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### **Mechanical Properties and Machinability Assessment of Four CAD/CAM Block Materials**

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**Objectives** This study aimed to assess the machinability and characterize the mechanical properties of three composite based blocks as compared to a ceramic block.

**Methods** Cerasmart (CS), Lava Ultimate (LU), Grandio Blocs (GR), and Initial™ LRF (IR) blocks were investigated. Flexural strength and modulus, fracture toughness and Vickers hardness were evaluated using the corresponding ISO norms (ISO 6872:2015, ISO6872:2015, and ISO10477:2020 respectively). Merlon fracture test (Machinability) was performed according to ISO18675.2018 and scanning electron microscopy was used to examine sample borders. Finally, statistical analysis was performed using One-Way ANOVA at P=0.05.

**Results** GR had significantly higher flexural strength values than other blocks. IR had significantly highest flexural modulus values. Fracture toughness values showed significantly lower values for CS. While IR had significantly higher Vickers hardness values. The brittleness index for the tested blocks was calculated and showed significantly higher brittleness index for the IR block. The machinability data revealed no fractured walls for all tested blocks. However, the bottom of the IR block hollow part was perforated. Scanning electron microscopy images revealed differences regarding the machined walls.

**Conclusions** The mechanical properties of the CAD-CAM block materials tested were within the acceptable range according to the ISO standard for ceramics (ISO 6872:2015). The machinability of the four tested materials were satisfactory according to the ISO standards (ISO 18675), while the ceramic based block showed lesser edge quality in comparison to the resin based blocks. From a clinical perspective, the corresponding properties should be taken in consideration for specific indications.