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E I N L A D U N G

zum

V O R T R A G

von

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of the
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Impact of Calcium Hydroxide Based Impregnation on Characteristics of Porous Mortar and Stone

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Impact of Calcium Hydroxide Based Impregnation on Characteristics of Porous Mortar and Stone

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Abstract

Development of compatible consolidation methods of degraded historic materials combines traditional approach with modern technologies. This calls for designing specific experimental procedures and testing different from usual standard methods. First part of the lecture will present some innovative techniques and achievements concerning the non-standard approach and investigation methods able to follow subtle change of material characteristics of degraded historic lime mortars or stones. Their application is demonstrated on examples of study of consolidation effects on lime mortars based on repeated applications of a water solution of calcium hydroxide. This technology requires tens or hundreds of application cycles in order to achieve observable strengthening effects, due to the very low solubility of these hydroxides in water. Therefore, new agents using calcium hydroxide nano-particles suspended in alcohols have now been developed and their effectiveness will be shown in the second part of the lecture. Here the lime particles are suspended in a stable manner in various alcohols and during application after the alcohol evaporates, the calcium hydroxide that is formed converts into limestone by reacting with atmospheric carbon dioxide. Thus, consolidation is achieved using a material originally present in the mortar and in many natural stones. The lecture presents the results of treatment with nano-materials in various modes of application, i.e. different numbers of repeated penetration treatments of the modeled degraded mortar or with the consolidating products. The measured strengths are compared to the effects attained with other present-day and historical consolidation methods. The structural change in the treated mortar is illustrated and compared to the effects of older techniques.

CVs

Miloš Drdácký has been working more than forty years in research into materials and structures, since 1994 almost exclusively into problems of cultural heritage. He has been further acting as member of editorial boards of several international journals, he is Chairman of the Scientific Board of the Czech Minister of Culture, he has been a member of various scientific committees, such as ICOMOS CIVVIH (Historic Cities and Villages), ISCARSAH (Historic Structures) and ISCS (Stone) and the RILEM Technical Committees (INR for non-destructive testing, AST for structural timber and the SAM for historic masonry). Since January 2010 he represents the Czech Republic and the Ministry of Culture in the Joint Programming Initiative (priority "Cultural Heritage") which is a new EU mechanism for coordinated planning of research. He was awarded about 30 research grants – national and international, (including 10 grants supported from the 4th, 5th, 6th and 7th EC FP). The results are published in more than 345 publications, and in 24 edited Proceedings or books.

Zuzana Slížková graduated from the Institute of Chemical Technology in Prague, Department of Chemical Technology of Monument Conservation. She completed her Ph.D. study at the Czech Technical University in the field of material engineering. Her work experience includes i.a. research and practical restorations of stone sculptures and stone architectural parts in the *State Restoration Workshops* (1989-1993), technology review of practical restorations processes, evaluation of agents and techniques for stone restoration, technological survey of previously conserved stones in the *National Institute for Monument's Care* (1993-2001, technology of repair and restoration of historic buildings and monuments, development of hydraulic lime binder based on metakaolin in the *AQUA obnova staveb, Ltd.* (2002-2006). Since 2003 Mrs. Slížková has been working in *ITAM* first as the Head of Laboratory for mortar and stone analyses and now Head of the Department of Particulate Media. She participated at several grant supported research projects – national (6) and international (18), namely the projects supported by the European Commission research programmes, focused on stone conservation, natural pozzolanic mortars, surface treatment of stone, mortars and timber, environmental issues in degradation processes. Her own running research grant project focuses on optimization of characteristics of mortar mixtures used for restoration of monuments. She is member of ICOMOS and its ISCS (stone committee). Mrs. Slížková is author of three innovated metakaolin based lime mixture products which are marketed in the Czech Republic and abroad. She is a Lecturer at the international MSc course on analysis of historical constructions working at the Universities of CTU in Prague, Minho in Guimaraes, UPC in Barcelona and University of Padova.

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