CHAPTER V

Architectural Theory

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5.1. Design Accentuation

5.1.1. Interpretation and Elaboration Review

Design Emphasis : **HighTech Architecture**

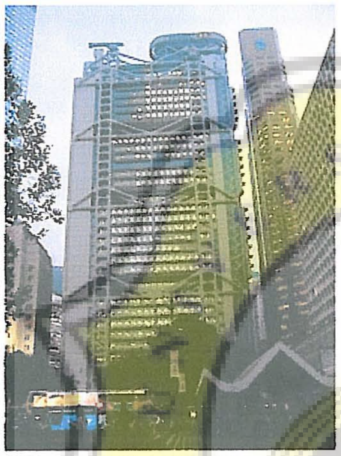

Figure 52. The HSBC Hong Kong headquarters is one example of Hightech Architecture
Source : http://en.wikipedia.org/wiki/File:HS

High-tech architecture, also known as Late Modernism or Structural Expressionism, is an architectural style that emerged in the 1970s, incorporating elements of high-tech industry and technology into building design. High-tech architecture appeared as a revamped modernism, an extension of those previous ideas aided by advancing technology. This architecture, such as Structural Expressionist buildings reveals structure on the outside as well as the inside well as the inside and places a visual emphasis on the internal steel and/or concrete skeletal structure as opposed to the exterior concrete walls.

The style's premier practitioners include the British architects Norman Foster, whose work has since earned him knighthood, Sir Richard Rogers, Michael Hopkins, Italian Architect Renzo Piano and Spanish architect Santiago Calatrava, known for his organic, skeleton-like designs. In the early days of High Tech

Figure 53. The Oceanic Pavilion, a skeleton-like design
Source : http://www.evolo.us/wp-content/uploads/2010/05/yeosu-emergent-5.jpg

architecture, historian Reyner Banham reffered to the buildings as "serviced sheds" due to their additional exposure of mechanical services in addition to the structure. Most of these early examples used exposed structural steel as their material of choice

Whilst the characteristics of high-tech architecture vary somewhat, all have accentuated technical elements. These include the prominent display of the buildings technical and functional components, and an orderly arrangement and use of pre-fabricated elements. Glass walls and steel frames are also immensely popular.

Materials and analyzed and chosen with every part possessing function. For example, glass is used to exploit daylight to light the building. Steel exposses, used to symbolize power, can also be easily utilized in building control. High-Tech Architecture can be referred to as Green Architecture because every part of the building is totally functioned and calculated according to the site condition.

The High Tech architect also sees architecture as a branch of industrial technology.He claims no social or artistic privileges. He wishes his buildings to be judged by the same criteria of performance as any of the other tools of everyday life. He wants them to be functional and efficient, not artistic or symbolic. But there is an ambiguity here. Architecture, it seems, can never be purely functional, no matter how hard it tries. The typical High Tech building symbolizes and represents technology rather than simply using it in the most efficient way possible. It may be cheaper and quicker to build a load-bearing brick wall, but the High Tech architect will always prefer the steel frame and the lightweight metal panel because this is a technique more in tune with the spirit of the age. He is committed to the idea that building must eventually catch up with the rest of technology, and he is determined to "drag building into the twentieth century". In this endeavour, symbolism and representation have on important part to play.

The motifs of High Tech - exposed steel structure, visible air conditioning ducts, plug-in service pods, and so on - are almost never the most economical solutions. There is nearly always a cheaper, more practical alternative. But this is architecture, not engineering. High Tech architecture, then, is not purely functional. But neither is it purely representational. It is an article of the High Tech faith that there must be a functional justification for every design decision. Take, for example, the tension structure of Nicholas Grimshaw's Ice Rink in Oxford. It converts a straightforward, shed-like building into a dynamic, self-advertising, instantly identifiable piece of architecture that irresistibly brings to mind the romantic image of a sailing ship. A similar effect might have been achieved by the application of a couple of fake masts to an ordinary portal frame structure. But the true High Tech architect would never resort to such deception. The structure has to be real and there has to be a functional justification for it. In this case, the justification is the low bearing capacity of the subsoil. Of all the possible ways to overcome this problem, the tension structure was chosen, however, not for its economy but for its symbolic power.

Le Corbusier described the house as a machine for living in, but he built houses that were technologically primitive and looked nothing like machines. **High Tech buildings do look like machines. The machine is more than a metaphor; it is a source of technology and of imagery.**

Machines are usually mass-produced, either mobile or portable, and made of synthetic materials such as metal, glass, and plastic. These characteristics have become the reference points of High Tech architecture. The buildings may not be mass-produced, or even assembled from mass-produced components, but they look mass-produced, or at least capable of repetition. They may not be mobile, like cars, or portable, like television sets, but they will usually be made of distinct components and will often appear to hover a few inches above the site as if, one day, they might be dismantled or moved.

