Comparison of certain mechanical properties including deflection fatigue resistance of Cobalt Chromium alloy & Nylon tooth colored clasping materials

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ABSTRACT

Cobalt Chromium alloys were used for not a short time to build all components of removable partial dentures including their retentive elements “the clasps ".

Clasps are subjected to repeated stresses deflecting their tips during function, insertion and removal leading to their fatigue fracture. Cobalt Chromium alloy cast clasps have also the disadvantage of poor aesthetic value.

Flexite company developed their product " Flexite supreme" , a thermoplastic material that can be injected to the desired design or can be supplied as a preformed clasp " Clasp Eze". This product aimed to solve both of the problems that are crippling the use of casted alloy clasps.

This study was conducted to test Cobalt Chromium alloy samples, Flexite Supreme samples & Commercially available Nylon (made in china) samples (fifty samples each), to evaluate their :

- Mechanical properties
    - Ultimate tensile strength.
    - Yield strength.
    - Modulus of elasticity.
    - Elongation percentage at breakage.
- Deflection fatigue resistance at deflections 0.25mm. , 0.5mm. , 1mm. & 2.1 mm (according to the monogram of the deflection fatigue testing machine's manual).

The study results revealed that Cobalt Chromium alloy have a considerable deflection fatigue resistance and better mechanical properties within the limits of 0.25mm. However it fails on mechanical properties and deflection fatigue test with higher deflections & leaving the aesthetic issue to tackle.

Flexite Supreme Nylon to have much higher deflection fatigue resistance without breakage in 0.25mm deflection, and a superior mechanical properties and deflection fatigue resistance in the deflections 0.5 mm., 1 mm. & 2.1mm.

Commercial Nylon to have a high deflection fatigue resistance in all deflections but inferior mechanical properties than the Flexite Supreme group in all deflections.