The Advantages of CO_2 Laser Metal Marking

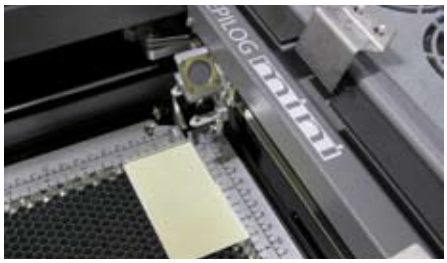
Laser marking of different metals using a CO_2 laser is finding increased applications as the industry develops a better understanding of how the CO_2 engraving process works. Some metals – anodized aluminum for instance – have been marked with CO_2 lasers for years. Products like serial tags, identification plates, and control panels are all excellent examples of how well the laser marking process works with anodized aluminum. Other metals, like stainless steel and titanium have traditionally not been marked with a CO_2 laser; however with the advent of metal marking compounds, CO_2 lasers can now easily mark these materials by producing a dark, high contrast mark that cannot be duplicated using other methods.

Marking with CO_2 lasers using metal marking compounds

Marking on materials like stainless steel with an Epilog laser system is achieved using a simple three step process that is fast, easy and produces a higher contrast mark than can be achieved with any other laser marking method.

Step 1) Simply apply a metal marking compound such as CerMark™ or TherMark™ directly to the metal you wish to mark. The laser marking material is easy to apply and comes in a spray can or in paste form that can be brushed on. After the marking material has dried for a few minutes the part is ready to be engraved.

Stainless Steel with CerMark



Step 2) Place your metal part on the engraving table and "print" your job to the laser. The laser is connected to your PC computer through an Ethernet or USB connection just like a paper printer, but instead of putting ink on paper, the laser engraves onto the surface of the material being processed. Since the laser system acts like a printer, you can use a wide variety of PC compatible software programs to print bar codes, serial tags, data matrix or even graphic images such as your company logo.

Step 3) After the part has been engraved, simply wash off the excess metal marking compound with water. The resulting laser mark will be a crisp, clear, permanent, high contrast mark. This simple three step process can be used on a variety of bare metals, including stainless steel, aluminum, chromed steel, titanium and tungsten carbide.

Is the mark permanent?

Physical testing on stainless steel has shown that the laser mark survives testing with organic solvents, acids/bases, hot/cold cycling, abrasion (scratch resistance), salt water spray, lubricants and blow torch. The dark, crisp, clean mark produced using a CO_2 laser with the metal marking compound is an easy, simple solution for your data matrix, bar coding and other metal marking applications.

5.1.5 Laser Bonding.

5.1.5.1 Description: Laser bonding is an additive process that involves the bonding of a material to the substrate surface using the heat generated by a Nd:YAG, YVO_4, or CO_2 laser. The materials used in this process are commercially available and generally consist of a glass frit powder or ground metal, oxides mixed with inorganic pigment, and a liquid carrier (usually water). The pigment can be painted or sprayed directly onto the surface to be marked, or transferred via pad printer, screen printer, or coating roller. Adhesive backed tapes coated with an additive are also used in this process.

The process also can also be performed using a CO_2 laser and ink foils for use in less harsh environments. Laser bonding is accomplished using heat levels that have no noticeable affect on metal or glass substrates and are safe for use in safety critical applications. The markings produced using this technique (dependant upon the material used), are resistant to high heat, are unaffected by salt fog/spray and are extremely durable (see Figure 5).

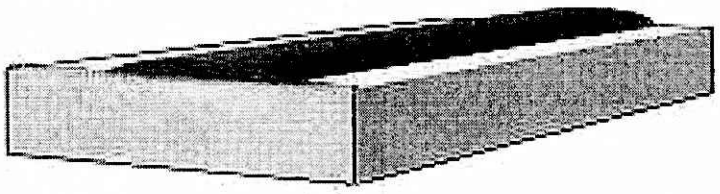


FIGURE 5. Material Fused To A Surface Using The Laser Bonding Process

Laser bonding parameters shall be established using scrap material or test coupons made of the same as the product marked.

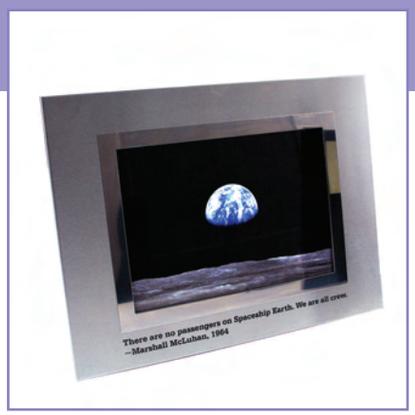
Coating materials must be stirred or agitated vigorously to ensure that the bonding materials are in suspension.

Coatings shall be applied in a manner that ensures even distribution of the coating across the marking surface.

The settings established for laser bonding must be tested on bare metal to ensure that the heat levels applied produced no visible affect on the part surface.

Figure 6 illustrates some of the more common laser bonding marking conditions that adversely affect reading.

NTW 154
Stainless Steel Photo Frame
Holds 4" x 6" photo



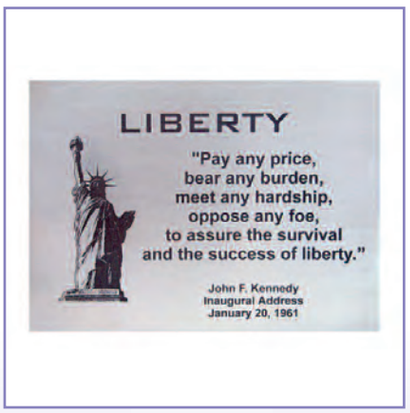
NTW 155
Stainless Steel Photo Frame
Holds 5" x 7" photo

NCH 115
Stainless Steel License Plate
Chrome Plated
11-7/8″ x 5-7/8″

NUS 049
Stainless Steel License Plate
Brushed
11-7/8″ x 5-7/8″

NUS 065
Stainless Steel License Plate Frame
Brushed
12-1/4″ x 6-1/4″

NUS 043
Stainless Steel TechLine Plate
Brushed
5″ x 7″ x .050″



NUS 044
Stainless Steel TechLine Plate
Semi-polished
5″ x 7″ x .050″

NUS 045
Stainless Steel TechLine Plate
Brushed
6″ x 8″ x .050″

NUS 046
Stainless Steel TechLine Plate
Semi-polished
6″ x 8″ x .050″