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PLANNING					

BSF - TORSION

GENERAL

The BSF connection is not designed for, and shall in no circumstances be used to transfer torsional moment from the beam into the column, neither during erection, nor in the final assembled situation. Consequently, torsional moments should be taken care of by other means.

If a beam is subjected to torsion the most sensible solution will in most cases be to prevent the torsional moment from being transferred to the column. This can be achieved by providing temporary torsion locking of the beam during erection by using props or clamps, and establishing permanent connections between beam and slab for permanent torsional locking.

EXAMPLES – TEMPORARY TORSIONAL LOCKING OF LEDGE BEAM DURING ERECTION

For all below examples: When the erection is completed, permanent torsion connections must be established between the slabs and the beams. This can be done for example as shown in Figure 4. These connections shall always be designed to carry both the dead and live load, and they must have their full effect before the temporary torsion locks are removed.

Recommended solution:
Temporary propping of the beam. The required amount of props must be calculated from case to case.

Note 1: This is the only of the suggested temporary torsional locking solutions that does not transfer torsion into the column during erection.

Note 2: The underlying structures must be designed to carry the loads from the props.

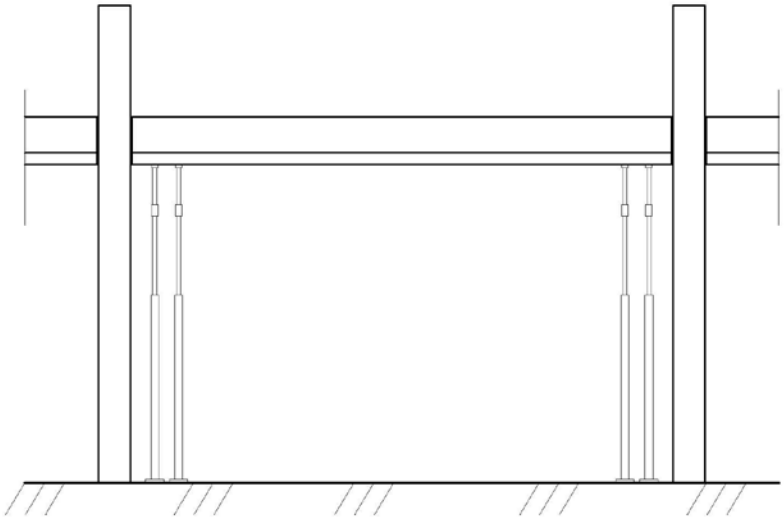

Figure 1: Temporary propping. (Illustration only, amount and location of props must be calculated and evaluated in each case)

Below are illustrated two other ways to temporarily lock the torsion of beam. These figures are only meant as illustrations for getting some ideas in case the recommended solution is not applicable. If these methods are used, calculations with respect to required dimensions and actual torsional capacity have to be done in each case.

Alternative 1:
Clamps can be made of steel plates or angles attached to the columns. The connection to the columns can be with short bolts in the inserts, or longer bolts going through holes in the columns. This solution only requires one plate or angle at the top and one at the bottom of the beam, on opposite sides. The disadvantage of the solution is large tension forces in the bolts due to the cantilevered load on the steel profile.

The beam and columns have to be of the same width.

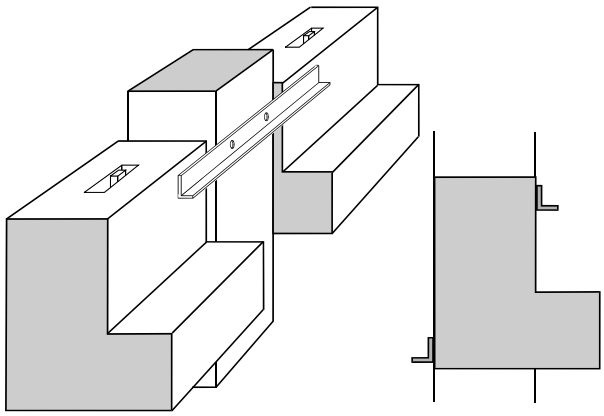

Figure 2: Clamps connected to the column.

Alternative 2:
This solution can be used for beams with ledges forked around the column. There is a clamp at the top, and shims between the elongated ledge and the columns. The shims may be spot welded to a steel plate in the columns. The ledge must be designed to take care of the horizontal force.

