

## Introduction

Dental splints are used in a variety of applications including stabilizing loose teeth, reinforcing provisional partial dentures, repairing dentures and other restorations, etc. In many of these applications, the splint material may deliver a bending force for proper function. The ability to maintain a consistent flexural force is therefore imperative.

Many dental splints are resin-based materials reinforced with glass fibers. The orientation of fibers, however, has the possibility of influencing the force delivery and force decay of the dental splint.

## Objective

The objective of this research was to compare the flexural stress relaxation of four structural configurations of a dental splint product made from glass fiber-reinforced resin material.

## Materials and Methods

Splint-S from SFC, LLC was used to make four structural configurations based upon fiber arrangement:

Group I: All Braided

Group II: All Uni-directional

Group III: Top and bottom uni-directional, center braided

Group IV: Top and bottom braided, center uni-directional



The four splint group specimens (n=6/group; approximately 25 x 2 x 1.5 mm) were tested in 3-point flexure with bottom supports separated by 20 mm. At a crosshead speed of 1 mm/min, the beams were deflected to 0.3 mm and flexural stress was monitored for 30 minutes. Four parameters (Flexural Stress at time zero with 0.3 mm deflection, Flexural Stress at 30 minutes, Flexural Stress Relaxation, and Flexural Stress Loss) were determined, averaged, and compared with one-way ANOVA and a post hoc Tukey test, if indicated. Significance was set to p<0.05.

## Results

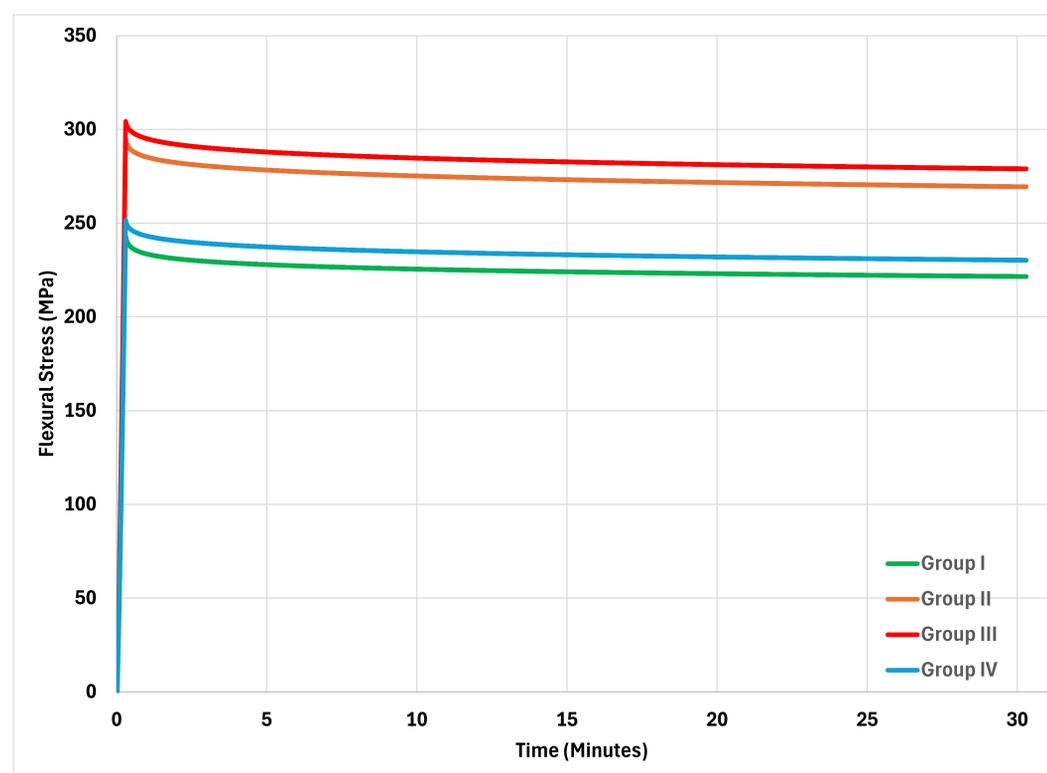
The flexural stress values are shown below.

Splint Material	Flexural Stress (MPa) at time zero with 0.3 mm deflection	Flexural Stress @ 30 min (MPa)	Flexural Stress Relaxation (%)	Flexural Stress Loss (MPa)
Group I	244±37 B*	223±35 B*	8.9±1.3	21±3 B*
Group II	301±24 A	274±21 A	9.0±0.7	27±4 A
Group III	301±16 A	277±15 A	8.2±0.7	25±2 AB
Group IV	250±5 B	229±6 B*	8.5±0.8	21±2 B

\*Groups with different letters are significantly (p<0.05) different from each other.

No significant (p<0.05) differences were found among groups with respect to flexural stress relaxation, however Groups II and III exhibited greater stress at 0.3 mm deflection initially and after 30 minutes.

Representative Flexural Stress vs Time curves are shown below.



## Conclusions

Fiber arrangement influences flexural stress values but not necessarily the percent relaxation when deflected within the elastic range.

## Acknowledgement

The splint materials were supplied by SFC, LLC.