

A LIGHTWEIGHT FLOOR SYSTEM BASED ON SANDWICH PANEL

Pier Giovanni Benzo

Supervisors: José Sena Cruz / João M Pereira

MOTIVATION

The aim of this research is the development of a **lightweight floor system based on sandwich panel** for applications in the **rehabilitation of degraded floor** in existing building and **modular construction** (see Fig.1).

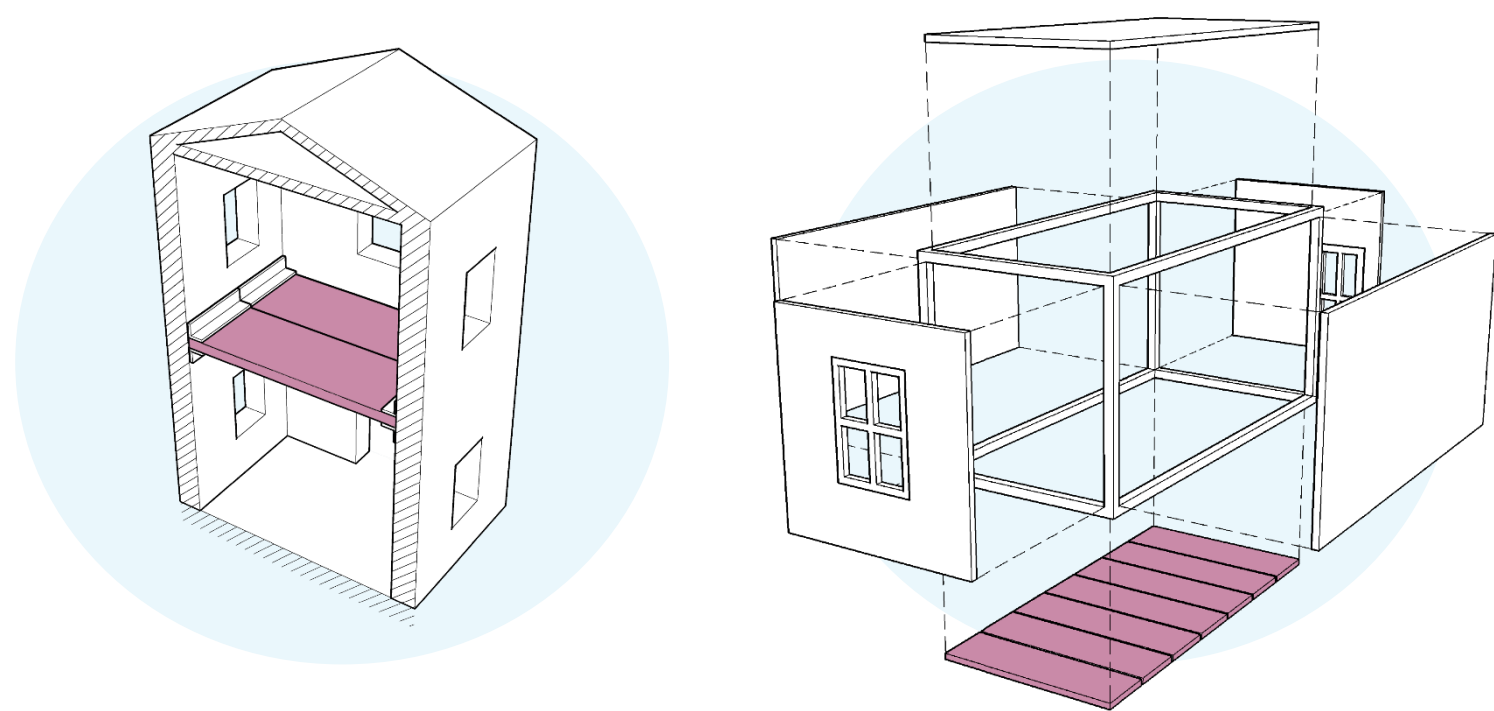


Fig. 1 Existing building floor rehabilitation and modular construction.

