07 (material)</td>
<td>54 hours</td>
</tr>
<tr>
<td>Machine Shop - Aluminum</td>
<td>$1,058.25</td>
<td>72 hours + shipping time</td>
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</tbody>
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Markforged printer paid for itself in 9 parts; cut lead time from 3 months to 1 week

The Road Less Traveled

Steep climbs, off cambers, drop offs, gap jumps, are only a few of the many treacherous obstacles RC Rock Crawlers regularly traverse during competitions. Unlike the traditional remote control (RC) car, designed to rocket around tracks at high speeds, a RC rock crawler is “slow and precise, almost like a robot,” says Rob Bradshaw, who runs Superstition Machine Works. A mechanical designer for ten years, Bradshaw started SMW out of a desire to fabricate all of his designs: “I needed a way to make actual parts, and that prompted me to get some hobby grade machine shop equipment in my garage. I started with a lathe, and then got a mill, and proceeded to CNC it as well.” He now fabricates custom RC car parts.

Passion

Rob Bradshaw, head of Superstition Machine Works, specializes in custom machined parts for hobby remote control rock crawlers

Perseverance

Running a shop out of his garage, he spends weeks upgrading his machines and sometimes months making specialized parts for the vehicles

Perfection

Using the Mark One to make anything from fixtures to final products, Bradshaw’s turnaround time has decreased from weeks to days
While most RC cars are made out of plastic for weight conservation and ease of manufacturing, rock crawler parts frequently need to be machined from aluminum or steel so that the cars can handle the rough terrain of the obstacle courses they usually compete in. “At SMW, we specialize in RC rock crawlers. What I like about those is there are very few rules, and you can really push the envelope with parts that you design,” Bradshaw mentioned when describing his niche market. The vehicles can take many shapes and sizes, so rock crawlers tend to be a bit more diverse than your standard RC cars.

Overcoming Obstacles

“My time is limited to spend out in the garage making parts.” Bradshaw explained. “When I only had my CNC mill, I would have to set up and run all the fixturing before I could ever actually make anything... a simple project would take 3 months because it would take so long to fixture it.” As a hobbyist, Bradshaw couldn’t commit all of his time to his fabrication, and each part requires time to make not only the part itself, but also the mounts for the part in the machine. With orders piling up for components, Bradshaw needed a way to vastly decrease his production turnaround time.

“So when demand for the link mounts started to pick up again I set out to find a simpler and easier way to produce them. With my Mark One, I was able to print the raw material, which included 16 parts, and also the fixturing to machine them.”

-Rob Bradshaw
Founder
Superstition Machine Works
After a first look, Bradshaw was sceptical of the Markforged printer: “I figured it was possibly a gimmick, and I moved on”, he explained. But after reading about how it could be used to improve machine shop efficiency, he realized its potential. "I saw the Mark One in Modern Machine Shop Magazine, and it was an article about real shops using the printer to make real parts and fixtures.” With parts eating up his time just because of how much setup was required, the Mark One was the perfect solution. A popular part Bradshaw often had to manufacture was an angled link mount for an axle housing. “They were CNCed from aluminum on my mill, took three setups and the fourth axis to complete the parts. They are very labor intensive parts to build,” said Bradshaw. “So when demand for the link mounts started to pick up again I set out to find a simpler and easier way to produce them. With my Mark One, I was able to print the raw material, which included 16 parts, and also the fixturing to machine them.”

Climb to the Top

Because of the rough terrain rock crawlers have to drive in, the Markforged printer helped in other ways as well. It provided Bradshaw with not only the means to make fixtures for custom parts, but also to make strong parts to support the frames of his rock crawlers. “The first fiber reinforced part I printed was a skidplate for an RC car chassis,” he explained. “A skidplate for an RC car is basically the foundation on which the rest of the chassis is built from. It’s important for an RC car to have a strong skidplate to reduce torsional flexing.” With his Mark One, Bradshaw can now print parts that have the strength and rigidity of metal but the weight of plastics.

“The Mark One has allowed fixturing to become easy. My time out in the shop is greatly reduced and projects get done much faster.”

- Rob Bradshaw
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From designing brackets for a butterfly drawbar adaption on his CNC mill, to fixtures for machining axle housings, to RC car skidplates, the Markforged printer has allowed Bradshaw to simplify his designs, making his parts easier to manufacture and optimized to their applications. “The Mark One allows SMW to design and test far more parts than I could previously do with CNC equipment alone,” Bradshaw described. “My time out in the shop is greatly reduced and projects get done much faster.” The simple setups, reliable, strong parts, and quick turnaround time all make the Markforged a huge asset at SMW, and it has allowed Bradshaw to make more than he ever could before.

“When I first got my Mark One I had no prior 3D printing experience. The first part I made was just a simple little keychain, and it was amazing just how easy it was to make a part with the Mark One.”

- Rob Bradshaw
Founder
Superstition Machine Works