

Insect attack : The most common wood boring insects in historic timber are the furniture beetle and the deathwatch beetle. The characteristic flight holes for the furniture beetle are typically 2mm in diameter, whilst those for the deathwatch beetle are 3mm. Look for digested wood in the form of dust (furniture beetle) or pellets (deathwatch beetle). Main structural members are generally constructed from the heartwood, although the shaped and embellished corners of beams or floor joists are frequently the outer sapwood, as are thinner structural members. Sapwood is vulnerable to attack by furniture beetle, heartwood by deathwatch beetle. Beetle damage usually only affects the surface of the timber, leaving much sound structural timber within. The honeycombed or powdered residue left on the surface after beetle attack is known as 'frass'. Remember that its removal may seriously destroy architectural and historic features.

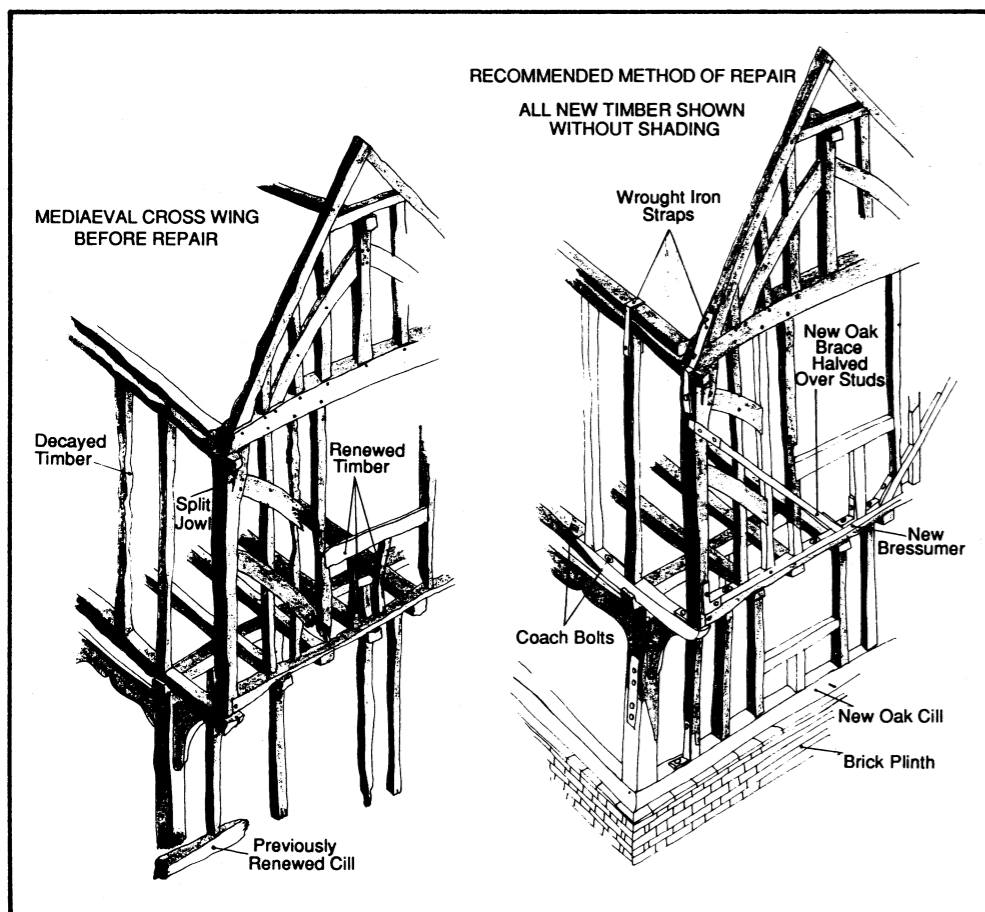
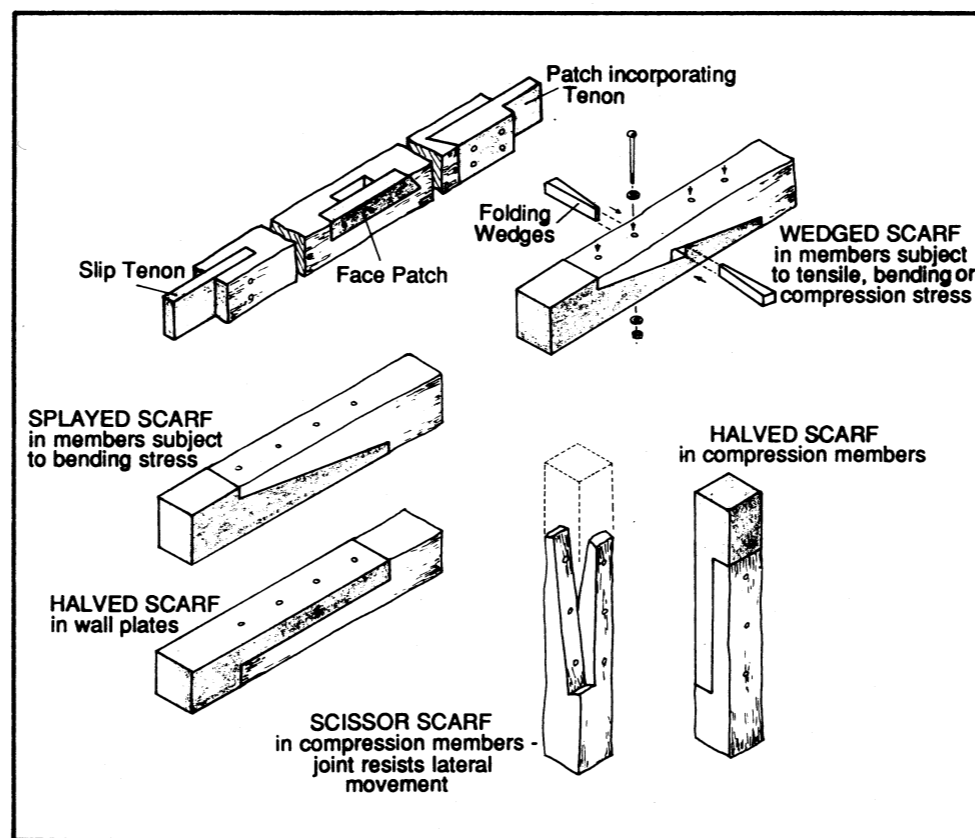
Treatment: Standard remedial treatment involves :

