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A World Apart in a World of Parts

773.463.6211

Photochemical Machining

Custom Designed Chemical Milling Processes Made Easy and Cost Effective

Fotofab uses the photochemical machining process to produce a wide variety of precision industrial parts in thin metal economically and quickly.

This special "Design Guide to Photochemical Machining" was created specifically for those who are involved with the designing and/or purchasing of metal parts.

The Design Guide provides you with:

- Engineering advantages of **photochemical machining**.
- Overview of our photochemical machining process.
- Considerations for the design of your thin metal parts.
- Considerations for your engineering drawings/sketches.

The information in the Design Guide provides you with considerations and general guidelines for designing metal parts to be made with Fotofab's photochemical machining process.

Fotofab offers free consultation and quotation for your specific designs. Our Technical Sales Staff is available to assist you with your specific metal parts requirements. By designing with an awareness of our process capabilities, you will minimize the cost and delivery time of your metal parts, whether for prototyping or production.

Design Advantages

- Many intricate part geometries, like those found in fine resolution screens, can be photochemically machined easily and economically.
- Extremely thin metal can be machined without distortion; dimensional accuracy actually increases as metal thickness decreases.
- Physical properties of the metal, such as hardness, strength and formability, are not changed by the process.
- Brittle metals, which often fracture during conventional stamping, are machined without difficulty.
- Magnetically soft materials can be fabricated while retaining their optimum permeability.
- Parts are inherently free of burrs.

Tooling and Delivery Advantages

- Tooling and set-up costs are extremely low compared to hard tooling.
- Initial quantities of newly designed parts can be produced on short notice - sometimes within days after the design is conceived.
- Revisions to part designs are similarly implemented quickly and economically.

Overview of the Fotofab Process

The Fotofab Process of photochemical machining (often abbreviated as PCM, and sometimes referred to as chemical milling or chemical etching) is a technique for manufacturing high-precision flat metal parts by chemically etching away the unwanted materials, using a photographically prepared mask (a Fototool) to protect the metal that is to remain after the etching process.

This process begins when we receive your engineering drawing or sketch that defines the precise characteristics of your part. We then utilize our CAD system and laser plot technology to generate an exact image of your part on a set of photographic films, called a Fototool. Depending upon the size of your part, the Fototool may contain from one to several thousand exacting images of your part.

The Fototool is used to transfer the images of your part photographically to a sheet of clean flat metal which has been coated on both sides with a photosensitive, etchant-resistant polymer called photoresist. The result of these processes is a sheet of metal that is covered with photoresist over only that metal that will eventually become your parts.

The sheet is then sprayed with a heated etching solution. The metal not covered by the photoresist is dissolved, leaving precisely the parts that you specified. (Refer to Figure

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Design Guide

Material

Geometry

Capabilities

Tolerances

Selective Etching

Tabs

Data

Shielding Design

BMW EXHIBIT 1019

1 below, which illustrates a progression of etching levels.)

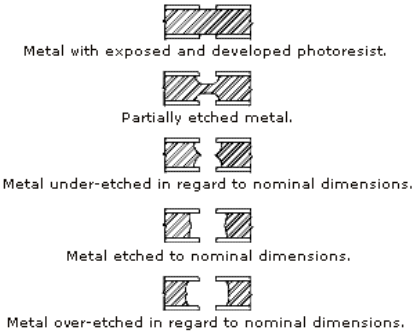


Fig. 1

Design Considerations

As you proceed with the design of your metal part, the following considerations will help you take full advantage of the Fotofab Process.

- Material Selection
- Part Geometry Considerations
- Tolerances
- Selective Etching
- Tabs
- Data Creation and Transfer

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