

Community

News

<https://doi.org/10.1515/aot-2019-0032>

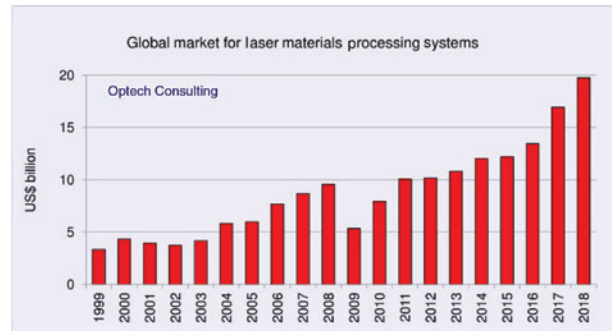
Market for Laser Materials Processing Systems reaches \$19.8 Billion in 2018

It takes quite some time to collect all the market data from the various sources but traditionally, in April of every year analysts collate all the numbers from the previous year and give a consolidated review of the economic situation of the photonics market. Apart of this is laser material processing. This market comprises all the machines which use an internal laser for processing various goods.

According to a report from Arnold Mayer, Optech Consulting, the market for laser systems for material processing reached a new record in 2018. 2017 was a legendary year for this market and in 2018 it grew another 17% and reached the new record volume of \$19.8 billion. In Euros, the market went up to a volume of €16.8 billion in 2018, up 12% compared to the previous year. The difference of growth rates in US\$ and Euros is due to a 4.9% appreciation of the Euro against the US\$ in 2018 compared to the previous year. Table 1 gives some more detailed information on the development in recent years.

Surprisingly, the market growth in Europe exceeded 20%, outpacing growth rates in North America and China. Investments in laser equipment increased substantially in Europe in line with growing capital equipment spending, defying comparably weak growth.

High power laser cutting and welding, which is the largest application segment of laser materials processing, once again spurred the worldwide growing demand for laser equipment. The demand for welding systems was



20 years of growth in the market for laser systems for material processing (© Optech Consulting).

stimulated by automotive applications, and especially by the transition of the industry to e-mobility. In contrast, market growth for laser applications in the electronics industry was mixed. While demand in the semiconductor segment continued to grow due to EUV and advanced packaging applications, market growth in the flat panel display segment took a dip. Due to decreased smartphone shipments mobile electronics manufacturers cut back their capital spending.

Laser sources 10% up in 2018

The global market for industrial laser sources reached \$5.1 billion in 2018, up 10% vs. the previous year. The growth rate falls short of that for laser systems because the average sales price for lasers decreased more than the average price for laser systems. Especially high-power fiber laser prices were under pressure in 2018 due to the increased number of suppliers gaining market traction by cutting prices.

Table 1: Global market for laser systems for material processing from 2007 to 2018.

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
World market in EUR billion	6.35	6.4	3.8	5.9	7.2	7.9	8.0	8.8	10.7	11.7	15.0	16.8
World market in US\$ billion	8.7	9.4	5.2	7.9	10.0	10.2	10.7	11.8	11.8	13.0	16.9	19.8

Herein, a 'laser source' denotes a laser and a 'laser system' denotes a system (machine) including a laser [http://www.optech-consulting.com/html/laser_market_data.html].

Market growth rates for laser systems as well as for laser sources were down in 2018 as compared to the previous year. 2017 was an outstanding year for laser materials processing, and in 2018 some of the drivers paused or lost steam. The process of laser adoption in the manufacturing industry in China continued at a slower pace. The microelectronics processing market felt the decreasing growth rates in the mobile electronics market. The decrease of car sales worldwide and especially in China spurred fears of decreasing investments in the automotive industry. Most visibly, the US-China trade row was often cited as a major reason for the slowdown of growth in the industrial laser market. While the direct impact of the dispute on the laser market appears to be small, it also has an indirect impact

by creating investment uncertainties and by slowing down global economic growth.

During the course of 2018, market growth rates vs. the previous year increasingly weakened, and the trend continued into the first quarter of 2019. However, as the first quarter is seasonally weak, Mayer waits for further data before setting up a 2019 market forecast. They will present the next market update at the 14th International Laser Marketplace, a separate event during the LASER – Owrld of Photonics trade show in Munich, Germany.

