Appreciating High Technology

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The present session is dedicated in particular to the appreciation of technology, preferably 'high technology', since we are aware of the interest of Iranian architects in this subject. We are all aware that the most sophisticated architecture and its subsequent discourse is created where construction forces its limits as far as contemporary building technology allows. The Aga Khan Award for Architecture aims to validate appropriate architecture for Muslim communities, therefore my presentation will be limited to those projects that have a particular emphasis on the creative use of technology.

Throughout the history of the Aga Khan Award for Architecture, its juries have placed an emphasis on 'appropriate technology', that is to say the technology related to the materials and methods of construction that are appropriate to the potentials of various geographical locations, especially in places where building materials are scarce. The juries have given awards to projects that experiment with building materials and that deal with new construction techniques using material abundant in the vicinity.

Sometimes emphasis was placed on compact bricks or large building blocks made out of desert sand, as was the case of the Agricultural Training Centre, Nianing, Senegal. Sometimes the Award was given for making more intelligent use of the abundantly existing volcanic stones on site, like the Stone Building System, Daraa, Syria. There are many projects that aim to develop local technologies for building, and all these would be considered in line with the teachings of Hassan Fathy.

When we examine the Awards from the point of view of advanced technology, in almost every cycle we find projects that have addressed the creative use of contemporary building technology. In the first cycle of the Award (1980), the Master Jury gave an award to the Hotel and Conference Centre in Mecca, Saudi Arabia. In this conference centre and the hotel next to it (with 170 rooms), but especially in the conference centre itself, the German architect Frei Otto used tensile structures inspired by popular and prevalent traditional tent designs.

Metal cladding was applied to these tensile structures. The interiors have been illuminated with modernised traditional light fittings, while other decorative elements were applied in order to be conversant with the ambiance of this Holy City. The tensile structure had steel pipes or columns

which transferred the load to the exterior. The whole structure was stretched by these outer columns, and cables stabilised and connected them to the ground. In the central polygonal courtyard, lighter sun-breaking decorative elements formed a kind of latticework. The courtyard was covered as an extension of the tensile structure of the main building and it was embellished with natural landscaping elements in order to soften the hard metallic presence of the design.

The aluminium cladding was designed in such a way that it would emulate or have some association with the desert tents of the region. The rest of the building, the hotel and the mosque were constructed in a reinforced concrete structure with traditional desert stone cladding. The texture of the outer walls refers to the traditional mosques and the colours and building materials of the region. The mosque and the minaret are strongly associated with an existing historical mosque with its corner minaret, and steep stairs up the side. This detail in the project has become a symbolic reference to the traditional mosque in a modernised version. There was some association with the widespread contemporary technology of reinforced concrete structures with stone cladding and tensile structures, used creatively in reference to traditional building modes.

In the Tuwaiq Palace, Riyadh, we can witness a more or less similar approach (pl. 94). Here the building itself is one undulating wall, which defines an interior space. This wall creates a barrier between the harsh desert climate of Riyadh and what has been contained within the large lush green courtyard.

The author of this project is Omrania whose chief architect is Basem Shihabi. It is similar to the previous building in that the tensile structures were also designed by Frei Otto, who is perhaps *the* master of this type of design in the twentieth century. The curvilinear wall is eight hundred metres long. It accommodates all the facilities that the building houses: guest rooms, conference halls, meeting places, restaurants, leisure areas; in short, everything a building like a diplomatic club needs to have in a capital city where the diplomatic community is very important. All entertainment and sports areas, which require large gatherings, are accommodated in the tensile structures projecting out of the continuous wall into the desert landscape and sports fields.

These tensile structures are made of woven reinforced plastic fabric, bound by polyester resin with surfaces treated with dust repellent Teflon® coating. The generic idea of this building is to confine a protected space in a desert climate where the outside environment is harsh but obviously dramatic to see. The contained space inside is treated like an oasis.

