

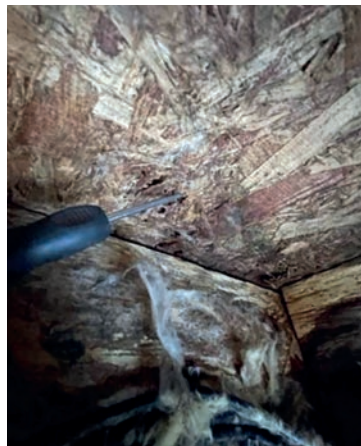
CROSS Safety Report

Durability issues with engineered timber

This month's report concerns durability issues with engineered timber due to water ingress or condensation issues. Engineered timber appears to disintegrate more quickly than conventional timber, resulting in structural failure rather than distortion.



↑ **FIGURE 1:** An example of OSB board deterioration



↑ **FIGURE 2:** Another example of OSB board deterioration



↑ **FIGURE 3:** Engineered timber joist deterioration

Report

Following three recent surveys, the reporter has concerns about durability problems with engineered timber when there is water ingress or condensation. While this does not necessarily relate to an issue with the engineered timber product itself, there appears to be significantly more disintegration than with conventional timber components which results in failure rather than distortion.

Structural failure of primary support members has been observed by the reporter, with rapid deterioration of the timber product compared to traditional timber. Examples of the issues are illustrated in Figures 1–3.

Figure 1 shows a top floor property within a development less than 15 years old. Water ingress and possibly condensation issues have resulted in significant deterioration of the engineered timber rafters and oriented strand board (OSB) sheeting.

Figure 2 also shows a top floor property within a development again less than 15 years old. Water ingress and possibly condensation issues have resulted in significant deterioration of the OSB sheeting. The engineered rafters have been saturated but they are still sound in this case, although they have areas of cracking after drying out.

Figure 3 shows a dwelling less than 13 years old. Again, this issue is likely a combination of water ingress and possible condensation issues because it has been designed as a passive house with high levels of insulation and cold bridging may have resulted locally. Engineered timber products were specified on the original plans, with glulam ring beams which the reporter notes have deteriorated significantly.

The reporter concludes that care is needed when specifying the circumstances in which engineered timber products will be used.

Expert Panel comments

In the UK, timber frame construction and the use of engineered timber products does not have the long history of traditional masonry and timber construction, however it is likely the issues highlighted by the reporter

Key learning outcomes

For designers:

- | Detailing to ensure watertight construction is particularly important with engineered timber components
- | The introduction of high levels of insulation can lead to condensation build up and subsequent deterioration of engineered timber components

For designers, surveyors and building owners/occupiers:

- | CROSS would be pleased to receive reports of similar instances

are related more to poor detailing or poor maintenance with regard to water ingress and condensation than the choice of timber based material. The problem is not so much that engineered wood products are less durable compared to solid timber but that, with increasing use of these products and systems, it is apparent that some parts of the industry need to better understand the do's and don't's of timber frame construction and the higher requirement for excluding water from such construction.

However it occurs, the presence of moisture in contact with wood based products can lead to difficulties and should be avoided. The most common causes of moisture build up are condensation and leaks.

CROSS is aware of considerable anecdotal feedback that 'durability' is not given the design attention it deserves, in particular the avoidance of water ingress through roof coverings, the avoidance of condensation and the limited ability to identify issues related to these before they may become so advanced as to require significant remedial measures.

CROSS Safety Report 852 – Rotting of cross-laminated timber (CLT) roof panels covered similar issues:

'What the reporter describes could be condensed water vapour dripping back into the building due to poor detailing or construction of the roof covering. BS 5250:2011 *Code of practice for control of condensation in buildings* gives guidance on the risks associated with excessive humidity in buildings, notably mould growth and condensation. Both can compromise the integrity of the building fabric. It describes the principal sources of water vapour, its transportation and

deposition, and provides guidance on how to manage those risks during design, construction and operation.'

Typically, the onset of decay starts when the moisture content of timber is over 20%. When there is a significant amount of trapped moisture or water collected during construction, the timber will begin to deteriorate. If moisture or water is continuously fed to the timber via roof leaks and/or condensation and it is not able to dry, then the rate of decay is accelerated.

If a material is only suitable for a dry environment, then it is essential that water ingress is prevented by sound detailing and correctly applied coverings. Maintenance is similarly essential and owners should be vigilant in taking action if there are observable leaks or excessive condensation.

Sometimes the use of the wrong sheathing board could also account for the sorts of defect noted within this report. The National House Building Council (NHBC) and other warranty providers have specified what sheathing material specification are acceptable on a residential site, for example NHBC Standards Clause 6.2.7.

There were press reports several years ago of issues with timber framed housing in New Zealand and Canada that in both cases led to extensive repairs and financial difficulties for homeowners.

The full CROSS Safety Report, including links to guidance mentioned, is available on the CROSS website (report ID: 1275) at www.cross-safety.org/uk/safety-information/cross-safety-report/durability-issues-engineered-timber-1275.

What is CROSS?

Collaborative Reporting for Safer Structures (CROSS) helps professionals to make structures safer by publishing safety information based on the reports it receives and information in the public domain.

CROSS operates internationally in the UK, US, and Australasia. All regions cover structural safety, while CROSS-UK also covers fire safety.



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The **Structural Engineer**

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The Drawing Board is *The Structural Engineer's* quarterly sketching competition, judged by Ron Slade FStructE of WSP.

Sketches must be:

- hand drawn (no CAD, except for 'guided free-hand')
- from a real project or assignment
- at a suitable scale for publication (i.e. not too intricate/detailed).

Please also submit a short description (150 words) to put the sketch into context.

To take part, submit your entries to: tse@istructe.org

Each published entry will receive a free single e-book from the Institution's current list of titles.

Background sketch by Kevin Lyons (Lyons O'Neill)