GSE SOFTWARE
General Structural Engineering

APPLICATION
GSE Timber

FUNCTIONALITY
Vibration of sawn lumber joists

Vibration of sawn lumber joists

The vibration limit state is now calculated for sawn lumber floor joists. To improve the productivity of GSE users, the floor joists are automatically generated inside the truss load surfaces.

Using the automatically generated joists, the resistance and vibration limit states are calculated for each floor. The resistance of sawn lumber joists are verified for the CSA O86 and National Design Specification (NDS) standards. For the vibration limit state, the maximum allowable span is calculated using the NBCC provisions.

With this function, users can generate and efficiently verify and design sawn lumber joists.

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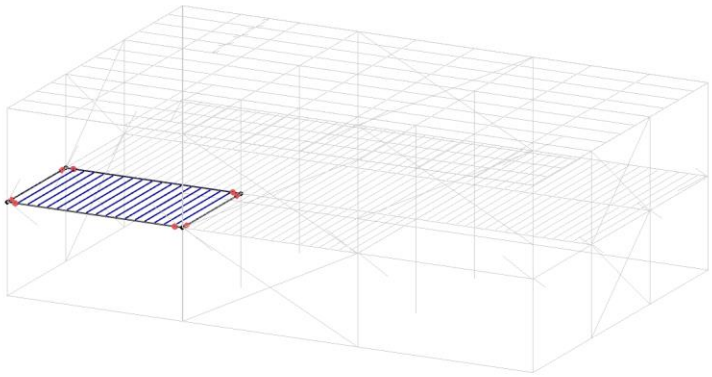
In the GSE, wood floors are represented by truss load surfaces. The efforts within the load surfaces are distributed to the trusses. In previous versions of the GSE, the resistance and vibration verifications of floors were performed only for I-joists members. Now, sawn lumber joists may be used within the truss load surfaces.



To simplify the user inputs, the sawn wood members design parameters have been automatically applied and simplified in accordance with floor typical uses. Hence, the floor ultimate limit states are quickly calculated. The bending, shear, bearing and deflection limit states are calculated.

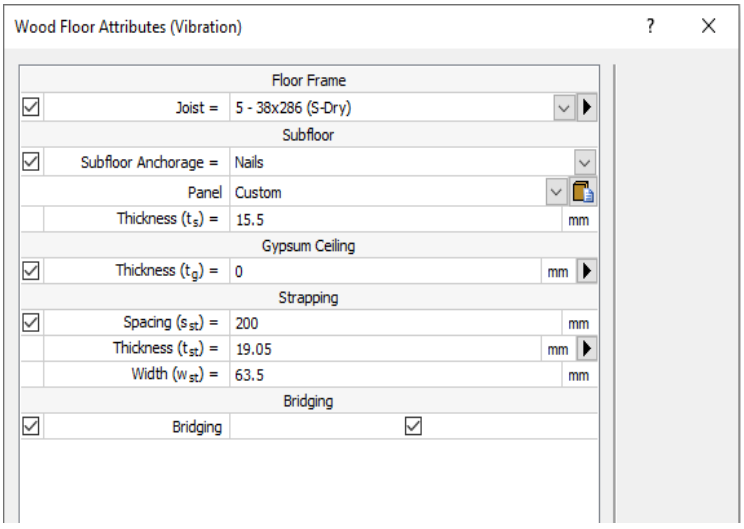
As per the NBCC, the vibration service limit state of floors are determined by their spans. The NBCC provides a set of equations to calculate the maximum allowable span for the joists. The main equations are presented below:

$$\ln(K) = A - B * \ln\left(\frac{S_i}{S_{184}}\right) + G \quad (1)$$

$$L_{max} = K * S_i \quad (2)$$

Various parameters influence the maximum allowable span such as the joists dimensions and the floor assembly method. Coefficient A and B are determined according to the subfloor thickness, the strapping and/or the bridging of the floor and the gypsum ceiling. Finally, the vibration limit state is calculated by dividing the joist span by the maximum allowed vibration span.

$$SLS_{vib} = \frac{L}{L_{max}}$$



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