TYPES OF STEEL ROOF TRUSSES

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Roof Trusses

- Trusses are Triangular Frame Works, consisting of Axially Loaded Members

- They are More Efficient in Resisting External Loads as the Cross Section of all the members are Nearly Uniformly Stressed

- They are Extensively used for Larger Spans
Applications

Trusses are used in

- Roofs of Single Storey Industrial Buildings
- Long Span Floors and Roofs Of Multistory Buildings, to resist gravity loads
- Trusses are also used in Walls and Horizontal Planes of Industrial Buildings to resist Lateral Loads and to provide Lateral Stability
Analysis of Trusses

- Truss members are regarded as being pinned joints.
- They are assumed to be joined together so as to transfer only the axial forces and not moments and shears from one member to the adjacent members.
- The loads are assumed to be acting only at the nodes of the trusses.
The trusses may be provided over

• a *single span, simply supported over the two end supports*, in which case they are usually *statically determinate*.

• Such trusses can be analyzed manually by
  – method of joints
  – method of sections.

• *Computer programs* are also available for the analysis of trusses.
Methods to reduce BM in columns (Knee Bracings)
Materials for Roofing

Corrugated sheeting

Roof decking

Sheeting

Insulation board

Felt

Decking

Girder or joist

Ceiling

Flat roof construction

Decking for sloping roof

Top chord of roof truss
Fastenings for Sheeting

- Ridge
  - 190
  - 125
- End lap
  - 100
  - 50
- Sheet felt
- Lead or bitumin diamond washer
- Galvanized steel diamond or limpet washer
- Steel washer bitumin felt washer
  - 8-mm diameter galvanized steel hook bolt
  - 6-mm diameter galvanized steel bolt

- Stitching to side and end laps
- Trimmer at end of glazing
- Glazing
- Lead
  - Glazing
  - Sheet felt
- Top glazing purlin
- Bottom glazing purlin
- Clip
- Lead
- Sheet felt
- Lead sheeting
- Glazing
- Eaves
- Dimensions in mm

- Gable sheeting
  - Gable closure (corner closure similar)
Side lap Corrugated Sheet
Flat Cum Corrugated Sheets

“TOP”

1100-mm overall width
1014-mm laid width
338 mm
45 mm
36 mm
50 mm
86 mm
Types of Roof Truss

- Pitched roof trusses
- Parallel chord trusses
- Trapezoidal trusses
Pitched Roof Trusses

- **Most common** types of roof trusses

- **Top chord** is provided with a **slope** in order to **facilitate natural drainage** of rainwater and clearance of **dust/snow accumulation**.

- The typical span to maximum **depth ratios** of pitched roof trusses are in the range of **4 to 8**, the **larger ratio being economical in longer spans**.
Pitched Roof Trusses

• These trusses have a greater depth at the mid-span. Due to this even though the overall bending effect is larger at mid-span, the chord member and web member stresses are smaller closer to the mid-span and larger closer to the supports.
King Post Truss

Top cord

Kingpost

Diagonal brace

Bottom cord
Queen Post Truss

- Ridge beam
- Common rafters
- Purlin cleat
- Infill brickwork
- Straining beam
- Straining sill
- Tie beam
- Strut
- Queen post
- Wall plate
- Stone template

Traditional Queen Post Roof Truss
Pratt Truss (6-30m)

• In Pratt trusses [Fig. (a)] web members are arranged in such a way that under gravity load the longer diagonal members are under tension and the shorter vertical members experience compression.

• This allows for efficient design, since the short members are under compression.

• However, the wind uplift may cause reversal of stresses in these members and nullify this benefit.
Howe Truss (6-10m)

• The converse of the Pratt is the Howe truss [Fig. (b)]. This is commonly used in light roofing so that the longer diagonals experience tension under reversal of stresses due to wind load.
Fink Trusses (up to 10m)

- Fink trusses [Fig. (c)] are used for longer spans having high pitch roof,
- The web members in such truss are subdivided to obtain shorter members.
Fan Trusses *(10-15m)*

- Fan trusses [Fig. (d)] are used when the *rafter members* of the roof trusses have to be subdivided into *odd number of panels*. 
Fink Fan Truss (20-30m)

- A combination of fink and fan [Fig. (e)] can also be used to some advantage in some specific situations requiring appropriate number of panels.
Mansard Trusses (20-30m)

- Mansard trusses [Fig. (f)] are variation of fink trusses, which have **shorter leading diagonals even in very long span trusses**, unlike the fink and fan type trusses.

![Diagram of Mansard Trusses](image)
Economical Span

• The economical span lengths of the pitched roof trusses, excluding the Mansard trusses, range from 6 m to 12 m.
• The Mansard trusses can be used in the span ranges of 12 m to 30 m.
Structural framing for an industrial building

Legend:
A–G Location of trusses
BB–Truss bottom chord in braced bay
C–Column
CC–Corner column
CB, CG–Column in braced bay and in gable end
DL, DT–Diagonal in bottom chord level in Longitudinal and Transverse direction
DG–Diagonal bracing in gable end
ES–Eave strut TB–Truss top chord
THANK YOU