Ad impossibilia nemo tenetur. Three case studies on built heritage elements at risk

International Conference

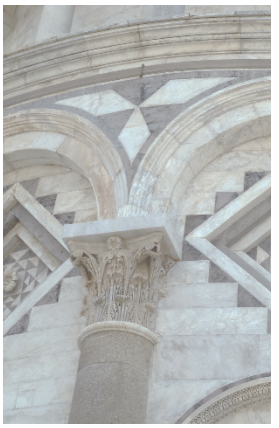
Built Heritage 2013

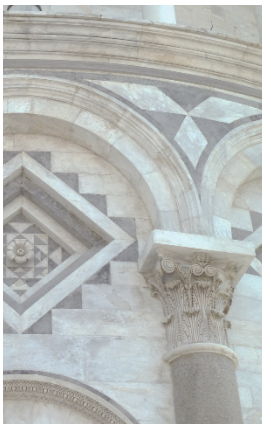
Monitoring Conservation Management

POLITECNICO DI MILANO

CENTRO PER LA CONSERVAZIONE E VALORIZZAZIONE DEI BENI CULTURALI

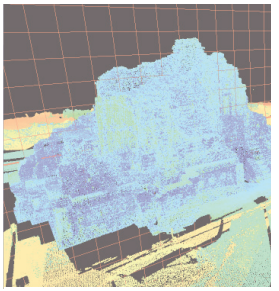
POLITECNICO DI MILANO 150°

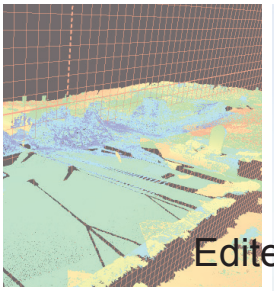




Online Proceedings of the Conference

BUILT HERITAGE 2013
Monitoring Conservation and Management



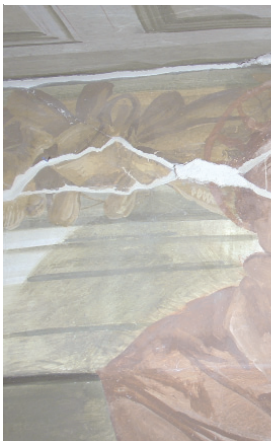


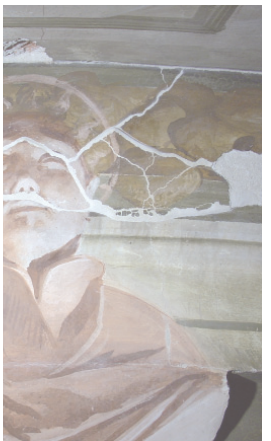
Milan, Italy

18-20 November 2013

Editor in chief M. Boriani

Edited by R. Gabaglio, D. Gulotta





Online Proceedings of Conference
Built Heritage 2013 - Monitoring Conservation and Management
Milan - Italy, 18-20 November 2013
Editor in chief M. Boriani, edited by R. Gabaglio, D. Gulotta

Politecnico di Milano, Centro per la Conservazione e Valorizzazione dei Beni Culturali,
Milano, novembre 2013
ISBN 978-88-908961-0-1

Scientific Committee
Politecnico di Milano
Lucia Toniolo, Chair, *Department of Chemistry, Materials and Chemical Engineering "Giulio Natta"*
Maurizio Boriani, *Department of Architecture and Urban Studies*
Rinaldo Cubeddu, *Department of Physics*
Stefano Della Torre, *Architecture, Built Environment and Construction Engineering*
Carolina Di Biase, *Department of Architecture and Urban Studies*
Gabriele Guidi, *Department of Mechanics*
Cesare Joppolo, *Department of Energy*
Pietro Marani, *Department of Design*
Paolo Paolini, *Department of Electronics, Informatics and Bioengineering*
Luigi Zanzi, *Department of Civil and Environmental Engineering*

Honor Committee
Francesco Bandarin, *Unesco, Paris (France)*
Amedeo Bellini, *Politecnico di Milano, Milan (Italy)*
Luigia Binda, *Politecnico di Milano, Milan (Italy)*
Caterina Bon Valsassina, *Direzione Regionale per i beni culturali e paesaggistici della Lombardia, Milan (Italy)*
Marco Dezzi Bardeschi, *Politecnico di Milano, Milan (Italy)*
May Cassar, *CSH, University College London, London (UK)*
Sharon Cather, *The Courtauld Institute of Art, London (UK)*
Giacomo Chiari, *Getty Conservation Institute, Los Angeles (USA)*
Mauro Cucarzi, *Fondazione Lerici, Rome (Italy)*
Stefano De Caro, *International Centre for the Study of the Preservation and Restoration of Cultural Property - ICCROM, Rome (Italy)*
Mike Forde, *University of Edinburgh, Edinburgh (UK)*
Maurizio Forte, *Duke University, Durham, NC (USA)*
Gary Lock, *Oxford University, Oxford (UK)*
Marco Magnifico, *Fondo Ambiente Italiano, Milan (Italy)*
Claudio Modena, *Università degli Studi di Padova, Padova (Italy)*
Cristina Sabbioni, *CNR ISAC, Bologna, Bologna (Italy)*
Salvatore Siano, *CNR IFAC, Firenze, Florence (Italy)*

Organizing Committee
Politecnico di Milano
Lucia Toniolo, Chair, *Department of Chemistry, Materials and Chemical Engineering*
Nicoletta Di Blas, *Department of Electronics, Informatics and Bioengineering*
Rossana Gabaglio, *Department of Architecture and Urban Studies*
Davide Gulotta, *Department of Chemistry, Materials and Chemical Engineering*
Austin Nevin, *CNR Institute for Photonics and Nanotechnologies*
Michele Russo, *Department of Design*
Maria Licia Zuzzaro, *Department of Architecture and Urban Studies*

Day 1 - November 18th, Monday

Room Rogers - Conservation and management

P.M. Koufopoulos & M. Myriantheos *The master plan for Wadi El Deir, Sinai Egypt: research and interventions*

M. Wu, S. Hu, Z. Xue, C. Shi *Monitoring and maintenance of built heritage within the daily management system: a case study of world cultural heritage Suzhou classic gardens in China*

L. De Marco, G. Franco, A. Magrini *Guidelines for eco-efficiency in the UNESCO site of Cinque Terre: an example of best practice*

A. Cazzani & C. Sangiorgio *Inventory, preservation and valorization of Historic roads In the Lombardy Region (Italy). Current policies and future plans*

