

Chemical Etching vs Laser Milling

Remember how fun it was to play with an “Etch A Sketch” when you were a kid? You can create any drawing you want if you had the patience, that is!

If I told you that a process similar to “Etch A Sketch” is still being used today in the industry, specifically electronics manufacturing, you’d probably think that we’re insane. Chemical Etching is still being used this day for manufacturing stencils for electronics boards and to also produce some custom designs out of metal materials for various other industries.



Chemical Etching and the Etch A Sketch are both examples of the Subtractive manufacturing process, where you create a certain design by removing material from certain locations on a piece of raw material. Although the mechanism is different between the two, the underlying principal is the same, the difference in application though is the difference between a mechanical and a chemical removal of the excess material.

Is Chem-Etching a new process?

Chemical Etching is so old; it was invented even before electricity was a thing. The earliest evidence of it being used is as early as 400 BC. It has been used to produce printed circuit boards, which incidentally is where the name stems from. The artwork is printed on a transparent sheet of Mylar. Then it is overlaid on top of a copper layer of the overlay material before the material was soaked into a UV light activated acid (Etchant). Then the areas of copper that are exposed to the UV light will be etched, leaving the desired traces. This will be used on the board’s final design since traces are shielded from UV light from the printed artwork on the Mylar sheet.

When surface mount technology became the industry standard for the manufacturing of electronic circuit boards there was an immediate need to create fast efficient ways to solder tiny components to the boards. This, in turn, gave rise to the solder paste and stencil industries.

Chemical Etching was the go-to approach to making solder paste stencils in the early days. Mechanical CNC machines were just not capable of cutting out apertures or holes small enough to accommodate the small sizes needed by the industry.



Challenges emerged to Chem-Etching

Because the advancements in technology never cease, SMT components keep on getting smaller and smaller while their designs become more and more intricate. It became evident that Chemical Etching was no longer the way to go if you wanted a clean release for solder paste without any shorting between pads or traces, even with tiny area ratio components.

What is the alternative?

Luckily, the advances in science and technology also brought about laser milling and cutting machines. Superior to chemical etching and mechanical CNCs in every way, laser milling machines fit the industry needs just like a glove.

Laser machines overshadow chemical etching in every way, with beams as small as 25 microns. Cutting stencils for minuscule components is no longer an issue, the cuts are repeatedly consistent with clean edge quality maximizing the smoothness of the solder release.

The most important aspect though since this is a time-critical industry will be... you guessed it... Time!

Chemical etching requires days to make stencils or parts of any design. If the process went wrong for any reason, of which there may be many, the wait to fix the project takes the same amount of time for the fix to happen. Between creating the mask, scribing the material, etching and then de-masking, the time and effort spent compared to fixing a CAD file and laser milling the stencil is not even worth mentioning.

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