Durability considerations of external use of Engineered Timber (EWP) by Craig Kay.

Acknowledged as the oldest wooden building in the world, the Horyugi Temple in Japan was constructed around the year 700AD with 26 other buildings in the complex built before 800AD. In North America, covered timber bridges were popular in the 19th century, with the Hyde Hall Bridge in Oswego County. NY. built circa 1825.

Both the temple and the covered bridges are examples of design masterpieces that allowed untreated wood to survive, in the case of the temple, for over 1300 years. The basic design premise employed is to carefully detail the structure to limit exposure of the wood elements to water, an essential element for biodeterioration. Extensive use was also made of sacrificial timber elements to keep the water away from structural component that could be replaced easily during routine maintenance.

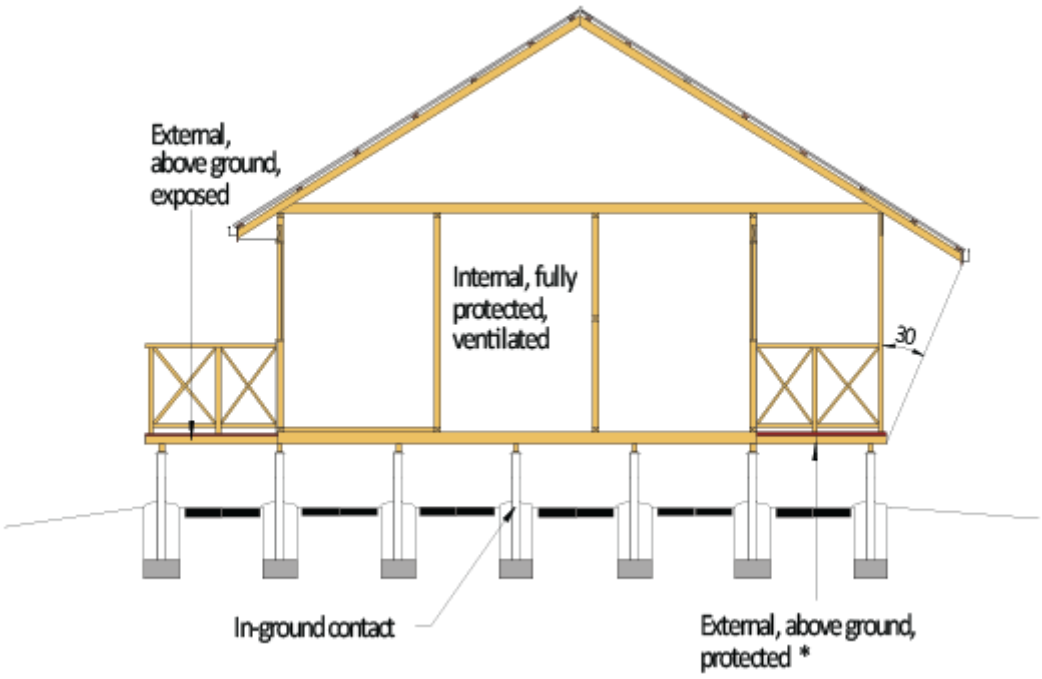
Fast forward to the 21st century where the designer, builder and homeowner are presented with a bewildering array of building products to use both inside and on the outside of their house. With EWP taking over from most large section solid timber elements, there is a need to educate industry professionals about when or where elements made for EWP should or should not be used externally to replace the traditional, but now limited volumes of naturally durable timber.

The majority of EWP’s are manufactured from a class 4 natural durability (AS

5604-2005) plantation wood fibre which in its natural state, has a probable external above-ground life expectancy of 0-7 years. To compensate for this low natural durability status, these products are preservative treated either against insect or other biological hazards or both, to make them fit for purpose for their intended end use. AS 1604.1 identifies these biological hazards by use of a hazard class number to identify the degree of biological hazard, with Hazard Classes H1-H6.

External, above-ground applications subject to periodic moderate wetting and leaching (e.g. facia, pergolas, window joinery, framing a decking) are classified as a H3 Hazard Class. Historically, the H3 preservative treatment processes were developed to give a piece of solid or round timber of class 4 Natural Durability similar durability to that of timber of Natural durability Class 2. (probable external above-ground life expectancy of 15-40 years).

Fig B1 - Species Selection for Durability within Appendix B of AS 1684.2:2010 gives general guidance on the natural durability class or appropriate level of preservative treatment (hazard level) required to give an acceptable service life for various applications in the construction of timber-framed Class 1 and Class 10 buildings. This appendix is classified within this standard as “informative”, thus while it is not an integral part of the standard, it is included for guidance, and depending upon the situation and some climatic conditions, the recommendations may need to be amended to suit.



