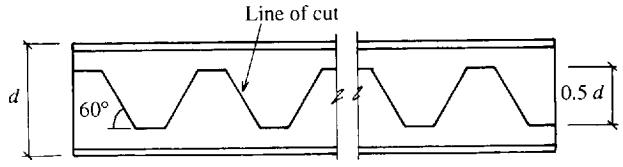
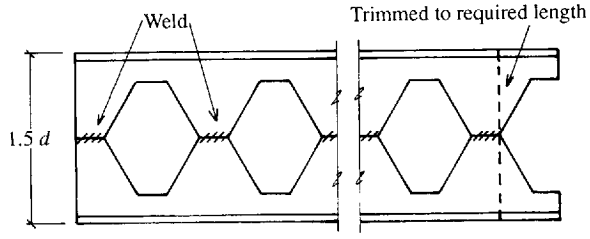
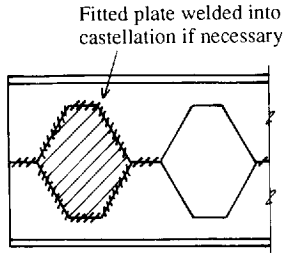



(a) Web of basic rolled section cut to prescribed profile




(b) Two-halves re-joined to form castellated beam




(c) Method of catering for shear

**Figure 5.28** *Castellated beams*

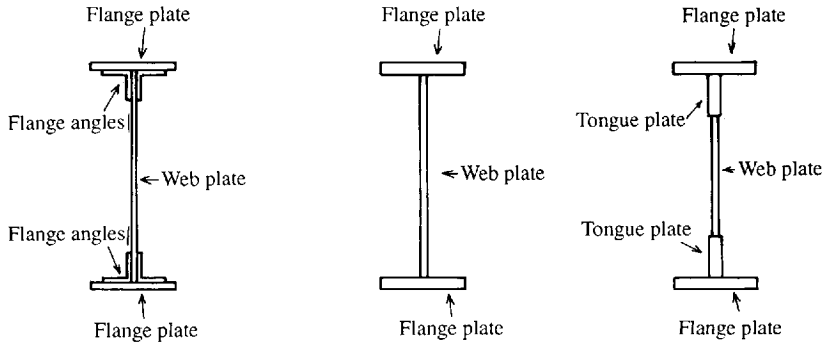



**Figure 5.29** *Examples of plate girders*

*Plate girders*

Plate girders are used occasionally in buildings where heavy loads or long spans dictate, but more often they are used for bridges. They are formed from steel plates, sometimes in conjunction with angles, which are welded or bolted together to form I-sections. Three of the most common forms are illustrated in Figure 5.29.

Whilst plate girders can theoretically be made to any size, their depth for practical reasons should usually be between span/8 and span/12.

*Lattice girders*

Lattice girders are a framework of individual members bolted or welded together to form an open web beam. Two types of lattice girder commonly encountered are illustrated in Figure 5.30; they are the N-girder and the Warren girder. In comparison with the structural behaviour of beams, the top and bottom booms of a lattice girder resist bending and the internal members resist shear.

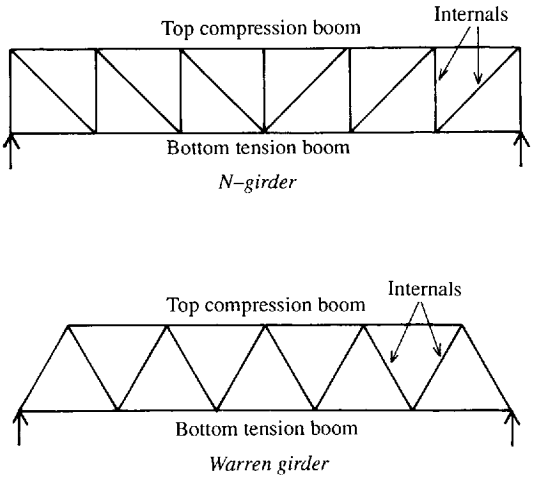



**Figure 5.30** *Examples of lattice girders*

Generally their economical depth is between span/10 and span/15. Exceptions are short span heavily loaded girders, for which the depth may equal span/6, and long span lightly loaded roof girders, for which a depth of span/20 may suffice.

## 5.12 Columns

A steel column may be subject to direct compression alone, where the load is applied axially, or subject to a combination of compressive loading and bending due to the load being applied eccentrically to the member