The wider outside environment has been planned and planted according to a very sophisticated landscape concept that is based on regenerating extinct species which resisted during the long period of desertification. The Riyadh Diplomatic Area Landscaping project, another Award-winning design, regenerated these species using a meticulous process of sifting desert sand into fine dust and keeping it in incubators, thus giving life to plants that were no longer known to exist. The saplings have been replanted as landscaping elements which do not need irrigation to survive and grow. This is the result of a meticulous process of research and development.

After many years of being exposed to sun and dust the tents have not collected any dust, since this has been repelled by the Teflon® coating and drifted away with the wind. The canopies function admirably well. In the places where this building opens to the internal lush, green, well-maintained and irrigated courtyard, the high-technology tensile canopy covers the semi-open space in the courtyard as well.

The joining lines and details of the natural stone cladding and the steel structure are honestly expressed wherever they occur. The points where they interact with the main building surfaces are articulated in the form of well-designed details as a gesture of celebration of technology where stone cladding and steel structural elements meet.

These details in many places produce their own composite order or perhaps some kind of abstract artistic expression which again can be regarded as a celebratory gesture *vis-à-vis* high technology. Inside the courtyard, on both the courtyard and terraced outside walls, a rich landscaping was executed. The building was also intended to incorporate soft elements of landscaping together with hard stonework and a fine finish of steel and reinforced plastic canopies.

The third building of interest is a dramatic one. It is a huge 'high-tech' canopy offering protected space to shelter three million pilgrims every year. The Hajj Terminal, Jeddah, Saudi Arabia, was built for pilgrims coming to Mecca (pls. 98, 100). The main purpose of the terminal is to accommodate the transferral of pilgrims from the aircraft to buses that take them to the Holy City of Mecca. The Terminal is used only one month each year but in a very intense way. It was designed by Skidmore, Owings and Merrill, where the chief designer was Fazlur Rahman Khan, a Bangladeshi engineer, who also conceived the whole structure of the famous Sears Towers in Chicago.

This is a vast complex where each module measures about fifty-two metres with two and four post-column structures holding the structure firmly at the edges. In the main area, where corners of each group of four canopies meet, there are large round steel columns. Each module is covered by a single-surface, reinforced plastic tent. The site plan is very simple, with two structures placed on each side of a highway. It emanates a very serene and horizontal presence as a light tent structure punctuating the desert shape of Jeddah. The structure is permanent but at the same time it has the quality of lightness that would be associated with periodical or temporary use.

The tensile bars hold the structure together and carry the top. The reinforced plastic membrane is stretched at the top level of the masts or columns and they are reinforced by cross wiring. The columns were connected at the top and in the middle by deep steel beams to prevent buckling and to resist lateral forces. A series of lateral members form square boxes on the edges. This is the first vast use of reinforced plastic and steel and woven plastic fabric material on such a large scale. It has lasted over twenty years, again with minimal maintenance, or none whatsoever.

The prospective pilgrims to Mecca land here first. The Hajj Terminal is the welcoming point for their passport clearance and emigration formalities and here they are distributed into small groups and guided by their local counterparts (*daleels*), the believers' hosts who will guide them through pilgrimage to the proceedings in Holy Mecca.

The basic idea of this structure is to provide shelter and comfort from the dust and sun and nothing more. Under this shelter there is an enormous activity of welcoming the prospective pilgrims or saying 'goodbye' to the accomplished *Hadjis*. During the preceding and succeeding weeks of *Eid ul Adha* about three million people are dealt with here under this vast space. Provisions are rudimentary and simple, but very clean: fresh water, refreshments, toilets and telephones – naturally facilities for eating and relaxing have been laid on. All this has been provided for by making use of the highest possible technology and there is also very good lighting in this space. The strong rays of the sun are filtered through the membrane during the day and reflected floodlights brighten the space at night. All the facilities that any airport should have are temporarily located here; souvenirs or shopping areas mark the historical presence of this unique life time experience.

