9 Timber Decay and Insect Attack

9.1 Introduction

Every year enormous sums of money are spent on repairing the damage caused by timber decay and insect attack (Ridout, 1999). It can cost several thousand pounds just to reinstate timber attacked by dry rot in a single house. A considerable amount of this damage could be prevented if the conditions which favour this type of fungal decay were more generally understood, and all necessary precautions taken to check any outbreak. Occupiers of buildings do not always appreciate the fact that dry rot can exist with no visible evidence on the surface of the wood. If timber in a building is properly seasoned before it is used and is subsequently protected against the penetration of damp it will not decay. Most outbreaks of dry rot are due either to faulty construction or to the lack of proper maintenance, particularly defects in the rainwater disposal system.

The surveyor who undertakes to examine a building in order to assess the damage caused by dry rot, wet rot or beetle attack should have sufficient knowledge of timber pests and their control to be able to identify the fungi or insects. There are several technical publications on this subject obtainable from the Building Research Establishment and Timber Research and Development Association (see list in Bibliography). The surveyor should also have a sound knowledge of the ventilation and insulation of buildings, surface water drainage and damp problems in the structure as described in Chapter 8.

DRY ROT

9.2 Description

Dry rot is the most common form of fungal decay in timber and one of the most serious as far as the surveyor is concerned (BRE Digest 299). The fungus, *Serpula lacrymans*, feeds on softwood in moist and poorly ventilated underfloor timbers and in conditions favourable to its growth it will spread and affect large areas of timber. It produces very light and minute spores which float about in the atmosphere; alight on timber and destroy the fibres, finally making it brittle and decayed

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both along and across the grain, and the cube effect thus produced is characteristic. The growth thrives best at a temperature around 23°C and therefore spreads more rapidly during the summer months. While the fungus is growing it forms white cotton-wool-like cushions with patches of bright yellow, and its feelers can creep across the brickwork, stone or plaster to attack timber in other positions which may be comparatively dry. The fungus is likely to attack timber having a moisture content above 20%. A great quantity of spores are produced by the fruit body of the fungus, and are often widespread as a red dust throughout a room.

9.3 Diagnosis

Below are listed some of the most likely places where dry rot is a possibility in a neglected building:

- In timber around floor construction where there is no DPC or the DPC is defective, and the ventilation is inadequate.
- Flat roof construction which is usually unventilated. Dry rot attacks are not only caused by defects in the roof coverings but also through penetration from parapet walls.
- Where timbers are built into brickwork or otherwise concealed, for example, built-in floor joists, timber lintels (called 'safe lintels') in old properties, and fixing blocks.
- Timbers supporting parapet gutters or valley gutters in pitched roofs (often poorly ventilated). Boarded roofs are also prone to dry rot attack.
- In skirtings and panelling to walls. Also around door and window openings. Internal window shutter boxes in old houses are particularly prone to dry rot attack. A slight waviness on the painted face of these materials can indicate that the back of the member has been attacked by dry rot.
- In basement construction where there is no damp-proof lining and poor ventilation.

In the first case described above the ground floor construction is the most likely place for dry rot to appear. The construction consists of timber joists supported on sleeper walls built of the site concrete. If the sleeper walls are well provided with honeycomb openings, and the external walls have enough air vents, the circulation of air may be sufficient to carry away the moisture and so prevent the fungus starting. However, it often happens in course of time the air vents become clogged or covered with earth (see Chapter 8). Pockets of stagnant air and rising damp through poor quality site concrete or brickwork are the primary contributory causes of fungal decay. The timber will absorb the moisture and so produce the fungi which decompose the wood. Figure 9.1 shows ground floor joists badly affected by dry rot attack.

Usually, the first indication of dry rot is the appearance of fruit bodies or spore dust. The fruit bodies have a fleshy consistency in the shape of a plate

Figure 9.1 Dry rot spore dust in floor joists and partition. Reproduced by permission of Harsco Infrastructure

about 300 mm in diameter growing out of cracks in a skirting or wall panelling. If the underfloor joists are badly affected by dry rot it will not necessarily show on the boarding, especially if it has been covered with a permanent finish such as linoleum or tiling, but a useful indication of an attack is the spongy depression in the floor covering which is characteristic. A further indication of the presence of dry rot is a musty smell, but the decay is usually well advanced before this is apparent.

Dry rot may also occur in floorboards that are laid on timber fillets either resting on top of the concrete slab or embedded in. If the underside of the concrete is exposed to damp this will creep into the fillets or attack the underside of the floorboards.

