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STANSTED AIRPORT - 'HIGH TECH' OR MODERNIST ?

by

Paul Clerkin

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INTRODUCTION

This thesis is an analysis of the new Stansted Airport Terminal (Foster Associates, 1991). It will attempt to answer the following fundamental questions about the terminal building. Is Stansted airport a 'High tech' building in its use of new technology ? Does it conform to the main conventions of the 'High tech' style as defined in this thesis ? Did Foster achieve the aims that he set out at the start of the project - namely blending the building in to the surrounding environment and simplifying passenger transit through the terminal ? And did Foster manage to successfully integrate the interior design with the exterior of the building ?

Chapter One discusses the career of Norman Foster to date. He was one of the originators of the 'High tech' style. The main influences on his career are outlined. In particular the influence of Buckminster Fuller and Mies van der Rohe are examined. From Fuller he derives his passion for getting more and more performance from his buildings in terms of materials and structure. Mies' influence is seen in his slick glass buildings notably the Willis, Faber and Dumas building in Ipswich and Foster's refined minimalist structures. The background and controversy surrounding the selection of Stansted as the site for London's third airport, the origin of Foster's commission, his brief and an introductory guide to the new terminal building are also included.

In Chapter Two, the history and origins of 'High tech' and a definition of what 'High tech' is, are discussed with regard to the six main stylistic conventions. The origins of 'High tech' will be traced back to the Crystal Palace and the great glasshouses of the nineteenth century. The main conventions of the style include -

celebration of the engineering process, bright vibrant colours, the use of light and transparency, exposed services and an optimism for the future. The works of other architects of the movement are also covered. Modernist architects who played an important role in formulating the conventions of the style were Mies van der Rohe, Buckminster Fuller and Charles Eames and their influence on Foster's industrial style is examined.

Chapter Three covers the engineering structure and how it determined the plan of the airport and Foster's main aim which was to simplify air travel for the passenger. It will also look at the services and the effect that they have on the design which although they are invisible to the public travelling through Stansted consumed 50% of the total budget. From the outset the simplicity of the plan was a priority and it had to be clearly legible to the first time passenger. This was done by putting the services under the concourse thus leaving no visual obstructions and clutter.

In Chapter Four, the machine aesthetic, the major element of 'High tech' is examined in relation to the silver aesthetic, mass production of components, prefabrication of buildings and continuation of process. All of which are important features of 'High tech' and Stansted. The Chapter will concentrate on Foster's predilection for sleek smooth skins as part of the machine aesthetic as opposed to Rogers' version with exposed services and picturesque outline. It will examine Foster's preferences for easily extended buildings and modular prefabricated buildings wherever possible.

Chapter Five examines the use of light, movement and transparency in the design of Stansted and the effect that the introduction of natural lighting has had on the British Airport Authority's (BAA) policies on airport terminal building.

Chapter Six covers the struggle between Foster and BAA in integrating the external design with the interior furnishings and furnishings. It covers the problem of the 'supergraphics' programme and the features which tie the exterior and interior together. Instead of reproducing the undulations of the roof in other aspects of the interior he opted for a restrained approach and in doing so uses the roof structure as a backdrop to the fittings and furnishings. Foster has used subtle tricks to integrate various parts of the terminal. He has used three variants of the one seat throughout the airport in different areas - the station, the concourse and exterior. Foster and BAA also laid down strict quidelines for the concession holders in the airport for shop-fronts and signage to prevent a mishmash of colours, materials and scale. These shop units are all built on a modular system with a common fascia board running around the retail block which visually ties them all together despite the differences in signage treatment.

Stansted Terminal is a new building (officially opened March 1991) and as such very little as been published about it except for some short articles in architectural and engineering journals like for instance Building (16th March 1990) and Blueprint (April 1991). These however deal with it on a very superficial level, concentrating on the overall appearance of the building and the service pods and completely missing the subtle details that make the design a success like the seating, various decorative features, and the natural lighting of the underground station. An exception to this was however Design (March 1991) magazine. Shortly after the official opening two articles by Michael Evamy dwelt in detail on the terminal in particular the interior furnishings and the design procedure. Several books about Foster's previous works and style have been quite useful including Martin Pawley's Design and theory of the second machine age (1990) and Colin Davies' High Tech Architecture

(1988). These journals and books were relied on for background information only, using observances made of Stansted from a site visit for the bulk of the thesis. It would have been impossible to do the building justice by relying wholly on the published work and it was only by visiting it that the scale and beauty of the building could be realised. It was also from this first hand experience and assistance from BAA at the airport that certain key points of the thesis were proved or answered.

CHAPTER I :

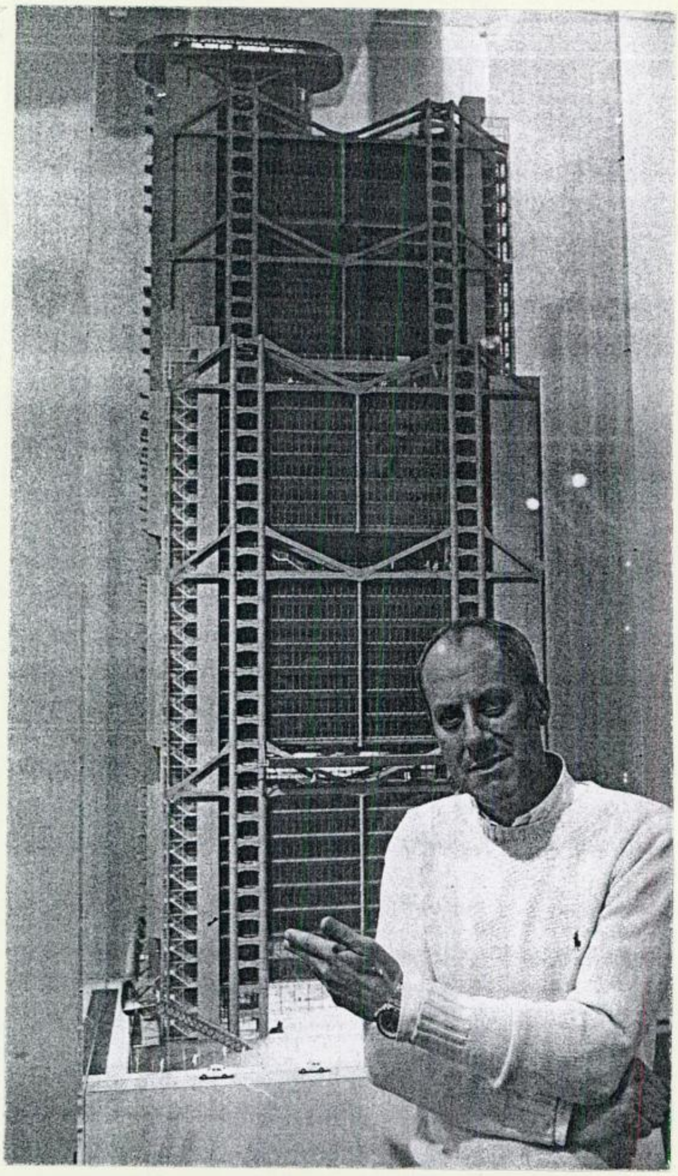
BACKGROUND TO NORMAN FOSTER AND STANSTED AIRPORT.

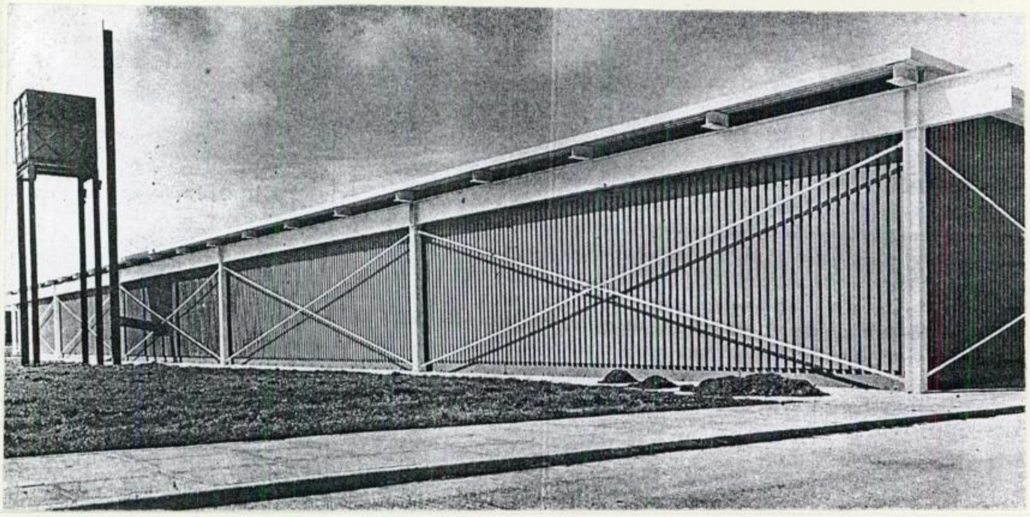
(a) INTRODUCTION TO NORMAN FOSTER

Norman Foster (Ill. 1) was born in Manchester in 1935 and started his architectural education after a stint in the RAF and in the City Treasurer's office. He attended Liverpool University where he studied architecture and won a scholarship to Yale. While there he met Richard Rogers (born 1933) and together they visited most of the work of both Frank Lloyd Wright (1869-1959) and Mies van der Rohe (1886-1969) in the United States. After returning to England they formed a architectural practice in 1963 with Rogers' wife Su and another architect Georgie Cheeseman which was called Team 4. Cheeseman had been brought into the group as neither Foster nor Rogers had full membership of the Architectural Association without which they could not start a practice of their own. After an initial misunderstanding on Foster's behalf - he thought that he was going into practice with Rogers solely - a distrust of Cheeseman grew into a friendship. Foster later married her sister Wendy also an architect who worked with Team 4 after Cheeseman left.

After completing several small commissions including a house for Rogers' father-in-law at Creek Vean, they received a commission for a small factory for which they had being recommended by James Stirling ahead of several other new practices.

The factory for Reliance Controls (Ill. 2) was built on a shoestring for a small up and coming business and Team 4 saw it as an attempt to bring more open working conditions for the





ILL. 1 (top) Norman Foster.

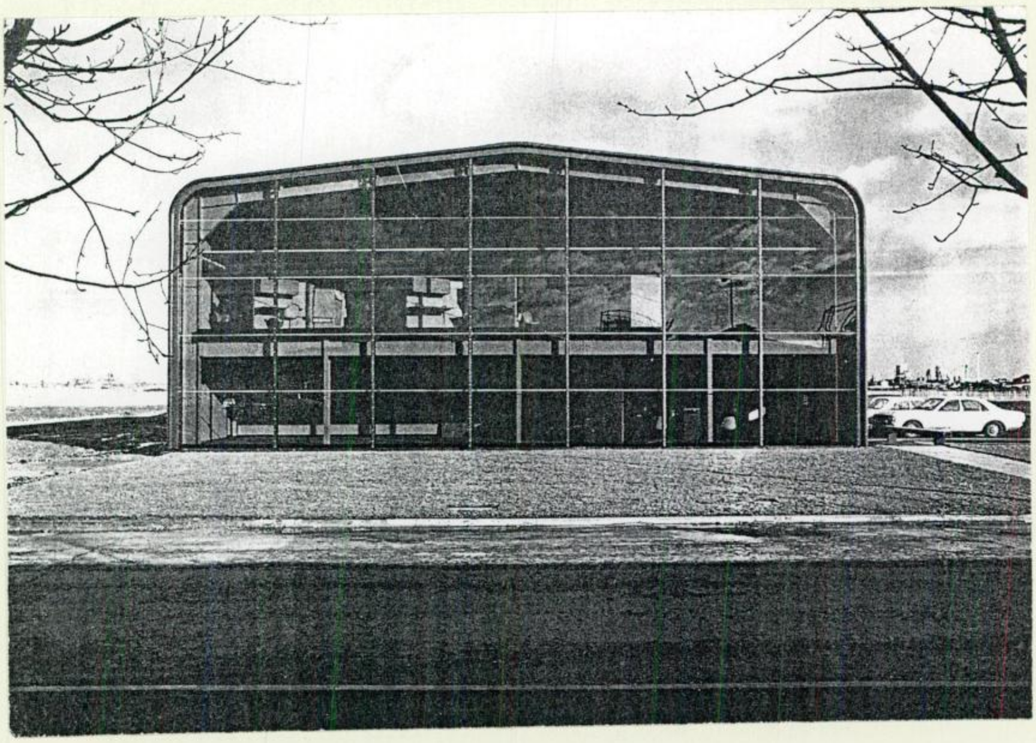
ILL. 2 Reliance Controls Factory

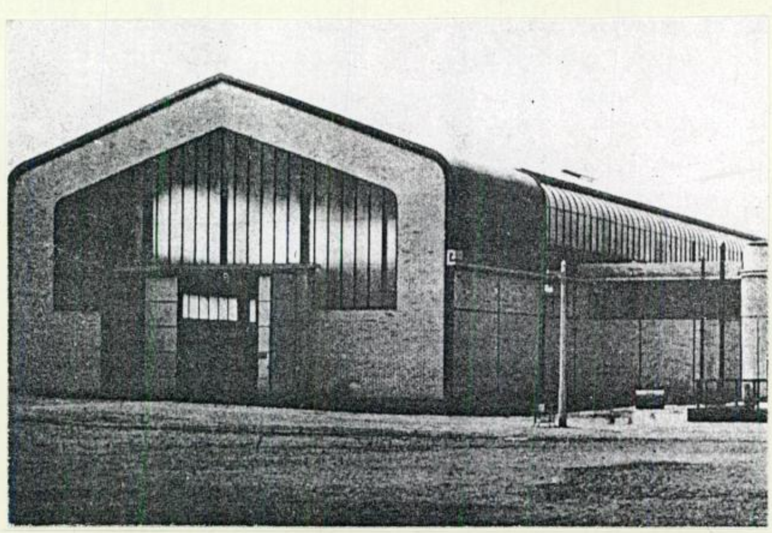
staff. It also had to be easily expandable and so the glazed end wall could be simply unplugged for extension. The internal divisions do not display a traditional social hierarchy - with one open space and dining area for workforce and management alike- a theme later repeated in their individual work. Externally it points the way forward for future 'High tech' buildings with its exposed diagonal cross bracing, industrial metal cladding, glazed end walls and potential for expansion. It won the Architectural Design award for 1966.

All of this was a signal of what was to come in the later work of both Foster and Rogers - Foster opting for the slick metal clad skin and Rogers opting for the exposed structure and services.

After Team 4 split up in 1967, after a bitter clash of personalities, Norman and Wendy Foster set up their own practice - Foster Associates and were later joined in partnership by Michael Hopkins. Unlike Rogers who went on to win the Centre Pompidou competition with Renzo Piano (born 1937) and receive other large commissions, Foster continued to design and build the type of projects which are the staple of a moderately successful practice.

Foster's Modern Art Glass factory in Thamesmead (1973) is a good example of his work at this time (Ill. 3). It seems to provide a faint echo of Gropius and Meyer's Machine Hall at the Cologne Werkbund exhibition of 1914. The Gropius and Meyer machine hall (Ill. 4) had a large glazed window in the gables and profiled eaves similar to those of Foster's factory. Foster however has totally glazed his end walls. With its profiled sheet cladding, seamless eaves and end glass gables it became the model for small advance factories all over Britain.





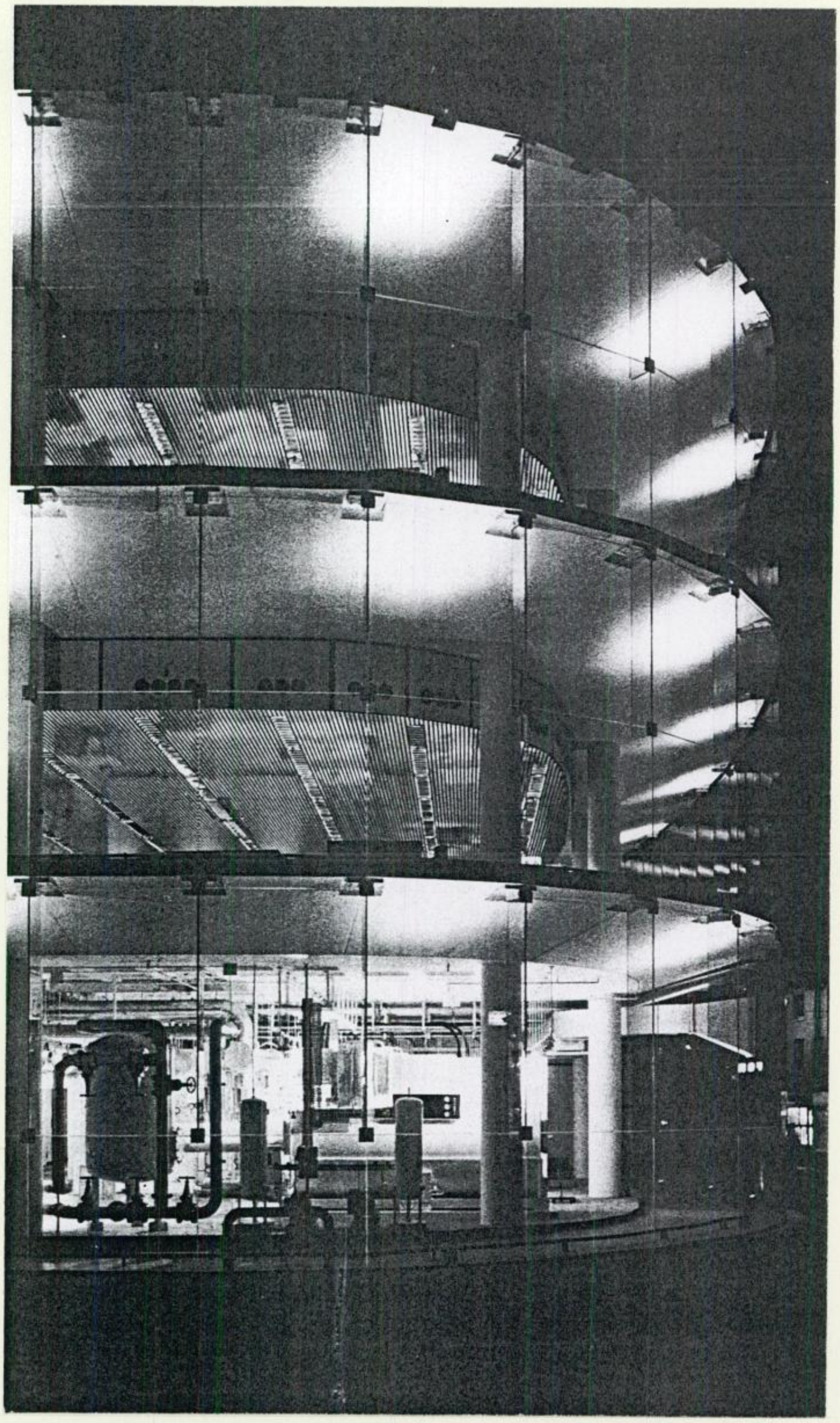
ILL. 3 (top) Modern Art Glass Factory.

