



Press Release

Emerging technologies: TRUMPF showcases lasers for research and 3D printing

Laser amplifiers offer new approach to attosecond physics – new picosecond lasers can machine highly reflective materials – compact, all-round 3D printers for metal parts – TRUMPF nominated for Prism Award

Ditzingen/San Francisco, January 31, 2017 – The high technology company TRUMPF, based in Ditzingen near Stuttgart, Germany, has put on another impressive show at this year's Photonics West, one of the most important optics and photonics conferences in the United States: The 2017 edition of the research-focused event is taking place from January 31 to February 2 in San Francisco, California. TRUMPF is focusing on showcasing its most promising solutions for emerging technologies in the fields of research, additive manufacturing and microprocessing. As well as its TruPrint 1000 3D printer and the latest model of the TruMicro 2000 ultra-short pulse laser, the company is also presenting its Dira 200-5 laser amplifier. Based on laser beam sources that deliver high-energy picosecond pulses combined with high repetition rates, the Dira product range has been specially developed for applications in the research sector.

One of the main uses of these systems is to pump optical parametric amplifiers. They open up the possibility of generating femtosecond pulses with just a few oscillations of the electric field, generally referred to as "few-cycle pulses." These can then be used by scientists to produce even shorter pulses in the attosecond range. To give some idea of the scale involved, one attosecond is a billionth of a billionth of a second. Scientists working on basic research in the realms of medicine, biology or chemistry, for example, can use these attosecond pulses to capture and investigate the highly dynamic movements of electrons on a molecular scale. "Our goal is to help scientists carrying out basic research conduct experiments more efficiently by providing laser systems that offer both high energy output and high repetition rates," says Knut Michel, Managing Director of TRUMPF Scientific Lasers, a joint venture between TRUMPF and



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attosecond researcher Professor Ferenc Krausz, who works at the Max Planck Institute of Quantum Optics and the University of Munich.

So what is the technological secret behind optical parametric amplifiers? The entire system is modular, comprising a disk laser as a pump source (in this case the Dira), a titanium sapphire oscillator as a seed laser, the multistage optical parametric amplifier (OPA) system itself, and a synchronization unit. The seed pulse is amplified in multiple stages. Inside nonlinear crystals, the pump and seed pulses are spatially and temporally superimposed with femtosecond accuracy. Amplification is performed using a frequency mixing process known as parametric amplification, in which energy is transferred from the pump pulse to the seed pulse.

In a particularly encouraging development, the Dira 200-1 – the flagship of the Dira range and the big brother of the Dira 200-5 – was recently nominated for the Prism Award in the “Scientific Lasers” category, the winner of which will be announced on February 1, 2017 at Photonics West. “The fact that our laser amplifier has been selected from among so many innovations and shortlisted for the Prism Award is a tremendous honor and exactly the kind of success we were looking for,” says Michel.

Compact 3D printer, flexible picosecond laser

TRUMPF is also pinning significant hopes on additive manufacturing technology, and the company is presenting one of the systems from its range of 3D printers at Photonics West. The TruPrint 1000 is a compact, all-round 3D printer that offers economical manufacturing of fist-sized parts with a maximum height of 100 millimeters and a maximum diameter of 100 millimeters. The TruPrint 1000 uses a process known as laser metal fusion (LMF). This involves using a laser to build up metal powder layer by layer in the powder bed to form whatever part is required, with the data taken straight from 3D CAD software. This technology is particularly suitable for geometrically complex parts – especially those with internal channels and cavities – as well as for cost-effective production of single parts and small batches.



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The flexible and versatile TruMicro 2000 picosecond laser is another highlight at this year's Photonics West exhibition. Combining extremely short laser pulses of between 0.4 and 20 picoseconds with a high pulse energy of 20 microjoules, this ultra-short pulse laser paves the way for a process known as "cold processing." The moment material struck by a laser pulse registers the onset of thermal processes, it is immediately vaporized. The TruMicro 2000 is designed for a broad range of industrial applications, ranging from high-quality metal engraving to the cutting of extremely thin films and corrosion-free marking of medical devices and chrome-plated plastics. Even when faced with medical devices made from highly reflective materials that are cleaned and sterilized on a daily basis, this system can create high contrast marks that remain corrosion free.

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Dira 200-1

The Dira 200-1 is a laser amplifier for basic research. It can be used as a pump laser for optical parametric amplifiers, which are used in turn to generate pulses in the attosecond range.



TruPrint 1000

The TRUMPF TruPrint 1000 3D printer can be used to produce metal parts with a maximum height of 100 millimeters and a maximum diameter of 100 millimeters.



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TruMicro 2000

The TRUMPF TruMicro 2000 picosecond laser can apply its ultra-short laser pulses in a wide range of industrial applications.



About TRUMPF

The high-technology company TRUMPF offers production solutions in the machine tool, laser and electronics sectors. We are driving digital connectivity in manufacturing industry through consulting, platform and software offers. TRUMPF is the world technological and market leader for machine tools used in flexible sheet metal processing, and also for industrial lasers.

In 2015/16 the company – which has more than 11,000 employees – achieved sales of 2.81 billion euros. With over 70 subsidiaries, the TRUMPF Group is represented in nearly all the countries of Europe, North and South America, and Asia. It has production facilities in Germany, France, Great Britain, Italy, Austria, Switzerland, Poland, the Czech Republic, the USA, Mexico, China and Japan.

For more information about TRUMPF go to www.trumpf.com

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