Indonesia, as a developing country, should utilize High-Tech Architecture to accommodate the developing country syndrome, that is *"The Equilibrium with the Westerns"*. This syndrome identifies the Western countries as fast growing, always employing advanced technologies and being innovative in design.

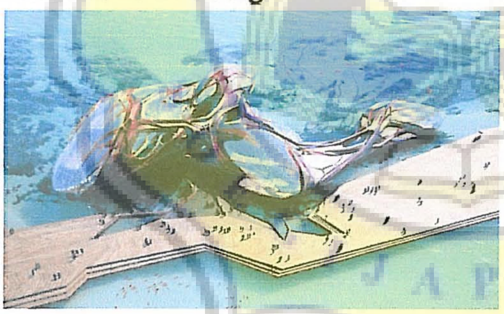

Figure 54. The Oceanic Pavilion designed by Emergent Architecture and Kokkugia for the Yeosu 2012 Expo in Korea is a structure "which celebrates the ocean as a living organism and the co-existence of human culture and ocean ecosystemsSource : http://www.evolo.us/wp-content/uploads/2010/05/yeosu-emergent-5.jpg

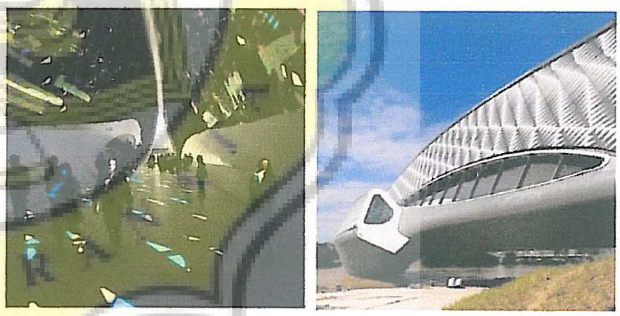

Figure 55. Bridge Pavilion Zaragoza, Spanyol – 2008
Source :
http://bp2.blogger.com/_uCgw18887YI/SHhM0Dg0ecI/AAAAAAAAAWQ/XtQ8THgVRfw/s1600-h/zaragoza-5.jpg

5.1.2. Precedent

Kansai International Airport – Osaka - Japan

Kansai International Airport (関西国際空港 *Kansai Kokusai Kūkō*) is an international airport located on an artificial island in the middle of Osaka Bay, 38 km (24 mi) southwest of Ōsaka Station, off the shore of the cities of Sennan and Izumisano and the town of Tajiri in Osaka Prefecture, Japan. It should not be confused with Osaka International Airport, which is closer to the city and now handles only domestic flights.

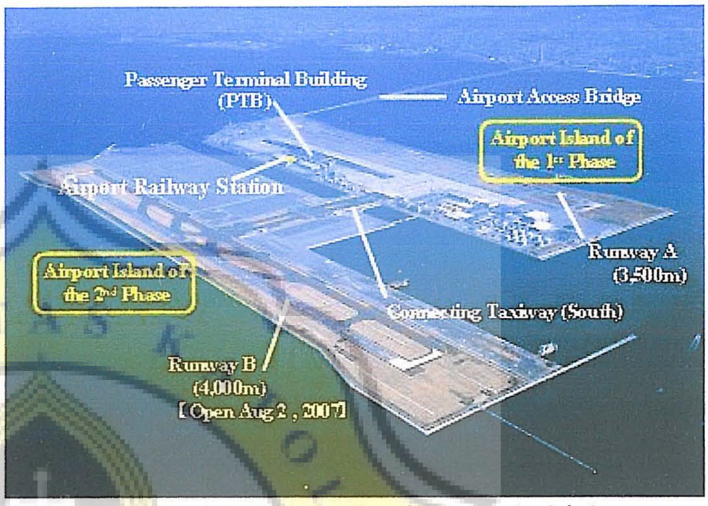

Figure 67. Kansai International Airport, Aerial view
Source :
http://en.wikipedia.org/wiki/File:Kansai_closeup.jpg

A man-made island, 4 km (2.5 mi) long and 2.5 km (1.6 mi) wide, was proposed. Engineers needed to overcome the extremely high risks of earthquakes and typhoons (with storm surges of up to 3 m (10 ft)). n 1991, the terminal construction commenced. To compensate for the sinking of the island, adjustable columns were designed to support the terminal building. These could be extended by inserting thick metal plates at their base. Government officials proposed reducing the length of the terminal to cut costs, but architect Renzo Piano insisted on keeping the terminal at its full planned length. The airport opened in 1994.

