

Preface

This volume presents selected authors of the H.Ea.R.T. 2013 conference held in November 2013 in Cosenza, Italy, and organized by the SmartLab of University of Calabria, financially supported by Regione Calabria, with the scientific collaboration of Collegio degli Ingegneri della Toscana; Ivalsa, Trees and Timber Institute; Icomos International Wood Committee; Mimar Sinan Fine Arts University, Vocational School, Architectural Restoration Program of Istanbul; National Technical University of Athens; Institute for Sustainability and Innovation in Structural Engineering, School of Engineering, University of Minho. The International conference was held under the UNESCO patronage.

The international meeting provided a forum for engineers, architects, researchers, and educators in the field of technology history, constructive features, and seismic behavior of historical timber framed walls; a contribution to the knowledge of these constructive systems, a fundamental requisite to encourage the conservation of these important and precious documents of the history of the world technology.

The use of timber framing technology is known since antiquity, witnessed by six clay models dated to sixth century BC representing *Italian* huts and emphasizing a wooden constructive system constituted by timber frames as reported in Ruggieri. Then, after disastrous earthquakes, it has been recommended, with various connotations and regulations, by several codes, as a recognition of its validity and as a planned technical answer designed to withstand natural disasters, especially seismic events. Relevant to this purpose are the examples of the so-called Sistema Borbonico in Southern Italy, the theoretical peak of which is represented by Vivencio's model (Ruggieri and Zinno) and the so-called Gaiola in Portugal that was described from a historical and mechanical point of view by Vasconcelos et al.

Other systems, Himis, Dhajji Dewari, and a type spread in Lefkas Island, outcome of a traditional knowledge, showed a proper response during recent telluric events (Langhenbach; Vasconcelos et al.; Makarios and Demosthenous).

Furthermore, the book deals with the interpretation of the behavior of timber framed walls under seismic actions by means of calculations and experimental tests.

Poletti and Vasconcelos described the results of several cyclic tests (ISO DIS 21581 protocol) performed on reinforced and unreinforced samples of Gaiola in the laboratories of Minho in Portugal; while Ruggieri and Zinno's manuscript devotes its attention to an experimental campaign (UNI 12512 protocol) carried out on the Borbone system full-scale specimens.

The answer of a timber framed building subjected to shaking table tests using full-scale model is presented by Hanazato et al. The contribution examines also the effectiveness of a strengthening technique using aramid fiber wires and, contemporarily, a new measure technology is presented to reveal both the dynamic deformation of the walls and safety limit of the displacement in dynamic phase. Dutu et al. present a research project data performed in the Center of Urban Earthquake Engineering of Tokyo Institute of Technology with the main aim to interpret, by means of reversed cyclic loading, relied on the Curee procedure, the efficiency of a retrofitting method using aramid fiber sheets.

Other contributions contained in the book deal with modeling analysis as in that of Kouris in which is presented a nonlinear empirical macro-model for nonlinear static analysis of Timber-Framed masonry structures and in Makarios and Demosthenous's paper that examines in particular the out-of-plane behavior of the panel by means of a 3D finite element numerical model. Ceccotti and Sandhaas propose to assess the seismic vulnerability of historical timber framed buildings, through the use of a commercial software, implemented with the "Florence pinching", namely introducing a spring model able to reproduce the behavior of semi-rigid joints under reversed cyclic loading.

Galassi et al. investigate and evaluate the seismic performance of the Borbone system through a comparison between experimental tests, carried out by means of cyclic tests on 1:1 scale models, and the results obtained by numerical modeling of the mechanical system that is able to interpret the contribution of the wooden structure, as well as that of the masonry, to the overall stiffness of the wall.

Moreover the textbook provides, based on case studies, a methodology relative to the diagnosis, strengthening, and seismic improvement, interventions compatible with the modern theoretical principles and criteria for conservation (Gattuso and Gattuso).

Nicola Ruggieri
Gennaro Tampone
Raffaele Zinno



<http://www.springer.com/978-3-319-16186-0>

Historical Earthquake-Resistant Timber Frames in the
Mediterranean Area

Ruggieri, N.; Tampone, G.; Zinno, R. (Eds.)

2015, VIII, 171 p. 139 illus., Hardcover

ISBN: 978-3-319-16186-0