

Restriction of Residential TJI® Joists in Commercial Applications

Background

Forte® software does not offer the TJI® Joists listed in Table 1 in commercial applications.

TABLE 1 – RESTRICTED PRODUCTS FOR USE WITH 2,000 LBS CONCENTRATED LOAD

Residential Product	Depths (in)
TJI® 110	9½", 11⅞", 14"
TJI® 210	9½"
TJI® 230	9½"
TJI® 360	9½"
TJI® 560	9½"

This restriction is required because Forte® does not perform a moment capacity check when considering code mandated concentrated load requirements. A worst-case analysis of the TJI® Joists listed above revealed that for common spans and uniform loads, the potential exists to exceed the moment capacity of the member when it is subjected to the code mandated concentrated load check. Until additional functionality is added to Forte®, this restriction will remain in effect.

Alternate Design Procedure

As an alternative, additional calculations and analysis can be performed on a case-by-case basis to determine if the TJI® Joists in Table 1 can be used in commercial applications with concentrated load requirements. The procedure to perform the necessary additional calculations using Forte® software is as follows:

1. Design member with Building Class set to "Residential" with full application loading (dead, live, partition, and any other additional loads). If the product passes all of the design controls, proceed to the next step.
2. On the Loads tab, set the live load to 0 psf. Remove any additional user input live loads on the loads tab. Only the system dead load plus concentrated load combination is considered for the concentrated load check. (Note: For Canada (NBCC), partition loads are considered dead loads and must be included in the concentrated load check. For the USA (IBC), partition loads are considered live load and are not included on the concentrated load check.)
3. On the Loads tab, add a uniform plf live load to the center 2½ ft of the first span and design the member. The magnitude of the safe load is dependent on the joist spacing. The following equation calculates the uniform load for moment design. Use this value in steps 3 to 6 for Moment Checks.

$$W_s = \frac{2000}{2.5 * N}$$

Where:

N= 3 at spacing ≤ 16" o.c.

N=2 at 16" o.c. > spacing ≤ 24" o.c.

N=1 at spacing > 24" o.c.

4. For multi-span applications, move the uniform plf live load to the center of the next span and design. Repeat this procedure for each span in the member.
5. If the design contains cantilevers, move the uniform plf live load to the end of the cantilever and design. Repeat this procedure for each cantilever in the member.

General

Moment Check

Moment

Shear / Reaction Check

6. In the Loads tab, apply a uniform plf live load from the inside face of the left support to 2½ ft from the support and design. The following equation calculates the uniform load for shear and reaction design. Use this value in steps 6 to 9 for Shear/Reaction checks.

$$W_s = \frac{2000}{2.5 * N}$$

Where:

N= 2 at spacing ≤ 24" o.c.

N=1 at spacing > 24" o.c.

7. For multi-span applications with unequal spans, move the uniform plf load to the opposite end of the joist and design.
8. For multi-span applications, apply a uniform plf live load from left face of the intermediate support to 2½ ft away from the support and design. Repeat this procedure for the right side of the support and for each side of every intermediate support.
9. If the design contains cantilevers, check each side of the cantilever as described in step 8.

Result

10. If the member passes all design steps, it can be used for the desired commercial application. If a failure occurs in any one of the design steps, the product may NOT be used in the desired commercial application.

For further information, contact your Weyerhaeuser Structural Frame Specialist.