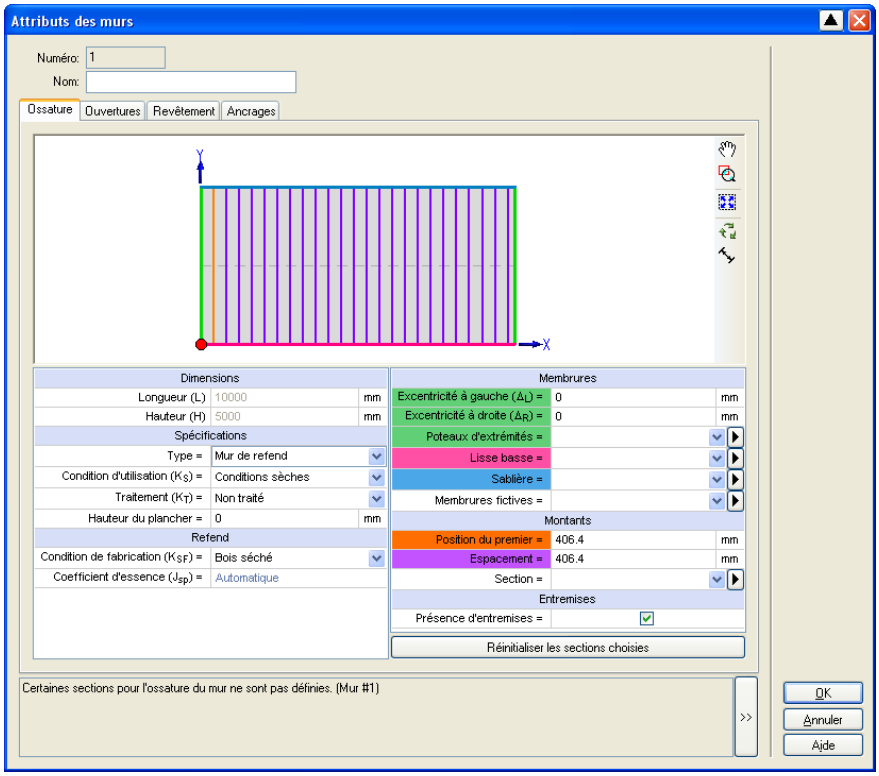
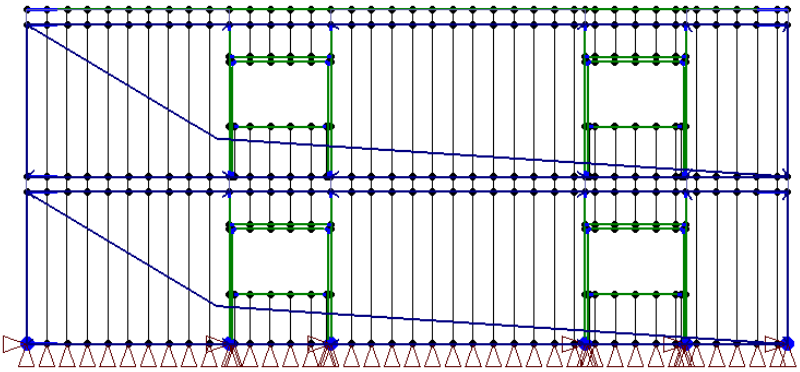
WOOD LIGHT FRAMING DESIGN

