

# Example of a diagnosis on a new X-Lam building in Italy: material decay and monitoring needs

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# X-Lam building diagnosis

X-Lam panels are becoming more and more popular in Italy for new buildings.

Panels are made of (Austrian) Norway spruce (*Picea abies*) without any treatment to artificially improve their durability because their use is previewed in class 2 according to the standard EN 335: 2013.

Being within the envelope of normal houses, theoretically they shouldn't suffer from fungal attack.

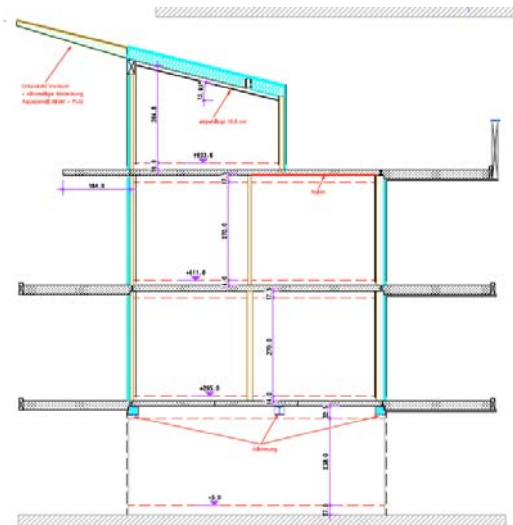
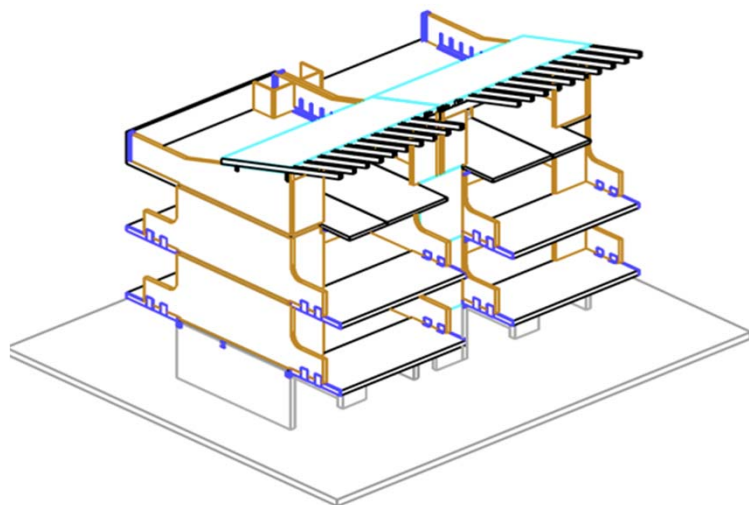
Moreover, being box-framed houses, they do not have a principal frame to concentrate on during diagnosis, because both floors and walls are structural principal elements.

The presentation shows a diagnosis performed on a pretty new X-Lam, box-framed building.

The building is located in Cervia, a summer vacation town on the Adriatic coast. It is a 4 storeys building, the three storeys above the ground are entirely made of X-Lam panels.

Building was assembled during summer 2011.

Diagnosis was performed in February 2012.