ILL. 4 Gropius' and Meyer's Machine Hall, Cologne Werkbund 1914.

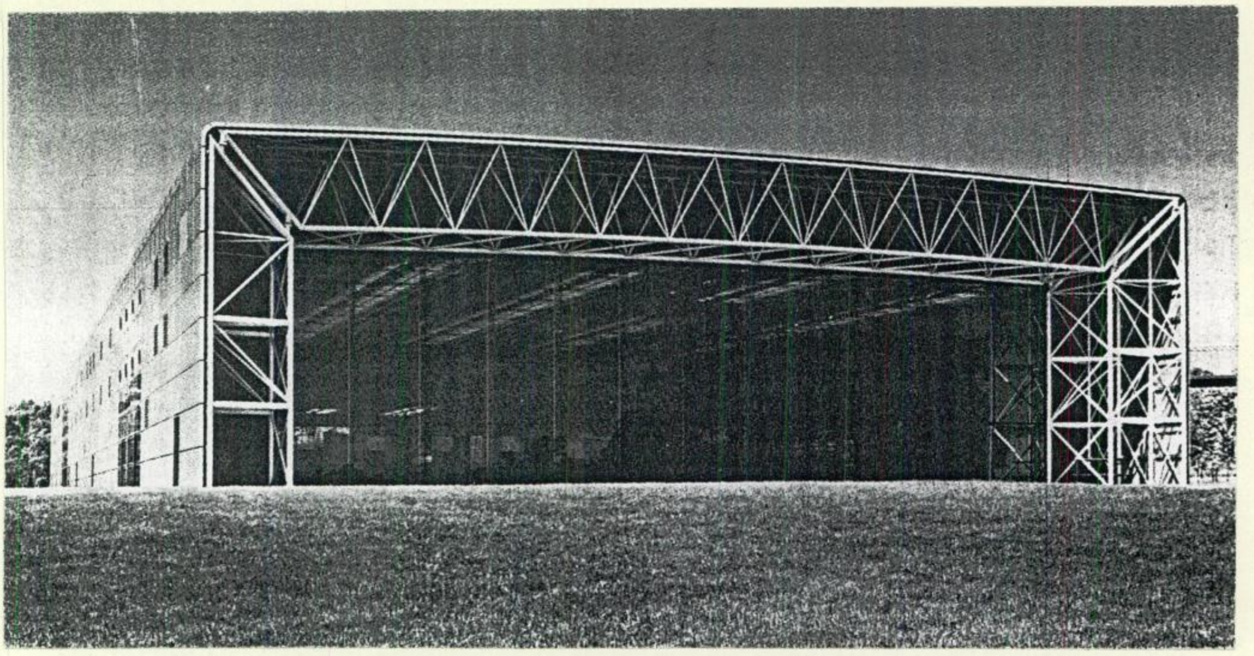
Then in 1975 along came the large commission that he had been waiting for. He was asked by Willis, Faber, and Dumas the insurance brokers to design for them a new administrative centre in Ipswich. Ipswich is a town with narrow twisting streets which has being destroyed by concrete office blocks being set in without any respect for the existing streetlines or building height. Foster produced a truncated black glass tower which flowed in tandem with the street plan (Ill. 5). The result looks like a large grand piano and with its glass curtain walling it reflects the surrounding buildings during the day, and at night when the lighting comes on inside it presents a totally different aspect showing the internal layout and services. The building respects the existing streetplan and does not detract from the surrounding buildings. It has recently been listed as a Grade 1 building when the owners applied to reconstruct the interior.

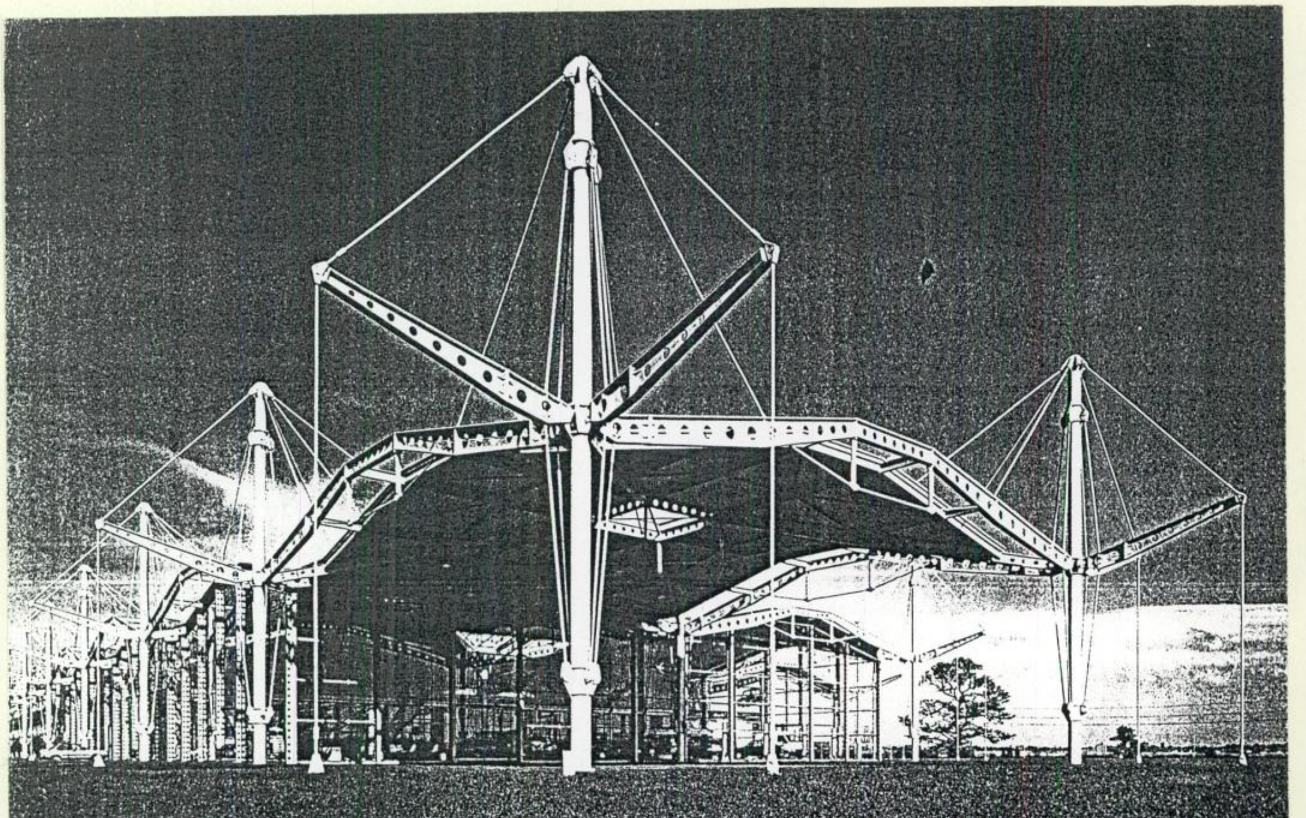
After these early successes Foster began to receive larger and more important commissions. In 1977 he was commissioned to design for the University of East Anglia, a centre for the Visual Arts which was to be sponsored by the Sainsbury family. Foster visited the United States of America and identified several major areas for development. These were an easily changed internal plan, the desirability of natural lighting, the need for good security, and easily accessed services without disrupting the gallery.

Foster produced a large aluminium clad shed, again with glazed end walls (Ill. 6). The wall panels are designed to be easily demountable and interchangeable so as to give any layout of glazed, louvered or solid panelling. This building marked the first use in the construction industry of vacuum formed plastic aluminium panels. To conceal the services he designed a building with thick cross-sectioned walls to contain the wiring, plumbing and even the public toilets. Between the panels on the



ILL. 5 Willas, Faber and Dumas Headquarters.





ILL. 6 (top) Sainsbury Centre for the Visual Arts, University of East Anglia.

ILL. 7 Renault Parts Centre.

exterior are neoprene gaskets with a vertical groove cut into them to act as a gutter for rainwater. Internally he produced motorised panels to operate like the shutter on a camera for controlling the amount and quality of light penetrating into the building. The end walls were constructed of large glass panels held together by a clear silicon gel for unplugging and further extension.

This building ~~really~~ marks the beginning of Foster's real use of and transferral of technology from other fields into architecture although he did design a new method of curtain walling and rainwater gutters for the Willis, Faber and Dumas building using neoprene washers - neoprene was originally used for cable jacketing. As his work developed Foster accumulated all the hallmarks of what would be called a 'High tech' architect - the exposed structure and mass production of components as well as the use of technology that is new to the building industry.

Shortly after this Foster and Richard Rogers discussed reforming their partnership now that all the bitterness and recriminations of the break-up were gone. They were encouraged in this by the chairman of Royal Institute of British Architects (RIBA) Gordon Graham who was convinced even then that they represented the best of British architecture. This was prior to the announcement of the Lloyds commission for which RIBA wanted a British architect to win and both Foster and Rogers were in the final six. Talks failed however because of the fact that Foster's and Rogers' styles have become so divergent, also Rogers is much more of a team operator than Foster. However they remained good friends and promote each others work in public.

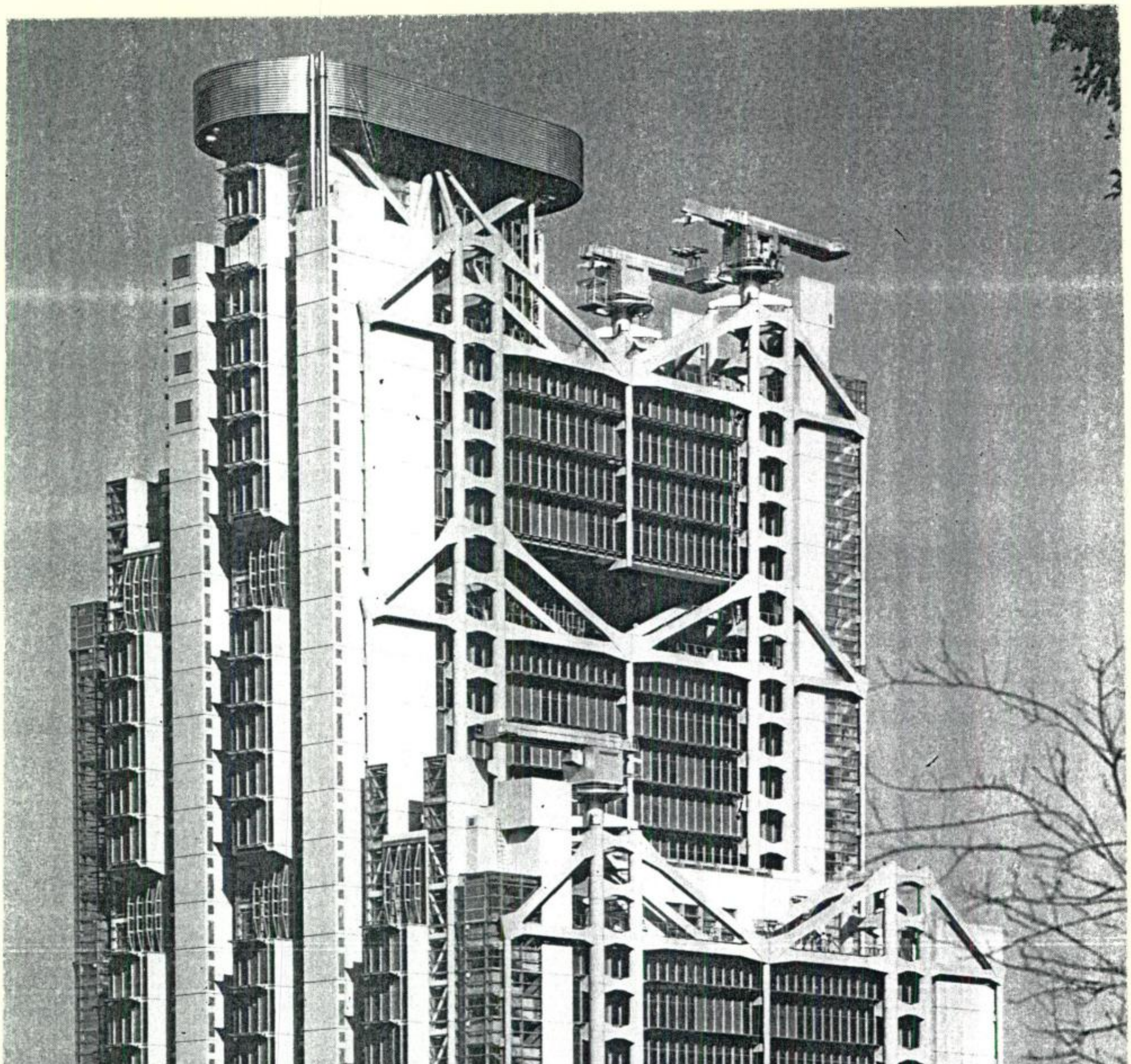
Foster's next large commission was the Renault Parts Centre in Swindon (Ill. 7). This is a recognisable 'High tech' building with

its exposed structure, bright colouring and extensive use of glass and metal cladding. In common with most of Foster's buildings it is capable of being extended without major disruption to the rest of the building. For Foster this is an uncharacteristic building in that it is unusually flamboyant in contrast with the Sainsbury Centre and Stansted Airport which he was also working on at this time and which are both examples of the 'silver aesthetic'.

Foster's most important commission to date has been the Hong Kong and Shanghai Bank completed in 1986 (Ill. 8). Foster reinterpreted the skyscraper and in doing so has produced the most technologically advanced building in the world. This claim should perhaps be seen as a fitting epitaph to a 'High tech' architects career but Foster is currently at work on several large commissions in Europe and in the Pacific Rim which promise much greater innovation in design and technology.

For Foster, technology is a passion and a means to an end, using high performance materials in a building in an appropriate way makes better ecological and economic sense in an industrial context and in the long term. For him, 'High tech' equals high performance and low weight. Buckminster Fuller (1895-1983) always asked architects how much their buildings weighed and Foster has taken this to heart.

As appropriate to a 'High tech' architect, in Foster's office today are pictures of triumphant pieces of engineering - the Eiffel tower, the Forth railway bridge and the Lunar module and he lists among his influences - Joseph Paxton (1801-1865), Charles Eames (1907-1978) and Buckminster Fuller.



ILL. 8 Hong Kong and Shanghai Bank.

(b) BACKGROUND TO STANSTED AIRPORT

Stansted's airport development began in 1942 when it was used as a base by the United States Army Air Force bomber command who built the current runway which is still one of Britains longest.

When BAA was formed in 1966, Stansted along with Heathrow, Gatwick, and Prestwick were taken under its control. Up to this, it had acted as an overflow for the two London airports until in 1967 the government designated it as the site of London's third airport. In 1971 the Conservative Party who were in Opposition produced a new plan for a third airport at Maplin Sands near Fulness Island. The oil crisis and the following recession caused that plan to be abandoned as too costly. In the late 1970s air travel again boomed and Heathrow and Gatwick became seriously congested. So BAA appealed to the government for a major development plan to be passed - they had been using Stansted since the early seventies and it was handling one million passengers per annum (1mppa).

In 1979 the governments official inquiry confirmed Stansted as the site for London's third airport. Planning permission was applied for in 1980 which caused a another public inquiry. This inquiry which was the second longest in British history ran from 1981 to 1983, hearing petitions from environmental groups, local residents, BAA, airlines and transport experts. A report was produced in 1984 which led to a white paper in 1985 giving the go ahead.

This approved an initial development providing capacity for 8mppa passengers and gave outline planning permission for further expansion to 15mppa although again subject to further government approval. (Courtesy BAA)

(c) BACKGROUND TO FOSTER'S COMMISSION

In 1981 the facilities planning office of BAA produced drawings of six different schemes, all of which according to Michael Evamy, could not have been understood by anyone other than a skilled airport planner. These were shown to Foster Associates for evaluation as buildings and to work out the engineering costs for each one. Foster however came back with a simpler one box, single level design. The BAA design team were not impressed but it was shown to management and the following month Foster was appointed architect to the new Stansted Terminal on a limited appointment. (17, p. 35)

Foster's brief was to include room for further expansion to the original building without producing the clutter and bewildering complexity that Heathrow and Gatwick had become because of the one step at a time development. BAA also required that the terminal cost 10% less that the new one under construction at Gatwick at that time.

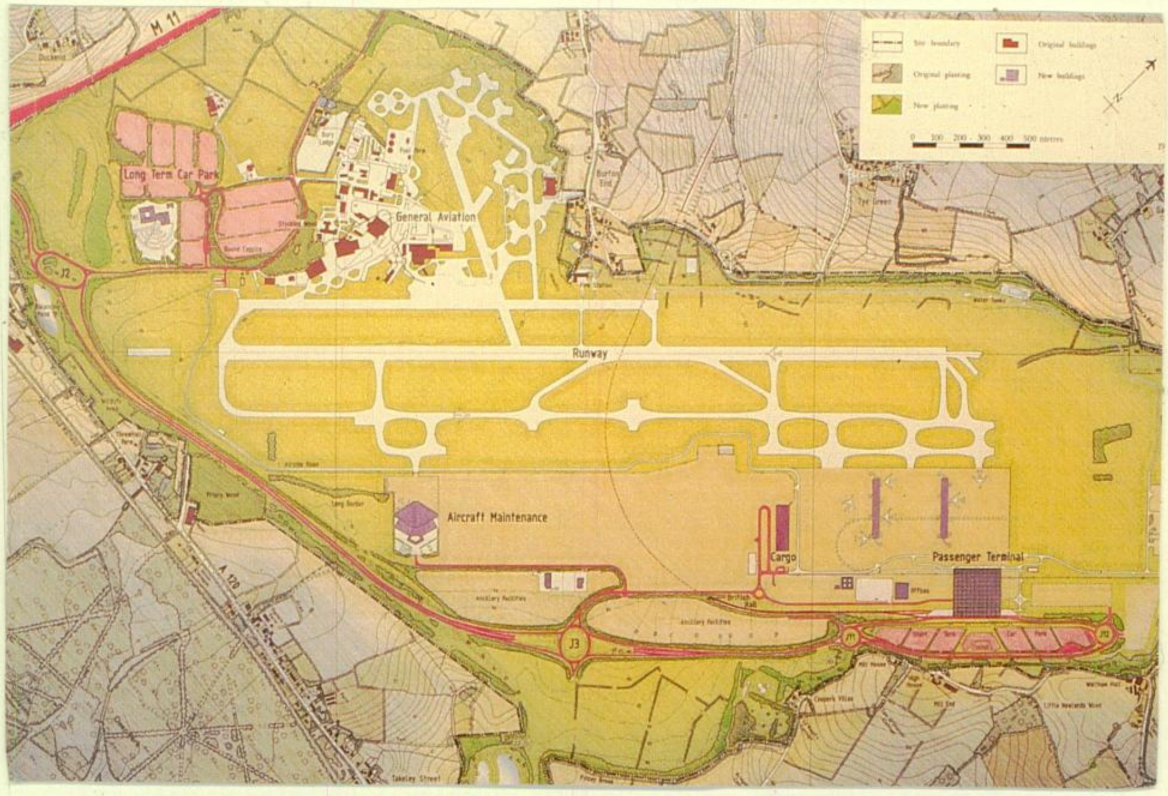
From the outset the environmental impact of the airport was a major concern, Foster's thumbnail sketches specified that the terminal should not be any higher than the canopy level of nearby woodlands to avoid spoiling of the landscape. A 'Design Group' was set up at an early stage to arbitrate on the key design issues covering the fields of engineering, architecture and landscape design - BAA had clearly recognised from the public inquiries the need for careful development control for the future.