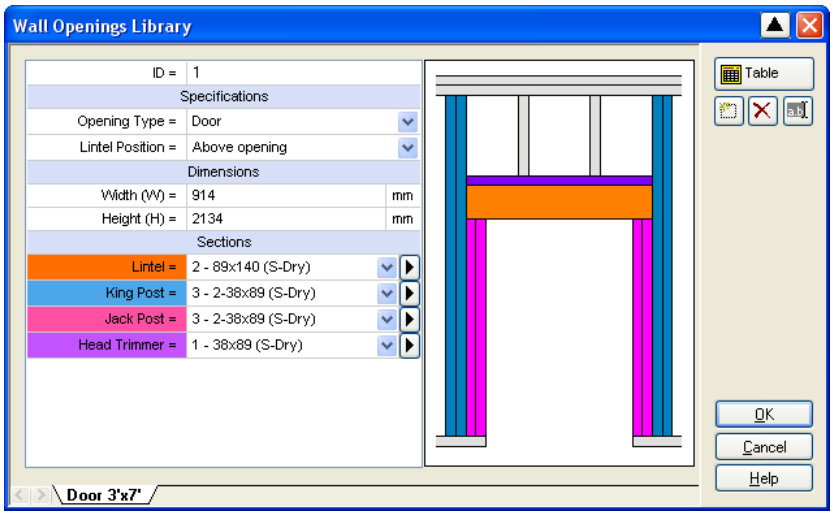
BEARING WALLS AND SHEAR WALLS

The modeling of a light framing wall or a shearwall is possible with the wall creation tools. Those tools are used to create the wall surfaces at first, than the wall attributes can be defined and finally the geometric elements of the wall can be generated. The wall generator creates the members and load surfaces of the wall and assigns the properties to these elements.



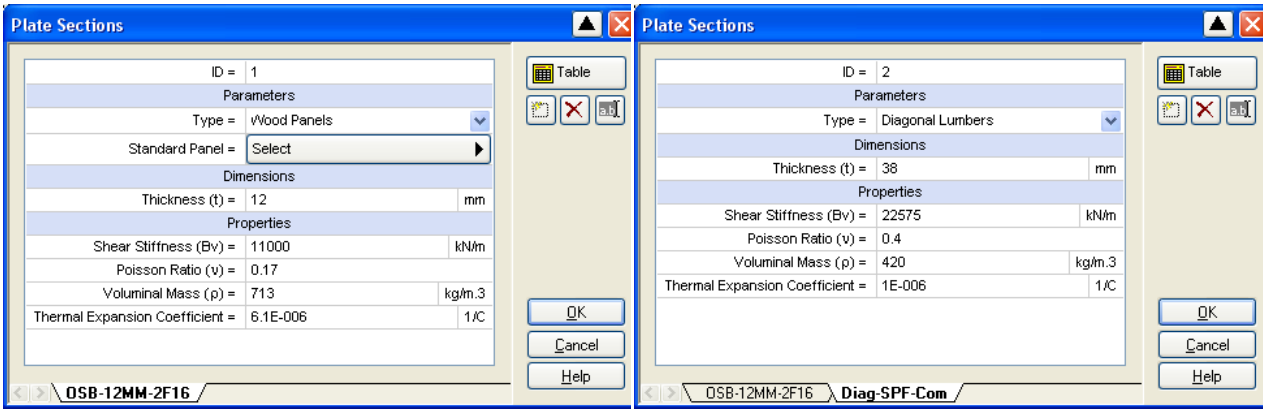


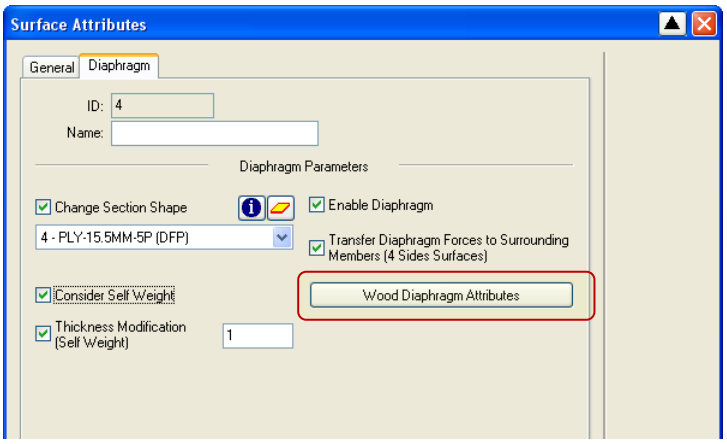
Wall openings can be created with the **Opening Library** and are available for a group of walls. The openings are then accessible when editing the wall attributes but it is also possible to create the openings when needed directly in the **Wall Attributes** menu, since the **Opening Library** can be accessed directly from the **Wall Attributes** menu.