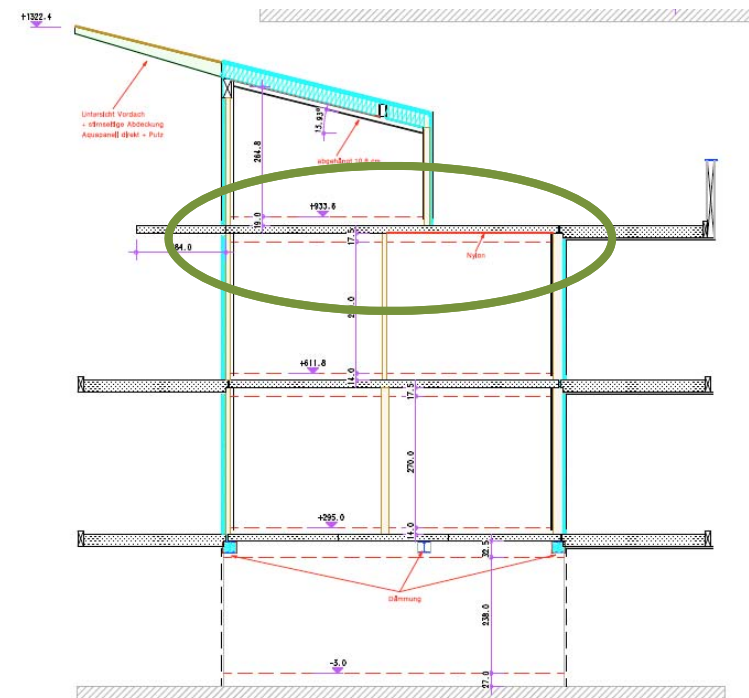


The request of *in situ* inspection was due to the fact that in the last level floor some staining and fungal attack on the wood panels were found at the end of winter season.

Apparently most of the problems correspond to the floor located below the solarium – terrace, partly overhanging.

A nylon vapour barrier in the bathroom caused the development of mycelium between the nylon sheet and the panel.

The aim of the survey was therefore to provide information regarding the extent of the attack on the panels, so as to suggest possible remedies.



## Methods

The wood panels buildings are having a rapid growth in recent years, but they constitute a recent frontier. Therefore it doesn't exist an established diagnostic methodology to be applied in these contexts. We decided to measure the MC and to evaluate the decay extension through a penetrometric drilling.

**Wood moisture content** was estimated through electrode wood moisture meters (Gann – Hydromette) at a depth 5 cm, according to the standard EN 13183: 2003.

**The decay due to fungi** was detected and measured through drilling measurements with a RESI<sup>®</sup> F400 IML. Decay was rated according to a 5-level scale based on the extension of decreasing of wood resistance to drilling as visualized on the profiles: **0% sound; 0 - 25% slight decay; 25- 50 % moderate decay; 50-75 % severe decay; 100 % failure.**



- Wooden panels are never directly visible, but hidden by a false ceiling that hides in the meanwhile the plant engineering.
- For this reason, the inspection was carried out only in the places where the false ceiling was previously removed.



