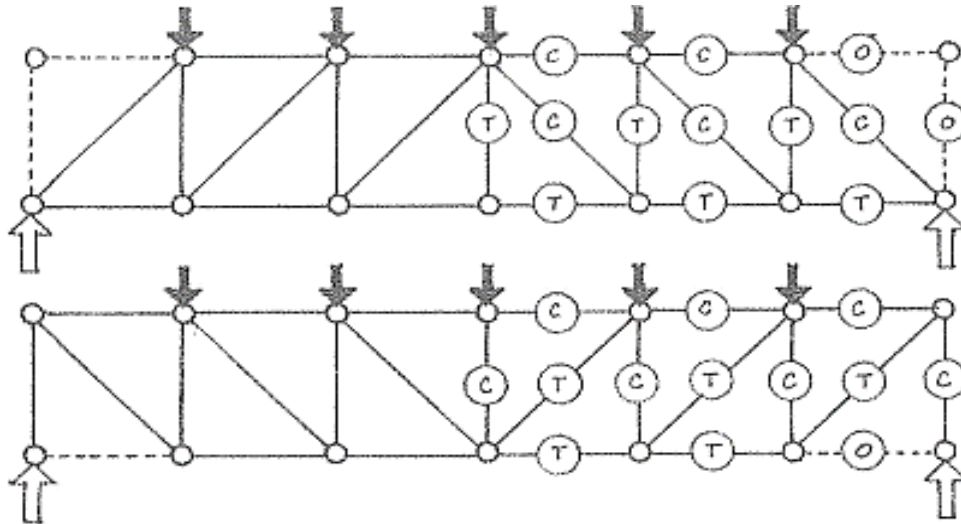


I.7.2. Long-Span Trusses:

I.7.2.1. Definition

A truss is a structure composed of simple struts that are pinned together and triangulated. The struts within the truss are subjected to either tension or compression stress. Truss bending moments are resolved into tension and compression forces in the bottom and top chords. Shear forces are resolved into tension and compression forces in the diagonal and vertical members.



Axial forces in trusses

T: Tension

C: Compression

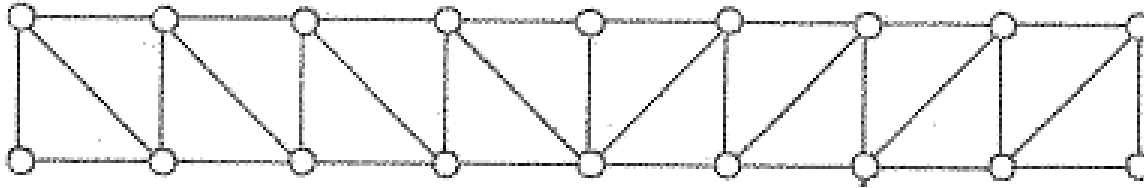
O: Zero-force members

theoretically carry no direct load

I.7.2.2. Types

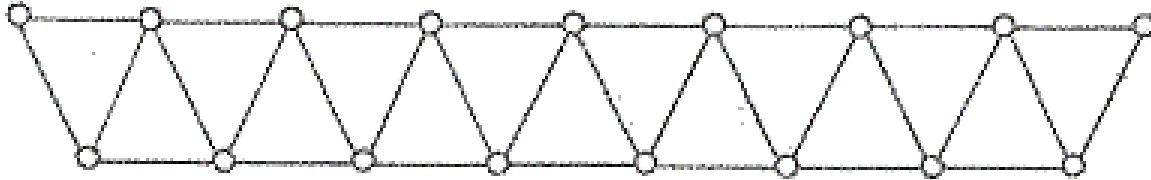
a) *Flat trusses*

that have parallel upper and lower chords and are less efficient than pitched and bowstring trusses.