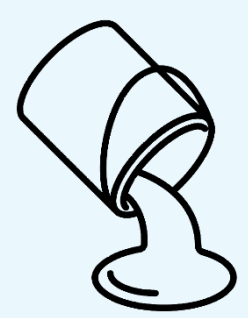
ADHESIVELY BONDED CONNECTION

The adhesive must ensure (see Fig.2):

- **Load transfer** from the face sheets to the webs
- **Long-term deformation** in fulfillment of the serviceability limit state for floor in residential building
- **Chemical compatibility** with the PUR foam
- **Curing temperature** compatible with the foaming process of PUR
- **Curing time** compatible with the production line cycle of sandwich panels

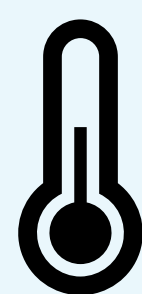
From preliminary lap shear tests Epoxy resin adhesive showed higher ultimate strength compared to Reactive/Modified Acrylic and polyurethane (PUR) based adhesive.

CHEMICAL COMPATIBILITY



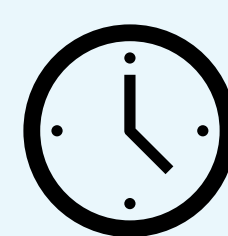
Adhesive spilling out from the bond area might interfere with the foaming process

