

### ***Minimizing Warp***

Warping of engraving sheet materials can be a natural result of several factors, such as improper storage and some engraving or lasering processes. Often the warp of a sheet or smaller piece of material can be so severe that it negatively affects the quality of the finished work. As a result of warping, material may not be able to be properly engraved or problems may arise when mounting the sheet to a mating surface or attempting to insert the piece into a sign frame.

#### **DEFINITION: WARP**

Warp in engraving material is a distortion of the sheet from a desired flatness. The degree that the sheet deviates from the specification or desired flatness is the result of many factors.

#### **HOW TO MINIMIZE WARP AND ITS EFFECTS**

Many cases of warp can be eliminated through proper handling and processing of the material. To minimize warp and its effects, the following suggestions are offered:

1. Never store sheets in extreme temperatures. For best results, store and use sheet material at ambient room temperature.
2. Store sheets flat at all times. Sheets stored vertically will take a set over time. A warped sheet should be placed flat. In some cases, some of the damage can be removed.
3. Remove the protective mask and allow the material to relax naturally over time. Place the sheet on a flat surface and place in a room temperature environment. If possible, place an even weight over the entire surface by using additional sheets or pieces of material to hold the material in place.
4. Apply adhesive tapes prior to using. Sheets stored for prolonged periods of time with adhesives previously applied will tend to warp as the adhesive materials dry out. Once this damage has occurred, removal of the adhesive carrier may or may not cause the sheet to lose its warp.

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5. Use a mechanical hold-down device during the engraving process. Clamping materials in vises or quick clamps may not eliminate warp since the clamping pressure is usually applied from the material's edge and can be the cause of warp during the process. Clamps that pin the material from above the sheet work best. Double-faced tape or "tacky mat" surfaces work well. They do not remove the warp, but may limit the effect during the engraving process.

6. When lasering, limit the power (applied wattage) or reduce the dpi of laser engraved raster images. This will minimize localized heat build-up. If possible, laser engrave text and graphics images before cutting sheets into smaller plates on multiples jobs. Holding down smaller pieces may be more difficult and warp in small plates will be greatest when there is no heat-sinking source from the surrounding plate area available.

### **HOW DOES WARP OCCUR?**

The most likely factors causing warp are noted below.

#### **1. Improper Storage**

Improper storage is one of the single biggest causes of warp in sheet materials. Sheets stored flat on a solid surface will relax over time, even if they previously exhibited some degree of warp. Temperature, length of time and weight can influence the properties of the plastic enough to relax the sheet. All sheet materials need to be stored in a flat position at all times. In almost all cases, storing sheet material upright will cause the product to warp - as shown in Illustration A below. As shown in Illustration B, sheet materials should always be stored flat.



**A: Improper Storage Method**

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**B: Proper Storage Method**

## **2. Protective Masking or Adhesives**

The addition of the protective mask or adhesives can be another source of warp. Tension of the mask or adhesives when applied to the sheet material can artificially pull on the corners of the sheet.

Generally, with the protective masking removed, the sheet can begin to return to a flat state.

## **3. Engraving/Lasering Applications**

The process of removing large amounts of surface areas during engraving or lasering can cause the material's surface to become "stressed relieved," resulting in some degree of warp. Generally this is not detectable during rotary engraving due to mechanical hold down (vise, clamp, double-sided adhesive, tacky-mat, etc.), of the work piece during the engraving process. Down pressure exerted by the spindle nose cone in "contact engraving" also hides the warp caused during the deep engraving process. During laser engraving, however, other factors come into play. When raster engraving a large area, localized heating of the material causes a high degree of warp in the work piece. This warp may appear to be minimal until the material is either lasered or sheared to its final size. Upon vector cutting of a piece during a "multiple application," the warp may even increase further, making the piece non-usable.