**Project title:** Structural optimization of a patented prefabricated isolated sandwich roof element for application in agricultural buildings.

**Motivation:** Economic and emotional damage by fires in stables, recently extensively in the news, form the motivation of this project. Many animals pass away due to stable fires. This should be avoided. For that reason, some years ago it was decided by Saint-Gobain Insulation Solutions to develop, together with TNO, an isolated roof element with the advantages of sandwich panels and mineral wool and to patent this roof element. The developed roof element is inflammable, recyclable, lightweight and easy to mount. This development resulted in a design for which the proof-of-concept was shown in some practical applications (Fig. 1). However, while developing the roof element, some choices have been made that restrict the practical application. To make the product more attractive for future applications, the design needs to be modified, recalculated and tested again for its structural properties.

**Goal:** To structurally optimize a prefabricated isolated sandwich roof element for application in agricultural buildings such that the roof element becomes more competitive fulfilling the requirements set in terms of strength, stiffness, durability and costs.

**Approach:** After a literature study, the requirements that the sandwich roof panel needs to meet have to be formulated. Then, modifications to optimize the sandwich roof element have to be proposed and finite element analyses (Abaqus) need to be performed to evaluate the optimization proposals. If necessary, material tests will be performed to determine the strength properties of and the bonding between the materials. In het Structures Laboratory Eindhoven TU/e, tests will be performed on the optimized sandwich roof element to check its performance. At first, only static loading is considered. The tests will be performed monotonically till failure, cyclic or both. Fatigue tests may be necessary as well. To carry out the necessary tests, a test set-up needs to be designed and built. Perhaps the available test set-up (Fig. 2) can be used. Literature study, formulation of requirements, proposing modifications, finite element analyses, material testing, designing and building the test set-up and the execution of the tests form part of this final project.

**Boundary conditions:** During your final project, you are expected to spend a substantial part of your time at the R&D department of Saint-Gobain Insulation Solutions. The R&D responsible of Saint-Gobain Insulation Solutions is one of your final project supervisors.

**What we expect of you:** Enthusiasm, Curiosity, Ability to cooperate, Problem solving attitude, Innovative approach, Out-of-the-Box thinking

**If interested:** Send your motivation to: marcel.verboven@Saint-gobain.com and h.h.snijder@tue.nl