

Construction Technology

Built Environment
Portfolio

Lattice Construction



Construction Technology



Lattice construction

Normally a beam or truss system constructed of open web design

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Why lattice?

- Strength to weight ratio
- Lightness
- Ease of handling
- Simplicity
- Resource efficiency



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- Why lattice?
- Service provision
- Aesthetics
- Availability
- Spans
- Fixability

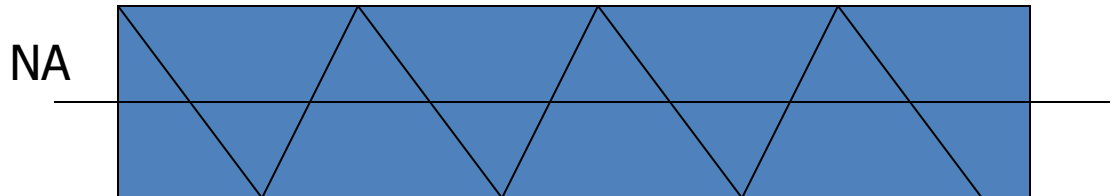
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Development



Area around the neutral axis is less highly stressed – material is wasted!

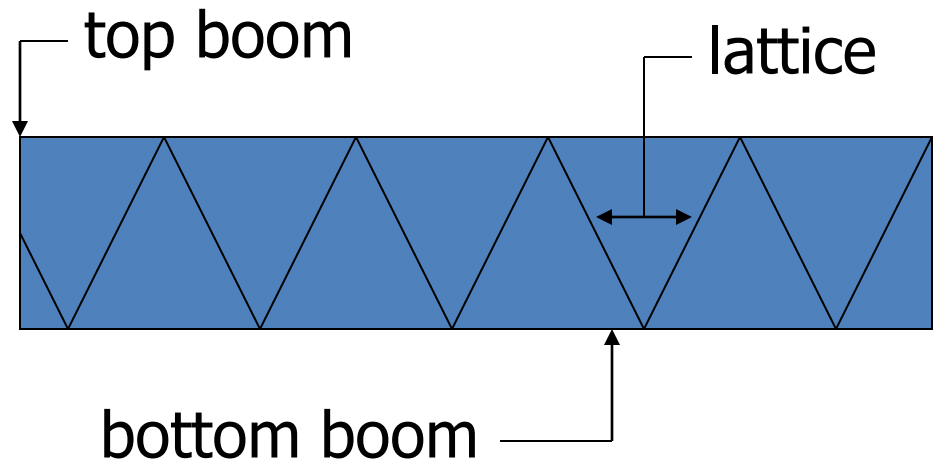
Result an open web
or lattice beam



Answer might be to cut away this portion
thereby lightening the load.

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Where would
compression
and tension
form?



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- Lattice construction
 - Normal systems can span up to 30m plus
 - Curved construction increases span to 60m or more



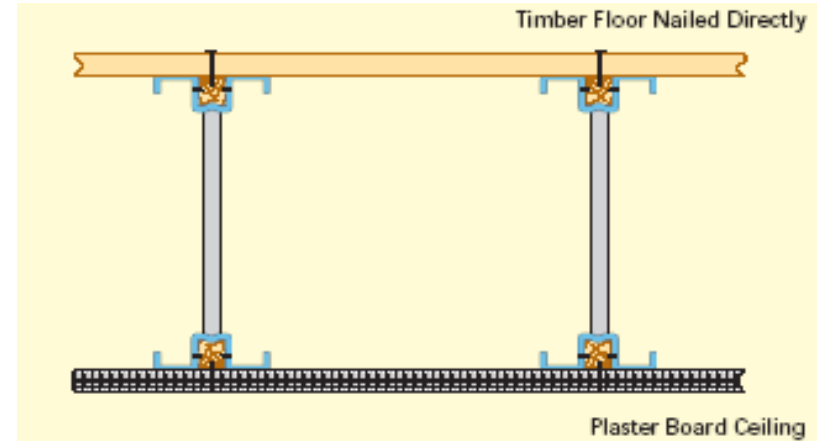
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- Lattice construction
 - Can span in two directions
 - Off-site manufacture
 - Economies
 - Flat or pitch roof