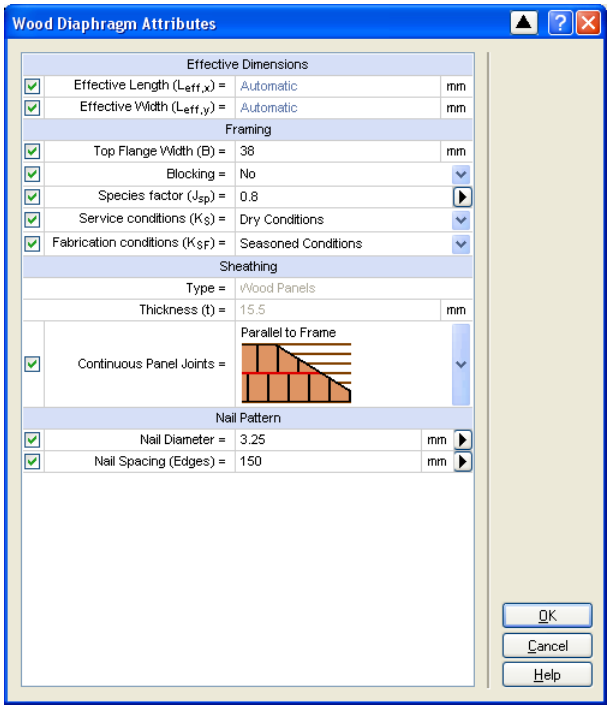
WOOD FLOOR DIAPHRAGMS

In the **Diaphragm** tab of the **Surface Attributes** menu, a plate section must be created and selected in the first place. Two types of plate section can be chosen in order to create the wood diaphragm, which are the **Wood Panels Type** or the **Diagonal Lumbers Type**.



