ORGANIZATIONS AND MANUFACTURERS IN FIELD OF LASER

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ABSTRACT

Today. laser make up a multi-billion EUR industry. Industrial manufacturers have developed innovative ways to use lasers to increase manufacturing efficiences and product quality. At present time every year over 3000 laser machines for industrial application are installed in the world. In many countries they are formed laser associations or organizations. These laser associations or organizations assist the manufacturing industries by providing technical, product and service information. All of these associations and organizations promote lasers and laser applications. Web-sites of laser associations and organizations contain: news, promote of lasers, industrial product catalogs and links, laser applications and safety, a list of events and a directory of services. Many of these associations and organizations support research in laser technology on a non-profit basis. They are several manufacturers of lasers, and many manufacturers of laser machines and equipments.

INTRODUCTION

Laser is undoubtedly the most promising and constructive invention of the second half of the 20th century. The laser is a young invention and it has found a wide rande of applications in all the sectors such as telecommunications, measurement techniques and the processing of metal and non-metal materials. The laser have been accepted globally by the engineering sector as an accurate and economical product. Laser based technologies are increasingly accepted as a competent substitute in component manufacturing on account of improvements in efficiency, quality and productivity at affordable cost. Laser processing is fast becoming essential in nearly all manufacturing industries. Today. laser make up a multi-billion EUR industry. At present time every year over 3000 laser machines for industrial application are installed in the world.

The first laser, a ruby laser, was invented 1960 by T. Maiman, the first He-Ne laser was invented 1961 by A. Jovan, D. Herriot and W. Bennett, the first Nd:YAG laser was invented 1964 by Geusic, the first CO₂ laser was invented 1964 by C.K.N. Patel, the first excimer laser was invented 1976. The first industrial application of a laser was making holes in diamonds used a beam from ruby laser. Since that beginning, the use of laser technology has continued to be an impressive and successful story. The term LASER is an acronym for Light Amplification by Stimulated Emission of Radiation. A laser is a cavity, with mirrors at the ends, filled with material such as crystal, glass, liquid, gas or dye. It is a device that produces an intense beam of light with the unique properties of coherence, collimation and monochromaticity. Typical lasers use electricity to create coherent light. Laser light can be different colors of the visible light spectrum, or can be invisible when the light is ultraviolet or infrared.

From laser surgery to CD players and grocery-store checkout scanners, our daily lives are enhanced by a basic discovery that was originally thought by some to have no practical uses

whatsoever. Lasers are used in almost all important sectors of industry, such as automotive industry, electrical industry, metal-working industries and others. In USA, the automotive industry and the metal-working industries are the biggest customers for lasers. In Asia, the electrical and semicondustor industry is the laser supplier's most important customer. In Europe, the metal-working industry and automotive industry are the biggest customers for lasers. Typical areas for applications of lasers are: printing technology, soldering, marking, drilling, cutting non-metals, cutting metals, sintering, heat condition welding, polymer welding, welding metals, hard soldering, hardening, heating, brazing, clading. Some of these applications can be performed by lasers alone, but for many the justification is purely economic. For many applications, laser processing is the most precise, economical method available. For some, laser processing is the only method. Given the speed, flexibility and precision of laser processing, the cost savings are dramatic and the payback rapid.

In Germany, in 1989. year, it is investigated in laser equipment 804.5 milion EUR. From this in laser equipment for: material processing 222.5 milion EUR, research and development 143 milion EUR, information technique 141.5 milion EUR, communication 135 milion EUR, medecine 118 milion EUR, measure technique 34.5 milion EUR and printer technique 10 milion EUR. Figure 1 shows the percentages of invetigation in laser equipment.



Figure 1. Percentages of invetigation in laser equipment

Many types of lasers have been developed, but very few may be employed in a practical sense by industry. In laser equipment it is instaled: semicondustor lasers 30%, CO₂-lasers 22%, solid-state lasers 17%, ion lasers 13%, He-Ne lasers 7%, excimer lasers 4%, dye lasers 3% and other lasers 4%. Figure 2 show the percentages of instaled lasers.



