





## Combination of laser scanner and drilling resistance tests to measure geometry change for structural assessment of timber beams exposed to fire

<https://research.thinkwood.com/en/permalink/catalogue3057>

Author: Cabaleiro, Manuel  
Suñer, Carlos  
Sousa, Hélder S.  
Branco, Jorge M.

Organization: University of Vigo  
University of Minho

Publisher: Elsevier

Year of Publication: 2021

Format: Journal Article

Application: Beams

Topic: Fire

Keywords: Drilling Resistance Test  
Structural Assessment  
Laser Scanning  
Cloud Point

Research Status: Complete

Series: Journal of Building Engineering

### Summary:

A structure may be totally destroyed due to a fire, but often it is only partially damaged and parts of it may still be salvaged and reused. For buildings with significant historic and cultural value, it is of utmost importance that these elements, which were only partially damaged, can still be recovered as to preserve the authenticity of the structure. In the case of timber elements after a fire, it is common to find damage on the cross-section exterior part, whereas the inner part presents still a non-damaged section. Therefore, the element is often found with an exterior irregular shape, either due to its original shape prior decay or due to the exposure to fire, that does not coincide with the inner residual cross-section. Moreover, it is essential to perform a preliminary safety analysis to verify which elements can be preserved and to what extent interventions could be needed. The objective of this work is to apply a methodology that allows to calculate the residual cross-section of partially burnt timber elements structures as to calculate the resistant and apparent sections for geometry assessment and to implement that information in three-dimensional structural models. For this purpose, this work proposes a methodology based on a combination of drilling resistance tests together with laser scanner measurements. The methodology was first tested and calibrated within a controlled laboratory environment and then validated onsite using elements from a building exposed to a past fire. The Casa de Sarmiento (Sarmiento's House) in Guimarães (Portugal) was used as case study, where various structural damages due to a past fire were found.

Online Access: Free

### Resource Link

<https://doi.org/10.1016/j.jobe.2021.102365>