K. Basili, R. Codello, G. De Vettor, P. Gasparoli, F. Pianezze, A.T. Ronchi, G. Totaro, F. Trovò *Wear processes in architectural heritage: definition, studies, contrasting measures. The case of UNESCO World Heritage Site "Venice and its Lagoon"*

S. Pratali Maffei & A. Marin *Forte Marghera and the entrenched field of Venice: a participatory process of planning and valorization*

R. Picone *Farmhouses in the Phlegrean Fields between archaeology and architectural palimpsest. A multi-disciplinary approach*

C.F. Carocci & C. Circo *"Needs-based architecture" in the Cyclades. A project for the enhancement and conservation of the architectural heritage and the rural landscape*

F. Colosi, R. Gabrielli, E.S. Malinverni, R. Orazi *Strategies and technologies for the knowledge, conservation and enhancement of a great historical settlement: Chan Chan, Perù*

E. Ciocchini, A. Maiocchi, F. Zangheri *The chapel of the Blessed Virgin of Miracles: a multidisciplinary approach for the project of conservation and reuse*

D. Concas, G. De Cesare, G. Capri *Santa Teresa from convent cloistered nuns to 'open' museum for the community*

C. Carocci, F. Campisi, I. Tranchina *The medieval Castle of Fossa (AQ). Analysis and restoration project*

I. Huic, M.Vujasinović, M.O. Šćitaroci *St. Mary on Lastre church in Beram, Istria, Croatia -multidisciplinary research, recommendations for restoration and further maintenance*

S. Dandria, F. Gabbrielli, M. Giamello, E. Giorgi, A. Magrini, E. Manzoni, F. Randazzo

Grancia of Cuna: from the complexity of the historical building to a composed knowledge for the project

G. Cardani & L. Binda *Guidelines for the masonry quality evaluation in built heritage*

E. Bersani, M. Giambruno, S. Pistidda *Planning for the historic built in developing countries: challenges and opportunities through the case study of Multan (Pakistan)*

M. Faliva New York City Local *Law 11/98: consequences of administrative regulations on the conservation of buildings*

K. Penna, E.S. Taylor, J.L. Tinoco *From paper to people: the complexities of developing guidelines for preservation education in developing countries*

Room IV - ICT and new technologies

F. Fassi, C. Achille, C. Monti, L. Fregonese, S. Parri, F. Rechichi, A. Mandelli, C. Monti, F. Gaudio, L. Galbusera *A yard of the future: the main spire of Milan Cathedral*

C. Pisu, P. Casu, S.M. Grillo *Multidisciplinary approach to the documentation of the XVIII century marble altars in Sardinia*

G. Fangi *Spherical photogrammetry for cultural heritage metric documentation: a critical examen six years after the beginning*

L. Pecchioli, F. Mohamed, M. Pucci, B. Mazzei *Museum of the sculptures of the basilica of Saint Silvestro integrating the visit at the catacombs of Priscilla in Rome*

C. Maierhofer, R. Krankenhagen, P. Myrach, J. Meinhardt, U. Kalisch, C. Hennen, R. Mecke, T. Seidl, M. Schiller *Monitoring of cracks in historic concrete structures using optical, thermal and acoustical methods*

V. Palieraki, C.E. Adami, E. Vintzileou *In-situ measurements using radar and boroscopy techniques: Case Study - Hagia Sophia Museum of Trabzon, Turkey*

Telmo Dias Pereira & D. Mateus *Monitoring noise and vibration emissions in Santa Clara-a-Velha Monastery*

L. Giorgi & P. Matracchi *The towers of San Gimignano. Architectural diagnostic for knowledge and conservation*

V. Russo, P. Cappelletti, G. Ceniccola, M. D'Amore, R. Landolfo, F. Portioli *Interdisciplinary conservation issues of an "unstable" architecture: researches about the bell tower of St. Augustine the Greater in Naples*

C. Giannico, A. Ferretti, S. Alberti *Satellite Radar interferometry: a new monitoring tool for cultural heritage sites*

A. Furini, M. Paternò, A. Pellegrinelli, P. Russo *Integrated measurement techniques for the monitoring of the ancient walls of Ferrara*

A. M. Manferdini *Documenting lost heritage. The experience of the survey of architectures damaged by the earthquake in the Emilia area, Italy*

J. Barton & R. Parsons *Use of leading edge Laser scanning and modelling technologies for Heritage conservation*

V. Bayarri, E. Castillo, J.M. García-Moncó, J. Calonge Diez I*ntegration of traditional and innovative techniques to resolve a complex case: monitoring the movement and temperature influence of the canvas in the south transept of the Church of the Convent of San Luis in San Vicente de la Barquera (Cantabria)*

A. Lionello, C. Rossi, P.P. Rossi *Testing and monitoring for the control of strengthening interventions of Santa Maria Gloriosa dei Frari in Venice*

E. Coisson & F. Ottoni *Monitoring historical structures, from their past to their future*

Room G.2 - Materials, preventive conservation and maintenance

S. Sestini, M. Sammartino, M. Laurenzi Tabasso *Monitoring the performance of stone conservation treatments: technical and economic aspects*

E. Tesser, L. Lazzarini, R. Ganzerla, F. Antonelli *The decay of silicone resins applied for the consolidation of stone in Venice*

G. Bearman, E. Doehne, L. Beegle, W. Hug, R. Reid, R. Bhartia *Remote Detection of Biofilms on Stone*

S. Sasso, L. Scrano, E. Ventrella, M.G. Bonomo, A. Crescenzi, G. Salzano, S.A. Bufo *Natural biocides to prevent the microbial growth on cultural heritage*

A. Velosa, F. Rocha, A. Haugen *Mortars in Norway from the Middle Ages to the 20th Century: conservation strategy*

S. Voltolina, C. Aibéo, T. Cavallin, E. Egel, M. Favaro, V. Kamenova, L. Nodari, A. Pavlov, I. Pavlova, S. Simon, P. Scopece, E. Verga Falzacappa, A. Patelli *Assessment of atmospheric plasma torches for cleaning of architectural surfaces*

P. Ortiz, R. Ortiz, J.M. Martin, M.A. Vázquez *RIVUPH: an Andalusian project for risk analysis in historical cities*

R. Vecchiattini, G.L. Pesce, G. Quarta, L. Calcagnile *Sampling problems in the radiocarbon dating of old mortars and plasters with the "pure lime lumps" technique*

G. Litti, A. Audenaert, J. Braet, L. Lauriks *Energy environmental monitoring in historical*

buildings; a simplified methodology for modeling realistic retrofitting scenarios. The case study of Schoonselhof Kasteel in Antwerp (Belgium)