This building has been given a special kind of architectural Award particularly for its ingenious structural solution and the space it defines for a unique Muslim activity that occurs once a year. The Master Jury of the Aga Khan Award for Architecture (1983) considered this accomplishment as 'appropriate technology' as regards to its unique and specific purpose in accommodating an important ritual of Islam. It also has its own drama as a very elegant structure.

It may be debatable whether the Water Towers of Kuwait are high-technology structures or not, but the construction technique of casting on the ground and raising the top pieces was applied here for the first time in Kuwait (pls. 97, 99). This is a project again designed by western consultants, the Swedes Sune and Joe Lindström, who provided a very powerful expression for these water towers. At the time when these towers were built (1976) water was even scarcer, and having water accumulated and stored at higher elevations was convenient for distribution and easier than using pumping stations. The architects referred to two aspects of Kuwaiti culture. One looked to the history of the Kuwaiti population, who have been pearl divers and merchants over the centuries: the pearl trade is still an important activity in Kuwait. The other source of inspiration came from palm trees and oases. In this project both are referred to in very abstract and elegant forms. The architects

avoided simplistic analogies and did not fall into the trap of banality while emulating natural forms. These are not copies of palm trees, but abstractions of palm trees.

The architects arranged these structures in the form of batteries of twelve or sixteen grouped towers. This assembly makes a distinct reference to oases, home always to water, and the groupings also provide shelter from the sun and landscaped areas. They quickly became landmarks like some kind of man-made oasis and in order to distinguish and give identities to each one of these oases they were treated differently. The construction system consisted in erecting stems and then sliding formworks upward. The top tanks were cast at ground level and then lifted up. Finally the binding concrete was poured up in small quantities. This technology was used here for the first time on this scale and this magnitude in Kuwait.

Another Award-winning project which is worth citing here is the Arab World Institute, located in Paris, France, designed by Architecture-Studio (whose lead partner Rodo Tisnado is participating in this conference) and Jean Nouvel.

The idea generating construction of the Arab World Institute in Paris was conceived by French industrialists and exporters, who were encouraged by the late President François Mitterand, as an appreciative gesture towards Arab countries – an act of embracing their culture in Paris (pls. 162, 163). Architects Jean Nouvel and Architecture-Studio (Rodo Tisnado) were very sensitive to the townscape of Paris and made this very special contextual building an integral part of Paris University. The site is in the vicinity of Notre Dame Cathedral on the embankment of the River Seine.

In using the most sophisticated building technology possible, the architects imagined a façade, which has been conceived like latticework. Lattice is a common craft form in almost all cultures, Islam being no exception. The façade is a huge screen, a lattice or maybe a *mashrabiyya* of Arab building tradition. The approach from the city is through a narrow and well-defined square gate court where the visitor sees the building in fragments; he then enters the main square which is a vast plaza defined only by one side screened by the lattice of the façade.

The architects developed an ingenious method of light control in this lattice in the form of contracting and expanding diaphragms. Many different types of apertures of the façade let the sun's rays into the internal spaces in proportion to the intensity of the sun and a predetermined comfort level of luminosity inside. They work like the apertures of cameras. It is a wonderful experience inside; when the sun goes behind the clouds there is much activity on the façade which adapts itself to the increasing or decreasing level of sunshine to be allowed in.

When this project was technically reviewed for the Award, the Award office engaged a parallel review by a Parisian architect-anthropologist to measure the reaction of Arabs in Paris in order to

find out how they regarded this very unconventional building. To our surprise, almost seventy percent of them said they were very happy to have a high-technology progressive building to house and represent their culture. But this is simple to understand: Arabs in France are contributing to the creation of Ariane rockets, Airbuses, Peugeots and Citroens; their aspiration is for their own original culture to be represented by the highest level of technology. They must be tired of their culture being represented by carpets, socks, clothing, their folklore and nothing else, and so they embraced this building as part of Arab culture in Paris. It is a building full of surprises. There is always a major exhibition of one or two aspects of Muslim culture going on in the Institute. And again, sunset becomes a defining experience when it is viewed from within the structure.

