

A close-up of the superior-quality forming piston printed by a 3D Systems ProX 500 SLS 3D printer.

Idaho Steel embraces 3D printing to deliver superior-quality parts faster

Manufacturing of key production parts reduced from 25 to 4 days; SLS 3D printing enables design for superior strength and durability

Idaho Steel is a machine fabricator. Not too different from others worldwide, except that it serves a unique industry and has embraced 3D printing as a way to very quickly manufacture one-of-a-kind parts for its machines.

Idaho Steel purchased a 3D Systems ProX 500 SLS 3D printer to manufacture key production parts for its fabricating machines. The ProX 500 produces ready-to-use functional parts and complete assemblies for a variety of aerospace, automotive, medical, consumer and industrial machining applications. It uses DuraForm ProX, a durable nylon material, to produce components that equal or surpass injection-molding quality.

“SLS 3D printing enables us to design for superior strength and durability,” says Jon Christensen, marketing and sales manager at Idaho Steel. “For those new to it, the idea of ‘printing’ parts may not convey the fact that when finished, these parts are solid plastic. Parts can also be designed for added strength in ways that are not possible through traditional machining.”



The redesigned forming piston printed by 3D Systems ProX 500 printer is faster to manufacture, more durable, and safer for food processing.

Emphasis on quality

Established in 1918 in Idaho Falls, Idaho Steel manufactures, maintains and customizes machines used to render potatoes in an almost infinite variety of sizes and shapes. If you’ve had french fries, potato salad, mashed potatoes or tater tots recently, odds are they were produced with an Idaho Steel machine. According to the company, it’s not uncommon to find Idaho Steel equipment that was manufactured in the 1960s in full-time operation around the world.

Idaho Steel’s emphasis on customization and meeting its varied customer needs makes it a perfect fit for production-quality 3D printing.

“We needed to come up with a way to build shapes quickly for our customers,” says Alan Bradshaw, Idaho Steel CEO. “We studied the alternatives and made a decision to purchase the 3D Systems machine. Since then, we’ve printed hundreds of parts out of that machine to use in our machines.”





3D-printed forming pistons installed on an Idaho Steel Nex-Gem Former machine.

From the beginning, it was understood that Idaho Steel would make no compromises in quality for the sake of speed.

“We are big on the quality of equipment we send out with our name on it,” says Christensen. “We are a full fabrication shop and while our competitors may be more dependent on sub-contractors, we control how individual parts are made and come together. 3D printing gives us more control over individual parts, which in the end helps us deliver superior equipment in a much faster timeframe.”

Better product, dramatically less time

One of Idaho Steel’s prime applications for 3D printing is customizing forming inserts and pistons for its Nex-Gem Former machine that forms potato products in different shapes. The forming inserts and pistons were formerly made from five parts, machined out of plastic and held together with 25 or more fasteners. Using multiple CNC operations and manual assembly, it took up to 250 hours—25 work days—to complete a set of 16 forming pistons.

Idaho Steel now makes the same number of parts in 90 hours of virtually unattended, continuous run-time on the ProX 500 machine.

“The machine can work through the night or over a weekend and the forming pistons require only about three to four hours of manual labor,” says Christensen. “Not only does 3D printing save time, it also frees up the CNC machines that would be tied up doing this job for 25 days.”

The forming insert and piston are made by the 3D printer as a complete, single assembly using 3D Systems’ DuraForm ProX material.

“A lot of the strength and durability of our SLS 3D printed parts is a result of 3D printing eliminating the manufacturing limitations of CNC mills,” says Christensen. “Typically the weak points or the potential problem areas are where pieces had to be bolted together because of those limitations.

“Perhaps a bigger advantage of the ‘one-part’ approach is the sanitation benefit. We produce food manufacturing equipment. Anywhere we can remove harborage areas and eliminate potential contamination risks such as fasteners is a huge plus. Also, there is always the human factor where fasteners can be over-tightened and damage parts.”

Enthusiastic 3D printing adopters

Another part that Idaho Steel transformed with 3D printing is a housing for a laser that detects the material level of a hopper or bin and relays it to the control system. Manufacturing of this part was previously outsourced to another company, but the quality was not meeting Idaho Steel’s standards.

Idaho Steel began printing the part on the ProX 500, yielding major improvements. The opening at the top was made larger for easier access to the sensor, corners were rounded, and the housing was made as a single part with a plastic chain connecting the screw-top cap to the housing so it will not be misplaced when the sensor is being accessed.



Idaho Steel used the 3D Systems ProX 500 to redesign a housing for easier access to the laser sensor inside.





“New ways to create better parts with 3D printing are always presenting themselves, adding much greater flexibility to our processes,” says Christensen. “We are making new scrapers, caps and plugs all the time. Those are not glamorous, but they would normally tie up the CNC mills for a simple but time-consuming part to machine.”

Christensen sees 3D printing and CNC as complementary tools for creating new parts: 3D printing is ideal for prototyping new designs, creating better low-volume parts and assemblies, and customizing new parts for existing machines. CNC is still the go-to option for simpler designs or larger parts produced at a higher volume.

“Our machinists have been some of the most enthusiastic adopters of 3D printing and are interested to see what the 3D printer can do and how it can be used to our advantage. They are coming to us with parts they feel may be better if 3D printed.”

Limited only by imagination

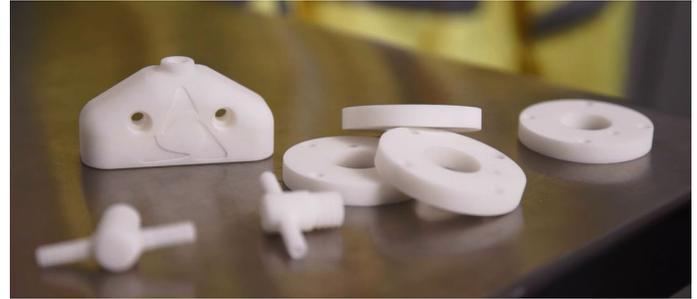
Christensen says that while Idaho Steel produces specialized machines, almost any machine shop can benefit from 3D printing, especially when it comes to the all-important imperative of delivering a quality part on-time under strict deadlines.

“One of the machining industry’s greater obstacles is lead time,” says Christensen. “A customer may have a preference for a supplier of a certain piece of equipment but if that supplier is unable to deliver in time for a project the customer will have to go another way.

“A good example of lead-time pressure is our forming pistons. When our customers get approval for projects they need these pieces, which could be any shape you can imagine, right away. Some of the shapes are fairly complex and could take up to a month to CNC machine, but we can reduce that time to a week with the ProX 500.”

Faster delivery, better quality, greater customization, more reliability -- these are things with which any machine-making company can identify, no matter what specialty products its machines produce.

“We are no longer limited by our standard and traditional machining tools,” says Idaho Steel CEO Bradshaw. “We are only limited by the imagination and creativity of our design group.”



A few of the parts that Idaho Steel has redesigned for 3D printing to provide greater strength, durability and utility.



Idaho Steel's ProX 500 printer in operation. “We are only limited by the imagination and creativity of our design group,” says CEO Alan Bradshaw.



Alan Bradshaw, CEO of Idaho Steel, holds a stronger, more durable forming piston produced more than six times faster by the ProX 500 SLS printer from 3D Systems.

