



LIA TODAY

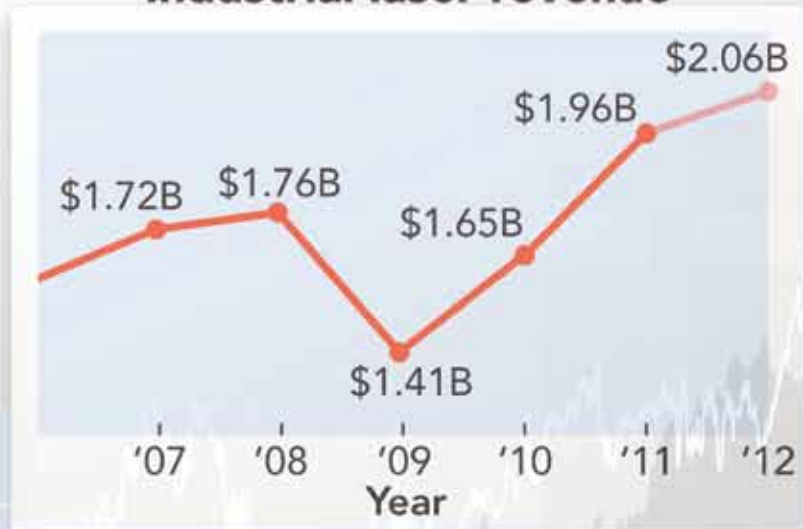
THE OFFICIAL NEWSLETTER OF THE LASER INSTITUTE OF AMERICA
The international society dedicated to fostering lasers, laser applications and laser safety worldwide.

FOCUS: LIA'S YEAR END REVIEW | VOLUME 20 NO. 6 | NOVEMBER / DECEMBER 2012

U.S. Strong for Industrial Laser Processing

pg. 6

Industrial laser revenue



\$ Billion

2.5

2.0

1.5

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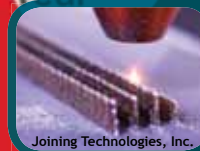
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90

Year

2010



The Next Era of U.S. Manufacturing is Here!
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LME 2012: The Industry's Marketplace for Innovative Laser Production
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Laser Institute of America

Laser Applications and Safety

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LIA TODAY

THE OFFICIAL NEWSLETTER OF THE LASER INSTITUTE OF AMERICA

LIA TODAY is published bimonthly to educate and inform laser professionals in laser safety and new trends related to laser technology. LIA members receive a free subscription to LIA TODAY and the *Journal of Laser Applications*[®] in addition to discounts on all LIA products and services.

The editors of LIA TODAY welcome input from readers. Please submit news-related releases, articles of general interest and letters to the editor. Mail us at LIA TODAY, 13501 Ingenuity Drive, Suite 128, Orlando, FL 32826, fax +1.407.380.5588, or send material by email to lia@lia.org.

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CALENDAR OF EVENTS

Laser Safety Officer Training Feb. 26-28, 2013 San Diego, CA June 25-27, 2013 Indianapolis, IN Dec. 3-5, 2013 Orlando, FL
Laser Safety Officer with Hazard Analysis* Jan. 28-Feb. 1, 2013 Orlando, FL Mar. 11-15, 2013 Phoenix, AZ June 10-14, 2013 Niagara Falls, NY Oct. 7-11, 2013 Miami, FL Nov. 4-8 2013 Los Angeles, CA <i>*Certified Laser Safety Officer exam offered after the course.</i>
Medical Laser Safety Officer Training* Feb. 9-10, 2013 San Antonio, TX Mar. 2-3, 2013 San Diego, CA Mar. 16-17, 2013 Orlando, FL <i>*Certified Medical Laser Safety Officer exam offered after the course.</i>
Laser Additive Manufacturing (LAM[®]) Workshop Feb. 12-13, 2013 Houston, TX
International Laser Safety Conference (ILSC[®]) Mar. 18-21, 2013 Orlando, FL
Lasers for Manufacturing Event (LME[®]) Sept. 11-12, 2013 Schaumburg, IL
International Congress on Applications of Lasers & Electro-Optics (ICALEO[®]) Oct. 6-10, 2013 Miami, FL

Visit www.lia.org for all course and event listings.

ABOUT LIA

Laser Institute of America (LIA) is the professional society for laser applications and safety. Our mission is to foster lasers, laser applications and laser safety worldwide.

We believe in the importance of sharing new ideas about lasers. In fact, laser pioneers such as Dr. Arthur Schawlow and Dr. Theodore H. Maiman were among LIA's original founders who set the stage for our enduring mission to promote laser applications and their safe use through education, training and symposia. LIA was formed in 1968 by people who represented the heart of the profession—a group of academic scientists, developers and engineers who were truly passionate about taking an emerging new laser technology and turning it into a viable industry.

Whether you are new to the world of lasers or an experienced laser professional, LIA is for you. We offer a wide array of products, services, education and events to enhance your laser knowledge and expertise. As an individual or corporate member, you will qualify for significant discounts on LIA materials, training courses and the industry's most popular LIA conferences and workshops. We invite you to become part of the LIA experience – cultivating innovation, ingenuity and inspiration.



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The Next Era of U.S.
Manufacturing Is
Here!

Photo courtesy of Fraunhofer ILT, Aachen, Germany / Volker Lannert



- Laser Additive Manufacturing (LAM)
- A Paradigm Change in Future Manufacturing?
- Process and Supply Chains & CAX Framework
- Digital Manufacturing for Medical and Dentistry
- International Markets
- Powders
- Surface Tailoring
- Success Stories (Maintenance, Repair, Overhaul, Under Water Cladding, Economics and more...)



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PRESIDENT'S MESSAGE



Dear LIA members, friends, colleagues and readers,

A very busy week in Chicago has passed for LIA and its staff at the 2012 Lasers for Manufacturing Event (LME®). I personally witnessed the impact of a well balanced mix of exhibitions and presentations, bringing the latest perspectives of the application of laser technology in the U.S.

manufacturing market to the attendees. Some of the presentations will be made available as “pay-per-view” seminars, so if you could not make it there, you have a chance to catch up online. LIA decided to launch a set of professionally processed products in that category and it will be interesting to see the development and the acceptance of web-based educational modules in that area.

Worldwide we observe various actions of governments to stimulate innovation in the nations. In Brazil for instance, application-oriented institutions are seen to be founded systematically. In the U.S., activities in our own area of photonic sources and applications have been started such as “Harnessing Light II” and it will be interesting to see how, after the elections, these findings will be turned into actions. LIA did analyze the findings and came up with a plan for its own role in the process. One focus will be the increased provision of educational elements, which you will soon find more detailed information on that in the web.

As the year moves fast toward its end already again, I wish you a successful finish and joyful winter season.

Sincerely yours,



Reinhart Poprawe, President
Laser Institute of America

EXECUTIVE DIRECTOR'S MESSAGE



Since LIA's International Laser Materials Processing Conference in 1980, and in the 31 years of ICALEO®, we have provided a home for the advances in laser-material interaction where developments in drilling, cutting, welding, laser additive manufacturing and much more have been presented and shared by the worldwide leaders in the field.

As these technologies matured and were applied in industry, LIA has provided a forum to share this technology with manufacturing professionals at the Automotive Laser Application Workshop (ALAW) and at our Laser Additive Manufacturing Workshop (LAM®), now in its 5th year and in our first Laser Welding & Joining Workshop, which was held in conjunction with our Lasers for Manufacturing Event (LME®), in October. LME brings all of this technology together, with courses and tutorials on all aspects of lasers for manufacturing, along with 70 exhibitors of lasers, robots, systems and related products.