The last building I am going to present is another project which celebrates high technology; the small tower designed by the architect Ken Yeang, who is also participating in this conference. I will simply attempt to explain why it won an Aga Khan Award.

For some time, all tall buildings were seen as being contradictory to the idea of environmental friendliness or the passive use of cooling systems and air circulation. With the IBM headquarters in Kuala Lumpur, Malaysia (pl. 95), architect Ken Yeang has proven that one can create tall structures and skyscrapers that use environmental forces for the benefit of comfort in a building. In his diagrams, the movement of air in the building is sketched in a way that shows that natural forces can also provide air circulation and passive cooling efficiently (pl. 96).

While incorporating natural forces Ken Yeang does not compromise his own liberty of architectural expressiveness; he uses technology and the forms of his free interpretation, but bases them functionally on his philosophy of environmentally-friendly building systems. As Charles Jencks has said, this type of work belongs to a school of thinking in contemporary architecture which makes use of ecological forces and endeavours to interact with them in an environmentally-friendly way.

Small landscaped courtyards with vegetation on the periphery also add to the cooling, while at the same time providing a more pleasant relationship between the inside and the outside of the building. The interface between 'in and out' is not a simple rigid glass pane but a stretch of nature which multiplies positive effects.

This is what we have accomplished with the Aga Khan Award for Architecture in terms of the appreciation of 'high technology'. As you know we have given Awards to more than ninety projects; it is not possible to present all of them in such a limited period of time.

For illustrations of Award-winning projects concerned with high technology, the reader is referred to pls. 94-100, 162 and 163.

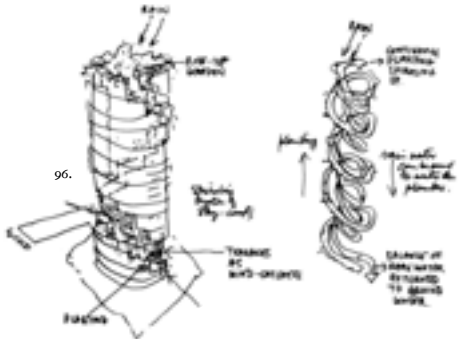
92.

93.

92, 93. Awqaf Department, Tomb of Shah Rukn-i-'Alam (14th century), Multan, Pakistan, restored in 1977.

94.

95.



96.

94. Atelier Frei Otto, Buro Happold, Omrania, Tuwaiq Palace, Riyadh, Saudi Arabia, 1985.

95. Hamzah and Yeang, Menara Mesiniaga, Selangor Darul Ehsan, Malaysia, 1992.

96. Drawing by Ken Yeang.

97.

98.

99.

100.

97. VBB and Björn and Björn Design,
Water Towers, Kuwait, 1976.

98. Skidmore, Owings and Merrill,
Hajj Terminal, Jeddah, Saudi Arabia, 1981.

99. VBB and Björn and Björn Design,
Water Towers, Kuwait, 1976.

100. Skidmore, Owings and Merrill,
Hajj Terminal, Jeddah, Saudi Arabia, 1981.

158.

159.

160.

161.

158, 159. Architecture-Studio, Our Lady of the Ark of the Covenant Church, Paris, France, 1986-1998.

160, 161. Architecture-Studio (Martin Robain, Rodo Tisnado, Jean-François Bonne, Jean-François Galmiche) and F. X. Désert, High School of the Future, Jaunay-Clan, France, 1987.

162.

163.

162, 163. Architecture-Studio (Martin Robain, Rodo Tisnado, Jean-François Bonne, Jean-François Galmiche) and Jean Nouvel, G. Lezenes and P. Soria, Arab World Institute, Paris, France, 1981-1987.