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- The use of the 'top hat'
 - Allows timber inserts to be included for fixing ceilings and roof



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- The 'V' pattern of the web diagonals allows fairly unrestricted passage of horizontal service runs

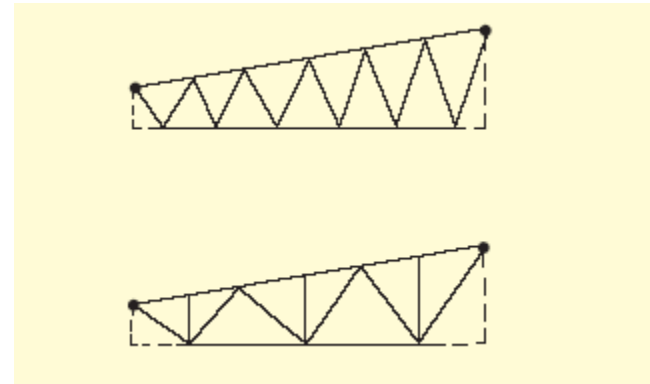
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- When used in lightweight systems horizontal members connecting booms may be required to restrain them from buckling in windy conditions

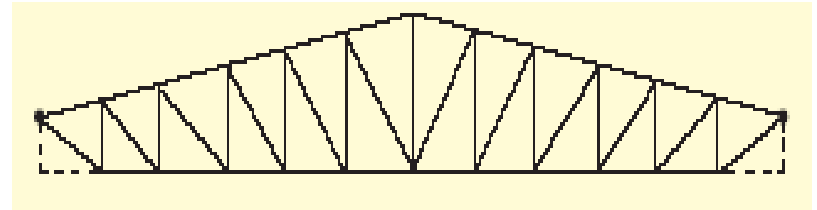


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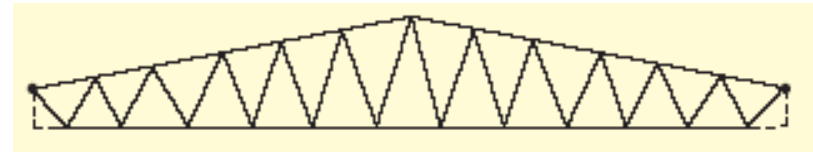
Off-site manufacture eases tapering of sections to allow falls
For drainage



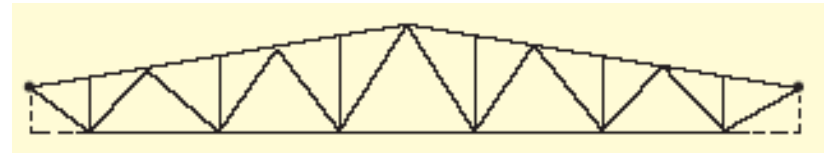
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N – type truss