J. Sasaki, K. Koizumi, D. Ogura, T. Ishizaki, K. Hidaka *Research project on the conservation of Hagia Sophia, Istanbul - results of environmental monitoring*

R. Hendrickx, H. De Clercq, F. Decock, F. Descamps *Hygrothermal analysis of the façades of the former veterinary school in Anderlecht (Belgium) for the risk assessment of internal thermal insulation*

A. Caratelli, A.M. Siani, G.R. Casale, A. Paravicini, C. Bertolin, D. Camuffo *Indoor measurements of microclimate parameters in the Mithraeum in the Baths of Caracalla (Rome, Italy)*

H. Norrström *The EEPOCH Project - Multidisciplinarity in a multiple case study*

I. Papayianni, M. Stefanidou, V. Pachta *Survey of repaired and artificial stone at archaeological site of Pella five years after restoration works*

D. Gulotta, C. Tedeschi, S. Goidanich *Long-term evaluation of the salt decay susceptibility of NHL repair mortars*

A. Calia, D. Liberatore, N. Masini *Approach to the study of conservation of historical masonry mortars by means of the correlation between porosimetry and penetrometric test. First results*

Poster Session A

E. de Almeida *Historic Center of Salvador, Bahia, Brazil: dilemma between conservation and cultural consumption*

Balayet Hossain *Historical imprints of Panam Nagar*

T. Basirico & K.B. Fazio *A multidisciplinary approach to the sustainable restoration of historical buildings: the case study of the San Francesco ex-convent in Piazza Armerina in Italy*

J.N. Bastos *The Algarve XVI-Th century Rural House – intervention for survival*

J.N. Bastos *The Fortress of Sagres (Portugal) - an heritage and restoration practice*

J. Bruin et al. *Uncovering mono-functional developments in a Seventeenth-century canal-zone block in the Canal District of Amsterdam World Heritage*

S. Bruni et al. *Post-earthquake recovery of architectural heritage: diagnostics, GIS documentation and restoration*

G. Buyukmıhcı & A. Ozkan *Integrity of conservation and sustainability techniques in a special historic site*

P. Chiodi et al. *A multidisciplinary approach: the conservation of an ancient bridge over the greater Zab river as part of community development plan of Deralok hydropower project under japanese international cooperation agency loan*

V. Cinieri & E. Zamperini *Lifecycle oriented approach for sustainable preservation of historical built heritage*

S. Colombo *An application of memory studies to museology: the case of Pinacoteca Ambrosiana between 1960s and 1990s*

F. Converti *The technological innovation of the knowledge areas: The Tourist Board of the City of Peastum*

T. Dreyfuss et al. *Transmitting Malta's legacy of forts and fortifications through the reuse of an abandoned 16th century warehouse*

R. Fabbri & S. Ciliani *For the valorization of the Monumental UNESCO Heritage: the system of signs pedestrian tourism in Ferrara and Modena*

B. Ferri & A. Maturo *Built cultural heritage and urban development: elements for a cultural planning in Pescara city*

C. Gentile et al. *Diagnostics and preservation strategies applied to historic iron infrastructures: the Paderno arch bridge (1889)*

P. Giandebiaggi & C. Vernizzi *The Roman amphitheater in Durres: the survey as a means of multidisciplinary knowledge for urban regeneration, architectural recovery and archaeological excavation*

K. Keutgens & B. Delmotte *Study of the architectural history of the St. Martin's Church, Zaventem, Flanders, by means of preliminary material-technical research*

C. Mura *Knowledge of modern architectural heritage in Sardinia through construction techniques. The case of rural architecture of Arborea (OR)*

B. Davidde Petriaggi et al. *The restoration of the Domus of the Mithraeum of the Painted Walls (Ostia): a methodological approach*

S. Sadeghi *A concealed garden: critical view on the restoration of Ghasr Prison, Tehran, Iran*

G. Sanfilippo et al. *A systemic approach for the restoration project: the church of St. Anna in Piazza Armerina (EN)*

G. Verdiani et al. *Ad impossibilia nemo tenetur. Three case studies on built heritage elements at risk*

M.R. Vitale et al. *Methods and strategies for the 'sustainability of the ancient built-up: studies and preliminary analysis on the "Monte" quarter in Piazza Armerina*

Day 2 - November 19th, Tuesday

Room Rogers - Conservation and management

M. Landoni *Conservation project on Nandin hall at Vat Phou archaeological site (Laos PDR)*

J. Cassar, S. Cefai, M. Galea, R. Grima, K. Stroud, A. Torpiano *Preserving the Megalithic Temples of Malta - the interdisciplinary approach*

R. Buzancic *Restoration of Diocletian's mausoleum in Split*

G. Bagnasco Gianni, S. Bortolotto, P. Favino, A. Garzulino, M. Marzullo, E. Riva, R. Simonelli, S. Valtolina, A. Zerboni *Past&Present at Tarchna &Tarquinia: a flexible approach to make visible the invisible*

W. Terlikowski & P.L. Narloch *Specificity of research and reconstructions of ancient wall constructions in Syria, the area of Palmyra*

P. Pesaresi *The Herculaneum Conservation Project's programmed maintenance cycles for the archaeological site of Herculaneum*

D. Cavezzali & A. Giovagnoli *Conservation works of the Hall of Masks in the Domus Aurea, Rome*

G. Putaturo *Restoration of the Villa Reale of Monza*

P.N. Barrera & P.E. Bartholomew *Anthropology of Design: how traditional Korean architecture is redefining the terms of conservation, collaboration, and sustainable management*

A. Baila, L. Mazza, A. Anzani *Conservation and restoration of polychrome stone mosaics in the architectures of the historical park of Villa Tatti Tallacchini: the music pavillion - Cafe house*

T.L. Park *The process surrounding the preservation of historical wooden architecture in Japan*

F. Ottoni, F. Aureli, C. Mambriani, P. Mignosa *An integrated conservation process between history and hydraulics. The case of the ancient masonry "Tower of waters" in Colorno, Parma*

M. Borsotti & C. Campanella *An architectural project for existing buildings from understanding to writing*

M. Carlessi & A. Kluzer *Past, present and future of the forgotten places in the ancient "Ospedale Maggiore" (Ca' Granda) in Milan. Studies, surveys, analysis, prospects and projects*

A.C. Glória *The "private" cultural heritage: management, right and public fruition. The case of Cedovim manor's house (Vila Nova de Foz Côa, Portugal)*