(d) INTRODUCTION TO THE NEW TERMINAL BUILDING

The new terminal building (Ill. 9-12) by Norman Foster is basically a single storey building loosely divided into separate

ILL. 9 (top) General view of Stansted Airport (front).

ILL. 10 General view of Stansted Airport (interior).



ILL. 11 (top) Plan of Stansted Terminal.

ILL. 12 Aerial view of Terminal.

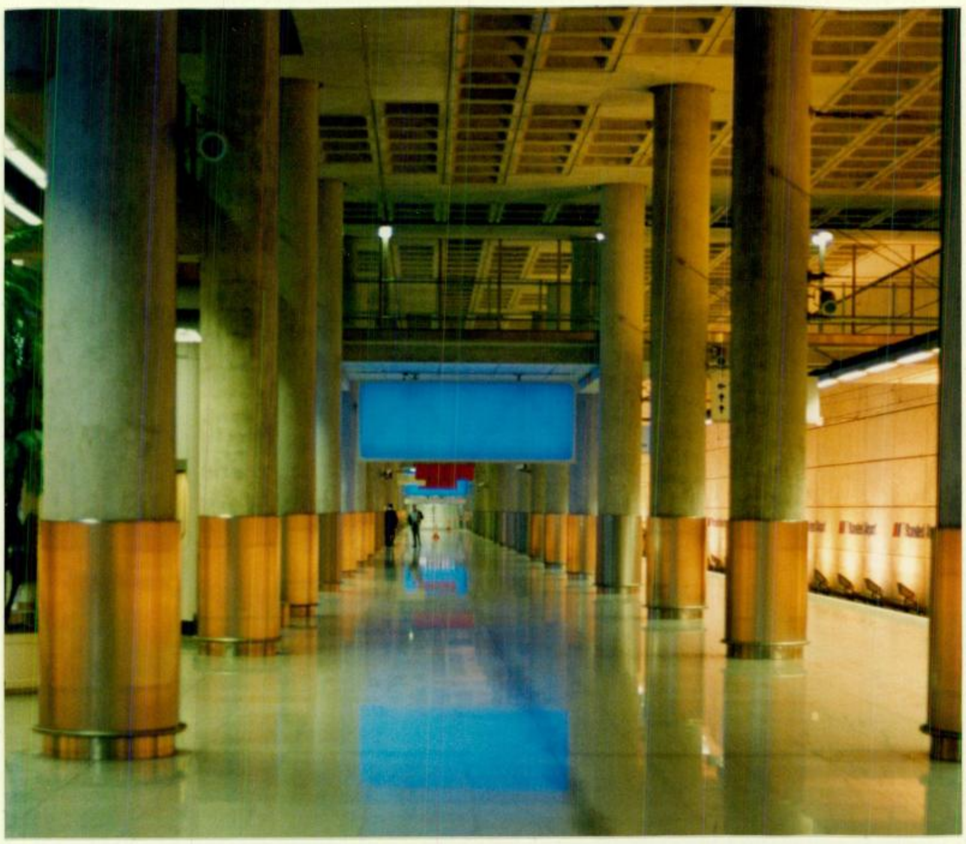
POST CARD

areas - landside and airside both of which are further subdivided into arrivals and departures. The airport is clearly one of the new generation of airports with its satellites placed some distance away from the building and connected to the terminal by a Tracked Transit System (TTS) unlike the older traditional airports like Dublin and Heathrow.

The new Stansted airport has been planned from the start with speed of transit in mind. As you land at the airport you exit the aircraft into one of the two satellites (two more are planned) where you get on TTS which takes you to the new terminal.

In arrivals on disembarking from the TTS passengers walk straight into the baggage hall and customs. On average BAA are claiming a eight to ten minute interval between disembarking from the plane and walking out through the front doors of the terminal building including a possible minute or two wait on a TTS.

Foster has positioned the shops and restaurants which are so essential to an airport between arrivals and departures on the landside of the terminal. These however are often empty because the airport works well in that passengers are processed so rapidly that they press on to their next destination before eating. These shops are in addition to the Duty Free facilities in departures and those in the satellites. Also BAA have built a railway station to link up with Network South East and Liverpool Street Station underneath the concourse. (Ill. 13-14) This can be accessed straight from the car-parks or from the concourse.



ILL. 13-14 Views of Railway station.

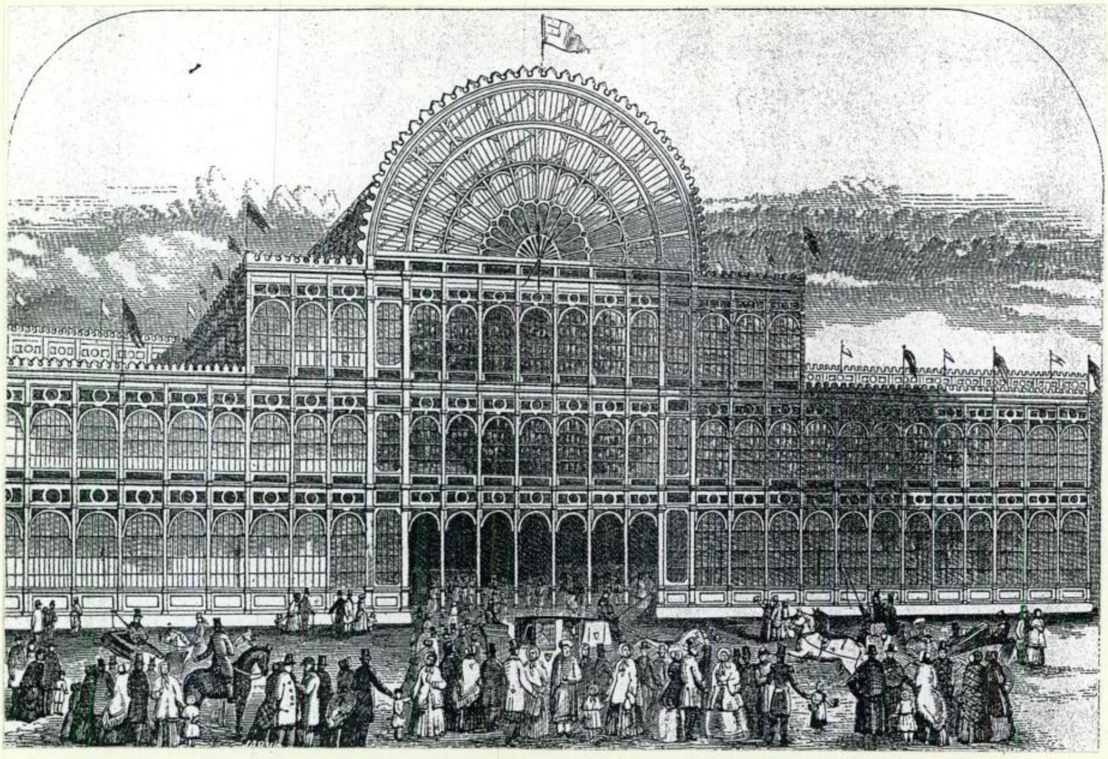
CHAPTER II :

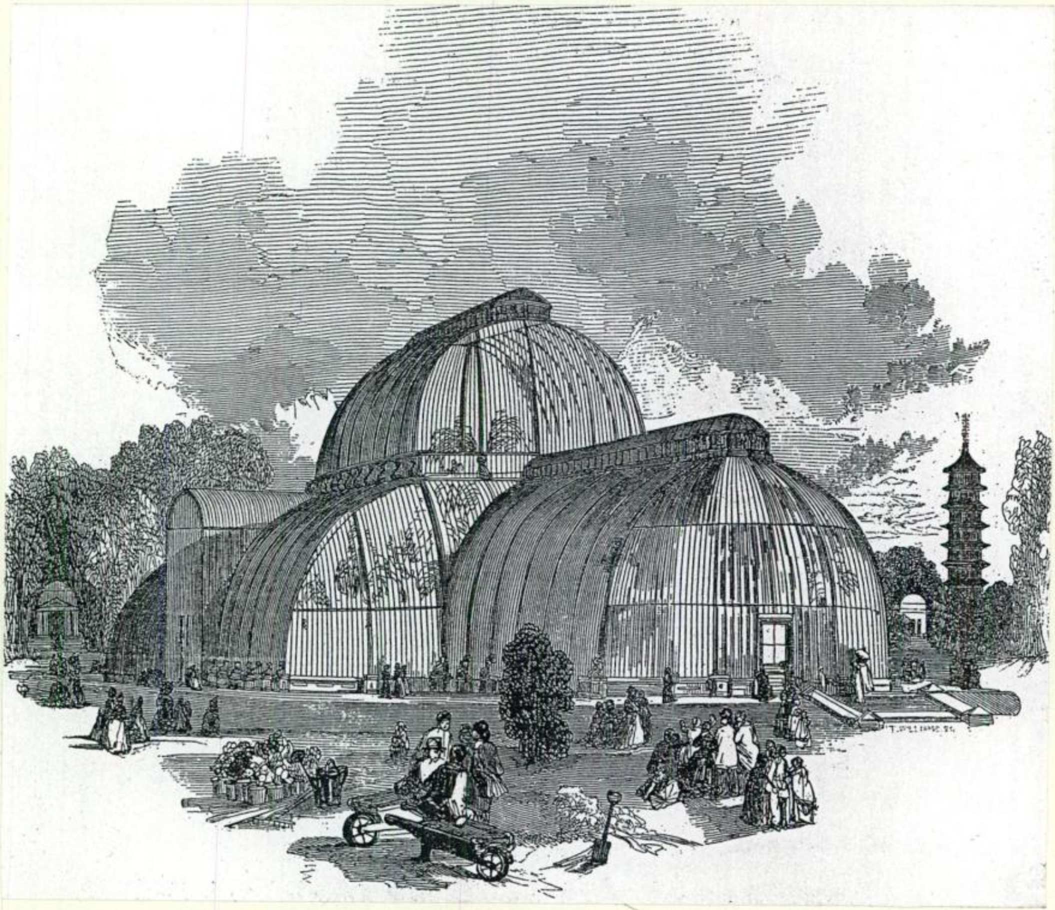
WHAT IS 'HIGH TECH' ?

This chapter will define the main conventions and principles of 'High tech' architecture for the purpose of this thesis. The main reasons for and against the use of these conventions will be explored and their origin and influences will also be examined.

'High tech' architecture is not 'High tech' in the sense that microchips and electronics are because the building industry is relatively backward in its techniques and technology compared with other major industries. The motor car for example has come quite a long way from Benz's first car one hundred years ago to the modern multi-valved sophistication of a Porsche or Mercedes in materials, engineering and production methods. Whereas in the same period building has only moved on to concrete structures - a material that was used by the Romans in all their large structures and was forgotten until re-discovered around 1800. So 'High tech' architects usually look beyond the building industry to other fields for sources of technology and imagery. A 'High tech' architect will always prefer to use clean factory mass produced tensile cables, masts and prefabricated panels instead of a messy cement block load bearing wall although it may be cheaper to do so.

The origins of 'High tech' date back to the engineering traditions of the last century when innovators such as Joseph Paxton and Gustave Eiffel (1832-1923) built and designed the Crystal Palace (1851) and the Eiffel Tower (1889). The Crystal Palace (Ill. 15) was a miracle of prefabrication and precision - nearly one million square feet of floor area was erected in just nine months. It was the first large building to omit all references to past styles. What made it possible was the work





ILL. 15 (top) Crystal Palace.

ILL. 16 Glasshouse at Kew.

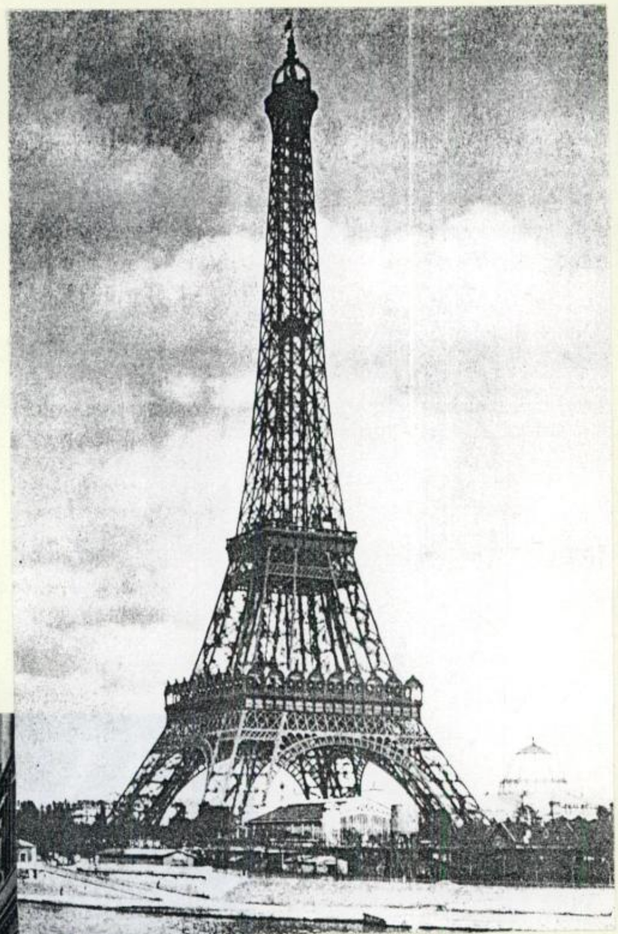
done by Paxton in glasshouses at Chatsworth (1836-1840) and by Richard Turner and Decimus Burton at Kew (1844-1847). Both were large curvilinear glasshouses with standard components and innovations. At Kew (Ill. 16) Turner used thermic welding and post-tensioning, both re-discovered in the twentieth century. The Eiffel tower (Ill. 17) was looked upon after its erection as a piece of engineering as opposed to architecture rather like some 'High tech' buildings are today. These builders were pioneers of mass production and their expertise led the way forward to the great railway termini of the nineteenth century. Victorian railway engineers took pride in displaying connecting rods and the care they took in composing the layout of pipework across their boilers, just like Richard Rogers does today.

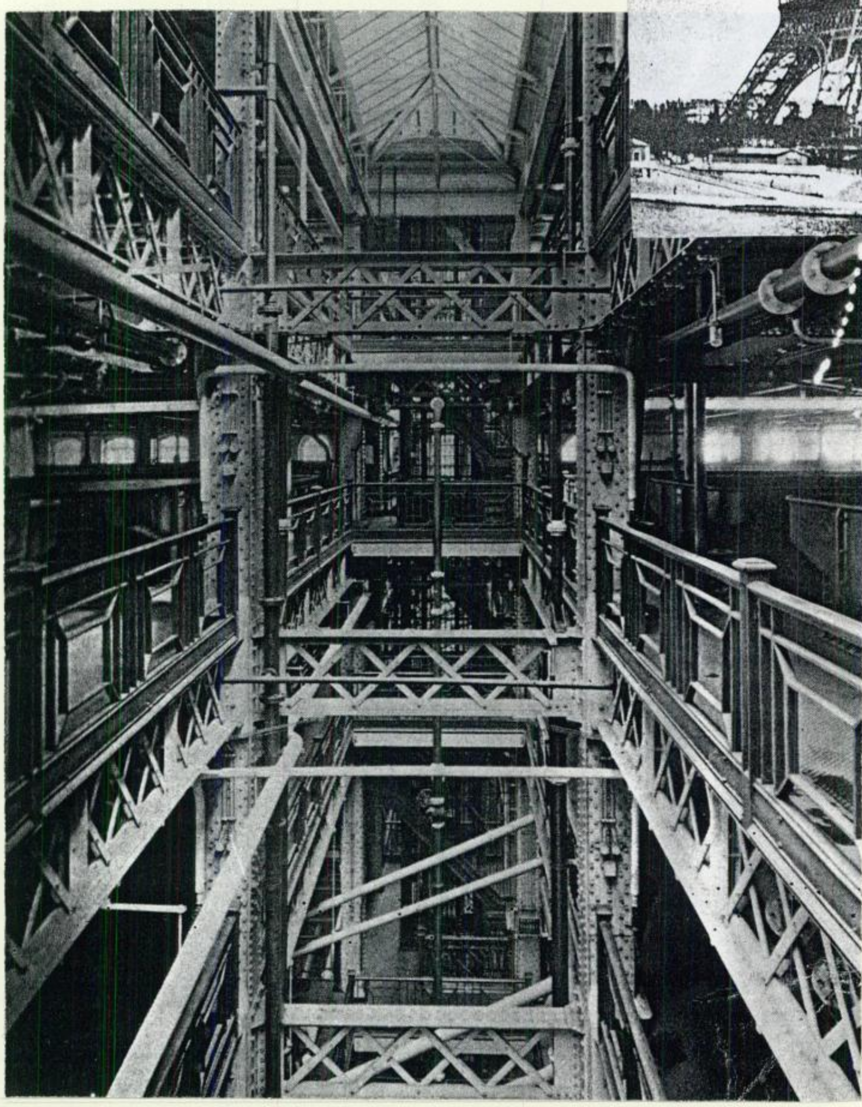
Some of the early metal framed structures are precursors to classics of the 'High tech' style. According to Rothery, the first large metal framed building in Great Britain and Ireland is a Guinness store (McLaughlan and Harvey, 1904) in Dublin. The interior (Ill. 18) is reminiscent of the central atriums of Lloyds (Richard Rogers and Partners, 1986) (Ill. 19) and the ITN building (Foster Associates, 1986). The Guinness store has an atrium falling the height of the building and was designed to be extended. One wall was built thinner than the other three for easy demolition and the flooring around the atrium was arranged for easy extension. (11, pp. 13-20)

reference Rothery also (12, p19)

Market Street Store

These buildings represent a mode of building based on industrial technology rather than architectural tradition and are 'High tech' in the sense that they make no contact with the mainstream of architectural development at the time of their construction. With the coming of modernism it was to remain an alternative form of architectural expression, as concrete





ILL. 17 Eiffel tower.

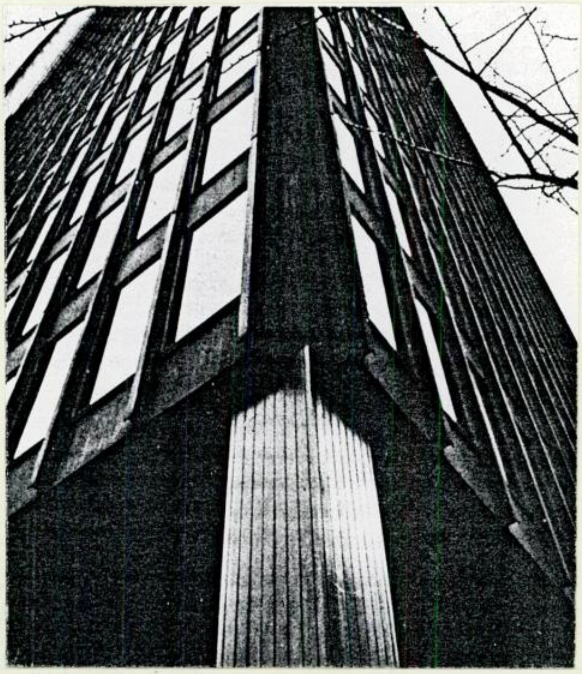
ILL. 18 Guinness Store, Market St, Dublin.

ILL. 19 Lloyds of London (interior).

which was the mainstay of modernism is a material which is not commonly used in 'High tech'.