- 1 Exposing all timber possible to determine the full extent and type of attack.
- 2 Vacuuming away all dust and debris.
- 3 Cutting away severely damaged and decayed wood and replacing with sound, pre-treated wood.
- 4 Applying insecticidal fluid.

Structural Weaknesses: The symptoms are generally the distortion of the frame or the cracking and displacement of panel fillings, both internally and externally. The cause can usually be traced to broken or cut members of the frame. For instance, it is quite common to find tie beams have been cut through to make a door between two attics, and main structural members may have been removed to enlarge existing door or window openings. Newly inserted doors may have added additional loadings to the original structure and drilling through beams to thread in new wiring or piping may have weakened the timber.

Treatment : Having identified the cause of failure, it is important to understand that if each individual member can be so repaired as to be capable of playing the part for which it was intended, the frame again becomes stable and structurally sound. Extra reinforcement should not be necessary in most cases. No attempt should be made to correct long standing distortion unless there is clear evidence of serious failure in the frame. All repairs should aim to preserve as much of the historic fabric as possible and should include:

- 1 Only cutting decayed timber and inserting new timber using traditional jointing methods, supplemented by pins well grouted with water-and- boil-proof glue.
- 2 Retaining existing structure e.g. rafters, and doubling up with new timber alongside, particularly in areas not open to view.
- 3 Strengthening weak joints with wrought iron straps or angles may be acceptable, galvanised mild steel is the modern and less satisfactory substitute. Metal fitch plates, top and bottom plates and hangers are all devices which may be used to strengthen floors, but it is important to understand that each case deserves specific treatment.



FURTHER ADVICE

For further advice contact your Local Planning Authority who should be able to draw your attention to any special requirements necessary for instructing your contractor. They can also provide information about the Historic Building Grants available and give details of the other leaflets in this series.



Advisory Leaflet 2

PRESERVATION & REPAIR OF TIMBER FRAMED BUILDINGS



The tradition of constructing buildings in timber has ancient origins. Many historic hardwood timber framed buildings survive in the County, predominantly of oak, felled from the vast tracts of Wealden forest. They date from early medieval times through to the eighteenth century. By the late eighteenth century, large quantities of softwood began to be imported from the Baltic and North America and the timber framed tradition was continued in softwood until the end of the nineteenth century.

The design and carpentry of these buildings forms an important part of our building heritage. Their type of structure and condition varies considerably, but the vast majority are capable of repair and continued use.

This leaflet aims to provide some information on the repair and maintenance of timber framed buildings and is one of a series prepared jointly by Surrey County Council and the eleven District Councils to provide advice, without prejudice, for the owners of, and those working with, historic buildings.

