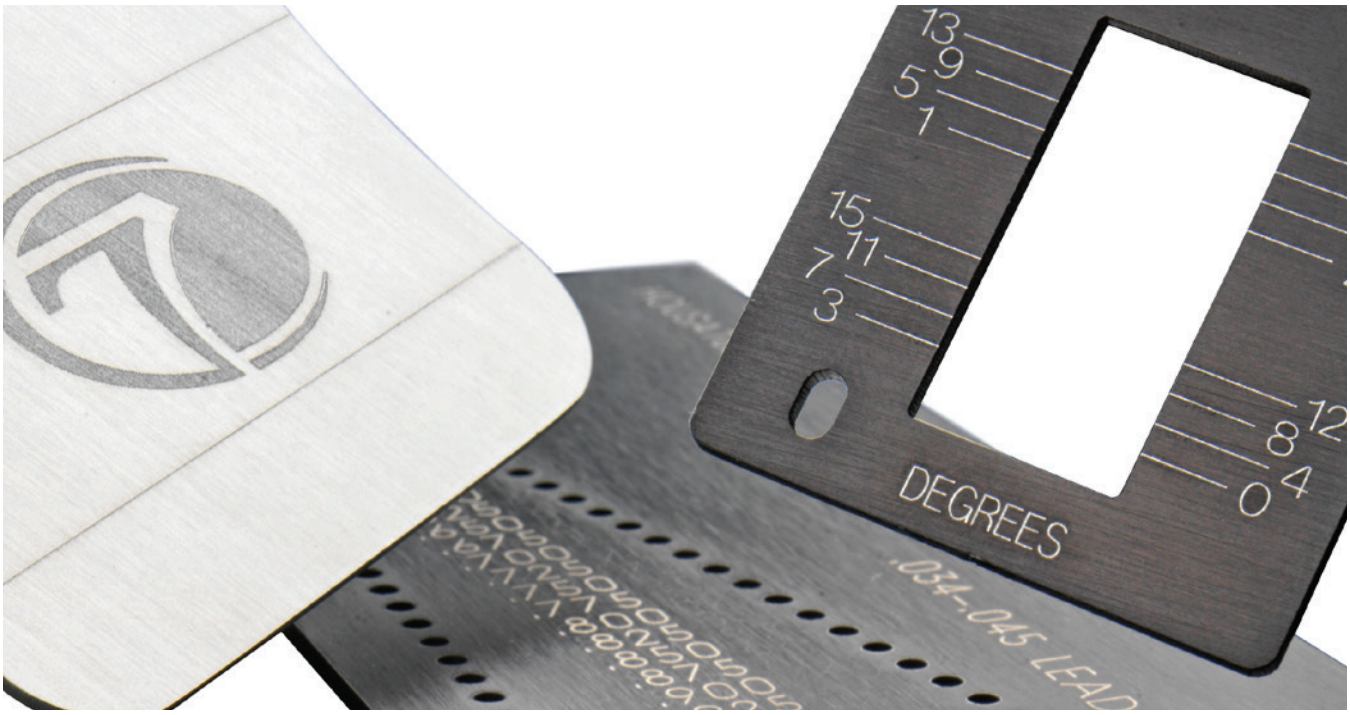
ACCUMET

Tech Brief

Laser Marking Vs. Screen Printing



INTRODUCTION

Product manufacturers may wish to consider laser marking as an alternative to screen printing (also called silk screening) when looking to permanently mark a surface such as with a bar code, a serial number, a logo, or calibration settings. Depending on the application, laser marking and screen printing each have their pluses and minuses — although for most applications laser marking is faster, cleaner, easier to set up, more precise and more adaptable than screen printing.

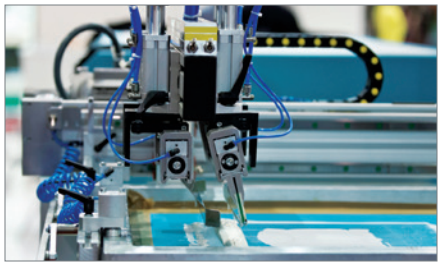
How Each Method Works

Laser Marking

The marking results from the laser beam hitting the surface and oxidizing it at the point of contact. The oxidation causes a color change (from gray to black in stainless steel, for example). The shape of the marking can be virtually anything from simple numbers and barcodes to complex geometric shapes and depends on the movement of the laser beam relative to the marked surface — i.e., either the laser beam moves (as directed by mirrors) or the table moves that holds the object being marked. Depending on the power of the laser, the pattern can be a surface marking (i.e., no depression) or an etching (i.e., a depression).

