

## TROUBLESHOOTING

When using TherMark laser marking materials, speed and power are the balance which defines how the materials bond. Too much or too little power and/or speed will prevent the materials from properly bonding to the substrate. Every substrate will react to the amount of energy applied differently. Sample marking will ensure the correct settings for your application.

**Q. The laser marking materials look great after laser marking them, but when I go to rinse them off they wipe clean. What am I doing wrong?**

A. Usually this means you are not allowing the laser enough time to bond the materials to the substrate. You can adjust by lowering the marking speed (expressed in %, in/sec, or cm/sec). We recommend this be done in 5% increments. A power grid on a sample piece may help to visualize the settings better. For more information on power grids, please click [here](#).

**Q. While laser marking my substrate I notice the laser marking materials are peeling back like a sticker. What is going wrong?**

A. If the materials are peeling back, one of two things is occurring:

- There may be a coating of some sort preventing the TherMark laser marking materials from bonding to the substrate. We usually see this with lacquer coated metals (these coatings are common on aluminum, brass, and pewter). If you are not sure whether or not your substrate has a lacquer coating, you can test by direct laser marking (to remove the coating), applying TherMark materials, and then re-laser marking on the same spot. If the materials bond, then you know a coating was causing your problem.

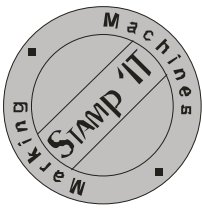
If you know your piece is not lacquer coated, the problem may be stemming from residue left behind by a cleaning agent such as an over the counter glass cleaner. Simply wash the substrate with warm water to remove any cleaning agent residue. Note: When marking with the TherMark LMC products on ceramic substrates, you should never use cleaning agents to wash or clean debris and oils off the substrate. Matte finished ceramics will hold the agents in the porous surfaces and will give you great difficulty when marking.

- Speed. Peeling may occur when the correct amount of laser energy has been applied to the substrate but with too high a speed setting. The materials are bonding to themselves but have not had enough time to bond to the substrate. To fix this problem, slow down the laser marking speed until you achieve the correct settings.

**Q. I am getting a discoloration on my substrate after I apply and laser mark the TherMark laser marking materials. What could be wrong?**



A. This type of discoloration can appear on silver-plated, gold-plated and chrome substrates and mostly occurs when using liquid TherMark materials straight out of the container. The liquid marking materials contain a strong concentrate of chemicals and may cause



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discoloration when left to sit on some surfaces (especially more inexpensive items). You can fix this problem by adding a small amount of thinning agent (denatured alcohol or demineralized water) to your TherMark marking materials, quick drying the piece with a heat gun, hair dryer or fan after application, and then laser marking and removing the excess marking material quickly. By not letting the marking material sit on the plated/chrome substrate you will greatly decrease the chance of discoloration.

**Q. After I laser mark my substrate there is no TherMark material left.**

A. This happens when you have your laser speed set too low. You are actually blowing the TherMark materials off the substrate surface. At too slow a marking speed, the amount of thermal energy is enough to disperse the materials around on the surface but not let them create a bond. In this instance you will need to increase the marking speed in increments of 5% until you find the exact setting needed.

**Q. I am getting a brown rust color instead of a black mark. Are the TherMark laser marking materials bad?**

A. No, the marking materials are fine. The browning or rusting occurs when you have applied too much thermal energy either due to slow speed or excess power. In this case, you have actually burnt the TherMark material. To fix this you should increase the marking speed or lower the laser power.

**Q. The mark is not as dark as I would like, can I get a darker mark by using a thicker application of the TherMark material?**

A. Different alloys may give slightly different shades of color with the same TherMark laser marking material. Different laser types (CO<sub>2</sub> and fiber) will also produce varying results. A thicker coating of TherMark material will result in more power being needed to create the bond with your substrate; it may not necessarily make the marks darker. In general, more is less: you will get the best marks using the smallest necessary amount of laser marking material. Make sure to consult your individual product's product page for recommended coating thicknesses.

**Q. I get inconsistent marks after marking. Different parts of the graphics have different contrast and quality.**

A. This may happen when the coating of TherMark materials is not homogeneous along the surface being marked. This usually occurs when airbrushing or foam brushing our liquid products. Care must be taken to master a technique which works for you so you can evenly apply the ink along the whole target surface every time.

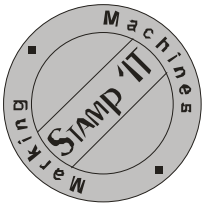
**Q. The marked graphic is not sharp; lines are thicker than in the picture. What could be wrong?**

A. A common reason for this problem is that your laser is out of focus. When your laser is focus, the narrowest waist of the laser beam is the part of the beam which hits the substrate. When you are out of focus, a wider part of the beam is hitting the substrate. Despite being somewhat out of focus it is still possible to create a bonded mark. However, the excess beam width will reduce the resolution you can achieve. In order to fix this problem, re-focus your laser. Once you bring the laser into focus you may need to reduce your laser power setting.

**Q. I use the same settings specified by TherMark and I get terrible results. What can be wrong?**

A. There are a number of circumstances which can cause this:

- For exactly same situation described you may get bad results due to being out of focus. See above.
- The coating thickness makes a huge difference, too. Try a few different coating thicknesses to get the best results.
- Check which kind of lens you are using. Different lenses with different focal lengths will have different beam waists at the focal plain, requiring different power and speed settings.
- A common error is failure to perform the proper conversion of settings. Settings are often given in percentages, but 80% power on a 45W laser is not the same as 80% power on a 30W laser. Similarly, 80% speed on a laser which goes 140 in/sec at



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100% speed is not the same as 80% speed on a laser which goes 60 in/sec at 100% speed. Make sure to convert percentages so they are relevant for your laser. Remember, the important thing is absolute power (Watts) and absolute speed (in/sec or cm/sec).

- Mode of operation is also very important. It is important to understand the differences between rastering vs. vectoring and continuous wave vs. pulse. For more information, please visit our Laser Settings section.

### **Q. I am marking glass with LMC products and get micro-fracturing. How can I prevent this from happening?**

A. Micro-fracturing occurs when the glass substrate is heated beyond its melting temperature and then rapidly cooled to room temperatures. These strong variations in temperature lead to local expansion and contraction and subsequently to micro-fracturing. There are two mechanisms of heating glass substrates: through conduction (ink heating the glass through thermal conduction), and through direct absorption. The latter is present mostly in CO<sub>2</sub> lasers due to the absorption at CO<sub>2</sub> lasers' wavelength of operation. Consequently, solid-state lasers generate smoother marks. In both cases the micro-fracturing can often be minimized by lowering the power and the speed, thus creating gentle conditions for bonding – heating the ink just enough to bond to the surface and scanning slowly enough to deposit enough heat to bond.

### **Q. My ink/paste has solidified. Can I re-liquify it?**

A. Yes. You can re-liquify the ink by using small amounts of denatured alcohol or demineralized water. This process may take several hours or even days depending on how much material was in the container. Please remember that the more thinning agent you use, the lighter the pigment may become.