CASE STUDY

Auto Brakes

Converting to Metal Stampings for Auto Brake Technology Drives Innovation, Savings

Automotive manufacturers and their suppliers are constantly working to advance the technology that makes vehicles safer and more efficient, while reducing costs and time to market. One example is the evolution of automotive brake technology, as it has moved from mechanical to electronic components that rely on all parts, including metal stampings, to perform without fail. **This case study examines how engineers from auto part suppliers, OEMs and Kenmode have worked together to deliver innovation while gaining huge savings in costs and production time by converting parts made with more expensive processes to metal stampings.**

THE CHALLENGE:
Innovating constantly

According to Motor Magazine, "A generation or two ago, the buzz in the brake world was the shift from drum to disc technology. But innovation didn't stop there. Brake technology has continued to evolve, through passive, active, integrated and, most recently, automated braking applications. The forces driving this evolution include safety concerns, regulations and command/control. The results: optimized brake materials and component design; a systems approach to brake system engineering and maintenance; and an ever-increasing role of software, sensors and electronic controls."

With the advent of Driver Assists in new autos, brake technology is becoming even more critical, as automakers work to mitigate or prevent collisions through automatic emergency braking systems. Recently, the U.S. Department of Transportation's National Highway Traffic Safety Administration and the Insurance Institute for Highway Safety announced a commitment by 20 auto manufacturers, who represent 99 percent of the U.S. auto market, "to make automatic emergency braking a standard feature on virtually all new cars no later than NHTSA's 2022 reporting year, which begins September 1, 2022." **The auto industry's commitment to early adoption is expected to prevent as many as 28,000 crashes and 12,000 injuries.**

For suppliers to the auto industry, the ability to quickly innovate new parts such as metal stampings to function in a complex, automated environment is crucial, including the ability to provide rapid prototypes to exacting specifications. By working with metal stamping engineers on DFM, OEMs and their suppliers have found that converting parts to metal stampings can dramatically reduce costs without compromising the part's critical dimensions or functionality.

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Kenmode
Precision Metal Stamping

Moving from Fine Blanking to Metal Stamping

As anti-lock braking systems have been engineered over the years for greater effectiveness, auto supplier Delphi approached Kenmode to consult with its engineers on a complex part that was being produced with fine blanking, followed by three operations, a costly and time-consuming process. The part consisted of a D-shaped shaft drive hole with teeth that required a milling operation to make it flat and meet critical tolerances.

"Most people would look at the project and say it couldn't be done with a stamping," recalls Ken Kenniston, a sales representative for Kenmode who worked on the project. "When we got the order, the naysayers at the supplier, who were close to the fine blanking company, said we would never be able to make the stamped part because it was too complicated."

In fact, converting the part to an aluminum stamping was an intricate operation. After eight iterations, Kenmode developed the stamping process that could do the job, which included a nine-station progressive die, robotic pick-up and a three-station transfer tool to form the gear.

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While developing the complicated tool itself took considerable time, the production time was reduced dramatically by eliminating secondary operations and completing all the necessary forming through progressive metal stamping.

THE RESULT:
Saving costs and production time

In its estimate to Delphi, Kenmode was able to bring the piece price for the stamping down by more than half the cost of the fine blanking operation – from $1.30 to 61 cents per piece. Due to the significant cost savings, the client wanted to switch over to metal stamping as quickly as possible. However, the process was complex and had to be proved before moving to production. Once the purchase order for the tooling was received, Kenmode began to build tooling to produce parts for the Production Part Approval Process (PPAP). With those parts tested and approved, production could begin.

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To ensure success, Kenmode invested in a new 200-ton press that provided the extra length needed for the nine-stage stamping operation. After stamping, the part went on a conveyor belt to a wash cycle. Kenmode also designed specialized packaging for the parts, which nested three parts together for faster and easier assembly by Delphi. **The part was produced at high volume for five years with zero defects until brake technology evolved beyond that anti-lock braking system, netting $3.5 million annually in savings.**

Converting a Part from Tubing to Metal Stamping

When engineer Harry Dickerson worked for an automotive supplier, he approached Kenmode regarding a part for a gear and rear brake adjuster. The supplier was putting together the sub-e assembly and had sourced steel tubing that would be cut to length and formed into its final shape. He asked Kenmode to quote on the secondary operation to stamp and form the end of the tube. Instead of quoting on the project as specified, the Kenmode engineers recommended a significantly less expensive method to stamp the part from flat steel.

One concern with the switch was the strength of the part. Unlike the intact tubing, the metal stamping seam would need to be interlocked with a dovetail joint. Kenmode produced rapid prototype parts that were tested in the application, which proved the stamping would meet the OEM's strength requirements. The stamping process was further complicated by the need to identify right- and left-hand components with different plating – another process that had to be proven. **Following PPAP, Kenmode produced the production tool and ramped up production quickly to meet demand.**

THE RESULT:

Eliminating expensive materials and secondary operations

Due to the high price of the steel tubing originally specified versus the flat metal used in stamping, as well as the elimination of several secondary operations through stamping, **Kenmode was able to save the client 30 percent on the cost of the part.** A few years after the project was completed, Dickerson joined the staff of Kenmode as Vice President of Engineering.

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THE FUTURE:

Collaborating on R&D with metal stamping engineers

Kenmode recently introduced its new Tech Center, a 20,000-square foot facility entirely dedicated to new product development, incorporating research and development, prototyping, 3D simulations, engineering, tool design and build, and program management for new products. Designed to enable collaboration between every facet of new product development, the Tech Center aims to help clients speed time to market by ensuring the optimal design, quality and functionality of each new metal stamping, as well as its smooth transfer to full production.

In keeping with confidentiality agreements, Kenmode cannot divulge the details of current projects for the automotive industry, but one project for a transmission application will convert a cast part to a metal stamping, which will yield significant savings on the cost of the tool and materials and cut production time. By consulting with engineers from the OEM and supplier early in the process of new part design, Kenmode engineers can offer imaginative solutions to bring innovations to market more quickly and cost effectively, with precision metal stampings that range from complex micro-miniature stampings to large-gauge steel parts.

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