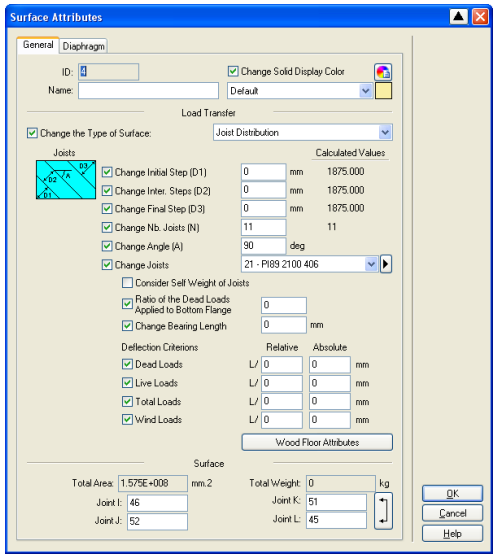


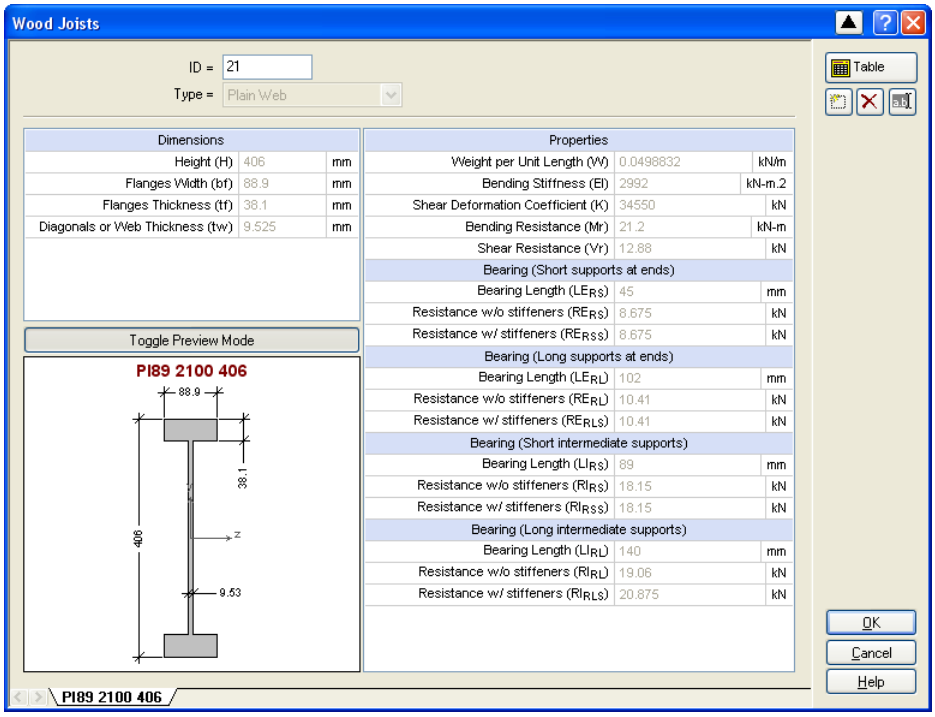
When the plate section is created, the diaphragm can be activated with the check box **Enable Diaphragm**, then the button **Wood Diaphragm Attributes** allows to access to the attributes menu specific to wood diaphragms.



JOISTS VIBRATION AND DESIGN

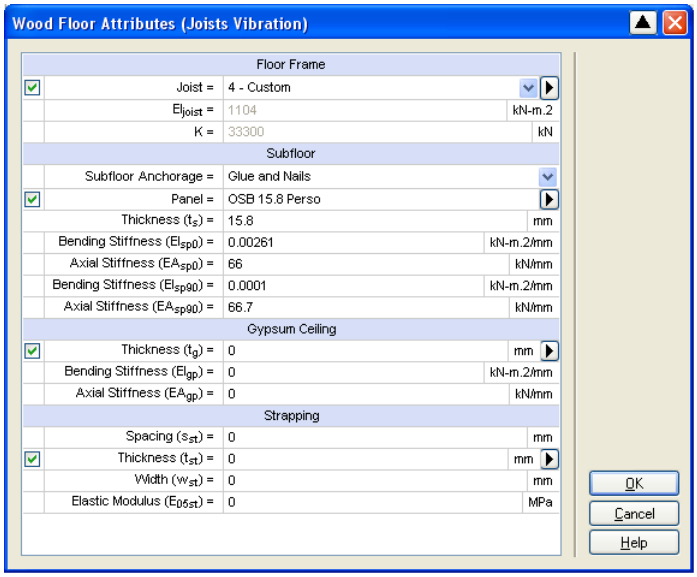
Standard I wood joists libraries (Boise, iLevel, LP SolidStart, Nordic, generic) and open web wood joists (generic). The system also allows the definition of custom joists when the properties are known.