Screen Printing

The marking is essentially "painted on" the object. Five main players are involved: ink, a mesh, a squeegee, a stencil, and the marked surface. The mesh is soaked with ink which flows onto the surface as the squeegee moves across the back of the mesh, pressing the mesh and forcing the ink through openings in a stencil that is attached to the front of the mesh. This action leaves ink on the surface in a design that is a mirror image of the design cut out of the stencil. The name "silk screen" comes from the fact that these meshes once were made only from silk. Today, most meshes are made of polyester, although nylon and stainless steel meshes may also be used in certain applications.



Technology
From the top: Laser Marking, Screen Printing

Comparing Laser Marking to Screen Printing

Key criteria for comparing these two methods include:

Type of material. It is possible to screen print virtually any material, from tee shirts to stainless steel. But although laser marking is somewhat more limited in terms of materials that can be marked, it is nonetheless extremely wide-range, including most metals, glass, ceramics, polymers and plastics.

Colors. With silk screening, color is only limited by the color of the ink used. Multicolored patterns are also possible by applying different meshes with different color inks. Because laser marking is a subtractive process, there's only one color available — i.e., the color that results from the reaction of the material to the heat of the laser.

Technical simplicity. Lasers cost more than screen printing machines and require more training to operate. That said, most product manufacturers will benefit from outsourcing the marking to a laser shop so they can benefit from the laser's inherent speed advantages.

Production speed. A production run on a laser is measured in days versus the weeks typically required of screen printing. Laser marking is faster because there's much
less prep work and no clean up. The marking itself is also faster. Once the job is "dialed in" to the machine, marking each piece takes only a few seconds.

Environmental impact. Screen printing requires ink and cleaning solvents—neither of which applies to laser marking, so laser marking is a much greener process.

Precision and uniformity. Light is inherently a more precise agent with which to mark than with a stencil, mesh or squeegee — all of which are much more vulnerable to variables such as the amount of pressure applied to the squeegee, the rate the squeegee passes across the back of the mesh, defects in the mesh material, variations in the stencil, and more. This makes laser marking the process of choice for very small barcodes and applications where there is not much room to mark.

LASER MARKING ADVANTAGES
- Faster production, less prep work, no cleanup
- More environmentally friendly
- More precise — for smaller objects, tighter spaces
- More adaptable — e.g., can print on curved surfaces
- Permanent, won't rub off
- Less possibility of contamination
- Control of etch depth
- Restoration of antique hand stamping

Adaptability. Not only can you mark in very small spaces with a laser, you can also mark very large objects (at Accumet we mark objects up to 12-feet long). Lasers can also mark curved objects and other multidimensional surfaces that require the beam to move on the X, Y, and Z-axis simultaneously — which screen printing can't.

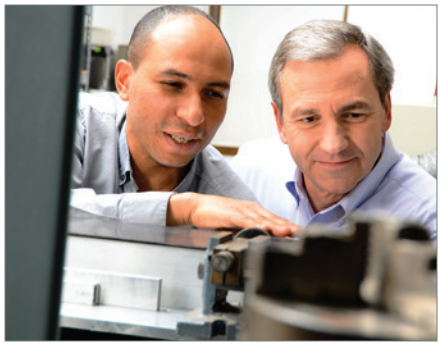
Durability. Because ink bonds to the surface material, it can come off with continued rubbing — making it less suited than laser marking for applications like dials and switches.

Contamination. And because surface pigment can come off, it can contaminate its surrounding environment, which makes screen printing less suitable in "high purity" applications such as clean rooms, spacecraft and biomedical implants.

SCREEN PRINTING ADVANTAGES
- Virtually any material can be marked
- More colors
- Lower equipment costs
- Simpler technology – i.e., less training needed

CONCLUSION

The best way to compare laser marking to screen printing is on the basis of your own product and production requirements. Are you looking for fast turnaround? Do you have significant constraints in the size of marking or the geometry of the surface to be marked? Would you just rather avoid the hassle of prepping and cleanup? Are you concerned about contamination or durability? If so, then you may wish to consider laser marking. One way to know for sure is by discussing your application with a laser marking expert first, before you commit to a process.



Next Steps:
Learn more by downloading this piece of related content: Laser Marking Vs. Screen Printing Blog.

You can access our entire library of technical briefs and design guidelines by visiting our support page.