Rehabilitation of Timber Beams with Reinforced Epoxy Plates

António DUARTE
MSc
Assistant
Dept. Civil Engineering
Polyt. Inst., Leiria,
PORTUGAL
aduarte@estg.ipleiria.pt

Graduated in Civil Engineering in Univ. of Coimbra (1986). MSc, Univ. of Coimbra (2004). Assistant Professor at the Dept. Civil Engin., Polyt. Inst., Leiria.

João NEGRÃO
PhD
Assistant Professor
Dept. Civil Engineering
Univ. Coimbra,
PORTUGAL
jhnegrao@dec.uc.pt

Graduated in Civil Engineering in Univ. of Coimbra (1981). MSc, Univ. of Oporto (1987). PhD, Univ. of Coimbra (1997). Assistant Professor at the Dept. Civil Engin., Univ. of Coimbra.

Helena CRUZ
PhD
Senior Researcher
LNEC, Lisbon,
PORTUGAL
helenacruz@lnec.pt

Graduated in Civil Engineering in IST/UTL, Lisbon (1983). PhD, Univ. of Brighton (1993).

Summary

This paper discusses practical and theoretical issues concerning a rehabilitation system for timber beams, consisting of the replacement of the damaged or decayed parts by new pieces of timber, connected to the remaining original material through a *cast-in-situ* reinforced epoxy plate. Mild steel ribbed bars, stainless steel threaded rods and pultruded GFRP bars were used as reinforcement and the performance for each alternative was found through bending tests of a number of spliced beams. A proposal for an analytical model for the design of such system was developed, which shows good agreement with the experimental results.

1. Introduction

The share of strengthening and rehabilitation works of existing buildings, in the overall value of the construction market, is increasing from year to year. Nowadays, many structures demand for rehabilitation works, due to either having undergone the expected service life, showing ageing-related pathologies, or premature decay or damage resulting from bad design, detailing or construction, accidental causes or under-maintenance.

The need for recovery of the built heritage stimulates the continuous enhancement of rehabilitation techniques. This is particularly true in the case of historic /protected buildings, in which any solution must be strictly committed to keep the original nature and “spirit” of the construction.

In this paper, one such system for the rehabilitation of structural timber elements is discussed. It consists of the removal of the decayed/damaged parts and its replacement by new pieces of timber. The connection between these new parts and the remaining original timber is achieved with a *cast-in-situ* reinforced epoxy mortar. Mild steel ribbed bars, stainless steel threaded rods and pultruded GFRP bars were used as reinforcement and the performance for each alternative was found through bending tests of a number of spliced beams.