

# LASER BEAM PRODUCTS

## CO<sub>2</sub> Laser Reflective Mirrors: Applications

### CO<sub>2</sub> lasers

Copper mirrors are widely used with CO<sub>2</sub> lasers and are the ONLY mirror that can be used with the most powerful of lasers.

Laser Beam Products manufactures mirrors for:

- laser resonators,
- beam delivery,
- laser scanning,
- laser focusing, and
- polarization control.

Whatever reflector is needed, Laser Beam Products offers the highest quality parts.

Designed with industrial applications in mind, gold coated copper mirrors will carry on working even when dirty or burnt. In a typical CO<sub>2</sub> sheet steel cutting laser LBP mirrors are working at just 3 percent of their power handling potential.

Thousands of mirrors are supplied every year to laser manufacturers. The reliability and long lifetimes of gold coated copper mirrors make them the industry standard.

Hundreds of standard mirrors are stocked for fast shipment, even custom designed mirrors are available on 4 weeks delivery or less..

Internally water cooled mirrors are particularly convenient.

### Cut/Weld

Industrial cutting and welding machines need maximum up time and reliability from beam delivery optics. To achieve this LBP copper mirrors are coated with an electroplated gold coating that never peels, flakes, cracks or lifts off. Even mirrors with accumulated damage from burning and debris, can be left until the next scheduled service for replacement.

Another benefit is the total absence of polarization effects from gold mirrors (they have zero phase shift). With today's demand for high quality edge finish of cut parts, the maintenance of circular polarization is essential. Not a worry when using solid metal mirrors.

Mirrors can be used in reflective beam expanders and focus units, eliminating fragile and expensive Zinc Selenide lenses.

A gold coated copper mirror is working at just 3% of its power capacity in a typical laser cutting system. It is possible to use gold coated copper mirrors with powers of 40 Kilowatts.

- Many of customers choose gold plated copper mirrors to replace the OEM mirrors to give increased reliability and lifetimes.



## Electro Optical Components, Inc.

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## **Pulsed Laser**

Gold coated copper mirrors have a massive pulsed laser damage threshold, making them ideal for beam delivery and cavity mirrors.

Independent test houses have certified Laser Beam Products mirrors as having a pulsed Laser Induced Damage Threshold of 46.7J/cm<sup>2</sup> for a 80ns pulse (500 MegaWatts!).

The reason for such exceptionally high damage resistance is the amorphous nature of the coating. Absence of crystal grains and grain boundaries means there is nothing on the mirror surface to initiate laser damage.

The amorphous nature of our proprietary coating allows "super smooth" chemically polished surfaces (surface roughness of 5nm or less) to be produced. There are none of the diffraction patterns, or target patterns so commonly seen on diamond machined metal mirrors.

## **Er:YAG**

Er:YAG lasers operating at 2.94 microns wavelength are popular in dentistry and medicine.

The high pulse power can damage many optics. Fortunately, gold coated copper mirrors offer excellent damage resistance. Frequently found in articulated arms the high reflectivity of gold means an arm can be used for several types of infrared lasers, CO<sub>2</sub> or CO for example, without changing optics.

Laser Beam Products offers silicon mirrors coated for maximum reflectance at 2.94 microns which are useful where lightweight optics are needed. For lightweight applications gold coated aluminum mirrors can be used.

Good reflectivity in the visible allows alignment lasers to be used to simplify the assembly of the articulated arm. We have developed mirrors with hardened "pads" pressed into the copper to provide a stable surface for a pointed adjuster or mirror mount to sit on.

## **Infrared**

Gold offers a broad consistent reflectivity in the infrared spectrum from 800nm to beyond 20 microns. This is ideal for broadband applications such as spectroscopy and where multi-wavelength sources are used.

OPO's are an area of research where gold coated mirrors can be used for multiple wavelength reflection.

The chemical inertness of gold allows uses in environmental monitoring of gases such as in chimneys, flues, pipes, and of liquids where other materials would be destroyed.

Stainless steel mirrors are manufactured for pharmaceutical, foodstuff, brewing and nuclear industries where it is one of the few approved materials for use.



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