Room IV - ICT and new technologies

S. Janvier-Badosa, C. Stefani, X. Brunetaud, K. Beck, L. De Luca, M. A-Mukhtar *Documentation and analysis of 3D mappings for monument diagnosis*

S. Bortolotto, A. Castiglioni, A. Castiglioni, N. Cattaneo, S. Massa *Complex Archaeological Sites: An integrated stratigraphic framework for progressive knowledge acquisition and representation*

A. Versaci, A. Cardaci, D. Indelicato, L. Fauzia *Integrated survey methodologies for the knowledge, restoration and valorization of modern architecture. The case study of the archaeological museum of Siracusa designed by Franco Minissi*

G. Bearman, E. Doehne, J. Voss, K. Merrill, R. Bagaria *Citizen Science and Mobile Phone cameras as tools for monitoring World Heritage*

T.E. Boothby *Ars sine scientia: how incorrect design theories lead to correct designs*

S. Arangio, S. Molinaro, F. Bontempi *Basic modeling for the forensic investigation of the collapse of a masonry structure*

K. Papadopoulos & E. Vintzileou *The new 'poles and empolia' for the columns of the ancient greek temple of Apollo*

Epikourios M. Vasic, D. Coronelli, C. Poggi *A multidisciplinary approach for the assessment of great historical structures: ties of "Duomo di Milano"*

S. Arangio, F. Bucchi, F Bontempi *Pushover seismic analysis of masonry buildings with different commercial codes*

B. Benedetti & S. Montanari *Methodology and technology in two new museums in Saudi Arabia*

M. Negrini & N. Di Blas *Digital storytelling for Cultural Heritage: a modular, multi-channel, multi-scenario approach*

G. D'Amico, A. Del Bimbo, A. Ferracani, L. Landucci, D. Pezzatini *Onna project: a na-*

tural interaction installation and mobile solution for cultural heritage

M. Barcaro & E. Oliviero *Scrigno, enriching the visitor's experience with a tablet*

Room G.2 - Materials, preventive conservation and maintenance

C. Pasquarella, C. Balocco, E. Marmonti, G. Petrone, G. Pasquariello, R. Albertini *An integrated approach to the preventive conservation of cultural heritage: Computational Fluid Dynamics application*

C. Pasquarella, G. Pasquariello, C. Balocco, E. Saccani, M. Ugolotti, O. Maggi, R. Albertini *An integrated approach to the preventive conservation of cultural heritage: indoor biological environmental monitoring*

E. Rosina & E. Rotta *Environmental protection and control systems for architectural and archaeological heritage*

A. Bonazza, I. Natali, I. Ozga, G. Bartolozzi, C. Cucci, V. Marchiafava, M. Picollo *Pollution effects on typical Florentine lithotypes: a multidisciplinary approach*

C. Di Benede*tto, S. Bianchin, A. Langella, M. Favaro, A. Gambirasi, A. Colella, G. Luca, M. Soranzo, M. de' Gennaro, P. Cappelletti The Neapolitan Yellow Tuff: experimental investigations about effectiveness of antiswelling treatment*

S. Lugli, S. Minghelli, P. Zannini *Barium silicate consolidation of historical sandstones*

V. Tornari & A. Moropoulou *Crack micromorphology detection in stone samples by digital holographic speckle pattern interferometry*

L. Brizi & P. Fantazzini *Internal structure of porous media studied by the apparent water self-diffusion coefficient in the field gradient of a portable single-sided NMR instrument*

N. Proietti, D. Capitani, V. Di Tullio, R. Olmi, S. Priori, C. Riminesi, A. Sansonetti, F. Tasso, E. Rosina *MOdihMA at Sforza Castle in Milano: Innovative Techniques for MOisture Detection in Historical Masonry*

M. Rossetto *Capillary rising damp in historical buildings: electrophysical charge neutralization technology - a needful "zero impact" instrument to prevent and resolve the problem once and for al*
l

A. Goppion, A. Gioria, G. Cotrufo *Museology meets conservation: Goppion display-cases with multiple microclimate*

A. Bernardi, F. Becherini, A. Vivarelli, C. Ghiretti, E. Mendez Bertolo, L. Pockelé, M.D. Romero-Sanchez, N. Tellado, R. Wansdronk Application of innovative technologies for energy storage to Cultural Heritage buildings

M. Filippi, M. Rota, P. Picchi T*he accreditation process for Museums in Regione Piemonte. Preventive conservation and indoor environment monitoring*

A. Grimoldi, D. Del Curto, A. Landi, C. Manfredi, L. Valisi *From rest/cons to en/eff: indoor environment and building preservation*

L. de Santoli, C. Calice, V. Coccia, V. Fazio *Multidisciplinary approach for renewal of historical center: the case study of Ceglie Messapica (BR)*

Poster Session B

F. Agnello & R. Prescia *Integrated studies for the enhancement of complex historic monuments*

W. Bagiński *Using location-related knowledge to maintain a historic residence*

V. Bayarri-Cayón et E. Castillo N*ew processing tools for heritage conservation and documentation*

N. Benabdelkader & M. Morandotti *The historical site of Mansourah*

R. Cacciotti et al. MONDIS *Knowledge-based system: application of semantic web technologies to built heritage*

I. Cerato et al. *From the dig to 3D reconstruction and AR dissemination. The case study of the Roman kiln of Massa (IT)*

S. Karaman et al. *MNEMOSYNE: visual profiling for personalized cultural content delivery*

G. Leucci et al. The Foggia *Cathedral: an in situ integrated geophysical and mechanical study on the wooden structures of the ceiling*

M.F. Mancini et al. *From video sequence as a database for the generation of 3D models to video as a tool for architecture communication*

S. Pallara & C. Caiulo *Energy saving for historical heritage: the domotised lighting system of the Cathedral of Nardò (Lecce - Italy)*

B. De Roo et al. *C*onservation of past times: data models for ensuring the future of our heritage

I. Rubino *Step by step: exploring heritage through a mobile augmented reality application at Palazzo Madama - Museo Civico d'Arte Antica (Turin, Italy)*

E. Sassoni & C. Mazzotti *Assessment of masonry mortar compressive strength by double punch test: the influence of mortar porosity*

G.M. Ventimiglia *Role of diagnostic surveys in the conservation of the former mother-church of Santa Margherita di Belice in Sicily: preliminary tests and restoration site checks*

S. Zambruno et al. *Photographing the past: using cloud computing and photo-modelling for 3D historical architecture modelling*

