

AN INTRODUCTION TO OPEN WEB JOISTS

Description

Open Web Joists are parallel chord trusses made from strength-graded timber joined together with either timber or metal webs. The resulting joist combines the lightness of timber with the structural qualities of the metal webs or plates, to produce a factory made precision-engineered component that is lightweight, strong and versatile.

They are ideally suited to modern methods of construction and although primarily developed for flooring, they can be used for a variety of other structural uses in commercial, industrial and domestic applications. In addition, because the joists are factory made, consistent quality can be assured.

Open Web Joists are designed and manufactured to the specific requirements of each project. This information sheet gives a brief introduction to them but it is not intended to be comprehensive and readers are advised to discuss their particular project with their specialist supplier who will be able to provide detailed technical and product approval information.



Timber Web Joists

Services

One of the major benefits of using open web joists is that they are designed to easily accommodate services and utilities within the floor void area without the need for any cutting, notching or drilling. This should NEVER be undertaken without the joist manufacturer's approval. Joist depths may be varied to suit particular duct requirements.



Open web joists easily accommodate services unlike solid joists.



Metal Web Joists

Practical Benefits

Open web design - allows easier installation of services such as plumbing, cabling, heating pipes etc. resulting in there duction or elimination of surface pipework.

Wide range of sizes - the depth, length and specification can all be adjusted to produce joists with specific performance criteria that can span greater distances than solid timber joists.

Design flexibility - they can eliminate the need for load-bearing intermediate walls, giving the designer greater freedom and flexibility.

Dimensional stability - the use of smaller timber sections together with the metal webs means that there is less shrinkage and a reduced risk of 'squeaky floors'.

Improved sound performance - open web joists when used with a rigid 'Strongback' reduce vibration of a floor. (Further information on Strongbacks on page 3.)

Lightweight - the open web structure means they are lighter to handle than solid timber joists.

Made to measure - which virtually eliminates site wastage. Some types are available with a solid timber 'trimmable end' to allow for any on-site discrepancies.

Speed of erection - the wide timber chords makes for easier fixing of flooring and ceiling and there is no need for herringbone strutting.

Reduced costs - increased spans, simpler installation of utilities, flexibility in design and faster erection can result in significantly reduced building costs.



Applications

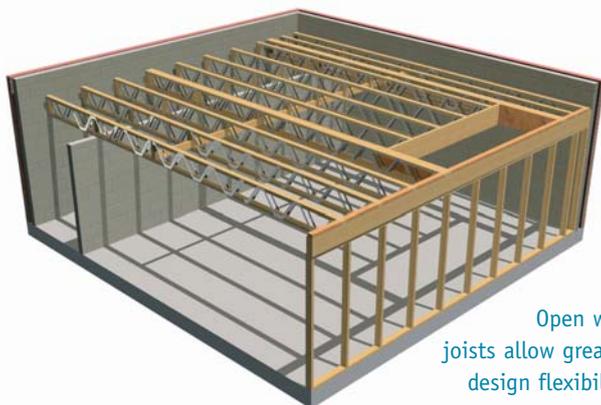
Open web joists have been primarily developed to make floor installation easier, faster and more cost effective but they can also be used for roofs and a variety of other structural uses. As well as domestic applications they are suitable for both commercial and industrial projects and can be used on a variety of substrates including timber frame, masonry, steel and concrete.

Floor Systems

An open web joist floor system can provide longer clear spans, which gives greater design flexibility in locating bearing walls and partitions. This allows the designer freedom to choose a variety of internal room layouts within an external shell.

The wide top and bottom chords allow speedy fixing of floor decking and ceiling materials. A further advantage is that herring- bone strutting is not required although if the span exceeds 4m, a Strongback is usually used.

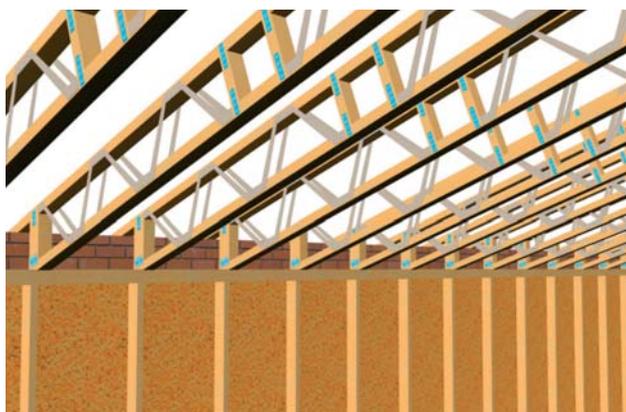
Open web joists are made to measure so eliminating on-site wastage of both time and materials. However if required they can be supplied with a solid trimmable end to overcome any on-site variations.



Open web joists allow greater design flexibility

Roofing Applications

Open web joists are also suitable for both flat and pitched roofs where, due to their span capability, they can provide an economical alternative to steel, concrete and other materials.



Open web joists can be used for pitched roofs.

