

Global High Power Laser Systems Market - Growth, Trends, and Forecasts (2023 - 2028)

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Report description:

The Global High Power Laser Systems Market is expected to register a CAGR of 7.1% during the forecast period (2022-2027). The key drivers boosting the market growth include the increasing adoption of fiber lasers in industrial applications like cutting and welding and rising demand from end-user industries like automotive, healthcare, aerospace & defense.

Key Highlights

The market is witnessing robust demand for interconnected machines with advanced laser head sensors and artificial intelligence algorithms for advanced process monitoring and control features. These machines can be integrated with other systems and management software, thus maximizing efficiency and productivity.

This enables the high-power laser machine to be managed by software for all phases, including importing production orders generated by the user's system, automatic programming, production planning and creation of worklists to be loaded onto the machine, collection of machine data on production (pieces produced, materials used) and performance (machine status, alarms, processing times), and offer the data necessary for production control management systems, all the while being fully compliant to Industry 4.0 law requirements.

Automotive and general manufacturing operations use high-power laser cutting processes to shorten process cycle times. The combination of reduced tooling costs and flexibility in materials is leading to the rapidly increased use of laser cutting.

Further, high-power diode lasers with outputs of ten or more kilowatts are opening new application scenarios for laser cladding. Particularly sustainable and resource-efficient coatings can be produced and applied, for instance, in automotive, machine construction, and other industries. To advance the idea, in April 2022, together with industrial partners, the Fraunhofer Institute for Material and Beam Technology IWS, developed applications and specific processes for this laser class to industry readiness under the label "HICLAD," which enables resilient laser cladding with a high-power laser.

On the flip side, high costs associated with the deployment of laser technology, strict regulatory framework and policies imposed

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by the government, and a lack of skilled personnel and expertise restrict the market and hamper its growth. Also, the laser industry suffered significantly from the impacts of the covid-19 pandemic. Manufacturing and automotive industries, in which high-power lasers are widely used, witnessed a slowdown owing to production restrictions in 2020, resulting in a decline in the overall demand for laser systems. However, the resumption of production activities has revived the demand for lasers, which is expected to increase further.

High Power Laser Systems Market Trends

Welding Segment is Expected to Hold a Major Market Share

Welding has always been considered a highly-skilled and labor-intensive activity, and in many respects, it is. One cannot assume the quality of a weld by appearance. The quality of the weld is demarcated by material and gas interactions during the molten phase and the bonding of the materials during the cooling phase.

With the increasing use of specialty alloys (e.g., boron steel, high-strength nickel alloys, chromium alloys, and titanium alloys), new challenges arise because the processing parameter window for these materials may be narrow. The welding process can be tightly controlled with high-power laser systems.

Further, High Power Fiber laser welding continues to evolve as a preferred process with enhancements in weld quality, reliability, and performance, as several fiber laser welding applications are autogenous, where the weld is formed entirely by melting parts of the base metal, and no additional filler wire or powder is used. The enhancements include better joint fit-up tolerance (air gaps, mismatch, etc.) of the parts to be welded, elimination of solidification cracking during the welding, and modifying the weld metal's chemical composition or microstructure to obtain suitable mechanical properties, etc.

Also, high-power laser welding is gaining popularity in the automotive industry. It is now commonplace for many automotive applications, including large-scale welding of body frames (body-in-white), door frames, trunks, auto hoods, chassis, and laser plastic welding for front and backlights and electronic housings. Sometimes forgotten as the welds are internal to automobiles and sometimes very small in size, laser welding is also widely used for metal welding of many sub-components, including airbag initiators, motor coil windings, and battery tab-to-bus bar connections for vehicle electronics, and electrical interconnections within an automobile build.

With the global upsurge in the demand and production in the automotive industry, the studied market is anticipated to encounter lucrative opportunities. For instance, according to the Organisation Internationale des Constructeurs d'Automobiles (OICA), in 2021, approximately 80 million motor vehicles will be produced worldwide. This figure translates into an increase of around 3%, compared with the previous year. China, Japan, and Germany were the largest car and commercial vehicle producers in 2020.

The Asia Pacific Region is Expected to Witness a High Market Growth

The Asia Pacific region's laser industry has seen significant growth in recent years, with the continuous improvement of domestic economic conditions. The region has consistently focused on scientific research, technology upgrades, market exploration, and the construction of laser industrial parks, which has intensified the development of the laser industry.

For instance, with the advancement of the "Made in China 2025" strategy, the manufacturing industry in China is transforming into a high-end, intelligent type. Laser technology has become an indispensable tool in high-end manufacturing due to its high efficiency, low consumables, small material deformation, and strong adaptability to processing objects. High-end laser processing equipment is receiving more and more attention. In current laser processing applications, laser cutting is the most popular, and fiber laser is the most popular light source system.

In December 2021, China's first 100 kW ultra-high-power laser, jointly developed by Nanhua University and Rayco Laser, was

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officially used in Hengyang City, Hunan Province. Compared with a traditional laser, the 100 kW ultra-high power laser has a more compact structure, higher electrical and optical conversion efficiency, lower energy consumption, and better beam quality. In Japan, the focus is on developing advanced military technologies such as high-power microwave- and laser-based weapon systems to help combat the growing missile threat posed by neighboring countries. Japan's Defense Ministry has planned to develop high-powered lasers to destroy enemy drones until 2025 and will engage with companies for the project. Recently, Japan's Furukawa Electric, an electric and electronics equipment company, developed and launched an industrial laser. The company is now further enhancing its fiber laser technology for energy, information, heat conduction, connection, and storage applications.

High Power Laser Systems Market Competitor Analysis

The Global High Power Laser Systems Market is moderately fragmented with significant players like Prima Industrie S.p.A, IP Photonics Corporation, Coherent Inc., etc. With a prominent share in the market, the major players are focusing on expanding their customer base across several regions. These companies leverage strategic collaborative initiatives to expand their market share and profitability.

October 2021 - Coherent, Inc. launched its new high-power UV laser. The Coherent AVIA LX 355-30 nanosecond ultraviolet (UV) laser offers an unmatched combination of high output power, reliability, and long lifetime, providing a significant boost in productivity for high-precision cutting, drilling, and microstructuring tasks, particularly in microelectronics production.

May 2021 - Prima Industrie S.p.A developed a new Laser Genius+ 2D fiber laser machine, wholly designed and built in Italy. The machine is fast and productive, with a trajectory speed of 180m/min. The Laser Genius+ machines comprise sizes 1530, 2060, and 2040. It can be equipped with numerous fiber laser powers, from 2 to 15 kW. The machine is built to have total control over the laser process and obtain robust reliability and quality with all available power. The new laser head has also been designed to efficiently manage the heat required to melt thick sheets while staying cold and clean, thanks to sensors that actively control the cutting process in real-time, hermetically isolated optics, simplified mechanics, and the high efficiency fumes extraction system.

Additional Benefits:

The market estimate (ME) sheet in Excel format
3 months of analyst support

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