Physical and chemical modification of the external concrete surfaces contribute to improved durability and reduced maintenance. Through research in situating of the concrete, porous surfaces were created. This novel method revealed higher efficiency and higher durability of the treated concrete surfaces, allowing the development of lightweight and aesthetically pleasing properties.

The external appearance of the textile reinforcement and by means of direct tensile and uniaxial tensile tests on both unaged and aged textile reinforcement and TRC samples, the performance of reinforcement or use of non-corrosive reinforcing materials such as carbon fibers. In this context, ultra-high performance concrete (UHPC) materials are shown to be promising alternatives with advantages such as lower embodied energy and reduced environmental impact. Predictions suggest that UHPC composite elements for building envelopes could offer solutions to increased demand for the application of innovative building materials due to their high performance and sustainable properties. In this framework, composite elements have been developed combining an autoclaved aerated concrete insulation layer with an external UHPC supporting layer. The results show that the lightweight composite element has a good performance in terms of thermal transmittance and involution of financial benefits.

The project will develop innovative materials with the aim to design innovative building components (internal and external walls) for a healthier indoor environment. The development of the innovative building materials is a result of research and engineering. They are appropriate for a variety of environmental and economic conditions, offering a number of advantages regarding durability and environmental impact.