

# Heat and Moisture Transport in Wooden Bearings of Monumental Buildings

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## Abstract

Currently insulation has been and will in future be applied to many buildings. This proves to be a challenge for monumental or old buildings. Mostly insulation has to be applied at the interior side of a building. That is why hygro-thermal bridges are inevitable. A wooden beam end beared in the external wall is an example of such a hygro-thermal bridge. Adding interior insulation introduces a risk on mould growth and can even lead to deterioration of wood.

In this area several studies, including measurement studies, have already been performed. With the use of simulation models, the risk on deterioration of wooden beams can be analyzed in another way. A simulation model made with COMSOL Multiphysics® that uses the logarithmic, capillary pressure (Lpc) as moisture potential has already been developed. In this study the COMSOL model is validated in 1D with Delphin, an advanced software tool that has already been used for simulating similar situations.

A case study from Denmark, that included measurements of a wooden beam end beared into a massive masonry wall, has been used for 2D validation. Thereafter different variants have been simulated in COMSOL Multiphysics®. The variants were separated into three categories: Indoor climate, insulation type and construction type. For each of these variants the influence of the moisture content inside the wooden beam has been mapped. Also the risk on mould growth and deterioration has been analysed.

## Figures used in the abstract

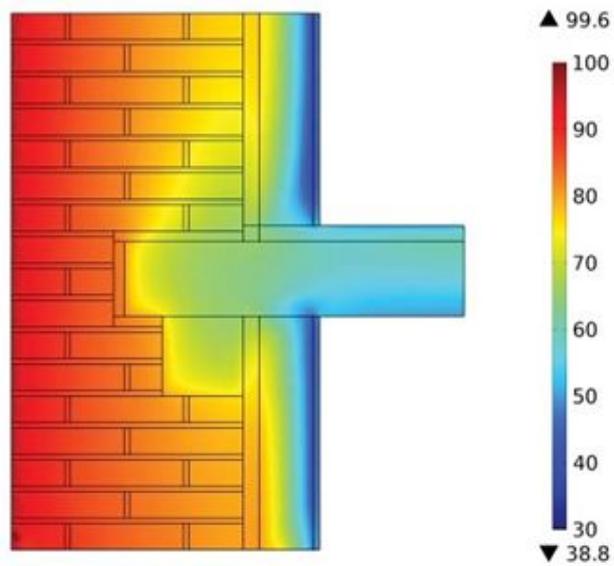


Figure 1: RH distribution within the construction given a museum indoor climate, during a rain event.