SIMPLE RULES OF THUMB FOR THE REPAIR OF TIMBER FRAMES

- 1 Always employ a contractor who has experience of the repair techniques necessary for timber frames.
- 2 Prepare a survey drawing of the frame on which defects are identified. Check with your local planning authority whether Listed Building Consent will be needed for the work.
- 3 Always repair in situ, retaining as much as possible of the original framing. Removal of timber may constitute "demolition" and therefore require consent. The minimum of new timber should be introduced and you should respect and utilise the existing methods of jointing to retain the original degree of flexibility and movement.
- 4 Where possible, replace or strengthen oak with oak, pine with pine etc, although where framing is hidden from view good quality softwood may be acceptable. Avoid trying to match new with old; this will compromise the archaeological integrity and evidence. Use either new timber or second hand timber which retains all the evidence of its previous use.
- 5 Do not "straighten-out" distorted frames. This results in loss of character and can cause stress elsewhere in the structure.
- 6 New openings should be placed where the frame has deteriorated beyond recall, or should make use of previous openings such as blocked doors, windows or stair wells. Always be aware of the visual implications of such works, externally and internally. Check whether Listed Building Consent is required.
- 7 Never expose a timber frame externally where the carpenter intended it should be covered over. Elm and softwood for instance are prone to fast decay and for that reason were never originally exposed. Similarly, never seal over internal or external timber frame until you are satisfied the conditions being created are not going to encourage any future decay or infestation.
- 8 If you suspect insect attack or rot, always obtain specialist advice before carrying out expensive treatment.
- 9 If contemplating cleaning a timber frame, ensure that traditional techniques are used. Sand blasting and other abrasive cleaning is not acceptable.

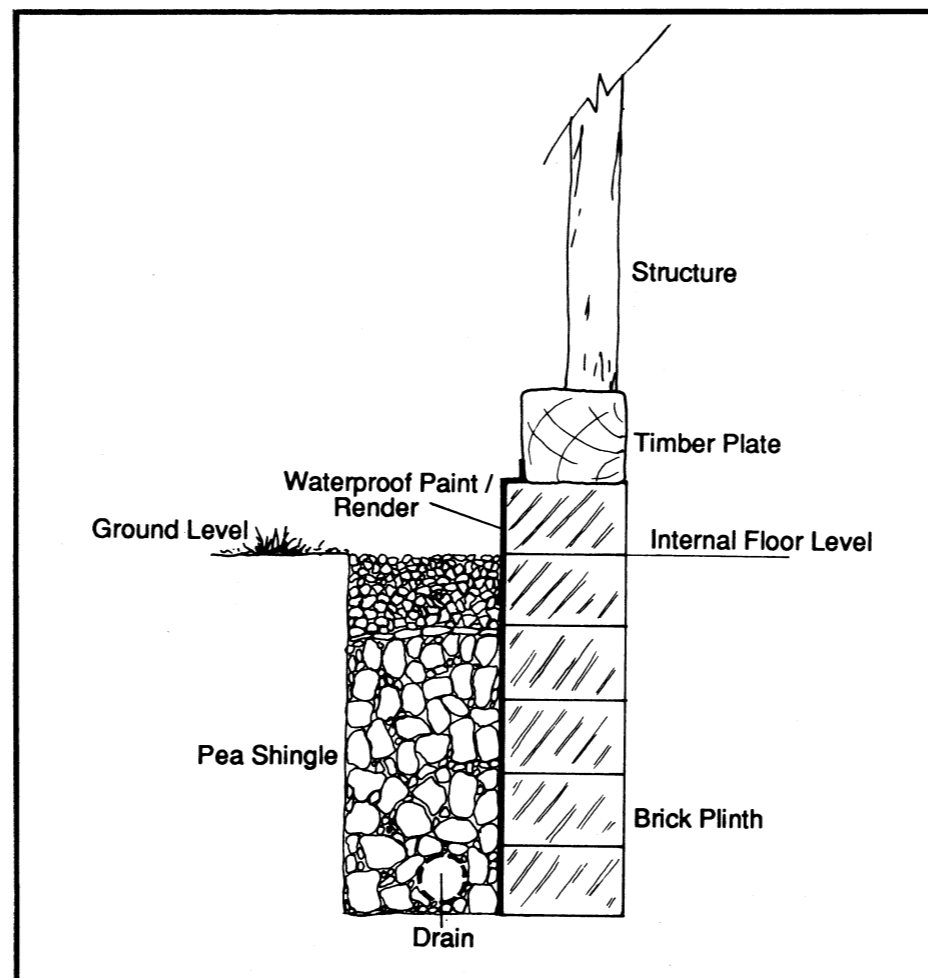
IDENTIFYING FAILURE AND THE APPROPRIATE METHOD OF REPAIR

This leaflet does not attempt to cover this subject in detail, but should offer initial guidance. For further advice contact your Local Authority Conservation Officer. It is essential to correctly diagnose the cause of failure before deciding on the appropriate treatment. Failure may be the result of damp, structural weakness or insect attack. It may even be a combination of all three.

