PEC University of Technology

DEVELOPMENT OF DENTAL DRILL GUIDES FOR IMPROVED COOLING AT DRILLING SITE

Centre of Excellence in Industrial & Product Design

ABSTRACT

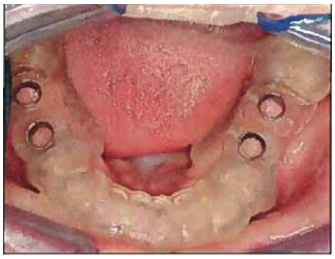
Loss of teeth results in significant disabilities, which can disrupt social activities. Men and women of all ages are self-conscious about their dentures, bridges or missing tooth. Some have difficulty speaking because their dentures slip or click. Moreover, they feel aged before time due to tooth loss.

A number of options exist for the replacement of missing teeth. The most recent of these is dental implants. Dental implants offer an excellent alternative to the limitations of conventional dentures, bridges and missing teeth.

Patient suffering from tooth loss having limited bone to support the implant and needs accurate placement due to adjacent anatomical structures.

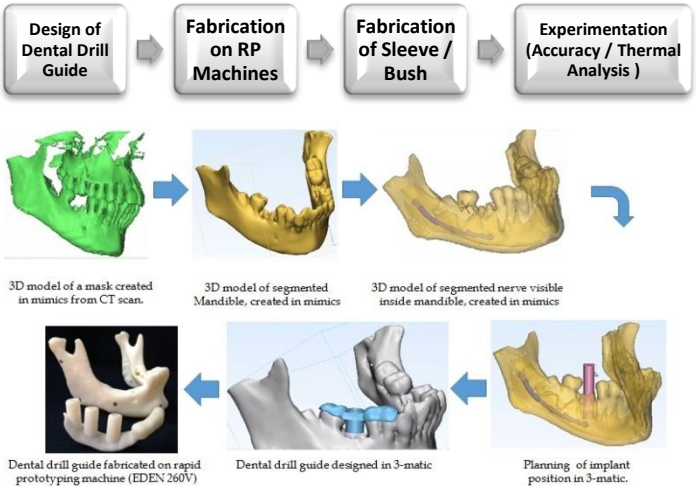
Dental drill guides are the solution to these problems.

There have been many advances in the field of implant dentistry that have improved the success and predictability of implant placement. One such advancement is the use of dental drill guides.



These guides have allowed surgeons to place implants in areas where there is limited bone, and in locations where adjacent anatomical structures require accurate placement. This has improved patient care by allowing implant placement in areas that may have otherwise required grafting and additional surgeries. The major problem reported in the use of dental drill guides is rise in bone temperature which further results in series of problems.

METHODOLOGY



Steps in Drill Guide Design

PROJECT POTENTIALS

- Partners: Biomedical Industries
- Patents: 01

PROBLEM DEFINITION

By improving the accuracy in implant position and angulation, CAD/CAM guides have also made the restorative phase of treatment more predictable. While placing implants it is essential that adequate irrigation reaches the osteotomy site to prevent thermal necrosis. This is important in placement of implants using a CAD/CAM guide that can limit access for irrigation.

However, existing dental drill guides also have a drawback of rise in bone temperature because of limited access of irrigant at the drilling site which further results in series of problems like bone cell death, longer healing time and even failure of implants.

The primary reason for the success of dental implant is the biocompatibility of Titanium, which bond to bone by the process of osseointegration. Osseointegration depends upon many factors but the most crucial of these is the presence of vital bone with healthy osteoblast/ostecyte surrounding the implant. For this reason it is crucial to prevent overheating of bone during drilling process, which is done by sequential drilling and constant irrigation.

UNIQUE INSIGHTS/BENIFITS

- Accurate
- Better coolant flow rate at the drilling site
- May improve success rate of surgery

KEY IMPLEMENTATION CHALLENGES

- Facility to manufacture Sleeve / bush used in guides

TARGET CUSTOMER

Biomedical Companies

Dental Clinics / Departments

TEAM DETAILS

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