

# Thermo-Mechanical Stress in Multilayered Dental Post Due to Temperature Gradient

## Abstract

**Objective:** To analyse thermo-mechanical stress in endodontically treated teeth restored with Multilayered Structured Dental Posts (MSDPs) under cold and hot conditions using Finite Element Analysis (FEM). **Methods:** Three MSDPs of multilayer design of xTi-yHA composition added to a zirconia layer (model A), an alumina layer (model B) and a titanium layer (model C) were compared with zirconia (model D) and titanium (model E) posts. The fractions of Ti and HA was varied gradually. Changes in temperature of an endodontically restored tooth model were calculated as a result of hot and cold response. The resulting thermo-mechanical stresses were analysed and compared using FEM in models A, B, C, D and E. **Results:** It was noted that Models A, B and C returned to near body temperature better than that Models of D and E. There was no evident difference in all MSDPs models. The smallest Von Mises thermal stresses were observed in MSDPs (models A, B and C) compared to models D and E. There were no also differences in Von Mises thermal stresses for all MSDPs. The magnitude of interface of stresses in models D and E with the surrounding tooth structures were greater than those in MSDPs especially in area close to middle third of the dental posts. The peak stress by thermal irritant for models D and E are approximately three times higher than models A, B and C. **Conclusion:** The findings of this study showed that pure zirconia and titanium posts produced greater thermal stresses than MSDPs.

<b>Authors:</b>	MADFA, A.; Abu Kasim, N.H.; M. HAMDI; R.G. RAHBARI; M. BAYAT
<b>Year:</b>	2010

**Keywords :**

SELF-REPAIR; CULTURE-CONDITIONS; COMPOSITE RESIN; DENTAL PULP STEM CELL; FUNCTIONALLY GRADED DESIGN; MULTI LAYERED POST; FUNCTIONALLY GRADED DENTAL POST; SOFT SKILLS; CLINICAL PAIRING; DENTAL PULP STROMAL CELLS; LONG-TERM EXPANSION; Thermo; Mechanical Stress; Multilayered Dental Post; Temperature Gradient

**Please cite as :**

MADFA, A., ABU KASIM N.H., HAMDI, M., RAHBARI, R. G. & BAYAT, M. 2010.

Thermo-Mechanical Stress in Multilayered Dental Post Due to Temperature Gradient.

**URL :**

- [http://iadr.confex.com/iadr/sea10/preliminaryprogram/abstract\\_141147.htm](http://iadr.confex.com/iadr/sea10/preliminaryprogram/abstract_141147.htm)