



Coherent - Complete laser solutions for microfluidic devices

Laser technology continues to have a profound impact on the manufacture of medical devices, but is not without its challenges. Frank Gaebler, director of marketing at Coherent, sheds light on how his company's products can be applied to the engraving, marking and drilling of microfluidic devices, and discloses the key to avoiding microcracks.

Could you provide an overview of Coherent's laser portfolio for the medical devices industry?

Frank Gaebler: We provide a comprehensive range of laser tools that are used for cutting-edge device manufacturing and medical device marking. Our tools range from stand-alone lasers to subsystems that include the laser, scanning optics and computer control, to fully featured workstations.

The manufacturing applications are incredibly diverse, but usually involve micromachining or nanomachining tasks. How diverse are they? Our picosecond lasers are used to machine next-generation coated and biodegradable stents, with low-Ra surface roughness being the main benefit.

Our direct laser diodes are used for plastic-disposables welding, where the advantages are clean, automated, low-cost manufacturing. In other applications, our picosecond lasers are used to create sharp but economical disposable silicon blades. We also support the fabrication of all kinds of glass and plastic microfluidic devices with three-dimensional precision.

What kind of demand is the company experiencing from the medical devices market?

While the fabricating applications continue to expand, we are seeing the fastest growth in laser marking of medical devices, driven principally by FDA mandate in the US for universal marking with a permanent UDI (unique device identifier) by mid-2018.

What makes Coherent different from its competitors in this area?

We offer tools with superior reliability and performance, as well as an incredible breadth of applications knowledge. Of course, competitors could potentially make similar claims, but the area where we are clearly unmatched by any objective assessment is in the range of our product line - horizontal and vertical.

By horizontal, I'm referring to all the different laser technologies we specialise in, including excimer, nanosecond, picosecond, fibre, direct-diode, carbon dioxide and carbon monoxide lasers.

Our vertical integration means we can support each application at the level required by the customer, whether that's a laser, laser and scanning optics, or a complete workstation including parts handling.

How can your lasers be applied to the engraving, marking and drilling of microfluidic devices?

Our picosecond and ultraviolet (UV) lasers are usually the preferred tools here. That's because the increasing need for greater precision, better surface quality and increased yields means that these features cannot be formed with traditional methods like electrical discharge machining (EDM), or even nanosecond infrared laser tools that were quite recently considered cutting-edge.

Our picosecond lasers are used for tasks ranging from drilling small (tens of microns) holes in catheters to complex patterns of grooves and channels in substrates that are then bonded together to make a 3D device, such as a lab on a chip.

What are the main challenges to be taken into consideration when marking sensitive materials, such as pharmaceutical vials, without microcracks?

Rigorous process development is always the key to avoiding microcracks. As a general rule, however, microcracks are a result of uncontrolled local heating. Colder marking is enabled by the use of shorter wavelengths.

In the past, the higher cost of both these options was a drawback. But recent advances in laser manufacturing and laser lifetime have significantly lowered the cost of ownership, particularly for industrial femto-picosecond lasers. We have developed a marking technique to change refractive index in thin glass. This allows the marking of pharmaceutical ampoules without leaving microcracks

and the danger of glass cracking or breakage. The marks are machine-readable and allow industrial traceability of products.

Are there any recent company developments you would like to share?

We are very excited about the recent acquisition [in 2016] of the Rofin group. Rofin brings some truly unique fibre-laser technology to Coherent. But just as important, Rofin is known for its excellence in vertically integrated tools and workstations. With Coherent's innovation and breadth in laser technologies, this makes for a powerful combination that will benefit the medical device industry.