SPACE IN ARCHITECTURE

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MAKING ARCHITECTURE (FORM AND FUNCTION)

There are two main ingredients required to produce architecture and these are SPACE and LIGHT. Without either ingredient we do not have architecture.

Another fundamental concept in making architecture is the relationship between function and space. Essentially architecture is about the enclosure of USEABLE SPACE.

This a fundamental "functionalist" point of view through which one can recognise the "useful" from the "useless" space.

Given that people and functions usually occur on horizontal platforms with required useable heights, the resultant space needed to serve these activities would generally be of a cubic nature reflecting the basic useful movement pattern within the space.

This may seem rather obvious yet to many architects and engineers the pre–occupation with the design and construction of the structure and enclosing elements often distracts the intentions into a solution with a considerable amount of redundancy in space making.

Non required or redundant space is about as useful as the fins on a 1950's cadillac.

MAKING ARCHITECTURE (FEELING AND FUNCTION)

You may think that the above leads to rather boring solutions of rectilinear space without feeling or flair, freedom or form which should excite people.

And in part you are right.

The more gifted architects usually adopt various design strategies to give form and function a more playful result.

Take for instance Mies Van der Rohe in his essentially cubist compositions. Simple boxy enclosures are transformed into quite magnificent spacial arrangements through the use of internal screens which never touch one another encouraging the space to flow endlessly through a very sculptural three dimensional play between planes. These can be flat and curved surfaces, varying in colour, material and texture to heighten the senses. Harry Seidler plays similar games with even more curvaceous and flowing forms.

STATIC SPACES

There are two types of space generally used in architecture producing both functional and feeling results to suit this purpose.

The STATIC SPACE is one which encourages the space (and the occupant) to remain in one place. A classic example of a static space would be a cube beneath a pyramidal roof shape which firmly holds the space intact. Such space is non–directional by nature. A similar form of space involves the repetition of static spacial units resulting in a concept we call UNIVERSAL SPACE. A good example of this is Stansted Airport by Norman Foster where 18 x 18 metre squares of space 12 metres high beneath a truncated dome roof are repeated many times to produce at this stage an airport terminal approximately 200 metres by 168 metres. The modular arrangement of the spacial building blocks lends itself naturally to extension for future growth of the building.

Space is perceived as a continuum from front to back and end to end of the building. This is quality also produces a downside as the space does not entirely mirror the essential passenger flows from

landside to airside or vice versa for arriving passengers. Foster's next terminal in Hong Kong, now under construction creates continuous barrel shaped spaces more accurately following the path of passengers.

MOVEMENT SPACES

The classic example of movement space is that of tube or tunnel. It's historical origin lies in the great cathedrals with linear plan forms and strong spaces leading the eye to the alter and the great stained glass window. Even here it is traditional to encapsulate the space at its important end by an apse shape to grasp and hold the space.

It is interesting to note that the transformation of such spaces into the modern shopping "plaza" is also about movement along an enclosed "street" but without the important focal point of the church. Recent slides of Eaton Place and an atria by Calatrava in Toronto, Canada illustrate these types of movement space.

TALL SPACES

The height of the space is another vital spacial tool used to maximum effect in the great European Cathedrals, particularly of the Gothic period where the pinnacle of the space formed by the pointed arch leads the eye to its heavenly conclusion. The effect must have been quite stunning on the people of the middle ages coming from humble dwellings into such awe inspiring spaces.

This is still a form of functionalism as one of the building's (and spaces) functions was to humble people in the almighty power of the church.

INFLECTED STRUCTURES

I have concentrated upon the shaping of space however the structures used to create these spaces can have their own exuberance to lend ostensibly simple spaces a dimension of richness through construction and detail.

There was undoubtedly a simplistic austerity in many spaces of architecture created after the war. Some were handled masterfully when in the hands of the great designers, while many appeared to lack feeling and soul.

Architects have regained their closer connection to structure in more recent times. We do not pretend to be engineers but do rely on your expertise in the making of buildings. We choose to more readily expose structure and more carefully think about how it can be detailed. We generally have a higher regard for gravity loads than other forces as we act as a type of mediator between the logic of the engineer and the perception of the public.

This leads us to explore the use of more extroverted structures where cable stayed beams or tree like structures either form a web of enclosure or form a series of internal props to form sculptural entities which break down the scale of the overall space.

Returning to the Stansted example, what is of interest in this building is the way that the functional "people zone" requiring great open spaces for maximum flexibility is needed only over the height of about 3 metres. However the remainder of the space could be "intruded" with structure to elegantly reduce the wide spans needed at floor level to half those spans at roof level.

At Brisbane International Airport we pursued a similar solution reducing roof members to more economical spans and punctuating the space with carefully detailed structure.

Large public buildings have other needs than mere circulation space at people level. There is a relationship between the height and size of a space which can only be judged by feel. At Stansted the space is universally 12 metres clear height. At Brisbane Airport the roofing material requiring

greater falls resulting in an “averaging” of ceiling height starting at a minimum of 6 metres and lifting up through 3,4 and 5 degrees to 8.5 metres.

The height also relates to light, particularly reflected up–light whereby hot spots would be created if the ceiling were too close to the light sources.

Volume and smoke are also an issue in large public buildings. The Victorian builders knew about this in creating great rail way stations which could be full of smoke. We are re–learning these techniques with computational fluid dynamics to tell us about the behaviour of smoke in times of fire and emergency egress.

In stansted the tall space requires no additional mechanical duct work to remove smoke. Calculations show how smoke would drop to people level after 20 minutes which gives an excess of time for evacuation.

BUILDING MATERIALS

The roof shape of the church which also was brought about by the desire to span quite wide spaces, resulted in pitched, vaulted or barrel shaped buildings.

Part of the art in making buildings is to work with the integrity and opportunities of building materials lending themselves to particular shapes or inflections in making the required space. The pure compression of masonry structures naturally led to the arched and “non–bending” forms.

Modern materials such as steel with enormous bending strength lead to much flatter solutions when spanning wide distances. Yet even these materials look and feel best with some upward inflection towards their centre over wide spans. An excellent example of this is the Sainsbury Centre also by Norman Foster in the late 1970’s.

Perhaps the sensation of a slightly curved beam is similar to that known by the Greeks 3000 years ago whereby columns were inflected by subtle swelling or “entasis” to overcome the eye’s tendency of seeing parallel lines appear to converge at their centre.

SPACIAL RELEASE

Another building form derived from a sense of spacial release can be demonstrated in two fine examples.

The Airport at Dulles, Washington by Aero Sarinen, possibly one of the world’s finest airports has what I call a natural sense of response. The space here is created by a hanging roof from inclined external columns.

The sensation is one of calmness and spatial release which relies upon a transparent external skin to let the internal space flow in an outward direction.

In a similar way Glen Murcutt uses a butterfly roof form to create a magical space in the horse at Binge Point on the N.S.W. south coast. Here the roof bends back to the horizontal at its edge to control sunshine and weather protection.

SUMMARY

We have through these examples gone from rectilinear to inflected spaces. All are carefully controlled by their skillfull designers. All are valid as architectural answers to solve functional problems. But all go beyond the simple functional solution to embody a feel for space and enclosing elements.

Space is a medium of architecture as real as construction and structural materials. It has to be carefully considered and manipulated as any building material. I hope that these examples give an explanation of the use of space in Architecture.