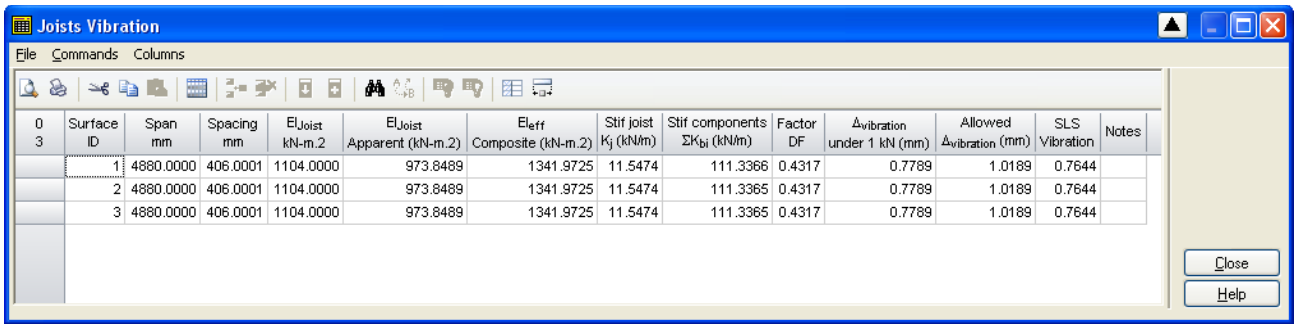


The service limit states applicable to floor systems with trusses (loading surfaces with load transferred by trusses) takes into account the calculation rules as defined by the report *Development of design procedures for vibration controlled spans using engineered wood members, 1997*, from the *Canadian Construction Materials Centre* (CCMC). This report allows to define an effective composite bending stiffness (EI_{eff}) and a distribution factor (DF) for loads distribution form a truss to another.

To calculate the vibration limit state of the joists, it is necessary to define the **Wood Floor Attributes** as shown below. In this example, the gypsum ceiling and the strappings are not considered.

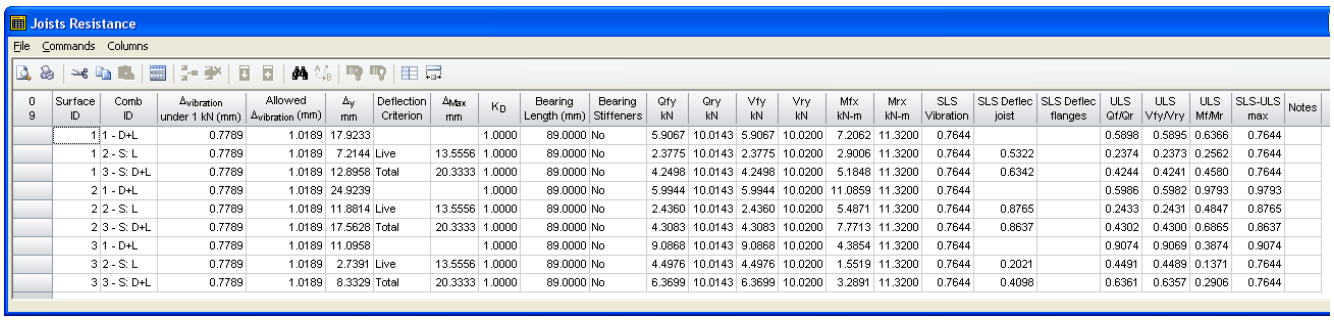


In the **Wood Design** numerical results, click on the button in order to display the possible choices and select **Joists Vibration**.



0 3	Surface ID	Span mm	Spacing mm	EI_{Joist} kN-m.2	EI_{Joist} Apparent (kN-m.2)	EI_{eff} Composite (kN-m.2)	Stif joist K_j (kN/m)	Stif components ΣK_{bi} (kN/m)	Factor DF	$\Delta_{vibration}$ under 1 kN (mm)	Allowed $\Delta_{vibration}$ (mm)	SLS Vibration	Notes
	1	4880.0000	406.0001	1104.0000	973.8489	1341.9725	11.5474	111.3366	0.4317	0.7789	1.0189	0.7644	
	2	4880.0000	406.0001	1104.0000	973.8489	1341.9725	11.5474	111.3365	0.4317	0.7789	1.0189	0.7644	
	3	4880.0000	406.0001	1104.0000	973.8489	1341.9725	11.5474	111.3365	0.4317	0.7789	1.0189	0.7644	

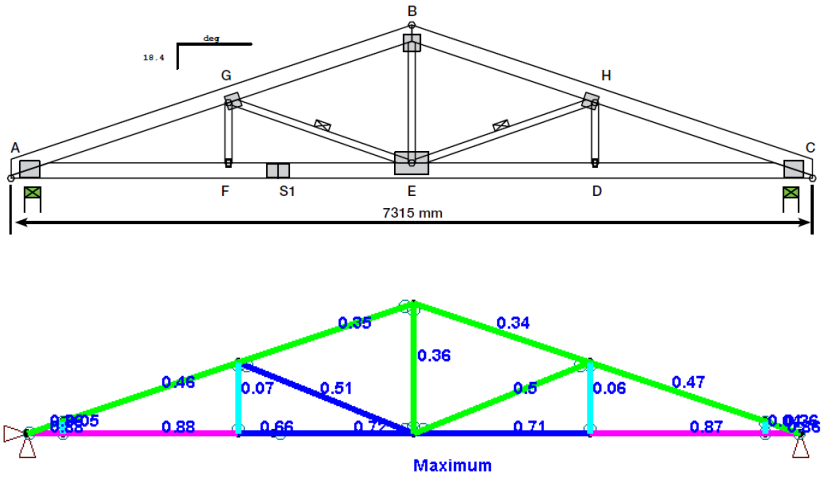
In the **Wood Design** numerical results, click on the button in order to display the possible choices and select **Joists Resistance**.



