The Epilog G2 Makes its Mark

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Equipment for laser-based marking, etching and engraving on metal, plastic, glass and more are common and readily available. Examples of laser marking applications range from sports trophies for such entities as NASCAR and football bowl events to bar codes, serial numbers and logos on industrial manufactured metal components. There are several types of marking/engraving machines that are used, and a more recent advanced machine that provides the speed and ability to work on large products simultaneously.

Epilog Laser's G2 Galvo laser represents a combination of high-speed metal and plastic engraving and marking capabilities and a large work area.

Laser Systems

Laser systems work by passing laser light across a series of mirrors and focus lenses. The wavelength of the laser depends on the type of laser used and the choice of laser typically is based on the materials of the workpieces.

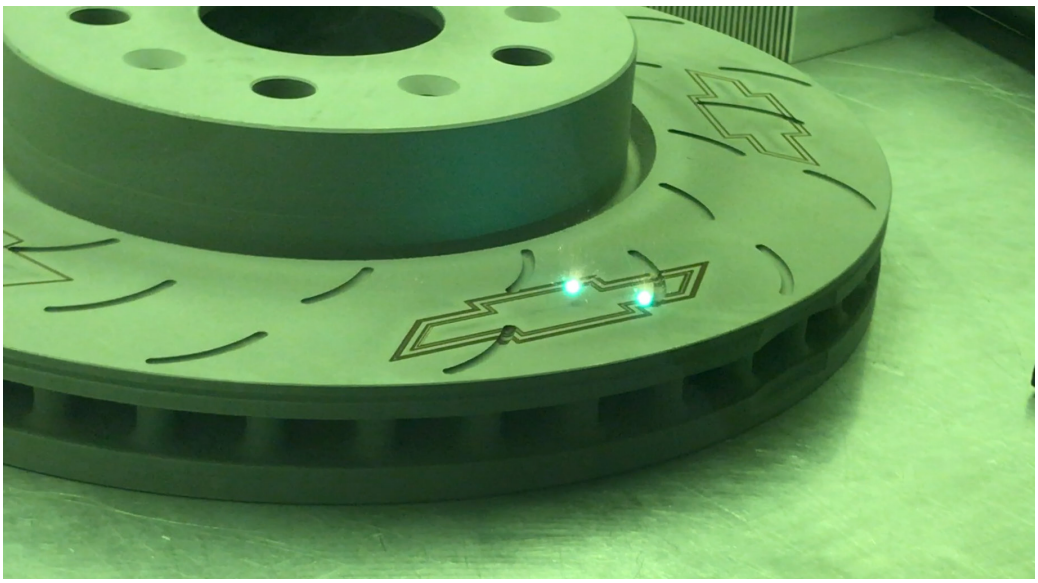

Figure 1: The G2 system engraving disc brakes. Source: Epilog Laser

While there are several types of laser sources used in industrial marking systems, fiber lasers are often used for marking metal; for wood and a variety of other products, CO2 lasers are effective.

In both cases, effective marking/engraving is a function of speed, power and pulse frequency and duration. Galvanometer-based systems direct the laser beam faster than other systems. Power is also based on the material to be marked. Marking lasers emit pulses of light, each with a very short duration measured in nanoseconds. There are fixed pulse width fiber lasers that can vary the number of pulses produced—also known as their frequency—but not vary the width of each pulse. A variable pulse width laser can vary the time of each laser pulse, and is typically used for marking materials such as plastic that could melt with a fixed pulse width and also to create color on metals.

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CO_2 lasers are versatile and are used to engrave and cut wood, glass, plastic, paper and marble, as well as for photo engraving glass, 3D engraving and 3D modeling. Their downside is that they are not ideal for direct metal marking since the CO_2 laser reflects off bare metal.

Fiber lasers generate a different wavelength of light compared to the CO_2 laser. There is no reflection issue with fiber lasers. They accomplish surface markings on metals as well as produce depth engravings. This wavelength is also used effectively with engineered plastics, stone and ceramics, but it is not appropriate for wood, glass and textiles.

In addition to different laser wavelengths, there are also different ways to deliver the laser beam to the work surface. A flatbed machine, for example, typically has a large working area, while a galvo system is both fast and efficient in high-speed marking, especially for deep metal engraving.

The Epilog G2 Galvo Laser

Epilog Laser's G2 Galvo laser features a unique dynamic-focus lens technology that enables the user to enlarge their engraving area from 4 x 4 in. (101 x 101 mm) to 16 x 16 in. (406 x 406 mm), all the way up to 24 x 24 in. (609 x 609 mm). The G2 represents a combination of high-speed metal and plastic engraving and marking capabilities and a large work area. Highlights include:

- **Laser Source:** Fiber Laser (1064 nm) both fixed and variable pulse duration (MOPA)
- **Work Area:** Maximum 24 x 24 in. (609 x 609 mm)
- **Fiber Wattages:** 30 or 50 watts
- **Materials:** Directly engrave into most metals and mark engineered plastics.

The G2 uses a waveform laser with pulse control, enabling different types of marks and engraving, as well as greater flexibility and functionality. The G2's air-cooled, fiber laser directly engraves into most metals and marks engineered plastics with speeds of 2 m/second. Dual pivoting mirrors microscopically adjust the laser beam to the worktable for incredibly fast, high-resolution engraving. Epilog also adjusted the focal height and beam delivery of the G2 by implementing dynamic focusing lens technology to safely engrave large parts within an enclosed-cabinet environment.

There is an added benefit of louvered ventilation for optimized airflow at any table height.

With the G2, there is no need to change lenses to change the field size. Operators simply set the engraving field directly from a keypad, enabling them to change between the three available work sizes.

