Long-Span Beams

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Définition

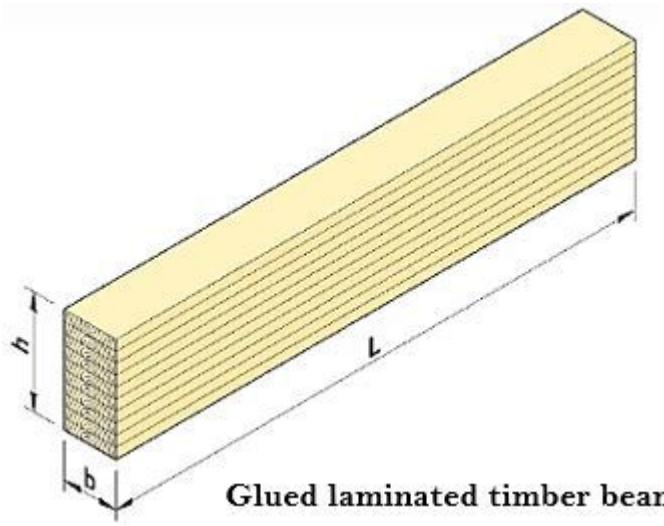
Flat beam structures are the most suitable option, when there is a need for a limited amount of space within a specific range. The depth of the beams is consequently directly proportional to the span that can be supported, and for glue-laminated beams and steel girders, this requires a depth-to-span ratio of around 1:20 for typical loads. Despite the fact that solid web beam systems have a depth to span ratio advantage, they have a high self-weight and do not easily accommodate mechanical services as do open-web or trussed beam structures.

2. Types

II

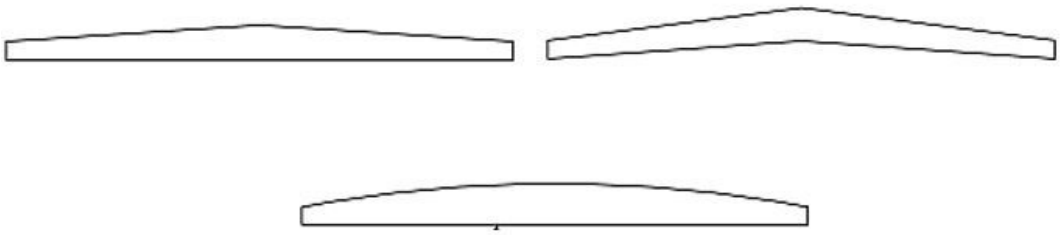
1. 2.1. Glue-Laminated Beams

Solid-sawn timber beams cannot be used for long spans, but it is possible to use glue-laminate (glulam) timber beams which have the ability to span up to 24.4 m. Glulam beams possess exceptional strength and can be produced with sizable cross-sectional areas, as well as curved or tapered shapes.



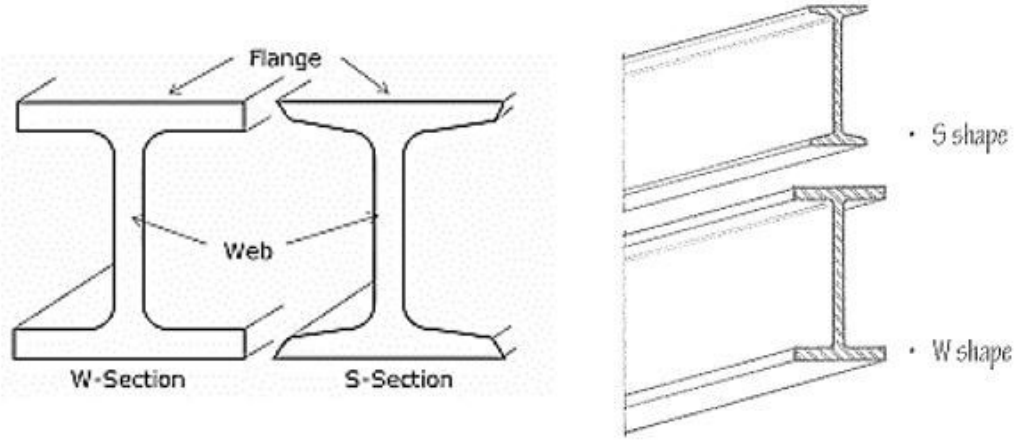
Glued laminated timber beam sizes

Some various profiles of long-span glulam beams

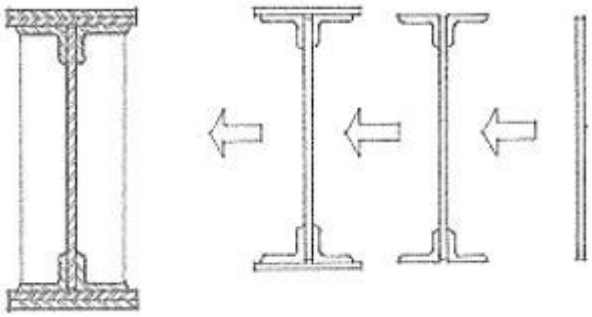


2. 2.2. Steel Beams

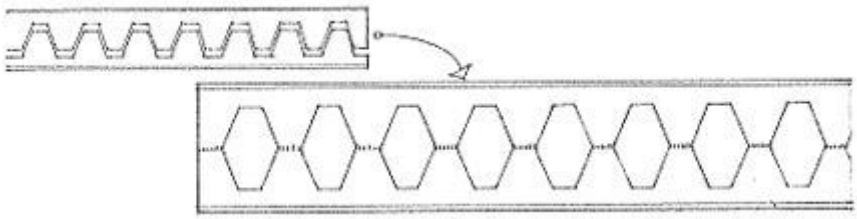
Wide-flange steel sections are capable of spanning up to 21 m with a depth of 1120 mm. More structurally efficient wide-flange (W) shapes have largely superseded the classic beam (S) shapes



Deeper sections for longer spans are possible by fabricating plate girders built up from steel plates and sections welded together to create the equivalent of a rolled beam.



Castellated beams are fabricated by building the web of a wide-flange section with a lengthwise zigzag cut, then welding both halves together at the peaks, thus increasing its without increasing its weight.



3. 2.3. Concrete Beams

The usage of Conventional reinforced concrete members for a long span is possible, but they become overly large and bulky. As comparison to regular reinforced concrete, pre-stressed concrete has more effective, smaller, and lighter cross sections that experience fewer cracks than standard reinforced concrete.

Precast, pre-stressed concrete members are available in standard shapes and sizes. The two most commonly used shapes are the single-tee and double-tee. Double tees are commonly used for spans up to 21 m while single tees are used for spans up to 30 m or more.


Double Tee


Single Tee