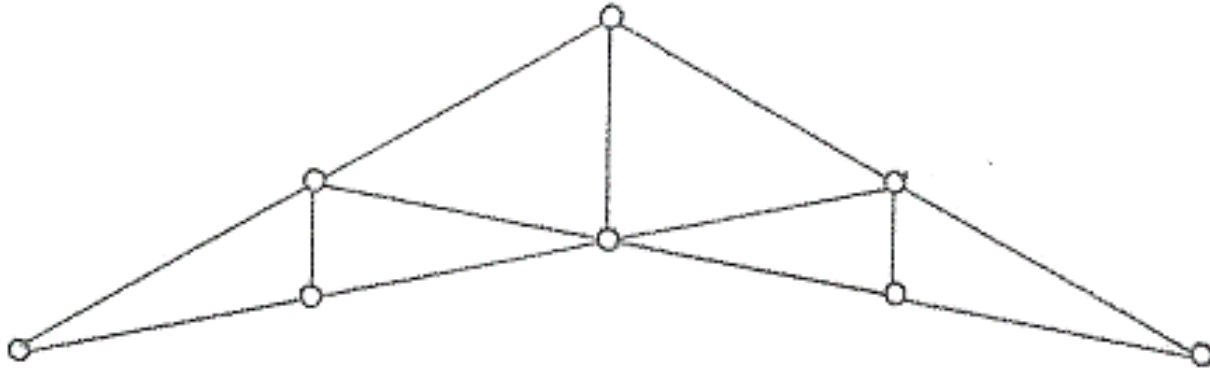
b) Warren trusses

have inclined web members forming a series of equilateral triangles. Vertical web members are sometimes introduced to reduce the panel lengths of the top chord, which is in compression.



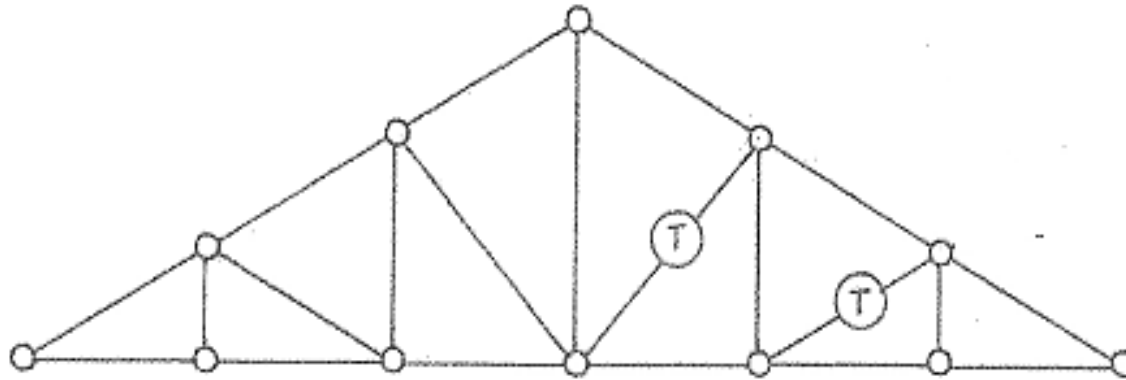
c) Scissors trusses

have tension members extending from the foot of each top chord to an intermediate point on the opposite top chord.



