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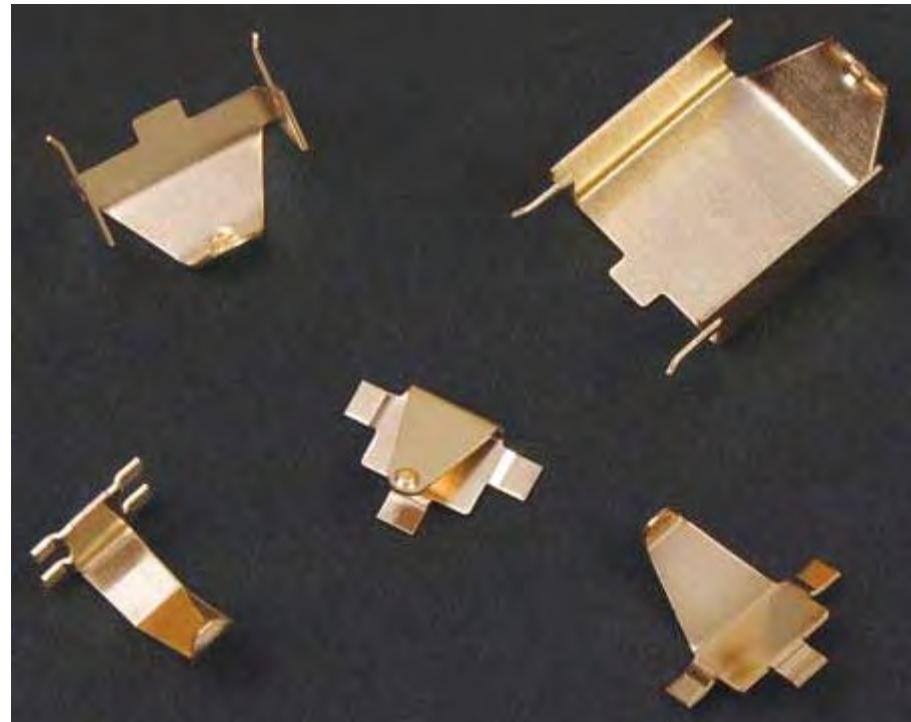
YESCO Relies on Fourslide Parts Manufacturing for Custom Electrical Contacts

December 1, 2011

"The smallest metal parts can often be among the most critical components in larger products, and how they are specified, designed and manufactured can play a vital role in overall product reliability and cost," said a company spokesperson.

"While small and seemingly insignificant, for instance, electrical grounding contacts keep sophisticated electronic or electrical equipment operational by conducting stray electricity safely to ground. For this reason, even the lowly electrical contact requires the proper design and manufacturing considerations when designing the larger system.

"When it comes to electrical contacts, variability in requirements from part dimensions and materials to contact area, location and spring quality can make ordering from a parts catalog difficult. Complicating matters, the design engineer doesn't necessarily know what features are going to be



YESCO, a manufacturer of custom signs and electronic displays set out to design 5 grounding clips for PCB sub-assemblies. The custom contacts were created using the fourslide process.

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a manufacturing problem or add significant expense. That's when working with the right manufacturing partner and using the best manufacturing technology for the job can have big payoffs in design reliability and cost."

When Brent Brown, an engineering consultant for YESCO, a Salt Lake City-based designer and fabricator of custom signs, electronic displays and outdoor media, set out to design a group of grounding clips for printed circuit board (PCB) sub-assemblies he knew that custom designed and manufactured parts would be required.

"At first, you look for an off-the-shelf part that's manufactured in higher quantities but unless it's a very common application you typically end up having to design it yourself," said Brown. "An off-the-shelf part seldom works as well as if you designed it for the purpose and in this case it had to be custom."

Some of YESCO's largest displays have over 10,000 PCB sub-assemblies in them controlling computer sequenced LED lights. The Wynn Las Vegas sign, created by YESCO for instance, is 135' tall with a double faced 100' by 50' LED message center and "moving eraser" that glides silently up and down over the LED message center, appearing to change the graphics as it goes.

"Since the displays are typically in service for 10 to 15 years outdoors, quality, corrosion, cost per part, spring tension and spring-back were among the issues considered for these contacts," said Brown.