Dav 3 - November 20th, Wednesday

Room Rogers - Conservation and management

A. Saisi, M. Guidobaldi, C. Gentile, L. Cantini *Dynamic and seismic assessment of the Gabbia tower in Mantua, Italy*

I. Stoyanova *Promoting a Nineteenth-century Italian Technology:the Crystal Skies of the Milanese Gallery "Vittorio Emanuele II"*

G. Vella & E. Messina *Fruition and valorization of disused manufacturing settlements: the "tonnare" of the Gulf of Castellammare case-studies*

A. Sanna & G. Monni *Recovery, reuse of designs of the Carbonia's dwelling. Proposal for a "Handbook for the Recovery of Modernist Building"*

Y. Salman, Z. Önsel Atala, N.B. Yöney *A model for an integrated multi-disciplinary approach for the preservation of 20th Century and modernist architectural Heritage*

R. Lozano Galvez *The multidisciplinarity in the protection of the 20th Century architectonic patrimony*

P. Dellavedova *Instruments for the preservation and promotion of the 20th century built heritage: the case study of Legnano (MI)*

D. Sarti & L. Varra *The organization of a districtual museum: the Textile Museum of Prato between the preservation of an industrial heritage and the development of a sustainable system*

E. Invernizzi & M.M. Locatelli *Central Karakorum National Park and the Northern Areas territory: the "Cultural Heritage Routes" Project*

N. Berlucchi *A fortress for Brescia: the enhancement of the Castle and the Cidneo Hill*

K. Rajangam & P. Modi *Nakshay - a community led culture mapping initiative an attempt towards best practices and successful conservation*

P. Giandebiaggi, M. Rossi, C. Tedeschi *The "survey of memory". Cultural heritage in cemeteries: development of a catalogue protocol from the "representation" of multidi-*

sciplinary researches

P. Gasparoli & A.T. Ronchi *Crespi d'Adda. Beyond the Management Plan: regulatory instruments for the management of built heritage transformations*

M. Achenza, I. Giovagnorio, L.G.F. Cannas *The 'earthen cities' itinerary*

J. Bruin et al. *Knowledge is Power: Monitoring the World Heritage site of Amsterdam, a policy analysis*

K. Rajangam & P. Modi *Heritage information management package (himp) -technology and experience driven approach towards efficiently managing india's built heritage sites*

Room IV - ICT and new technologies

S. Hermon, F. Niccolucci, K. Yiakoupi, A. Kolosova, G. Iannone, M. Faka, P. Kyriacou, V. Niccolucci *Documenting architectonic Heritage in conflict areas. The case of Agia Marina Church, Derynia, Cyprus*

L. Guerriero, S. Barba, E. De Feo, F. Fiorillo, A. Manco *Multidisciplinary analysis: the early christian complex in Cimitile (Italy)*

G. Verdiani, A. Peruzzi, M. Gualandi *The Piacenza Cathedral, from the digital survey to a complete multimedia documentation*

N. Masini, F. Gabellone, G. Leucci, R. Persico, F. Soldovieri *Enhancement of the information content available from non invasive diagnostics for restoration and knowledge of architectural heritage*

C.F. Carocci & A. Scudero *The restoration project of the church of Saint Agata in Tussillo (AQ, Italy) within the framework of the post-earthquake reconstruction plan*

M. Dolce, E. Speranza, R. Dalla Negra, M. Zuppiroli, F. Bocchi *Constructive features and seismic vulnerability of historic centres through the rapid assessment of historic building stocks. The experience of Ferrara, Italy*

R. Fabbri *Complex monumental heritage: problems and operational programs for post seismic restoration*

A.G. Mazzeri *Mantua Ducal Palace: one year after the earthquake. From emergency management to seismic improvement and programmed maintenance*

K. Nedvědová & R. Pergl *Cultural Heritage and floods*

F. Niccolucci, A. Felicetti, N. Amico, A. D'Andrea *Quality control in the production of 3D documentation of monuments*

G. Guidi, P. Rodríguez Navarro, S. Gonizzi Barsanti, L.L. Micoli, M. Russo *Quick textured mesh generation in Cultural Heritage digitization*
P. Ronzino, F. Niccolucci, A. D'Andrea *Built Heritage metadata schemas and the integration of architectural datasets using CIDOC-CRM*

E. Demetrescu, G. Lucci Baldassarri, A. Pagano, S. Pescarin *CONNEXT: CONNecting metadata to web3D interactive applications of large archaeological contEXTs*

M. Riggio, J. Sandak, A. Sandak, I. Santoni, L. Babinski *Degradation of wooden surfaces in historical buildings: integrated sensing and modeling techniques for monitoring and conservation*

M.S. Okten, C. Haydaroglu, B.B. Okten *A structural design case study on reconstruction of a historical timber mansion*

V. Sousa, T. Dias Pereira, D. Silva *Asset management of built heritage: application to wood-framing elements of the National Palace of Sintra, Portugal*

Room G.2 - Materials, preventive conservation and maintenance

L. Brambilla, P. Condoleo, S. Perego, G. Zerbi, L. Binda *Experimental study on the influence of the environment on the properties of vegetal resins used in the conservation of Cham temples in Vietnam*

A. Verganelaki, N. Maravelaki, V. Kilikoglou, I. Karatasios, I. Arampatzis, K. Siamos *Synthesis and characterization of a calcium oxalate-silica nano-composite for stone conservation*

G. Cappelletti, P. Fermo, A. Piazzalunga, G. Padeletti *Transparent hybrid films for stone preventive conservation*

T. Dreyfuss & J. Cassar *Ammonium oxalate treatment application in the presence of soluble salts: laboratory results on soft limestone*

M. Matteini, C. Colombo, G. Botticelli, M. Casati, C. Conti, R. Negrotti, E. Possenti, M. Realini *Ammonium phosphates to consolidate carbonatic stone materials: an inorganic mineral treatment greatly promising*

E. Sassoni & E. Franzoni *Evaluation of hydroxyapatite effects in marble consolidation and behaviour towards thermal weathering*

M. Favaro, M. Chiurato, P. Tomasin, F. Ossola, N. El Habra, I. Svensson, E. Beckers, V.J. Forrat Pérez, M.D. Romero Sánchez, A. Bernardi *Calcium and magnesium alkoxides for conservation treatment of stone and wood in built heritage*

S. Tamburini, M. Favaro, A. Magro, E. Garbin, M. Panizza, F. Nardon, M.R. Valluzzi *Geopolymers as strenghtening materials for Built Heritage*