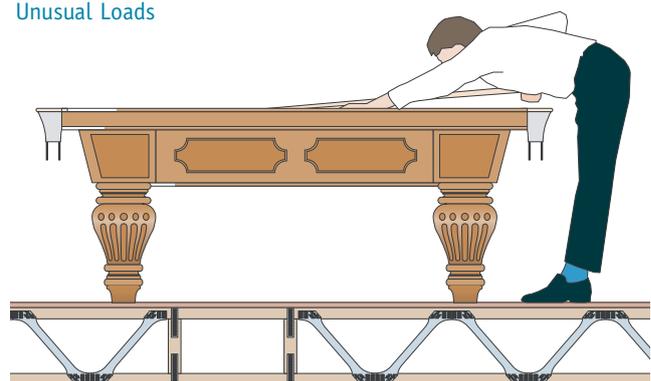
Sizes

Open web joists are available in a wide range of sizes to suit almost any project. Actual dimensions are dependant on loads, spans and specified centres. Whilst the technology exists to make extra long joists, in practice length is limited by the practicality of handling and transportation.

Loading and Design

Open Web Joists are designed and manufactured to the specific requirements of each project, their design being dependent on the application and loads applied. The design is undertaken with the aid of software programmes, which allow the designer to accommodate both dead and imposed loads applicable to the particular end-use and depending upon the type and occupancy of the building. The floor designer should be advised of any unusual loads which may be applied to the floor system e.g. spa baths, hoists etc. Open Web Joists are not designed to support masonry load-bearing walls but can be designed to support lightweight partition walls.

Unusual Loads



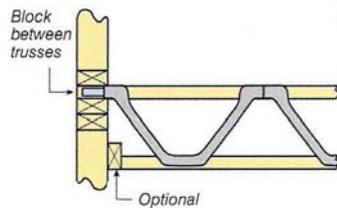
Layout

When used for flooring, joists are typically laid perpendicular to load-bearing walls. They should be laid as specified by the designer and as indicated on the layout drawing supplied. Care should be taken to ensure that the specified spacings and bearings are maintained. To aid setting out the joists should be temporarily fixed to a length of timber batten to keep them in their correct positions. Care should be taken to ensure that joists are level along their lengths and across the floor and that each is correctly supported. All bearing positions should be level and firm and provide the specified minimum bearing area.

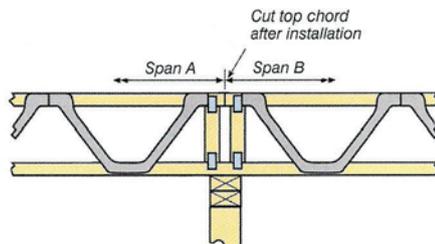
Support Details

The joist manufacturer or floor designer will supply typical support details covering a variety of situations for timber frame, masonry constructions and other supporting structures. In practice there are 2 principal ways of supporting the joists -either on the bottom chord or on the top chord. A number of typical support details are shown below.

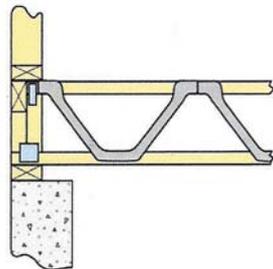
External Top Chord Bearing



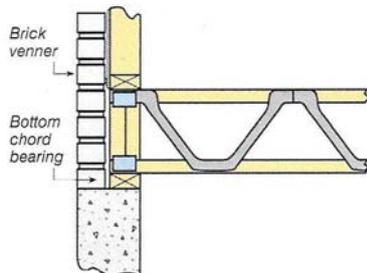
Intermediate Simple Span



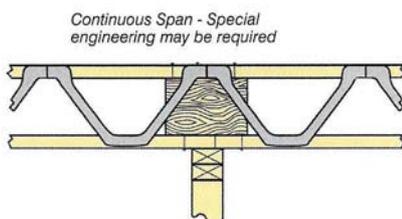
Bottom Chord Bearing - External Frame



Bottom Chord Bearing - Masonry Wall

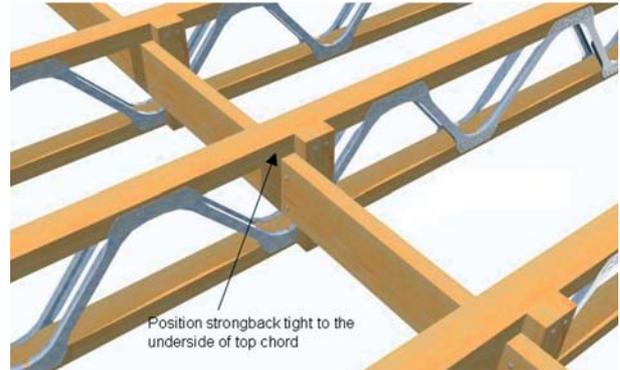


Intermediate Block Bearing



Strongback

Strongbacks are used to dampen vibration by increasing the stiffness of the floor and reduce deflection by load sharing. They should be installed as per the manufacturer's guidance. Strongbacks should be inserted before the joists are fixed, as it may not be possible to do so after fixing. They are usually fitted tight to the underside of the top chord and fixed to blocks at positions indicated by the floor designer.



