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ADAPTIVE HANDPIECE FOR LASER-BASED THERAPY SYSTEMS

Task

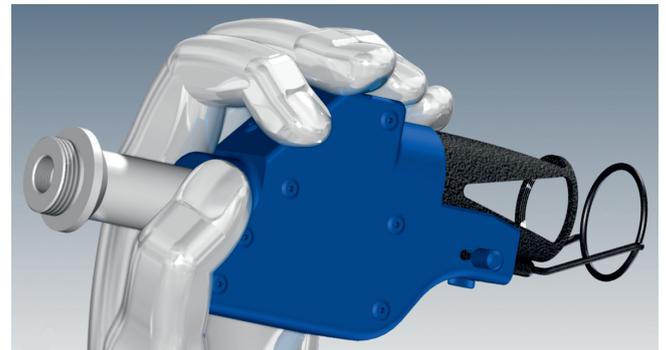
In numerous applications in dermatology, for example, when treating vascular lesions, laser radiation is used to ablate or coagulate tissue. For this process, the laser radiation has to be focused on the tissue and, via a scanner mirror, passed over the tissue surface. A handpiece developed at Fraunhofer ILT with integrated scanner technology should enable the doctor treating the patient to do this, whereby he retains complete control over the process and is supported by assistance systems.

Method

The therapeutic radiation is coupled to a handpiece that the surgeon places upon the section of skin to be treated. The micro scanner technology ensures that the laser is positioned precisely. The use of 2D image acquisition combined with scanner mirrors enables the doctor to document the treatment process and its success. In addition, the geometry of the surface to be irradiated can be adapted automatically to the results of pre-operative diagnostics. Measurement radiation of optical coherence tomography can be superimposed over the therapeutic radiation in order to monitor the coagulation process in deeper lying layers of tissue.

1 Handpiece for laser-based surgery.

2 Grip with irrigation channels and illumination via glass fibers.



CAD design of a handpiece for dermatology.

Result

At Fraunhofer ILT, handpiece technology has been developed for applications in hard tissue surgery, which enables capturing 2D images and making 3D OCT images of the treatment site while laser radiation is used to cut. The OCT system, developed at Fraunhofer ILT specifically for use in laser surgery has a measuring area of $z = 11 \text{ mm}$, a measuring frequency of $f = 14 \text{ kHz}$ and an axial resolution of $dz = 25 \text{ }\mu\text{m}$.

Applications

The handpiece can be used in laser therapy and surgery systems for which the laser radiation has to be applied by the surgeon with high precision in spite of being guided by hand.

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