The results that we are achieving, namely educating the manufacturing workforce, improving manufacturing technology and creating well paid jobs is pretty much the charter of the President's Council on Jobs and Competiveness which, as far as I can tell, has rounded up a lot of high profile people, held meetings and hasn't shown any significant result in the year or more since it was created.

The need for lasers in advanced manufacturing, especially additive manufacturing, and the need to educate the manufacturing workforce in photonics technologies is also recognized in a recent report from the National Research Council titled “Optics and Photonics: Essential Technologies for Our Nation,” (www.nap.edu/catalog.php?record_id=13491). LIA will partner with OSA, SPIE, APS, IEEE-IPS and others to raise awareness of the report and its proposal to have a National Photonics Initiative. LIA will lead the way in forming a subcommittee on advanced manufacturing. This Subcommittee, consisting of industry representatives, will develop actionable recommendations which will be presented to the rest of the subcommittees, members, chairs, government officials and agency represented on Feb. 28, 2013 in Washington DC. When the public, local, state and federal governments become aware of the challenges and opportunities with photonics technologies, it is hoped that intelligent support might be forthcoming since the elections are behind us.

Meanwhile LIA will continue to deliver results for industry, government and education, exactly as our logo suggests.



Peter Baker, Executive Director
Laser Institute of America
pbaker@lia.org

U.S. STRONG FOR INDUSTRIAL LASER PROCESSING

By Dave Belforte

The recovery from the 2008-09 global recession was, according to experts, going to take at least three years to reach pre-recession levels. In the United States, manufacturing companies, reacting to orders from pent-up demand and delayed 2009 buying plans, found their production taxed to meet a rapidly growing order book in 2010 followed by a banner year in 2011 and likely through 2012.

Riding on the coat-tails of a more rapid U.S. recovery (see Figure 1) were the suppliers of industrial lasers used to power systems that were being heavily utilized by six key manufacturing industries: transportation, energy, medical devices, agricultural equipment, aerospace and communications. Another sector, fabricated metal products, while slower to recover, is a market sector of importance because of the high value laser products required to cut sheet metal.

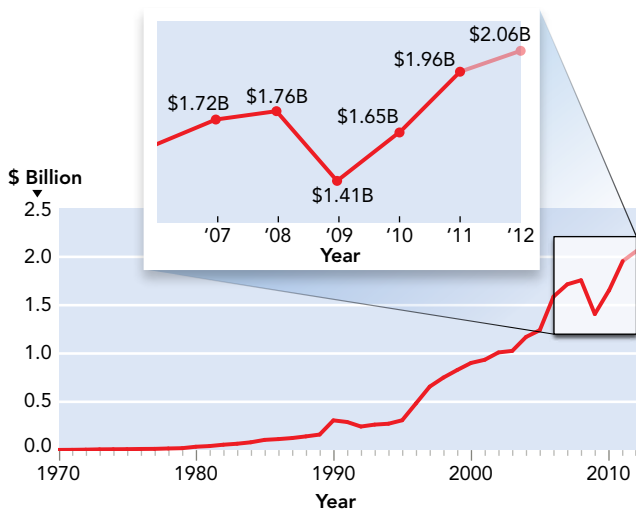


Figure 1: Industrial laser revenue.

BY THE NUMBERS

Over the past 10 years the North American share (dominated by the U.S.) of annual global laser installations has decreased as a result of phenomenal growth in the Asian market, dominated by China. Today, North America represents about 16 percent of the annual industrial laser installations (Figure 2). The U.S. share of industrial laser applications compared to total global shares is shown in Figure 3. From this figure, it is obvious that metal processing – cutting, welding and drilling – are market sectors that use high-cost laser systems, and thus generate high revenues. Semiconductor/microprocessing and marking, while lower in revenues, are major and important markets in terms of units sold. A review of the six key industries that drove the rapid recovery of manufacturing and laser sales in the U.S. follows.

The Big Three auto industry, led by the U.S. government's stimulus recovery plan at two of them, quickly became a significant market for high power CO₂ and fiber lasers for welding and

brazing applications. Combined with the increased requirements for laser systems by the nine other international automakers with expanding operations in the U.S. provided laser suppliers with an unexpected but welcome active market for on-line processing equipment powered by these lasers. The manufacture of passenger aircraft (5,000 narrow-body planes to be built in the next 20 years) by the two major suppliers has been expanded in the U.S. with the resultant increase in the use of lasers for welding, marking and laser additive manufacturing.

Energy, both conventional and alternative, has been on a steep growth curve supported by federal and state plans to boost the U.S. independence from imported oil. This has spawned actions in previously shelved projects, many of which are now exploring the use of laser processing, such as welding, cutting and drilling, to enhance cost reductions in ground-based turbine engine manufacture, cross-country oil and gas transmission lines (20,000 miles planned) and oil drilling (\$330 billion spent by 6,500 companies). High- and low-power lasers have found a receptive market in the wind power (a \$60 billion industry) and solar power (showing over 100 percent growth last year) industries, where they are welding, cutting, marking and surface treating components used in these growth industries.

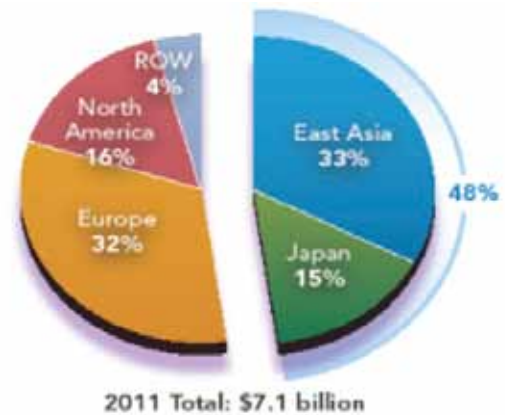


Figure 2: Global laser systems installation as of 2011.

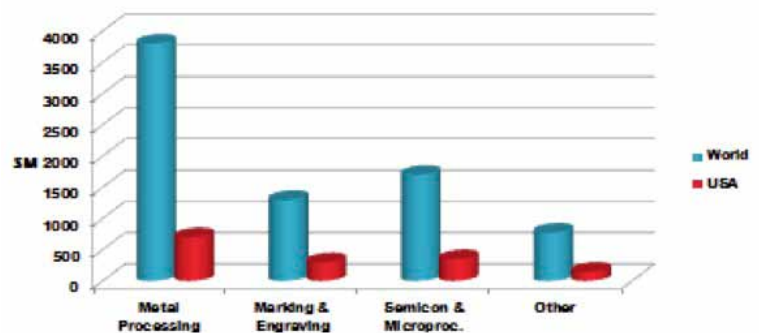


Figure 3: USA share of total world system installations.

The U.S. medical device industry was one of the few that experienced only a slowing of growth in the recession and therefore was among the first to recover, and, as a consequence, acted to boost the overall manufacturing sectors' return to health. A key manufacturing tool in many medical device applications is the industrial laser used to cut stents (an \$11 billion industry), weld and drill catheters (an \$11 billion industry) and weld implantable devices (a \$100 billion industry). Large numbers of solid-state and fiber lasers are utilized in these applications throughout this vital U.S. manufacturing sector.

This year in the U.S., more than \$27 billion of agricultural equipment will be built for domestic and export markets. Industrial lasers have long been a useful tool in this industry for cutting sheet metal, an application that has led to more widespread use in cutting and welding heavy plate and in the processing of worn equipment, such as laser additive manufacturing new teeth in harvester equipment. The agri market has been and is expected to remain a strong contributor to manufacturing revenues for the coming years.

