

# Influence of moisture content on the application of ND and MD tests to various species of timber elements

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## ABSTRACT

Investigation of timber structures relies on both visual and instrumental inspections, the latter based on both non-destructive (ND) and minor-destructive (MD) test procedures [1] [2]. As well known, results are affected by many aspects, among which moisture content (MC) is one of the most sensitive one for wood [3]. The paper compares the results obtained by the application of various ND and MD methods to a series of 21 new and 12 old timber beam elements (made of spruce, larch, oak, elm, and pine). Old beam elements were recovered by existing structures in deteriorated conditions.

Experimental tests were performed by research groups of the University of Padova (UNIPD), Italy and the UNIPD's spin-off Expin srl, and the Institute of Theoretical and Applied Mechanics of Prague, Czech Republic (ITAM), taking into consideration MC variation ranges in wood of 15-24%.

Results were compared by grouping similar methods, i.e.: resistance drilling (two types of Resistograph®, one for each group), pin penetration (Pilodyn® for UNIPD and the pin pushing for ITAM), wave velocity-based methods (ultrasonic for UNIPD and stress wave for ITAM) [4]. Pin pushing is an in-house new MD device provided by ITAM, which is able to gradually apply, monitor and record the force occurring for the pin penetration into the wood [5].

Three types of moisture measurement devices were used (two electric and one electromagnetic).

Results showed the low influence of MC on resistance drilling and pin penetration tests in comparison with sonic/ultrasonic ones, which were more affected by MC variations. Correlation curves are provided, which are able to quantify the effect on MC for the various experimental investigated conditions and testing equipment.

## REFERENCES

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