Abstract

This paper means to show how important is the introduction of Energy Conscious Design and the integration of it in CAAD Systems. Briefly is reported the State of the art in this sector of Architecture as well as is listed the DGXII activities on improving appropriate research.

Buildings is a team effort in which many elements have to be combined into a unified structure. The aims of the architect, the engineer and all the other players of building process should merge into a seamless design. Awfully until recently that idea was difficult to achieve because everyone had to begin and continue working on new project from a different perspective. Each specialist was obliged to operate in isolation until the time came to match and patch with other members of the design team. Information technology is changing that approach because rapid exchange of data is making it possible for all players to work around the same interactive core design.

This breakdown of barriers is a significant advance not just in terms of administration, but in achieving better final results. Instead of having add-on compromise, all the functional elements of a building project, such as energy efficiency, can be merged into a totally integrated design.

The interface with widely used CAD systems allows easy introduction of I.B.D.S. (Integration Building Design System), and many designers using computer can expect to benefit in using appropriate software, because they are already working in a suitable environment for IBDS.

Energy Conscious Desing aims to make the design process having the potential to significantly improve the bioclimatic factors consideration in terms of controlling internal comfort conditions, thermal performance, and the environmental impact of the building(s) concerned. Projects should take account of appropriate "housekeeping" measures, such as insulation, draught and weather sailing and the control of auxiliary heating or cooling, and artificial lighting system.

Several Software have been developed in order to provide the above mentioned themes; particularty the DG XII, European Commission’s Directorate General XII for Science, Research and Development, has managed, promoted and founded researches on this sector. Some outcome of that are:

1. PASCOOL: aims to develop techniques, tools and designe guidelines in order to promote and facilitate the use of passive cooling in buildings
2. IAQ Indoor air quality is playing an important role in building design today; awareness has been intensified by the diagnosis of the Sick building syndrome in some buildings
3. COMNBINE 2 covered HVAC design, internal space planning, thermal simulation, energy analysis, energy economic design, geometric modelling and the design of external building elements.
4. PASSPORT is a correlation-based evaluation tool which enables heating needs in residential buildings
to be assessed. It has been developed in the framework of the PASSYS project of the European Commission DG XII.

5. SOLEXPERT is a multilingual software programme to facilitate the conception of solar thermal installation.

Furthermore it is useful to bear in mind how interesting have been the results of ZEPHYR: European architectural ideas competition in which an application of the LT Method.

The LT 3.0 Method (Lighting Thermal) is an assessing tool of Building Energy performance in South Europe. It is about the design optimization of passive zones, allowing to estimate the energy consumption (in CO$_2$ emission). The Rate PA/TA (Passive Area, Total Area) is an indicator of building energy performance attitude.

Furthermore it shows the role on Building Energy Performance, of choices on the Lay-out shape, the definition of external wall, and the dimensions of interior areas. LT allows you to manage it quite friendly, using as parameters the Climate Conditions, the Main Orientation, Glazing, Shading Systems, Daylighting levels, Internal Oains. Actually Analytic methods as Solar diagrams and Heliodon can be complementar.

Objectives of this scientific contribution and research are:

- To inspire building designers by encouraging the development of architectural ideas capable of providing radical improvements in the architectural quality, living environment and energy efficiency of buildings;
- To promote the use of innovative conservation technologies integrated with passive solar heating, passive cooling and daylighting techniques, as appropriate to local conditions, as a means to achieve high energy efficiency and more comfortable indoor environments;
- To contribute to the reduction of energy consumption in building and the consequent environmental pollution.
- To show responses to the needs and opportunities for energy efficient heating, cooling and daylighting which are appropriate to the required comfort levels, the chosen site, climate, urban context and building(s);
- To provide a realistic estimate of the annual energy saving per m$^2$ of original gross floor area in terms of heating, cooling and lighting energy savings using diagramatic representation of the seasonal and diurnal environmental functioning of the building which indicate the energy performance.

In the building industry, new justifications for energy conservation techniques abound. Voices in the wilderness, for years ignored are now heeded. But energy conservation need never be an excuse for poor design. On the contrary, it should be able to inspire and its effects should become evident in contemporary architecture by an enhancement design.

As architect our role is to attempt to generate progressive ideas. The design process is a vehicle for generating system useable beyond the one-off. In this way, research becomes an inseparable part of the process (Foster, 1993).

Conclusions

To know and control Energy need of a building is the aim of the I.B.D.S. as well as to build an anthropic sustainable environment should be the aim of the designers.

It would be interesting to inquire the new Computer potencial innovation impact in building.

Knowing how fast and useful has been the innovation due to CAAD systems, it is hopeful to wait such a lot adding this integration design factor in design process.

References


DG XII-EEC, 1994, Zephir, European Architectural Ideas Competition Programm, Bruxelles;