

Ultrafast Lasers Market - Growth, Trends, Covid-19 Impact, and Forecasts (2023 - 2028)

Market Report | 2023-01-23 | 155 pages | Mordor Intelligence

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Report description:

The Ultrafast Lasers Market is expected to register a CAGR of 16.7% over the forecast period. The COVID-19 outbreak and the consequent lockdown restrictions worldwide affected industrial activities. Many industries witnessed a disruption in supply chain and manufacturing operations worldwide. Some other effects of lockdown include a lack of availability of raw materials used in the manufacturing process, labor shortages, fluctuating prices that could cause the production of the final product to inflate and go beyond budget, shipping problems, and others.

Key Highlights

Ultrafast or ultrashort pulse lasers are critical manufacturing tools across industries, such as automobile, consumer electronics, and medical devices, due to advantages like tighter tolerances, enhanced dimensional accuracy, and elimination of post-processing steps.

Industries move from laser-cut technology to ultrafast laser technology for machining accuracy, enabling earlier marketing of their products. Although laser (usually in the form of oscillators and amplifiers) equipment tends to have high initial costs, the improvement in process precision decreases the operating cost and overall time for production, which drives its adoption in material processing applications.

Available in the picosecond and femtosecond variants, these lasers also gain traction in the medical and military equipment manufacturing sectors. For instance, catheters and stents are made with ultrafast lasers. Mandates for laser marking for medical devices across regions are another reason for the growing demand for ultrafast lasers.

Technological advancements in industries such as consumer electronics, automobiles, healthcare, networking and telecom, and computing created the need for small and robust electronic devices. Such portable electronic equipment demands precise dimensional accuracy for components. This is expected to augment the demand for the fabrication materials needed to develop components with precise dimensional accuracy.

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Various alternate technologies are available and widely used for applications, such as material processing, owing to the reduced manufacturing complexities involved in the comparison. For instance, Excimer lasers, which produce high-energy UV radiation in various wavelengths, have been widely used for micromachining applications such as microelectronics, medical, automotive, and other industrial applications. Although ultrafast lasers can process optically transparent polymer materials, excimer lasers are more used owing to the costs involved. Other alternative technologies include Q-switched lasers, continuous wave (CW), nanosecond pulsed, among others.

The COVID-19 pandemic and the subsequent lockdown restrictions around the globe impacted industrial activities, disrupting manufacturing operations and supply chains around the globe. Some other effects of lockdown include a lack of availability of raw materials used in the manufacturing process, labor shortages, fluctuating prices that could cause the production of the final product to inflate and go beyond budget, shipping problems, and so on.

Ultrafast Lasers Market Trends

Demand from Consumer Electronics is Expected to Witness Significant Growth

The electronics manufacturing segment remains a highly dynamic sector. The sector is primarily driven by the increasing demand from the consumer electronics sector and fast-paced technological developments, which pressure OEMs to continuously introduce new products in the market. Consumer electronics providers largely depend on electronic manufacturers that offer benefits, such as cost savings, reduced time-to-volume, quality, reduced time-to-market, and flexibility, to provide their products in the market. According to Consumer Technology Association, Consumer Technology Sales in the United States increased by 7.5% and reached USD 487 billion recently.

Further, Consumer electronics (CE) retail revenue in the United States is steadily increasing. According to the Consumer Technology Association, consumer electronics retail sales in the United States will reach USD 505 billion by the end of 2022. Furthermore, smartphones generated the most retail revenue in the consumer electronics sector, accounting for USD 74.7 billion in revenue in 2022.

Most of the electronic devices in the market nowadays are miniaturized and demand tighter dimensional tolerances so that the components can fit inside ever-smaller form factors, driving the growth of the ultrafast laser market. The electronic manufacturing process needs the inspection of the tinier component features and improved accuracy.

A growing application for femtosecond lasers is in the field of handheld electronics. Mobile phones, memory chips, microprocessors, and display panels are incredibly sophisticated components comprising various materials, multiple layers of extremely low thicknesses, and minimal features. These components require high-precision and advanced manufacturing processes and the ability to be economically produced in large quantities.