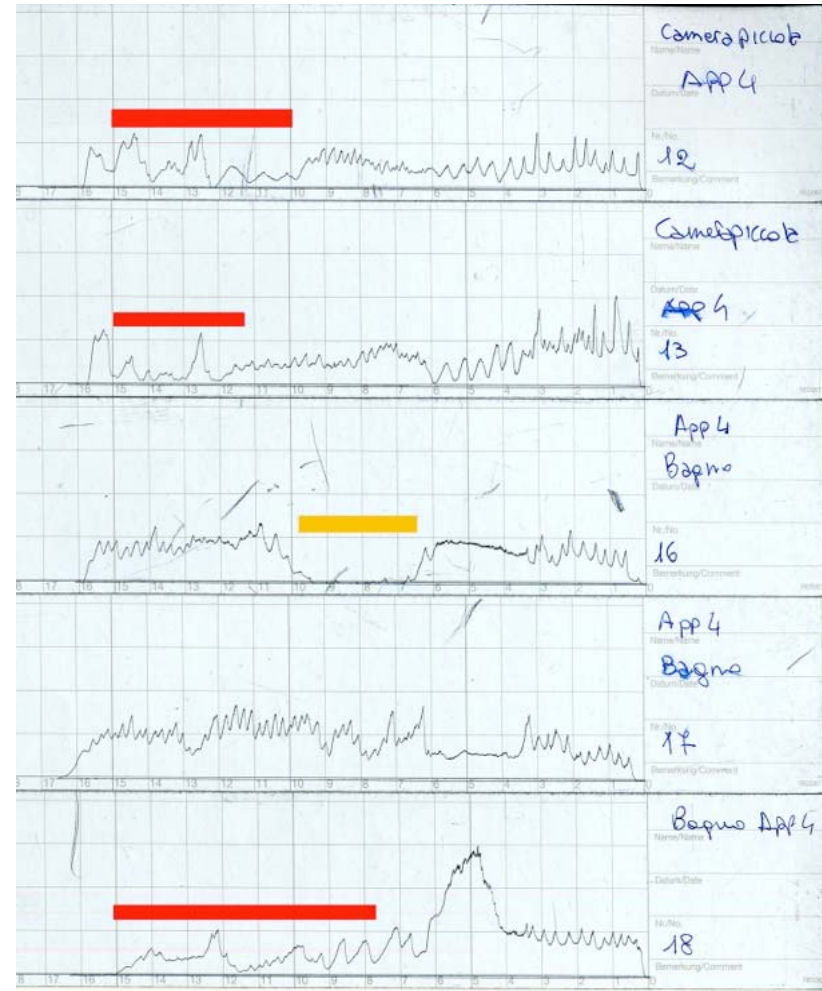
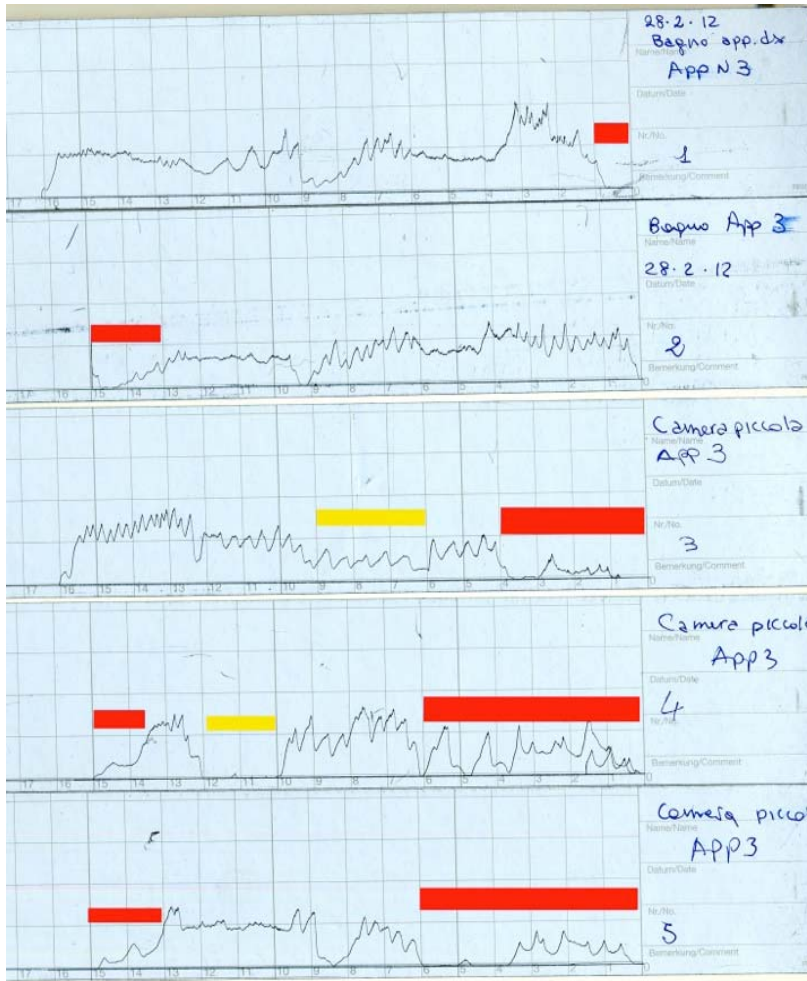
# RESULTS

The results were expressed by means of maps of the ceiling with the MC determined in different points.



There is a correspondence between the high moisture content and the developing of fungal attack as evidenced by the photos.

The drilling perforations performed in the area where the moisture was higher than 20% evidenced the extension of decay into the depth of the panels.





# Conclusions

In this case study the X-Lam panels of the walls and floors have absorbed rainfall during construction, especially on the top floor.

Further, water percolation from the roof through the different floors of building occurred subsequently to the melting of an extraordinary snowfall in 2012 winter.

The tar paper on the outer surface and the layer of nylon on the inside part caused slower drying or even prevented the subsequent rebalancing of the wood with the relative humidity after the complete assembling of the building.

As consequence, severe fungal decay occurred during the first year after assembling.

# Proposals

This case study evidence the need for a monitoring of wood moisture content in critical parts of the building.

Can we be really sure that within the envelope of a house timber structures will be permanently in service class 2?

Both during assembling and during service life of a box frame house wood could reach a MC that could allow a fungal attack.

Consequently we need to establish:

- clear assembling practices (a standard?)
- monitoring in possible critical points (bathroom floors?)
- let possible inspection windows in design practice
- Development of inspection practices

