The Photochemical Etching Process by Bruce Larkin

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Photochemical etching is the process of making sheet metal components to be used in a variety of applications. Using a photoresist â€“ a light sensitive material â€“ and etchants, selected areas of the metal are machined away using corrosion. While the process emerged in the 1960s, over the years the technology and industry have advanced immensely. The photochemical etching process can easily produce high quality, highly complex parts with great accuracy. Not only is the finished product finely detailed, it can also be produced economically.

Photochemical etching offers a cost-saving alternative to stamping, punching, and water jet cutting. While the tooling is inexpensive and quickly produced, the end product is still of a high quality. Because of its economic advantages, the photo etching process is ideal for use in creating prototypes. Not only will it save money, the process also allows for easy and timely changes to be made in mass production. A new part can be crated within hours after receiving a drawing.Another advantage of the photochemical etching process is that it does not create unwanted burrs or sharp edges. This saves yet more time and money because the piece does not have to do through a deburring process after manufacturing. The process can be used on nearly every commercially available metal or alloy.

The photochemical etching process begins by the shape of the part being printed onto an optically clear and dimensionally stable photographic film. The phototool itself consist of two sheets of this photographic film that show negative images of the parts. This means the area that is going to become the part is clear, while all other areas, which are to be etched, are black. The two sheets of film are mechanically and optically recorded. This forms the top and bottom halves of the tool.Following this step, the sheets of metal are then cut to size. After the cutting phase, the metal is cleaned and laminated on both sides with a UV-sensitive photoresist. This coated metal is then placed in the middle of the two sheets that comprise the phototool. A vacuum is then drawn to ensure strong contact between the metal plate and the phototool.

After being exposed to UV light, the areas that are in the clear sections are hardened. The plate is then developed to wash away the unexposed resist and leaving the areas to be etched unprotected. The unwanted areas are then etched, typically using an acid. Reacting to the unprotected metal, the area is corroded away.

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