NEW DEVICES FOR DIAGNOSTICS OF HISTORICAL STRUCTURES

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Two new devices developed at ITAM AS CR for non-destructive testing of materials, especially from historical structures, are presented below.

- So called microtube is a semi-automatic portable tool for water absorption measurements. The natural stones, mortars and other porous materials can be measured and it is very useful to assess the efficiency of various hydrophobic treatments used within the restoration also.
- The diagnostic device for in-situ assessment of timber enables direct determination of conventional compressive strength and modulus of deformation in arbitrary depth along timber profile. The semi-destructive method causes a very gentle damage on the structural members.

WATER ABSORPTION MEASUREMENT

The microtube is a semi-automatic device that needs just one operator holding the pistol-like body and recording the values in the same time.

- calibrated scaled glass microtube with volume of 0.1 ml
- metal plate adjusts position of microtube according to the inclination of surface
- trigger is modified into micro-switch to control the recorded data
- pistol barrel (diameter of 8 mm) is filled by cigarette filter/special sponge plug for homogeneous transfer of water to surface material

IN-SITU MEASUREMENT

The portable device was designed to be light and handy. The smaller diameter of a contact area allows measuring diverse surfaces as shown on the pictures.

The method is strictly local and can be used for testing:
- heterogeneities in the materials,
- deteriorated surfaces,
- efficiency of applied treatment within restoration works.

The diagram demonstrates how various materials absorb water. Four typical Czech sediments with different porosity, size of grains and mechanical property were compared. Water absorption correlates with all the mentioned variables.

CONCLUSION

The microtube device helps restorers to assess the quality of porous materials and is also a popular device for comparative testing before and after applying the hydrophobic or consolidation treatments. The device for compression stress-deformation measurement substitutes the laboratory tests in-situ and became interesting for the specialists also from Germany or Norway, regions where the timber structures have a long history.

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