

BauBuche Beech laminated veneer lumber

Trusses



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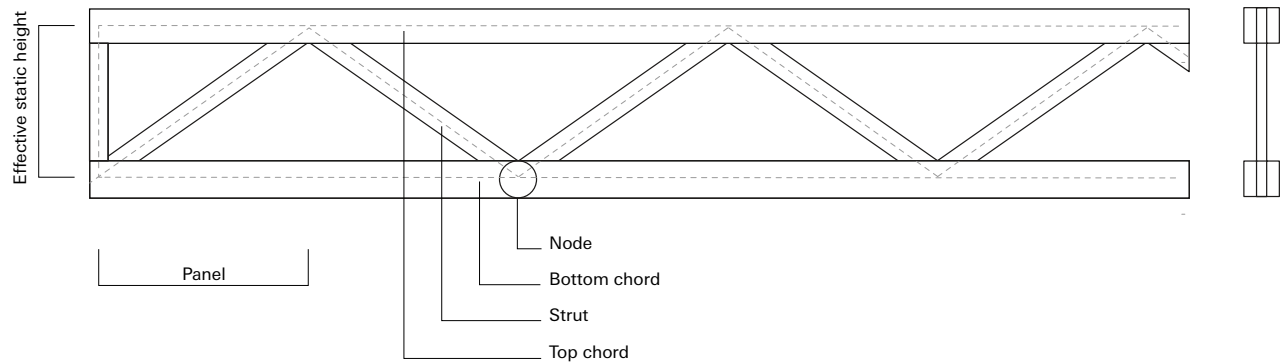
Pferdsdorfer Weg 6
99831 Kreuzburg

BauBuche consulting service for
architects, civil engineers, builders and
timber construction companies
P +49 (0)36926 945 560
baubuche@pollmeier.com

Consulting service on sawn timber,
BauBuche, Pollmeier LVL and contact
person for the trade
P +49 (0) 36926 945 163
sales@pollmeier.com

8.1 Introduction

Trusses allow for particularly elegant and slim constructions that use only minimum material. Truss members are only exposed to compression and tension.



Comparison of trusses

made in BauBuche and spruce glulam

Due to its high tensile and compressive strength, BauBuche allows for considerably slimmer components.



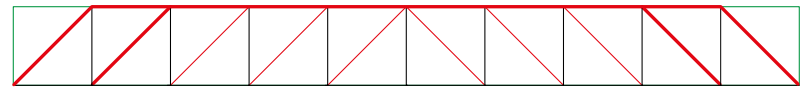
8.2 Truss types

Trusses come in many forms and shapes. BauBuche is particularly suitable for the construction types described below. Depending on the construction type, the height of the truss is normally around 1/10 to 1/15 of the overall span.

Designation

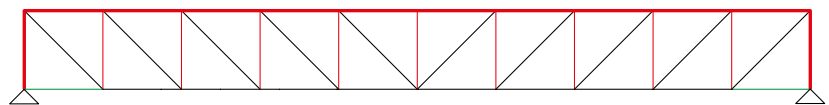
Diagram

Howe configuration



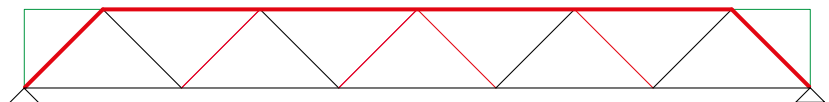
$$H = l/12 - l/15$$

Pratt configuration



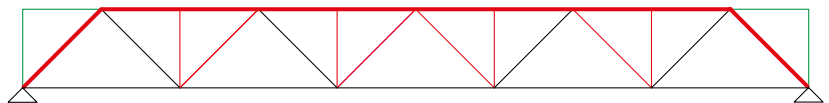
$$H = l/12 - l/15$$

Warren configuration



$$H = l/10 - l/15$$

Modified Warren truss

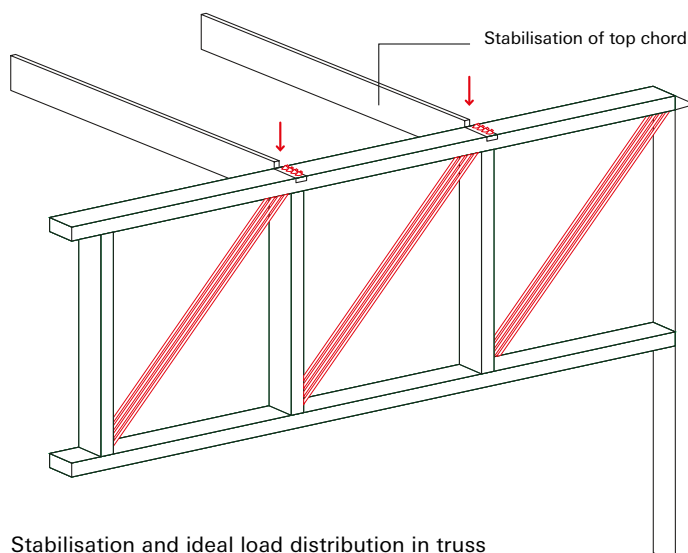


$$H = l/10 - l/15$$

— Compression — Tension — Neutral

8.3 Rules of construction

For reasons of production, the length of the individual elements is limited to 18 m. For longer spans, several chords must be combined and connected with suitable fixtures. A number of recommended connection types are described in 7.7 to 7.9. As a rule, the joints in the bottom (tension) chord are positioned not at the centre but close to the bearing points. Compression members in lattice constructions are generally prone to buckling. It is therefore recommended to choose short struts.