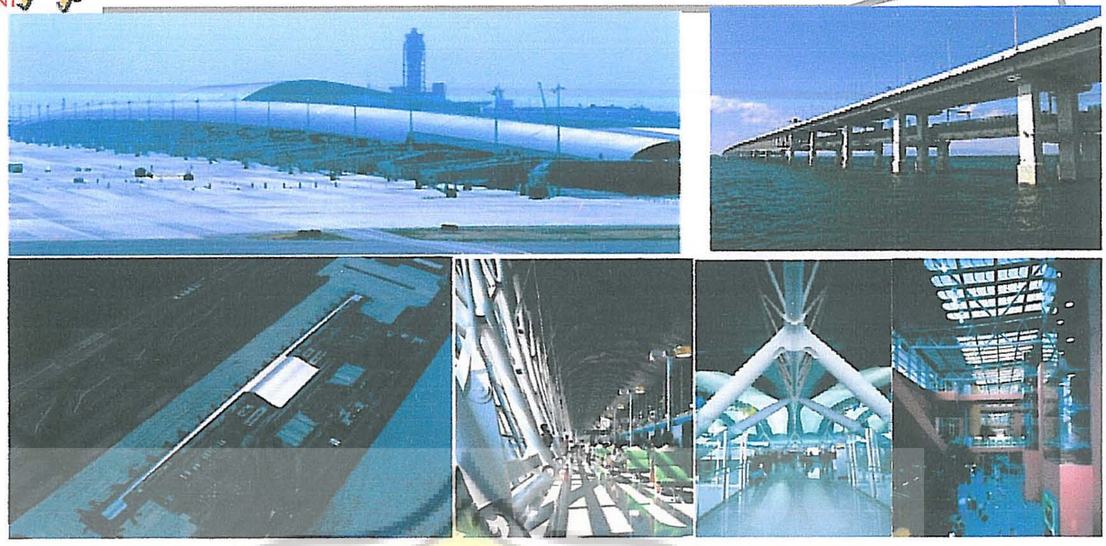

Figure 57. Kansai International Airport
Source : http://www.architectoo.com/, http://en.wikipedia.org/wiki/File:Sky_gate_bridge01s3200.jpg

Ecology is the inspiration for the stategy behind the air conditioning, the landscaping of the 4.37 by 1.25 km man made island , and the incorporation of planting into the terminal. The basic shape of the building derives frim nature's own profiling of shapes into undulating sand-dunes at ocean edges. The building workshop sought in its initial investigation of the design that of "Technology emulating, and harmony, with nature".

This relationship is most apparent in the roof with a profile of a natural curve of a jet of air blown into the departure hall from the landside. By adjusting the building profile to the natural flow of air currents, there is no need to provide suspended ducts, which disfigure rectangular, flat roofed terminals. At Kansai, the ecologically inspired macro-system of natural ventilation is tempered locally by micro-system that heat or cool specific locations by more conventional means

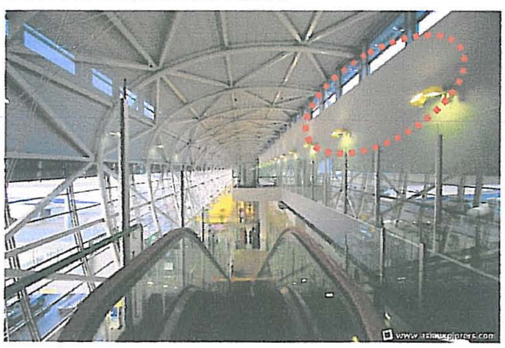

Figure 58. The red oval, One of ventilating system in Kansai International Airport (functional also in natural lighting system)
Source : www.asiaexplorers.com

Ventilation is a huge problem to solve in such a long terminal building. The problem of air movement throughout the terminal has been addressed in a very ingenious way. Notice the blue colored air vents to the below of this photo. Then notice the concave structures attached to the ceiling. Those are *air troughs* and they are designed to direct the airflow output from the vents, all along the length of the terminal.

