



Do sweat the “small” stuff

Connection design and detailing

Issues of concern

The design and detailing of structural steel connections is not always being carried out in accordance with principles of statics, material behaviour and technical guidelines.

Incorrect design and construction of connections can seriously undermine the integrity of the structure.

Background

Connection details are a time-consuming part of design, but their correct design is vital in satisfying the design concept and transmitting loads between the main structural elements.

To assist in the design process a number of standard connection details are available that have been specifically designed for a number of common situations and loads. However, these standard connections are not always applicable and can be misinterpreted if left solely to steel fabricators and erectors to carry out.

Further information: NZS 3404 Steel Structures Standard; HERA Report R4-100, Structural Guide Steelwork Connections; HERA Report R4-80, New Zealand Structural Steelwork Limit State Design Guides, Volume 1, especially Section 10; HERA Report R4-58, Manual of Standard Connection Details for Structural Steelwork; HERA Steel Design and Construction Bulletin Issue No. 78; Code of Practice for Structural Steelwork Documentation.

Note that this Practice Advisory is issued as guidance information in accordance with section 175 of the Building Act 2004 and, if used, does not relieve any person of the obligation to consider any matter to which the information relates according to the circumstances of the particular case.

Don't

- ✘ **Don't** use minimalist drawings that rely on the fabricators to work out construction details.
- ✘ **Don't** change or use substitute connection details without obtaining the consent of the design engineer.
- ✘ **Don't** allow eccentricities to occur at member intersections unless they cannot be avoided.

Do

- ✔ **Do** use standard detail types wherever possible.
- ✔ **Do** spend the time necessary to design and draw exactly what is required in terms of connections. Look at every link in the chain.
- ✔ **Do** carry out a constructability review of the design and drawings to ensure that the correct connection details are provided and can be fabricated.
- ✔ **Do** ensure that any standard details used are appropriate for the design loads and the design concept.
- ✔ **Do** ensure that connection details are sufficient to provide the required lateral buckling and twist restraint to column and beam members.
- ✔ **Do** allow for any member eccentricity in the design of connections.

Designers should attempt to use standard New Zealand-tested connections where possible and where not applicable develop solutions from technical first principles. All connection details should be designed or called up in the engineering calculations. A chain is only as strong as its weakest link.

Practice Advisory 4 cont.

Figures 1 and 2 Example of poor connection design and improved details.

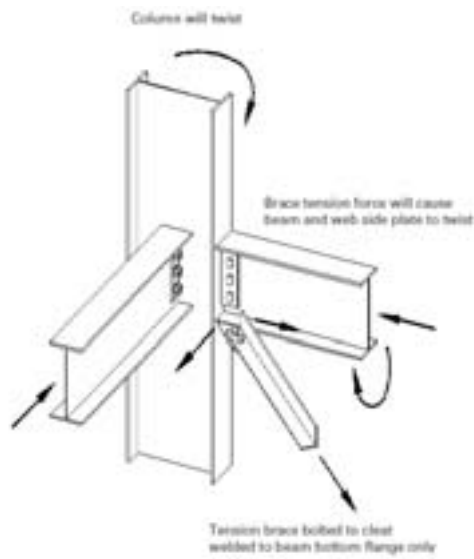


Figure 1: Poor structural design

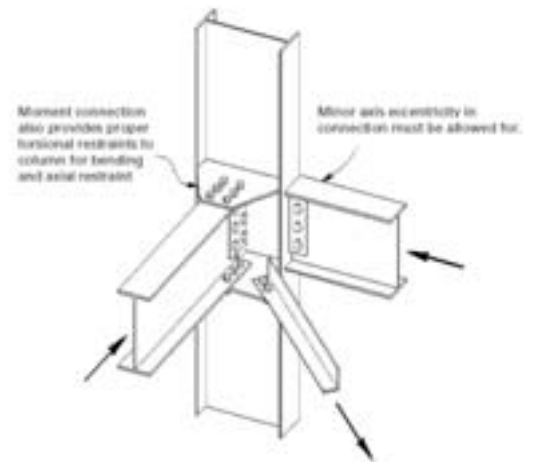


Figure 2: Improved design