Asia Pacific

Lonza | Wood Protection

Mould on wood: identification, prevention and treatment

Example above shows mould affected wood on left which does not affect strength or stiffness. Example on right shows wood with advanced wood decay fungi attack which dramatically reduces strength as fibres are degraded and split perpendicular to the grain.

Introduction

Moulds are a class of simple fungi with many thousands of known varieties. They are ubiquitous in the environment and can opportunistically grow on or in a wide variety of materials given suitable conditions. The most important factors supporting mould growth are as follows:

- **Water** – Moisture present as free water or as moisture embodied in the affected substrate.

- **Nutrient source** - Some form of organic matter that provides nutrients. In many cases the substrate that the mould grows on provides the nutrients such as with organic materials like wood. However mould can still grow on inorganic substances such as concrete and brickwork and derive sufficient nutrients from other environmental sources.

- **Suitable temperature range** – while some moulds can grow at very low temperatures, and some can tolerate high temperatures, most moulds grow in a temperature range between 4°C and 40°C.

For the purposes of dealing with mould on wood products, an important distinction needs to be made between surface mould infection and more invasive wood decay fungi. Early onset surface moulds as typically seen on relatively new wood products do not materially change the wood structure so do not affect strength and stiffness of the wood product. Wood decay fungi which generally take a longer time to establish can degrade the wood structure by enzymatically breaking down the cellulose and/or lignin components of wood. This results in loss of structural strength and other physical changes in the wood product.

Appearance of mould infection

While not affecting the structural properties of wood as discussed above, the presence of mould can severely detract from the appearance and value of wood products. Moulds exhibit as filament like or amorphous growths on the surface with a wide variety of colour and appearance. Colouration of mould growth can range from white, yellow, pink, brown, green to black. Physical manifestation can be as delicate, fluffy filaments which are easy to brush away to a heavy surface film that adheres strongly to the surface. Dark coloured mould species such as *stachybotrys spp*, *tricoderma spp* and *aspergillis spp* have the most pronounced impact on wood appearance which can leave a permanent stain on the wood even after the mould growth is removed.

Above: Examples of different types of mould on timber

As moulds do not digest the wood itself, they can be resistant to normal timber treatments that are designed to protect against wood decay fungi and/or insects. Hence treated wood can still become mould infected if the moisture content is high as shown below.

Examples of mould on new treated decking timber sampled from retail sites.

Sources of mould infection

Mould and mould spores are almost universally present in the environment: in water, in the air, in vegetation, in soil, and on many surfaces. Spores in particular are invisible to the naked eye so lack of visible mould on a surface is not an indication that mould is not present. Thus outside of a micro-filtered air supplied and ultra-clean laboratory, avoidance of mould in that sense is not practical.

In a wood processing or retailing environment, mould spores can come from wood residue or wastes, log yards, forested areas and standing pools of water. Infection of freshly processed wood can commence within 24 to 48 hours in favorable conditions or under high mould spore pressure.

For wood products in the end use situation, mould spores can originate from multiple sources such as overhanging trees, overflowing guttering, proximity to the ground and composting ground cover like mulch. Spores from these sources can colonise surfaces elsewhere that have sufficient moisture content for an extended time.

Prevention of mould infestation

For wood processing and retailing sites, managing and minimising sources of mould spores is important in reducing the local pressure of airborne spores and the risk of mould infection. Hence site hygiene is important such as not allowing wood waste residues to persist on site and hard sealing wood storage areas. Where practical, freshly sawn or processed wood products should be stored away from or upwind of mould infection sources.

Example of poor site hygiene at top with waste and old logs in proximity to timber stored on unsealed ground. On the bottom is a good example of site hygiene with fresh timber on free draining hardstand surface well away from the log yard and sources of mould infection.

Example of an anti-mould chemical dipping operation to protect fresh timber from mould and stain

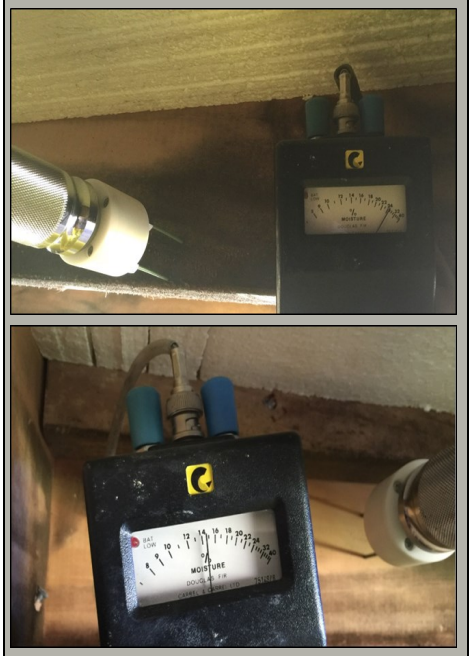
Freshly sawn wood should be treated with prophylactic anti-sapstain / anti-mould chemical or kiln dried immediately. Wood which has less than 20% moisture content is a lot less susceptible to surface mould. Once dry, wood products should be protected from rain and re-wetting while in storage. Contact Lonza for further details.