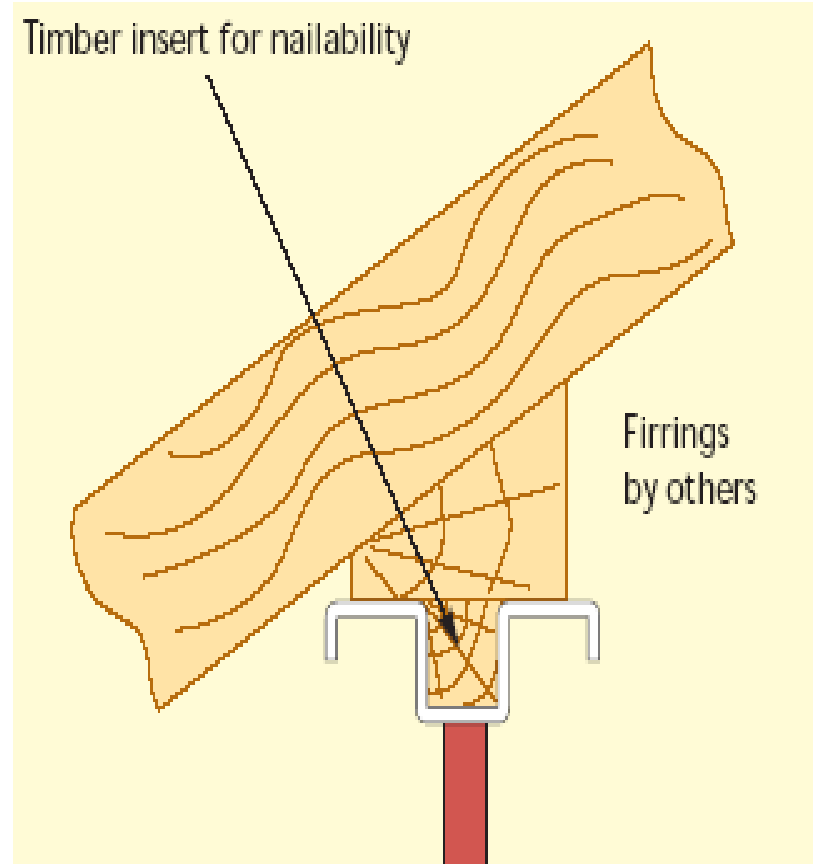


Warren type truss



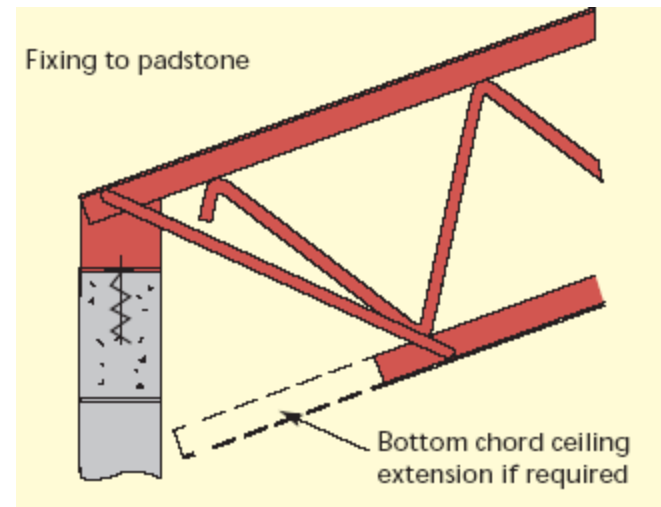
Warren type truss with vertical posts

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Joists laid to fall



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A normal 'rule of thumb' may be applied to calculate joist depth:

Approx depth = span/24

So, for a 12m span the joist depth would be?

500mm deep

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- For medium to long-span flat roofs structural efficiency is less making them more expensive than portal frames
- The need to prevent too large a deflection of the roof structure under load to $1/250^{\text{th}}$ of the span
- Also to prevent ponding



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- Lattice truss
 - Probably the cheapest form of structure for single storey, single bay buildings
 - Trusses fabricated from small sections bolted, riveted, welded or plated together to form a triangular, symmetrical pitch roof frame



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Lattice truss

- Pitch of 17° for maximum efficiency
- Fabrication costs limited
- Economy in material
- Erection time minimal

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- Lattice truss
 - Some challenges
 - Volume of space
 - Heating
 - Maintenance



