

**Institut Pascal (UMR6602 UCA/CNRS) - Group M3G (S2O team)**

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**Title of the thesis:** *Experimental and numerical study of the mechanical behavior of demountable and composite floors made of steel, timber, and concrete.*

**Thesis Abstract:**

This thesis aims to study the mechanical behavior of demountable composite beams made of concrete panels bolted together with CLT panels and with steel beam sections. Such interesting technological solution emerged as an attempt to develop more sustainable constructions and to reduce the environmental footprint of existing constructions by promoting their reuse. This original light solution in comparison to existing ones takes advantage of the interesting mechanical, thermal, acoustic, and vibrational properties of steel, concrete and CLT. In addition, it allows incorporating timber as a bio-resourced material in structures. The proposed solution will be tested under flexure. In addition, a numerical model on Abaqus will be developed. Using both experimental testing and numerical modeling aims to show the efficiency of the proposed solution and to study the impact of different concrete blocks, CLT panels and bolt configurations (number and dimensions of panels, types of bolts, etc.) on the overall behavior of the composite structure. During the flexural test, the proposed structure will be instrumented using load, LVDT sensors, as well as digital image correlation and strain gauges. In addition to studying the mechanical behavior of the proposed solution under Ultimate Limite State loadings, the idea is also to study its vibrational behavior under serviceability limit states (instrumentation using accelerometers) to make sure that such solution satisfies users comfort (by overcoming excessive vibrations usually observed in timber structures through its association with concrete panels). Since the mechanical behavior of this composite floor depends on the shear connectors used between concrete and steel as well as between CLT panels and concrete panels, push-out tests will be performed on bolts (shear connectors) connecting concrete panels and CLT panels as well as the ones connecting CLT panels and steel beam to determine their constitutive law.