

**APPLICATION SPOTLIGHT**

# Tools and Fixtures



## 3D Printed Vise and Soft Jaws

Lean Machine is a metal fabrication job shop in Saskatoon, Saskatchewan, specializing in custom machining with a 5-axis CNC mill. A job for a customer required Kurt vises to hold a component while the mill cut the part. To avoid collision between the mill head and the vise, the stock would have to be clamped 12-14 inches from the cutting area. This was not an acceptable option, as a cantilevered part takes longer to machine and results in a less accurate cut. The team considered building their own metal custom vise, however they could not justify the \$6,000 price tag.

The addition of a Markforged Mark Two led Lean Machine R&D Engineer Josh Grasby to use 3D printed components to build a cost-effective, custom vise/soft jaw combination. Comprised of over two dozen 3D printed continuous carbon fiber reinforced components combined with off-the-shelf parts, Lean Machine's custom printed vise can clamp 1.5 inches from the end of the extrusion, as opposed to 12-14 inches. The company has since taken on more complex jobs, all while applying a design for additive manufacturing approach to solving other problems they come across.

	Time	Cost
Traditional	3 weeks	\$6,000
Markforged	1 week	\$1,500
<b>Savings</b>	<b>66%</b>	<b>75%</b>



Lean Machine CNC is a metal fabrication shop in Saskatoon, Canada, working primarily for the commercial transportation and mining sector.

### Challenge

Engineers needed to mill cantilevered workpieces, which meant that they had to control media removal.

### Solution

The team used its Mark Two to create a low-profile custom vise and soft jaw combination.

### Results

Complex workpieces, such as the cantilevered steel, can be accurately mill without wasting any material.

### + Non-Marring Material

Continuous carbon fiber holds up against cutting fluids and abrasive environments, making it the perfect material for machine shops.

### + Accurate Parts

Markforged's cloud-connected software ensures your parts are printed accurately, leaving no room for guesswork.

### + Speedy Process

Markforged 3D printers provide users with parts in a fraction of the time it takes for traditional processes.