Aerospace, long a major industry in the U.S., has been enjoying a remarkable resurgence as the world's airlines are refitting their fleets for the new travel trends. Thousands of turbine engines are on order, and the manufacturing of each one requires a heavy use of lasers drilling, cutting, welding and additive manufacturing applications. This year, more than \$180 billion of jet engines will be built by an industry made up of more than 1,100 companies. A new-to-lasers procedure, the cutting of composite materials for aircraft fuselage applications, has opened the doors for expanded use of multi-axis cutting systems powered by high-power fiber lasers.

HIGH DEMAND ELECTRONICS

Perhaps the greatest shot-in-the arm for the resurgence of industrial lasers after the recession has been the seemingly insatiable demand for hand-held communication devices, smart phones and tablets. Mostly driven by industry technology leader Apple®, whose significant need to expedite production of its iPhone® consumed a vast amount of industrial lasers and systems in the 2009-10 period. That, plus the continuing demand by that company and its competitors for increasing amounts of laser processing capability in excimer laser silicon annealing, scribing, cutting and marking related to displays and circuit boards for phones, occupied several leading laser suppliers in the U.S. and their OEM customers in Asia. These same laser companies experienced, and continue to experience, the fresh demands of the tablet maker industry for similar products to assist in the manufacture to meet the needs for a fast-growing market of devices.

And finally, slow but steady growth in the supply of laser-based sheet metal cutting systems, to meet the increasing need of the U.S. companies supplying fabricated metal products, has boosted the lethargic post-recession sales of these high-selling-price systems. The introduction of high-power fiber lasers into these systems was certainly a contributor to the increased selling activity of U.S. laser cutters.

BRIGHT FUTURE AHEAD

In the U.S., industrial lasers serve diverse areas that have not been sensitive to recent economic pressures, such as in aerospace, where aircraft and engines are in the midst of a massive expansion; energy (conventional and alternative), which is expanding to meet the need to offset reliance on foreign oil; a resurgent auto industry; medical devices: after a 40 percent growth in 2011 looking forward to a 25 percent increase in 2012; smart phone usage and tablets showing unlimited growth; fabricated metal products – leading the recovery from tight credit and recession and agricultural equipment with growth led by exports.

For all these reasons, the U.S. share of the global market for industrial laser systems, which had been decreasing for several years, stabilized in 2012, and the industrial laser market now remains vibrant and growing as other world markets recover more slowly from the great recession. The major market drivers described here have strong near-term growth prospects, ensuring the viability of the U.S. as a target market for exporters. ■

David Belforte is the founder and editor-in-chief of Industrial Laser Solutions magazine.

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THE NEXT ERA OF U.S. MANUFACTURING IS HERE!

By Geoff Giordano

Whether you drive or fly to LIA's fifth-annual Laser Additive Manufacturing (LAM®) Workshop in Houston in February, there's a chance at least one part on your vehicle was prototyped — maybe even produced — by LAM.

Most likely, lasers played a significant role in protecting the equipment used to process the fuel for those vehicles.

Whether they are traditional cladding applications to prevent corrosion and wear of vital parts and machinery, or 21st-Century technologies that go by many names — selective laser melting, sintering, 3D printing, laser metal deposition — the latest research in these areas will be presented Feb. 12-13 at LAM 2013.

General Chair Paul Denney and Workshop Co-chairs Ingomar Kelbassa and Jim Sears are crafting an educational lineup that again runs the gamut from bread-and-butter 2D processes to groundbreaking powder-bed and 3D rapid manufacturing.

"There's a lot going on in 3D rapid fabrication, or full functional deposition, whether it's medical/dental, aerospace, etc.," notes Denney of Lincoln Electric. "Very high-value, moderate-to-low volumes is still a big interest."

Meanwhile, "there is a lot of activity and interest in surface technology — call it 2D-plus. Its large surfaces, either thin or moderately thin buildups, for corrosion protection, wear protection or repair." Some of that is being driven by energy. "We're drilling deeper, digging up oil sands, and we have to be able to recover that material in an economical fashion."

Laser processing has advantages over other technologies, but it still needs to be faster and cheaper, Denney says. "It's glamorous to do the 3D stuff, but there's a lot going on in the old-fashioned cladding. There are people out there doing more than 200,000 pounds of powder a year at their one facility — that's more than \$8 million in powder; that's not counting the value of the product."

MOMENTUM FOR LAM

At LAM 2012, renowned additive manufacturing consultant Terry Wohlers delivered a keynote address in which he projected significant advances in the technology across a broad range of industries. In a Sept. 15 post on his blog, Wohlers Talk, he suggests AM has reached a tipping point.

"The accumulation of activity over the past 12 months suggests that (AM) may have hit this important milestone," he wrote. "The technology is receiving unprecedented attention by corporations of all sizes, the investment community and government agencies around the world." He attributes this to growing mainstream media interest, the availability of relatively inexpensive personal 3D printers and a rush to identify parts producible by AM.

But AM processes "are no stand-alone production solutions," notes Kelbassa, of Fraunhofer ILT and RWTH Aachen University. As with subtractive manufacturing processes such as five-

axis milling, "AM processes are embedded in entire horizontal and vertical process chains. They only represent single process steps. All process steps need to be addressed holistically when approaching new AM chains to be industrially implemented — from the AM design (geometric freedom) to the raw material (powder additive) to the finished product."

That concept is informing the educational sessions at LAM 2013, he says. They will feature "new, emerging applications that are already industrially implemented in terms of maintenance, repair and overhaul of high-value parts and components. The diversification of the use and application of laser-based AM processes is mainly due to its significantly increased efficiency; AM can already compete with conventional manufacturing techniques in certain areas."

In fact, in terms of industrial implementation, "AM is a standard production technology (Technology Readiness Level 9), such as in dental restorations like bridges, crowns and dental implants," Kelbassa notes. "In other areas, mainly aerospace, power generation and automotive, the TRL is about 6 to 7 and increasing." Of course, cladding and coating by laser metal deposition are standard procedure in mining, oil and offshore operations and in the areas of tool, die and mold-making, he says.

THE FUTURE OF LAM

The promise of LAM is such that in March the U.S. proposed a National Network for Manufacturing Innovation that will "catalyze up to 15 manufacturing innovation institutes around the country," according to the government's Advanced Manufacturing Portal (www.manufacturing.gov). In August, the first such center — the National Additive Manufacturing Innovation Institute — was established. NAMII "will provide the innovation infrastructure needed to support new additive manufacturing technology and products in order to become a global center of excellence for additive manufacturing. This pilot institute will bridge the gap



Exhibitors at LAM demonstrate the newest equipment and processes available.

LAM con't on page 10

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See us at LAM 2013



LAM con't from page 8

between basic research and product development for additive manufacturing, provide shared assets to help companies, particularly small manufacturers, access cutting-edge capabilities and equipment, and create an environment to educate and train workers in advanced additive manufacturing skills.”

Of course, LIA has been leading the charge to do just that since creating the LAM workshop. The 2013 edition will spotlight trends such as progress toward significantly higher deposition rates, application-tailored materials and adapted process chains, Kelbassa says.

But innovation takes time. The average time from invention until market impact is about 15 years, he notes. Advanced AM must gain traction at a time when process and supply chains have been “planned, designed and established for subtractive manufacture.”

Ultimately, the laser industry must focus on meeting its customers’ needs with the correct — and cost-effective — processes, Denney says.

