Timber Structures for Large-Span Structures

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Large spans structures should ideally be designed so that they work primarily in tension and/or compression. In fact, minimizing bending moments leads in general to an optimum utilisation of the structure, regardless what material is chosen. This often results in slender and elegant shapes.

Timber is a structural material which has excellent strength and stiffness, in particular when these properties are expressed in specific terms. By specific strength and specific stiffness it is meant the material strength and the material Young's modulus, respectively, divided by its density. As an example, it can be mentioned that both the specific strength and stiffness in tension and/or compression parallel to the grain of e.g. spruce timber are very similar to that of a mild steel. For this reason, timber is a material which is particularly appropriate for large span structures.

This paper gives a description of both traditional and innovative structural shapes which can be used for large building with timber as main load bearing material. Both planar and special structures are discussed.

As spans becomes longer, a number of problems arises. For example, as compression members gets longer, buckling begins to be an issue. Moreover, most likely large-span structures will be made of several members, which must be prevented from coming apart at the joints. In this paper, methods to reduce the risk for both in-plane and out-of-plane buckling of timber members are illustrated. Also, suitable joints able to resist either large compression and tension forces are presented and discussed.