CURING TEMPERATURE



The foaming process of PUR is an exothermic reaction which reaches 40 °C

HANDLING STRENGTH



Handling strength shall be reached within 3-4 mins from adhesive application

ULTIMATE STRENGTH



The full curing time shall be within 24-48 hours

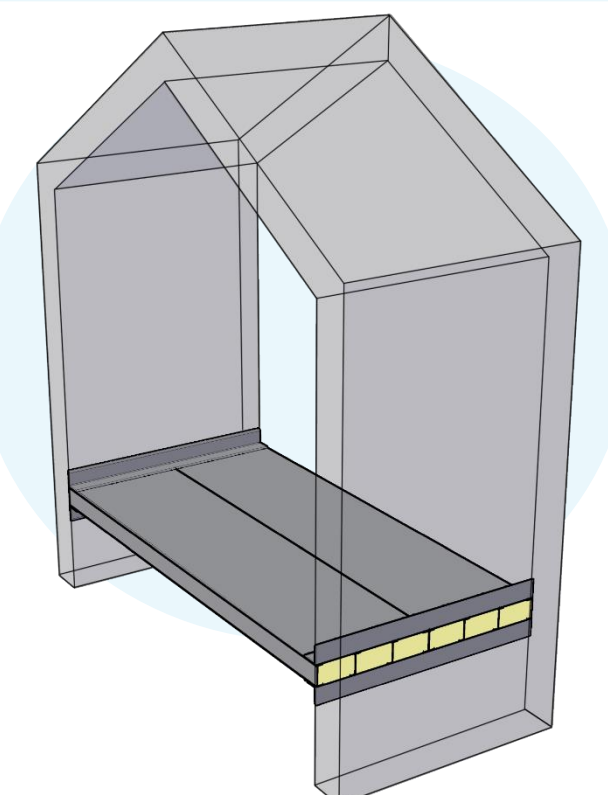
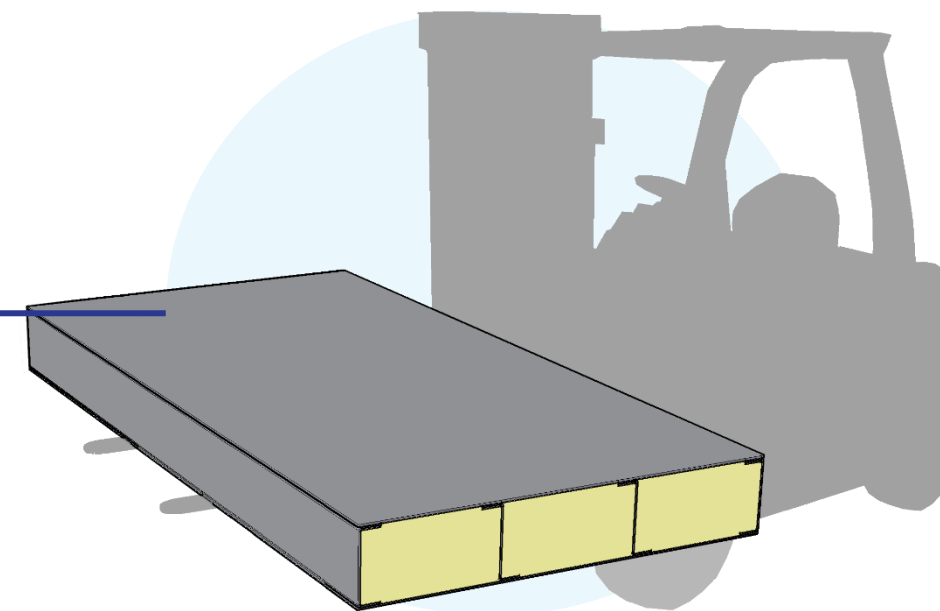
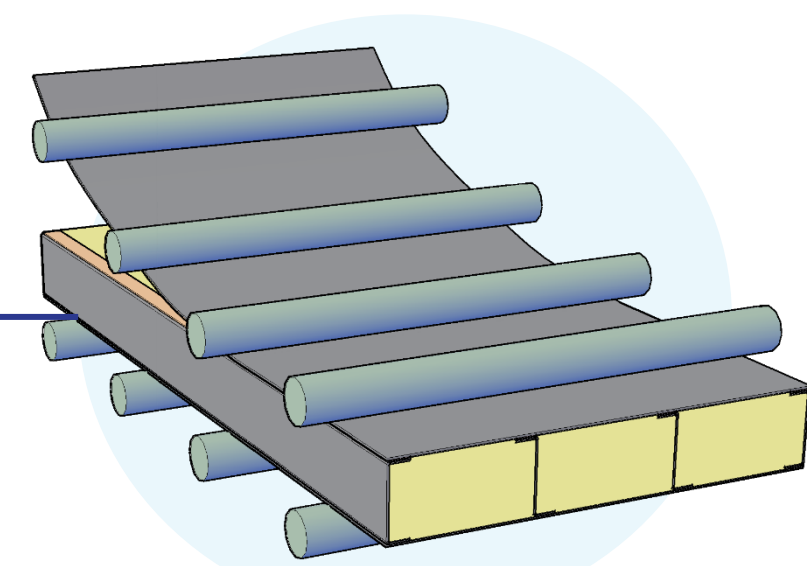
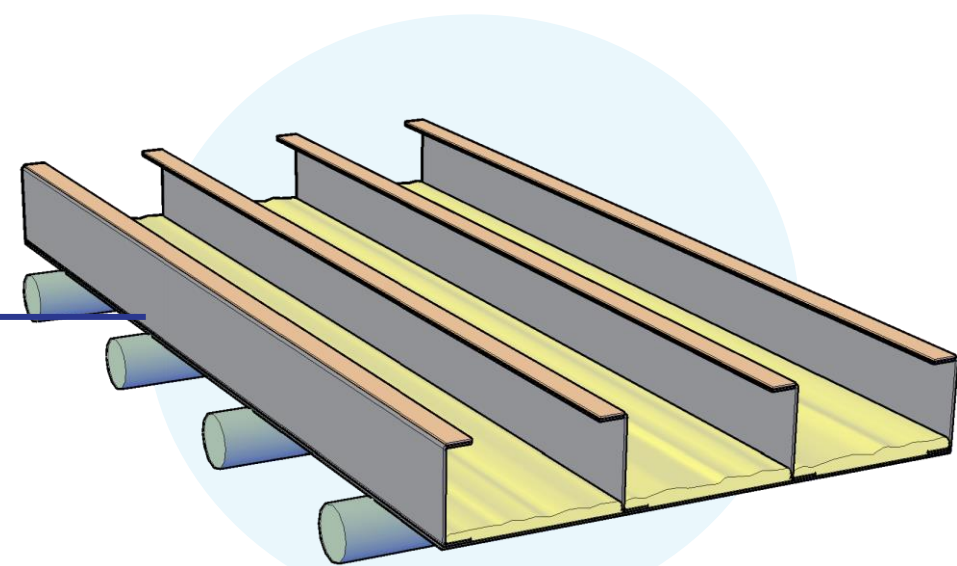


Fig. 2 Production line of the sandwich panel manufacturing process and related constraint for the adhesive characteristics

SANDWICH FLOOR PANELS

Three prototypes were preliminary designed to meet the **structural safety, thermal and acoustic requirements**. All of the prototypes involve the use of **steel face sheets** and different **web core system** (see Fig.3).

