



CLT PANELS THAT HAVE BEEN TREATED TO STAY FREE OF DECAY AND WOOD-DESTROYING ORGANISMS INSIDE FINISHED AIRPORT

Source: Mitsubishi Estate

CASE STUDY: SHIMOJISHIMA ISLAND AIRPORT

TREATMENT ENSURES SUSTAINABILITY THROUGH DURABILITY

PROJECT OWNER: SHIMOJI ISLAND AIRPORT

PROJECT LOCATION: TROPICAL ISLAND (SHIMOJI) NEAR OKINAWA, JAPAN, SAWADA-1727, IRABU, MIYAKOJIMA, OKINAWA, JAPAN, 906-0507

COMPLETION DATE: MARCH 1, 2019

ARCHITECT/DESIGNER: NIKKEN SEKKEI LTD.

MASS TIMBER ENGINEER/MANUFACTURER:
YAMASAMOKUZAI CO. LTD.

GENERAL CONTRACTOR: MITSUBISHI ESTATE CO. LTD.

CROSS-LAMINATED TIMBER (CLT) is a relatively new construction method that allows multistory construction using solid wood instead of concrete or steel. Because a natural organic material is used, durability against mold and wood-destroying organisms is a concern. Even if it were possible to permanently keep the wood dry to prevent wood-rotting basidiomycete fungi, some pests can attack wood that is wetted temporarily (e.g., mold fungi) or even relatively dry wood (e.g., drywood termites).



CLT PANELS INSIDE THE FINISHED AIRPORT

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Borates—especially polyglycol borates for dry wood—have the advantage of being effective against both decay fungi and insects at low retentions, and even are bait toxicants against subterranean termites at low retention. Such approaches have been successfully used in residential construction in the US for decades. The use of an inorganic salt as the active ingredient is also good in topical applications where organic systems can be destroyed by ultraviolet light during construction.

Even non-wood-destroying insects such as psocids and cockroaches can be controlled via the use of borate-treated wood. Borates have low acute mammalian toxicity and are globally available from a number of suppliers. Using topical treatments also ensures that all of the construction components are treated (the mass timber itself but also framing and plywood and other SKUs that typically go into a building), and borates have the unique advantage of diffusing into even refractory wood species.

In this project, topical treatment was carried out using a 40 percent DOT glycol borate diluted at a 1-to-1 volume dilution in water (Bora-Care to equal

a 23 percent DOT solution concentration). A 0.8 percent didecyl dimethyl ammonium chloride (1 percent as Mold-Care, available commercially from Nisus Corporation) was added as a surface moldicide. The diluted material was applied with roller coating at Yamasamokuzai Co. Ltd., the CLT manufacturer.

An application of 300 milliliters per square meter was used in compliance with Japan Wood Protection Association requirements to treat 6,000 cubic meters of CLT. This concentration and application rate was chosen to help drive diffusion over time, to protect against subterranean termites and other wood-destroying organisms, to enhance spread of flame performance, and to supply some reservoir to compensate for dilution because of diffusion into the wood.

The inaugural direct flight from Narita to Shimojishima occurred on March 30, 2019, and many more flights will be able to land in an airport that is sustainable because of its durability—effectively storing carbon and remaining free of decay and drywood termites and other wood-destroying organisms for decades to come. If mass timber, especially CLT, is to gain the position it deserves in future construction, it is essential that long-term durability is addressed, as suggested by wood experts globally. This project has shown that it is relatively easy and cost-effective to achieve.

This case study has not been fact-checked, but it has been edited for length, clarity, grammar, and style. 🟢