

How to Optimize Laser Settings When Using CerMark Products

- **Factors to Consider When Marking Metals**

It is sometimes difficult to determine the correct power and speed settings for creating high quality laser marks using CerMark marking materials. There are numerous variables that must be considered when establishing the proper settings. The type of metal substrate, thickness of the substrate, and the substrate's ability to conduct heat will all have an influence in the process. For example, aluminum conducts heat much better than steel, so it will require more marking power (heat) to do so. A thicker substrate will dissipate heat much faster than a thinner one, again meaning more marking power needed to achieve a good mark.

More variables come into play when you consider the laser used to produce the mark. The laser's wattage, the type of optics it employs, the quality of the beam, the spot size, and even the software can affect the mark quality achieved via the laser settings. For example, a higher wattage laser will deliver more energy than a lower wattage laser; a smaller spot size will mean more power in a given area.

Keeping all of these variables in mind, it is hard to make specific recommendations for laser settings when marking with CerMark products. We can recommend a starting point for power and speed, but this may not be the best for your particular application. So, what is the magic equation that crunches these variables into a perfect power and speed setting?

Well, in short, there is no equation that can calculate the perfect setting. But there is a method which will allow you to quickly and efficiently determine a proper power and speed setting for any type of substrate you choose to mark. The key is to create a power & speed test grid.

- **Designing a Test Grid**

The goal is to make a series of marks on the metal you want to laser that will vary from low heat to high heat. The grid should look something like the one shown in Figure A. In this grid, P denotes % Power and S denotes % Speed. The Color Mapping option in your laser system is designed to allow you the flexibility of running multiple laser settings one after the other as one job file. Contact your laser manufacturer or reference your laser Owner's Manual to understand Color Mapping. Adjust your laser's settings to match the selected colors, and then mark the substrate. See Figure A.

*Note: If your laser system speed is controlled by millimeters per second created the speed steps in increments of 50 mm/sec starting at 50 mm/sec.

- **Evaluating the Test Results**

After laser marking the part, wash off the CerMark and observe the variation in the marking quality. They should range from barely visible to a slight destruction of the substrate, as seen in the photo in figure B.

Now, scrub the test marks using the green abrasive side of a kitchen scrub pad. The mark with the highest contrast and durability will be your settings. Be careful not to overpower or damage the part. Remember the mark is only as durable as the surface you are marking on. In this example, settings at 100% power and 30-60% speed are optimal.

If you are using a lower wattage laser, i.e. 25 or 30 watts, and are having trouble marking aluminum & brass substrates, increase your Dots per Inch (DPI). This will deliver more energy to the surface of the substrate, or, start your test grid with 100% power and 20% speed stepping the speed down as you go.



Figure A.



Figure B.

- **Conclusion**

Using this test grid when marking any metal substrate for the first time will save you time and money. A well designed test grid will quickly pinpoint the optimum laser settings for your laser on a given metal substrate.

We recommend running this test before any large jobs and regularly as part of your Preventative Maintenance Program.

Remember, if you're not testing you're guessing!

Writer's Bio:

Dennis Gilmore is the lead Technical Service Representative for Ferro Corporation servicing the CerMark/Thermark laser marking product line. He is known as a specialist in the industry as it relates to the patented CerMark/Thermark laser bonding technology. In his 12 years of experience he has been involved in product development, production, quality control and sales and distribution for the CerMark/Thermark product line.