

Latest Laser technology and applications

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1. Introduction

Besides the CO₂ Laser technology, solid state laser technology becomes the most used laser technology in production and manufacturing processes. Today, direct Diode laser are known for high wall plug efficiency, whereas Disk laser and Fiber laser technology are commonly used for applications demanding high laser beam quality and high laser output power. Another generation of laser is the ultra short pulsed lasers, also known as ultrafast lasers. Ultrafast laser technology has matured from complex laboratory sources to versatile industrial tools for cutting, drilling and structuring of an almost unlimited variety of materials. These ultrafast lasers open a new variety of applications and possibilities to process even new materials. To elicit high performance of laser, it is need to develop peripheral equipments and processing know-how. With this paper we would also like to introduce technology development of TRUMPF's laser and peripheral equipments.

2. Latest Laser technology and applications

Laser technology

In former years, laser technology for manufacturing has been mainly used for metal cutting and welding applications. With development of new laser sources, the area of cutting and welding applications has been widened and new applications with new materials and new laser manufacturing methods could be added.



Pic1: POWER OF CHOICE

CO₂ laser technology

In fact, Solid State Laser technology is developing very fast. However, the CO₂ laser technology has many advantages in material processing. The different wavelength opens possibilities in the non material manufacturing and compact design at low cost open new markets.

Solid State Laser technology

In addition to well known Disk and Fiber technology, a new trend with direct diode lasers is coming up. These new direct diode lasers equipped with latest diodes of highest brilliance allow even fine welding applications without additional optical components for beam quality improvements.

Beside the laser as a beam source, customers are demanding for complete welding systems. TRUMPF provides a variety of full-turn-key solutions like the TruLaser Cell generation with high performance 3D-cutting in serial production.

Ultra short pulse laser technology

Ultra short pulsed laser technology has matured from complex laboratory sources to versatile industrial tools for cutting, drilling and structuring of an almost unlimited variety of materials. These light sources are established in 24/7 application in a wide variety of industrial applications.

Recent developments of shorter pulse durations and higher average output power will be reviewed. New product lines and new versions of established lasers deliver average powers from low (10 W ps-pulses) to very high output powers in the infrared or frequency converted into the green or UV-wavelength. Pulse durations range now from 800 fs up to several ns.

Additive Laser Manufacturing

Laser Metal Deposition and Selective Laser Melting are two different kind of additive laser manufacturing. Both process methods are supported by TRUMPF and enable newest manufacturing methods by using the advantage of laser technology.

3. Conclusions

Laser technology is one of the most important high technology tools, which enables a variety of applications and processes. These applications can be found in the automotive industry as well as in the electronic sector or Semiconductor market. Due to less improved beam quality and higher efficiency and stability, even industries with high demands on process stability and high demands on up time, are accepting the Laser technology more and more. With new Ultra Short Pulsed Lasers, even laser processing of new materials like CFRP, plastics and brittle materials are becoming of interest in the automotive, electronics, semiconductor and aero space industries.

Acknowledgements

We would like to express sincere thanks to all the contributors to the symposia for their cooperation