# Moisture Content Monitoring in Glulam Structures by Embedded Sensors via Electrical Methods

**https://research.thinkwood.com/en/permalink/catalogue1462**

| | |
|---|---|
| Author: | Li, Hang |
| | Perrin, Marianne |
| | Eyma, Florent |
| | Jacob, Xavier |
| | Gibiat, Vincent |
| Publisher: | Springer Berlin Heidelberg |
| Year of Publication: | 2018 |
| Country of Publication: | Germany |
| Format: | Journal Article |
| Material: | Glulam (Glue-Laminated Timber) |
| Topic: | Moisture |
| | Serviceability |
| Keywords: | Sensors |
| | Moisture Content |
| | Monitoring |
| Language: | English |
| Research Status: | Complete |
| Series: | Wood Science and Technology |
| ISSN: | 1432-5225 |


Summary:

Today, more and more timber structures (especially glulam structures) are used in civil engineering in respect of sustainable development and thanks to their competitive costs. However, the durability problem limits their development. Degradations related to excessive moisture content (MC) or to the wetting/drying cycles were observed and can lead to severe structural damages. In order to promote the use of wood in construction, infrastructure supervisors have expressed their need on continuous monitoring techniques of wood MC. However, no information exists in literature regarding the MC monitoring inside the lamellas of glulam.
In the light of this observation, we propose to transform glulam into “smart material” by embedding the MC monitoring system between the lamellas, on taking into account the major constraints of fabrication of this material (the small glue line thickness, the important bonding pressure, etc.). To achieve this, we have selected two families of methods: the electrical methods and the ultrasonic method. The former are based on resistive/capacitive measurements and the latter consists in the analysis of ultrasonic wave propagation in the material. 4 measurement configurations were identified for the electrical measurements using pin-type or surface-type sensors. Regarding the ultrasonic measurements, 2 configurations were proposed and tests were realized with two families of piezoelectric film sensors (PVDF (Polyvinylidene fluoride) and MFC (Macro Fiber Composite)).


| | |
|---|---|
| Online Access: | Free |

## Resource Link

https://hal.insa-toulouse.fr/hal-02078673/document