Another likely place is parapet gutters or valley gutters in pitched roofs. Trouble usually arises when damp penetrates the roof coverings which may be due to cracked or missing tiles, or parapet walls due to rain penetrating the brickwork. An examination of a pitched roof can be complicated, and if it is large it is advisable to divide the roof area into sections giving each rafter, collar or purlin a number and use corresponding numbers in the report. Wall plates and lower ends of rafters are often hidden particularly if they are under parapets or valley gutters. In such cases it may be necessary to remove some of the tiles or slates to the eaves in order to expose the feet of the rafters and wall plates. These areas are the most vulnerable parts of the roof structure. Never be satisfied until these areas have been examined. Fascia and soffit boards are likely to be suspect. The backs of these timbers are unlikely to be protected other than by a coat of primer, and in most cases are in contact with the brickwork, thus the conditions for dry rot attack are produced.

The interiors of many domestic roofs are unlit so always carry a powerful torch or handlamp. This piece of equipment is very necessary when trying to locate timber decay or small holes made by the furniture beetle. To probe the wood, use a bradawl or small screwdriver. Decayed timber can be pierced without difficulty while the fibres of sound wood grip the point. For testing large sections of timber for fungal attack use a large gimlet. If the timber is sound when struck a ringing note will be heard in contrast to a dull sound if the timber is decayed.

The dry rot fungus produces hyphae which can grow over brickwork and penetrate the wall or ceiling plaster. Their presence is indicated by raised 'blisters' or cracks in the plaster. The hyphae can carry water to dry timber, and where they come in contact with door frames and skirtings etc., it is likely that dry rot will be found.

WET ROT

9.4 Description

Wet rot is the most common of the fungi and requires timber with a high moisture content (usually above 25%) to thrive, but it does not have the ability to penetrate into masonry, and because of this is usually localised (BRE Digest 345). The most common of the wet rot fungi found attacking building timbers are the cellar fungus (*Coniophora puteana*) and the pore fungus (*Poria vaillartii*). The wet rot fungus requires very damp conditions to germinate and a continuous supply of moisture for its existence. Once the source of moisture is removed the fungi will die.

9.5 Diagnosis

Much wet rot fungus in external joinery has been reported in recent years (BRE Digest 345). A high percentage of this type of rot has been due to rainwater penetration on the external faces and condensation on the internal faces. A contributory cause has been rain penetration through defective tenon joints in windows and doors. A close inspection of these areas is essential, particularly at the bottom of each vertical member. Sills and jambs which abut the structural walls should be carefully examined. External door panels must be considered suspect because internal grade plywood is often used for the panels. Owing to damp penetration the ply becomes wrinkled and split at the edges. Glazing bars are particularly susceptible where the putty or glazing beads have broken away.

Cellar rot requires very wet conditions in which to grow and is found in cellars and similar situations below ground. The cracks run longitudinally with the grain and the fruit bodies, which are rarely found in buildings, consist of olive green strands when fresh but soon darken to a dull olive brown. Unlike dry rot it does not extend its activity beyond the area of dampness.

Roof timbers are sometimes affected by wet rot resulting from defects in the roof coverings, and this usually involves the replacement of the defective timbers. The most vulnerable parts of a timber roof structure are those situated under gutters or buried in masonry. Early slate or tiled roofs with no underlay provide good ventilation to the roof timbers, so although the rafters may be damp stained they may not have rotted. Floor joists are also affected, particularly joists built into outer walls which are often inaccessible. External timbers such as fences and gates, even if treated with a preservative, are liable to deteriorate when exposed to ground moisture.

The surveyor should always remember that the wet rot fungus is of microscopic size and is invisible to the naked eye. Consequently, the moisture meter must be used to ensure that the full extent of the rot has been detected.

BEETLE ATTACK

9.6 Description

In recent years beetle attack has had much prominence and is probably the prime reason for a property owner seeking a structural survey. Beetles of various types breed and live in the cellular structure of the timber and the four most common in this country are described below.

9.6.1 Furniture beetle

In the majority of cases of infestation the furniture beetle is the most common. This is a small beetle about 3–5 mm long, reddish to brown in colour and has rows of fine pits longitudinally along the wing cases. It is clothed with a fine covering of short yellow hairs. The life cycle is 1–3 years. The flight holes are 2–3 mm in diameter. The eggs are laid in cracks and joints and hatch out 3 or 4 weeks after laying. The grub leaves the eggs, boring straight into the timber and tunnelling along the grain. The bore dust consists of cylindrical pellets, gritty to the touch. They attack seasoned softwood, but also attack the sapwood of hardwoods and plywood.