Due to the very short pulse duration, ultrafast lasers enable thermal micromachining without any heat generation. Their increasing use in the advanced display repair process has led to a new generation of high-speed, compact, multi-wavelength ultrafast lasers.

For instance, Spark Lasers, an Ultrafast lasers manufacturer, offers DIADEM, a compact, high-energy ultrafast laser for advanced micro-machining applications with short femtosecond pulse widths that deliver over 40J at 30W and up to 1MHz. This laser has been designed for demanding electronics manufacturing and implantable medical devices.

Several industrial processes are taking advantage of the high precision of ultrafast laser processing. This includes selective layer ablation, where ablation rates as precise as 30nm per pulse are routinely achieved, and high-precision thin-film transistor electrode cutting, which has a cutting width smaller than 2µm. These processes require developing advanced and flexible beam shaping techniques, allowing the delivery of uniform, flat-top beams with variable shapes to the sample and sizes as small as 2µm x 2µm.

Players like Amplitude Group offer a range of femtosecond lasers for the consumer electronics, such as Tangor UV, Tangerine, and Yuja. These products include optical technology, the new standard for quality-driven results. They offer high repetition rates and

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peak-to-average power ratio; they can perform on any material with unparalleled precision, whether PCB, operations on semiconductors or flexible electronic materials, glass-cutting, and many others.

Asia Pacific is Expected to Hold a Significant Market Share

The Ultrafast Laser market has seen significant growth in Asia-Pacific due to augmented demand for femtosecond fiber lasers in the automotive and electronics industries. This region, especially in countries such as Japan and China, is expected to grow considerably during the forecast period due to technological advancements and many electronics OEMs.

The Asia-Pacific is an established leader in laser technology development with many market players, such as Thorlabs Inc., Wuhan Huaray Precision Laser Co. Ltd, Amplitude Laser, and others. The product offerings are one of the initiatives being taken by the market players for maximizing profit and gaining a competitive edge while fulfilling the ever-rising demand for enhanced ultrafast laser equipment. Companies have developed ultrafast lasers for myriad industrial applications due to increasing government initiatives for manufacturing defense and medical services.

The industrial application includes ultrafast lasers for manufacturing industrial products ranging from machines to aerospace equipment. Ultrafast laser in the industrial domain is used in heating for hardening, melting for welding and cladding, and removing material for drilling and cutting. Femtosecond laser processing for material manufacturing is gaining traction. For surface processing, ultrafast lasers have become an industry standard.

Many manufacturing utilities and an increasing focus on product quality and accuracy are significant factors fueling the demand for ultrafast lasers in Asia-Pacific. Moreover, manufacturing is one of the prominent industries in the Asian economy due to the rising need for industrial and consumer products.

Several supportive factors, including research funding, equipment purchase funding, and agreements, drive the demand for ultrafast lasers in the region. Recently, Chromacity signed a deal with Photonteck to supply and distribute their ultrafast lasers in China. Photonteck will promote Chromacity's range of fixed wavelength femtosecond lasers and picosecond optical parametric oscillators (OPO) for imaging and sensing applications.

Ultrafast Lasers Market Competitor Analysis

The Ultrafast Laser market is highly competitive due to multiple players. The market appears to be moderately concentrated. Vendors in the market are involved in new product rollouts with significant R&D investments and partnerships that significantly boost the market growth. In addition to technological investments, companies have acquisitions as their growth strategy. The market consists of laser/photonic giants, such as Coherent, Trumpf, Jenoptik, and Lumentum.

In February 2022, Jenoptik announced its strategic partnership with Accretech. The companies combined economic and technological strengths to create added value for the entire Japanese industry from February 1, 2022. Jenoptik thus gained another strong distribution partner.

In January 2022, Light Conversion launched CRONUS-2P and CRONUS-3P microscopy-dedicated femtosecond laser sources covering. Its applications include functional neuroimaging, optogenetics, and deep imaging using medium-repetition-rate three-photon excitation and fast high-repetition-rate two-photon imaging.

Additional Benefits:

The market estimate (ME) sheet in Excel format

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