



## Perfectly positioned: A laser shows the way

Every surgical operation has inherent risks. New technologies help to minimize these risks, for example with high-precision 3D navigation for computer tomography.

The Radiology department at the University Hospital of Basel has state-of-the-art equipment. In addition to the world's first 3D X-ray device, the hospital also relies on a new laser navigation system for CT scanning – guided minimally invasive surgery. “It offers a lot of advantages for image-guided operations,” explains Dr. Christoph Zech, head of the Interventional Radiology department at the University Hospital of Basel.

### Visualizing the invisible

Since 1974, CT scans have been used to create detailed cross-sectional X-ray images of the human body. Doctors use these high-resolution images in their decision making, e.g., on where to take a tumor sample. But how do they reach that target? Where exactly do they place the needle tip, and what is the correct angle? Until now, this used to be a difficult challenge – every millimeter counts. Here's where the fully automated laser navigation system made by the company amedo comes in. The device consists of a ceiling-mounted, arc-shaped rail on which a motorized laser positioning unit is mounted. That's all – a simple system that makes a big difference for doctors and patients alike.

## Lower radiation exposure

The navigation system uses a laser beam to project the needle's point of entry on the patient's skin and visualize the needle path along which the radiologist needs to move the instrument. Dr. Zech uses a foot switch to adjust the exact position of the needle. This triggers an imaging sequence to monitor the ongoing operation, the infiltration of a nerve root. The monitor of the CT scanner shows the position of the 0.7-millimeter-thin needle. It is already in the correct position in the first set of frames. "Here's where the new laser navigation system is extremely helpful," says Zech. The intrusion depth of the needle is also displayed.

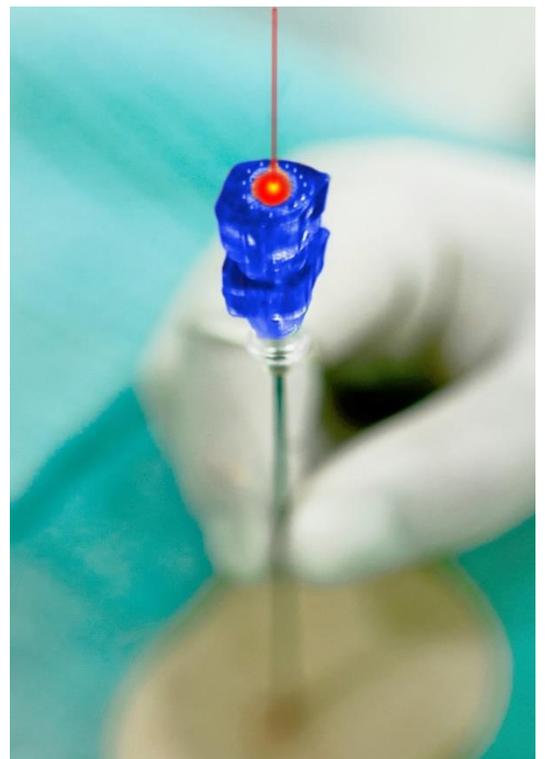
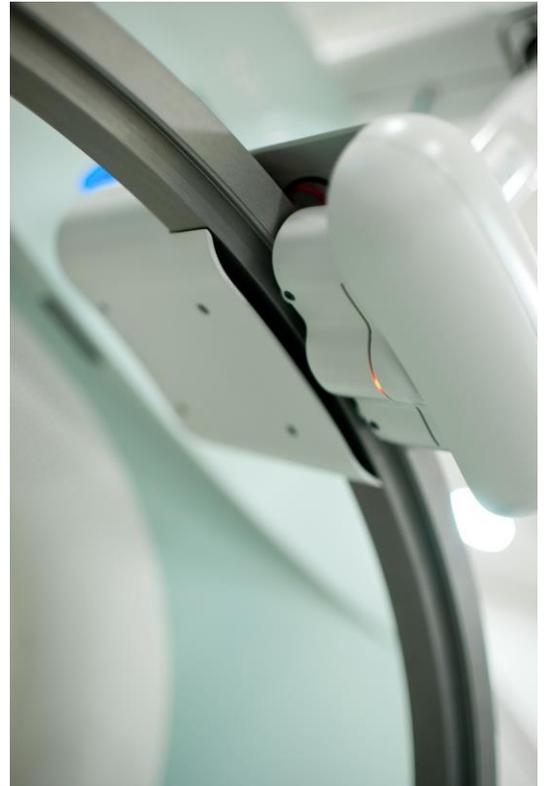
Additional CT scans to determine the position are hardly necessary any longer, which significantly reduces the radiation exposure for the patient. With traditional technology, the position of the needle had to be checked at least two or three times.

## maxon motors position the laser

Brushless maxon drive systems are used to ensure that the laser unit moves precisely on the device's rail. The unit is equipped with a brushless flat motor with a 45-millimeter diameter, combined with the GS45 planetary gearhead and an MR encoder. Via a synchronizing pulley, they drive an endless belt that moves the carriage along the arc. The rotating laser pointer is installed in this carriage.

Two more maxon motors control the mechanical rotation of the laser mirrors: brushless EC-max 16. Combined with GP 16A planetary gearheads and MR encoders, they enable a precise positioning of the laser beam to show any angle as required for the operation. The motors are controlled using three EPOS2 Module 36/2, taking into account all process parameters as well as the communication with the control computer. According to Volker Trösken, managing partner at amedo, the small-form factor and reliability were the main points in favor of the maxon drive systems.

The young medical technology company from Bochum, Germany, has developed a device that did not exist before in the market. The success is impressive – a total of 16 devices are already in use worldwide. The team of six has acquired sales partners in 14 countries. "We recognized the surgeons' need for a solution that provides an easy-to-use, low-risk, and time-saving navigation aid for CT-controlled surgery and developed our laser navigation system together with the Grönemeyer Institute for Microtherapy here in Bochum."



## maxon products in this article



### maxon EC 45 flat

maxon flat motors are especially suitable for installation in confined spaces.



### maxon EC-max 16 Motor

maxon EC-max stands for an optimal price/performance ratio, with all of the advantages offered by a brushless DC motor.



### maxon EPOS2 Module 36/2

For brushed DC motors with encoders and brushless DC (maxon EC) motors with Hall sensors and encoders up to 72 W.

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