Damp: Oak is a first class building material and when protected from damp, in a reasonably ventilated situation, will last indefinitely. Softwood is more prone to serious levels of decay. When claddings are removed, some areas of deterioration will usually be revealed.

Rising damp: Usually identifiable internally by a tide mark up to a metre from the ground floor level. Mildew, peeling wallpaper, perished plaster and rotting wainscoting are all signs of rising damp. Many timber frames are built either directly on top of compacted earth or on shallow plinths of brick or stone. Often the external ground level has risen over the years until it may be at the same level, or higher, than the ground sill beam. In this event rising damp can be anticipated and it is usual to find both the ground sill and the feet of the studs have decayed and may have been patched or renewed on previous occasions.

Treatment: Trenching around the building will ensure the ground level externally is lower than that inside. Filled with pea shingle the trench will assist in avoiding future problems with rising damp. With solid walls or plinths, ensure that the air bricks remain unobstructed to ensure ventilation of internal suspended floors. If the ground sill beam is to be renewed, in whole or part, it should be bedded in lead to act as a damp-proof membrane. Where possible, lead should also be inserted under any sections of original plate being retained.



Rainwater penetration: Leaking gutters, downpipes or holes in the roof will have allowed water to penetrate top plates and rafter feet, inviting subsequent decay and beetle attack. Where rainwater has been able to penetrate behind claddings, such as render, weatherboarding or brick, decay and rot of the timber can be anticipated. Junctions between panel filling and studs are particularly vulnerable. It is therefore essential to locate where water is penetrating and to examine carefully the adjoining timber structure.

Treatment: Quite simply, the most effective treatment is to ensure that all rainwater goods are in proper working order and correctly direct the rainwater well clear of the building. Ensure that any holes in the fabric or cracks in the cladding are repaired as soon as possible to avoid any further ingress of water.

Wet Rot and Dry Rot: Wet Rot is found in very damp conditions and is often associated with wet ground or timber set into wet masonry. Both hard and soft woods are vulnerable to attack, with blackish brown strands spreading in a fan fashion over the surface of timber and walls. Fruiting bodies are rarely seen. The timber takes on a dark brown colour with cracking along and across the grain. Dry Rot is usually found in softwood, although hardwood can also be vulnerable. Damp unventilated conditions encourage its growth. Fruiting bodies, matted grey skins and thin grey strands give some visual clues to the presence of dry rot. The timber will look light brown in colour, dry and embrittled. It will have deeper, cuboidal cracking, than found with wet rot.

Treatment: If you suspect wet or dry rot is present specialist advice must be sought. Standard treatment for infected wood may be summarised as follows:

- 1 Expose all timber possible to determine the full extent and type of attack. If dry rot is suspected, check behind the plaster on both sides of the wall and over ceilings.
- 2 Locate the original source of moisture and remedy it.
- 3 Cut out all infected timber. With dry rot, cut away and burn timber within 50cm of the outbreak.
- 4 Thoroughly clean away all debris which may be infected.
- 5 Provide adequate ventilation of suspended floors, eaves and other roof spaces.
- 6 If dry rot is suspected, remove all plaster indicating its presence, thoroughly clean the wall and irrigate, using boreholes, with a suitable fungicide.
- 7 Flood sound timber in the vicinity of all rot by three brush or coarse spray applications of fungicide (first remove paint/varnish etc).
- 8 Ensure new timber is well seasoned and treated with preservative.
- 9 Treat selected specified areas with fungicidal paste.
- 10 Continue to inspect at regular intervals.

Emphasis must always be laid on the need to keep the moisture content of buildings within 'safe limits' if timber is to be protected. Sources of damp penetration must be cut off and over insulation avoided, always ensuring adequate ventilation is maintained to timber frame members.

Control of environmental conditions as a means of containing potential fungal spread, rather than wholesale destruction and sterilisation, is one of the most important developments of the past few years. This method of treatment does require regular and conscientious monitoring but can provide a more positive guarantee against further trouble than the approach described above.