Experimental characterization of wood mechanical performance in constant environment: use of acoustic emission to monitor crack tip propagation

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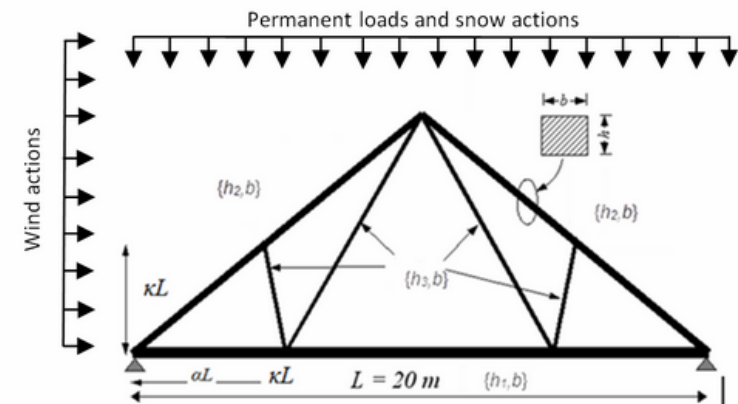
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1st Conference "Life Cycle Assessment, EPDs and modified wood
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# CONTEXTE & OBJECTIFS

❑ Use of wood-based materials in sustainable constructions in order to reduce the environmental impact of buildings

❑ Improve maintenance policies for existing timber structures subjected to decay degradation by monitoring material damage evolution

❑ Identification of the most relevant descriptors of failure mechanism

❑ Detection of early warning signs of crack propagation within the material

❑ Use statistical tools (Probability of Detection) to make

more robust the analysis of acoustic activity within the

material, so Health Structure Monitoring

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WOOD MATERIALS AND SPECIMEN

❑ Two Massif Centrals Species : Douglas Fir and Silver Fir (in dry state)

❑ Double Cantilever Beam with variable inertia (notched specimen)

Douglas Fir

Silver Fir
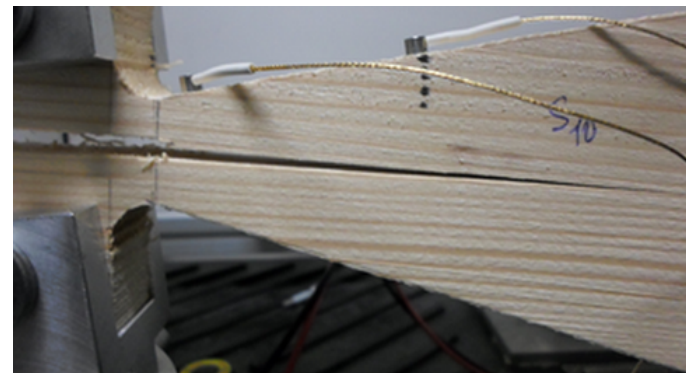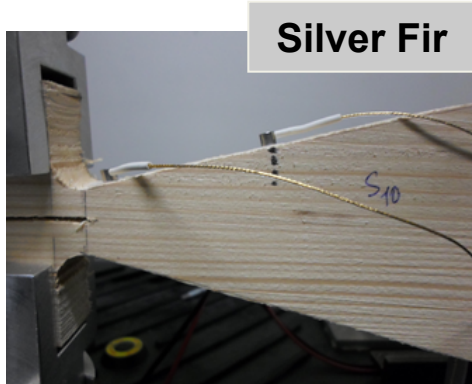
LAB TESTS : MECHANICAL AND ACOUSTIC EMISSION

❑ Tests performed at ambient temperature (≈20°C)

❑ Opening mode crack tests using MTS testing machine

❑ Tests performed at a displacement-controlled velocity of 0.5 mm/min ; cell force capacity of 500 N

❑ Four acquisition channels (only two were used to perform linear localization of AE sources)