The 14th International Laser Marketplace will be held on 26th June 2019 in Munich. A detailed program can be found at http://www.optech-consulting.com/html/14th_international_laser_marketplace.html.

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Conference Notes

Review: UKP Workshop

Aachen, Germany, 10–12 April, 2019

Do you remember when ultrafast lasers were complex setups and hard-to-align research systems? The progress they have made within the last 20 years is incredible. As Eric Mottay (Amplitude Systèmes) confirmed at this year's UKP-Workshop, their output power grew by a factor of 1000 and most importantly, they became easy-to-handle industry grade boxes. Now it is time to get them integrated into machines.

The UKP-Workshop in Aachen, Germany, is a small expert meeting where people think about all aspects of the industrial use of such lasers. UKP stands for the German 'Ultrakurzpuls' or ultra-short pulsed. Held every other year, it drew 170 visitors from 14 countries this year. The program of the 2-day meeting went from laser sources via scanners and optics to simulations and finally, applications of ultrafast technology.

Actually, one might think that everything has been said about the ultrafast laser sources, but last year, the Fraunhofer Society announced their Cluster of Excellence 'Advanced Photon Sources' [1]. And this might be a game

changer. As Dieter Hoffmann, one of the speakers about the project confirmed, they want to increase the power of ultrafast lasers to the level where currently cw laser do the cutting and welding applications. In other words: 'Femto goes macro!'

They are serious about it and after making 3.5 kW from a fiber laser system [2] and, more recently, 500 W with 30 fs pulse duration from a slab laser system they want to start two application labs in Aachen and Jena later this year to test new process technology with a number of their multi-kW sources.

The crowd at the workshop just briefly stumbled upon the question, who would need thousands of Watts of ultrafast laser radiation. It is not only that we have had the same discussion with fiber lasers and CO₂ lasers already, the actual point is that there are first applications which obviously work well with high power ultrafast lasers.

One example was shown by Stephan Brüning (Schepers GmbH). He used a 500 W ultrafast laser source for processing of printing rollers. A few years ago, he started with four separate lasers to improve efficiency, but now with the new system he divides the strong laser beam into 16 beamlets which are each controlled by an acousto-optic modulator.



Attendants of the workshop enjoyed a very special location so far: The lounge of the local soccer team. But the event has grown beyond that lounge and so, the next UKP-Workshop on April 21 and 22, 2021, will probably see another and larger place.

For the 1:16 division he uses a diffractive optical element. Oskar Hofmann from Fraunhofer ILT used the same technology to create almost 200 identical beamlets from one source. The main challenge there is to get all those beams through optics without spatial distortions.

Ultrafast lasers for digital production systems

Reinhard Poprawe, the director of Fraunhofer ILT worked hard for his vision of Digital Photonic Production. The laser is just the perfect tool for a fully digital workflow, as he often said. But is that realistic for ultrafast lasers already?

Claus Dold (EWAG AG) showed an example, where carbide and diamond drills are made with ultrafast lasers. The machine he presented is fully automated and needs geometrical data for the drill only. It selects appropriate laser parameters on its own and produces a set of drills. For diameters from 0.5 to 3 mm the laser process is more efficient than other procedures. As a fully digital system it is prepared to do so within a global marketplace.

Even if such systems prove the feasibility of efficient production with ultrafast lasers, there remain a number

of challenges remain: Scanner technology either for high repetition rates or large bunches of beamlets is improving rapidly. Simulation tools have improved by separating micro and macro levels, and even fibers for the transport of ultrafast laser radiation are now available.

Still, making a machine for ultrafast lasers needs very detailed knowledge of the laser matter interaction. And a relatively new concern comes on top of laser protection: ionizing radiation, which is regularly created by strong ultrafast pulses impinging on metal.

(A modified version of this text has been published with Laser Focus World before.)

