NBCC Vibration Check in BC Calc®

BC Calc® provides several tools for investigating floor performance, though no specific vibration limits exist in U.S. building codes. In Canada, the National Building Code of Canada (NBCC) has included a criterion to limit floor vibration of solid-sawn lumber joists in single-family structures since 1990. In 1996, the Canadian Construction Materials Centre (CCMC) adopted a similar criterion for approval of engineered wood products, such as wood I-joists. Though a Canadian code provision, the NBCC Vibration span limit may be calculated with U.S. designs by selecting NBCC Vibration in the Settings tab of a Floor Joist design (see Figure 1 below).

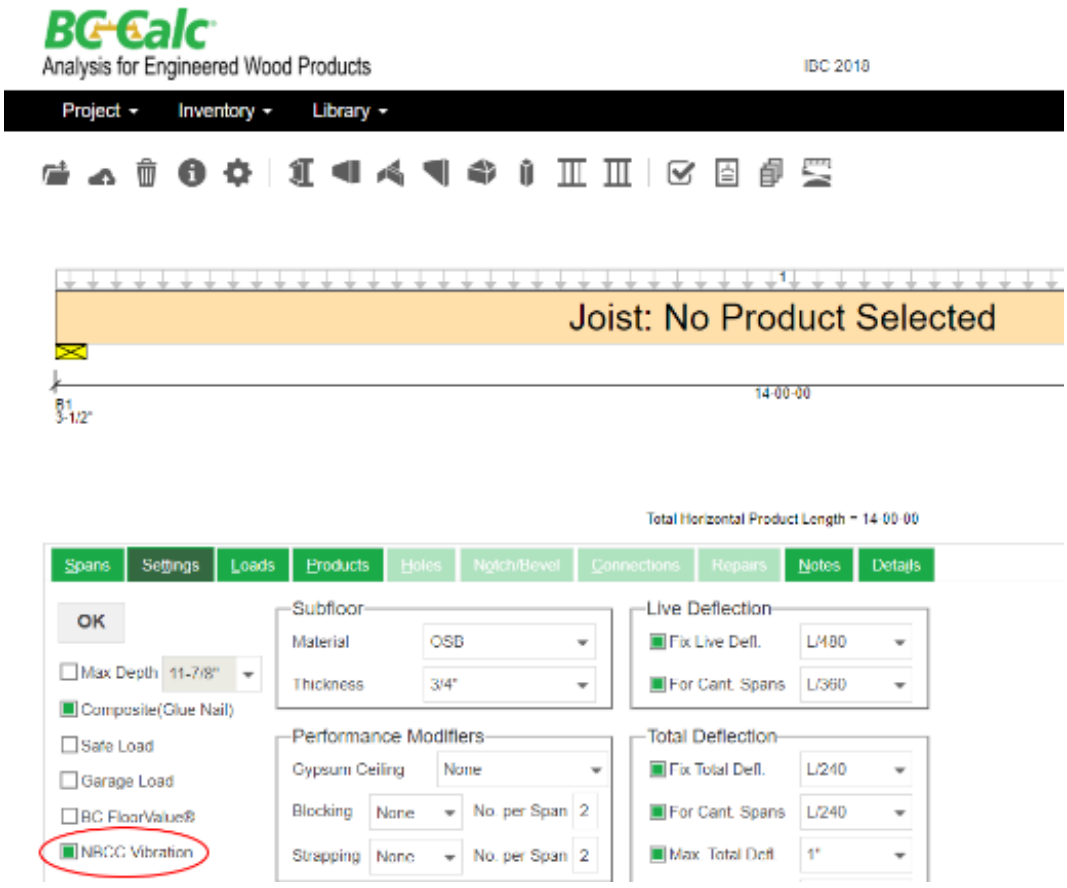

Figure 1: BC Calc® Floor Joist Design Settings Tab

The vibration criterion includes the analysis of the floor fundamental natural frequency and joist stiffness, based upon a prescribed concentrated load deflection limit. In addition to the joist, factors that affect the criterion include joist span, spacing, subfloor and ceiling sheathing, bracing and strapping. All factors can be selected in BC Calc®, including the latter two framing aspects in the Settings tab (see right side of Figure 1).