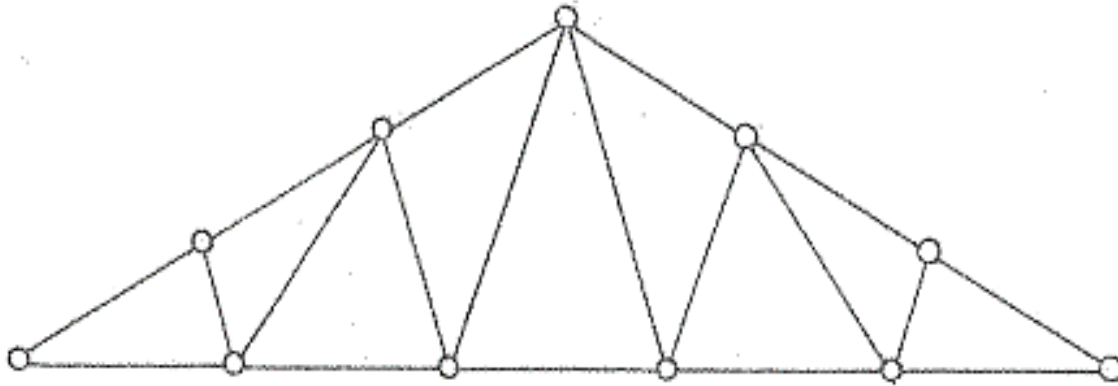
d) Pratt trusses

have vertical web members in compression and diagonal web members in tension. It is generally more efficient to use a truss type in which the longer web members are loaded in tension.



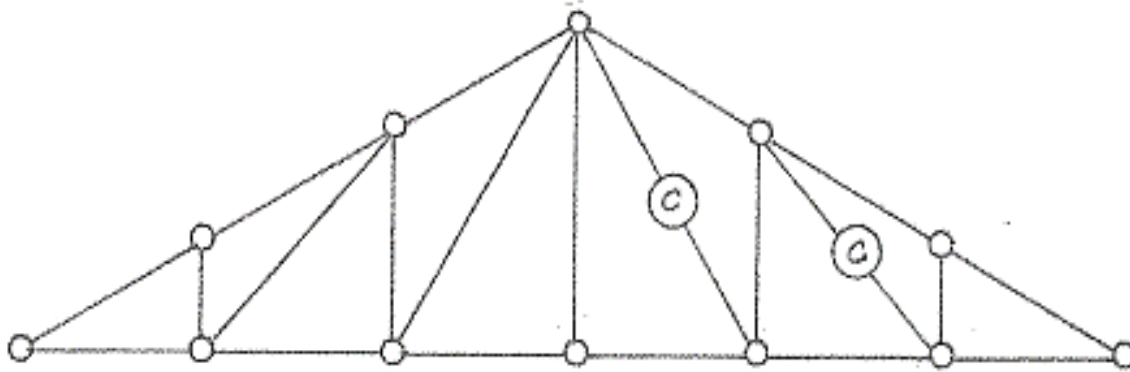
e) Belgian trusses

have only inclined web members.



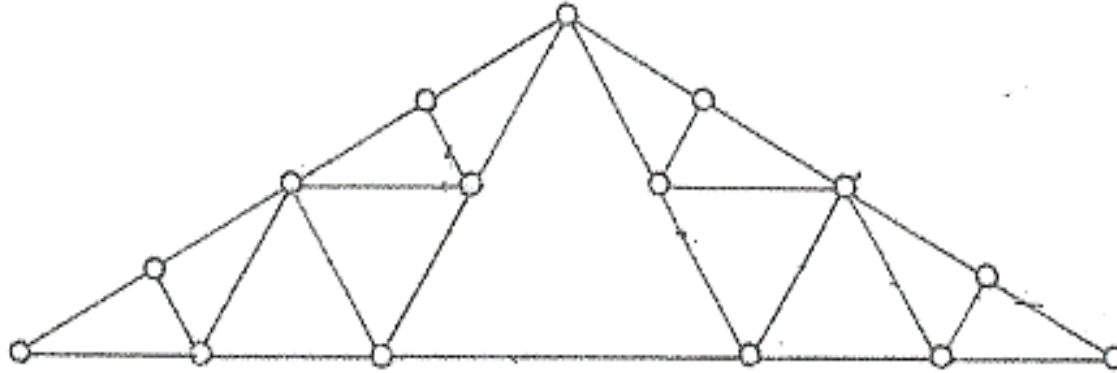
f) Howe trusses

have vertical web members in tension and diagonal web members in compression.



