CASE STUDY

Deep Draw Stamping: Developing Parts for Sustainable Function and Metallurgy Troubleshooting

By Brad L. Hankin, Customer Service Manager

Abstract

A leading manufacture that designs and builds gerotors for use as pumping and motor elements contacted Larson Tool & Stamping Company to help in the development and deep draw stamping of parts. After the first production run, there were concerns about the surface roughness of the inner cylinder failing. Larson sought the solution, a new recipe for the material, and created viable, sustainable relationships and products for all parties.

Larson Tool & Stamping Company

For almost 100 years, Larson Tool & Stamping Company has been a valued supplier of precision metal stampings and assemblies to hundreds of U.S. companies. It offers a wide range of capabilities—including forming, stamping, deep drawing, assembly, brazing, painting, coining, and more. Larson delivers high-quality, cost-effective solutions and does so from design inception through building, testing, and producing parts. Notably, Larson guarantees the tool used in making the part for the life of the product.

Case Presentation

Larson completed the first production run for a standard deep draw project with a company that manufactures gerotors. After the first run was successfully completed, there were concerns that the critical surface roughness requirement of the inside tube (ID) could fluctuate on future runs, depending upon different material lots and mill suppliers.

The solution: Larson created a partnership with a metallurgist and a mill to custom-produce a material (ongoing) that guarantees Larson's ability to provide the critical requirement each and every time the part runs.

Standard Protocol

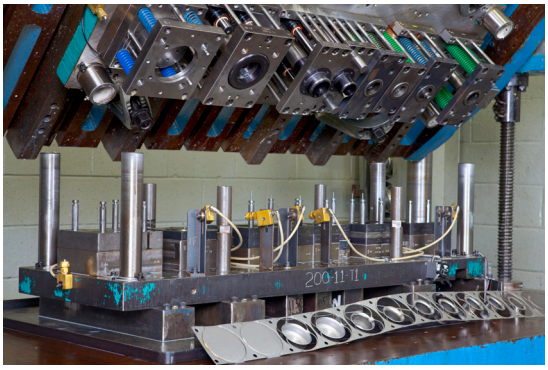
To fully understand the complexity of this situation, it is important to know the standard protocol that is followed in similar instances. Typically, Larson is provided a drawing, then collaborates with the customer's engineering team to verify their needs. Once these steps are satisfied, the work is priced out. After the work is awarded, samples are made by locating and securing a material from a vendor that has a small lot of material that can be used to produce the parts.

Once the samples or PPAP is approved, the common practice—when seeking large quantities (literally tons) of metal from a materials supplier—is to get them from a large, integrated steel mill. Large mills have massive amounts of material available, and generally at reasonable market prices. A couple of caveats with buying from a big mill are that customers (like Larson) take what the large mill stocks: standard metals are available; the material needs to be bought en masse and up-front; and metal is processed in standard ways, also running through rollers multiple times. The latter of these points plays into one of the major breakthroughs Larson needed to ensure the metal was able to withstand the surface roughness requirements of the part.

This particular mini mill was able to troubleshoot the situation, create the recipe for the metal, and process it in a way that produced—and continues to do so—the right roughness for the part.

Production Phase

Upon establishing all the above criteria relative to this customer engagement—engineering approvals, drawings, pricing, materials vendor, and plating—Larson began production on this part. The first run was successful and the customer was pleased with the part. Larson stamped around 10,000 pounds (approximating 55,000 parts). There were, however, concerns on the subsequent run that the surface roughness requirements of the ID were not being met. It was a deep draw stamp, so there was a deep inner cylindrical dimension to the piece, which is a difficult area on a part to test for surface roughness. Finding the solution to this lead Larson down a new, and productive, path.



Change of Plans

The metal needed to be changed. Because the integrated mill could only provide its existing stock, Larson knew that going back through this route would prove unfruitful. Larson received a recommendation from a trusted vendor to seek a metallurgist from a mini mill in North Carolina.

Mini mills had not previously been part of Larson's supply chain. (This one now is.) As their moniker suggests, mini mills are smaller, and are also generally more cost effective, less complex, and more efficient than integrated mills. Because mini mills can adapt the mixing and processing of metals for different jobs and only roll the metal once, the metallurgist can guarantee that the surface roughness is made to specification.

This particular mini mill was able to troubleshoot the situation, create the recipe for the metal, and process it in a way that produced–and continues to do so–the right roughness for the part.

Operating from a communication model that is nimble, responsive, and accessible, these relationships continue today.

Anticipating Needs

During the production of this part, Larson encountered another challenge and addressed it early on. This helped prevent production bottlenecks or long-term quality issues for the end-use. Larson's customer required electroless nickel plating on this part to prevent corrosion. The advantages of electroless nickel plating afford the part superior corrosion resistance, uniform deposit thickness, deposit lubricity, and keep it free from flux-density and power supply issues. Because these parts are used in volatile environments, they need robust protection. Larson was concerned that the vendor it was initially using to plate these parts was not able to keep pace with production and was also falling behind on quality standards as a result. Larson ultimately partnered with a local vendor that was able to plate on time and with the required quality results. This change granted Larson more flexibility to keep up with its customer's growing production, and an ability to pass along a cost savings due to the volume increase.

Relationship Building—Working towards the Vision

The design and development phase for tooling and stamping parts can be quite lengthy and iterative. It can take years for some parts. As much an engineering company as it is a tool and stamping company, Larson's approach is to work towards the vision with customers, collaborating with engineers to develop parts for sustained functionality. It designs, builds, tests, produces parts, and guarantees its built tools for the life cycle of the product. This means that Larson will service and adapt modifications as needed. The development process involves always looking for improvements to production so the customer ultimately gets a better, cost-effective product.

In this instance, the material available on the market was not capable of consistently meeting the specifications that this part required to maintain surface roughness. From the recommendation of an existing vendor, Larson found the solution through forming a new relationship with a metallurgist at a mini mill. This involved getting the unique material recipe needed for the part.

This collaboration is so successful that Larson and the mini mill forged an arrangement that allows materials to be purchased on consignment, with a monthly release of materials. This ensures the end-customer reasonable pricing and material availability.

Operating from a communication model that is nimble, responsive, and accessible, these relationships continue today. They provide all parties involved predictable production, quality, and reliability across all functions.

About Larson Tool & Stamping Company

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Larson Tool works with our customers from the earliest stages of design to optimize your part design for the metal stamping process and determine the best materials, tooling, and process solutions for your product. We'll leverage our years of experience as a valued supplier of metal stampings and assemblies to help you with all your metal stamping needs. Download our **Stamping Design Guide** to get started with your next successful part production.

Larson Tool & Stamping Company

90 Olive Street
Attleboro, MA 02703-3802

(508) 222-0897
www.larsontool.com