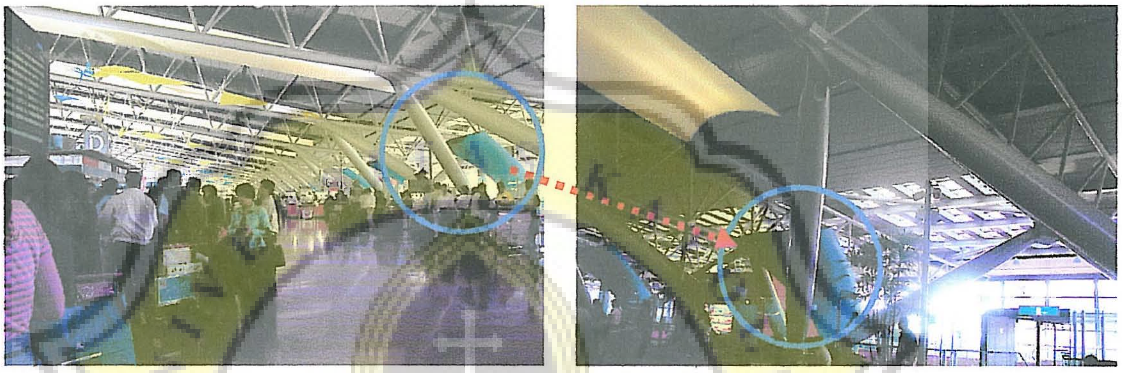

Figure 59. & 60. The blue circles, show the ventilating ducts (call as "Jet Nozzle") of KIAC Terminal building
Source : http://static.flickr.com/92/256132097_d2506da835.jpg?v=0,

To determine this ventilating system is actually working Just check the movement of these very cleverly designed mobiles. Japanese engineers have succeeded in melding the old with the new in these origami-kites that move with the breeze. Most people just watch them and admire the soothing slow motion action of these beautiful pieces of art.

Figure 61 & 62. Origami –kites the yellow and blue ones
Source : http://static.flickr.com/98/256132769_4044e96bce.jpg?v=0, Kato Lab. and Ooka Lab - Institute of Industrial Science, University of Tokyo

5.1.3. Implementation of Design Accentuation

Given the precedents, the applicable designs are:

- Utilization of materials chosen to suit the marine condition,
- Application of ecological technologies that appeal to the building user,
- Manipulation and direction of natural light into the interior architecture, and
- Utilization of curved profiles that respond naturally to wind pressures and aid ventilation.

HighTech architecture style at this project would be focused into :

- Structure and enclosure

Structure at this building would use advance structure because because :

- Airport passenger Terminal building rather a big scale building. It needs free span structure
- This project has a potential to be monumental building and new icon of Semarang. So its need advance structure to interpreted it monumental shape.

There are some specification of the usage of HighTech Architecture style at this project :

Figure 63. Collaboration of Space frame and PTFE Material to create futuristic effect. This material is ecological too.
Source: http://bored-bored.com/wp-content/uploads/2008/08/inside-national-swimming-center-beijing.jpg

Figure 64. Titanium composite panel is layered by fluoropolymer to cover it from salty wind of ocean, the heat of sun and minimize the glare.
Source :, www.freepatentsonline.com

- Electricity and ventilating system

Figure 65. Wind Farm area
Source : http://3.bp.blogspot.com/_CBkHfib0kWU/SkbWqg-QJnI/AAAAAAAAAFA/ul293DKhbFg/s1600-h/natucket+wind+power.jpg

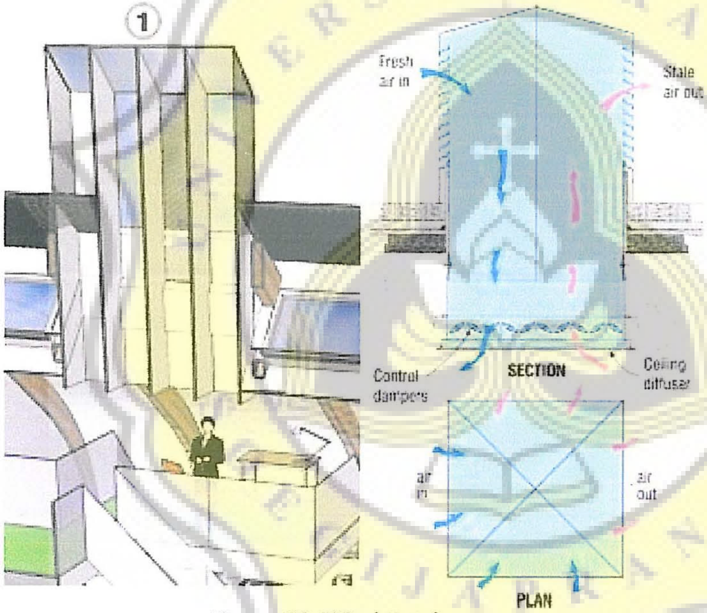

Figure 66. Wind Catcher
Source : www.omegagold.biz/552/573.html , www.housebuying.eu/blog/page/2/

Figure 67. Jet Nozzle
Source : http://static.flickr.com/101/256075804_deb1b533e2.jpg?v=0

Above technologies, some reflection of HighTech style. If HighTech architecture is green, so that with these technologies. Because every parts of those technologies are calculated into site and local condition.