After Brown defined the first part, a surface mounted grounding contact to be soldered onto PCBs on tiny pads, he talked to a variety of companies and emailed them concept drawings to find out who had the expertise to help with its design and manufacture. "We had a number of companies quote the part and tooling, including those using hard, dedicated tooling such as power press progressive dies. But the tooling and parts were too expensive."

Brown, however, soon found a willing partner in the design and manufacturing process when he contacted Jim Richards, Director of Sales and Marketing at Fourslide Spring and Stamping, Inc., a Bristol, CN, parts supplier specializing in the integrated stamping and forming parts operation called fourslide.

"After eliminating companies that didn't have the capabilities or price points we were looking for, we ended up with Fourslide which was the least expensive for both the tooling and the parts," said Brown.

"What makes the fourslide part-making process capable of cutting typical tooling costs to as little as \$3,000, halving tooling lead times and eliminating after-production adjustment to meet specifications is



When it comes to smaller metal products that are complex or needed in lesser volumes, an integrated process known as "fourslide" fabrication can offer design engineers major savings on production all the way from tooling to material savings.

its unique integration of stamping and forming operations," said the spokesperson. "The process begins with the raw material in flat strip form off a coil, which is stamped or blanked in the progressive die section of the fourslide machine, which is a fully functional but lighter version of the progressive die found in most power presses.

"Where high-speed power presses can cost hundreds of thousands of dollars, fourslide machinery typically costs just a fraction of that, enabling greatly reduced shop rates. Fourslide production at up to 15,000 pieces per hour can be achieved depending on part size and complexity. And since the process typically starts with material the width of the finished part, it usually generates less scrap than power press machinery, so material costs are often lower as well."

Each time Brown emailed Richards a concept drawing or sketch of the part he wanted, Richards emailed back suggestions and minor tweaks to help with part manufacturability and cost. To provide a good combination of spring properties and electrical conductivity for the grounding clip at reasonable cost, for instance, Richards suggested using phosphor bronze as a material.

"Many design engineers request expensive options such as beryllium copper because it has good spring properties and electrical conductivity," said Richards. "That's true, but it's up to four times more expensive than some alternative materials with good spring properties and electrical conductivity such as phosphor bronze.

"We ask the customer to consider tempered phosphor bronze when applicable. This can eliminate the cost of a secondary heat treating operation along with the risk of material deformation. In contrast, beryllium copper is a very expensive base material that typically requires a heat treating process to add its spring properties, a rather expensive process since it must be heat treated in a controlled atmosphere."

Through testing, Brown determined that half hard phosphor bronze was sufficient for the application. "The material also provided corrosion resistance, which helps with our outdoor weather requirements," he said.

Satisfied with the first surface mounted grounding contact produced, Brown designed an additional two types of surface mounted grounding contacts, plus two types of pin mounted grounding contacts whose pins go through holes in PCBs perpendicular to its pads. "Depending on which configuration of grounding contact it is, the tab that sticks up from the circuit board is the spring and conductor at the same time," said Brown.

From the time Brown placed orders to the time Fourslide shipped first article parts for approval took about eight weeks for all five types of parts. Many progressive dies can take 12 weeks or longer since power press progressive die work requires more complex tooling changes and is typically done overseas with substantially longer lead times, the company said.

In testing, Brown mounted the prototype grounding contacts on circuit boards and put them into the sub-assemblies. He checked for compression to see whether the parts yielded or not, whether they were hard enough to maintain contact strength, and if they met additional requirements.

"The prototypes and products worked the first time, and we haven't had any trouble with them," said Brown. "Because the grounding clips resist corrosion and don't lose spring, they should be good for many years. If we do another sub-assembly that requires a different grounding contact, it would be relatively easy and inexpensive because the fourslide process is so versatile in building different parts with minor tooling changes."

For more information contact:

Fourslide Spring and Stamping, Inc.

87 Cross Street
Bristol, CT 06011
800-832-6405
info@fourslide.com
www.fourslide.com

Young Electric Sign Company
2401 Foothill Drive
Salt Lake City, UT 84109
801-464-4600
info@yesco.com
www.yescom.com

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Contact

Gross Publications, Inc.
1133 Airline Drive, Suite 2100
Grapevine, Texas 76051
USA
Phone: 817-488-8488
Fax: 817-488-7813
Email: info@mfgnewsweb.com
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