Passive shading device in Dor Tivon House for the Elderly.

Top: Optimization of shading device according to the Cellular Shading Method.
Middle: Theoretical shading device based on external data, without considering internal needs.
Bottom: Schematic description of need for shading every hour the year round.
While it is widely agreed that global warming necessitates consideration of climatic awareness, the subject of shading is still negligible in architecture. Contemporary styles, usually based on hi-tech images and advanced technologies, encourage free forms with little consideration of sun positions and thermal comfort. Many parts of the facades are transparent, and the few shading devices, if at all used, are usually decorative with no planning depth regarding climate control.

Different models developed to increase thermal comfort in buildings have not established themselves in architectural offices, both because of their apparent complexity, and their extra burden on the building budget. With this in mind, it is worth encouraging every model to simplify the subject and bring it closer to the "planning board".

From a thermal point of view, openings have always been a vulnerable point of the building. While other facade sections can be sealed and insulated, windows and doors pose a more problematic situation. The prevailing use of curtain walls has encouraged the development of improved glazing. However, a side-effect of this is that it also limits natural light, prevents penetration of winter sunlight, and disperses the absorbed heat uncontrollably to the surroundings.

Dynamic shading solutions which change according to conditions, succeed in moderating the problems, yet always raise the question of cost, and, at the end of the day, leave passive shading devices as a prevailing solution.

Common passive shading calculations are usually based on the different angles of the sun in winter and summer. While direct sunlight in winter is a welcome commodity, in summer it is a nuisance that ought to be minimized. A simple calculation of the length of a cornice can prevent direct sunlight in the summer, and allow "low" sunshine in the winter. However, such solutions are usually based on compromise that prefers, especially in Israel, solutions for summer shading, while ignoring other times of the year when warming is needed.

Dynamic, or semi dynamic shading devices - shutters, porticoes, and brise-soleil, allow optimization of the shading solution. However, the current "look" has refrained from using them so far, as they "threaten" to disrupt the pure lines of the structure.

Computerization of shading devices and sensor automatic operation can substantially lower energy consumption. The erroneous thought, however, that this requires high maintenance cost, still creates a psychological block to Israeli entrepreneurs, who have proven time and again that future maintenance costs is not of their concern.

Another problem occurs due to unforeseen change in the building's environment. While the shading system is initially planned when the building is located on virgin territory, eventually it is surrounded by other buildings (or foliage), which create air streams and other disturbances, thereby disrupting the original calculations.

Recently developed at the University of Arizona, a cellular method seems to promote the subject of shading, though still in the area of passive solutions. The method aims to increase the device efficiency, by matching its form with the internal thermal requirements of the various spaces.

The process goes through three phases: The first assesses the thermal requirements of each space according to the activities that take place in it, in order to determine how important shading is, or the exposure of a space to the sun.

The second stage locates the points on the building's mantle that are relevant to the given space, namely - those parts that can either block or expose the openings to direct sun at all hours, all year long.

A comparison of the figures derived from the two stages allows a virtual mapping which can then shape the optimal shading device.

In recent decades, several models have been developed in Israel to improve thermal comfort in buildings. Worth mentioning are those of Prof. Edna Shaviv and Dr. Gad Kapulski of the Technion; several models developed in the Unit of Desert Architecture in Sde Boker, headed by Prof. Yair Etzion; and a model for the use of natural light in buildings, developed by Prof. Eliezer Neeman of the Technion.

The relative advantage of the model presented here, is that it can be used as an applicable tool to achieve thermal conditions, without restricting creativity. Though its weakness lies in its reliance on passive solutions, one hopes it will encourage the development of improved models for dynamic shading solutions.

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