Perfect Laser Technologies

TECHNICAL BULLETIN # 15

MOPA Fiber Lasers

On the 16th of May 1960, Theodore (Ted) Maiman created the first working laser. In a July 7, 1960 press conference in Manhattan, Maiman and his employer, Hughes Aircraft Company, announced the laser to the world.

In 1956 Maiman started work with the Atomic Physics Department of the Hughes Aircraft Company in California where he led the ruby maser redesign project for the U.S. Army Signal Corps, reducing it from a 2.5-ton cryogenic device to 9 Kilograms - while improving its performance. On a total budget of $50,000, Maiman turned to the development of a laser based on his own design with a synthetic ruby crystal, which other scientists seeking to make a laser felt would not work. On May 16, 1960, at Hughes' Malibu, California, labs, Maiman's solid-state pink ruby laser emitted mankind's first coherent light, with rays all the same wavelength and fully in phase. See Wikipedia article : https://en.wikipedia.org/wiki/Theodore_Harold_Maiman

As with all other major inventions and innovations of the 20th century, the laser has come a long way since then.

Among these innovations is the invention of the MOPA (Master Oscillator Fiber Amplifier) laser, which has the capability to mark, etch and engrave products.

Although there are many laser systems on the market today, the MOPA fiber laser system is one of the most innovative and technologically advanced systems you can find.

The term MOPA is actually an acronym for Master Oscillator Power Amplifier. This type of technology was a breakthrough in DUV (Deep Ultra Violet) light source design.

In traditional, single-chamber light sources, there is a trade-off between bandwidth and power, forcing you to choose between compromising either performance - or cost effectiveness.

The MOPA design has two gas discharge chambers : the Master Oscillator, and the Power Amplifier. The Master Oscillator generates light with a low amount of energy in a tight spectrum. The light is then passed through the second chamber (Power Amplifier), which intensifies the light.

Fiber lasers are essentially similar to other lasers, except the active gain medium is made up of an optical fiber with doped rare-earth elements. These may include erbium, ytterbium, neodymium, dysprosium, thulium etc.

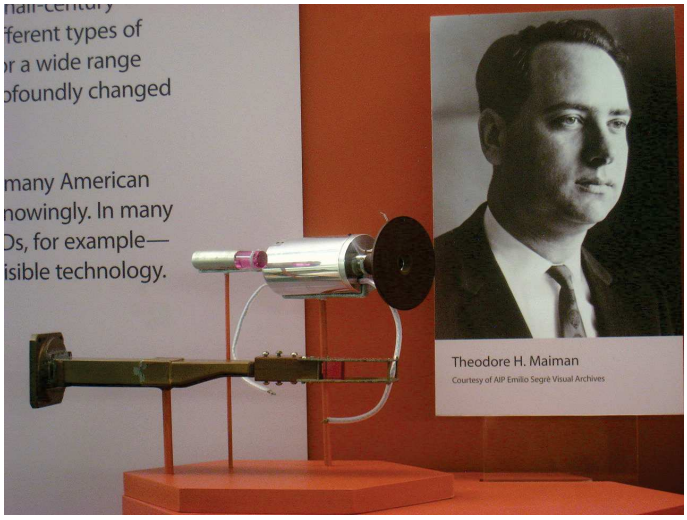
These types of lasers use less energy and take up less space than other laser systems. The MOPA fiber laser is the best of both worlds.

As with all lasers, the process of how a MOPA fiber laser begins its journey is the same. To create light, you need to get the atoms into an excited state. As they move, they create a weak light that becomes more concentrated as more energy is added. Once this beam of light is created, it is amplified to produce a focal point. In MOPA lasers, an Optical Amplifier is used to create the focal point.

With the ability to modify and increase output power without changing the geometry, shape or operating principle, MOPA fiber lasers are the best way to achieve power scaling.

Nd:YAG (Neodymium-doped Yttrium Aluminum Garnet) lasers and MOPA lasers both have the capabilities to mark, etch and engrave on a variety of surfaces and materials, but YAG lasers utilise a bulb as a pumping mechanism and a YAG crystal as the gain medium. These both reside in an optical resonator, typically a gold-plated cavity, which reflects the light and helps with creating the laser light.

This is considered to be outdated and lacks many of the qualities found with a modern MOPA fiber laser system.



Unlike YAG lasers, MOPA fiber lasers utilise semiconductor diodes as the pumping mechanism and a doped fiber optic cable as the gain medium. For these fiber lasers, the doped fiber optic also serves as the resonator.

MOPA fiber lasers are much more reliable and efficient than previous laser technologies. With these laser systems, you are getting the best technology on the market today.

At Perfect Laser Technologies, we strive to continuously provide our customers with the most innovative and high-quality laser marking, engraving and etching technology available.

Our new MOPA fiber laser machines give you maximum flexibility and better pulse duration control no matter the substrate. MOPA technology allows you to utilise selectable waveforms and an expansive frequency range, offering greater peak power at high frequencies. This also allows you to mark, etch or engrave on a wider variety of surfaces.

Some of the materials and surfaces on which our MOPA lasers will mark include : Steel, Aluminum, Titanium, Brass, Copper, Painted materials, Black oxide, Polyethylene, ABS plastic, and much more!

MOPA technology also allows our machines to mark on difficult materials such as gold and nickel plating, as well as a variety of painted and anodized surfaces. With MOPA technology, you get more enhanced and definitive marks than you would with any other type of laser marking machine, and colour marking!

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