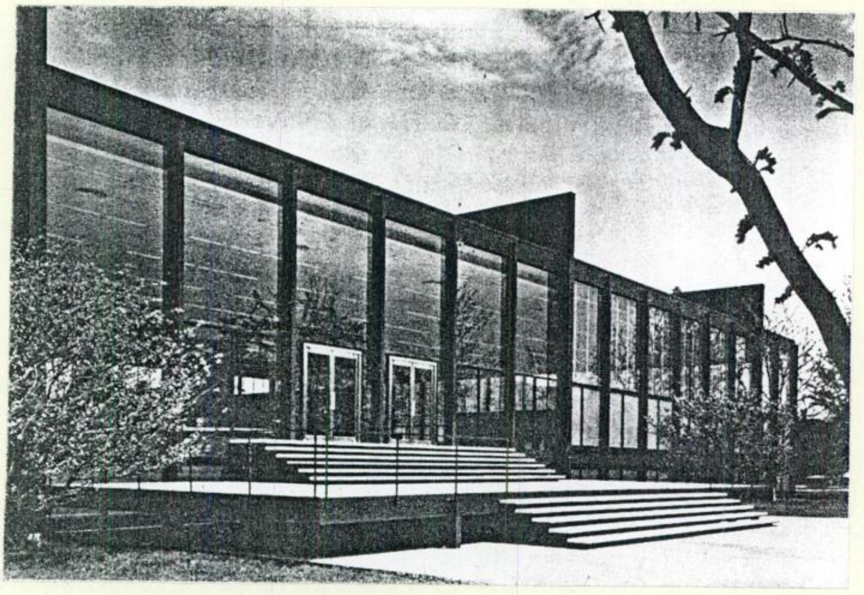
A lot of 'High Tech ' features can however be traced back to Ludwig Mies van der Rohe who preferred an external steel structure. Mies however did not use materials or structure in complete honesty, which is supposed to be a major factor in 'High tech'. The Seagram Building's metal beams which run down the side of the building are not those holding up the structure as they are inside encased in concrete. The outside beams are merely window mullions which are indicative of the structure. (Ill. 20-21) Mies justified it on the grounds that the buildings function would change and so the architect should look at what will not change namely the exterior and place all the emphasis on that. Mies however believed in 'almost nothing' in that he refined his components down to a minimum - just like Foster does today. Mies also used exposed space frames notably in the Illinois Institute of Technology. (Ill. 22) This influence is readily seen in the Schlumberger Laboratories (Michael Hopkins and Partners, 1987) (Ill. 23), the amenity centre for Fred Olsen Ltd (Foster Associates, 1969) and other 'High tech' buildings.

Buckminster Fuller, the American innovator was a major influence on some of the architects of the style with his research and development into mass production and installation pods. Foster in particular has paid homage to him and has actually worked with him. It is Fuller who most deserves the title of the 'Father of High Tech' with his revolutionary Dymaxion house project of 1927 and his Geodesic dome structures. The geodesic dome (Ill. 24) is the structure which covers large areas with the greatest efficiency of materials and is entirely built with mass-produced parts - a real high performance building.



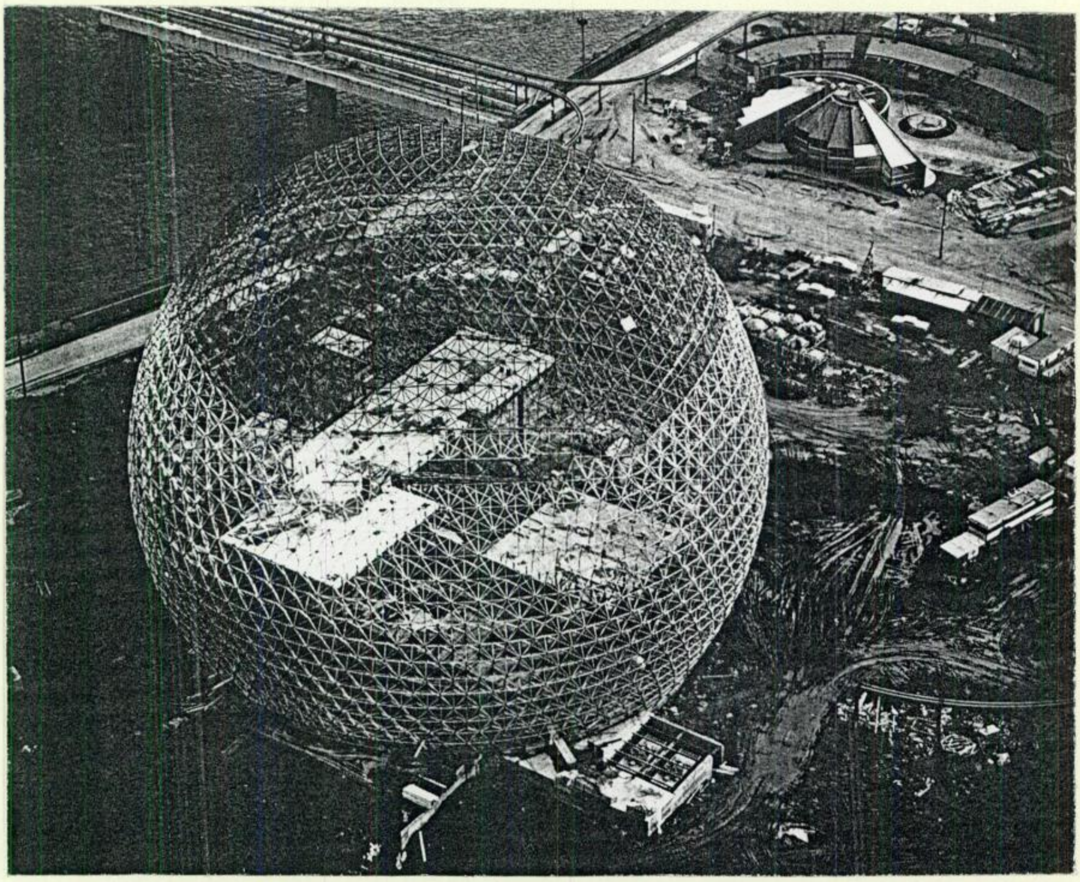
ILL. 20 (left) Seagram Building.

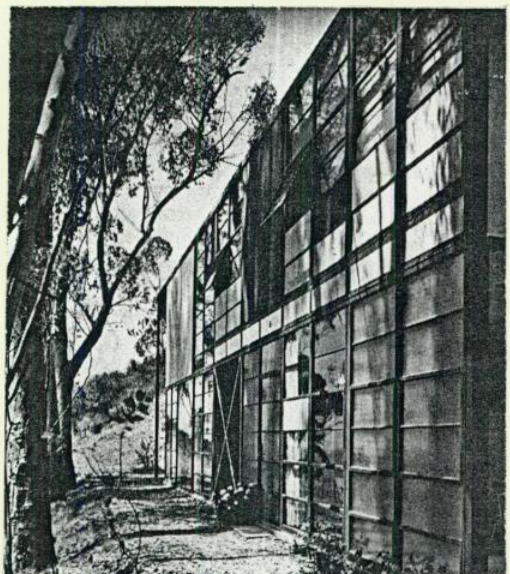
ILL. 21 Detail of exterior - Seagram Building.



ILL. 22 (top) Illinois Institute of Technology.

ILL. 23 Schlumberger Laboratories.





ILL. 24 (top) Geodesic Structure,

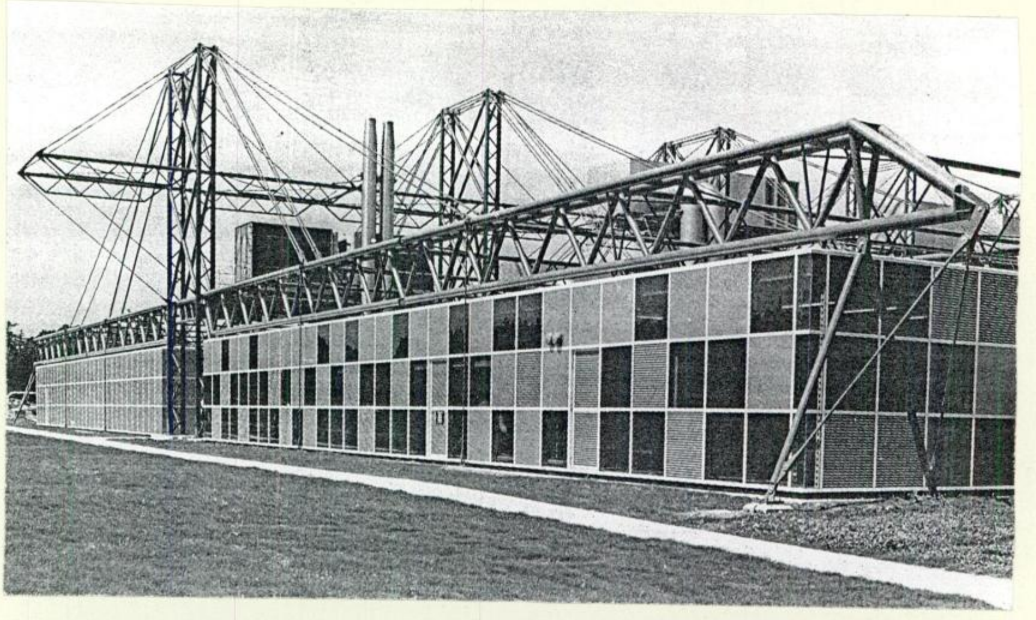
ILL. 25 Eames House.

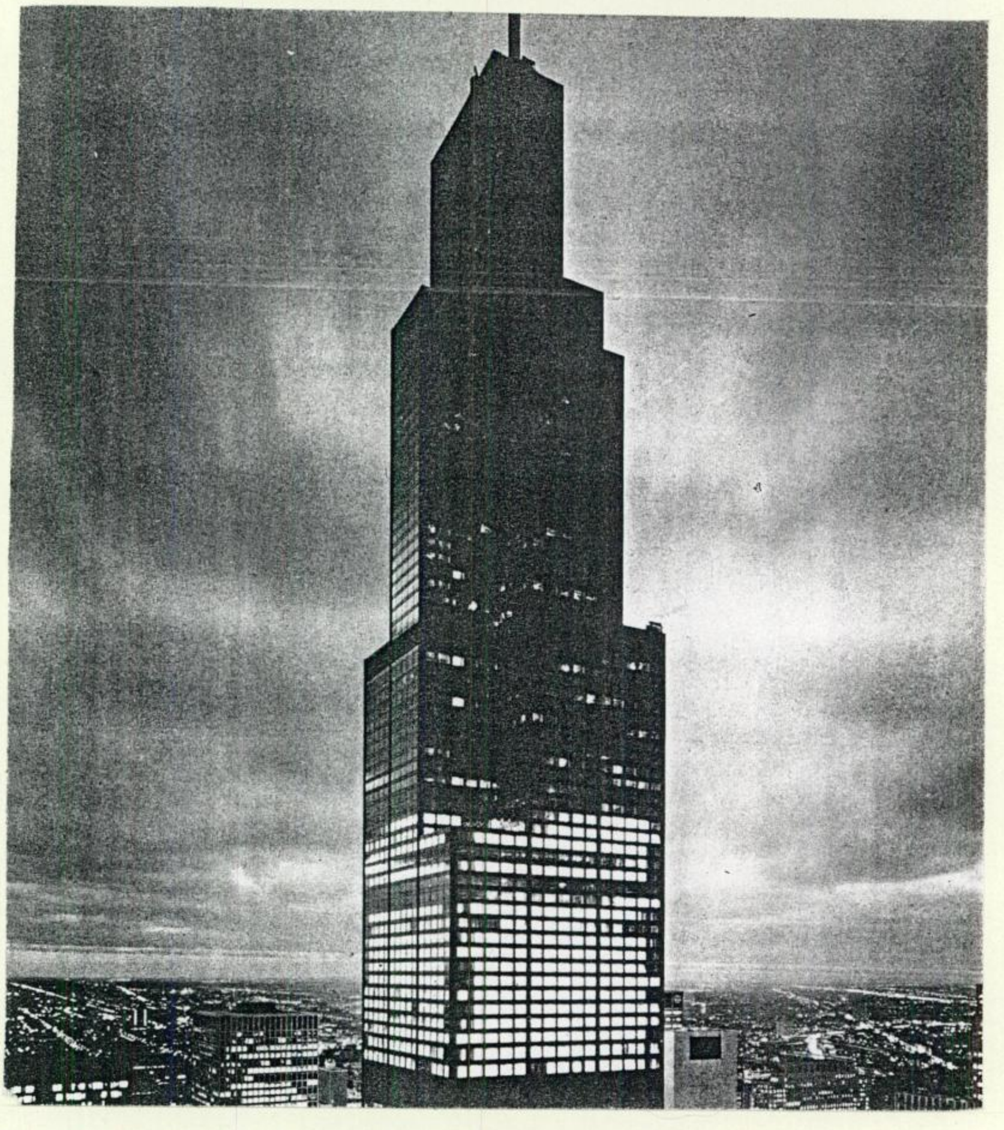
Charles Eames is another architect whose has had a lot of influence on the practitioners of the 'High tech' style. He built his own home (Ill. 25) and studio from standard off-the-shelf components in Santa Monica, California.

Like the early modernists the major practitioners of 'High tech' architecture are reluctant to call it a style - as this implies that there are rules or conventions to be followed and they like to infer that it is all based around a humanist approach (interaction between the building, man and the environment). However it does seem that there is a loose set of unwritten conventions to be followed though not religiously adhered to, as many of the major conventions are commonly broken by the principal architects of the movement and leaves a exact definition of 'High tech' hard to arrive at.

First it must be a celebration of the engineering process. Many 'High tech' buildings have their structure expressed boldly on their exteriors. The joints, rivets, ducting, and cross members are all clearly evident looking like a giant Meccano set appealing to the child and the engineer in us all. In this they are following in a long engineering tradition back to the Crystal Palace, and the Eiffel Tower in the glorification of structure and truth to materials. Michael Hopkins has said, 'Our architecture comes out of our engineering and our engineering comes out of our engineers.' (7, p. 152)

Two of the most powerful examples of this are the Renault parts centre (Foster Associates, 1983) and the Inmos microprocessor factory (Richard Rogers and Partners, 1982) (Ill. 26). These are however the obvious face of 'High tech'. Some buildings do not seem to conform to the 'High tech' style. Sears Tower (Skidmore, Owings, & Merrill, 1974) at 110 storeys tall is a definite glorification of engineering and technology even though





ILL. 26 (top) Inmos microprocessor Factory.

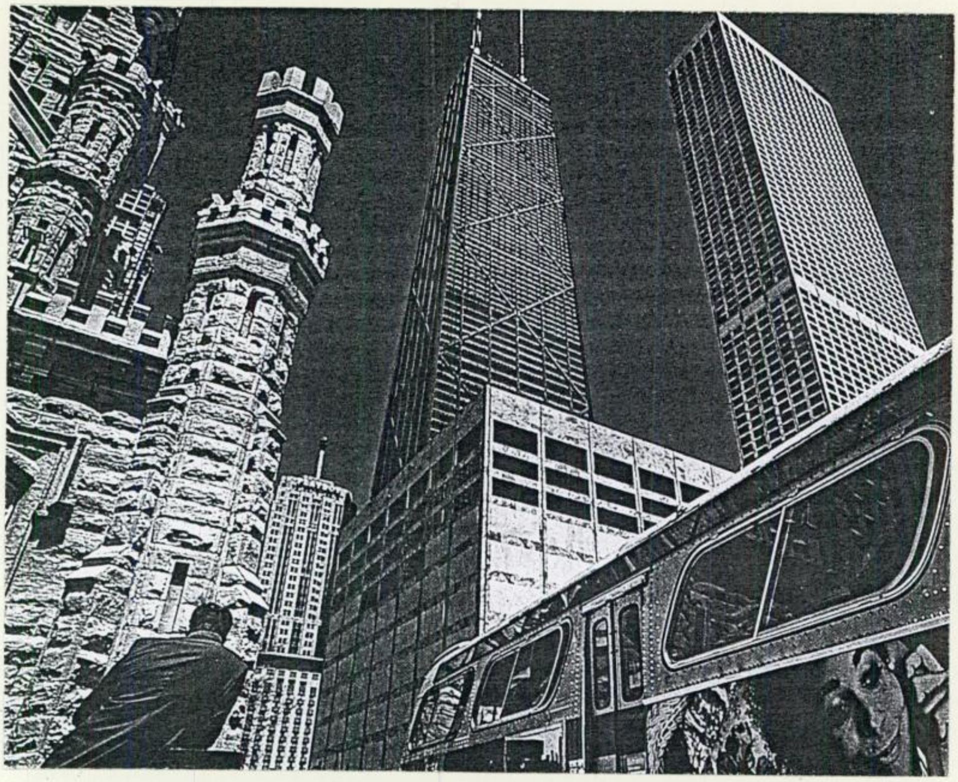
ILL. 27 Sears Tower.

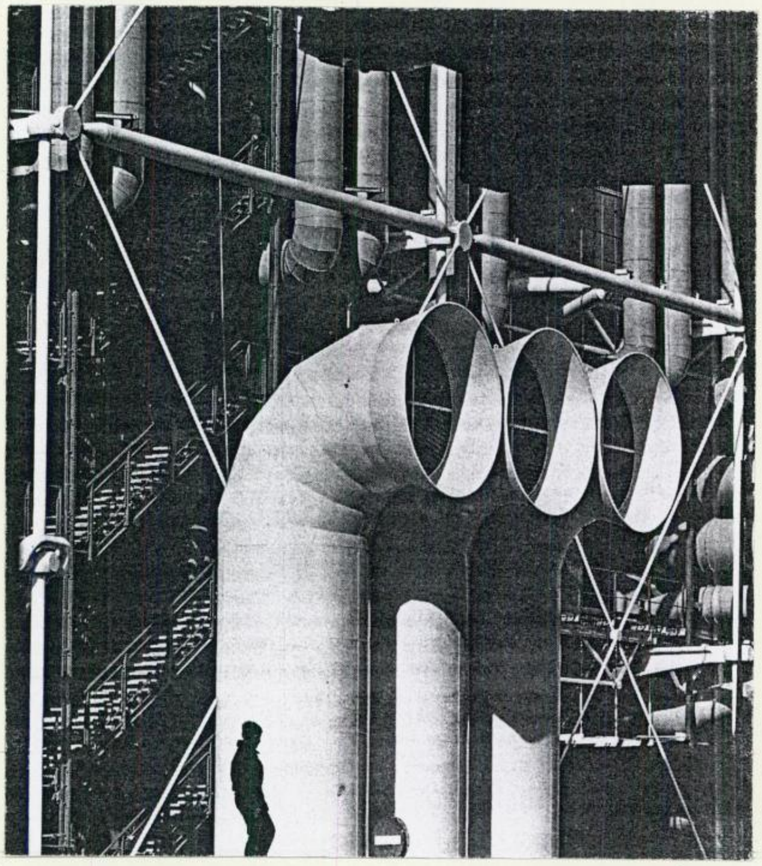
it has not exposed its structure (Ill. 27). SOM have done that with their earlier work the John Hancock Tower (1965) in Chicago. This has external cross-bracing and structure on a grand scale (Ill. 28). This leads to the point that all engineering related structures are 'High tech' in some way and helps to show why the movement cannot be tied down to any particular rules but just a set of loose conventions.

Secondly, there is the use of bright flat colouring. With their exposed servicing and structure many building have their services colour coded as they would be if they were inside. This causes many critics to refer to it as boilerhouse architecture or to compare to them to oil refineries. One of the first large 'High tech' buildings, the Centre Pompidou (Piano + Rogers, 1976) (Ill. 29) has been referred to is this way. One of the best examples is the Medical Faculty building at the University of Aachen (Weber Brand and Partners, 1969-1984) which obviously resembles a huge power station or generator in its technicolour garishness (Ill. 30). The use of colours in this way is a particularly seventies fashion which died out in the early to mid eighties. By using bright palette colours the architects hoped to break away from the traditional conventions and establishment of architecture. This has not gone down too well with the critics who feel that too much colour is hard on the eye. In Great Britain the Prince of Wales (a self appointed architectural critic) is staunchly against 'High tech'.

