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Biomaterials Research Report
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Flexural Strength and Marginal Integrity of Amber® Mill Direct

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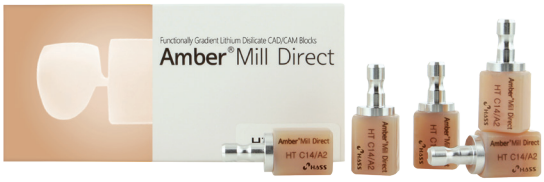
Introduction:

Amber® Mill Direct is the newest offering from Hass Corporation that is a Lithium Disilicate-based millable glass block which requires no crystallization. The block has graded translucency and the additional option of modifying the translucency by additional crystallization at >840 °C from the initial HT translucency to LT. This study tested the flexural strength of the block in the Incisal, Middle and Cervical areas. The Cervical area has the highest strength as this is where the most stress fractures occur from occlusal loading, and the incisal area has higher translucency for aesthetics. Crowns were also milled to examine the marginal integrity and any appearance of chipping.



Conclusion:

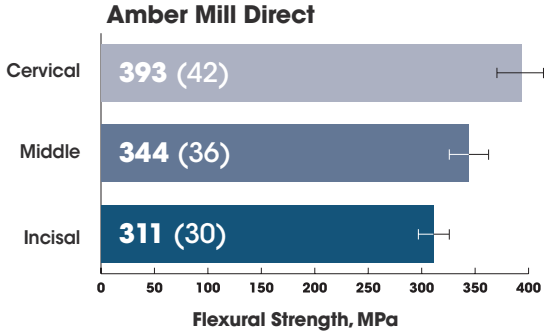
Amber® Mill Direct graded lithium disilicate has a range of flexural strength from 311 to 393 MPa without additional crystallization. ***Amber® Mill Direct*** shows minimal machining damage when examined under scanning electron microscopy.

MATERIALS:

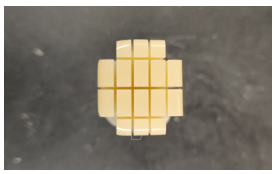
CAD/CAM Materials: ***Amber® Mill Direct*** (Hass Corp)
Mills: ***VersaMill 5X400*** with Lithium Disilicate milling strategy
Burs: 2.5 mm, 1.5 mm and 1.0 mm OEM diamond burs (Versamill Part Number: DG-52, DG-53, DG-54)

Methods and Results:

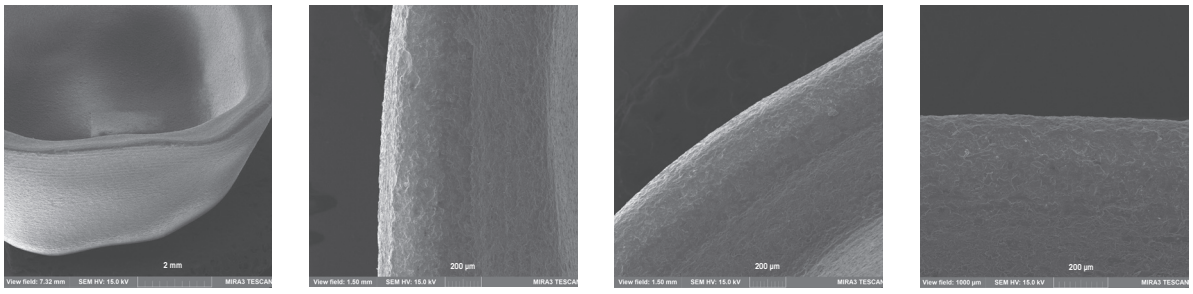
Flexural Strength: Three groups of flexural strength bars (n=10) were tested (16 x 2 x 4 mm). Bars were tested in the groups: 2 mm from incisal edge, 2 mm from the cervical side and bars through the middle, with groups fabricated initially by cutting with a slow-speed wafer blade to minimize damage according to ISO 6872:2015 methods and polished through 600 grit. Bars were loading in 3-pt bend with a 12 mm span and 1 mm/min crosshead speed on a Shimadzu AGX-V universal test frame.



The mean flexural strength ranged from 311 MPa in the incisal area to 393 MPa for the cervical area. The mean flexural strength for all groups was 349 MPa.



Diamond cut bars from the block. Either end has 2 mm bars cut for the Cervical and Incisal test groups.



Milled posterior crowns with a 0.5 mm margin thickness and 1 mm walls were assessed under SEM. Minor shallow flakes of under 10 micron in depth were observed, with more than 98% of the margin intact with no flaws.