“At the end of the day, it’s price,” he stresses. “If (manufacturers) can use cheaper powders or go to sheet, they would. Everyone’s (asking): ‘Can I do water-atomized powders or mechanically created powders instead of using gas-atomized? Can I introduce heat or processes to decrease the laser power or increase at the same laser power my deposition rate? Can I do in-situ cladding, can I do inside pipe?’” These concerns are “driving



LAM 2013 will feature cutting-edge presentations.

all processes, whether it’s arc or laser or plasma transferred arc welding.”

At Lincoln Electric, “we’re focusing on hot wire,” he says. “We think if you’re adding something cold to the interaction you’re increasing your power requirements in the laser. Anything I can do to keep the laser power as low as possible, which decreases my price, great. Or, if I stay at one laser power and up my feed rate, so much the better.”

To register for LAM 2013 and learn about the right solutions for you or your customers, visit www.lia.org/lam. ■

Geoff Giordano is a freelance writer.



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LME 2012: THE INDUSTRY'S MARKETPLACE FOR INNOVATIVE LASER PRODUCTION

By Geoff Giordano

More vendors, more content, more onsite registrations — In its second year, LIA's Lasers for Manufacturing Event (LME®) continued to establish itself as the industry's only marketplace focused exclusively on photonics-based production.

LME 2012 built upon the success of last year's inaugural session by featuring an expanded package of fundamentals courses, two new concentrated tutorials and the companion two-day Laser Welding & Joining Workshop. Held on Oct. 23-24, at the Schaumburg Convention Center in Schaumburg, IL, LME attracted another sizable group of first-time attendees. Many took advantage of the event's proximity to their facilities to glean a wealth of information about state-of-the-art practices in laser production.



The message was clear: Advances in fiber lasers, ultrafast machining and additive manufacturing are pushing the bounds of efficient production in a broad range of industries. From automobiles and airplanes to stents and ship decks, lasers are delivering superior quality, performance and profits.

LIA's longstanding mission to serve as the go-to source of laser technology for the manufacturing professional is further evidenced by a just-signed contract that commits LME to Schaumburg for the next three years. That level of commitment is a key factor in ensuring U.S. economic prosperity, according to the just-released report "Optics and Photonics: Essential Technologies for our Nation" by the National Research Council's Committee on Harnessing Light. The so-called "Harnessing Light II" document stresses the impact of laser-driven advances in communications, defense, energy, medical and manufacturing



The 2012 LME showcased the latest advances in the industry of using lasers in manufacturing.

applications — advances LIA has fostered since 1968.

The major optics and photonics societies, including LIA, are committing resources to raise awareness of this report, particularly in Washington, D.C., with the aim of influencing public policy and commitment of resources for photonics.

Five subcommittees have been formed covering major areas delineated in the report. LIA will form and support the subcommittee on Advanced Manufacturing. On February 28th, members of these subcommittees will meet in D.C. to present our recommendations, and those of the four other subcommittees, to government agencies and their representatives. The recommendations will be the foundation of NPI's policy and lobbying efforts moving forward. They will be communicated to our constituents and used as talking points to Congress, agencies, and the Administration.

"We agree with, and support, the conclusions reached by the Committee on Harnessing Light," said LIA Executive Director Peter Baker. "The potential for lasers to continue to revolutionize manufacturing on macro and micro scales is something LIA has traditionally advocated and will continue to vigorously promote with our events like LME and the Laser Additive Manufacturing Workshop."

WORLD OF OPPORTUNITIES

When past LIA President David Belforte took the stage Tuesday morning to deliver the first keynote address at the Technology Showcase in the exhibit hall, he detailed a wealth of profit potential via laser manufacturing. A standing-room-only crowd gathered to hear a heartening series of projections in his presentation, titled "U.S. Strong for Industrial Laser Processing."

"Contrary to what you might have heard... manufacturing in the United States is doing pretty well — if you're in the right sectors," Belforte asserted. "After the recession, everybody recovered very quickly because there was a built-up buying demand. As we normalized in 2010, the problems in Europe and the problems early this year in China and other Southeast Asian countries slowed things down a bit. But here in the United States, things remained very constant."

In fact, the U.S. is "a more positive market through the first three quarters of this year than the rest of the world markets," he declared, thanks to "markets of opportunity that have caused the U.S. industrial laser business to be strong." Five of those six markets demonstrate strong potential:

- **Transportation:** "The resurgence in Detroit has been remarkable," Belforte said, with 12 auto manufacturers in the U.S. aiming to build more than 13 million vehicles this year worth more than \$200 billion in revenue. It's a strong market for high-power lasers. "Some of the laser suppliers will show you charts of an automobile that have hundreds of laser applications on them," he noted. Meanwhile, "passenger aircraft have been fantastic."

Airbus is going to double operations in Alabama from \$24 billion up to \$50 billion, he said. These themes were amplified in keynote addresses by Scott Heckert of Highyag and Brad Walsh of Pratt & Whitney, who highlighted laser requirements for the automotive and aerospace manufacturing, respectively.

- **Energy:** “Gas turbines are booming” and are expected to generate a quarter of all power in the U.S. in the next five years, he said. “Every one of those turbine blades, every one of those compressor sections, has got laser processing in it.” Turning to pipelines, he noted that more than 9,000 miles of pipelines are in construction in the U.S. “A lot of those (projects) are considering, or may even be using, high-power lasers to weld the pipe.” In the petroleum sector, “downhole drilling is a terrific opportunity. Many of those operations use lasers one way or another, some of them to help fracture the rock.”
- **Medical Devices:** This sector “kept us alive through the recession,” Belforte enthused. Now, industrial lasers are being used for the assembly of catheters, including marking, drilling and welding balloons onto the catheter. The market for implantable medical devices has expanded into drug delivery units and defibrillators, he said, with seven of the top manufacturers in the world using more lasers for joining, marking and other applications within the devices. Stent cutting is one of the major success stories in laser precision cutting going back 25 years, he said. “As stents are getting more and more sophisticated, they have to be processed by lasers, and lasers are doing well every single year in expanding this particular market.”
- **Aerospace:** With 5,000 narrow-body jets planned for construction in the U.S., that means two engines featuring millions of laser-drilled holes for each, Belforte said. Given the pioneering use of composites in airliner wings and fuselages — for example, in Boeing’s Dreamliner, production of which is targeted at five a month — lasers are being used to cut those structures.
- **Communications:** The smart phone business is “just spectacular.” It’s a market that “seems to have no bounds. If you take apart that smart phone, you’ll find lasers being used all over the phone for a variety of applications.” Belforte noted the U.S. is set to ship 20.6 percent of the world’s smart phones this year. In the tablet market, there are “fantastic applications for lasers in the displays, plus inside the product in terms of the circuits.” Worldwide, 326 million are expected to be sold in 2015 — all using laser technology.

Beyond those markets, sheet metal cutting accounts for \$500 million to \$700 million a year in revenue in the U.S. and \$2.5 billion worldwide. With 4,500 to 5,000 systems shipping each year, at a cost of \$500,000 to up to \$1 million or more, “you’ve got a big, big mover in the marketplace.”

GETTING THE JOB DONE

While Belforte delineated the market opportunities for LME

attendees, the educational program provided nuts-and-bolts details on how to capitalize on those opportunities.

As he did last year, Tom Kugler of Laser Mechanisms kicked off the education program by delivering a comprehensive survey of the most important types of lasers and their capabilities. The packed room Tuesday morning was a good sign that LME’s message was right on target.

