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Mass Timber Frame with Mass Timber Buckling Restrained Braces

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Mass Timber Expertise

•University of Utah has completed mass timber research and continues to develop this research through physical experiments and numerical models

oFreres Inc. for engineered wood materials using MPP and MPL

•Timberlab for manufacturing and construction of MT frame and MT BRB

•Forest Products Laboratory for material specifications and design

TIMBERLAB







Mass Timber Facilities

Mass Ply Lams (MPL) uses veneer as the primary raw material to create an LVL panel, which is then used to create a mass timber panel; whereas CLT uses dimensional lumber as the primary raw material

Mass Ply Panels (MPP) are made of 1" lamellas that are used to construct panels made with 9 layers of 1/8" veneer; they are engineered and oriented to enhance the natural strength and dimensional stability of the wood



Mass Ply Lams (MPL)







Cross-Laminated Timber (CLT)







Mass Timber Facilities













Mass Timber BRB Construction





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Mass Ply Panels (MPP)





Mass Timber Frame Construction



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MT-BRB construction includes a steel yielding core and MPP casing blocks



Fig. 7. T-BRB layout and three-dimensional visualization.

(Murphy et al. 2021)







THE UNIVERSITY of UTAH

Previous testing showed MT-BRBs performed well enough to meet AISC requirements



Fig. 12. Specimen 2 hysteresis for fatigue loading protocol and failure mode.

(Murphy et al. 2021)







The beam-column joint was rotated 90 degrees for testing convenience







📘 T I M B E R L A B



The beam-column connection tests showed balanced hysteresis curves



20 Dowels

16 Dowels

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12 Dowels





Post-testing damage observed included dowel bending and necking and hole elongation













📄 T I M B E R L A B

MT-BRBF Testing



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MT-BRBF Testing













MT-BRBF Testing



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Bare Frame

MT-BRB Frame





Future Research Plans

•Tests with enhanced MT-BRB

•Bare frame limits test

oNumerical models of existing research and prototype MT-BRB frame buildings







Questions?

















References

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- Dong W., Li M., He M. and Li Z. 2021. "Experimental Testing and Analytical Modeling of Glulam Moment Connections with Self-Drilling Dowels." *J. Struct. Eng.* 147(5). <u>https://doi.org/10.1061/(ASCE)ST.1943-541X.0002977</u>.
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