

DOUBLE-SKIN FACADES FOR HOT-HUMID CLIMATE

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There is a need for a sustainable development in the Hong Kong build environment. One of the most significant technologies for energy savings in a building is the facade. Architects working in collaboration with engineers started to take an energy-responsible approach to the design of building facades where the facade contributes to both the embodied energy as well as operating energy of a building. However, little work has been done on the behaviour of double-skin facades in hot and humid climates. It is not sufficient to adopt the new concepts to a different environment. The seasonal and daily climate in respect to mean temperature, humidity and wind speed distribution in Hong Kong is different to the moderate climate in Europe. A new approach has to take the climatic factors into account to find out if a double-skin facade can help to reduce the energy consumption in buildings in a hot and humid climate.

SIMULATION

From the analysis of existing buildings in Hong Kong three different types of facades were identified. This leads to three different simulation models which were compared to a prototype building with a single skin curtain wall system as a base case. The other models refer to the three different projects with different construction geometries as follows:

Facade options	Precedents	Cavity width
Option 1	conventional curtain wall	0 m
Option 2	double-skin facade as external air curtain with 500 mm air cavity and movable blind installed in-between	0.5 m
Option 3	double-skin facade as external air curtain with 2000 mm air cavity and movable blind installed in-between	2 m
Option 4	air-flow window in which interior conditioned air flows through 200mm cavity of double-skin facade and return into ahu	0.2 m
Option 5	air-flow options (Option 4) in which exterior unconditioned air naturally ventilated through 200mm cavity	0.2 m

The simulation software VisualDOE is capable of simulating whole building energy consumption calculating the annual electricity consumption of lighting, small power load and cooling. It was used to simulate the different types of double-skin facades but for the buoyancy flow in the cavity four different assumptions were made. The simulation was run with 2, 5 10 air changes per hour (acph) in the cavity. Additionally 200 acph were assumed as a maximum of buoyancy flow to study the influence of further increases in acph. There was no support of airflow to the HVAC-system assumed so all options were simulated with the same HVAC-system.

RESULTS

Option 3 shows the best consumption reduction of 9.18% compared to the base case followed by option 5 with a reduction of 8.17%. By looking at the consumption pattern of the three different energy-consuming units an increase of lighting and a decrease of cooling consumption is apparent. The difference of energy savings for option 3 between no ventilation and a ventilation of 200 air changes per hour is 2.00%.

VERAMAR PROJECT

SCAP

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This is an Urban Regeneration Master Plan that involves 15 different projects for an important port in Mexico: the Port of Veracruz. The new shape of this 2 miles long waterfront will include a cruiser dock, a Marina, four shopping malls, an historic district, an aquarium, a beach renewal, a kids museum and a visitor center.

Throughout the water front of this great city, several areas are deteriorated, generating an urban recycling. Some of the old spaces will turn in to commercial areas. With these commercial zones the project will obtain funds to finish its own financing and making possible all the implementation. The areas that are being operated by particulars will grow with private investments.

On the other hand, the government will facilitate the permits for the implementation of the master plan. The aquarium of Veracruz, which at the moment is the biggest aquarium in Latin America, works as one of the detonators points of the master plan, and will enhance its spaces.

The urban study of the streets, as well as the accessibility from different points will promote the rise of the land cost beneficiating their owners and making them care of the zone. At this moment, the project is in study by the governmental departments.

Team's Name:	SCAP
Country:	Mexico
University:	Universidad La Salle, Mexico
Title of the Project:	Veramar Project
Description:	Urban Regeneration Master Plan in the Port of Veracruz, Mexico.
Authors:	Juan Carlos Alvear Homero Hernandez Victor Marquez
Location:	Veracruz, Mexico
Year:	2001
Sust. Concepts:	Urban Recycling