The beam and columns have to be of the same width for simple clamps to work effectively.

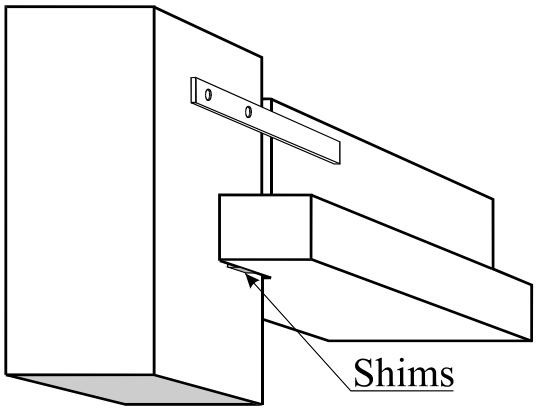

Figure 3: Beam with forked end.

EXAMPLE – PERMANENT TORSIONAL LOCKING OF LEDGE BEAMS

Provide temporary supports for the beams during erection. Provide a tensile connection between the beam and the slab as far down in the slab as possible. Once the void between the hollow core slab and the beam has been grouted, or the welding has been completed in the case of the double T, the monolithic structure will prevent the beam from tilting, while any subsequent rotation of the slabs will introduce negligible torsional moments in the beam.

The permanent connection between the slab and the beam shall be designed for the torsional moment caused by the sum of live and dead loads.

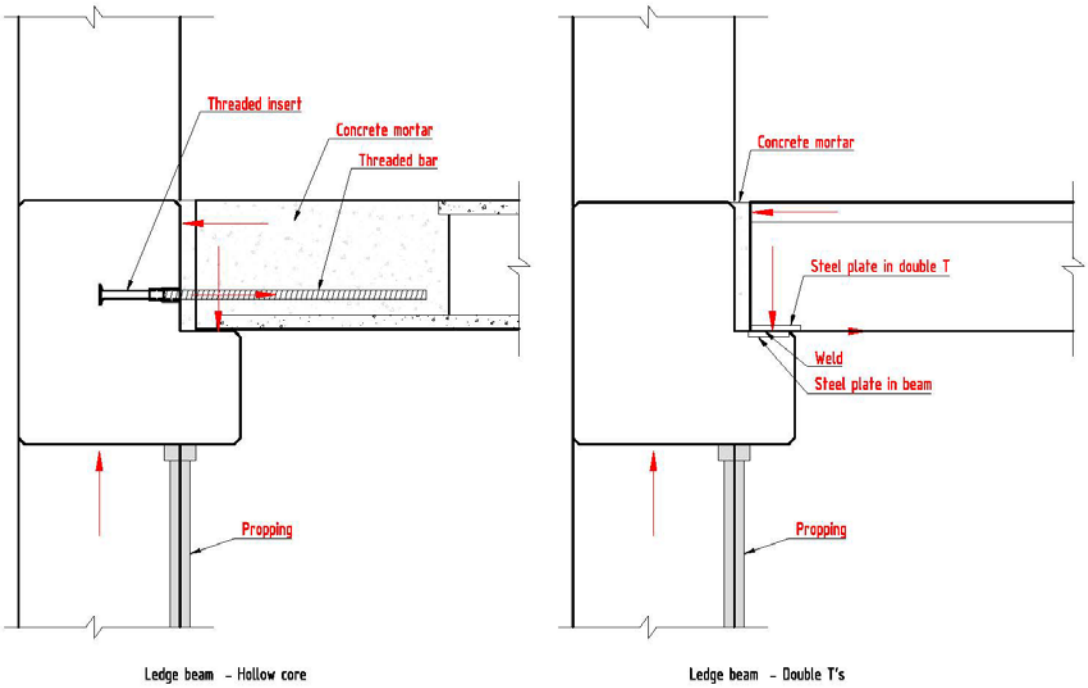

Figure 4: Torsional moment connections. These are examples only. Other methods such as "pull out" continuity bars in the beam may also be used.

REVISION HISTORY	
Date:	**Description:**
20.09.2013	First Edition.
27.11.2013	Included comments from external review
23.05.2016	New template