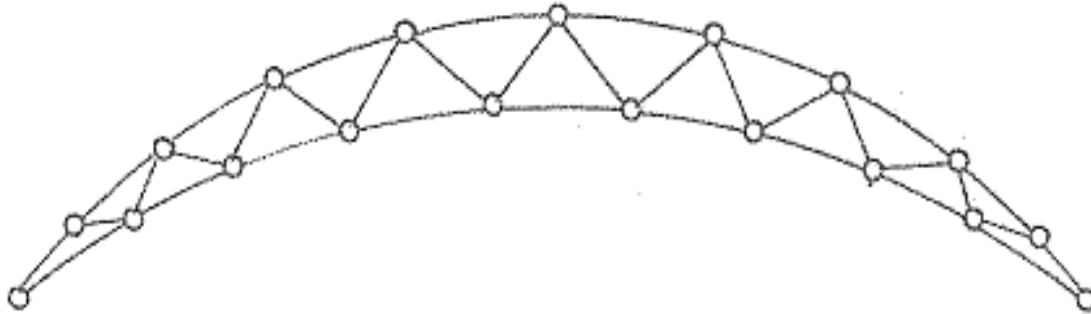
g) Fink trusses

are Belgian trusses having sub diagonals to reduce the length of compression web members toward the centerline of the span.



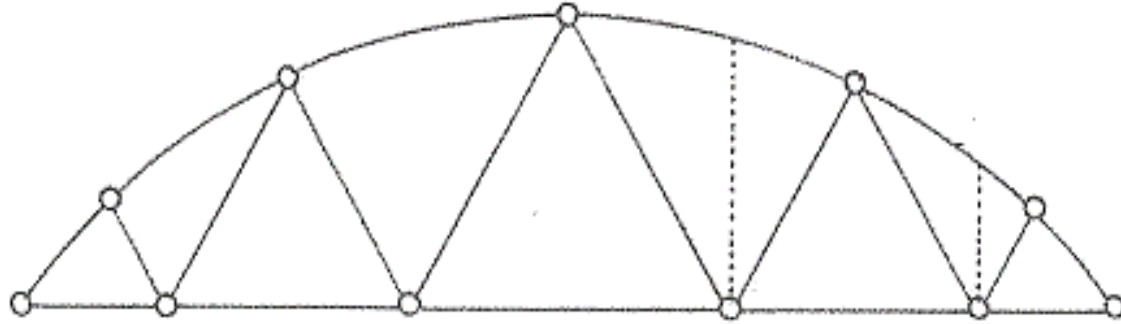
h) Crescent trusses

have both top and bottom chords curving upward from a common point at each side.



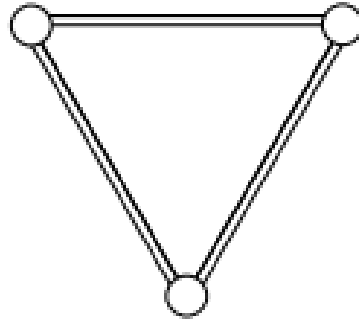
i) Bowstring trusses

have a curved top chord meeting a straight bottom chord at each end.



j) Space trusses

A space truss is a unidirectional framework that can be imagined as two planes of trusses intersecting at the lower chord, with the upper two chords forming a third truss. This 3D truss is now capable of resisting vertical, horizontal, as well as torsional forces.



Trusses are typically made of steel, wood, or occasionally a combination of steel and wood. Concrete is seldom utilized for trusses due to its weight. Whether to use steel or wood depends on the type of structure required, the intended aesthetic, and compatibility with the roof framing and roofing materials.

References

1. Francis, D K C. Onouye, B. Zuberbuhle, D. 2014. **Building Structures Illustrated. Second Edition, John Wiley & Sons, New Jersey.**
2. Francis, D K C. 2008. **Building Structures Illustrated. Forth Edition, John Wiley & Sons, New Jersey.**