The increasing demand for materials such as wood undeniably contributes to the depletion of natural resources and global warming. In order to stop this phenomenon, a more sustainable and circular management of wood could be developed by intelligently recycling our wood waste. This recycling has a lot of ecological potential. A part of the wood waste is in the form of beams or pallets and could be recycled by being considered as wood slats. These wood strips could then be combined, assembled, and glued to create Cross-Laminated Timber (CLT) panels for use in the construction industry.

We aim to develop optimization techniques to revalue raw wood waste by providing the layout schemes to build CLT panels. The objective can be to produce as many CLT panels as possible or to minimize the wood surplus when a given set of panels should be produced.

A literature review has been performed to identify the relatively similar problems that have been modeled and analyzed by experts in operations management and mathematical optimization. The two closest problems to ours are the skiving stock problem and the dual bin packing problem. The latter is quite misleading since our problem is technically not a dual version of the cutting stock/bin packing problem, but a problem on its own as shown in the literature.

In this work, we propose a clear description of our problem and different mathematical formulations for the different variants. We also add several cuts to improve the formulations. They are then tested with various numerical experiments based on field data from the wood industry. As it is an NP-hard problem since it is a special case of 3-partition, we identify the limit size of the instances for which the problem can still be solved in a reasonable amount of time.