The criterion produces a maximum allowable span length for the specific joist application entered. This span limit typically produces a design with a live load deflection L/over limit greater than 480. When Analyze Vibration is selected, an additional control is added to the analysis results (see Figure 2). A joist design with a % Allow value less than 100 passes the Canadian criterion (note that the % Allow value should not be considered a rating value).

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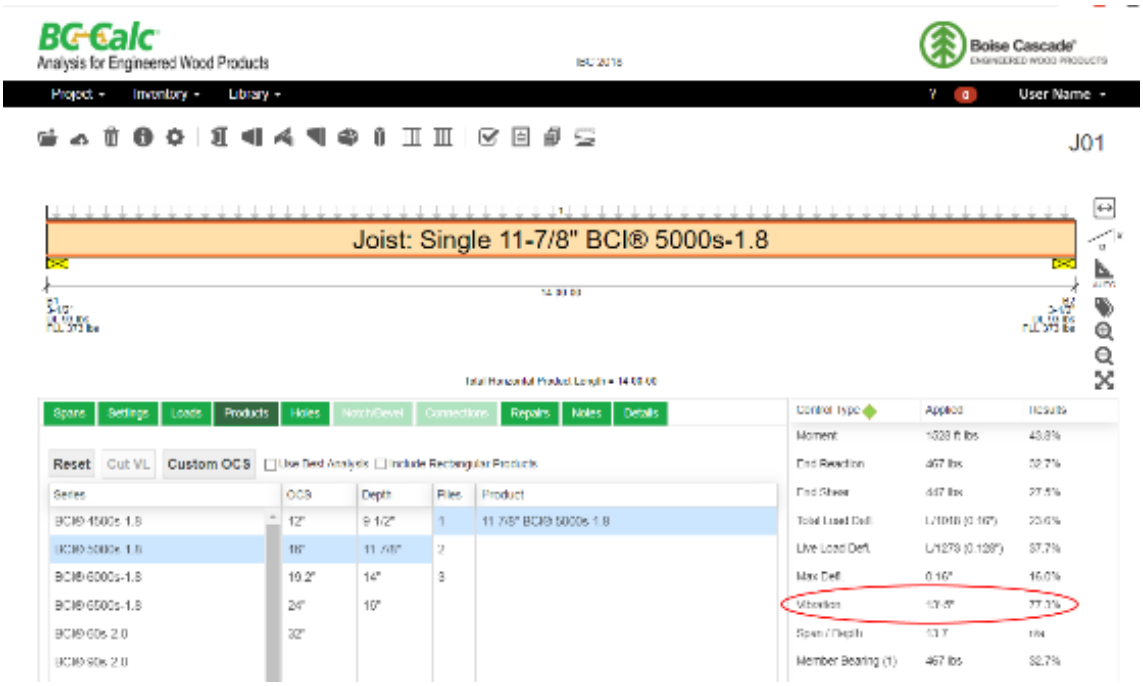

Figure 2: BC Calc Example Analysis Results with NBCC Vibration Enabled

This vibration criterion provides the designer with another tool, in addition to BC FloorValue®, tighter live load deflection limits, span to depth ratio, and 3 and 4-star joist span tables in Boise Cascade literature, in reviewing joist designs for floor performance considerations. Please see the following publications for further information regarding this subject:

- *Span to Depth Ratio*, Technical Note IJ-2, 06/2026 Boise Cascade EWP: Span to Depth Ratio
- Engineered Wood Specifier Guides, Boise Cascade EWP: BCI® Joists - Boise Cascade EWP
- *Minimizing Floor Vibration by Design and Retrofit*, EWS E710, 09/2004, APA – The Engineered Wood Association.

For further questions, please contact Boise Cascade EWP Engineering at 800.232.0788.

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