> This is very much the age of the computer and the word processor but why on earth do we have do be surrounded by buildings that look like machines
> (21, p. 19)

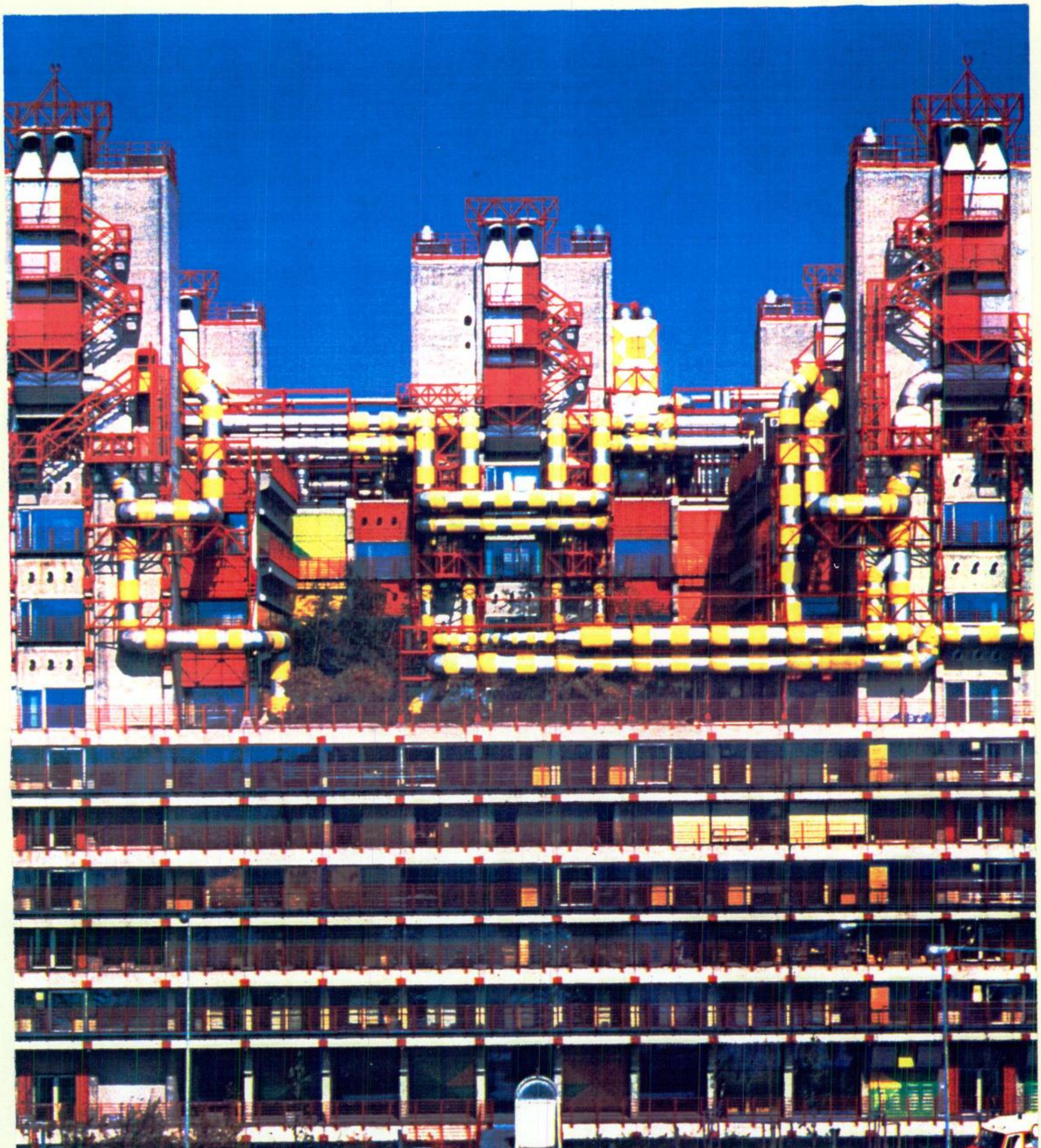
He has called a Plessey semiconductor plant (BDP, 1987) in Wales a Victorian prison - with the result that it was immediately painted a different colour. At the opening of the Inmos factory





ILL. 28 (top) John Hancock Tower.

ILL. 29 Centre Pompidou.

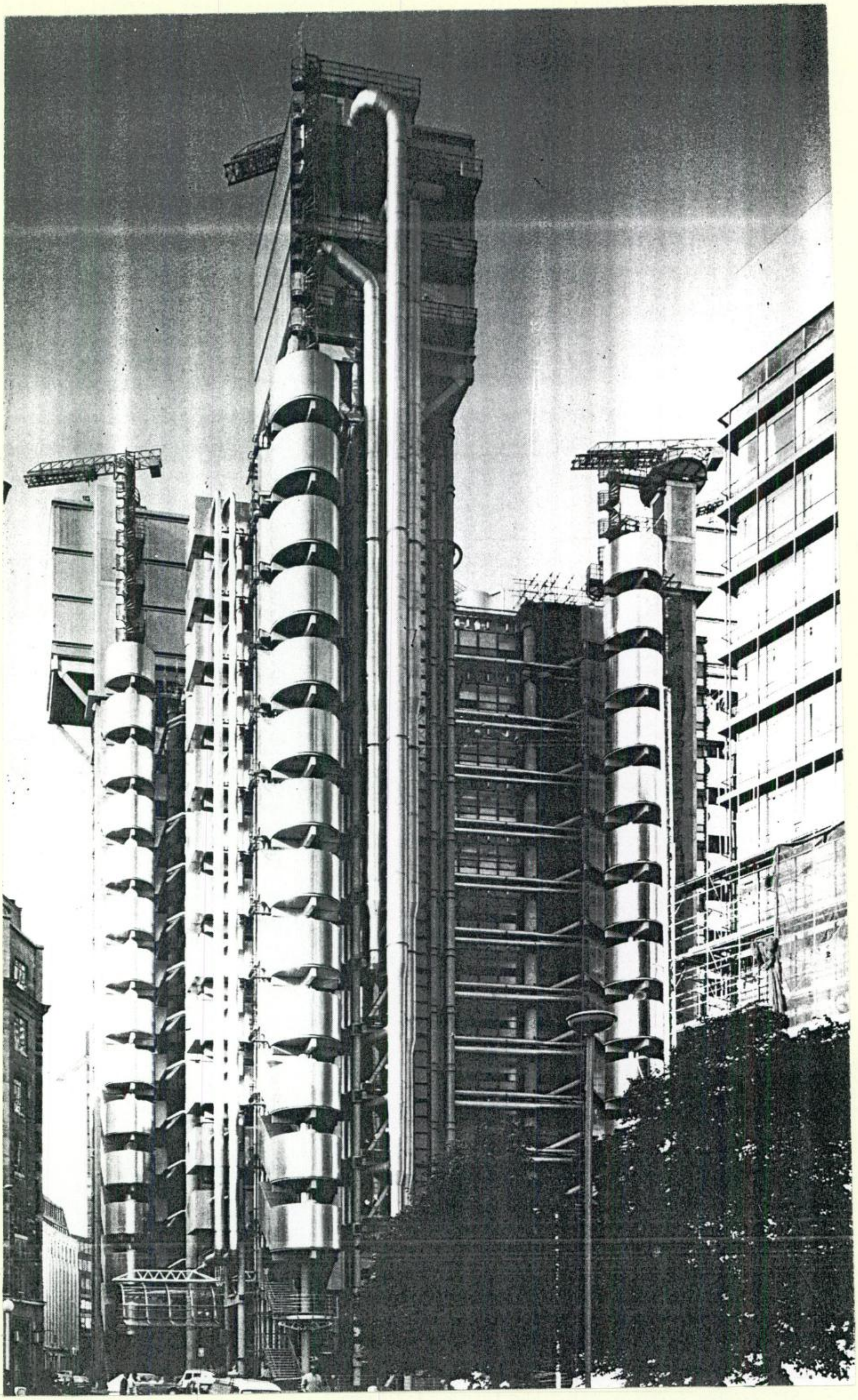


ILL. 30 Medical Faculty, University of Aachen.

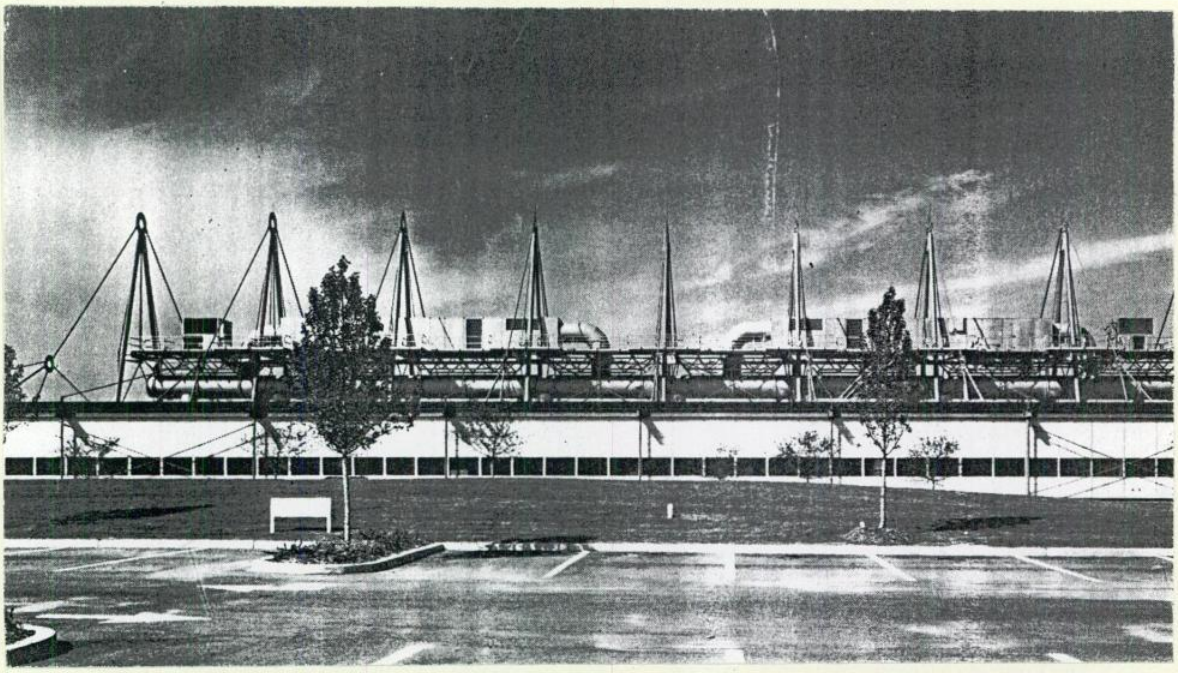
he remarked to Richard Rogers that it seemed that the engineers had got their way again. Indeed so much controversy has built up around colour that the two leading architects of the movement - Norman Foster and Richard Rogers have increasingly moved away from the bright colours towards a palette of greys or a silver aesthetic as they now feel that brightly coloured buildings are not suitable for a sensitive landscape or cityscape. The Hong Kong and Shanghai Bank (Foster Associates, 1986) and Lloyds of London (Richard Rogers and Partners, 1989) (Ill. 31) are the two foremost examples of this silver aesthetic although originally the exposed frame or coathangers of the bank were going to be coloured red considered a symbol of potency by the Chinese.

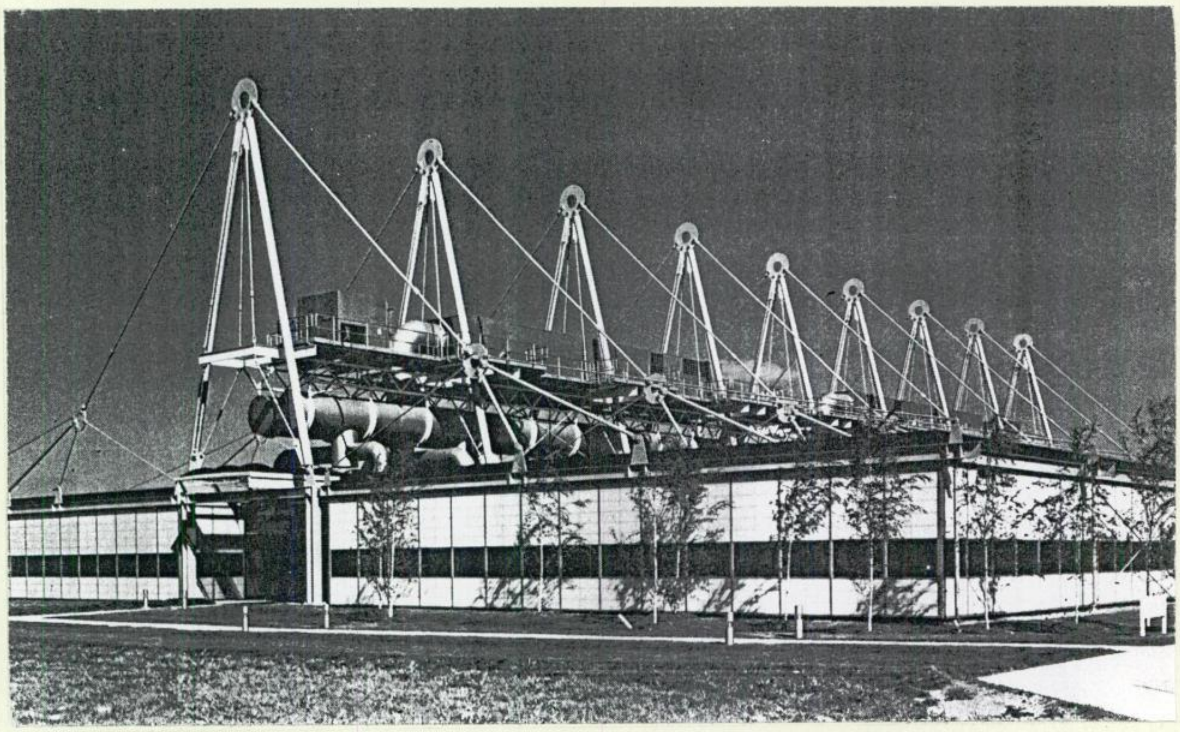
Thirdly, there is extensive use of transparency and movement. Almost without exception there is extensive use of glass. Many buildings feature see through lifts or escalators showing the gears and shafts, giving the impression of being inside a machine. The flow of people through a building can also be made a feature of the building and is sometimes used to provide colour in an otherwise grey building. In the Hong Kong and Shanghai Bank pedestrians in the street can observe the customer service floor above them through a glass floor. Foster in particular has used glass extensively - his Willis, Faber, and Dumas building is a flowing black glass irregular shape.

Fourthly, a common device is to turn the building inside out. Invariably along with the brightly coloured structure the stylistic feature we most associate with 'High tech' is the services exposed on the exterior as a form of sculpture or decoration. The architects maintain that there are several good reasons for placing the services outside. It is reckoned that most service components wear out in ten to fifteen years while a concrete or steel structure can last in theory for up to a hundred years. So



ILL. 31 Lloyds of London.

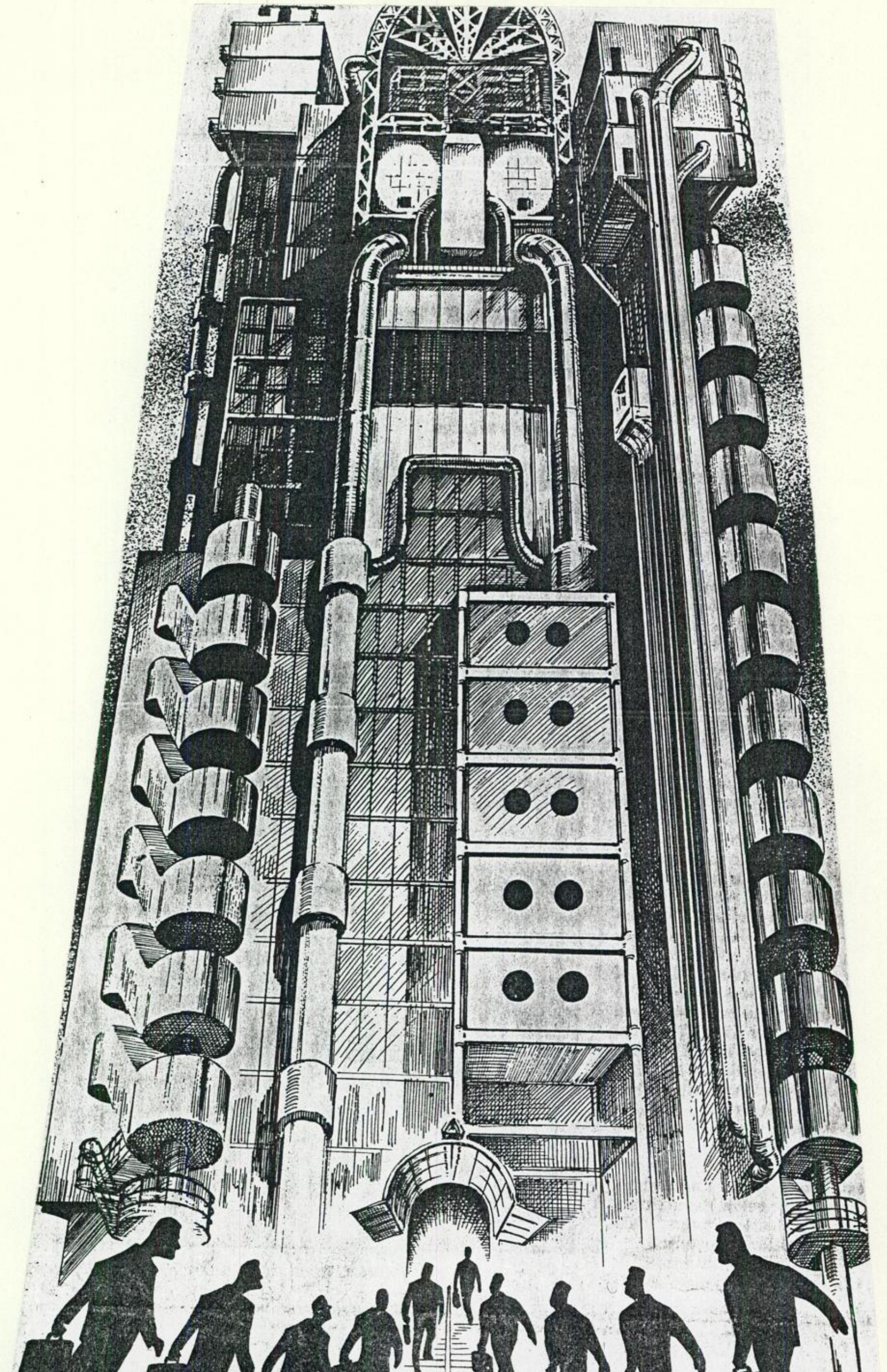




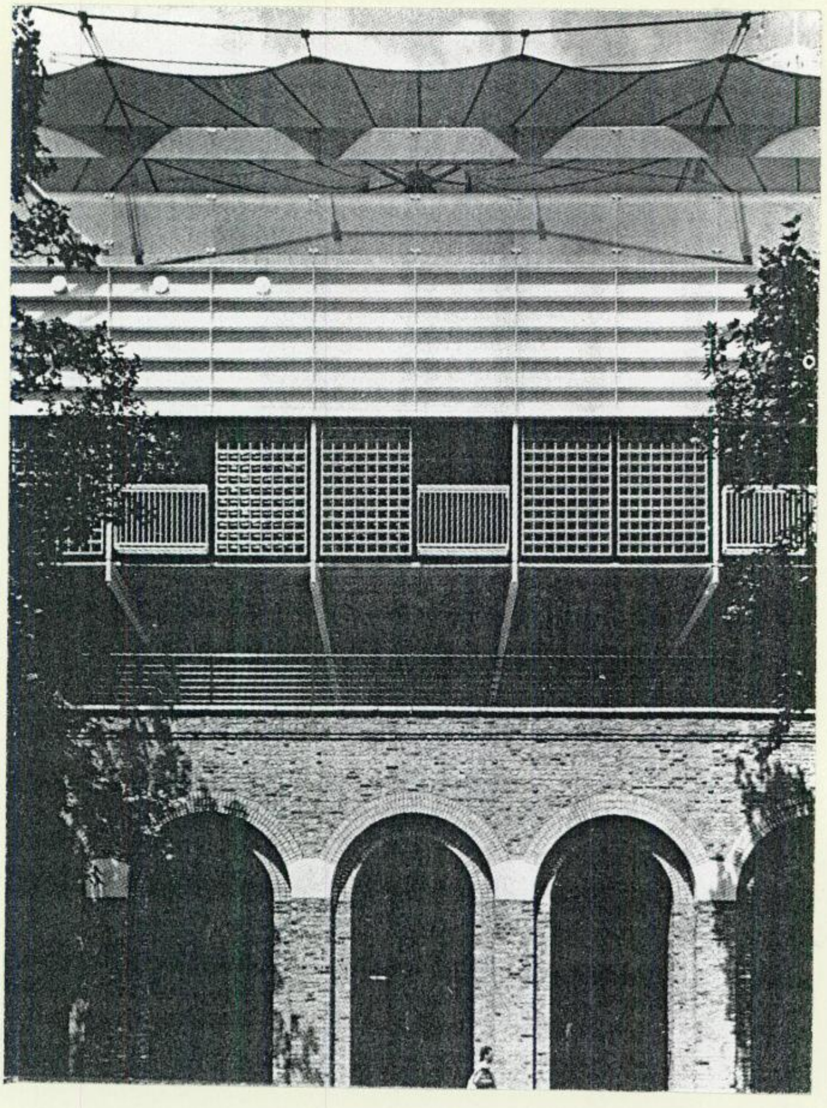
ILL. 32 P.A. Technology.