R.S. Adhikari, E. Lucchi, V. Pracchi *Historical buildings: energy performance and enhancement*

M. Legnér & A. Luciani *The historical indoor climate. A long-term approach to conservation environments within heritage buildings*

F. Romano, M. Gaudenzi, C.M. Joppolo, L.P. Romano *Temperature and humidity in museum display case: a simulation tool and experimental validation*

G. Cavaglià, M. Mangosio, I. Caltabiano, C. Curti *Intervention strategies for the energy retrofit of the built heritage: a case study in Turin*

Poster session C

A. Alomari et al. *Experimental study on the role of freezing-thawing in the degradation of stones in the castle of Chambord*

P. De Berardinis et al. *Strategies for improving energy of the historic masonries of the minor centres of Abruzzo Region*

A. Bonazza et al. *Climate impact and innovative materials for the preservation of Built Heritage: the EC NANOMATCH project*

C. Conti et al. *First results on diethyl oxalate as a new product for the conservation of carbonatic substrates*

M. Coppola et al. *Analysis and conservation of ancient Egyptian gypsum-based binders and mortars from the temple of Ramesses II in Antinoe*

G. Corso et al. *Pigments and binders in Pompeian four styles wall paintings*

C. Daffara et al. *The challenge of infrared imaging of frescos: thermal quasi-reflectography unveils hidden features of artworks*

E. Galán & P. Aparicio *The environmental risk assessment applied to cultural heritage. A methodological approach*

M. Jadicicco Spignese & Z. Faravelli *Historical buildings current value*

C. Kyi et al. *Investigations into the suitability of the free□radical molecule nitric oxide (NO•) in the treatment and control of biodeterioration*

E. Lombardi et al. *Strategies for increasing the scale of biocleaning treatment through sulfate crust bioremoval*

T. Meier et al. *Ultrasonic surface measurements for the investigation of superficial*

alteration of natural stones

A. Osman & J. Kościuk *Characterization of binding lime mortar used in the ruins of Anba Bishoi Monastery near Sohag (Egypt)*

M. Pretelli et al. *Indoor Microclimate effect on heritage buildings: the case study of Malatestiana Library*

A. Proto et al. *Ca-based absorbents for NOx measurement in atmospheric environments surrounding monumental and archeological sites*

M. Stella et al. *Testing of nanostructured products for the protection and consolidation of biocalcarenite*

R. Terra et al. *Restoration of San Petronio Basilica: four year project between innovation and eco-sustainability*

D. Vandevoorde et al. *Influence of environmental conditions on water adsorption measurements performed by non-destructive in situ applicable techniques*

C. Kapridaki & N. Maravelaki *TiO_2 -SiO_2 -PDMS nano-composite with self-cleaning properties for stone protection and consolidation*

C. Zambella et al. *Environmental monitoring of the St. Gennaro and St. Gaudioso catacombs in Naple*

Ad impossibilia nemo tenetur. Three case studies on built heritage elements at risk

Giorgio Verdiani[1]; Lorenzo Parretti[2]; Valentina Fantini[1]; Jacopo De Paola[1]; Stephane Giraudeau[1]
[1] Dipartimento di Architettura, Firenze; [2] MaisonBiò Studio, Firenze

1. Introduction

The Built Heritage is rich, articulated and fragile, it is subject to human choices, bringing it to be well preserved and greatly enhanced in its good time and fall into despairing conditions during its bad moments. In our time a lot of precious buildings are at the risk to get irremediably lost and disappear, abandoned for long time and slowly becoming ruins. Probably this condition is common all along the human history, even if in our time our more sensible attention in the Patrimony makes it more hurting at our sight. But rarely people go beyond some blaming about the ruins they are seeing, considering the recovering of these masterpieces as something too far from their possibilities of intervention. So sometimes it is worth to face the emergency of such buildings with some direct and well aimed intervention, at least to document, survey and get the right knowledge about the building at risk. Projecting about it can be a right step to better understand the possibilities for a recovering, but the whole process can be a pain for the researcher, the architect, the lover of Cultural Heritage beauty, because it shows the lost occasion caused by improper use, improper management, abandon, abuse and ignorance.

2. Case study one: The Bruscheto Mill near Incisa (FI), Tuscany

2.1. Study of the place

Immersed in the typical landscape of the Tuscan countryside in the Upper Valdarno, on the border between the municipalities of Incisa and Reggello, on the right bank of the Arno, it stands the Bruscheto's Mill to which is connected the eponymous bridge, also known as the Hannibal's bridge[1]. This place can be found at 31 km south-east from Florence, following a small winding road from the highway. It's a place where time seems to stand still. This mill origins can be placed in the early Middle Ages, but a large number of modifications have changed little by little its original appearance until its recent abandon.

2.2. Actual situation

The ruin is in an advanced dilapidated state. Analyzing the outer perimeter of the building, the North-East front appears to be the most compromised. From the reading of the walls it is possible to identify various collapses, with some partial reintegration operated using bricks walls. The area is quite accessible, even if there are various fences and there are signs indicating dangerous state of the building. The Southeast and Northwest fronts have no major damage, except for the pier placed on the East corner of the building which has a transverse lesion. The Southwest front, which faces the Arno, has suffered several alterations over time, and various collapses. The vegetation has rooted in the cracks and in some places there are real trees growing. The collapse of the roof triggered the subsequent collapse of the floors which are gravitated

to the ground floor making it difficult and dangerous to access the interior of the building and to inspect many rooms. The vaulted ceiling of the ground floor rests on the lower basement, it has not collapsed. Upon entering the building, it is possible to see that the architecture is totally devastated. The debris and vegetation follow each other without interruption. Nature has reclaimed the space taken by the former mill. Those whose, one time, were indoors appear surreal: stairs that lead nowhere, doors that open onto the void, cascades of ivy covering entire walls, glimpses of sky. This context seems to catapult the visitor into an Escher artwork. The measurements of the exterior of the building have been made on the North-West and North-East fronts along the road. After completing a part of the survey of the ground floor, supported by photographic shooting, it was possible to understand the distribution of the interior spaces of the building, which are highly fragmented by the necessity of work and production. It is also possible to observe that there have been many alterations to the walls, with openings buffered and then reopened, using recycled materials coming from older collapses.