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Lattice construction

Details

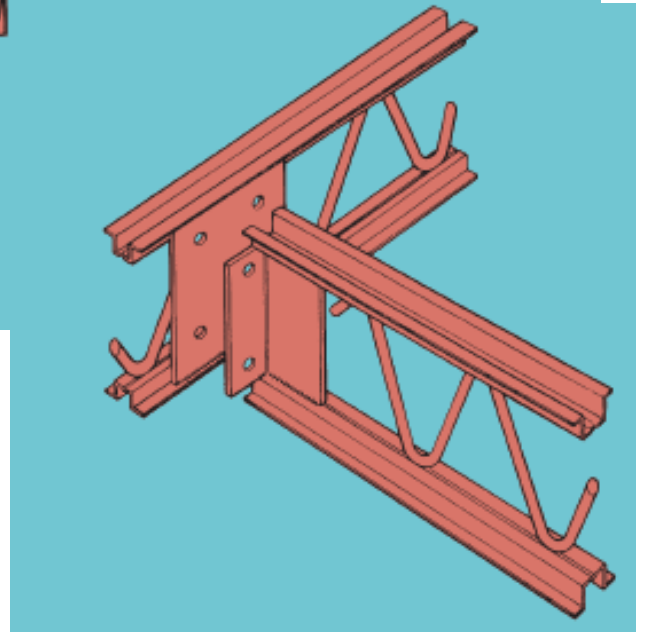
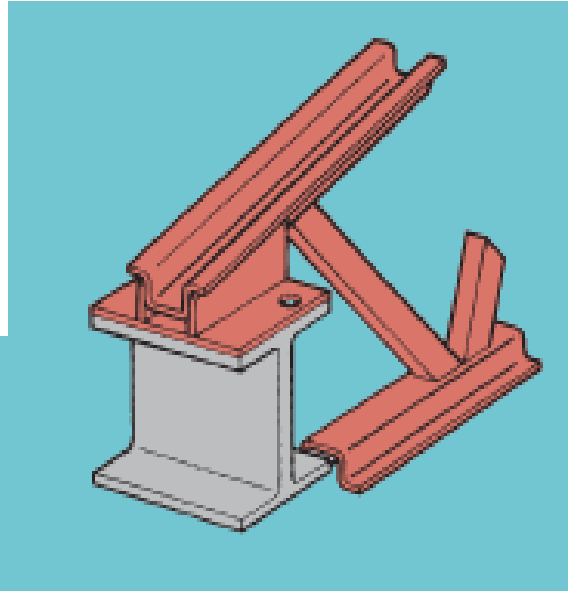
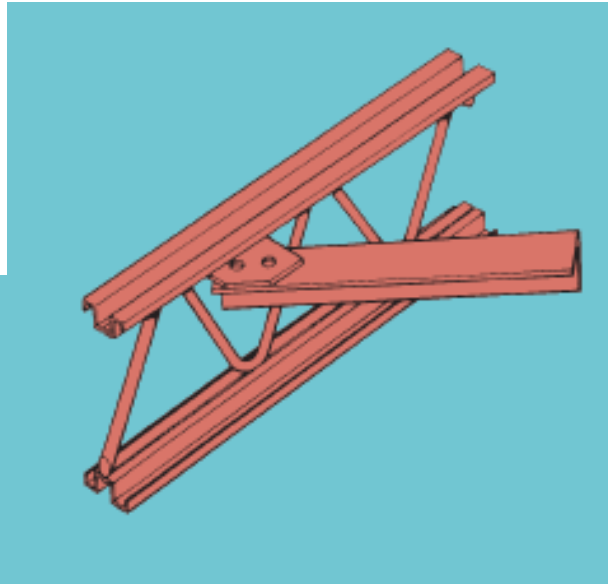
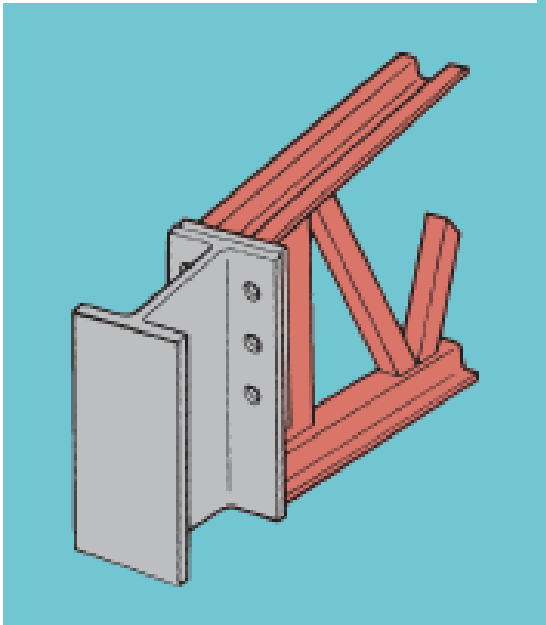