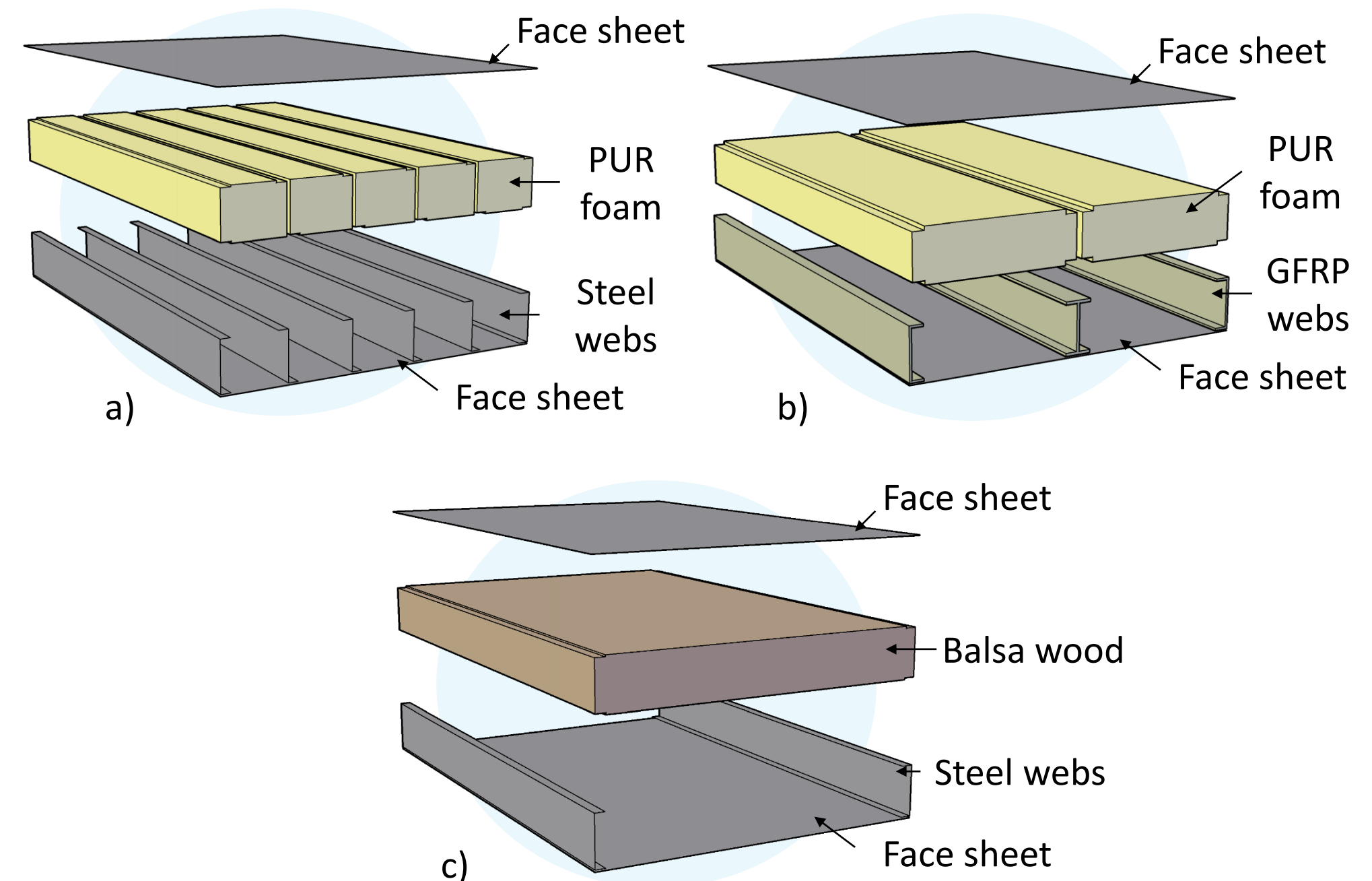


Fig. 3 Layout of a) steel + PUR core system, b) GFRP + PUR and c) steel + balsa wood

CONCLUSIONS AND FUTURE WORK

Prototypes of the steel – PUR foam web core solutions will be manufactured to test the strength of the connections.

ACKNOWLEDGEMENTS

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