Sometimes, where wall repairs prevent the joists being located in the wall, joint hangers can be used, keeping timber away from a wall, which can even after repair, may remain damp for several months.

Structurally unsound timber should be removed back to a sound base, and new sections scarfed or lapped on. There are different techniques for this which essentially apply to roof and floor timbers alike:

- **Strapping** is the standard technique of fixing timber or plywood plates either side of the joist and the new section, they are normally secured with a determined pattern of bolts. While simple in execution, they take up space and are visually obvious.

- **Plating** using modern steel is a similar approach, but using preformed steel plates, angled to fit the joist. They are fixed with ringshank nails. This repair is simple and takes up much less space, although the steel is highly visible.

- **Steel fitchplates** can be used where space and appearance is important, especially when using exactly matched timber. A thin section is cut in the centre of the existing and new sections, and a steel plate is inserted within and fastened with bolts.

**Jointing.** A skilled repair, used where craft, material and appearance are important. Historically common as no metalwork was required and often used on exposed horizontal timbers of above average dimension, but probably not an option in the domestic context. Whatever technique is used, it is vital that good quality timber is used.

**Resins and glues.** Some engineers specify an epoxy resin to be used in structural repairs, especially in areas where the timber is in more than one plane of the timber element (for example valley beams). Such resin is normally a dowel setting resin, giving time for the resin to soak into the matrix and fibres of the timber.

While some repairs may appear self evident, it should be remembered that timberwork of such size is structural, and a structural engineer with conservation experience may be required, especially on larger projects.

In many cases, replacement of rotted elements is dealing with the symptom, equally important is dealing with the cause. In the case of rot caused by damp for example, the cause of the damp must also be addressed. Preserved timber wrapped in plastic will not survive in a damp wall; identify the water source and cure the problem. Frequently problems in joinery elements are caused by small but persistent defects, for example a small crack in a gutter can lead to progressive saturation. Sometimes a failure of a timber element can lead to distortion and damage to other parts of the building. A series of failed roof ties, for example, can lead to the downward pressure on the wall forcing the wall apart. The nature of lime masonry, especially if progressively wet, is to slowly give way with pressure, eventually causing collapse. This distortion can happen in all but the thickest walls.

Further reading
- The Tenement Handbook, John Gilbert & Ann Flint, RIAS, 1992
- Building Construction Drawing, R B Eaton, Donhead 2009 (Reprint)
- Rivington’s Building Construction, Percy Smith, Donhead 2009 (Reprint)

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Structural timber, on the whole, was carefully selected for quality on every level - from bow and twist in bars and timbers (laying bars and timbers along the grain), with only clear-grained timbers being used. The selection was improved, from the 16th, then latterly from France and the USA. It must be emphasised that the quality and durability of timber cannot be matched today, and the appreciation of the material affects the approaches described below in this INFORM.

Most jointing of timbers was using wrought iron nails and sometimes straps and hoops were used. The tradition of wooden pegged joints had died out by the increasing shortage and consequently expensive cost of native hardwoods in Scotland in the 17th C.

Joinery refers to the timbers which is of crucial importance. Structural joinery elements make up the roof and floor construction, whilst the rafter feet are fixed to a timber or collar. A ridge plate links the apex or top section, with the rafters then fixed to a timber wall running along the wall. Joining was simple - simple' lapped joints for the apex, and a special lapped to essentially a governed joint for the rafter. Joining to the ridge plate was usually by nails only. In some earlier roofs, the A-frames are forested, and jointing logistically by timbers called peers, which in the lower timber, carry the floor. As the roof have to carry more weight, they are reinforced to a principal structure. This type of roof became the forerunner of the A-frame, and standard A-frame roofs became the most common.

Floors are built up from the joists, whilst the rafters have to carry more weight, they are shorter and smaller. Rafters then carry the roof. Most roofs consist of a frame of rafters formed in the triangular pattern called A-frame, with the wall plate running along the wall head. Jointing was simple - simple lapped joints for the apex, and a special lapped to essentially a governed joint for the rafter. Joining to the ridge plate was primarily by nails only. Early roofs were assembled on the ground, whilst the rafter feet are fixed to a timber wall running along the wall. Joining was simple - simple lapped joints for the apex, and a special lapped to essentially a governed joint for the rafter. Joining to the ridge plate was primarily by nails only. In some earlier roofs, the A-frames are forested, and jointing logistically by timbers called peers, which in the lower timber, carry the floor. As the roof have to carry more weight, they are reinforced to a principal structure. This type of roof became the forerunner of the A-frame, and standard A-frame roofs became the most common. Early roofs were assembled on the ground and weathered (usually with rain lashing) to allow correct reassembly in situ. Other marks that may be seen are gouged symbols called ‘slipping marks’ believed to denote quality and grading of the timber. Most roofs were built during the 17th C.

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Structural joinery makes up some of the key parts of a traditional building and their correct function is of crucial importance. Structural joinery elements make up the roof and floor construction, whilst the rafter feet are fixed to a timber or collar. A ridge plate links the apex or top section, with the rafter then fixed to a timber wall running along the wall head. Joining was simple - simple lapped joints for the apex, and a special lapped to essentially a governed joint for the rafter. Joining to the ridge plate was usually by nails only. In some earlier roofs, the A-frames are forested, and jointing logistically by timbers called peers, which in the lower timber, carry the floor. As the roof have to carry more weight, they are reinforced to a principal structure. This type of roof became the forerunner of the A-frame, and standard A-frame roofs became the most common. Early roofs were assembled on the ground and weathered (usually with rain lashing) to allow correct reassembly in situ. Other marks that may be seen are gouged symbols called ‘slipping marks’ believed to denote quality and grading of the timber. Most roofs were built during the 17th C.

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