

CUSTOMER SUCCESSES

PERFECTION SPRING & STAMPING

Coe Precision Straightener Slashes Scrap Rate, Secondary Rework while Increasing Productivity for Critical Automotive Engine Control Module Part

Flatness was critical for an automotive engine control module that Perfection Spring and Stamping Corp. (Mt. Prospect, IL) was producing. Continuous surface cleanliness was also at issue to the end result. It took an unusual piece of [straightening equipment \(and know-how from Coe Press Equipment\)](#) to finally solve the problem.

Perfection Spring and Stamping Corp. is a full-service metal stamping facility in business since 1955. Today it focuses on three different manufacturing areas: slide forming manufacturing, coiled springs, and metal stamping. They make a variety of parts from wire and strip coil. Their expertise in fourslide and spring work allowed them to grow into a full-service contract manufacturer serving industries as diverse as automotive, automotive electronics, power tools, and appliance producers.

VP of Operations Kenny McLaren said, “We ship locally and internationally for a variety of manufacturers who have plants worldwide. We’re attempting to grow our markets even further with our diverse manufacturing abilities.”

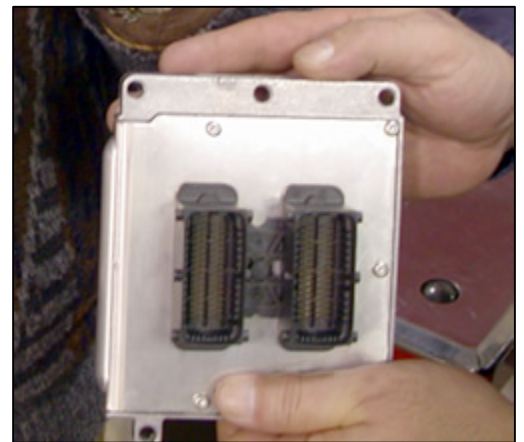
Perfection Spring & Stamping produces parts from coil steel and aluminum strip up to 24” coil widths and up to .300” thick and wire from .004” to .312” in diameter. They manufacture a variety of different types of springs in their coil forming area, such as torsion, compression, and extension springs. Their production is split with coil and conventional springs at 15%; fourslide and multislide work at 25%; and the balance in punch press and sub- assemblies.



The “Rigidizer” Challenge

“We were having a major problem with production of a rigidizer that is part of an automotive engine control module (ECM),” said McLaren. “It’s a flat aluminum-alloy plate or a flat steel plate (3-mm thick) with a printed circuit board laminated to it. Electronics are added to the laminated board, and then it’s formed into a finished control module.”

McLaren added, “We manufacture these rigidizers for several different companies that supply OEM’s around the globe. A key requirement of this part is that it is extremely flat without surface imperfections. Any presence of nicks, mars, or tool marks, etc. on the surface will interfere with the quality of the finished component. It is very important that these control modules work in extreme environmental conditions, whether it’s at sea level in the western US or below sea level, or in the tallest mountains or the most extreme conditions that either summers or winters give us on the globe.”



“There is the equivalent of a double-sided adhesive tape laminated on the flexible circuit board to hold it to the stamped backing. Our customers populate various electronic components to the circuit board, solder it, test it, and form it into a shape around some type of metal body or housing. Once this is done, the flexible circuit board is flat. When it’s folded up, it’s generally in a sealed unit that makes it impervious to the outside environment.”

He added, “Flatness for the surface mounted electronics is absolutely critical. When the circuit board is mounted and has the various electronic components added, it’s very important for them to solder and only solder where required. Any voids or imperfections on the metal surface or



rolling in the stamping will cause the solder to puddle and, especially with the size of some of the circuitry, allow it to puddle in ways that can cause the whole board to short circuit. These ECMs range in size from 5" x 7" to 8.5" x 17". Some of the overall panels are 11" x 15" or 11" x 18" laid flat before bending operations. We have a five-station progressive die that stamps them. Total overall flatness after all of the manufacturing processes is roughly 0.5 mm, which is 0.020".

"We've managed to punch holes of various shapes and configurations in these panels and form ridges. In some cases we've even drawn bubbles in the parts. So there's the overall panel flatness of 0.020" that is still expected. But on a square inch basis, our customers are looking for a total flatness condition of approximately 0.05 mm or 0.002". All this is important because consumers driving modern cars have these ECMs in them, and we all know how imperative it is that these modules don't fail."