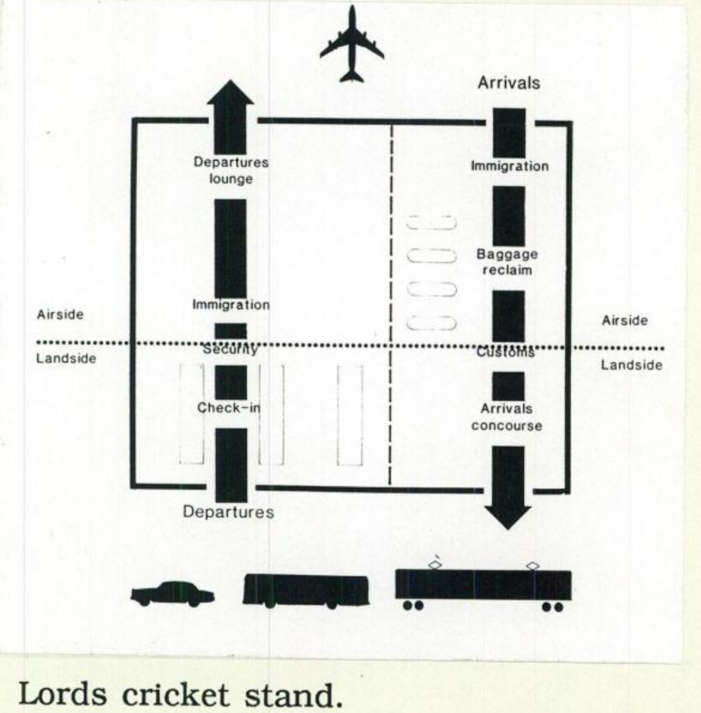
the components are much more easily accessible for maintenance and replacement without disrupting the interior functions. However the components will wear out quicker when they are exposed to the elements thus increasing the need for maintenance and replacement. It also allows for large uninterrupted interior spaces which is especially important in factories. In some industries it is important to have dust free surgery like interiors and having the services on the exterior reduces potential dirt and dust traps. For instance the PA Technology factory (Richard Rogers and Partners, 1984) (Ill. 32) in Princeton, New Jersey needed a clinical, dust free interior for the production of microchips and electronic research. It can also be seen as a demonstration of the domination of technology in our every day lives. (Ill. 33) Often although the services appear to be laid out in an arbitrary manner, a lot of work and design has gone into finding the most interesting silhouette, appearance and colour. Traditionally architecture has been judged on four criteria - shadow, texture, silhouette and light and Richard Rogers has admitted that the picturesque effect and the play of light and shade are as important as differential life-span. Foster however rarely exposes the services as he prefers to tuck them behind screens and ceilings as in the Sainsbury Centre for the Visual Arts. On the exterior he prefers a slick, smooth skin.

Fifthly, there is the use of tensile members and membrane structures. The cross brace is the most common 'High tech' visual feature and is often used in conjunction with membrane structures and tensile cables to express informality and lack of class restrictions. The membrane structure has been used to great effect at Lord's Cricket Ground (Michael Hopkins and Partners, 1987) in the new stand (Ill. 34). It clearly evokes sunny summer days and creates a very relaxed atmosphere. Unusually for a 'High tech' building it has been praised by the



ILL. 33 'High tech' as a machine.





ILL. 34 (top) Lords cricket stand.

ILL. 35 Passenger flow pattern for new terminal.

Prince of Wales. The tensile member officially made its debut with the Reliance Controls Factory by Team 4 but in reality was an element of the Crystal Palace. The architects insist that the masts and cables are for structural reasons where adequate foundations cannot or have not been laid. They also allow for large inner spaces uninterrupted by columns. It is generally accepted that the tensile members and structure of some 'High tech' buildings are more architecture than engineering since most of the tensile members in a lot of 'High tech' buildings are structurally redundant. In the Reliance factory half of the tensile members are structurally redundant. This is what the 'High tech' architects have accused Mies of, structural dishonesty and they are guilty of the same sin. Yet again it is to be seen that visual impact comes before process so claims of functionalism by the movement cannot be entertained.

Finally there is optimism for the future. Many 'High tech' buildings hit the ground cleanly without any plinth or suchlike. This has been slated by the critics who refer to it being like a fridge or freezer unit dropped into place. This is of course intentional - it displays the architect's faith in science and technology. However much the architects claim to want to break from the past it does not seem that they are always successful. Critics, in particular Charles Jencks have pointed out that the Centre Pompidou echoes the tripartide facade of the Louvre and that the massing of the Lloyds building echoes the Strand Law Courts. (21, p. 24) Stansted itself has been compared to past architecture because of it's box shape, its TTS platform and front entrance with their 'trees' and fairing that echo the columns and architrave of a classical temple.

The enthusiasm for 'High tech' in Britain has been described by some as evidence of a nostalgia for Britain's past engineering greatness - the main exponents of the style - Foster, Rogers,

Hopkins and Nicholas Grimshaw are all British. Most of so called 'High tech' architecture is simply the use of exposed space frames and perforated metal mullions but Foster and others have continued to push 'High tech' and materials to their limits extracting more and more performance from them - genuine high technology. Defining 'High tech' according to any set of rules no matter how loose is hard as many of the rules are commonly broken or are not obviously present in a building. One point that stands out however is that appearance counts for more than functionalism and the engineering content of a building is often exaggerated for dramatic impact.

CHAPTER III :

ENGINEERING and PLAN

> An engineer who does not care a damn what his design looks like as long as it works and is cheap, who does not care for elegance, neatness, order and simplicity for its own sake is not a good engineer
>
> Ove Arup (14, p. 232)

This chapter will explore the engineering structure, the plan and the impact they have on one of Foster's main ambitions to increase and simplify the through traffic flow of the building. It will also examine the conflicts if any between the performance of engineering and the aesthetics of Stansted.

At the beginning of the design process several planning principles were decided upon by Foster and the BAA. Firstly that the building was to be arranged for the quick and easy transit of passengers through the terminal. Also that the passenger building was required to have as little walking as possible involved in travelling through it.

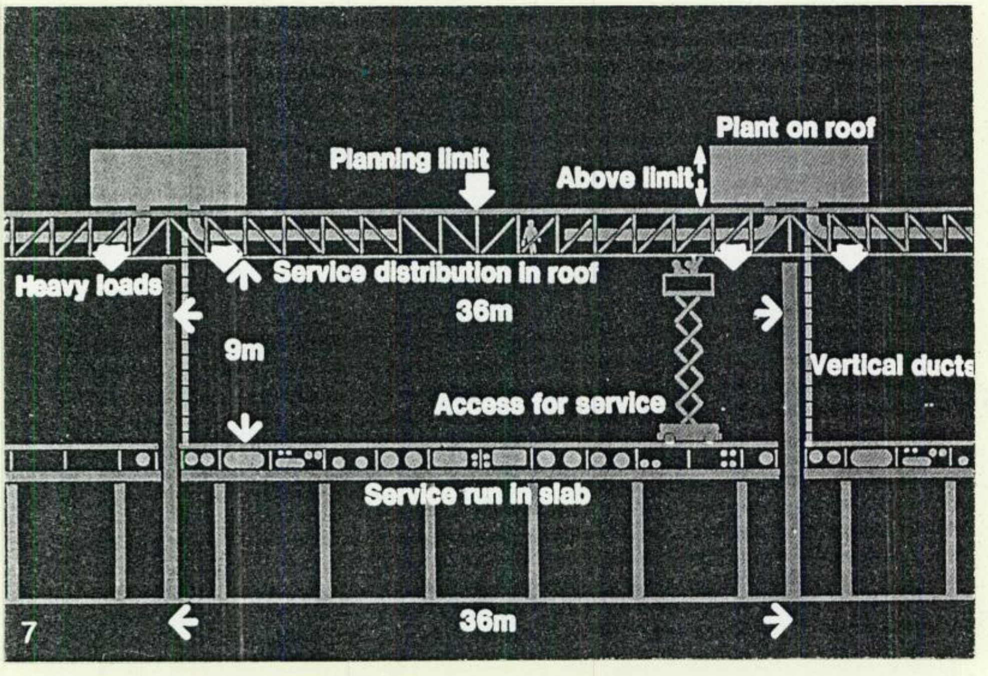
One of the earliest presentations made by Foster had two biplanes outside a hanger as its opening slide. He said 'I want to return to the simplicity of early air travel' (15, p. 51). Foster wanted the passengers to be able to see their aeroplane as they arrived in the terminal building so he based the design on zones parallel to the runway to allow for further expansion without taking away this capability.

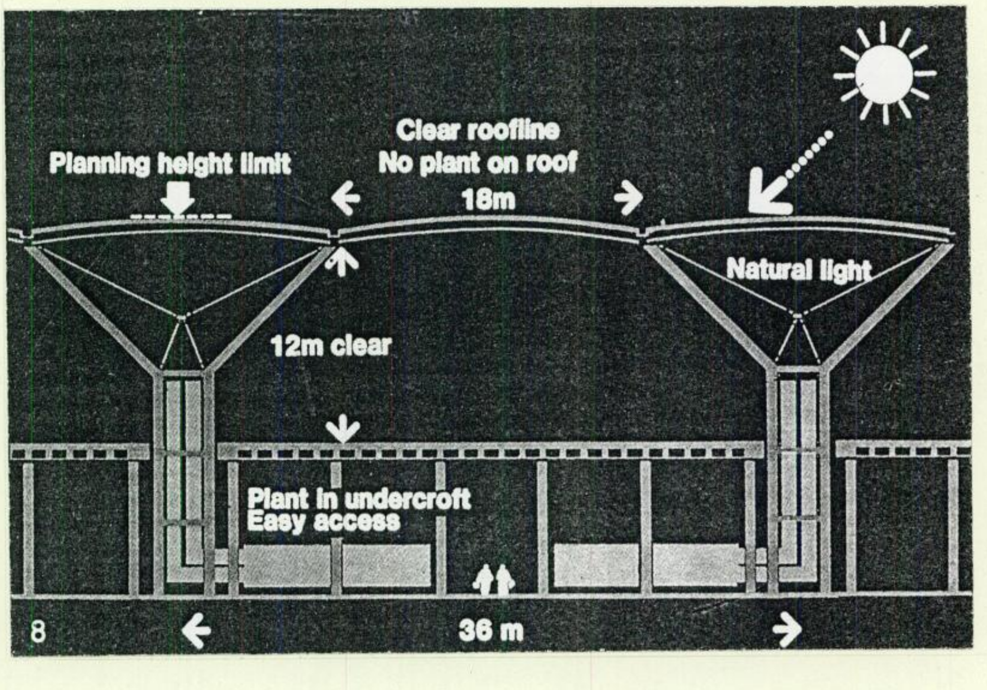
The finished building is 198 metres deep x 162 metres wide. The depth was determined by the maximum desirable walking distance while the width is related to capacity as this can be

extended. The passenger concourse is divided into two main sections - landside and airside which are further subdivided into arrivals and departures. By building the 'trees' on a 36 metre grid there is an allowance for large aisles and large uninterrupted spaces. There is a natural progression from front to the rear of the building in that as you enter the terminal you pass through in a straight line - check-in, passport control and customs on your way to the departures lounge and vice versa on arrival. (Ill. 35)

This was one of Foster's main intentions at the start of the project - to simplify transit through the building. To a certain extent the engineering of the building helps in that, as it has removed the clutter of the building it leaves the airport less visually confusing and produces a less frantic more relaxing peaceful air.

The roof structure was seen by Foster as the main design generator of the building. At an early stage calculations and studies were carried out to compare two methods of roofing the structure. Because of the large single circulation space the roof had to be at least nine metres above concourse level to avoid a feeling of claustrophobia in a low ceiling room and to comply with fire regulations. To allow for this it was impossible with the external planning height restrictions to put the air conditioning and generating plant on the roof in the conventional method. By putting the machinery in an undercroft which was to be built anyway for the baggage halls and could be easily built much larger, they could provide a clear 12 metres from floor to ceiling internally and it would allow maintenance without disrupting the use of the airport terminal. (Ill. 36-37) Above all BAA had demanded that the structure should cost 10% less than the terminal in construction at Gatwick and the roof structure as the main architectural feature of the building should be economic.





ILL. 36 - 37 Alternative schemes for treatment of roof.

The studies were carried out and it was found that Foster's alternative scheme was marginally cheaper and so the plant went underground.

The roof supports or 'trees' as they became called were set at 36 metre centres. The 'trunks' of the 'trees' were to enclose the service risers for the air conditioning and other services for the concourse. Several criterion were set out for the form of the 'trees'. Obviously they had to support the roof but they also had to help define the scale of the public space and as the most visually obvious feature of the building they also had to be easy on the eye. They were to be conceived and detailed to take maximum advantage of off-site prefabrication and on-site preassembly at ground level (prefabrication being the preferred 'High tech' method as opposed to on-site manufacture). The construction of the 'trees' should also be capable of proceeding independently of the weather.

The 'trunks' of the 'trees' rise to around 4 metres from where the 'branches' spring to support the roof. (Ill. 38) The roof is supported at 18 metres spans rather than 36 metres although modern engineering methods are well capable of spanning 36 metres - it would have been more expensive. The 'trunks' of the 'trees' were assembled at a workshop some distance from Stansted and trucked in to the site for erection. The 'branches' were added and stressed on-site. The 18 metre square roof panels were assembled on the ground from pre-manufactured parts and lifted by crane to the top of each tree. It took just under a year to manufacture and construct the structure and roof of the building. After the roof had been constructed the walls and interior could be started. Work was comfortably completed within the allowed 48 months.

ILL. 38 Detail of 'trees' and 'branches'.

As you enter the terminal building the most dominant features are the 'trees' and the ceiling. This is accentuated after dark by Erco uplighters which come on in the 'trees' highlighting the roof both inside and outside the building. (Ill. 39) Because the 'trees' and the ceiling are the main features of the building Foster has kept all the other buildings within the structure as low as possible without impairing their functions (three metres). Inside the terminal wherever you look up, you can see the 'trees' in rows over the cabins and screens. (Ill. 40) Although the 'trees' soar nine metres above the cabins, the cabins still manage to disturb the effect of the repetitions of the 'trees' and the spatial qualities of the building.

Apart from being an aesthetic feature and roof support the 'trees' perform other useful functions. The 'trunks' serve as information points for travellers hosting flight information screens and signage for various parts of the terminal as well as hosting the risers for heating and air-conditioning systems. (Ill. 41) One of the faces also hosts a firehose as well as a clock face. Virtually all the services are compacted into 'pods' that sit between the four steel columns of the 'trunks'. A floor system like this allows for easy maintenance and allows for rapid changes in the configuration of services as required.

The pods and 'trunks' rise to around 4 metres from where heat and light are distributed through the building. No services are visible in the building yet the building is always warm and bright. Air is distributed in the building by large diffusers in the top of each pod. Behind these are the four giant uplighters which radiate artificial light to bounce of the ceiling overhead creating a soft glow at night.

By concentrating the services in these pods Foster has removed most of the traditional clutter that has plagued airport terminal

ILL. 39 (top) Uplit ceiling and 'trees' at night.

ILL. 40 'Trees' visible over retail cabins.

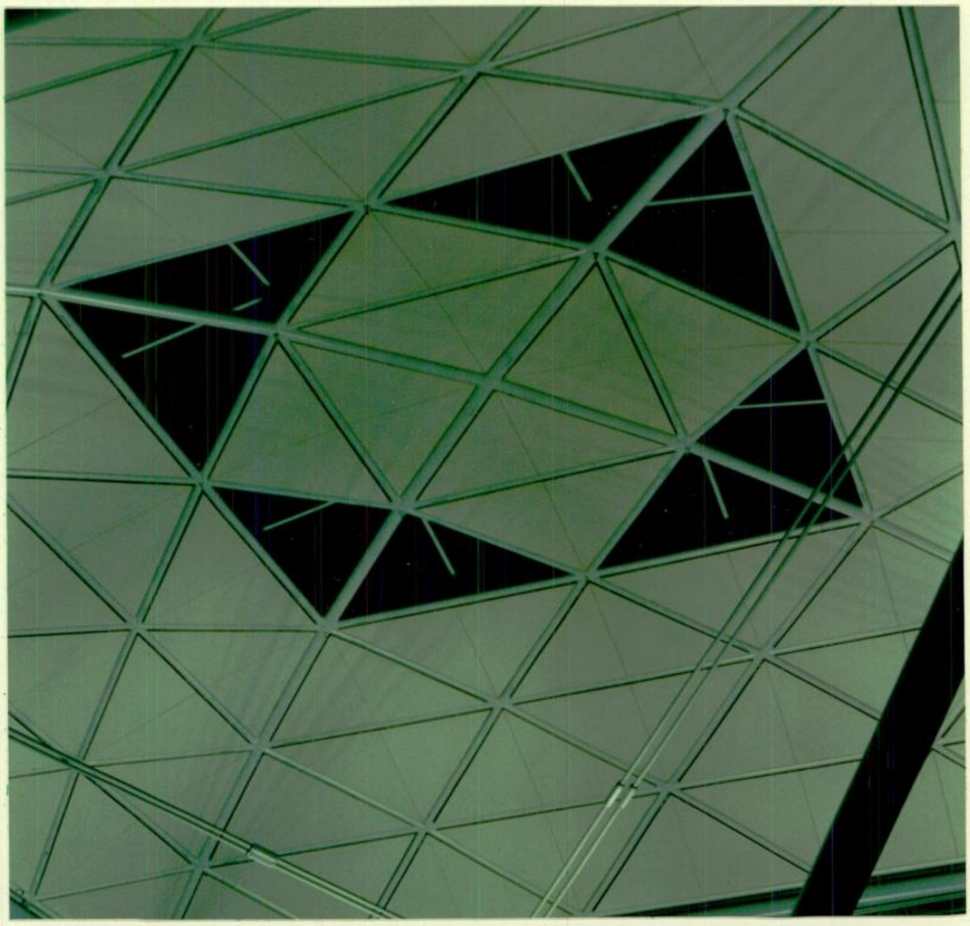
ILL. 41 'Tree' with information screens and signage.

design down through the years and produced an airy spacious concourse by simply assimilating the services and information points into an element which occurs at regular intervals to hold up the roof. Foster is on record as saying that he did not want Stansted to end up looking looking a supermarket or a labyrinth. (15, p. 51) Granted it would work in no other airport but Stansted as from an early stage services were given equal importance with the appearance of the building. Spencer de Grey, the Foster Associates partner in charge of the construction describes it as 'a services success story'. (29, p. 53).