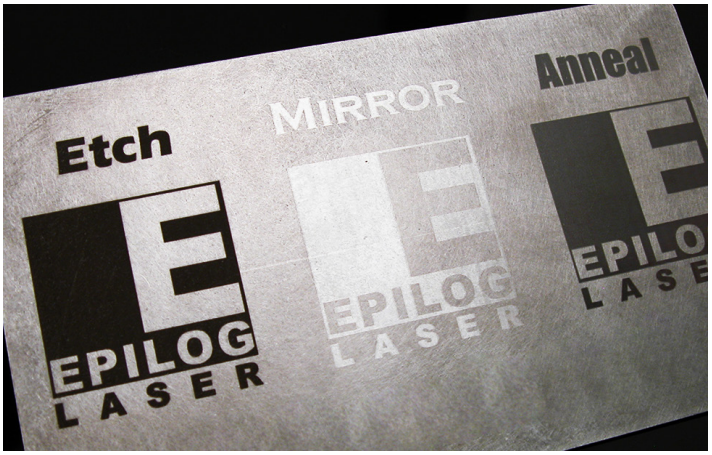

Figure 2: Create multiple styles of marks simultaneously with the G2. Source: Epilog Laser

Most galvo systems are based on proprietary software. The G2, however, provides seamless software integration, enabling users to opt for Windows-based AutoCAD, SolidWorks, barcoding or serialization software or graphics programs such as CorelDRAW and Adobe Illustrator.

The software also enables the user to set hatch patterns, multiple hatch patterns simultaneously and the number of passes for a given mark. Users select from different speed, power, frequency and waveform values. Most important, however, is that users do not have to learn yet one more proprietary program and instead use their own familiar and commonly available software to do the job.

Figure 3: The G2 marking area fits up to 29 x 27 x 36.3 in. (736 x 685 x 922 mm) parts and tools within the safety enclosed Class 2 laser cabinet. Source: Epilog Laser

There are many unique features of the G2, including:

- The G2 can mark on very tall parts up to 36 in. in height. Most galvo machines can only mark workpieces up to a few inches in height.
- Network connectivity: One laser can be used with multiple computers as long as each computer prints to a specific network address. It is possible to print to multiple Epilog Laser systems from one, two or three networked computers as well. Comparatively, competitive systems require a dedicated computer to

run that one machine.
- The Class 2 G2 is fully enclosed, eliminating the potential risk for eye damage from the lasers. If a door is opened during operation, the laser shuts off automatically.

Figure 4: The G2 high speed etching features marking speeds up to two meters per second. Source: Epilog Laser

The Technology Behind the G2

The G2 uses a three-axis galvo with a translator optic featuring a dynamic adjustment that compensates the beam diameter that can be used over a much larger area. Dual-rotating mirrors make microscopic adjustments to direct the laser beam to the table for fast, high-resolution laser engraving.

The G2 uses two different types of lasers. A Q-Switch laser gives the G2 a fixed pulse length, which is a limited frequency range used for deep engraving and surface markings. The MOPA—master oscillation power amplifier—in comparison, is a variable pulse length laser, providing greater frequency ranges and laser pulse width control for producing different types of marks and color on metal. A telescoping third-axis lens moves on the horizontal axis to adjust the focal distance for a consistent spot size across the table.

Technical specifications include:
- Maximum material thickness per work area:
  - 4 x 4 in. (101 mm): 36.3 in. (923 mm)
    16 x 16 in. (406 mm): 25.98 in. (660 mm)
    24 in. x 24 in. (609 mm): 15.79 in. (401 mm)
- Maximum Piece Size: All table sizes: 29 x 27 in. (736.6 x 685.8 mm).
- Laser Wattage: 30 or 50-watt pulsed fiber laser, air-cooled.
- Standard Features: 5 in. (12.7 mm) machined aluminum table, 2 m/second maximum marking speed.
- Print Drive and Software: Laser Dashboard, Epilog Job Manager. Print from most Windows-based CAD and graphic software packages.
- Operating Mode: Optimized Vector Mode.
- Speed and Power Control: Computer controlled speed and power in 1-100% increments. Color mapping links speed and power.
- Print Interface: 10/100 Ethernet with auto MDIX, compatible with Windows 7/8/10.
- Size (W x D x H): 33 x 43.75 x 71.1 in. (838.2 x 1,111.25 x 1,805.94 mm).
- Electrical Requirements: Auto-switching power supply accommodates 110 to 240 volts, 50 or 60 Hz, single phase.
- Ventilation System: 650 CFM (1,104 m3/hr.) external exhaust to the outside or internal filtration unit is required. There are two output ports, each 4 in. (102 mm) in diameter.
- Laser System Classification: Class 2 Laser Product—1 mW CW MAXIMUM 600-700 nm.

Summary

The Epilog G2 has taken the industry from a 4 in. work area to a 24 in. work area. Also unique is the ability for users to use common software programs versus proprietary software with a learning curve and potential compatibility issues.

The G2 provides speed, greater work area, software advantage and reliability in a highly flexible solution all inside a Class 2 laser system enclosure. Engrave one part at a time, or a full table of parts given the greater work area and fast galvo–based fiber laser technology.

The G2 represents Epilog's newest marking/engraving machine, which joins several existing laser solutions. The breadth and depth of laser solutions at Epilog enable its customers to purchase and use exactly the right machine for the job and materials at hand.

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ABOUT EPILOG LASER

In business since 1988, Epilog Laser has worked hard to become the leader in the laser engraving, cutting and marking industry. Epilog's dedication to building strong relationships with customers, distributors, vendors and employees has been paramount in building and strengthening our business. To our customers we offer a near endless stream of support - from our online technical library and virtual training suite to our top-notch technical support staff.