Afterward, Eckhard Beyer of Fraunhofer IWS presented the first of two two-and-a-half-hour tutorials. His discourse on the basics of laser welding and joining gave a taste of LIA’s first-ever workshop on the subject. Chaired by Beyer, the Laser Welding & Joining Workshop spanned two days and featured 16 presentations running the gamut from fiber laser welding in automotive applications to welding polymers with long wavelength fiber lasers to welding of mixed materials using high brightness lasers. (Jerry Zybko of Leister Technologies later continued the theme of the workshop with his Technology Showcase keynote presentation on the impact of lasers in plastics manufacturing.)

“It’s very interesting stuff,” said Pinnacle senior technologist Bill Gibler after he and coworker Joshua Thacker attended Paul Denney’s session on hot wire welding of galvanized steel. “It gives us ideas for stuff that we do. We’re welding small inconel parts. It’s always neat to see other technologies and other manufacturers and how they’re using the lasers to improve their yield, processes and products.”

Gibler noted that his operation used an inexpensive fixed-optic, flashlamp pulsed YAG laser. “We bought it to replace an electronic beam welder. We’ve already discovered that we need to upgrade the laser to do all the welds we need to do. In the meantime, we’ve learned a lot (at LME). Now when we go to buy another laser, we’ll know the right questions to ask. We also came to this show because we’re looking for a laser scribe or laser engraver. (LME is) very well organized. I’m impressed. Everything seems to flow together; it’s well worth the money.”

LIA President Prof. Reinhart Poprawe captivated attendees with in-depth analyses of advances in laser additive manufacturing and his four-module tutorial on ultrafast laser machining. LIA Education Director Gus Anibarro appropriately capped the first day of courses by reprising his session on proper safety to avoid beam and nonbeam hazards.

TAILOR YOUR LME EXPERIENCE

While the expert sessions — including Wayne Penn’s survey of key laser system components and options and Rick Neff’s overview of the fundamentals of laser cutting — continued upstairs, attendees were able to venture downstairs to the exhibit hall at any time and connect with dozens of the top names in the industry.

“We have a few cutting applications that we’re working through,” noted LME first-timer Josh Vander Meulen, a mechanical engineer for Innotec in Zeeland, MI. “We’re meeting with our suppliers; we’ve got a couple of SPI lasers and Synrad lasers. I’m pretty new to it, so I’m learning a lot. I’ve been on the floor a couple of hours and it’s been great.” Added coworker Nate Tickfer, “LME is a great place to come and see everybody at the same time.”

LME con’t on page 16



LME sponsors had many creative opportunities to promote their company throughout the event.



Networking was a key part of LME.



Dave Belforte, founder and editor-in-chief of *Industrial Laser Solutions*, gave the first keynote address, left, and Rick Neff of Cinninnati Inc. presented a short course.

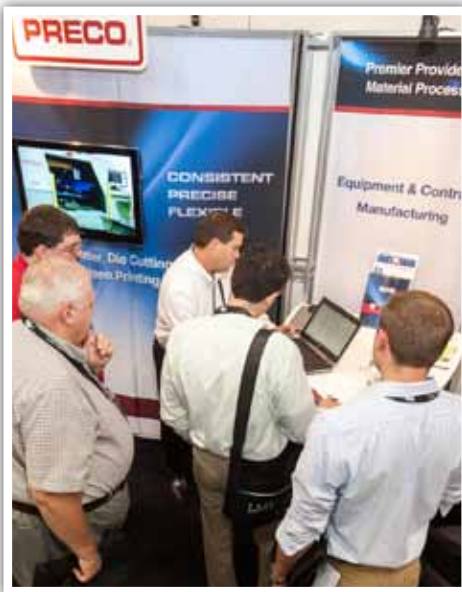


Equipment demonstrations on the exhibit floor had a great impact on the attendees' overall experience.





The education element of LME was seen throughout the multiple level courses as well as the show floor.



Neil Ball, president of Directed Light, and Rob Mueller, senior laser solutions engineer of NuTech Engineering, were both present at the “Ask The Expert” booth to answer questions.



Bill Shiner of IPG Photonics gave a presentation on the LME show floor as part of the Technology Showcase.



Many of LIA's Corporate Members were exhibitors at LME.

While end users were getting vital questions answered by representatives of the industry's top companies, others indicated that they were interested in joining the concentrated networking opportunity at LME.

"I'm here as a walk-in," said Burt Mooney, sales development manager of Gentec in Lake Oswego, OR. After having attended LIA's annual ICALEO event in September, he was at LME "trying to decide whether we should exhibit here. I think it's probably a show we should be at. There are people here walking around buying these laser systems, and if they need that they need equipment like ours, which is laser power meters."

Thomas Shelow, founder of Superior Joining Technologies in Machesney Park, IL., was at LME 2012 at the urging of an industry peer. He, too, immediately understood the value of the event and indicated he would like his job shop to be represented in the hall.

"A laser-focused event is attractive to us," Shelow said. "We're getting a lot of great information from the seminars, like insights into welding techniques. Some of the things that we're seeing on our shop floor that we didn't understand" were explained in LME's educational sessions. "That's been really gratifying. (There are) very knowledgeable individuals here who are very open with ideas and answering questions."

A BRIGHT FUTURE

Presentations by major LME sponsors, TRUMPF and IPG, further emphasized the need for the laser industry to focus on the

cost benefits to customers.

Christof Lehner of TRUMPF contrasted the potential of CO₂ vs. solid-state fiber lasers in steel cutting applications during his fundamentals course on return on investment. In detailing how to calculate per-part costs, he emphasized the customer-focused assessment required to maximize their profit margins.

Bill Shiner of IPG recalled in his Technology Showcase presentation that in 2002, "I'd been hired to develop the industrial market for IPG. I remember asking when I came on board what are our net sales in material processing. It was \$800,000. Today, in nine or 10 years, we've reached almost \$500 million, \$600 million." The technology has taken off because "reliability has been proven in multiple material applications in very, very demanding three-shift-a-day operation."

Exhibitors like Klaus Kleine, general manager of the U.S. office of Ingeneric in Los Gatos, CA, and Leonard Migliore, senior staff engineer with Coherent, noted that LME again delivered quality contacts. Given attendee reaction, the trend is likely to grow when LME returns to Schaumburg on Sept. 11-12, 2013.

"I should have brought some of the other guys along with me," said Rayovac's Steve Esch, who attended the Welding & Joining Workshop and took advantage of the "Ask the Experts" booth in the exhibit hall. "Hopefully next year we'll get at least two or three guys out here."

For more information on LIA's Lasers for Manufacturing Event, as well as next year's exhibit, visit www.laserevent.org.

Geoff Giordano is a freelance writer.

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3RD ANNUAL

ILSC 2013 TO PRESENT CUTTING-EDGE CONTENT FOR THE LASER SAFETY COMMUNITY

By Geoff Giordano

With new ANSI Z136 laser safety standards recently published or on the horizon, the session chairs of the LIA's biennial International Laser Safety Conference (ILSC®) are busy shaping next year's cutting-edge educational program.

Under the oversight of four-time Chair Dr. Ben Rockwell, ILSC 2013 will build on the success of the 2011 Technical and Medical Practical Applications Seminars (PAS). Rockwell, who is



2013 Conference General Chair Ben Rockwell, center, accompanied by LIA Executive Director, Peter Baker, right, and Past President Stephen Capp, left.

also chairman of the subcommittee that produces the ANSI Z136.1 standard, envisions a good deal of instruction to be based on the recently revised Z136.3 standard regarding lasers used in health care settings and the new Z136.8 standard guiding laser use in research, development or testing.

"The laser community is moving toward having one horizontal standard with several vertical standards," notes Rockwell, of the Air Force Research Laboratory at Fort Sam Houston, TX. "The laser safety professional needs to understand where his or her program fits into the new standardization. They'll learn those kinds of things at ILSC."

