



Editorial

Special issue: Reinforcement of timber structures



Timber structures form an important part of our built heritage, both historical and modern. While these structures have proven durability with some over 1000 years old, nevertheless, the need for structural reinforcement can arise. The main reasons necessitating reinforcement are change of use, deterioration due to a lack of maintenance, accidental damage, and requirements to increase seismic resistance or extend the use of structures approaching the end of their design life. Depending on the situation, the function of the reinforcement may be to repair a weakened structure or to increase the load bearing capacity of an intact structure.

A large range of reinforcement methods is currently available and further technologies are under development. Many of these methodologies are, however, not harmonised for their use in-situ. In addition, for buildings that are classified as part of the cultural built heritage, specific conditions related to preservation must be met. For these buildings, the reinforcement strategy adopted should aim to minimise the removal of original material, conserve the original function of the structure and be reversible. In the past, due to a lack of knowledge on how to select and implement appropriate reinforcement methods, some of the interventions have resulted in further damage to the structures.

In order to harmonise current research and practise in this field, a European network, COST Action FP1101 "Assessment, reinforcement and monitoring of timber structures", was established under the aegis of the COST domain "Forests, their Products and Services". The main objective of the Action is to increase the acceptance of timber in the design of new structures and in the repair of existing structures by developing and disseminating methods to assess, reinforce and monitor them. The Action is structured into three working groups: Working Group 1: assessment of timber structures, Working Group 2: reinforcement of timber structures, Working Group 3: monitoring of timber structures.

The papers in this special issue have been prepared by members of Working Group 2 and represent a summary of much of the work

presented and discussed at a series of workshops during the course of the Action. These workshops considered the latest research in reinforcement technologies for both modern and historical timber structures, current and proposed design methods and also case studies that illustrate the current best practise for on-site implementation of these technologies. Some of the papers are focussed on reinforcement materials and methods, including adhesive systems, mechanical fasteners such as glued-in rods and self-tapping screws, fibre reinforced polymer (FRP) laminates and bars, and emerging nano-structured materials. The remaining papers focus on reinforcement approaches for specific building system components, such as beams, floors, columns, shear walls and connections. These papers describe the types of failure that may occur in these components, the appropriate reinforcement strategies, including consideration of cultural heritage issues and the methods available to increase the seismic resistance of timber buildings. All papers have undergone rigorous peer review prior to acceptance for publication.

The reinforcement of existing timber structures create sustainability and is important from economic, environmental, historical and social perspectives. In this special issue, details are presented of the latest research findings related to the reinforcement of timber structures, current and new design approaches and also how the various reinforcement methods can be best used in practice. It is hoped that this special issue will be of interest to experts within the research community, relevant standardisation bodies, and policy makers and also to practitioners, such as architects, structural engineers and builders, representatives of the timber construction and building industry and product developers in the sector of reinforcement technologies.

Guest Editors

Annette M. Harte

Keith Crews