❑ AE sensors : PICO (operating frequencies 200 to 750 kHz)
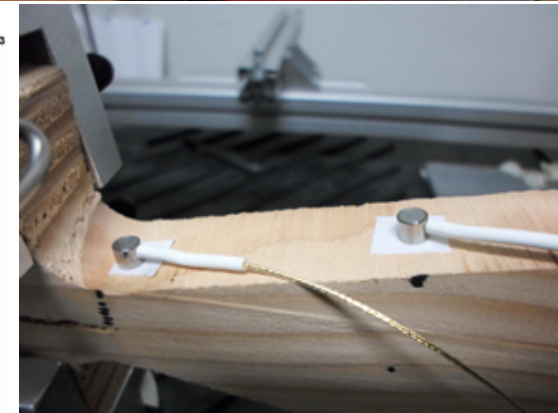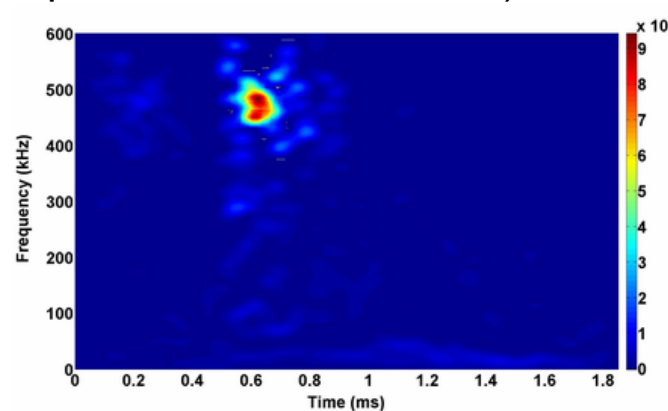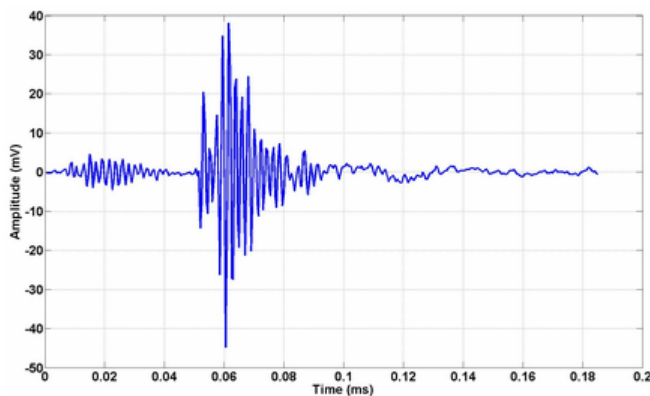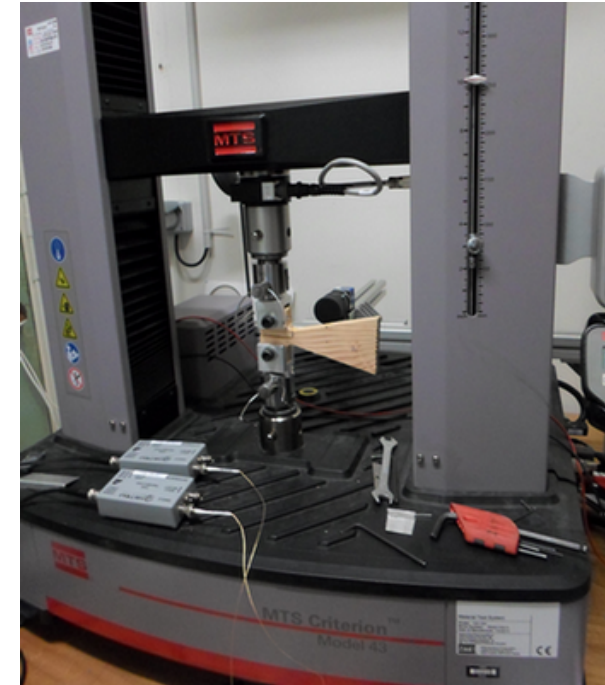
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