

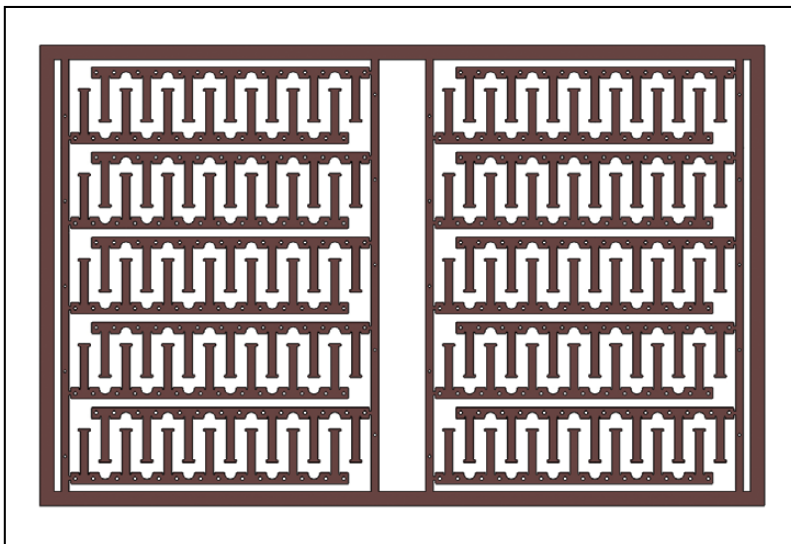
AVOIDING REDESIGN: THE IMPORTANCE OF UPFRONT PLANNING

“I wish we had thought about that when we started our design effort.” These words are articulated every day when the important questions aren’t addressed as a precision metal part is being developed. When starting a new project, the people responsible for delivering that new product into the boardroom are under pressure. There are delivery dates, quality expectations, and the need to bring it in within budget. Because of these outside stresses, a metal component being developed to prove a concept is often not ready for a high-speed stamping press. If the end goal is not addressed early, a redesign is looming in the future. What constitutes the development of a precision metal part? What should an engineer responsible for a project be thinking in order to avoid delays and cost escalations?

There are many ways to develop light-gauge metal parts; die cutting, a turret press, and photochemical milling are all options. For this discussion we will focus on the photo-etching and forming process as the first step in prototyping a metal component. Photo-etching is a very quick and economical method that can hold good tolerances specific to light-gauge metals during the prototyping phase.

Determining Part Function

The first step is determining what the part function will be. A spring, battery holder, grounding clip, optical encoder, board shield, tab, connector, circuit, mechanical or electronic in nature, on it goes. What material will function best in the application? Are there any special mechanical properties that will need to be specified when developing the material description? Spring force, wear, flexibility, solderability, corrosion resistance, etc. Unfortunately metals are often specified without determining if that material is able to be worked into a usable final part.

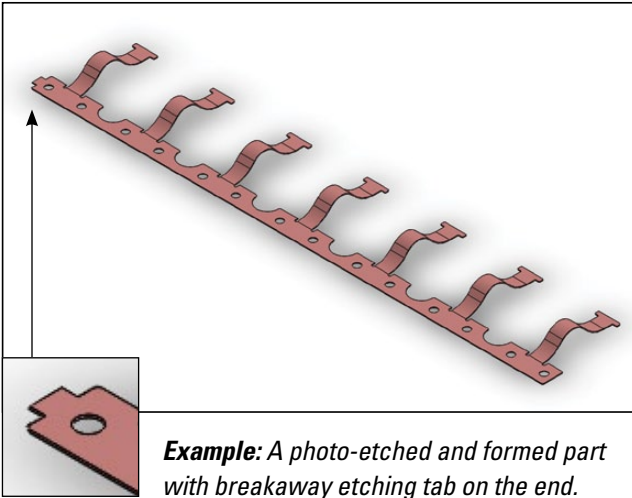


Example: Sheet of photo-etched parts before singulation.

Solving Elusive Metal Form Issues

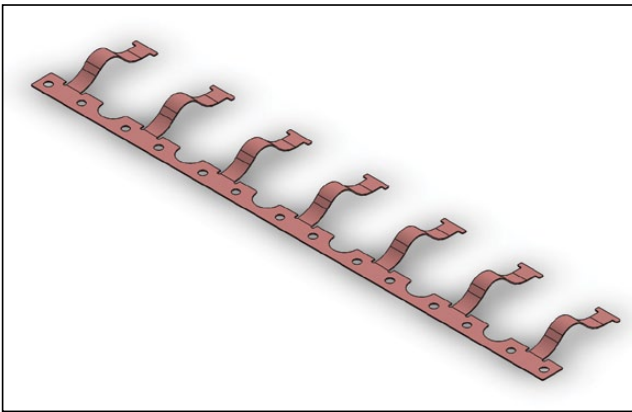
During the photo-etching and secondary forming process there is room for adjustment to yield a functioning part. Forming blades can be adjusted to yield a workable radius. Hand adjustments of a few parts can yield a working prototype. Photo-etching has the unique capability to address both sides of a part. In other words, lines, logos, and pockets can be etched in one side but not the other. This offers designers the ability to solve elusive metal forming issues. If the project warrants unique features then photo-etching becomes the only option. In cases where the final product must take advantage of progressive stamping’s power of cost reduction, preplanning has great benefits. The advantages of photo-etching need to be used with care if high-speed stamping is the desired manufacturing process. As an example, the photo-etching process requires an area to hold the part in a large sheet as it is being processed.

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This holding area is called a tab. The tab area always leaves an artifact in the metal when parts are removed from the sheet. The location of the tab may be incidental during prototyping; however, as volumes increase and production goes from hand assembly to automated production, the tab mark location often becomes an issue.

There are two ways to deal with the tab mark. First, you can locate the tab in an area such that it will not affect the final product during automated production. The second option is to hard-tool the part as soon as the design is deemed matured. The latter is always preferable but may not be an option in early-stage production. Investing in hard tooling without a clear picture of product success can be risky as there can be a downstream revision to the part. Photo-etching/forming offers the flexibility for a quick, reasonable cost revision. Hard tooling has an extended lead-time, from development to first article approval. When a change is required it can get very expensive to execute in the hard tooling world. Photo-etching and forming can also in some cases offer a long-term solution based on economics.



When a progressive die can be used the advantages are quite clear. Tolerances are tighter and the cost to produce is much lower than applying the photo-etch and form method. Employ the progressive stamping method when the cost for tolerances can be justified or volumes are high enough to overcome the capital cost of hard tooling. Photo-etch and form offers a wonderful way to prototype. In many cases product volume does not pass the smell test of a progressive tool so the long-term best choice for manufacturing becomes photo-etch and form for the life of the project.

It is always wise to think about the expected volumes required when planning a new part. By working the future into prototyping you can eliminate the need to update prints while going through the part approval process twice for the same end part. This saves time and

money. When looking for a prototype partner it is important to make sure they have scalability within their operation. This makes developing and moving the part into the best possible manufacturing scenario possible.

In conclusion, there are many ways to get from idea to production. Extensive upfront planning allows for a quicker and cheaper process from beginning to end.

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