

Materials Science Department

NiTi-Fail - Assessment of fracture risk of Ni-Ti endodontic files during clinical use



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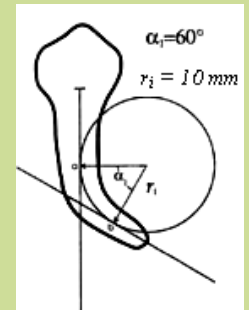
MSc in Chemical Engineering
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Objectives

The current project aims at studying endodontic files that are commonly used for root canal treatments, especially at understanding the relationship between material characteristics and mechanical and fracture behavior of such instruments.

Ultimately, such knowledge will allow for clinical use optimization of NiTi rotary files and contribute to the systematization of the testing procedures to be used by the endodontic industry.



Methodology

- Literature review;
- Identifying the clinical situations of interest, by choosing the bench model types, by defining the most representative root canal curvatures and constrains and by determining the most suited files to be used as case-studies;
- Metallurgical, thermal and mechanical characterization of the NiTi alloys used on the previously chosen endodontic files, by means of several experimental techniques;
- Combined rotation-flexion fatigue testing, from the previous evaluation of the bench models, considering the effect of temperature within the practical range of clinical interest.

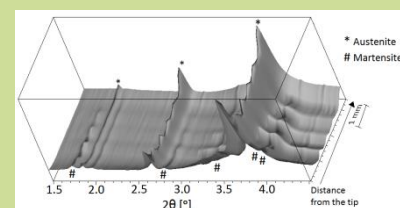
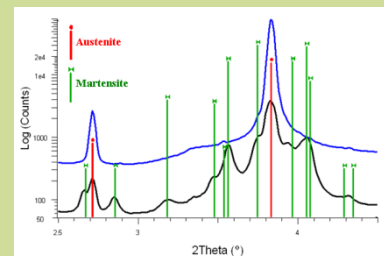


Expected Results

To address the structural characterization and gather of thermomechanical data of Shape Memory Alloys (SMA) in order to support the fatigue testing and the understanding of the fracture mechanisms in the endodontic files tested.

Understanding of the optimal operational conditions during clinical use of endodontic files based on the information gathered on fatigue testing and fracture mechanisms.

Establish a set of guidelines for a safer use with longer duration of treatments.



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