Iradion Laser Inc

Advancing CO2 Laser Technology Light Years Ahead

Since 1960, when the laser was invented, the technology slowly developed and got introduced into industrial applications. Laser metal cutting and welding started to flourish in the 1980s and then rapidly expanded into a wide range of materials. Today, laser utilization continues to expand into state-of-the-art uses: inertial confinement fusion, space debris detection, 3D printing, and modern imaging techniques. However, despite the current wide use of laser technologies, dramatic developments in CO2, fiber, UV, Femto, Pico, and other wavelength laser technology continue to improve performance and reliability. Iradion Laser has achieved a patented breakthrough in traditional CO2 laser technology found in typical glass and metal tube laser designs.

Philippe Brak, Iradion President and CEO, explains that conventional CO2 laser designs use metal chambers that contain a laser gas mixture (CO2, Helium, and Nitrogen) and also metal electrodes to excite the gas to produce the infrared laser beam. Over time, the internal electrodes shed atoms that contaminate the gas mixture reducing excitation efficiency, and thus, power output. In addition, many glass or metal chambers use O-ring seals and welds that allow the Helium atoms to escape, further compromising the internal gas mixture. “With Iradion’s patented ceramic core design, we are flipping this conventional script by hermetically sealing the CO2 gas mixture in an inert aluminium oxide ceramic core and exciting the gas with externally mounted electrodes,” notes Brak.

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Under the Hood of Iradion’s Ceramic Core CO2 Laser Technology

Notably, Iradion’s ceramic core CO2 laser tube technology solves structural limitations of conventional laser enclosures by moving all the reactive components to the outside of the laser tube, leaving only pure, clean alumina or aluminum oxide (ceramic) in contact with reactive gases. Due to its chemical makeup, alumina does not react with the gas. In addition, the CTE (coefficient of thermal expansion) of alumina is one-third the CTE of aluminum. Therefore, Iradion’s ceramic core CO2 laser tube has significantly better power stability and performance compared to traditional CO2 lasers. What’s more? The use of alumina allows Iradion’s ceramic core lasers to be fired at very high temperatures as part of the cleaning process of the laser source. This further assures no contaminants in the laser tube remain to react with the gas. Also, Iradion’s design enables filling the ceramic core with comparatively higher gas pressures than traditional lasers to produce faster pulse rise/fall times and power stability over a wider range of power levels. Typical CO2 lasers lose their power stability at 10 percent of their rated power, but Iradion’s lasers maintain excellent power stability from maximum rated power down to 2 percent; a 100-watt Iradion laser will maintain power stability from over 100 watts down to 2 watts.

“Iradion’s design is built on years of successful CO2 laser technology development, but innovation was needed to meet a stringent government contract requiring a CO2 laser with a 10 year shelf life.” shares Brak. “To overcome the laser gas degradation problems of traditional CO2 laser technology, the patented ceramic core CO2 laser technology was developed.” Iradion’s integrated radio frequency excited CO2 laser comes in three power categories, namely: Eternity Series (30 to 40 watts), Infinity Series (50 to 120 watts), and Iradion 1600 Series (200 to 250 watts). These laser sources cater to applications like cutting, marking, engraving, drilling, ablation, heat-treating, and other processes. Today, Iradion lasers are used in electronics and semiconductor industries for marking electronic components, cutting ceramics, drilling PC Boards, wire stripping, fiber optic splicing, 3D glass, and ceramic printing, and other state-of-the-art applications. They are also used in systems for many different industries: automotive, medical, converting and packaging, promotional products, textiles, signage, and robotics. Leading laser system integrators such as Trotec, GCC, TYKMA Electrox, Laser Engineering, Boss Laser, Perfotec, Control Micro Systems, Infosight, and many others currently partner with Iradion.

Iradion is actively working on expanding its product lines to include higher power and pulsed lasers, all based on ceramic core CO2 technology. “Through proactive development, we want to provide our customers with the highest level of quality and service. We are constantly improving our processes and technology through teamwork, ongoing training, and a high level of integrity and customer focus,” concludes Brak.