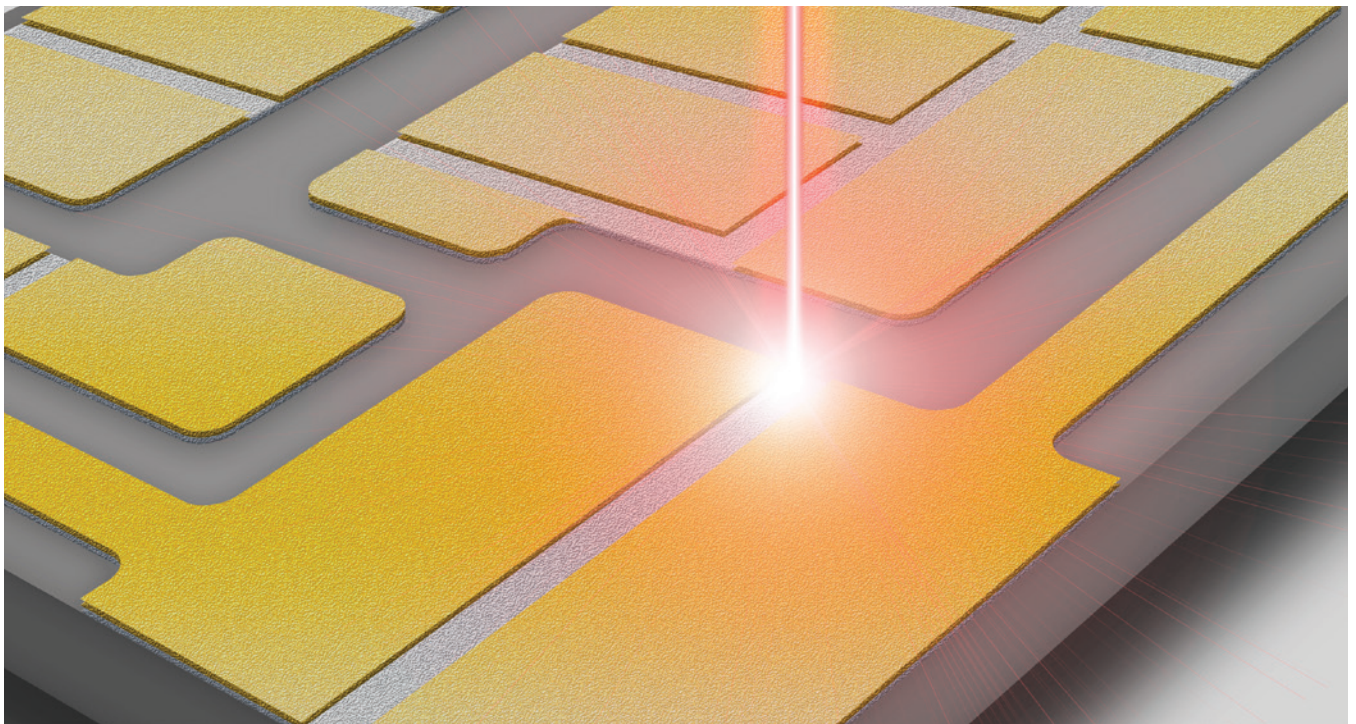


# Laser Ablation: The Alternative to Chemical Etching and Solder Dams



## INTRODUCTION

Laser ablation is a process that product manufacturers may wish to consider when looking to remove unwanted materials from a part's surface or when they wish to control solder flow on a PCB — typically so excess solder does not travel and cause electrical shorting. For cleaning a surface, the technology that laser ablation typically replaces is chemical etching. For controlling solder flow, the replaced technology is typically solder dams.

Compared to these rival technologies, laser ablation is almost always cleaner, more environmentally friendly and more precisely controllable. To see why, let's examine each technology in turn.



### Technology

From the top: Laser Ablation, Chemical Etching.

## For Removing Unwanted Surface Materials

### How Each Method Works

#### Chemical Etching

Chemical etching removes unwanted material, such as conductive material or paint, by immersing the object in a bath of corrosive liquid known as an etchant. The etchant reacts with the material in the area to be cleaned and causes the solid material to be dissolved. Inert substances, called maskants, are used to etch specific areas of the material. How much material is removed (and to what extent the base material is left undamaged) is often determined by trial and error and involves factors such as the concentration and composition of the chemical, the material to be etched and the temperature.

#### Laser Ablation

Rather than use a corrosive chemical bath, laser ablation removes unwanted material by irradiating the surface with a (usually pulsed) laser beam that heats the material and causes it to evaporate or sublimate. How much material is removed can be precisely controlled and varies based on the amount of laser energy applied per pulse, the pulse rate and the material's optical absorption characteristics.

#### LASER ABLATION ADVANTAGES VERSUS CHEMICAL ETCHING

- More environmentally friendly (no solvents used)
- Less hazardous to workers (again, because there are no corrosive solvents)
- More readily automated, such as with robots, for more consistent results and higher productivity
- More precise control and production of your circuits (thereby reducing the possibility of damaging the base surface)
- Less trial-and-error, again for more consistent results and higher throughput
- No expensive tooling changes

## For Controlling Solder Flow

### How Each Method Works

#### Solder Dams

To prevent unwanted solder flow, many PCB designers will install dams formed of glass or other dielectric materials — using traditional printing or firing techniques — to keep solder from shorting active areas on a circuit. The resultant dams may be as small as 0.030 inches wide.

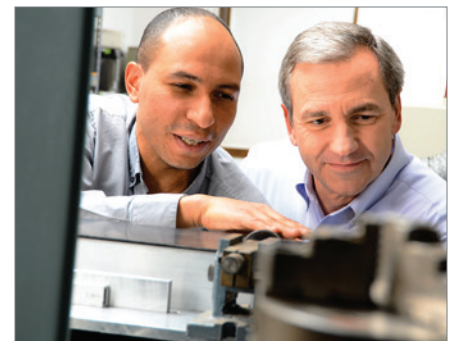
#### Laser Ablation

While solder dams control solder flow by steering the solder where it is supposed to go, laser ablation controls flow by using a laser pulse to create a trench around solder pads. That way, solder does not flow through the trench, contacting nearby conductors and causing a short.

LASER ABLATION ADVANTAGES VERSUS SOLDER DAMS
- More environmentally friendly (no glass or other dielectric to dispose of)
- Faster
- Less labor intensive
- Highly repeatable for more consistent higher-quality results
- More precise (typical solder dams are 0.030 inches versus laser trench widths of 0.007 inches — so you can reduce your circuit size)

## CONCLUSION

If you are looking for a cleaner, more precisely controlled and also more environmentally friendly way to accomplish either of these two applications, you might consider laser ablation. A good first step is to contact [Accumet](#) before you plan your manufacturing workflow to see how laser ablation can improve both your process as well as your product results.



#### Next Steps:

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