*External timbers are regarded as protected if they are covered by a roof projection or similar to the vertical if the are well detailed and maintained.

This Figure above shows four (4) different regions within the building envelope and identifies the natural durability class or appropriate level of preservative treatment (Hazard Level) required to give adequate service life.

External, above-ground, exposed	• Above-ground durability class 1 timber with sapwood removed or sapwood preservative treated to H3 • Above ground durability class 2, 3, or 4 timber preservative treated to H3
Internal, fully protected and ventilated	• In- or above-ground durability class 1, 2, 3 or 4 timber
External, above-ground, protected	• In- or above-ground durability class 1, 2, 3 or 4 timber
In-ground contact	• In- ground durability class 1 timber with sapwood removed or sapwood preservative treated to H5 • In- ground durability class 3 or 4 timber, preservative treated to H5

With the ever-increasing prevalence of alfresco dining areas and patios (covered decks) there is a corresponding increase in the use of EWP both as bearers and joists and post and beams for the roof structure.

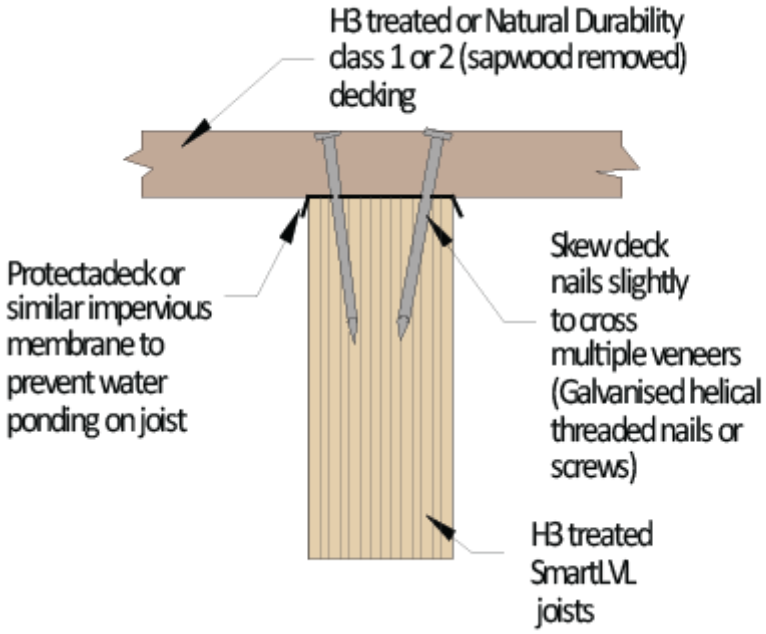
Despite this Figure above being contained with AS 1684, a form of it reproduced within the Design Guides of reputable EWP suppliers and further advice are contained within Wood Solutions Design Guides, experience unfortunately confirms the old adage “if all else fails, read the instructions” is alive and well.

If we focus on EWP bearers and joists that are deemed external, above-ground, exposed, we therefore require these elements to be preservative treated to the H3 hazard class. Notwithstanding being H3 treated, every reputable EWP supplier providing installation instructions also mandates that the elements must be detailed to consider the following key factors:

- Shielding
- Drainage
- Ventilation
- Maintenance

Shielding

Shielding works by blocking or deflecting weather and moisture from direct contact with the EWP structure. It is especially important to prevent moisture being able to lay on horizontal surfaces of the EWP such as deck joists, especially the edge.



Reputable EWP suppliers also recommend the use of acrylic paint to all surfaces to protect the element from UV sunlight and general weather exposure. One major EWP manufacturer also includes in their Technical Data Sheets that parts of the EWP exposed to the sun be sheeted and top/end capped.

Drainage

EWP members and connections should always be designed to allow free drainage of water to prevent the development of moisture traps.

Ventilation

Ventilations is essential to prevent moisture accumulation from a variety of sources including rain, condensation and rising damp under subfloors. Building in of air gaps between members allows better ventilation.

Maintenance

Maintenance of any weather exposed elements is essential to the successful performance of EWP in weather exposed applications:

1. Prevent debris build-up between decking and joists. This debris can hold moisture create a bridging for water between adjacent elements.
2. Create a regular maintenance scheme with inspections to focus on key areas such as:
    a. All horizontal surfaces
    b. Integrity of the paint system
    c. Joints, end grain and fasteners
    d. All capping elements

In precis, this means excellent detailing and regular maintenance. It is that simple.

By following these principles, EWP, with its many length and spans benefits in

the alfresco and patio applications, should provide the desired life expectancy, even if it may not be around 1300 years like the Horyuji Temple in Japan.