Of the 100 million budget 50% was spent on the services and the undercroft which is the same height as the concourse itself. The services themselves however break no new ground - it is the manner with which they have being integrated into the design. One exception is the rain water collection system. As there are no vertical elements intersecting the concourse roof the rainwater is drained from around the perimeter by 18 downpipes. As water drips down the pipes, it induces suction which then increases the rate of flow down the pipe.

The concourse roof itself is made up of a regular series of curving aluminium panels. (Ill. 42) These panels are made up of individual triangular panels assembled and held together in the manner of geodesic structures - Foster worked with Buckminster Fuller. At the apex of each shell is a rooflight which in conjunction with the glass walls transforms the concourse into a vast airy tent like structure. The 'trees' by their very slimness, elegance and regularity promotes this feeling and give the impression of a large floating canvas tent above your head.

Because the terminal is one large air circulatory area, all cabins or offices have to be fire protected individually for 1 hour. The



ILL. 42 (top) Roof showing geodesic structure.

ILL. 43 Miniature 'trees' in restaurant buildings.

cabins internally are miniature termini. Each is a fully self-contained building and the structural steel columns supporting the cabin roof are made up of four tubular steel legs with the space between them devoted to air supply and other service components just like the "trees". (Ill. 43) There was difficulty in installing these without damaging the intumescent paint coating on the columns which was eventually solved by putting neoprene gaskets on the ducting panels. Again a little thought and innovation solves a problem that could have been avoided by taking the usual conventional path. But still there is nothing particularily high technology about neoprene gaskets - it was a neoprene gasket which caused the space shuttle Challenger to explode shortly after take-off. Bearing in mind that the space program is the most technically advanced project in the world today and that the neoprene gasket was a low-tech component in it shows how backward the building industry really is.
In Stansted Foster has produced a plan which is at once legible to the first time flyer and pleasant to use. The clutter and hassle which for so long has made flying a harrowing even an unpleasant experience is gone producing a soothing environment prior to take off. The engineering is the cause of this by virtue of its simplicity, elegance and lack of clutter.

CHAPTER IV :

THE MACHINE AESTHETIC

> Creative design must of course build on previous experience and contain and employ predesigned parts and it may even consist almost entirely in assembling such parts to create an entity.
>
> Ove Arup (14, p. 232)

This chapter will discuss the machine aesthetic with relation to the silver aesthetic, mass production of buildings and components, and continuation of process.

There are two conflicting camps in the 'High tech' style - one led by Norman Foster and the other led by Richard Rogers. The Foster camp prefers slick cladding in opposition to exposed exterior services while the Rogers led camp prefers the play of light and shadow on exposed services. However they both look upon architecture as machines, utilising the movement of people, services, colour (or lack of), and transparency to create the machine effect.

While Foster has not always rigidly maintained his slick look he has consistently kept his services hidden away and Stansted is no different. As we have seen he has hidden the services into the undercroft and pods to allow a light roof structure and unbroken glass walls.

The exterior cladding at Stansted is made up of aluminium panels at undercroft and railway station level. At concourse level the 'walls' are made up of both clear and opaque glass giving a very bright interior. Outside this presents a slick surface with the exception of the six trees at the front entrance and at the rear TTS platform. (Ill. 44) Around the tops of the 'trees' and

ILL. 44 (top) Slick exterior cladding and glass curtain walling.

ILL. 45 Chimney stack and aerofoil nosing.

building runs a streamlined aluminium fairing designed to deflect the wind up over the roofpanels. Spencer de Grey compares the wind deflecting nosing to an aerofoil section. However he denies any overt air symbolism in the building and has described a representational terminal building as inappropriate. (19, p. 35) Any memories evoked in Foster's work is for strictly technical reasons rather than nostalgia. Here the aerofoil section is the most effective means of pushing the wind over the roof.

The stack containing the boiler flues and kitchen vent stacks rise alongside the terminal in a freestanding tower clad in the aluminium panels and topped on all four sides by large industrial grilles, (Ill. 45).

On the exterior and inside the terminal the overwhelming colour is a grey palette or silver - the silver aesthetic. In Stansted the only colour is provided by people, signage and shops. (Ill. 46) At an early meeting with BAA, when Foster was putting forward his view of the colour being provided by the clothes of the passengers the BAA executives did not pass up the opportunity of reminding him that they were all wearing grey suits. Standing outside the terminal looking in, the most visual feature is the standard BAA signage. There is a slight amount of colour provided by the green tinted glass but this only serves to accentuate the grey and is only visible during the day, (Ill. 47).

The silver aesthetic has proved itself at Stansted to be admirable for a building in the countryside. During the Stansted inquiry, large red weather balloons were moored on the site to mark the roofline to check environmental impact of the building. Over one million cubic metres of soil were removed to set the building into the ground giving it a surprisingly low profile for a building with a large floor area. Although its low proportions

ILL. 46 (top) Signage provides colour in the terminal.

ILL. 47 BAA signage clearly visible from the carpark.

have a lot to do with it, from a distance Stansted just blends into the fabric of the countryside. Britain with its climate undoubtably facilitates this with it's frequent grey skies and overcast weather.

Prefabrication

> It will soon be possible to break altogether with the tradition of putting stone on stone or brick on brick and move in the direction of rational fabrication
>
> J.D Bernal

> The architect must realise that the machines, processes and appropriate materials of industry are the effective means for production of buildings
>
> Herbert Ohl

> I am convinced that the traditional methods of building will disappear
>
> Mies van der Rohe
>
> (7, p. 90)

As partners in Team 4 Foster and Rogers had bad experiences with builders. On one occasion they arrived on-site to find builders not putting on the waterproof bitumen felt that they had specified but black painted newspaper. This experience persuaded both of them to use prefabricated components whenever they could.

Stansted is to all intents and purposes one large prefabricated building. It has one large indoor space punctuated by individual smaller buildings containing restaurants, bars, duty-free and all the paraphernalia of todays airport. Varied though their functions are they all share a modular system - all are the same height, sign fascias are all the same size, all windows and doorways in these buildings are identical. Foster designed a strong unifying architectural fascia strip that runs right around

the retail cabins and the concession holders can do what they like with it within certain control guideline's. (Ill. 48-49) This creates a visual link between each of the shops while giving them a chance at individuality. Each of the buildings are designed to be dismantled and re-erected elsewhere easily and are all fully self contained prefabricated buildings in their own right.

Added to the fact that all the pods, trees and roofpanels were all factory produced is evidence indeed that Stansted is a modular prefabricated building. Most of the building was simply installed on-site although some had to be assembled on-site from a kit of parts. While very few parts of Stansted could be said 'to be off the shelf' most components were manufactured in quantities especially for the building. When components are specially manufactured for this one building it can not really be said to be completely mass-produced but simply a modular structure.

Continuation of process

While Stansted does not have the conspicuous cranes or towers of Lloyds or the Hong Kong and Shanghai Bank it does have the capability to be endlessly extended unlike Lloyds whose capability is largely picturesque and Foster's Hong Kong and Shanghai Bank which has only limited potential for extension.

By simply removing the gable walls of opaque glass new sections can be bolted on. As the departures and arrivals are side by side this extension can be done without disruption of the interior and the airport will not lose its visual identity or its easy to read layout. In this way Foster has simply repackaged his plans for extending the Reliance Controls factory, the Sainsbury centre and other buildings. This capability may never be used as at the

ILL. 48 (top) Public Bar.

ILL. 49 Fast Food Restaurant.

Sainsbury centre where the University decided to let it stand as a monument in its own right and commissioned a new building from Foster as an extension.

Stansted airport comes across as an extremely streamlined modern building. Foster is an unashamed modern modernist. He has often put down post-modernism and on one occasion called it 'a game for consenting adults only'. According to Arthur Drexler, the director of the Museum of Modern Art's architecture department, the sleek skins suppressing details which Foster prefers are the authentic mark of a modernist. (12, p. 46) Richard Rogers once summed up the silver aesthetic with relation to Lloyds as;

> we wanted to find a way of both linking in with the past and at the same time use modern technology, modern economics to help define the form of the building.
> (28, p. 10).

This could also be said of Foster at Stansted. He had a desire to produce a building which blends into the landscape yet relates to aircraft and aircraft technology which has a fascination for him - he flies his own private plane. An obsession with machines is also a feature of modernism - the Italian futurists were obsessed with cars and Le Corbusier talked about a machine for living in. At the moment the aeronautics industry is the most technologically advanced in the world. The use of silvers and greys, streamlining and graceful engineering all help suggest aircraft and speed.

Stansted comes across as a modern machine - a processor of people, streamlined and efficient rather than the Richard Rogers' brand of 'High tech' which resembles a steam engine in its antiquated display of pipes and services. It seems probable that Foster was using this imagery in an attempt to make the

building seem more technically advanced than it is, as unusually for his work it does not contain any major transferral of technology.

CHAPTER V :

LIGHT AND MOVEMENT

> Norman Foster's predilection for modern light, height and transparency is realised in Foster Associates new Riverside Three offices in Battersea
>
> Martin Pawley (25, p. 31)

This chapter will cover the influence that light and transparency have on Foster's work at Stansted. The importance of this quote is not the building it refers to but what it says about Foster's work in general. In all of his major buildings, transparency and vast open spaces are important features. From the Modern Art Glass factory to the Hong Kong and Shanghai Bank all of his designs feature glass curtain walling and natural lighting to some extent or other.

> The most powerful thread running through our buildings is the use of natural light. Stansted is probably the best example. It produces a sense of enjoyment, of elegance and pleasure which is much more difficult to create in a large, internal, artificially lit space. And the ability to see through the building gives a sense of orientation and guidance.
>
> Spencer de Grey (19, p. 35)

> Natural light is something we now treasure highly in terminal building. Even on a dull day the difference it makes is astonishing
>
> Norman Payne (19, p. 35)

This is realised as never before at Stansted. Here is the most open, light and airy, spacious public building in Britain. Although an airport has to be subdivided for various functions, customs, arrivals etc - Stansted does not have the appearance of being so. All partitions are made of special frittered glass and

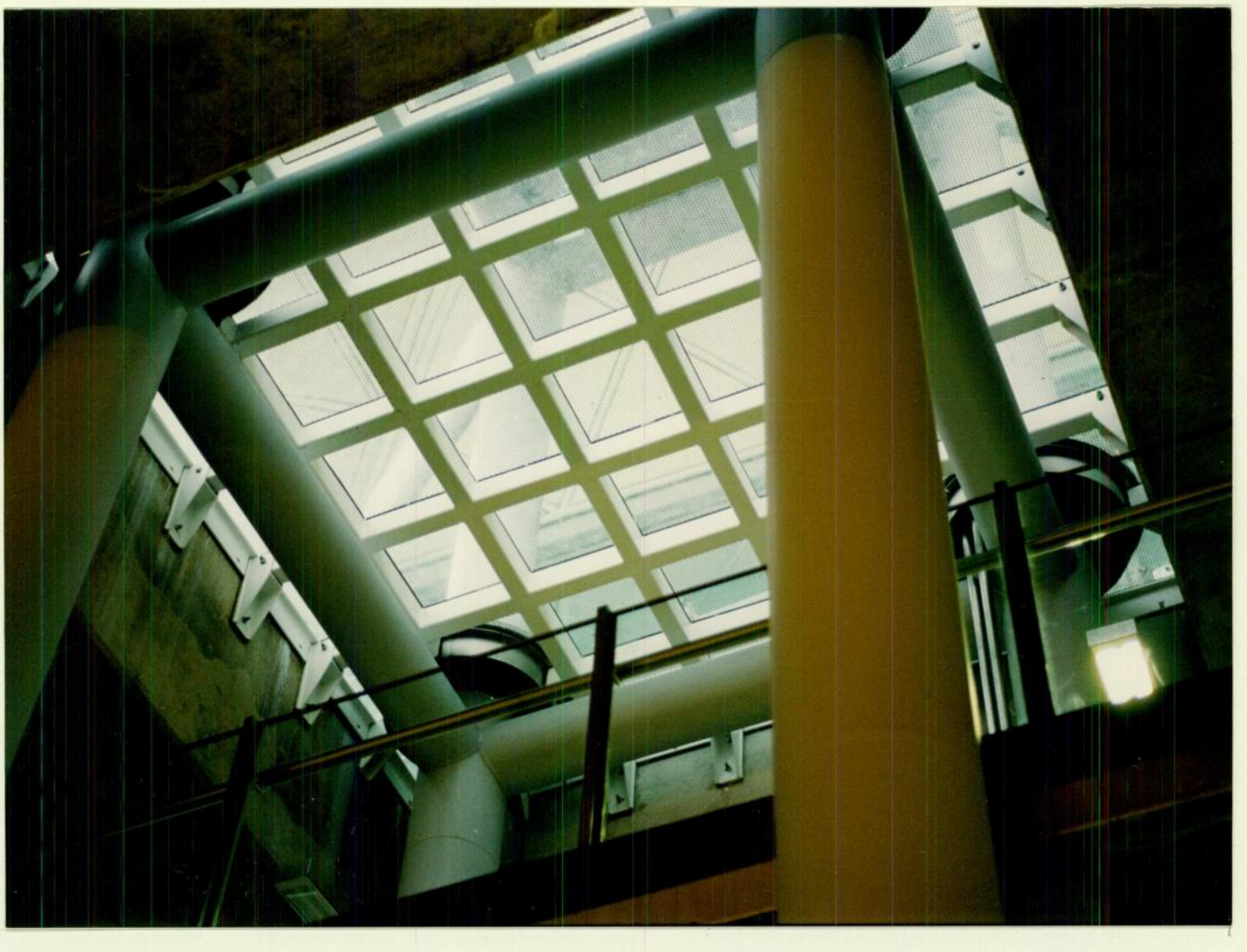
are of an unobtrusive height. This allows the free travel of light through the partitions but provides privacy and screening.
A basic aim has been carried through from the concept stage to finished building - transparency. Natural light pours into the building from the most unexpected places. The concourse is entirely naturally lit during the day both by the glass walling and rooflights. The glass walling is made of opaque glass to cut down glare, providing a soft yet bright ambience. (Ill. 50) The rooflights have diffusers which hang down from the roof have the effect of spreading the light so it seems that the light is coming from the roofpanels creating an effect very like a membrane roof even though the roof is made of solid aluminium panels.

In the railway station underneath however one would expect it to be totally artificially lit but this is not so. Natural light is emitted from glass panels set into the ground between the legs of the 'trunks' of the 'trees' at the front entrance. These are of transparent re-inforced glass and allow you to see into the station from outside the terminal. (Ill. 51-52) This is a totally unexpected feature of the building and one normally omitted by the architectural press and so it comes as a pleasant surprise to passengers walking both above and inside the station.

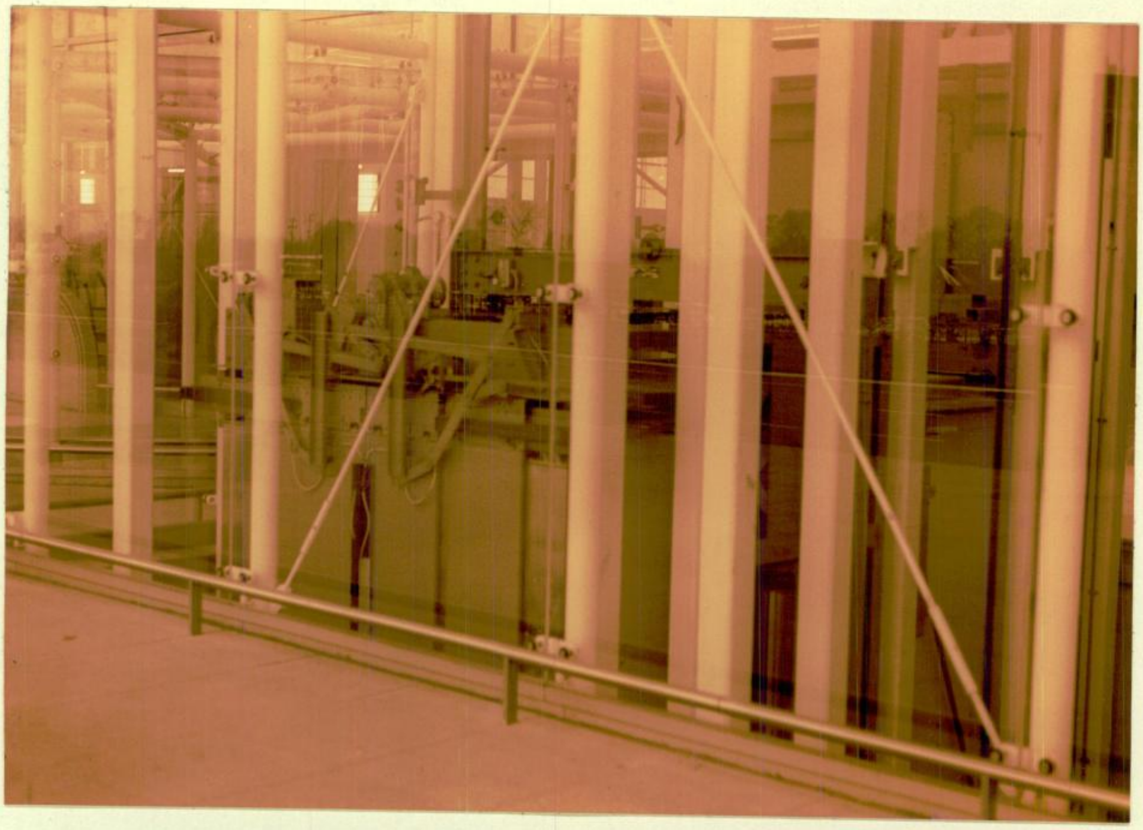
All the ramps and escalators leading down to the station are outside the terminal proper and are fully glazed over following the doctrine of movement and transparency - in this case people or escalators. There are also two lifts rising and falling from the station throughout the day. Foster has placed these lifts in glass shafts but he has not done what others would have - the lifts are not glass fronted. Thus Foster avoids a cliché and produces the spectacle of a large piece of machinery rising and falling with all the mechanicals clearly visible. (Ill. 53)

ILL. 50 (top) Interior view showing opaque glass.

ILL. 51 Looking down into Railway station.



ILL. 52 Looking up out of station.



ILL. 53 (top) Lift descending to station.

ILL. 54 Floodlit ceiling at night.

Throughout the rest of the building movement is provided by the passengers themselves. Unlike the Hong Kong and Shanghai Bank which mechanically moves (sunscoop follows the sun during the day), Stansted is a passive processor of people.

At night the building is floodlit by halogen diffusers and uplighters off the ceiling. (Ill. 54) This gives the building a beautiful glow at night both from inside and from outside and helps create a restful ambience that is radically different from the harshness of the usual airport lounges. Because of its use of subdued restful lighting at night and the use of natural light during the day Stansted has the ambience of a large church leaving it as a very restful place from which to travel from.

