

# Consolidation of Timber Degraded by Fungi in Buildings: an Experimental Approach

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## Abstract

The present paper concerns the theme of maintenance/rehabilitation of timber structural elements in heritage buildings that have been degraded by rot fungi. This type of degradation usually results from the unwanted but continuous presence of water in timber elements, very frequently permeating through damaged roofs and facades. In the past, it was common practice to replace degraded timber with new elements of the same or similar material. However, the option of maintaining in the building the original timber (even though deteriorated) has gained considerable importance in recent years. Therefore, a research programme on the consolidation of timber through impregnation of polymeric products is under development, looking for ways to regain the former original physical and mechanical conditions. This technique has been largely used in restoration of works of art but very little in civil engineering. The laboratorial work, developed using degraded maritime pine specimens, is presented. The test-specimens were either prepared in the laboratory, at different decay levels by varying the exposure time to brown-rot fungi. Six commercial low-viscosity products, specific for the impregnation of timber deteriorated by rot fungi, were tested: four epoxy-based (R, E, Lw, Li) and two acrylics (PB72, B98). The efficiency of these products was assessed through compression tests parallel to the grain and hardness tests, involving both impregnated and non impregnated wood. The relationships between the level of degradation of the timber (mass loss), the penetration capacity of the polymer and the consolidation efficiency on test-specimens are presented and discussed. Test results indicate a reasonably good strengthening effect of some of the products tested, the best value being a 39% increase in compressive strength and 91% increase in surface hardness by comparison with timber under the same circumstances but not consolidated.

**Keywords:** timber, degraded wood, heritage buildings, consolidation, rehabilitation