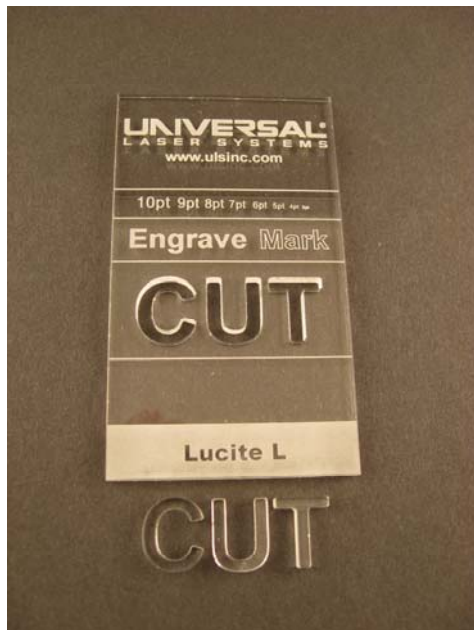


## Laser Processing Guide for Lucite L

### General

CO<sub>2</sub> laser systems are ideal for cutting, marking and engraving of Lucite L. The 10.6 micron wavelength emitted from the CO<sub>2</sub> laser is absorbed very efficiently by polymeric materials such as Lucite L. The absorbed laser light is converted to heat, and the heat causes material that is directly in the laser's path to vaporize (ablation). Higher laser power densities can be used to cut through Lucite L sheets leaving a clean, square, fire polished edge. Lower laser power densities can be used to create a high definition, permanent mark on the surface of the material for branding or serializing parts. Figure 1 shows a sheet of Lucite L that was cut, marked and engraved using a CO<sub>2</sub> laser in a single, continuous operation.



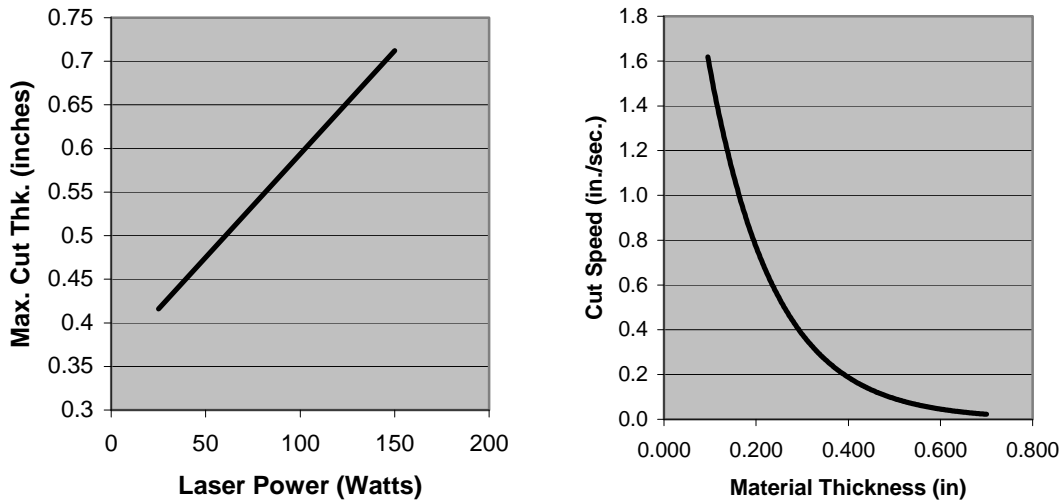
**Figure 1. Cutting, Marking and Engraving Lucite L in a single laser processing operation.**

### Laser Cutting

A 2.0 lens (two inch focal length) is suitable for most cutting applications. Air assist with back sweep is recommended for cuts of greater than 0.250". The back sweep will allow direction of the high pressure air across the surface of the work piece instead of down the cut where it could cause frosting of the cut edge. Gas assist with nitrogen is recommended for thicknesses greater than 0.500". For gas assist, the cone will provide better direction of the low pressure nitrogen to the cut. Since the nitrogen pressure is low, frosting of the edge due to rapid cooling is not an issue. Also, for thicknesses greater than 0.500", switching to a 3.0 lens will provide a more uniform cut through the thickness of the work piece due to reduced beam divergence.

When cutting it is best to remove the masking from the top side of the work piece so that it will not interfere with the laser cut. Leave the masking on the bottom side of the work piece to protect it from reflections off the cutting table. For applications where edge quality is critical, the work piece should be elevated about an inch above the cutting table to avoid all reflections.

For cutting, the laser is usually run at 100% of its rated power. Lower cut speeds are used for thicker materials. Figure 2 provides guidance on laser power selection and laser cutting speed respectively.



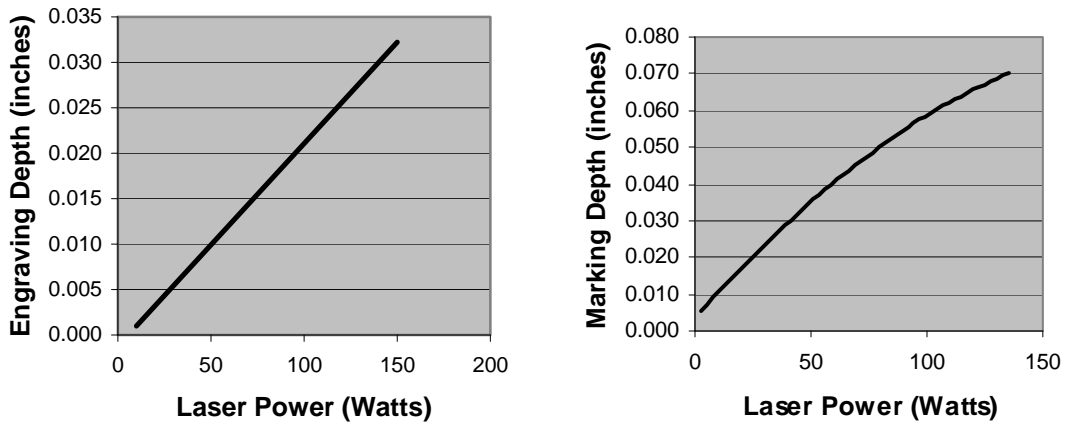
**Figure 2. Maximum thickness that can be cut as a function of laser power (left), and maximum cut speed as a function of material thickness (right).**

### **Laser Marking and Engraving**

A 2.0 lens (two inch focal length) is suitable for most laser marking and engraving applications. For applications that require very fine detail, High Power Density Focusing Optics (HPDFO) are recommended. This will provide a much smaller laser spot size than the 2.0 lens.

For most applications, the masking should be removed from the top side of the work piece. The top side masking should be left in place for deep raster engraving (depths of greater than 0.010") in order to avoid hazing of adjacent surfaces due to re-deposition of ablated material. Leave the masking on the bottom side of the work piece to protect it from mechanical damage (scratches).

Figure 3 provides information on marking and engraving depth as a function of laser power.



**Figure 3. Engraving depth as a function of laser power (left), and marking depth as a function of laser power (right).**

For further information on laser processing of Lucite L, please contact Universal Laser Systems.

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