Figure 2. Percentages of instaled lasers

The two most commonly used lasers are the CO_2 lasers and the Nd:YAG lasers. It is probably fair to say that of these two,

the CO_2 laser is the most versatile. Today, there is no doubt that the CO_2 laser is the most useful on for metalworking.

LASER ASSOCIATIONS AND ORGANIZATINS

In many countries they are formed laser associations or organizations. They assist the manufacturing industries by providing technical, product and service information. All of these associations and organizations promote lasers and laser applications. Web-sites of laser associations and organizations contain: news, promote of lasers, industrial product catalogs and links, laser applications and safety, a list of events and a directory of services. Many of these associations and organizations support research in laser technology on a nonprofit basis. In table 1 is shown some of these associations and organizations and their web-sites. In table 2 are shown laser institutes, in table 3 are shown laser centres, and in table 4 are shown laser laboratories.

Table 1. Laser associations and organizations	Table 1	Laser	associations	and	organizations
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No	Laser associations	Web-site
1	American Welding Society (AWS)	www.aws.org
2	European Laser Applications Network (ELAN)	www.ailu.org.uk
3	International Laser Display Association (ILDA)	www.ilda.wa.org
4	International Society for Optical Engineering	www.spie.org
5	Japan Laser Processing Society (JLPS)	www.jlps.gr.jp
6	Laser and Electro-Optics Manufacturer's Association (LEOMA)	www.sfo.com
7	Lasers and Laser Engineering	www.lasers.org.uk
8	Optical Soc. of America (OSA)	www.osa.org
9	Optronics Ireland	www.tcd.ie
10	Russian Federal Research Center RAMET	www.girmet.ru
11	The Association of Industrial Laser Users	www.ailu.org.uk
12	The Entertainment Laser Association	www.ela.org.uk
13	The International Society for Optical Engineering (SPIE)	www.spie.com
14	4 The Laser & Electro-optics Manufacturer's Association (LEOMA) www	
15	UK Laser and Electro-Optics Trade Association	www.ukleo.org

No	Laser institute	Web-site	
1	Arizona State University – MEMS	www.eas.asu.edu	
2	Beckman Laser Institute	www.bli.uci.edu	
3	Columbia University – MRL	www.mrl.columbia.edu	
4	Edison Welding Institute (EWI)	www.ewi.org	
5	Fraunhofer Institute for Laser Technology (ILT)	www.ilt.fhg.de	
6	Institute of Optics – Rochester	www.optics.rochester.edu	
7	Institute of Electronic Structure and Laser (IESL)	http://safety.web.cern.ch	
8	ISLT TU Vienna	www.tuwien.ac.at	
9	Laser Institute of America (LIA)	www.laserinstitute.org	
10	Laser Palace – Lawrence University	www.pkal.org	
11	Rice University – Laser Science	www.ruf.rice.edu	
12	Rockwell Laser Institute	www.rli.com	
13	The Welding Institute (TWI)	www.twi.co.uk	
14	UMIST University of Manchester Institute of Science and Technology	www.me.umist.ac.uk	
15	University of Twente (WB)	www.wa.wb.utwente.nl	
16	University of Wisconsin	www.engr.wisc.edu	
17	University St Etienne	www.univ-st-etienne.fr	
18	Lund university – Lund laser centre (LLC)	www.llc.fysik.lth.se	
19	Masquarie university – Centre for lasers and applications	www.mpec.mq.edu.au	
20	Oklahoma State University – Laser Center	www.okstate.edu	

Table 2. Laser institute

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21	Umea University – Laser Physics Group	www.phys.umu.se
22	Lulea University of Technolofy	www.mb.luth.se
23	Michigan state university-MSU laser laboratory	http://photon.cern.msu.edu
24	Optics and Laser Group, Adelaide University, Australia	www/physics.adelaide.edu.au
25	tsinghua University	www.tsinghua.edu.cn