2.3. Study of the water paths inside the Mill

The survey of the basement of the mill was carried out with traditional procedures. The few vertical linkages partially obstructed by debris were used as the few points of observation. To better interpret the plot of the basement it was necessary to descend inside the water exit door of the mill. The entire structure rests on discontinuous outcrops of limestone rock from which the walls develop from the basement ending in the vaulted ceilings. An external path gives access to the turbine rooms. Here there is the arrival of two ducts, one is still active. The water that passes this compartment, through a lateral outlet, reaches the last room for expansion. This room that could be divided by partitions into three separate areas to manage the flow of water, now is clogged with debris and no longer performs its initial function. The presence of such debris is due to a misguided attempt, carried out by inexperienced, to block, with sandbags, the inflow of water in the underground rooms to protect the foundation. A pier reinforcement was built on the West corner of the mill. The construction of this pier has occluded an outlet for the water. Consequently, the path of the water output has varied its course, and now passes under the pier. This arch has the same wall texture of the arches of the near Hannibal's bridge. Finally, thanks to field investigations, it has been hypothesized a second room that housed a turbine under the central millstone and a duct tangent to the boundary wall of the mill.

2.4. A project for the Bruscheto's mill

2.4.1. Hypothesis of a river park

In line with the regional guidelines , the Mill will be the centrepiece of an hypothesis for a project of river park, due not only for the geographical aspect, but also for the road network along the territory. From here trekking routes will develop to connect to the existing ones; the cycle tracks will be connected with those already existing in the area and foreseen along the Arno banks; some horse ways will be connected to the places already offering trips to historic si-

tes such as the Tower Lombard and the Abbey of Vallombrosa, but also to the nearby shopping centre “The Mall”. In the end, it is possible to imagine some Land Art installations supporting temporary or permanent events.

2.4.2. Concept - Inspiration for the restoration

The suggestion generated from the ruins of this ancient mill, together with its volume movements recalling a medieval fortress, has spotted the choice to fulfil the intervention idea. So it is thought that the best approach should be keeping the identity of the building, adopting a conservative restoration on the front facing the Arno, but preferring a more direct intervention on the opposite side were the façade is so anonymous and hacked by the collapse, that no longer symbolizes the building identity.

2.4.3. The project and design ideas

The project involves a change of use from factory to public building, which his functions are: the mill museum, conference and exhibition space, winter garden, dining area, administration river park, bike-sharing. It also involves the construction of an artificial canal, below street level, which will power a turbine screw placed near the Mill. The old wrecked oven, in front of the mill, will be used as a technical room for boiler and compaction woodchip. Finally will restore the road conditions of the Hannibal’s Bridge, reconstructing the missing span. The whole intervention is aimed to create a building with a high resilien-

Fig.1 - View from the river of the Bruscheto Mill, autumn 2012; View of the inside of the Bruscheto Mill, autumn 2012

ce to possible floods, all the technical elements are placed at the upper floors. To enhance the educational aspect of the project it is possible the reactivation of some existing millstone to show the ancient processes of production of the flour. It also plans to integrate it with elements of bioclimatic architecture, renewable energy and energy savings. And with a special production of renewable energy: the turbine cochlea outside the mill; this element, combined with other power saving solutions can create both a fully supplied and autonomous building and a energy producer structure.

2.5. In the end, about the work on the Bruscheto's Mill

In conclusion, this hypothetical project aims to transform an artefact of industrial architecture, now in an advanced state of decay, into a rallying point for the community including educational purposes: the restored building will present the contemporary aspects of bioclimatic architecture and the importance of renewable energy combined with energy savings. Finally, the redevelopment of the park, whose centrepiece will be the mill, would be a great opportunity to make liveable again the banks of the Arno river.

3. Case study two: Livorno, "Terme del Corallo"

3.1. A long story of misfortunes

During the period between the XVIIth and XXth Century, thermal baths have an exponential growth in Italy and several new baths complex were built, "Terme del Corallo" was one of them. The ruins of this building is located along the "Viale degli Acquedotti" in Livorno and was built in 1903 by the engineer Angiolo Badaloni; the "Terme del Corallo" has the main characteristic of an "Art Nouveau" architecture (which was called Liberty in Italy) and it was one of the first building have been built in iron concrete[2]. The history of "Terme del Corallo" starts in the 1854, when the owner of that area was seeking for the water and scientific tests proved that the water was drinkable and had purging features. The complex was inaugurated in the 1904, it had an instant success. Livorno became a popular place for human care with thermal water and was indicated as "Montecatini a mare" (literally "Montecatini" by the sea). People used to spend in the "Terme del Corallo" 15/20 days enjoying sports and relax. About the events that caused the closure of the complex in 1936 there aren't any clear information. Then, during the second War World Livorno was strongly damaged and the later growth of the city in the East area probably caused a ground pollution and damaged the underground walls protecting the water table. The "Terme del Corallo" lost its monumental appeal and the building had a hurried decline; a succession of different owners changed the primary function of the building into a factory, a deposit, and then into a disco club but in the 1967 the "Terme del Corallo" was finally closed. Today the wreck of "Terme del Corallo" maintains its charm and lies below an overpass built in the 1982 appearing like a crass demonstration of urban insensibility. The complex is composed by a main building connected with other two minor ones by a rhythmic colonnade facing on the garden. All the spaces were organized around their healthy features and around a central magnificent concert hall, the whole complex could house up to one thousand persons.

3.2. The survey

The building is very complex to measure; there are many roofs and vaults near to collapse and so it' s very difficult to use direct measurements. The building isn't really safe, debris and vegetation hinder the access to many parts of the building. For all these problematic condition and the great delay caused by the administration in programming a correct documentation using 3D laser scanner solution, it was chosen to operate the survey combining SfM photogrammetric solution and direct measurements. The main hall was the core of the operations, a large vault in reinforced concrete with a skylight on the top. The dimensions of the hall are quite large: the vault reach the 15 meters and the hall has a depth of 25 meters; the floor is strongly damaged and the skylight is near to collapse. To survey the main facade and other parts of the complex was used the same SfM procedure, all the photographic work was supported by the integration of direct measurements, used for reference and correct verification of the digital results. The post processing of all the SfM generated 3D models was planned in order to use this survey to recompose coherent drawings of the main plan, of some meaningful section and of the main front of the building.

3.3. Planning a possible and logic project

Starting from the new survey a possible project was planned to focus on the intervention priorities: 0) consolidation of the structures, while any other operations before this are only aimed to put people at risk 1) Complete retriever of the garden; 2) Renovation of the main entrance of the building; 3) Requalification of the "Viale degli Acquedotti"; 4) Realization of pedestrian and cycle paths, non invasive parking areas, and other urban connections; 5) Start of a process of "giving back to the community" combined to the near "Hotel Corallo" building; 6) Restoration of the complex adding new functions like: conference hall, thermal bath, spa, restaurant.

