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Shear-Bond-Strength of Nine Dual-Cured Build-Up Materials and a Light-Curing-Adhesive-System on Dentin

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Objective: The purpose of this study was to measure the shear bond strength of nine different commercially available dual cured core build-up materials on human dentin in conjunction with a light curing adhesive system. The null hypothesis was that there is no statistical significant difference among the core build-up systems.

Materials and Methods: A total of 54 human molars were cross-sectioned, roots cut off and embedded in acrylic composites to expose the coronal portion of dentin. Nine commercially available core build-up materials have been selected for shear bond testing: CompCore(Premier), GrandioCore(VOCO), ParaCore(Coltene), BuilditFR(Pentron), LuxaCore(DMG), MultiCoreFlow(Ivoclar), ClearfilDCPlus(Kuraray), Permaflow(Ultradent), Encore(Centrix). All core build-up materials were tested with the Scotchbond-Universal Adhesive System(3M ESPE). Six specimens per group were tested. The exposed flat dentin surface from the samples was treated with Scotchbond-Universal adhesive in the self-etching mode according to manufacturer's instructions. It is an all-in-one adhesive material. The treated sample was placed in a bonding clamp followed by the core build-up application. All core materials were setting in the dark-cure mode. After removal the samples were stored for 24h at 36 degree Celsius and 100% humidity. The Ultratester(Ultradent) was used to shear off the build-up composite from the samples at 1mm per min. Statistical analysis was done with student t-test at a 0.05% confidence interval.

Results: The shear bond strength averages in MPa for the core materials were as follows: CompCore 22.0(±10.0),GrandioCor 22.1(±8.4), ParaCore 9.2(±1.2), Buildit FR 15.0(±7.1), LuxaCore 25.0(±7.1), MultiCore Flow 25.6(±9.2), ClearfilDCPlus 22.3(±6.4), Permaflow 20.8(±9.4), Encore 23.8(±6.7). Significant lower shear-bond-strength was found for ParaCore(Coltene) compared to all other core materials except in comparison with BuilditFR (Pentron) p=0.078.

Conclusion: A desired average of more than 20 MPa was reached for all core materials except for ParaCore(Coltene) and BuilditFR(Pentron).