

Laser Marking Versus Chemical Etching

A non-contact process, with superior mark speed and inherent flexibility; Laser Marking has the clear advantage

When comparing a Laser Marking System to a Chemical Etching System, one must understand the differences between the two marking methods. These differences can be broken down into four points of interest.

Contact vs. Non-Contact Process

The first difference between the two is that the laser mark is a non-contact method. This means that once the part is placed into the mark area, the laser has no physical contact with the part to be marked.

Compare this to a chemical mark, which requires a multi-step process which requires a mask to be applied directly to the part, then the etching solution applied, followed by a fixing solution and washing.

Not only is the part handled more in the chemical etching process, but chemical supplies

need to be purchased. The biggest problem here is their disposal. Government regulations require that only certified hazardous waste companies dispose of these waste items which can be very expensive.

Mark Speed

The second difference is that the chemical etch method is more time consuming than the laser marking method. Chemical etching is a multi-step operation, whereas laser marking can be accomplished in a single step.

One of Rofin-Baasel's customers reduced their marking work force from 6 employees doing chemical etching to one employee operating the Laser Marking System.

That one employee was able to mark the same number of parts in one eight-hour day as were previously marked by a six-person force in a 40-hour time period.

Flexibility

The third difference is the flexibility of the laser system. Lasers can apply different types of marks, with greater legibility and minimum dependence on part geometry.

The laser system is able to mark different types of marks; light engrave, deep engrave, annealing, and etching. The

chemical etch process can only provide an etch mark.

The increased legibility of a laser mark is possible by focusing the laser beam to a 0.004" spot and writing the image on the part with computer-controlled mirrors.

Due to the undercutting of the chemical etching solutions and the ability of the material to absorb the solutions, the chemical etch mark can appear fuzzy and non-uniform.

The chemical etch process requires a flat and uniform surface to be able to place the marking mask down evenly. In contrast, the laser can mark on different part levels and on the inside pockets, complex shapes, even on rough surfaces.

Repeatability

The fourth difference is the mark repeatability of the two methods. Due to the varying absorption rates of the etching solutions and placement of the mask, the chemical etching process can have an acceptable mark yield as low as 50%. In contrast, the laser method, with its precision beam delivery and uniform power distribution, will yield consistent marks 98–100% of the time.

After reviewing these differences, one can see that laser marking has the clear advantage over chemical etching.

Computer-controlled laser assures precision marking on these stainless steel calipers and measuring instruments in an environmentally-benign, one-step process



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