9.6.2 Powder post beetle

The beetles are about 5 mm long, elongated and reddish brown to black in colour. They have no hood over the head. The life cycle is approximately 1 year. The flight holes are circular in shape and are about 3–4 mm in diameter. The female lays 30–50 eggs during a season. The grub is about 6 mm long and yellowish white in colour with brown jaws. The grubs begin boring along the grain and later branch out in all directions. The bore dust consists of a very fine flour-like powder. The beetle only attacks hardwoods and usually the sapwood. Softwoods are never affected.

Figure 9.2 Effects of death watch beetle. Reproduced by permission of Harsco Infrastructure

9.6.3 Death watch beetle

The death watch beetle derives its name from the tapping sound both sexes make during the mating season. This is a larger beetle, about 6–8 mm long, chocolate brown in colour, spotted with thick patches of short yellowish grey hairs. The life cycle is 1–11 years. The flight holes are circular, about 3 mm in diameter. They lay their eggs in crevices or knots or old flight holes and the eggs hatch in 2–8 weeks. The grubs wander over the surface before tunnelling. The bore dust contains coarse bun-shaped pellets. The beetle is often found in

old hardwoods, usually oak and chestnut, and most damage occurs in built-in parts of a structure such as end beams, wall plates and poorly ventilated places (Figure 9.2).

9.6.4 House longhorn beetle

This beetle was originally confined to the northern parts of Surrey, but has now been reported in parts of Hampshire and Berkshire. It is a large beetle around 10–20 mm long. The life cycle can last up to 10 years. The flight holes are oval, 10×5 mm and are widely spaced. The bore dust consists of finely divided wood dust and the excrement consists of short cylinders almost as broad as they are long. The beetle is usually found in the sapwoods of softwood and can cause serious damage particularly in roof timbers. The Building Regulations require that all timbers in the above-mentioned counties should be treated with timber preservatives.

9.6.5 Termites

Climate change in the UK has increased the risk of termite attack to timber in buildings, especially in the south of England. The potential damage that termites can make to timber is extensive (see BRE Digest 443).

9.7 Diagnosis

In the first instance, it is necessary to identify the type of insect and the extent of the outbreak before considering what remedial measures are necessary. Also a knowledge of the life cycle of the beetle is helpful which can be summarised in the following four stages:

- The egg laid by the beetle.
- The grub which develops from the egg.
- The pupa where the grub works into the timber surface.
- The pupa changes into an adult beetle and emerges from the timber to lay further eggs.

It is in the second stage that most of the damage is done to the timber as it is eaten for food.

The examination of timber floors involves a close inspection of all visible timbers with the aid of a torch and bradawl. This can be a very tedious operation requiring much patience. When dealing with floors it is often only possible to remove occasional floorboards for checking the undersides where exit holes are usually found. Evidence of a recent beetle attack is usually identified by clearly formed exit holes and piles of dust on the horizontal members. The beetles themselves can also be seen during the following periods:

- Furniture beetle – June to August.
- Powder post beetle – April to October.
- Death watch beetle – April to June.
- House longhorn beetle – June to August.

When dealing with roof structures the surveyor must remember that the most vulnerable parts are those timbers which are under parapet gutters or partly buried in masonry, such as ends of tie beams and wallplates. The death watch beetle will often attack these inaccessible parts of the structure especially under leaky gutters which may be invisibly infested with fungus as the fungus grows as a result of damp conditions. Roofs of old farm buildings are particularly prone to beetle attack, usually the furniture beetle.

Timber joists supporting the flat roofs or valley gutters may be impossible to examine and if so, this must be clearly stated in the report.

Roofs constructed of softwood and particularly if they are over 20 years old are often attacked by the furniture beetle. Old buildings with hardwood roof structures are often neglected and when examined will often be found to be riddled with furniture or death watch beetle. Another serious timber pest found in roof structures is the house longhorn beetle. This type of infestation can cause far more damage in a much shorter time than other types of woodboring beetle. The insect often works below the surface of the timber for many years before emerging and is not easily detected until considerable damage has occurred.

9.8 Conclusion

It should be remembered that treatment of large outbreaks of dry rot or woodboring beetle is generally beyond the capabilities of the average builder. During the past 30 years there have been many changes in the way that most outbreaks of these timber pests are being tackled. Very few surveyors at the present time are asked to examine property and report on dry rot and insect attack and appoint a builder to carry out the work. Most property owners now engage specialist certified contractors who usually employs their own surveyors who have been trained in this type of investigation. Names and addresses of such firms are usually obtained from Yellow Pages or from advertisements in various magazines. The advantage of employing a specialist is the fact that they will guarantee the work and will no doubt use proprietary solutions obtained from recognised manufacturers which are guaranteed to be effective. The object of the treatment is to destroy the beetle infestation in all its stages. This operation is best carried out during the period of greatest activity, namely spring or summer.