

CARBON DIOXIDE LASER SYSTEMS (CO₂)

CO₂ lasers are far IR lasers and they are the most common laser in industry. They are relatively inexpensive (\$/W) and are available in a wide range of output power, from 10 W to 10 kW.



CO₂ Laser Systems

CO₂ lasers have a high wall plug efficiency of over 25%. The output is a series of emission lines from 9.3 - 11.0 microns in the IR with the band center around 10 microns. These emission lines can be filtered by using dielectric optics and/or isotopic mixtures in the gas mix in order to enhance certain lines for better material processing. For instance, 9.3 microns is more efficient for polymer processing while 10.6 microns is better for ceramics. They have a high penetration depth (5 – 100 microns or more) and machining is via a first order thermal process – material/photon interaction is primarily via vibrational excitation.

Most of these lasers are used in focal point machining mode except for CO₂-TEA (Transverse Excited Atmospheric) lasers which have a longitudinal electrode discharge resulting in a high order multi-mode beam that is better used in an imaging mode than in focal point machining. Some of the lasers we integrate include:

- **Light Machinery** Impact™ lasers for imaging applications. This 9.3 micron TEA CO₂ runs up to 500 Hz and 50 W of average power.
- **Coherent** Diamond™ laser with control of pulse width and pulse repetition rate up to 20 kHz at 100 W - 500 W. High quality beam provides for less than 100 microns focusability.
- **Synrad** CO₂ laser available from 10 W to several hundred watts of output power.



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