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Benefits of the Photochemical Etching Process by Bruce Larkin

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The process of photochemical etching is used to produce incredibly precise parts that would otherwise be impossible, or too costly to manufacture using more conventional methods. The process combines computer aided design (CAD), photography, chemistry and metallurgy to provide a precise, as well as cost effective method of producing thin metal parts quickly while avoiding hard tooling costs.

The technology, developed commercially during World War II for producing gun sight reticles, has been adapted and innovated over the years to serve a variety of applications in an array of industries. There are many advantages in the use of photochemical etching.Photochemical etching is a cost-saving alternative to stamping, punching, and laser or water jet cutting in the creation of precise parts. Not only is photochemical tooling inexpensive, it can also produce quick results. The part can be created just hours after receiving the drawing.The unmatched precision and accuracy in chemical etching makes it ideal in the creation of prototypes. Because of the easy repeatability and quick turn around, changes and modifications to the engineering can be made not only easily, but also inexpensively. The process allows for easy changes in mass production.

Compared to hard-tooled counterparts, photochemical etching tools are significantly less expensive. With photochemical etching, the complexity of a part does not drive the cost like it does in typical hard tooling and there are no die maintenance and repair costs. In photochemical etching there is no tool wear. Through a contact printing process, the photo tool is transferred to the metal. This process ensures no tool degradation, i.e., the first part produced will be identical to the last part produced, making it ideal for mass production.While hard tooling is a major investment, photochemical etching lowers costs while also achieving better results.Chemically etched parts also eliminate metal stress and part deformation. Because the metal is removed chemically, not mechanically, the parts remain flat. This also eliminates the need for secondary de-burring operations, since no contact stress occurs. Additionally, the use of photochemical etching will not compromise the integrity of the metal properties. Because of the nature of the process, the internal structure of the metal remains unchanged. This ensures the hardness, grain structure, magnetic properties, or ductility of the metal is unchanged.

Photochemical etching can be performed on virtually any commercially available metal including: aluminum, brass, Inconel, manganese, copper, silver, steel, nickel, zinc and titanium. The process can be performed on metals of any temper with thicknesses from .0001â€• to .125â€•.

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Bruce Larkin - About Author:
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