

RWTH Technology

High-Frequency Ultrasonic Microscanner



Challenge

The conventional fabrication process of dental prostheses requires numerous laborious steps which might negatively influence precision and operational long-term reliability of the end product. Conventionally applied elastic impression procedures cause failures in the early stage of dental restoration which propagate through the entire process. In addition, as preparative step of the impression procedure it is necessary to manipulate or even operate on the gingiva, which is often painful. More error sources exist during the generation of the plaster model. The accumulation of all these inaccuracies might lead to failure of the prosthesis fit resulting in the need for refabricating or laborious modifications. Even currently available optical measurement techniques, that were developed to overcome the mentioned limitations, are not able to completely eliminate the error sources of the conventional fabrication process of dental prostheses.

Solution

The use of ultrasound for recording intraoral scan data has a series of advantages (see section below). Consequently, the technology relates to an intraoral scanning device for recording ultrasound scan data in the mouth of a patient and a method suitable for processing the ultrasound scan data recorded by this intraoral scanning device. Among other features, the device comprises a high-frequency sonic head with a transducer for scanning for example a covered or non-covered tooth region. The scanner is here arranged by means of an intraoral interface structure which encloses the teeth using a coupling medium. The scanner kinematic provides a transducer movement in multiple degrees of freedom to collect signals from various positions and angles. The method for processing the ultrasound scan data applies a focusing technique and an optimization of noisy high-frequency signals. The system outputs ultrasound raw data, slice images and three-dimensional reconstruction by means of point-clouds of the scanned structures.

Advantages

- Non-invasive treatment, no surface drying
- No gingiva management needed
- Improved usability
- Principle can also be used for industrial material testing

Status

- Basic patent granted in EP (validated in BE, CH, DE, ES, FR, GB, IT, NL)
- Three further European and PCT patent applications filed

If you are interested in the system, prototypes, the design dossier for medical CE or other components, we would like to bring you into contact with the former licensee.

RWTH Innovation GmbH

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#0295, #1617, #1618, #1619

Fields of application

Medical Engineering,
Dentistry, Implantology,
Dermatology, Oncology, Oral and
Maxillofacial Surgery,
Material Testing

Keywords

#Ultrasound, #Scan System,
#Kinematics, #Dental Impression,
#Dental CAD/CAM, #Skin Imaging,
#Dental Diagnostics,
#Digital Prosthodontics,
#High-speed Imaging,
#Surface Reconstruction,
#Ultrasound Biomicroscopy,
#Non-destructive Examination,
#Material Testing,
#A-Mode, #B-Mode, #C-Mode

Patent(s)

EP 16200800.7,
PCT/EP2017/080566,
EP 16200802.3,
PCT/EP2017/080567,
EP 16200803.1,
PCT/EP2017/080568,
all pending
EP 2023849 B1, granted in 2015

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