While the parent Z136.1 standard is slated to be revised, an updated guideline on safe use of optical fiber communication systems using laser diode and LED sources is likely to be approved in time for ILSC. The conference will be held March 18-21 at the Doubletree by Hilton® at the entrance to Universal Studios® in Orlando.

The primary attraction of ILSC is that the "content is updated with the community," Dr. Rockwell says. "It brings current and cutting-edge information to the laser safety professional. As the standards change and the criteria for evaluating laser hazards change, ILSC changes. A good example is intense light sources," one of the many topics addressed at ILSC, along with plume hazards and eye protection, new technologies, operating room procedures, nominal hazard zones and more.

Especially strong have been submissions for the two bioeffects sessions, "which makes me particularly happy because this is where the most science is," notes Laser Safety Scientific Sessions Chair Dr. Karl Schulmeister of Austria's Seibersdorf Laboratories. Other highlights, he says, will be presentations on broadband (non-laser) sources and product safety specifics, "for instance on the hot topic of using laser radiation to produce lamp-like emissions as well as on the challenges of home-use devices for skin treatment."

PRACTICAL APPLICATIONS SEMINARS

The highly popular two-day Medical PAS, returning from 2011, will offer contact hours for attendees. Chaired by Vangie Dennis, administrative director for the Spivey Station Surgery Center outside Atlanta, it will feature an overview of the 2011 Association of Perioperative Registered Nurses Recommended Practices for Laser Safety.

"The recommended practices from AORN focus on clinical practice while optimizing laser safety through the essentials of appropriate hazard assessment with a patient focus. New and innovative types of laser systems will be discussed, and new services are continually transitioning. We'll always have a section on aesthetics because aesthetics changes quicker than anything."

The companion two-day Technical PAS will "provide laser safety professionals with a set of ready-to-use tools designed to immediately improve their laser safety program," says chair Ben Edwards, assistant director of the Radiation Safety Section at Vanderbilt Environmental Health and Safety in Nashville, TN. It will emphasize "high-impact approaches that maximize their return on time and effort invested," explains Edwards.

As with LIA's other highly focused workshops and conferences, ILSC 2013 will give professionals with shared interests and unmatched networking opportunities through ancillary meetings, the poster presentation gallery, awards and hot topic luncheons and receptions. Experts from around the world will share their insights at the event; laser safety officers will be able to compare notes with their peers, as well as with other attendees including everyone from physicists, military personnel and environmental specialists to medical technicians, biomedical researchers and industrial hygienists.

For more information about registering to attend ILSC or for updates regarding certification maintenance points, visit www.lia.org/ilsc. ■

Geoff Giordano is a freelance writer.



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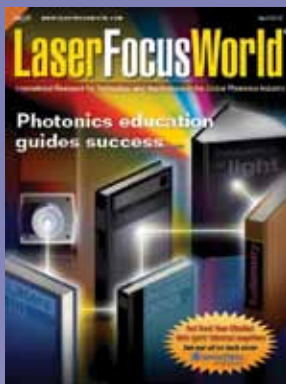
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LIA Corporate Member Cambridge Technology, Inc., (CTI) Lexington, MA, is a market leader in galvanometer-based optical scanning components, servos, mirrors, controllers, scan heads and scanning subsystems providing superior performance in a wide variety of applications including laser marking, engraving, drilling, machining, biomedical, ophthalmology, DNA sequencing, OCT, confocal microscopy, laser projection and any application requiring laser beam steering. The company is the world's dominating specialist for the development and production of optical scanners based on closed-loop galvanometers.

Cambridge Technology was founded in 1978 as a supplier and developer of instrumentation products in the field of biomedical research. In striving to bring the highest levels of precision and accuracy to its products, CTI laid the foundation for the closed loop galvanometer technology that is now the company's exclusive product focus. Cambridge Technology was founded by Bruce Rohr and Jean Montagu and today is owned by GSI Group and is publicly traded.

In the '80s, the first galvanometer product launched by the company, a high-precision motor for the positioning of mirrors, was based on a capacitive position detector and was immediately patented. These galvanometers are drives for quick positioning and angling of mirrors for vector-controlled laser scanners, light pointers, laser show devices and more. The development of the 6450 series was a milestone for the company as it was based on a closed-loop control circuit with a moving coil that combines the two technologies – the positioning process of the company's own moving coil technology with the patented construction of the movable dielectric capacitive positioning detector.

"This series was the first Cambridge Technology galvanometer that was used by the laser industry in large numbers," said Sales and Marketing Director David Freihofer. "The 6450 series paved the way for us to become one of the world's pace-setting specialists in our industry."

In 2008, CTI and GSI merged scanner teams/products under the CTI brand.



Galvanometer technology is the main focus of Cambridge Technology.

THE COMPANY TODAY

Cambridge Technology's international sales are handled by distributors with some 60 percent of its export business generated in Asia and Europe, while 40 percent is in North and Latin America. The company's products are mostly used in the laser industry and are suitable for a wide range of applications.

"On the solutions side of the business over the last few years, Cambridge Technology's expanded offerings in 2 axis, 3 axis, high power and all-digital scan subsystems with industry standard XY2 and advanced controls hardware and application software have enabled new levels of laser system performance with improved ease of use and integration.

"And, on the component side of the business, the 62XX/83XX family of galvanometers continues to be the de facto standard for galvanometer performance, reliability and cost-effectiveness, and represents the latest in the company's advances in analog galvanometer technology with improved positioning stability for today's shorter wavelength and small spot size applications. For high throughput applications, these products offer the highest torque per watt and closed-loop bandwidths for the highest positioning speed and precision," said Freihofer.

Cambridge Technology has been the industry leader in the development of galvanometer technology for decades. The latest in their cutting-edge technology is the development of new resonant galvanometers, new high-power 3-axis scanning subsystems and scan control software.

FOR THE FUTURE

Freihofer has seen growth and changes in the industry over the last couple of years in two main areas.

"On the component side, the fastest growing market has been laser-based biomedical applications where our compact 62XX moving magnet scanners offer the positioning accuracy, speed, size and cost that are ideal for system designs used in dermatology, ophthalmology, confocal microscopy and analytical applications," he said. "While on the solutions side, growth in laser material processing applications have been driven by new fiber and short pulse laser technologies that enable new laser applications in the place of mechanical cutting, drilling and welding processes."

An LIA member since 2008, Cambridge Technology is proud to be a member of the LIA community with its goal of broadening the market for laser applications together.

"From the local LIA chapter meetings, to shows like ICALEO®, LME® and LAM®, LIA's commitment to the laser industry helps Cambridge Technology contribute to and to stay in touch with the other leaders and the latest technologies and applications in the new and emerging laser markets," said Freihofer.

For more information, visit www.camtech.com. ■

Note: Parts of this article are excerpted from "The Maximum in Precision and Speed" article, 2007, Dutch magazine Regionaleuropaischer Wirtschafts-Spiegel.

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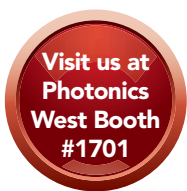
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ASC Z136 UPDATE

A look into international standards activities, courtesy of Jerry Dennis.

