Planning the reuse or recycling of structural timber in redevelopment projects

A practical guide

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Contents

Introduction

When redeveloping buildings, the new design cannot always reuse the existing structural frame in its current form - but the building may still contain **valuable structural timber elements** that can be **deconstructed and reused** in the new building. In this scenario, reused structural timber elements are not resold, but it is still necessary to **quantify their performance** and confirm they are suitable for reuse.

This document provides a simple guide for planning **a safe and resource-efficient process to reuse timber structural elements** in building redevelopment projects, aiming to save as much of the resource as possible. This process can be part of a pre-demolition audit or any redevelopment process where timber structures are involved.

This document is accompanied by an infographic giving an overview of the steps required to safely reuse structural timber in renovations.

*Please note: This guide provides an overview to help plan redevelopment. It does not provide any specific advice on assessing timber for reuse. **Expert advice, from competent professionals, is always needed** to ensure building safety and compliance with regulations and standards.*

Reusing structural timber in redevelopment projects

1. Assess reuse potential in the early stages

- **Conduct expert visual inspection** of structural timber in the existing building. Note: This can be done as part of a pre-demolition audit. It requires drawing from experience to anticipate likely issues with the structural timber hidden in areas that cannot be seen until deconstruction.
- Guided by the expert's assessment, it may be useful to **carry out in situ non-destructive testing (NDT)** to assess timber condition and likely properties (e.g. density, stiffness).
- Use expert knowledge to estimate timber quality and condition and check documentation (e.g. markings, records) for timber identification, previous grading, and load history.

2. Make a first reuse feasibility assessment

- Estimate the **quantity, quality, dimension,** and likely **properties** of reusable timber.
- Decide whether to:
    - Continue with the reuse plan (if adequate quantity/quality is available).
    - Redirect timber to **non-structural uses** or **recycling streams** (if reuse is not viable).

3. Integrate reuse into design

- If reuse is promising, **incorporate reclaimed timber early in the design phase**. Designing with the reused timber in mind is likely to be more successful than trying to fit the reused timber as a simple substitute for new timber.
- Design based on the **actual expected properties** (characteristic strength, stiffness, density) of the reused timber – **not generic strength classes** like C24. Using generic strength classes would likely mean under-utilising the potential of the timber.
- Compare this reuse-based design with other construction options to determine if the project is still feasible with reuse.

4. Plan deconstruction and storage

- Prepare a detailed **deconstruction plan**, ensuring timber elements can be safely removed and stored without damage.
- Set up appropriate **temporary storage** for reusable elements within the project schedule. Not planning ahead risks the reused elements interfering with site work, or being damaged before reinstallation.

5. Execute careful deconstruction

- **Deconstruct the existing structure** carefully to protect the timber intended to be reused.
- **Sort timber on site:**
    - **Reusable timber** → for further processing and strength grading.
    - **Non-usable timber** → for non-structural use or material downcycling.
    - **Hazardous material** → dispose of appropriately.

6. Reassess post-deconstruction

- Confirm if the **quantity and quality of recovered timber** meets the expectations set during the initial assessment. It may be necessary to adjust the design for reuse.
- Decide whether to:
    - Proceed with structural reuse.
    - Redirect timber to other uses if it falls short.

7. Clean, repair, and resize timber

- **Clean** recovered timber as necessary. This includes removal of metallic fasteners if the timber is to be resawn or planed.
- Carry out any required **repairs**.
- If necessary, **plane or resaw** timber to the required dimensions for the new building. Ideally, the design should lower need for this to a minimum to reduce time and cost.

8. Strength grading and property assessment

Strength grading reclaimed timber requires specific supporting information, learn more in our dedicated infographic.

- Use gathered information from records and markings (species identification, markings, previous grade) to support the **strength grading** process.
- Grade timber based on **specific, actual performance needs of design**, not generic strength classes designed for easy trade, e.g. C24. This will ensure more effective reuse and better grading yields.
- Ideally the design is limited by stiffness, e.g. deflection or density, e.g. connection design, because these properties can be assessed by **non-destructive measurement**.
- If strength of the reused elements is safety critical (depending on design and assessed strength) it may be necessary to conduct load testing:
    - Perform **proof testing** of all elements (being watchful of damage).
    - or **destructive testing** on a sample (which reduces the quantity of timber left for reuse).

9. Final adjustment and go/no-go decision

- Use strength grading results to:
    - **Confirm viability** of the reuse plan.
    - **Adjust design** if necessary based on strength grading (design properties and pass rate).
- If timber does not meet structural reuse criteria:
    - Reassign to **non-structural** use or **downcycled** applications.

Key considerations

- Start the assessment **early in the project lifecycle** to reduce the risk of abandoning the reuse plan later and incurring unnecessary cost.
- Integrate reuse into design from the outset, increasing the chances of success. Ideally the design should cover **optimistic and pessimistic scenarios**.
- Focus on **actual performance**, not standard generic timber classes, which would almost certainly not use the reused wood to its real potential, e.g. rejecting timber for not being strong enough when the actual need is stiffness or density.