For timber treatment operations, where the wood will be left wet after treatment or if storage conditions are expected to be less than ideal, addition of an anti-mould additive to the treatment solution is recommended. These additives are low cost and effective in the short to medium term prevention of surface mould. Contact Lonza for further details.

In a retail or truss and frame manufacturing environment it is important to ensure that wood products are protected from rain and stored off ground contact so that excess moisture does not build up.

Stocks should be rotated regularly and any incidence of mould reported to the site manager to ensure that control measures are put in place.

In buildings, moisture leaks, condensation and ground proximity are the most likely reason for excess moisture and development of mould on wood and other surfaces. Hence, steps should be taken to ensure: weather tightness, storm and run-off water management, adequate ventilation, low indoor humidity and vapour barrier sheets on ground to prevent excess moisture developing within or on the building envelope.



With the examples above, at the top the mould affected timber is at elevated moisture content as shown by the moisture meter (approximately 24%). On the bottom, at another location in the same structure the timber is free of mould and at a lot lower moisture content (approximately 15%).

Treatment or removal of mould

Mould surfaces can be cleaned with readily available household or industrial bleaches and cleaners designed for such purposes (use as per manufacturer's instructions). However unless the underlying conditions giving rise to excess moisture are managed, the mould is likely to re-occur. In addition, as discussed above some moulds can leave a stain on the wood that is more difficult to remove. Sanding or planing the wood back to a fresh surface may be necessary in these cases if appearance is important. Avoid inhalation of dust from mould-infected timber.

QUESTIONS & ANSWERS

Does the appearance of mould mean that the timber will rot?

Not necessarily. As discussed, mould themselves do not cause decay of timber. However, the conditions that promote mould are also conducive to the development of decay fungi which can more seriously damage wood products. Also, treated timber that will be resistant to fungal decay may still exhibit surface moulds.

Does mould affect the structural grade of timber?

No, moulds do not digest the cellulose or lignin content of wood and hence do not cause structural weakening. However the excess moisture content in the wood as indicated by the development of mould may have other implications as discussed.

What is the best way to deal with mould infection?

Like many related issues, prevention is the best cure. Development of mould can be a symptom of underlying problems that are causing excessive moisture content to develop or reside in a wood product. For processing and storage sites, site hygiene, good stock management and anti-mould pretreatments where appropriate are the best ways to prevent mould development on wood products.

Dry wood should be kept dry (<20% moisture content) in which case the risk of mould developing is dramatically reduced.

If wood does become mould infected then application of bleach or a strong cleaning agent should be effective in removing it. Note that mould is likely to re-occur unless the underlying source of excess moisture is controlled.

Are there health hazards from exposure to moulds?

This has been reviewed extensively by the US Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO). While there is significant uncertainty in the validity of some anecdotal cases attributed to so called "toxic mould", there is a consistent body of evidence that exposure to high levels of mould spores particularly in indoor environments can have undesirable health effects. Typical symptoms of excessive exposure to mould or mould spores include upper respiratory tract irritation, asthma like symptoms and other allergies. Persons with pre-existing respiratory or hyper-allergy illnesses may be at increased risk.

There is considerable complexity involved with such exposures including conjoint exposures to other irritants, pathogens and microbiological agents that also tend to be promulgated in the same conditions that support mould. The leading indicator and pre-cursor to these conditions is excessive moisture content in the building, in building materials or in the building envelope. See https://www.cdc.gov/mold/ and http://www.who.int/indoorair/publications/7989289041683/en/ for further details. If working with mould affected timber it is recommended to wear a filter mask and take precautions as normally used for the management of wood dust hazards in order to minimise exposure to airborne mould spores.

New Zealand
Tel: +64 9 276 3646
Email: tanalised.nz@lonza.com
www. lonza.com

Zelam
Tel: +64 6 755 9234
Email: scott.connor@lonza.com
www.zelam.com

Australia
Tel: +61 3 9339 8915
Email: tanalised.au@lonza.com
www.lonza.com

Tanalised®