Reverse Enginering and Finite Elements Analysis In Removable Partial Denture.

C. Bortun[1], A. Cernescu[2], N. Faur[3], L.Sandu[4], F. Topala[5]

[1,4,5]*„Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania*
University School of Dentistry, Specialization of Dental Technology , [2,3]*Politehnica University Timisoara, Mechanical Engineering Faculty, Department Strenght of Material*

INTRODUCTION: The finite element analysis is well known in dentistry. In the field of removable partial dentures were studied dental clasps, major connectors and other maintaining, support and stabilization systems [1,2]. The objective of the study is to test wax pattern framework optimum design of removable partial denture (RPD) using **numerical simulation**. After testings, the pattern can be transformed into finite piece.

METHODS: There was made a comparation between "LiWa" (WP Dental, Beven/Hamburg Germany) wax pattern and different CoCrMo metallic frameworks. Those were 3D laser scanned with LPX 1200 (Roland) and processed with Dr. Picza program (Fig. 1).

a. b. c d. e.

Fig.1 3D scanned wax pattern: a. "LiWa" wax pattern; b. metallic framework; c,d. scanner, e. 3D scanned wax pattern.

Further processing were made using ,,Pixform Pro''(Roland) program. Imported point clouds were processed and transformed into one surfaces network after connection. This network was exported as DXF extension file in CAD program, where the 3D model (Solid Work 2007 - SolidWork Corporation West) of the pattern was obtained.

RESULTS: Within the analyses results made on patterns, meshing and loading of some prosthetic pieces fragments was allowed. As fragments, RPD clasps were chosen. In the second figure are presented some of the results.

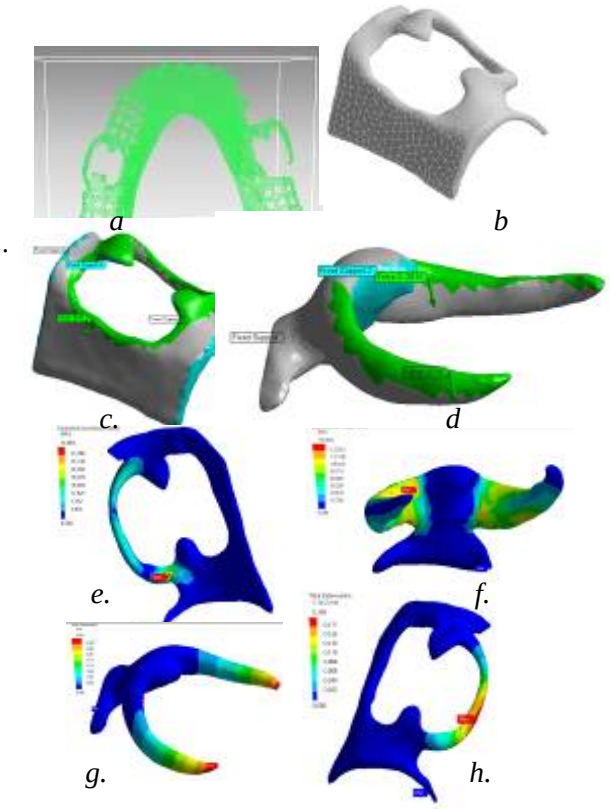

Fig.2 a. RPD point clouds – wax pattern; b. circumferential clasps meshing; c,d. fixed support conditions; e,f. von Misses equivalent stresses; g,h. clasps total deformation.

DISCUSSION & CONCLUSIONS:

1. Using light curing waxes is a novelty in the field of removable partial dentures technology.
2. Wax pattern finite element analysis allows the design testing of future metallic frameworks of RPDs, before their achieving.

REFERENCES: [1]Sato Y, et all. (1995) *An Investigation of Preferable Taper and Thickness Ratios for Cast Circumferential Clasp Arms Using Finite Element Analysis,* Int J Prosthodont, 8:392-397. [2]Sandu L, Faur N, Borţun C. (2007) *Finite element stress analysis and fatigue of cast circumferential clasps*.J. Prosthet. Dent., 2007 vol. 97, no.1: 39-44.

ACKNOWLEDGEMENTS: This study was supported by the CNCSIS Grant, no.744/2006, from the Ministry of Education and Research of Romania