CHAPTER VI :

THE INTERNAL STRUGGLE

> Its a very important feature of Stansted. Theres a danger you always run by bringing in a separate interior designer of not achieving that sort of integration
> Spencer de Grey (20, p. 38)

From the beginning Foster intended to produce a totally integrated interior and exterior as opposed to a separate interior design job. For an architect in Britain to be given this responsibility is unusual but is a sign of the faith which BAA held in Foster and it was to be an opportunity that Foster would relish.

Two approaches to the interior were considered - the first was that they could have tried to echo the undulations of the roof structure in other elements of the building which would have visually confusing. The second was to let the roof remain as the main visual identity of the interior and try to make every thing else as anonymous as possible.

Foster also brought in an outside graphic design consultency, Pentagram and they had idea's about very large colourful graphics or 'supergraphics' throughout the airport. These were not to be anonymous but large pictograms to areas or utilities. Some of the earliest sketches show huge three dimensional numerals on the baggage reclaim carousels. Dominating this area they were designed to be seen from the car-parks and to add primary colour to the environment. Similarly there were to be 'supergraphics' for the restaurants (large knife and fork), the toilets. (Ill. 55-56) and the Bureau de Change (a large pound sign). These were to be supplemented by the standard BAA signage - neo standard bold on a yellow background.

ILL. 55 (top) 'Supergraphics' for public toilets.

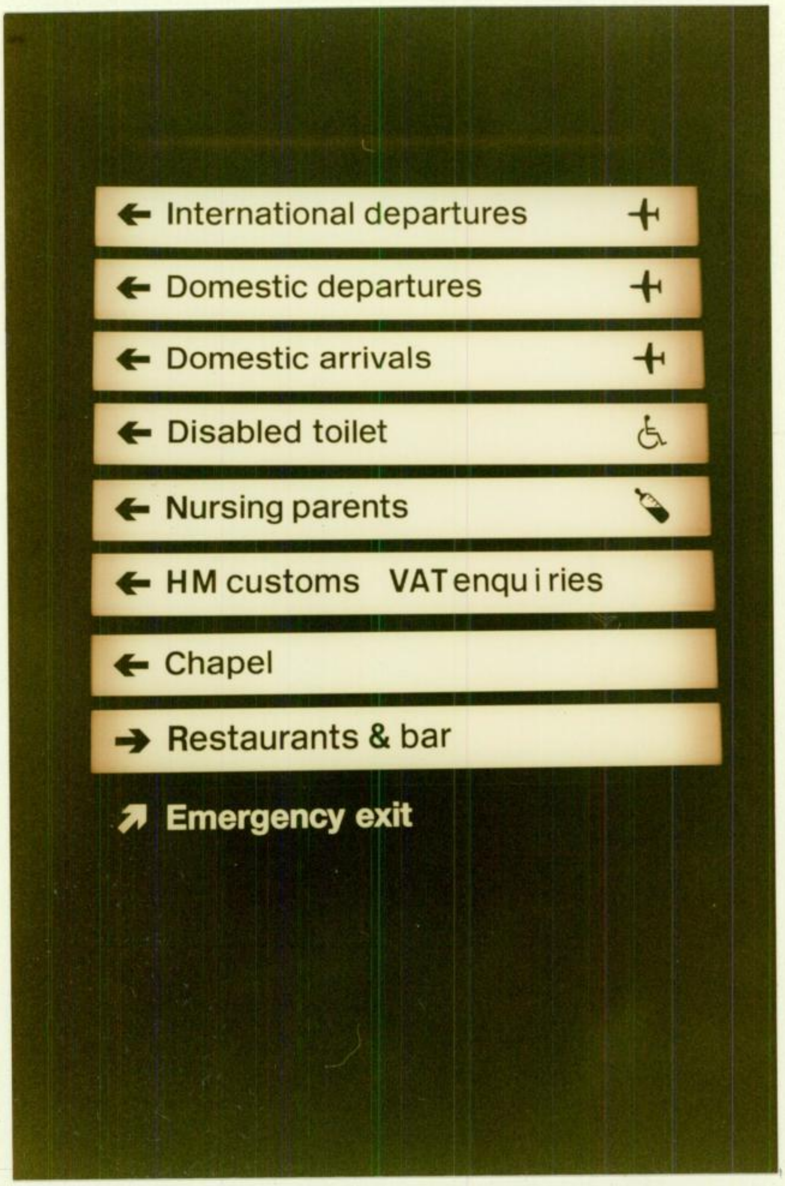
ILL. 56 'Supergraphics' for restaurants.

At the next on-site meeting however BAA was definitely not keen on the 'supergraphics'. As Norman Payne the Chairman said 'all designers when they are appointed are told "this is the signage system, don't tell us we are telling you"' (20, p. 40)

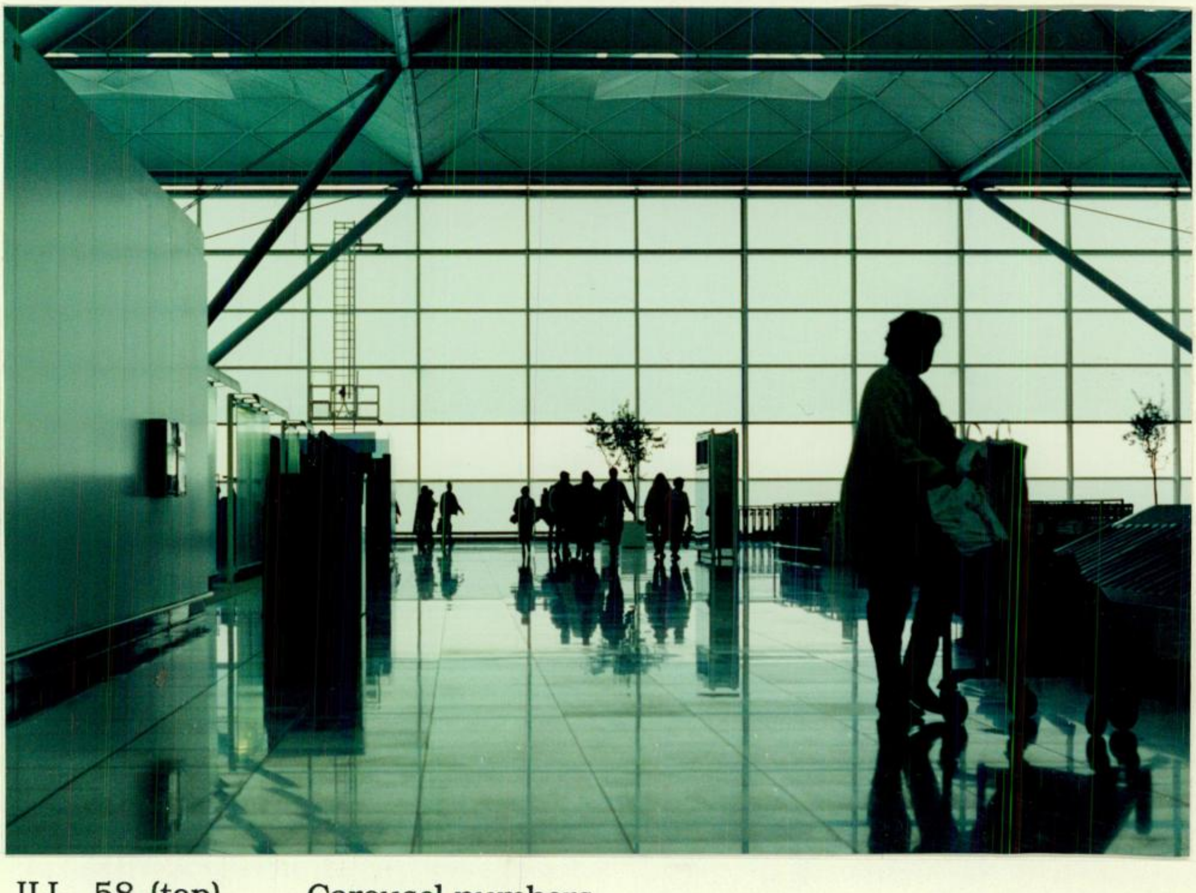
Pentagram went back to the drawing board and came up with a compromise system and produced a design which may be accepted by BAA as a standard for their airports in the future. They kept to the BAA typography but lined up the arrows and pictograms on each side and suggested producing the signage on separate slats for easy realignment and replacement. (Ill. 57) By toning down the yellow slightly and reducing the yellow expanse on each sign they have produced a much more sensitive scheme.

The 'supergraphics' idea however fared less well. It was only used for the toilets and restaurants and was reduced in size by about a third. The large 3-D numbers were scrapped completely and in their place is a board with the number on each side in the BAA script in a blue colour. (Ill. 57) As it now stands the signage in this area lacks impact and focus. Because of the monochromatic colour scheme of the area (greys and blue) the area tends to look cold and lifeless. The baggage reclaim area of an international airport should in no way be lifeless but should be a hive of activity and colour. (Ill. 58-60)

Because of the terminals method of construction it was available at an early stage for the trying out of ideas. A chairmans 'design group' had been formed by BAA which included the chairman, his design director and external advisers from the Royal College of Art (RCA) which met regularly on-site to discuss ideas and individual pieces of furnishings. These meetings were sometimes acrimonious especially over the choice of seating.



ILL. 57 Adapted BAA graphics.

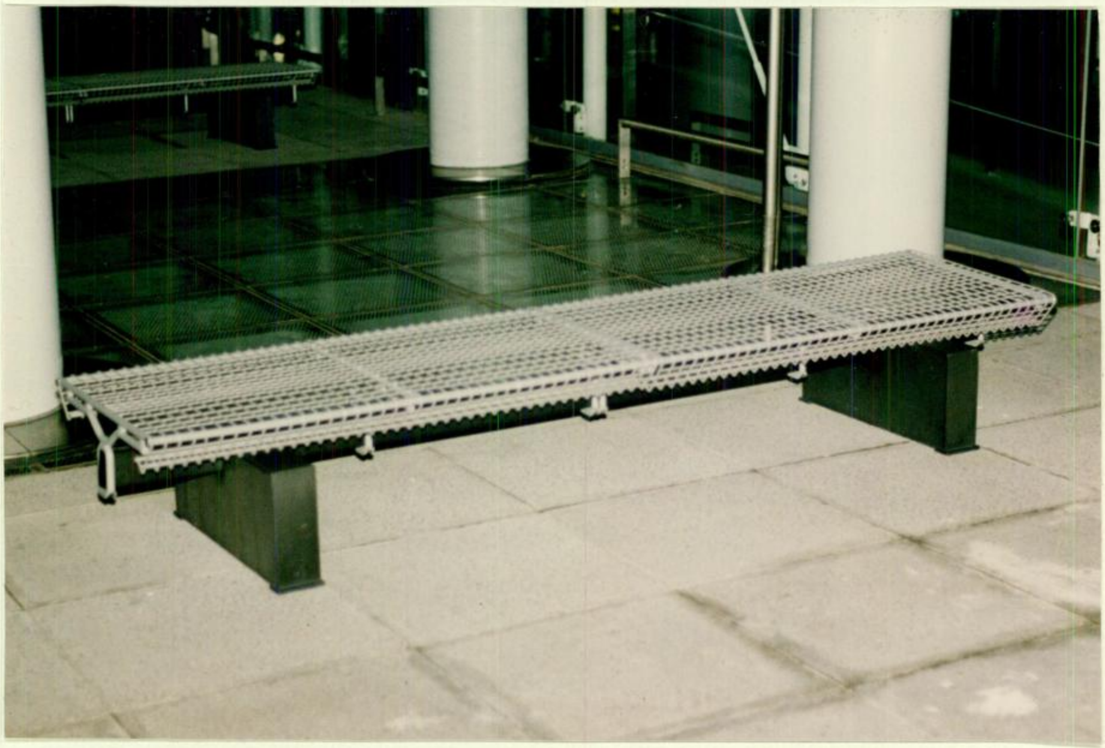


ILL. 58 (top) Carousel numbers.

ILL. 59 Lifeless arrivials area.

ILL. 60 (top) View of carousels.

ILL. 61 Concourse seating.



ILL. 62 (top) Station seating,

ILL. 63 Exterior seating.

After several trips to and from Milan the group decided on the Techno WS1 range of seating. Originally designed for Italian airports in the mid seventies, they passed all the tests of the chairman Norman Payne. The seats had to be comfortable and also suitable for sleeping on because of the ever possible risks of delays especially in the holiday season. According to Payne 'Designers tend to get carried away and forget that the main function of a seat is to sit on.' (20, p. 39) The seats had to be adapted to prevent possible hiding places for bombs. Upholstered in a blue fabric the seats have proved very successful in blending in with the 'Stansted look'. In a move which ties the three separate areas of the airport together - concourse, railway station and the exterior Foster has adapted the seats for different environments. In the railway station the seating has been stripped of its upholstery and the metal mesh sprayed red. Outside only the bases painted silver have been used as seats underneath the structural trees.(Ill. 61-63)

The airport check-in desks were designed especially for Stansted. After checking the desks of several airports around Europe the design team decided it would be quicker and better to design their own. (Ill. 64-65) After experimenting with black ash and light wood veneers they finally decided on a grey laminate finish with an aluminium 'kicking' plate at the base (like that which surrounds the base of the concrete columns of the railway station) and a black marble worktop. It can be totally stripped down in 15 minutes for repair of the electrics.

As mentioned before, the shop or retail block was built on a modular system with individuality limited to signage and interior layout. Even within these restrictions some of the concession holders have come up with some interesting ideas. The central restaurant has produced what is the only large vertical element in the airport - a column of stained glass 15 feet high. (Ill. 66)

ILL. 64 (top) Check-in desks.

ILL. 65 Detail of check-in desks.

ILL. 66 Coloured Glass Tower.

This acts as a 'signpost' for the retail block without destroying the scale of the airport. The public bar has an etched pattern in its windows which upon closer examination is a stylized version of the airport seen from the air - clearly visible are the rooflights and roof panels. (Ill. 67)

British Telecom (BT) and their rival Mercury both were invited to install telephones in the terminal. Appropriately for a modern mould breaking building they are quite radical in appearance. Mercury opted for individual mounting and enclosures (Ill. 68) while BT mounted their telephones in pairs (Ill. 69). In the interests of competition they have been placed side by side in the terminal. A different approach was followed by the Royal Mail however. They have installed traditional wall enclosed red postboxes which look strangely out of place in this environment.

Although Foster was overruled on some features for the interior, he has produced with the help and co-operation of the retailers and other concession holders a remarkably coherent design. The interior architecture and engineering acts as a flamboyant backdrop for the subdued muted hues of the retail blocks and furnishings.

ILL. 67 (top) Detail of etched window decoration of the Bar.

ILL. 68 Mercury Telephones.

ILL. 69 British Telecom Telephones.

CONCLUSION

> High tech architects think that the discipline provided by the engineer is the best framework in which to conduct architecture. Pawley (7, p. 152)

The work of Norman Foster has matured and developed from such earlier work as the Sainsbury Centre (1978) and the Renault Parts Centre (1983) to Stansted Airport(1991).

Norman Foster is not a mainstream 'High tech' architect in that he does not use primary colours on the exterior of his buildings. Although his work does comply with most of the conventions, it is becoming more and more streamlined and modernistic in its smooth lines and slick surfaces. Recent work like Stansted, the extensions to the Sainsbury Centre and the Royal Academy demonstrate this sleekness and are cool modernistic buildings. Where most 'High tech' buildings are highly visible in their use of colour and superstructure, Foster's are subdued and blend into the environment. This does not of course apply to the Renault Parts Centre which is a very flamboyant visible building but it certainly applies to Stansted. Foster has always been content to pursue his own path in much the same way that his major influences over the years have usually been on the edges of modernism. Fuller, Eames, Paxton - none of these could be said to have been part of mainstream architecture and it is from them that Foster gets his passion for lightweight buildings, flexibility and transparency.

For Foster, architecture is a branch of engineering rather than art and he is perhaps the closest any architect has been to realising the modern movement's dream of treating architecture as an industrial process. He has always been interested in new developments in materials and processes, as new materials allow

him to achieve greater technical feats - one of his interests in the late 1970s and early 1980s was the human powered Gossamer Albatross.

Foster always works on a component or a design until it works perfectly and has been designed down to the minimum. His work is continually becoming more refined and streamlined. 'He aspires to smoothness, perfection, minimal thickness and elegant slim jointing ' (7, p. 54).

Foster is following Mies van der Rohe's 'almost nothing' and this minimalism is demonstrated at Stansted. Stansted is not a 'High tech' building but a streamlined modernist building. Unlike the Sainsbury Centre it does not use any new technology and it does not have the exposed servicing or bright colours that most associate with 'High tech'. Stansted is the result of engineering process applied to an ideal that of rapid transit producing a disciplined and orderly design as was shown in Chapter Three.

Foster has produced in Stansted a modern machine, a streamlined sleek processor of people which can be extended without disruption - a feature of most of Foster's mature work. Foster has always tried to treat architecture as an industrial process and since his early days as an architect has always tried to use prefabricated components and buildings wherever possible. At Stansted the terminal building with the exception of the railway station has been entirely produced in factories and either assembled or installed on-site. A lightweight structure the heaviest part of it is like at the Sainsbury Centre, the basement and foundations.

One of his aims at the beginning of the project was to assimilate the building into the environment by using the silver aesthetic and carefully worked-out proportions. This he has succeeded in

doing. From a distance Stansted just blends in to the countryside, even from the access road Stansted is hard to pick out against a grey sky.

Foster also set out to bring his doctrine of natural lighting to Terminal building and at Stansted he has produced an airy building with a church-like feel to it because of it's vast ceiling, light and the tranquillity brought about by the design. This is enforced by the lack of people and silence because they are processed so rapidly. Indeed so quiet is the airport that you can hear people walking at the other end.

Above all Foster succeeded in his aim to integrate the exterior and the interior of the building. This was accomplished by the careful use of furniture adapted for different areas of the airport and by knowing where to stop with the roof structure. It would have been quite easy to imitate the undulations of the roof structure in the furnishings like check-in desks but this would have resulted in a busy agitated unrestful interior.

Foster set out at the very beginning of his involvement with Stansted to design an airport which worked efficiently, had a calming influence on passengers, and blended into the landscape. To do this he had to balance many different problems and potential answers, and to proceed with his vision of the terminal in the face of opposition from within BAA and from the general public. In doing so he has produced a wonderful travelling experience in a bright, atmospheric and aesthetically pleasing building.

APPENDIX A

BUILDINGS AND UNCOMPLETED PROJECTS

TEAM 4

1966	Creek Vean House.
1967	Murray Mews, London
	Reliance Controls Factory.

FOSTER ASSOCIATES

1968	Temporary air supported structure for Computer Technology, Hemel Hempstead.
1969	Amenity Centre for Fred Olsen Ltd. London
Docks.	
1971	Climatroffice (in assoc. with B. Fuller).
	Passenger Terminal For Fred Olsen Ltd.
	Advance Head Office IBM Hampshire.
	Offices for Computer Technology, Hemel Hempstead.
1972	Headquarters for Volkswagen Audi, Milton Keynes (not executed).
1973	Modern Art Glass Ltd. Thamesmead.
	Interiors of boyswear shops for Burtons.
1974	Travel Agency for Fred Olsen Ltd. London.
1975	Head office for Willis, Faber and Dumas, Ipswich
	Public housing Milton Keynes.
	Palmerston Special School, Liverpool.
1977	Hammersmith Centre (not executed).
	Technical Park for IBM, Middlesex.

1978	Sainsbury Centre for the Visual Arts
1979	Hong Kong and Shanghai Bank (finished 1986).
1980	Stansted Airport (finished 1991). Technical Park for IBM, Middlesex.
1981	National German indoor Athletics Stadium, Frankfurt.
1982	Autonomous House (in assoc. with B. