

Environmental Conditions Simulation Device for Evaluating Fungal Growth on Wooden Surfaces

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Abstract : Moisture fluctuations govern the occurrence of fungi-related problems in buildings, which may impose significant health risks for users and even lead to structural failures. Several numerical engineering models attempt to capture the complexity of mold growth on building materials. From real life observations, in cases with suppressed daily variations of boundary conditions, e.g. in crawlspaces, mold growth model predictions well correspond with the observed mold growth. On the other hand, in cases with substantial diurnal variations of boundary conditions, e.g. in the ventilated cavity of a cold flat roof, mold growth predicted by the models is significantly overestimated. This study, funded by the Grant Agency of the Czech Republic (GAČR 20-12941S), aims at gaining a better understanding of mold growth behavior on solid wood, under varying boundary conditions. In particular, the experimental investigation focuses on the response of mold to changing conditions in the boundary layer and its influence on heat and moisture transfer across the surface. The main results include the design and construction at the facilities of ITAM (Prague, Czech Republic) of an innovative device allowing for the simulation of changing environmental conditions in buildings. It consists of a square section closed circuit with rough dimensions 200×180 cm and cross section roughly 30×30 cm. The circuit is thermally insulated and equipped with an electric fan to control air flow inside the tunnel, a heat and humidity exchange unit to control the internal RH and variations in temperature. Several measuring points, including an anemometer, temperature and humidity sensor, a loading cell in the test section for recording mass changes, are provided to monitor the variations of parameters during the experiments. The research is ongoing and it is expected to provide the final results of the experimental investigation at the end of 2022.

Keywords : moisture, mold growth, testing, wood

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