Perfect Laser Technologies

TECHNICAL BULLETIN # 1

Glass Tube CO^2 Lasers

There are various applications for CO^2 lasers, not just for laser engraving. CO^2 lasers have military applications for rangefinding, medical applications for skin resurfacing and laser surgery - also high powered CO^2 laser are used for cutting and welding. Lower to Middle power CO^2 lasers are commonly used in laser engraving and cutting machines, mostly for wood and acrylic products.

CO^2 lasers are not generally suited for metal cutting or engraving (except for the range of Oxygen assisted machines) and generally are applied to materials such as acrylic, leather, rubber, cork, wood, bamboo and some fabrics and papers. Whilst CO^2 lasers are not intended for use with metals, they can be used on coated metals such as anodized aluminium. An anodized aluminium card or other anodized item can be beautifully engraved with the use of a CO^2 laser.

If Laser Marking Materials (LMM) are applied to stainless steel, a CO^2 laser can be used to create permanent staining of the metal. The LMM is applied as you would a spray paint and once dry, the application of CO^2 laser engraving will result in a black stain on the metal. Though this marking is not engraved into the metal, it is a permanent mark and is often used for applying barcodes or serial numbers.

The power rating (wattage) of a CO^2 laser determines the engraving rate as well as cutting thickness. An almost identical engraving can be done using a 40W CO^2 laser as could be done on a 100W, though a 100W will yield a higher production rate, especially on cutting thicker materials. The application that the material will be used for will determine what power rating is suitable.

GENERAL GUIDE TO LASER POWER AND APPLICATION

40 TO 50 W	:	Entry level laser for general engraving, not for cutting thick materials
60 TO 80 W	:	Higher speed and deeper engraving as well as thicker cutting
80 TO 100 W	:	Higher production yield (speed) and deeper engraving and cutting
100W & more	:	Higher speed cutting of thicker materials

What to cut – and what NOT to cut when it comes to foams and plastics

OK to cut :

Polyester (PES)
Polyethylene (PE)
Polyurethane (PUR)
Neoprene (wet suit material)
Teflon (PTFE)

NOT ok to cut (can lead to severe illness or death) :

PVC (Poly Vinyl Chloride) / vinyl / pleather / artificial leather : Emits chlorine gas and other noxious stuff when cut! Don't ever cut this material as it will ruin the laser optics, and cause the metal of the machine to corrode.

ABS : Emits cyanide gas and tends to melt. ABS does not cut well in a laser cutter. It tends to melt rather than vaporize, and has a higher chance of catching fire and leaving behind melted gooey deposits on the cutting grid. It does not engrave well.

HDPE / milk bottle plastic : Catches fire and melts. Don't use it.

PolyStyrene Foam : Catches fire! It also melts, and only thin pieces cut. This is the #1 material that causes laser fires!

PolyPropylene Foam : Catches fire. Like PolyStyrene, it melts, catches fire, and the melted drops continue to burn and eventually turn into rock-hard stuff.

Fiberglass : Emits fumes. It's a mix of two materials that can't be cut.
Glass (etch, no cut) and epoxy resin (fumes).

Coated Carbon Fibre : Emits noxious fumes. A mix of two materials. Thin carbon fiber mat can be cut (with some fraying) – but not when coated with epoxy.

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