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Lattice construction

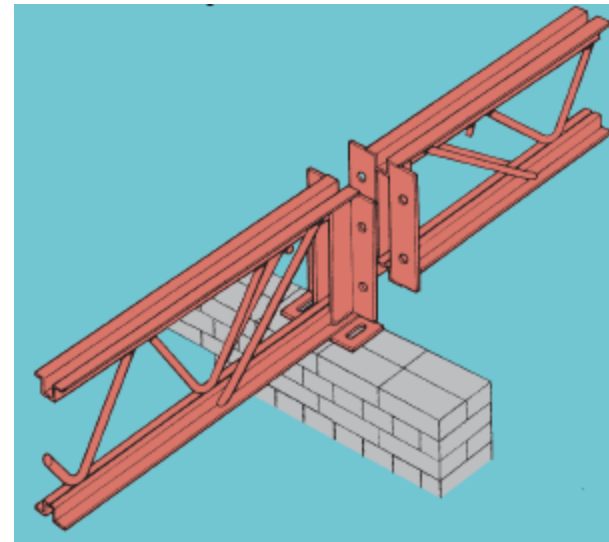
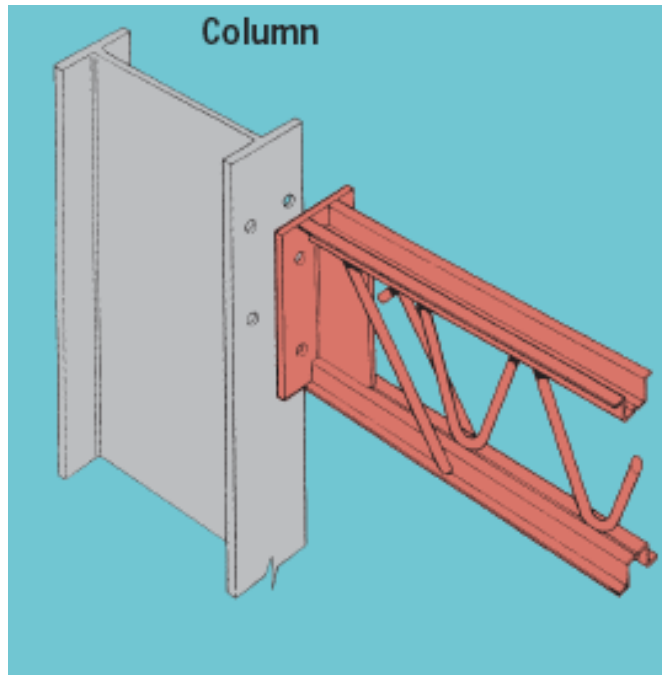
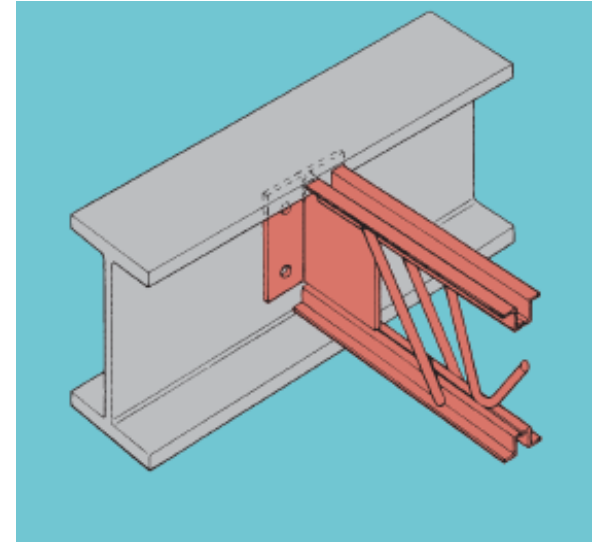
Details



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Lattice concrete



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Workshop

Discuss each of the performance requirements applicable to lattice construction.

Provide key details to show the following:

- lattice beam support

- lattice truss eaves parapet detail

- pitched lattice support at eaves