Horizontal Restraint Straps

Horizontal restraint straps are used to tie the walls to the floors and should be fixed to perimeter walls in accordance with the Building Designer's instructions.

Preservative Treatment

Open web joists do not normally need to be preservative treated when used in floor constructions where the environment is likely to be classified as Use Class 1 or 2 as defined in BS 5268 Part 2 or Euro code 5. However if the joists are to be used in situations where preservative treatment may be required then the manufacturer's advice should be sought and any preservative treatment used should not adversely affect the corrosion resistance of the metal webs or plates.

Design Responsibilities

The main parties involved in any design using Open Web Joists are the Building Designer and the Manufacturer. The Building Designer, usually the Architect or Structural Engineer has overall responsibility for the design and structural integrity of the building. They should ensure that the floor design is compatible with the supporting structure and that the floor is adequately connected to the walls. They should provide the Open Web Joist manufacturer with all relevant information. The Manufacturer provides the materials to produce a floor that meets the criteria specified by the Building Designer. If, in addition to supplying the materials, the Manufacturer provides construction details and layout information they may take on the role of the Floor Designer, which involves additional responsibilities.

Technical Approvals

Open web joists manufacturers will be able to provide detailed technical and product approval information. Where they possess a European Technical Approval (ETA) and the joists are manufactured under a recognised third party quality assurance scheme they are capable of being CE marked.

Site Handling & Storage

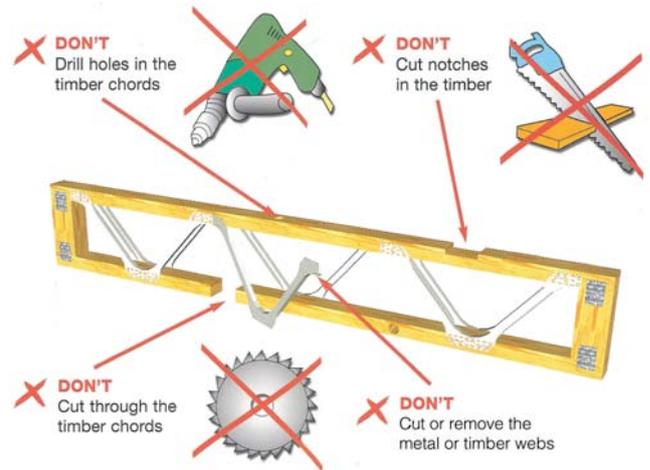
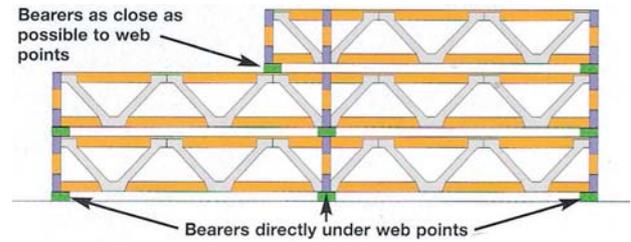
Whilst the manufacturer is responsible for the safe loading and delivery of open web joists, the safe offloading, handling once on-site and erection are the responsibility of the contractor. However to assist the contractor, the manufacturer will usually supply with the delivery, and on request, general guidance on their storage, handling and erection.

Handling

- When unloading with a crane, fabric slings should be attached to the timber chords or lifting points not the metal webs. Metal chains / slings should not be used.
- Slings should be attached to the panel points closest to the quarter points
- If unloading with a forklift, care should be taken to ensure that the forks do not damage them.
- Joists may be lifted as either single units or packs but care should be taken to avoid bending, twisting or dropping.
- Open web joists should be lifted in a the vertical position.

Storage

- Site storage is intended to be temporary immediately prior to erection so delivery should be arranged to minimise site storage time.
- Open web joists should be stored on firm level ground well clear of any vegetation.
- They should be protected with a plastic covering to protect them from short term exposure to inclement weather.
- Open web joists can be stored either vertically or on the flat. If stored vertically there should be adequate bearers under the node points. If stored horizontally they should be supported so as to prevent distortion.



Do's and Don'ts

DO's

- ✓ Store as shown in handling and storage section.
- ✓ Lift the joists in a vertical position.
- ✓ Use the open web feature for services.
- ✓ Protect joists from inclement weather.

DON'T's

- ✗ Drill holes in the timber chords.
- ✗ Cut through the timber chords.
- ✗ Cut notches in the timber.
- ✗ Cut or remove the metal or timber webs.

This information sheet gives a brief introduction to Open Web Joists and whilst intended to provide general guidance, the TRA accepts no liability and offers no warranty in relation to it and its contents.

The guidelines contained within this information sheet are given in good faith but without liability and its use shall be entirely at the risk of the user. It is in no way intended to replace specific information produced by individual Open Web Joist manufacturers.

Readers should refer specific queries and requests for detailed information to the individual Open Web Joist manufacturers.