0 9	Surface ID	Comb ID	$\Delta_{vibration}$ under 1 kN (mm)	Allowed $\Delta_{vibration}$ (mm)	Δ_y mm	Deflection Criterion	Δ_{Max} mm	K_D	Bearing Length (mm)	Bearing Stiffeners	Qfy kN	Qry kN	Vfy kN	Vry kN	Mfx kN-m	Mrx kN-m	SLS Vibration	SLS Deflec joist	SLS Deflec flanges	ULS Qf/Qr	ULS Vfy/Vry	ULS Mf/Mr	SLS-ULS max	Notes
	1	1 - D+L	0.7789	1.0189	17.9233			1.0000	89.0000	No	5.9067	10.0143	5.9067	10.0200	7.2062	11.3200	0.7644			0.5898	0.5895	0.6366	0.7644	
	1	2 - S: L	0.7789	1.0189	7.2144	Live	13.5556	1.0000	89.0000	No	2.3775	10.0143	2.3775	10.0200	2.9006	11.3200	0.7644	0.5322		0.2374	0.2373	0.2562	0.7644	
	1	3 - S: D+L	0.7789	1.0189	12.8958	Total	20.3333	1.0000	89.0000	No	4.2498	10.0143	4.2498	10.0200	5.1848	11.3200	0.7644	0.6342		0.4244	0.4241	0.4580	0.7644	
	2	1 - D+L	0.7789	1.0189	24.9239			1.0000	89.0000	No	5.9944	10.0143	5.9944	10.0200	11.0859	11.3200	0.7644			0.5986	0.5982	0.9793	0.9793	
	2	2 - S: L	0.7789	1.0189	11.8814	Live	13.5556	1.0000	89.0000	No	2.4360	10.0143	2.4360	10.0200	5.4871	11.3200	0.7644	0.8765		0.2433	0.2431	0.4847	0.8765	
	2	3 - S: D+L	0.7789	1.0189	17.5628	Total	20.3333	1.0000	89.0000	No	4.3083	10.0143	4.3083	10.0200	7.7713	11.3200	0.7644	0.8637		0.4302	0.4300	0.6865	0.8637	
	3	1 - D+L	0.7789	1.0189	11.0958			1.0000	89.0000	No	9.0868	10.0143	9.0868	10.0200	4.3854	11.3200	0.7644			0.9074	0.9069	0.3874	0.9074	
	3	2 - S: L	0.7789	1.0189	2.7391	Live	13.5556	1.0000	89.0000	No	4.4976	10.0143	4.4976	10.0200	1.5519	11.3200	0.7644	0.2021		0.4491	0.4489	0.1371	0.7644	
	3	3 - S: D+L	0.7789	1.0189	8.3329	Total	20.3333	1.0000	89.0000	No	6.3699	10.0143	6.3699	10.0200	3.2891	11.3200	0.7644	0.4098		0.6361	0.6357	0.2906	0.7644	

DESIGN OF TRUSSES BASED ON TPIC-2011

Some particular factors for light metal plate connected wood trusses elements can be taken into account in resistance and limit states calculations. These factors are then calculated according to the Truss Plate Institute of Canada (TPIC) rules which are described in the report *Truss design procedures and specifications for light metal plate connected wood trusses, Limit States Design, 2011*.



Graphical results of the truss limit states