The top (compression) chord is normally stabilised against buckling by means of wind bracing. Posts are generally not stabilised separately, and their dimensions must be based on the buckling analysis. Tension members are not prone to buckling. To produce slim lattice girders, bending stress on the chords should be eliminated. Where possible, the load transfer from the auxiliary system should occur at the nodes.

8.4 Deformation and camber

Most lattice girders are cambered. Serviceability is normally the relevant criterion for dimensioning. In order to camber a truss, it is assembled based on a template, whereby the chords are arched to counteract deflection in the completed building construction. The sleek BauBuche chords normally have the elasticity required to produce arched girders without first producing pre-stressed (bent) chords.

8.5 Fire safety

The timber elements of trusses are generally fire-resistant for 30 minutes (F30/R30) without any further fire protection measures. For more stringent fire safety requirements, the cross-sections must be increased accordingly.

8.6 Node design

In timber constructions, each node constitutes a weak point in the cross-section. It is therefore not possible to transfer the entire load capacity of the member to the connection. In addition, connections are quite expensive and also affect the deformation behaviour of the structure. The construction of nodes is therefore crucial for the strength and stability of the truss. The systems described below have been proven most suitable for use in BauBuche trusses.

8.7 Dowel connections

The production of dowel connections is a standard task for joineries. The steel parts are thereby recessed into the timber. Apart from the elegant look, such connections offer also greater safety in the event of a fire, as exposed steel parts quickly lose their strength when becoming hot. Normally, the steel and timber elements are drilled separately, which must be done with great precision. This can only be done with CNC joinery machinery with and high-precision drilling machines.

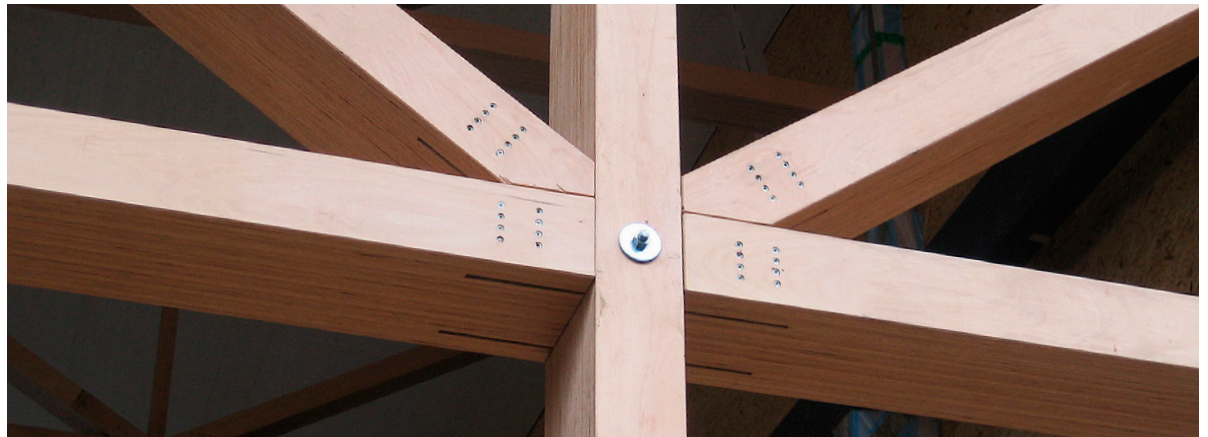
BSB ("Blumer-System-Binder") connections are a technology developed specifically for use in trusses. The positioning of the steel blades and the dowels (of a uniform diameter of 6.3 mm) are standardised, which makes the design and production of such connections particularly efficient.



BauBuche truss with BSB connections, i+R Holzbau

8.8 Dowel connections with self-drilling dowels

These innovative fasteners do away with the challenges of precision assembly required for other connection solutions. Using WS fasteners from SFS intec AG and a special setting tool, multi-layer steel and timber connections can be produced with high accuracy. The dowels made in carbon steel are available with diameters of 5 mm and 7 mm and can be driven in one go through the timber elements and up to three inserted 5 mm steel fasteners.



BauBuche truss with SF connectors, production hall in Probstzella

8.9 GSA® technology – threaded steel rod anchors

GSA® technology is a high-performance connection technology for modern timber engineering developed by Neue Holzbau AG in Lungern, Switzerland. In GSA® connections, threaded steel rods are glued to glulam or timber with epoxy resin. The system was approved as early as 2012 for use with glulam and its excellent safety and performance has since been demonstrated in many reference projects. This innovative connection technology has been further developed for use in conjunction with the high-performance material of BauBuche and an application for general approval is pending. GSA® connections can, however, already be used with BauBuche where an individual project approval is in place.

The GSA® connections do not only meet the criteria for ductility, stiffness and load capacity, but are also fully concealed. For each application, the steel anchors, the BauBuche material and the two-component epoxy resin are carefully matched. The connections are dimensioned in such a way that the steel elements form the weakest link, and that the steel begins to expand under maximum load. This ensures that all fasteners of the anchoring assembly are loaded equally and no brittle breaks can occur at the glued joints.



BauBuche truss nodes with concealed GSA fasteners