



Timber bodies strength of materials: Fundamental principles, test specimens proposal

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Abstract

To reduce the economic cost of a Timber Structure, the first condition is to have a “rational” Structural Code, that is, a Code supported by research and a specific theory. To establish a rational Structural Timber Code, a specific theoretical support is needed. The objective of this paper is to cooperate in the construction of this theoretical support. To design timber structures, it is necessary to have mathematical models able to reproduce the resistance of timber bodies under different solicitations. In this paper, a “road map” to arrive to a specific Strength of Materials of Timber Bodies is proposed. This theory will be the tool needed to develop the mathematical models whose quantification will be obtained by testing “basic test specimens” obtained from timber of any particular timber building (like in concrete or soil mechanics). Finally, a “basic test specimen” for practical application of the theory is proposed. In this case, the experimental support is referred to “willow” wood.

Keywords: strength of materials; timber structures; test specimen; willow wood.

1 Introduction

To reduce the economic cost of timber structures and make them competitive, it is necessary to reduce “security margins” but without any reduction of structural security. Our proposal is the following:

- a) To define timber bodies rupture mechanisms under different kinds of solicitations. This means establishing a specific theory referred to the resistance of timber bodies; it must be the support of a “rational” Structural Timber Code.
- b) To be able to determine the mechanical characteristics of the particular timber employed in any timber structure. This requires testing that timber.

- c) It is possible to adopt an adequate security margin based on the rupture mechanisms and the mechanical characteristics of the timber employed.

2 Characteristics of Structural Codes

There are some theoretical models for the redaction of a Structural Code of any material. For timber constructions, there are two main models:

- a) To use value tables with the minimum strength of the wood bodies under different solicitations in building constructions.
- b) To determine experimentally in each circumstance the strength of the employed timber.

As the strength of a particular wood has a very large variability –geographical region where the