References

- [1] 'Fraunhofer institutes to develop 20 kW USP laser'. Andreas Thoß, 23. Mai 2018, blogpost for Laser Focus World, <https://www.laserfocusworld.com/articles/2018/05/fraunhofer-institutes-to-develop-20-kw-usp-laser.html>.
- [2] 'Record 3.5 kW from an ultrafast fiber laser'. Andreas Thoss, 21 March 2019, blogpost for Laser Focus World, <https://www.laserfocusworld.com/articles/2019/03/record-3-5-kw-from-an-ultrafast-fiber-laser.html>.

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EOS News

Photonics21: Future of Photonics in Europe

The annual meeting of Photonics Public Private Partnership (PPP) was held in Brussels on 27 and 28 March 2019. The PPP is a joint effort between the European technology platform Photonics21 and the European Commission. EOS was represented at this meeting by its Executive Director, Elina Koistinen, and President Elect, Gilles Pauliat.

The highlight of the meeting was the official announcement of the new multiannual strategic roadmap for years 2021–2027 (available for download at www.photonics21.org). This roadmap shows the way to industry and research by giving specific focus points/priorities for funding. The roadmap links directly to Horizon Europe, the European Union's ninth framework program, covering the same period, until 2027.

Proposals for call topics have been discussed and are now planned, and the Photonics21 community is working hard to maintain the priority status of photonics in the new funding plans.

Gathering of global optics and photonics societies: joining efforts for brighter future

Several optics and photonics societies met on 3 February 2019 in San Francisco (USA), during the Photonics West Congress at the SPIE initiative. EOS, represented by Thomas Südmeyer, chair of the Scientific Advisory Committee, joined the meeting and discussions with the other key players in the field.

The societies discussed global issues around optics and photonics and opportunities for co-operation. Three areas were identified for deeper collaboration between the societies:

- International Day of Light and outreach resources
- Anti-harassment policies
- National reports and initiatives

The issue of photonics being diluted in Europe was one of the discussion points, and a united message and communication will be created, joining forces world-wide to



Photonics21 released the roadmap to Photonics funding at their annual meeting in Brussels at the end of March.

promote photonics as a key enabling technology. The societies will meet again in June and develop activities on the topics.

Upcoming EOS events



EOS Optical Technologies

Munich, Germany

24–26 June 2019

Includes conferences on Manufacturing, Tolerancing, and Testing of Optical Systems (MOS) and Optofluidics

Register: www.conftool.com/wpc2019

EOS Topical Meeting on Diffractive Optics

Jena – City of Light, Germany

16–19 September 2019

Submit an abstract: www.conftool.com/do2019

Integrated Optics

Joensuu, Finland

26–28 November 2019

Save the dates

EOS Annual Meeting (EOSAM) 2020

Porto, Portugal

7–11 September 2020

Website: www.eosam2020.org

Save the dates

We look forward to seeing you at the events.

Community

Conference Calendar

2019

June

Optical Interference Coatings

Santa Ana Pueblo, NM, USA

2–7 June 2019

www.osa.org/Meetings/Topical_Meetings/Optical_Interference_Coatings**EPIC World Industrial Quantum Photonics Technology Summit at ICFO**

Barcelona, Spain

5–6 June 2019

www.epic-assoc.com/epic-world-industrial-quantum-photonics-technology-summit-at-icfo/**OSA Optical Design and Fabrication Congress**

Washington, DC, USA

10–12 June 2019

www.osa.org/Meetings/OSA_Meetings/Optical_Design_and_Fabrication**120th Annual Meeting DGaO**

13–16 June 2019

Darmstadt, Germany

www.dgao.de/de/jahrestagung**LASER World of Photonics**

Munich, Germany

24–27 June 2019

www.laser.de**World of Photonics Congress**

European Conferences on Biomedical Optics (ECBO)

Lasers in Manufacturing (LiM)

EOS Optical Technologies

Imaging and Applied Optics (OSA)

Digital Optical Technologies (SPIE)

Optical Metrology (SPIE)

CLEO/EQEC Europe

Munich, Germany

23–27 June 2019

www.photonics-congress.com**OSA Optical Sensors and Sensing Congress**

San Jose, CA, USA

25–27 June 2019

www.osa.org/Meetings/OSA_Meetings/Optical_Sensors_and_Sensing_Congress**Rapid.Tech + FabCon 3.D**