3.4. Design concepts

The building is characterized by a perfect symmetry. This main characteristic suggest a direction and underline also the importance of South-West front. Around the area of the project there is a disorganized urban fabric. This area was born as an East expansion of the main Livorno town and it doesn't has meaningful design rules. The choice of suggesting a square in front of the main entrance is guided by the will to create a place where it will be possible to appreciate the symmetry of the whole building and also to give an appropriate importance to the main entrance. The project is aimed to preserving the historical shape of the thermal settlement and it wants to recover all the historical decorations. For this reason all the new functions are placed underground. In the restoration proposal the problem of lighting the underground space is solved excavating below the main colonnade following its same curvature and consolidating its foundations. The main function of baths is inside the main building, the restaurant and café are inside the building in the right side and finally the spa and office are planned in the left side. For the access to the underground space, the symmetry becomes again a guideline: in fact two

Fig.2 - On the left: two view of the recovering idea for the Bruscheto Mill. On the right: the main hall in the “Terme del Corallo”, Spring 2011

Fig.3 - On the left: a view of the recovering idea for the “Terme del Corallo”. On the right: Irpinia, abandoned church, winter 2012

symmetrical staircases can be the entrance to the conference hall. The “new Terme del Corallo” is imagined as a contemporary baths/spa with multiple functions inside. In the central building there are thermal baths; the main hall became the internal swimming pool offering a spectacular space to the visitors, the corridor in front of the swimming pool is closed with large glass becoming the reception, all the other spaces orbited around these elements. The main function of “baths” is restored, the lost water table is substituted using sea and treated water creating a place with a strong appeal for the tourists and for the locals.

3.5. In the end, about the work on the “Terme del Corallo”

The project wants to give back to Livorno a part of city, that is abandon for a long time, where a historical building is decaying. All buildings and the garden around are connected in the shape but have indipendent use, this choice of-

fers an easy access and support a better conservation of the locations.
The research starting from the study of the historical complex wants to propose a functional recovering of the “Terme del Corallo”, hoping that this idea could be not only an example but an incentive for an immediate action. The dream of rebirth of the “Stablimento delle Acque della Salute” is becoming all days more far: the buildings are near to collapse and the recovering and the survey are becoming more and more difficult.
Behind the complex was built new apartments replacing the STIB factory’s storage (with no documentation of the demolished parts), this fact accelerate the recovering of the garden (even if it’s clearly a risk to bring people near the built structures without consolidation). This isn’t the final solution but people will visit the garden and could look closer at the building heritage they could lose. Will this helps this apparently irremediable loss? It’s up to the people from that town to decide and ask their administrations for decisions aimed to recovering and documentation instead of simple waiting and resignation.

4. Case study three: Abandoned church in Romagnano al Monte, Irpinia, Campania

Romagnano al Monte is a totally abandoned town, after the Irpinia earthquake in 1980, its population run away and never come back. So there is only to be spoiled for choice in choosing an abandoned building there, the whole town is almost in the same condition. Recent suggestion for recovering are quite imaginative and seems not to get the right strategies, for example: why planning a school for chiefs and waiters there when a professional school for masons should have a whole town to work on? So it seems a hopeless place. The town can be seen from the distance until a certain hour in the evening, then, when the sun go down, it completely disappear, the buildings, made of the same stone of the mountain has get back their original color and are completely mimetic with the peak were the town was raised. Inside the town there is a church, that’s obvious, but any place can give an interesting lesson. During an university workshop about the reuse of abandoned place[3], during the January inspection, operated in the logic: “If you want to understand the decay, it is better to see it in winter“, it happened the opportunity to visit this church and immediately it was decided to produce a SfM photographic survey of the interior, the suggestive results, preserve the mood of that place where a special elements teach a special lesson: the wood ceiling was almost completely fallen showing the remains of the wooden structure to support it, between the beams and tables still hanged up it is possible to read the printed word “FRAGILE”. This can be considered as a sort of poetic resonance element, really well suited to demonstrate the condition of Built Heritage in Italy. No project suggestion for this building but the simple presence of that piece of wood coming from guess what early XXth Century is something casual but worth the effort to be notices and communicated, something strong and symbolic.

5. Conclusions

The Built Heritage at risk in Italy is a meaningful part in each the constructed areas while each town has something worth to be properly recovered, most of

the time the owners, the administrations, the people in themselves, seem not correctly oriented in these interventions: lack of money, ignorance, indifference, different interests, resignation collaborate in leaving these architectures to a slow and unrecoverable decay. Knowledge and documentation are the first steps to start thinking in a different way to the Built Heritage management. A cultural process that starts from the documentation often stimulate a project, a proposal, minimal or rich, possible or just dreamed, but always a first step towards a new life for these buildings. Starting thinking to a possible recover, taking care about the meaning of these architecture its always worth of the effort to hope to seem a better time and not only the regret for an unrecoverable loss.

Notes

[1] According to a popular legend, on this bridge Hannibal passed with his army, fighting nearby this area he would lost one of his eyes. Obviously there are no historical evidences of these event.

[2] The first non industrial building using reinforced concrete was built in Bourg-la-Reine, Paris in 1892 by François Hennebique. The first Italian building using it is the “Hennebique” Silos in Genoa (1901).

[3] The “Nuovi ruoli per territori antichi in abbandono” (New uses for ancient abandoned places) workshop took place in 2012 and was coordinated by Francesco Ventura from the Università degli Studi di Firenze.

References

Armino F., 2011, *Terracarne. Viaggio nei paesi invisibili e nei paesi giganti del Sud Italia*, Mondadori.

Berta L., Bovati M., Los S., 2005, *Progetti di architettura bioecologica*, Maggioli Editore Rimini

Ermini L., Ulivieri L., De Pietri P., 2007, *Ad Arnum: verso un parco fluviale dell’Arno*, «Aiòn», Firenze.

Termini P., 2003, *Bruscheto, un mulino sull’Arno nel Medioevo*, «Giornale di bordo»,IIIrd series, n°12.

Bossaglia R., 1985, *Stile e Struttura delle città termali*, Nuovo Istituto Italiano delle Arti Grafiche.

Piombanti G., 2003, *Guida Storica ed Artistica della Citta’ e dei Dintorni di Livorno*, Arnaldo Forni Editore.

Menicagli S. Di Batte, 2000, *Fatti e personaggi intorno alle Acque della Salute*, Editrice l’informazione.

Milano, novembre 2013

ISBN 978-88-908961-0-1