As with other mechanical properties, aging or storage in a simulated oral environment or at elevated temperatures can decrease the fracture toughness. Attempts to correlate fracture toughness with wear resistance have been mixed, and therefore it is not an unequivocal predictor of the wear of restorative materials. Also, numerical analysis rechnics have been applied to composites and the tooth-denture base joint to determine energy release rates in the presence of cracks.

A variety of brittle restorative materials, including dental amalgam, cements, ceramic materials, plaster and stone, and some impression materials, is important to dental practice.

The shear strength is the maximum stress that a material can withstand before failure in a shear mode of loading. It is very important in the study of interfaces between two materials, such as a porcelain fused to metal restoration or an implant tissue interface.

A variety of tests are recomandated to measure the bond strength between two materials such as porcelains to metal; cements to metal; and polymers, ceramics, resin composites, and adhesives to human enamel and dentin.

When the stress is frecquently repeated, the strength of the material may be drastically reduced and ultimately cause failure. Failure under repeated or cyclic loading is therefore dependent on the magnitude of the load and the number of loading repetitions.

The rate of loading is important in many materials, particularly polymers and soft tissues.

Tear strength is a measure of the resistance of a material to tearing forces. Tear strength is an important property of dental polymers used in thin sections, such as flexible impression materials in interproximal areas, maxillofacial materials, and soft liners for dentures. Specimens are usually crescent shaped and notched. Many materials used in dentistry are not homogeneous solids but consist of two or more essentially insoluble phases.

As a further illustration of the factors that effect the properties of a composite, consider the filled polymer resins used in dentistry.

For many of these dental composites a random arrangement of the dispersed phase is used, even though a random orientation results in about a sixfold lower strength compared to an oriented dispersed phase.

The property of hardness is of major importance in the comparison of restorative materials. Hardness represents the resistance to permanent surface indentation or penetration. Hardness is therefore a measure of the resistance to plastic deformation.

The importance of friction in dentistry lies in the concept of roughening the surface of a dental implant to reduce motion between the implant and adjacent tissue. It is perceived that a rough surface and resultant less motion will provide better osseointegration.

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