Erfurt, Germany

25–27 June 2019

www.rapidtech-fabcon.de/

July

2019 International Conference on Numerical Simulation of Optoelectronic Devices (NUSOD)

Ottawa, ON, Canada

8–12 July 2019

Abstract submission date: 15 March 2019

www.nusod.org/2019/**OSA Advanced Photonics Congress**

Burlingame, CA, USA

29 July–1 August 2019

www.osa.org/en-us/meetings/osa_meetings/advanced_photonics_congress/

August

SPIE Optics + Photonics

San Diego, CA, USA

11–15 August 2019

<http://spie.org/x124283.xml>**EPIC World Photonics Technology Summit 2019**

Berlin, Germany

29–30 August 2019

www.epic-assoc.com/world-photonics-technology-summit-2019/

September

SPIE Remote Sensing/Security + Defense

Strasbourg, France

9–12 September 2019

<http://spie.org/x124461.xml>**Frontiers in Optics: the 103rd OSA Annual Meeting and Exhibit/Laser Science Conference**

Washington, DC, USA

16–19 September 2019

www.frontiersinoptics.com/home/**SPIE Photomask Technology + EUV Technology**

Monterey, CA, USA

15–19 September 2019

<http://spie.org/x126645.xml>

2019 European Conference on Optical Communications (ECOC)

Dublin, Ireland
 22–26 September 2019
 Abstract submission date: 19 April 2019
www.ecoc2019.org/

OSA Laser Congress

Laser Applications Conference
 Advanced Solid State Lasers Conference
 Vienna, Austria
 29 September–3 October 2019
[www.osa.org/Meetings/Global_Calendar/Events/Advanced_Solid_State_Lasers_Conference_\(1\)](http://www.osa.org/Meetings/Global_Calendar/Events/Advanced_Solid_State_Lasers_Conference_(1))

2019 IEEE Photonics Conference (IPC)

San Antonio, TX, USA
 29 September–3 October 2019
<http://ieee-ipc.org/>

October**V2019 – Vakuum & Plasma**

Dresden, Germany
 8–10 October 2019
www.efds.org/event/v2019-vakuum-plasma/

SPIE Optifab

Rochester, NY, USA
 14–17 October 2019
<https://spie.org/conferences-and-exhibitions/optifab>

November**2019 24th Microoptics Conference (MOC)**

Toyama, Japan
 17–20 November 2019
www.moc2019.com/

medica

Düsseldorf, Germany
 18–21 November 2019
www.medica.de

formnext

Frankfurt/Main, Germany
 19– 22 November 2019
<https://formnext.mesago.com/events/de.html>

2020**SPIE Photonics West**

San Francisco, CA, USA
 1–6 February
<http://spie.org/PW>

Optical Fiber Communications Conference and Exhibition (OFC)

San Diego, CA, USA
 8–12 March 2020
www.ofcconference.or

SPIE Photonics Europe

Strasbourg, France
 29 March–2 April 2020
<http://spie.org/x126677.xml>

OSA Biophotonics Congress: Biomedical Optics

Fort Lauderdale, FL, USA
 20–23 April 2020
www.osa.org/Meetings/OSA_Meetings/OSA_Biophotonics_Congress_Biomedical_Optics

AKL'20

Aachen, Germany
 6–8 May 2020
www.lasercongress.org

LASYS

Stuttgart, Germany
 16–18 June 2020
<https://www.messe-stuttgart.de/lasys/>

Stuttgarter Lasertage SLT 2020

Stuttgart, Germany
 16–17 June 2020
www.slt.uni-stuttgart.de

Frontiers in Optics: the 104th OSA Annual Meeting and Exhibit/Laser Science Conference

Washington, DC, USA
 14–17 September 2020
www.osa.org/en-us/meetings/global_calendar/events/frontiers_in_optics_the_104th_osa_annual_meeting_a/

VISION

Stuttgart, Germany
 10–12 November 2020
www.messe-stuttgart.de/vision/