Table 3. Laser centres

No	Laser centres	Web-site
1	Australian National University Laser Physics Centre	http://laserspark.anu.edu.au
2	Center for Research and Education in Optics and Lasers	http://lorien.creol.ucf.edu
3	Fraunhofer Center for Laser Technology (CLT)	www.clt.fraunhofer.com
4	Laser Physics Centre ANU - Canbera	http://laserspark.anu.edu.au
5	Laser Science Centre - Queensland	www.physics.uq.edu.au
6	Laser Spectroscopy Center – Wisconsin at Madison	www.chem.wisc.edu
7	Laser zentrum Hannover	www.lzh.de

Table 4. Laser laboratories

No	Laser laboratories	Web-site
1	Bell laboratories	www.bell-labs.com
2	Lapeeuranta University of Technology	www.lut.fi
3	Laser and Electro-Optics Research Laboratory (BYU)	www.ec.byu.edu
4	Laser Laboratory – Hope College	www.chem.hope.edu
5	Laser Laboratory – Hunter College	www.ph.hunter.cuny.edu
6	Laser Laboratory – Lawrence College	www.lawrence.edu
7	Laser Laboratory – Lynchburg College	www.lynchburg.edu
8	Laser Laboratory – Western Maryland College	www.wmc.car.md.us
9	Laser Optics&Spectroscopy Group	www.lsr.ph.ic.ac.uk
10	Lawrence Berkeley National Laboratory	http://efssun.lbl.gov
11	Penn State's Applied Research Lab.	www.arl.psu.edu
12	Semiconductor Laser Laboratory	http://sll.ccsm.uiuc.edu
13	Ultrafast Laser Laboratory (BNL)	www.inst.bul.gov
14	Berkelet-Laser Manufacturing Laboratory	http://enler.me.berkeley.edu

LASER MANUFACTURERS

There are several manufacturers of lasers, and many manufacturers of laser machines. In table 5 are shown manufacturers of lasers. Industry leaders of laser manufacturers are: Coherent Laser Group, Ferranti Photonics, Rofin-Sinar, Spectra-Physics and Trumpf. Laser machines are product of high technology. They present complexe hardware and software equipment. Manufacturers of machines incorporate laser, optical system for laser beam transmission, and processing head in mechanical machines with CNC unit and build laser machines. In table 6 are shown the most known manufacturers of laser machines and their web-sites. Industry leaders of laser manufacturers are: Amada, Bystronic, Cincinnati, ESAB, Hahn%Kolb, Lumonics, Mazak, Messer. Prima Industrie, Rofin, Salvagnini and Trumpf.

Table 5. Laser manufacturers

No	Laser manufacturers	Web-site	No	Laser manufacturers	Web-site
1	Aculight	www.aculight.com	23	Melles Griot	www.mellesgriot.com
2	Alpha Lasers	www.alphalas.com	24	Metrologic Instruments	www.metrologic.com
3	Big Sky Laser Technologies	www.bigskylaser.com	25	Optlectra	www.optlectra.com
4	Blue Sky Research	www.blueskyreseach.com	26	Opto Power Corporation	www.optopower.com
5	Bonneville Technologies	www.bonnevilletech.com	27	Oxford Lasers	www.oxfordlasers.com
6	Cilas	www.cilas.com	28	Parallax Technology	www.parallax-tech.com
7	Coherent	www.cohr.com	29	Photonics Industries	www.photonix.com
8	Continuum	www.ceoi.com	30	Photonics Solutions	www.psplc.com
9	Cutting Edge Optronics	www.ceolaser.com	31	Positive Light	www.poslight
10	EKSPL	www.ekspla.com	32	Power Technology	www.powertechnology.com
11	Ferranti Photonics	www.ferrantiphotonics.com	33	PRC Laser	www.prclaser.com
12	Lambda Physik	www.lambdaphysik.com	34	Q-Peak	www.qpeak.com
13	LASAG Industrial Lasers	www.lasag.com	35	Quantronix	www.quantron.com

