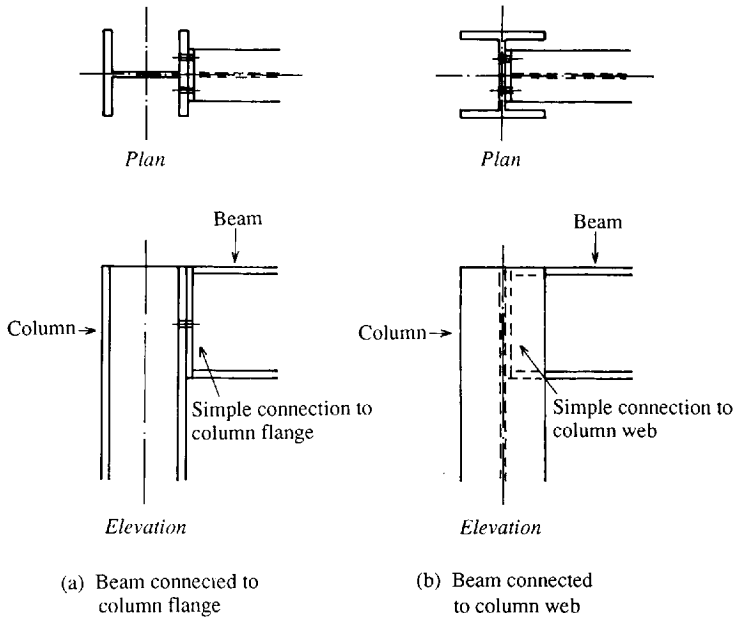

Figure 5.35 *Beams connected to the face of a column*

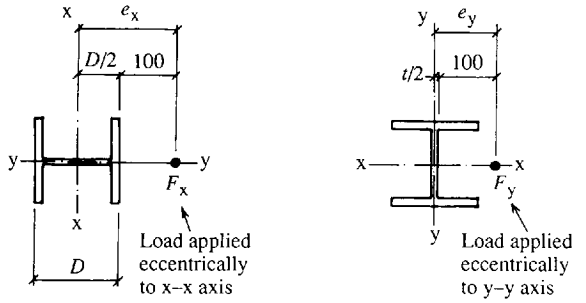

Figure 5.36 *Load eccentricity for beams connected to the face of a column*

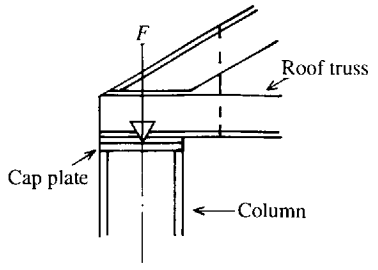

Figure 5.37 *Column supporting a roof truss, the load from which is transmitted concentrically*

Generally there are two separate checks that need to be applied to axially loaded columns with moments; they are a local capacity check and an overall buckling check.

Local capacity check

The local capacity of a column should be checked at the point of greatest bending moment and axial load. It will vary depending on the section classification, and therefore two relationships are given in BS 5950. One is for semi-compact and slender cross-sections, whilst the other is for plastic and compact cross-sections. For simplicity the relationship for semi-compact and slender cross-sections may be used to check all columns except those designed by plastic analysis. Therefore if elastic analysis is employed only one relationship need be satisfied, which is as follows:

$$\frac{F}{A_g p_y} + \frac{M_x}{M_{cx}} + \frac{M_y}{M_{cy}} \leqslant 1$$

where

F applied axial load
A_g gross sectional area, from section tables
p_y design strength of the steel
M_x applied moment about the major axis
M_{cx} moment capacity about the major axis in the absence of axial load; see Section 5.10.2 for beams
M_y applied moment about the minor axis
M_{cy} moment capacity about the minor axis in the absence of axial load; see Section 5.10.2 for beams

It should be noted that if the column section is classified as slender, the design strength p_y of the steel would be reduced. This does not apply to any UC sections since none is classed as slender.

Overall buckling check

A simplified approach and a more exact approach are offered in BS 5950 for the overall buckling check. The simplified approach must always be used to check columns subject to nominal moments. Since only columns with nominal moments are dealt with in this manual only the simplified approach will be considered here, for which the following relationship must be satisfied:

$$\frac{F}{A_g p_c} + \frac{mM_x}{M_b} + \frac{mM_y}{p_y Z_y} \leqslant 1$$