Improving the Process, Quality Levels

McLaren remarked that the company needed to make some aggressive improvements in producing ECMs, because they had unacceptable defect rates and downtime issues when they first started manufacturing them. Primarily, the problems they had were getting the material flat, secondary part rework, and downtime due to die adjustment to make up for the inadequacy of their coil straightening equipment. These problems were costing them thousands of dollars per month in scrap.

"Now we have all but eliminated these issues," McLaren remarked. "We went from extremely unacceptable scrap quantities, which made it almost undesirable to make these parts via stamping (originally, they were die cast and machined), to producing a quality part."

Perfection Spring solved these problems by purchasing a [Coe Press Equipment \(CPPS- 250-24\) power straightener](#) that employs 11-rolls (rather than the five to seven rolls found on a conventional unit) along with a [pulloff \(CPR-PO 8024\) coil reel](#). These were added to an existing Verson 300-ton press line.



McLaren remarked about the problems before buying the new Coe equipment, "We were running two shifts a day just to keep our head above water. We were probably running at a 5-6% scrap rate typically on multi-thousand runs. We could be in and out of tolerance very quickly depending on the coil size, which affected coil set and material flatness. So we were only getting a third of the way into the coil, and we found that we weren't getting flat material anymore. We tended to constantly check the material flatness and had to readjust the previous straightening equipment, which also added labor to the part."

"We were making ongoing improvements from the time we ordered the Coe equipment to the time we got it. However, in less than a week after we received it, we were able to settle down the manufacturing process to the point where our downtime went from many hours a day to just a portion of an hour a day. What the Coe equipment has allowed us to do is run a wider variety of products on the same piece of equipment, because our uptime is greater. Also we were able to consolidate the production for ECM parts and other products on one press line and open time on our other presses for different work. This equipment has really allowed us to get a tremendous amount of throughput. We've at least doubled or tripled the amount with it."



Perfection Spring runs the material with a very slight loop and uses a Sonotrol to monitor the loop. What they don't want to do is re-induce any coil set into the material from the loop, and the company has found that the amount of coil set in aluminum is variable depending on where the coil is on the reel. Coe's straightener uses a variable drive and performs like a precision leveler. It was specially made, because Perfection Spring needed more rolls in it to get flatter material. With a variable drive, as they start and stop the press, it allows the rollers to slow

down at a very even rate and accelerate smoothly. The type of marks that can be associated with coil stops and starts on soft materials like aluminum are virtually non-existent now.

Cleaner is Better

The [Coe straightener](#) also has an opening head that allows for easy cleaning. Most other straightener heads are designed in a sandwich construction and are not built to open. The only way that rolls can be cleaned on most conventional straighteners is by using a Scotch Bright abrasive mat that is run through the rolls to remove any blemishes or material pick-up on them. But Perfection Spring needed more insurance...and Coe delivered. "This unique design allows us to open up the head and clean all the rolls so we don't impart any picked-up dirt from them to the stamped material. We also ordered the straightener with hard-chrome and polished rolls, because these give the least amount of pick-up," added McLaren. So the company performs a daily cleaning (wiping down the rollers with a simple alcohol solution) and does so quickly...simply opening it up by loosening two screws, completing the entire operation/cleaning process in a matter of minutes.



McLaren remarked, "These parts can be rather large, even though they are aluminum, they weigh close to one pound each. With 3-mm thick aluminum, we go through a 55" coil quickly. We don't want to be adjusting the straightener all the time to get the flatness we need. As a job shop we must have the capability to process these rigidizers in aluminum or steel. We wanted to have a system that dialed back to the straightener settings that we originally ran. Coe equipped the straightener with digital indicators on each upper roller that show us what our exact heights are. Once we worked out the heights for each roller to give us successful straightening, it was easy to get back to these settings with this feature. We were spending upwards of five hours per week on adjustments to our previous equipment. Now we're able to run within minutes once we have the die successfully set up. Using digital indicators with this equipment allows us to take the craftsmanship out of the settings and apply some real science for material deflection."

The bottom line: improved quality, reduction of secondary finishing operations, and increased throughput level that has been doubled or even tripled, at times.

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