5.2. Core Issues

5.2.1. Interpretation and Elaboration

Passenger Spatial - Ordering System and Save Energy concept.

Several design could be interpreted are:

- Minimize walking distances
- Facilitate inter-airline transfers of passengers
- Separate air carrier functions but provide easy interconnections
- Maximize marketing and rental opportunities
- Encourage joint airline use of facilities
- Link terminal buildings directly to public transport
- Optimizing the natural lighting into the building in the daylight
- Gain own energy from Wind resources
- Optimizing air conditioning system that is resulted by Wind energy.

5.2.2. Precedent

Stansed Airport – London, United Kingdom

Figure 68. Stansed Airport
Source : www.wikipedia.com/en/stansed_airport

Stansed airport has two particular interest for the terminal designer : it is essentially a single level building and the evenly spaced grid of columns does not gesture to the direction of passenger flow. Sir Norman Foster's concept design, envolved between 1982-1984 , was based upon the idea of an elegant and directionally neutral terminal with detached satellites set in a spacious England landscape.

Figure 69. Structure is used to direct passenger flow
Source : www.globalphotos.org

The approach at Stansed is a far cry from other recent terminals, where colour, the interconnection of interior levels and dramatic directional structure lead passengers from landside to airside. The detailed brief Stansed issued to Foster's office instructed the architect to create :

- A convenient, safe terminal
- An adaptable terminal capable of phased construction
- A modern terminal able to accommodate the largest aircraft of the foreseeable future (up to 800 seats)
- An economical terminal, at least 10 percent cheaper than other recent BAA buildings.

It was a brief that tended to encourage a single storey solution , in terms of cost, flexibility, passenger convenience and incremental development.

Stansed is a pavilion-like terminal six bays six, with eah column (or cluster of four) on an orthogonal grid of 36 m. In its single storey, rather rectangular simplicity, the design owes something to the terminal O'Hare Airport Chicago. Both Stansed and O'Hare share the Miesian architectural model of crisp cubes accommodation within large sheets of glazing set behind a discipline structural framework.

The architecture of Stansed is noteworthy because of Foster's skilful manipulation of architectural volumes, structure and daylight. The volumes are not complex and interconnected but regular and serene in the manner of the

Sainsbury Centre at the University of East Anglia. By adopting an unusually high ceiling level (justified partly as a means of smoke control) the sense of interior space is heightened. Whereas BAA terminals elsewhere have ceiling heights of 6-10 m, at Stansed the height is 12m.

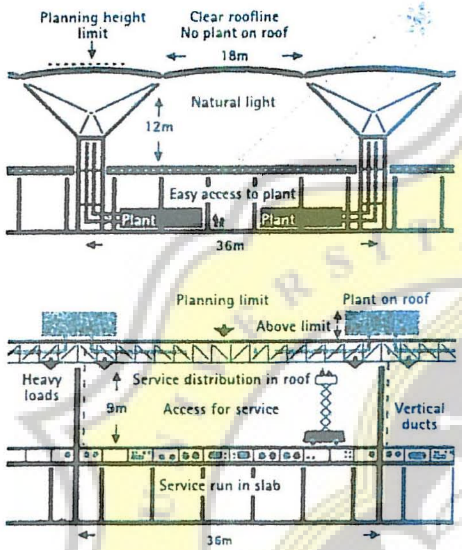

Figure 70. Comparison of environmental design of Stansed (above) and orthodox airport (below)
Source : Edwards, Brian.2005: 215

Figure 71. Concessions at Stansed Airport
Source : www.globalphotos.org

Cleverly, the design exploits the perception of the high ceiling by creating square pools of natural light within a roof structure not unlike interconnected umbrella. The grids of squares of light in both directions set against the angular steelwork of the columns, and the general luminescence of the space, give Stansed a quality quite unlike modern terminal elsewhere. It is an architectural of frame, panel and light, not of walls, weight and heavy engineering.

Figure 72. Square Pools of Natural light
Source : www.wikipedia.com/en/stansed_airport

5.2.3. Implementation of Core Issue

Given the precedents, the applicable designs are :

- Expression spatially, and to a greater extent structurally, of important key spaces in the terminal building,
- Utilization of beams and columns to indicate a direction of flow or to provide scale in a large public area, and
- Application of natural lighting into the building according to sun path and sun diagram.