IEC TC 76 meets in the UK

Seventy delegates from 13 countries met at this year's meeting of the International Electrotechnical Commission (IEC) Technical Committee (TC) 76 on Optical Radiation Safety and Laser Equipment. The Health Protection Agency (HPA) hosted the six-day meeting at its site on the Harwell Campus near Chilton and Didcot in Oxfordshire, as it similarly hosted the last UK meeting of TC 76 in 2002. The eight working groups that met during this time focus on specific areas of responsibility, which include hazard classification and criteria, measurements for classification, lasers for medical applications, optical communications, high power laser systems, engineering and labeling controls, non-laser sources and industrial laser machines.

TC 76 had several critical issues to discuss at this year's meeting, especially since its basic standard, IEC 60825-1, is due for updating. Included were:

- **Definition of a new hazard class, 1C** – There are now laser products in the international marketplace, primarily for irradiation of the skin, that because of their design and control features confine the laser exposure to the intended target and do not result in any hazardous level of laser radiation being emitted into the surrounding space. For this reason, normally required hazard warnings (for Class 3B or 4) and user controls are not appropriate. Classification in this new 1C class would require that there is an applicable specific product (vertical) standard providing the engineering and reliability specifications necessary for the product to be in Class 1C.
- **Radiance threshold** – New laser products that have greatly reduced radiance are also entering the

marketplace. Classification of these products into a high hazard class puts them at a competitive disadvantage compared to non-laser products that may be equally or more hazardous but do not have any history of having caused injuries to the public or to their users. The proposal under consideration is to establish a radiance threshold below which the risk group system under IEC 62471 for lamps and lamp systems may be used to identify the hazard in lieu of the laser classification of IEC 60825-1. Two significant advantages are foreseen if this proposal is approved, the laser-based products have much higher luminous efficiency than the conventional lamp based competing products; and if treated as lamp systems, would not be subject to the administrative burdens imposed by various jurisdictions such as site registrations and licensing of operators. High radiance, of course, is the unique property of laser radiation that permits the projection of highly collimated intense beams over great distances and can result in the focusing of laser light to very small intense spots on the retina of the eye.

Laser and other light emitting products used in homes for irradiation of the skin are considered as medical devices in some countries and as household appliances in others. For this reason liaison between TC 76 for optical radiations safety and laser equipment and TC 61 for household appliances is being strengthened. Both TC 76 and TC 61 have named Ms. Sharon Miller of the FDA Center for Devices and Radiological Health (CDRH) as the key person in this effort.

TC 76 is also working on a guide for the safe use of Intense Pulse Light (IPL) devices used in medical and aesthetic applications.

At the concluding session, the countries present voted to issue a Committee Draft for Vote (CDV) for the amendment of IEC 60825-1. If this draft is unanimously approved, it can be immediately published as a new edition of the standard;

however, if approved but not unanimously, the document with editorial refinements will be re-voted as a Final Draft International Standard (FDIS). The working groups involved in this project plan to meet again at ILSC® in March 2013, in Orlando, FL.

On behalf of the TC 76, Jerry Dennis, committee chair, thanks Dr. John O'Hagan, HPA and the UK Committee for making this year's meeting possible. ■



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BLS UPDATE

Annual Reminder

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After successfully achieving certification, the BLS requires continuing education activities to maintain one's certification, in recognition of the need to stay aware of new technology and other advances in the field. A CLSO or CMLSO must undergo recertification every three years, at which time it is necessary to demonstrate completion of sufficient professional development activities to ensure continued competency.

The certification maintenance (CM) cycle begins on January 1 of the year following the year in which the individual passed the exam. The cycle ends on December 31 of the third year. A minimum of 10 CM points* must be obtained over the course of each 3-year cycle.

**Note that CM points are not calculated in the same manner as nursing contact hours.*

The following are the CM categories in brief:

1. Laser safety experience
2. Attendance and successful completion of laser safety specific education/training
3. Publication of laser safety or application related articles
4. Teaching laser safety (outside of your company/organization)

5. Membership in a laser safety-related professional/technical organization or society
6. Active participation in a laser safety standards or regulations committee (outside of your company/organization)
7. Attendance at laser safety or applications professional conferences or meetings
8. Presentations or poster papers at laser safety professional conferences or meetings
9. Writing exam questions (accepted by BLS Review Board)
10. Related professional certifications; review of approved laser-related journal articles

Lastly, a CLSO or CMLSO who wishes to maintain active certification status may retake the applicable exam if unable to achieve the 10 CM points; however, the exam must be taken prior to December 31 (end of cycle).

Go to www.lasersafety.org/certification-maintenance for a thorough review of certification maintenance including CM categories in detail. To download a CM manual or worksheet, go to www.lasersafety.org/forms/certification. If you have any questions regarding activities for certification maintenance, contact the BLS at +1.407.380.1553 or email bls@lasersafety.org. ■

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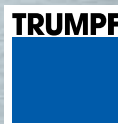
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HIGH SPEED SPINDLE BALANCING WITH PULSED FIBER LASERS

by Jack Gabzdyl

Today's high speed production drills in PCB board manufacture operate at speeds in excess of 250,000 rpm. The spindle shafts in these devices need to be individually balanced by very selective removal of material to ensure that, in operation, they run true. Any eccentricity in rotation can cause drill bit wobble, resulting in breakage and down time. Current manufacturing methods are manual and time consuming, requiring skilled labour.

HIGH POWER DIRECT DIODE LASER CLADDING OF STAINLESS AND NICKEL ALLOYS

by Gerald Bruck

A four kilowatt high power direct diode laser is demonstrated to clad stainless (UNS S41000) and nickel based (UNS N06002)

alloys. Trials are conducted using pre-placed as well as argon fed filler metal powders deposited on matching alloy substrates. Parametric tests are performed to define effects of powder depth, powder feed rate and travel speed.

NEW ADVANCEMENTS IN DIRECT METAL DEPOSITION TECHNOLOGY

by Bhaskar Dutta

POM's patented close loop Direct Metal Deposition (DMD) process allows precision metal deposition using a laser and a coaxial powder delivery system. Besides this, DMD systems include DMDCAM, a comprehensive 6-axis CAM software solution to generate deposition paths for contour, surface and volume geometry, adopting different deposition path strategies required in additive manufacturing processes. ■

View complete articles at www.lia.org/laserinsights under the Featured Category.

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JLA UPDATE

The *JLA* is published four times a year in February, May, August and November. It is available electronically to LIA members as a member benefit. To view the journal online, please make sure your membership is current.



The Laser Institute of America's official refereed publication, the *Journal of Laser Applications*[®] (*JLA*), an online-only journal, is complete with new features for a broader audience. *JLA* is hosted on AIP Publishing's robust Scitation online platform, providing the journal with great functionality and the ability to leverage a wide range of valuable discoverability features. *JLA* now features nine topic sections, a faster peer-review process and a more functional website (jla.aip.org) that makes content easier to access and more interactive. Readers will find full-text HTML rendering featuring inline reference links and the ability to enlarge tables and figures by clicking on them. Among the new features are enhanced search functions with more options and better controls to explore returned content in more useful ways.

For non-members of LIA, call the American Institute of Physics at 1.800.344.6902 for subscription information. Sign up at jla.aip.org/alerting_services/table_of_contents_alerts to receive your *JLA* table of contents email alerts.

Research Highlight – Quo Vadis, Laser Additive Manufacturing?

