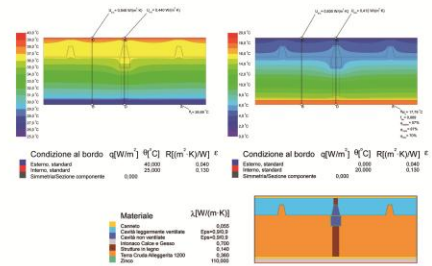
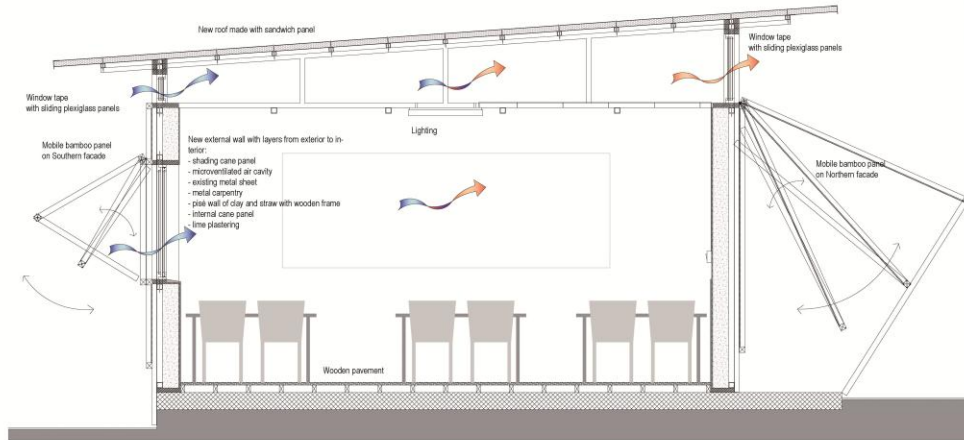


REFURBISHMENT AS INNOVATION

This project innovates the local inhabitants attitude towards building activity in Palestine, introducing the practice of sustainable refurbishment of existing buildings, which is an activity of basic importance in a country with land scarcity as Palestine.

The envelope is transformed with an innovative use of low cost and low tech materials. The traditional Mediterranean building technique of pisé is innovated and adapted to the existing situation, using the external metal sheet as a quarterdeck and adding on the interior side of the wall bamboo panels and lime plastering. This simple solution is highly transferable in many situations to improve existing buildings in poor countries. The monitoring of the actual school building situation – after more than a year of life - shows the good resistance of materials, thus giving a proof of the high transferability of the building technique with good results in other situations.

Particularly in the C area of Palestine, the ‘unpermanent’ character of this refurbishment creates a new and innovative building practice that can overcome Israeli impositions and become a typical practice to refurbish all existing buildings in Palestine.



The existing metal sheet presented a heat transmission of 5.9 Wm²K. classrooms were unbearable spaces before the refurbishment. The intervention had to face the need of keeping enough space inside the classrooms together with the constraint of thickening the wall layers only on the inside face, because of the imposition of keeping the external metal sheet as the first envelope of the school building. Thus, the solution was to apply an external removable shading layer, which could protect metal sheet from solar radiation during the very long hot season, and to create a fixed internal wall with a thickness able to give a good thermal insulation without reducing too much the floor surface of the classrooms.

Given the mostly recurrent climatic conditions in the geographical context of Abu Hindi school, the thermal analysis of the external wall was made using both the typical analysis border temperature conditions of 0-20 °C and the context border temperature conditions of 40-25 °C. The result of heat transmission across the wall is around 0.84 Wm²K. This value is under the maximum heat transmission permitted by Italian law in the hottest areas of Italy until 2006 (0.85 Wm²K) and is comparable to the actual permitted values (until 2009 0.62 Wm²K, since 2010 0.56 Wm²K). The wall internal surface is around 17°C, when the indoor temperature is 20°C, thus the gradient is of 3°C. These values show that new wall guarantees a high thermal comfort, as there is no generation of convective motions due to temperature gradient.

DESIGN METHODOLOGY AS INNOVATION

This project brings innovation in designing activity methodology for auto-construction projects. The final project comes after the verification of the building technique critical points by means of a 1:1 scale realization workshop, handmade by designers. Moreover the creation of an illustrated instructions booklet makes dissemination of this technique easy and fast. Local workers employed for this building can now spread their acquired knowledge and autonomously apply it to other situations.



The instructions booklet is a fundamental instrument for practicing and spreading the diffusion of auto-construction activities. Anyone can use it to understand main steps of construction as it is conceived with a universal language, made of photos, drawings and a very few words in English language – just as an Ikea assembly instructions manual. It overtakes translation problems and it's the first essential tool to master building techniques for the non insiders and for people who are going to build something for the first time in their life. In this way, building techniques become part of the permanent local building culture and can be used in different situations directly by users-builders. This is a key aspect for emergency situation in developing countries, where local economy is poor and there is need for low-cost and low-tech auto-construction techniques. The instructions booklet can be used even without designers and low-tech building techniques can be more easily adapted to different situations, thanks to their low content of complex details and high content of common materials and elements. This is deeply bounded to sustainability culture, as one of its main features is sharing of open source knowledge.