Case Study: GreenDwell Thailand

Industry Challenge

GreenDwell provides design and consultancy services for buildings based on the principles of sustainable design. Rather than the conventional approach of looking at sustainable design purely from an energy and environmental perspective, GreenDwell also considers the human aspect of sustainability. The company believes that how people experience space through time defines their well-being.

The company uses a Green Research-Integrated Design (g.r.i.d) process to hypothesize the various senses that people might experience after the building is constructed. Computer simulation tools are used as the ‘sensual experience tester’ to help architects check for the sensual performance early in the design phase. The design is analysed for visual, thermal, and acoustic comfort, alongside checking the building’s environmental impact. Thus, the company creates an experience that is a delight to the senses, while minimizing negative effects on the environment.

Given the unconventional approach, the work process often takes longer than the typical design process. The company uses simulation to demonstrate to clients the impact of various environmental factors on the design. Using the additional layer of site and context-specific information enables the creation of a better design.

Given that the company caters primarily to clients in Thailand, which is a hot and humid country, shade and natural ventilation play a very important role in design. Also, for projects set in urban areas, the design needs to consider existing obstructions and their impact on wind flow on the site. The most efficient way to achieve this is by integrating ventilation simulation throughout the design process.

Curved form to enhance windflow
MSC Solution

Greendwell initially tried to work with basic software tools, but these were suitable for use only at the conceptual design stages since they were not equipped to handle aspects of simulation such as grid size and grid limitation. At the advanced design stages, the team required the ability to test for parameters such as the opening dimension and distance between each building mass to aid design decisions. Generic CFD tools did not suit the purpose. As a result, even testing of basic design questions took too much time.

The company then decided to use scSTREAM, a general purpose thermo-fluid analysis system with structured mesh from MSC Software. It was a good fit for GreenDwell’s objectives since its accuracy and simulation time addressed the company’s design questions. Since the workflow from the modelling tool into simulation was fairly simple, it proved to be extremely user-friendly. The quality of the output was so good visually, that it could directly be included in client presentations.

One of the projects where scSTREAM proved to be extremely useful was for a kindergarten project located in an urban site. The site had several neighbouring buildings that were obstructing ventilation. Also, there were existing large shade-giving trees on the site. One of the design objectives was to ensure that the kids be able to run around and play in the tree shade without having to rely on air conditioning.

Since the site was long and narrow, it was challenging to determine the best possible building form that would allow the wind to flow through. The team ran simulation, accounting for both present surrounding buildings as well as for a future worst-case scenario where near-by empty plots are developed.

The simulation helped the team determine that the wind was following an unusual pattern, entering and exiting from the narrow side from back to front. This was a diametrically different from the expected wind direction. The simulation results helped the design team to conceptualize the building form and optimize the “wind channel”. The building shape was designed accordingly to enhance the wind flow into the pocket courts, which were to be used for the kids’ play area.

Key Highlights:

Product: scSTREAM

Industry: Architecture

Challenge: Integration of ventilation simulation throughout the design process

Solution: Simplified workflow from the modelling tool into simulation to facilitate superior wind-optimized design

Benefits

Ever since the kindergarten building has been operational, the feedback from teachers and parents have been extremely positive. The atmosphere at the school is quite different from what one might expect from an urban school. Since it is cool and breezy, the kids truly enjoy using the space. Even on days when wind is scarce, ceiling fans are sufficient to ensure comfort.

GreenDwell team was able to overcome some of the challenges that the site posed, through an integrated work process aided by scStream. The presence of a reliable ventilation simulation tool played a big role in enabling effective design decisions.

For more information on MSC scSTREAM and for additional Case Studies, please visit: www.mscsoftware.com/product/scstream

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