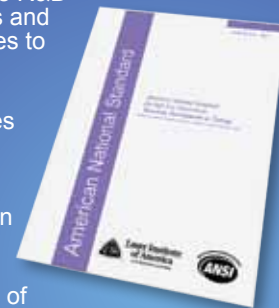
Ingomar Kelbassa, Terry Wohlers, Tim Caffrey

New needs and demands from the product-oriented markets necessitate emerging solutions from the production-oriented technology in (advanced) manufacture enabling breakthrough innovations. Manufacturing remains the main driver of economic wealth: "Manufacturing has a larger multiplier effect than any other major economic activity." New products addressing adapted and customized specifications due to rapidly changed needs and demands require new manufacturing approaches that subsequently require a revolutionary thinking toward completely re-invented manufacturing chains and processes. These new, additive, manufacturing processes are the key enablers for the production of new parts and components that could not be manufactured before due to, e.g., design and/or material restrictions based on conventional—subtractive—manufacture such as 5-axis-milling. Customized parts and devices, more energy efficient components, light-weight structures, and tailored materials, contributing to minimum six out of 12 megatrends, become manufacturable.

LASER SAFETY OFFICER TRAINING IN RESEARCH & DEVELOPMENT ENVIRONMENTS

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- Discover the unique duties of the R&D LSO, as well as traditional laser basics for the health and safety professional embarking on the role of LSO.
- Understand the elements of a sound safety program and how to respond to potential accidents.



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MEMBER INNOVATIONS

LASER-TREATED STEEL FOR AUTOS

A new technique has been developed by the Fraunhofer Institute for Laser Technology ILT for the local heat treatment of high-strength steels that softens the material in a limited area, thus increasing the local formability of components. Automakers, for instance, can reduce weight using stronger steels with lower metal thicknesses without impairing the function of the parts. With funding from the German Federal Ministry of Education and Research (BMBF), a team has developed a technique for locally softening sheet metal using heat input as part of the LOKWAB project. The aim was to produce local, defined softening of high-strength steels. The newly developed technique now allows the material to be treated using the laser so that it can be deep-drawn much further at the modified points without cracks developing. In addition, the heat treatment can also be used on press-hardened components in order to improve joinability using spot welding. For more information, visit www.ilt.fraunhofer.de.

BEAM ANALYZER AND SENSOR

Ophir Photonics Group, a Newport Corporation brand, North Logan, UT, has introduced its newest version of the M2-200s, the company's camera-based beam propagation analyzer. The M2-200s is an ISO 11146 compliant system that automatically measures laser beam quality. The latest version adds support for the 64-bit Windows® 7, addressing more physical memory,

minimizing the time required to swap processes, and speeding up the measurement cycle to less than two minutes. Designed for continuous 24/7 use, the M2-200s features a CCD camera that works with pulsed or CW lasers.

Ophir has also introduced the Fast Axial OEM Sensor. The sensor is based on a novel thermopile design that provides significantly faster response times and higher power levels. Response times are up to 20 times that of traditional thermopile sensors; power and energy levels are up to 2000J for single pulses and more than 20KW average power. The Fast Axial OEM Sensor is designed to handle a wide array of laser beam sizes, from 20mm to 180x180mm. Visit www.ophiropt.com/phonics for more information on either.

LASER CUTTING MACHINE

Coherent, Inc., Santa Clara, CA, has extended its integrated laser machine tool product portfolio with its new META platform, offering improved performance and greater ease-of-use. The META platform features a unibody chassis design. This rigid, single weldment provides improved mechanical stability for the system, resulting in faster cutting speeds and better positioning repeatability. In addition, the cutting bed on META platform products has been enlarged to accommodate standard European sheet sizes (1.25 m x 1.25 m). Visit www.coherent.com for more information. ■



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SAVE THE DATE – ASC Z136 2013 ANNUAL MEETING

The annual meeting of ASC Z136 will be held in conjunction with the 2013 International Laser Safety Conference (ILSC®) at the Doubletree by Hilton® at the Entrance to Universal Orlando, FL on Sunday, March 17. This meeting is open to the public; however, RSVP is necessary for meeting planning purposes.



Z136 subcommittee and TC 76 working group chairs – meeting space is available during conference hours on a first-come, first-serve basis. It is not too early to arrange your meeting!

If you have any questions regarding the annual meeting, plan to attend as an observer, or are interested in scheduling an ancillary meeting, contact Barbara Sams at 1.407.380.1553 or email bsams@lia.org.

REGISTRATION OPEN FOR ILSC 2013

Make plans now to be in Orlando, FL March 18-21 to attend the 2013 International Laser Safety Conference (ILSC®). Registration is now open at www.lia.org/ilsc for ILSC, which is a comprehensive four-day conference covering all aspects of laser safety practice and hazard control. Laser Safety Scientific Sessions (LSSS) will address developments in regulatory, mandatory and voluntary safety standards for laser products and for laser use. The Practical Applications Seminars (PAS) complement the LSSS by exploring everyday scenarios that the Laser Safety Officer (LSO) and the Medical Laser Safety Officer (MLSO) may encounter. Professionals in all fields and applications will find ILSC a tremendous source for information and networking opportunities.

Sponsorship of ILSC 2013 is still available and a valuable way to reach a highly-qualified target audience. For more information, visit www.lia.org/ilsc or contact Chelsea Empfield at cempfield@lia.org, 1.800.34.LASER.

SAVE THE DATE – ICALEO 2013

The International Congress on Applications of Lasers & Electro-Optics (ICALEO®), which has a 31-year history as the conference where researchers and end-users meet to review the state-of-the-art in laser materials processing, laser microprocessing and nanomanufacturing, as well as predict where the future will lead, will be held Oct. 6-10, 2013 in Miami, FL. ICALEO will feature plenary sessions, laser solutions short courses, a vendor reception and tabletop display, a business forum and the annual LIA meeting and awards luncheon. Covered topics include laser process monitoring and control, laser processing of biological materials, laser hybrid processing, laser manufacturing for alternative energy sources and laser business development.

ICALEO offers various level sponsorship opportunities to help create a lasting impression with attendees. Sponsors are acknowledged in a number of ways ranging from onsite signage to visibility on our ICALEO website. From general refreshments to receptions, ICALEO can highlight your company both online and onsite! Find a sponsorship that best fits your company's strategy

and needs. Visit www.icaleo.org for more information, or contact Chelsea Empfield at cempfield@lia.org, 1.800.34.LASER.

SAVE THE DATE – LME 2013

Mark your calendars now for LIA's Lasers for Manufacturing Event (LME®), which will be held in Schaumburg, IL, Sept. 11-12, 2013. LME 2013 will be the place to see the latest in laser technology, network with the industry's elite and find solutions to current and future manufacturing needs. The mission of LME is to provide a one-stop event for companies interested in integrating laser technology into their production. Attendees will learn about laser choices, beam delivery, automation equipment, safety considerations, applications development and meet exhibitors who supply these products and services.

There are sponsorship opportunities available for companies looking for that special market LME serves. For more information visit www.laserevent.org or call 1.800.34.LASER. You can choose the level that best matches your company's promotional goals and boosts your brand visibility. Plan now so as to not miss this exclusive Event for lasers in North America.

LIA'S NEW LASER SAFETY AWARENESS COURSE ONLINE

LIA has created a new online Laser Safety Awareness course tailor-made for the rapidly increasing non-medical laser workforce. LSOs or "laser area personnel" can sign up from anywhere in the world to complete this highly focused training session in about two hours. The Laser Safety Awareness course, similar to other LIA online programs, allows three days' access, so users can review the material at a pace that works best for them. The course will address basic laser physics, beam and non-beam hazards, laser system control measures and current standards and regulations. Based on the parent Z136.1 *Safe Use of Lasers* standard, this course will detail the all-important wavelengths that can cause bodily harm.

The individual cost per trainee is \$70, however, LIA also offers a bulk discount based on the number of "seats" purchased. To register for LIA's new Laser Safety Awareness course, visit www.lia.org/education or call 1.800.34.LASER. ■

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