PENETRATION OF MOLARS TEETH USING CARBON DIOXIDE LASER

RESEARCH MANAGEMENT INSTITUTE (RMI)
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR
MALAYSIA

BY :

NOORSYAM BINTI YUSOF
MOHAMAD ADHA BIN MOHAMAD IDIN
NOOREZAL ATFYINNA BINTI MOHD NAPIAH

AUGUST 2011

Contents

1. Letter of Report Submission

Tarikh : 9 Ogos 2011
No. Fail Projek : 600-RMI/ST/DANA 5/3/Dst(119/2010)

Penolong Naib Canselor (Penyelidikan)
Institut Pengurusan Penyelidikan (RMI)
UiTM, Shah Alam

Tuan,

LAPORAN AKHIR PENYELIDIKAN 'PENETRATION OF MOLARS TEETH USING CARBON DIOXIDE LASER'

Merujuk kepada perkara di atas, bersama-sama dengan ini disertakan 3 (tiga) naskah Laporan Akhir Penyelidikan bertajuk 'Penetration of Molars Teeth Using Carbon Dioxide Laser' dari Jabatan Sains Gunaan, Pulau Pinang untuk makluman pihak tuan.

Sekian, terima kasih.

Yang benar,

NOORSYAM BINTI YUSOF
Ketua
Projek Penyelidikan

5. Report

5.1 Proposed Executive Summary

Drilling is the most common approach in dental treatment. It takes time and sometime causes a pain on patient. By drilling the teeth does not achieve the desire depth should be. So the new technology is welcome to solve this kind of problem. Different types of lasers had been used in dental applications since the early 1990's for soft tissues (gums). Dental lasers have not been widely used because of their high cost and limited applications. A dental laser for preparation of cavities is a very new and potentially promising technology that will need several years of research and improvements. This research presents an artificial neural network (ANN) technique to predict and optimize the depth penetration of carbon dioxide laser used for teeth. This determination is important to dental treatment instead of using drill for drilling the teeth.

The objective of this research is to determine the best parameter in carbon dioxide laser in order to achieve the desire depth penetration of teeth. The parameters are in terms of power intensity and exposure time. The combinations of this parameter are important to get the required depth penetration. Carbon dioxide laser is used to shoot the molars. The area that will expose to laser is enamel. The parameter setting is set differently according to the type of teeth. The collected data from the experiment will used to build the intelligence system. The model combines single hidden layer multilayer perceptron Artificial Neural Networks (ANN) for prediction and optimization. In this method, training and prediction performance of different ANN architectures are initially tested and the architecture with the best performance is further used for optimization. Finally, the best ANN architecture is found to show much better prediction capability compared to an experimental method in obtaining the depth penetration. Therefore, the new method is introduced in this research.

5.2 Enhanced Executive Summary

In this study we investigated the depth penetration of teeth by using carbon dioxide (CO_2) laser. The objectives of the study were to identify the parameter of depth penetration of teeth by penetrating the carbon dioxide laser using experimental procedure. Twenty teeth samples (all molars) were sectioned perpendicularly using CO_2 laser radiations at wavelength 10.6 μm at different power intensities of 10.15 W, 11.33 W, 12.05 W, 12.45 W and 13.35 W with exposure time in range of 40 s to 420 s with increment of 20 s. After being exposed to the CO_2 laser beams, the length of teeth were then measured using digital vernier calliper. From the observations, the relationship between depth penetration and power intensity of laser beam and exposure time are almost linear. As a conclusion, the depth penetration increased with increasing power intensity of laser beam and exposure time. This study is important to identified the appropriate level of power for laser beam for drilling the teeth.