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14	Laser Labs	www.laserlabs.com	36	Resonetics	www.resonetics.com
15	Laser Physics	www.laserphysics.com	37	Rockwell Lasers	www.rli.com
16	Laser Power Corporation	www.laserpower.com	38	Rofin-Sinar	www.rofin-sinar.com
17	Latronix AB	www.latronix.se	39	Spectra-Physics	www.splasers.com
18	Lee Laser	www.leelaser.com	40	Spectron Laser Systems	www.spectron.co.uk
19	Lexel Laser	www.lexellaser.com	41	Synrad	www.synrad.com
20	Liconix	www.liconix.com	42	Trumpf	www.haas-laser.com
21	Light Solutins	www.lightsol.com	43	TRW	www.trw.com
22	LumenX Technologies	www.dyelaser.com	44	Unitek Miyachi Lasers	www.unitekmiyachilasers.com

Table 6. Laser maschine manufacturers

No	Laser machine manufacturers	Web-site	No	Laser machine manufacturers	Web-site
1	Amada	www.amada.com	28	Mazak	www.mazaklaser.com
2	Arnold	www.arnold-rv.de	29	Mecanumeric	www.mecanumeric.fr
3	Baasel Lasertech	www.baasel.de	30	Messer Cutting Systems	www.messer-cs.de
4	BLM-ADIGE USA	www.blmgroup.com	31	Mitsubishi Laser	www.mitsubishi-world
5	Bystronic Laser.	www.bystronic.com	32	Modern Machine Tool	www.modernmachinetool.com
6	Cheval Freres	www.cheval-freres.fr	33	Motoman	www.motoman.com
7	Cielle	www.ciellecnc.com	34	Omega Laser	www.a1.nl/omega-laser-systems/
8	Cincinnati Incorporated	www.cincinnati-tools.com	35	OTO Mills USA	www.otomills.com
9	Convergent Prima	www.convergentprima.com	36	Photonics Spectra	www.photonicsspectra.com
10	Cutting Edge Optronics	www.ceo-laser.com	37	Precitec	www.precitec.com
11	Edwards Pearson	www.edwards-pearson.co.uk	38	Prima Industrie	www.primaindustrie.com
12	Electrox	www.electox.com	39	Profile 600	www.profile600.co.uk
13	Embassy Machinery	www.embassy-mach.co.uk	40	Pullmax	www.pullmax.com
14	ESAB	www.esab.com	41	Rofin	www.rofin.com
15	FANUC Robotics North America	www.fanucrobotics.com	42	RPA Limited	www.rpaservices.com
16	Ferranti Photonics	www.ferrantiphotonics.com	43	Salvagnini	www.salvagnini.it
17	Franek Laser&Fab Systems	www.franeklaser.com	44	SEI	www.seispa.com
18	GSI Lumonics	www.gsilumonics	45	Sondronic Automotive	www.sondronic.com
19	Haco	www.haco.com	46	Strippit/LVD	www.lvdgroup.com
20	Hahn&Kolb	www.hklaser-systems.com	47	Thinklaser	www.thinklaser.com
21	Hana Laser	www.hanalaser.com	48	Trotec	www.trotec.net
22	Koike	www.coikeox.co.jp	49	Trumpf	www.trumpf.com
23	Lasag AG	www.lasg.com	50	Yamazaki Machinery UK	www.mazakeurope.com
24	Lasercut	www.lasercutinc.com	51	Universal laser systems.	www.ulsinc.com
25	LPKF Laser&Electronics	www.lpkf.com	52	Virtek Industrial Laser	www.virtek.ca
26	Lumonics	www.lumonics.com	53	Wightman Stewart	www.wightmanstewart.co.uk
27	Marbach	www.marbach.com	54	Whitney	www.wawhitney.com

CONCLUSION

Today, industrial lasers are now classed as "conventional" technology in many sectros of industry. There are several manufacturers of lasers, and many manufacturers of laser machines. Industry leaders of laser manufacturers are: Coherent Laser Group, Ferranti Photonics, Rofin-Sinar, Spectra-Physics and Trumpf. Industry leaders of laser manufacturers are: Amada, Bystronic, Cincinnati, ESAB, Hahn%Kolb, Lumonics, Mazak, Messer. Prima Industrie, Rofin, Salvagnini and Trumpf. Laser associations and organizations assist the manufacturing industries by providing technical, product and service information. All of these associations and organizations promote lasers and laser applications.

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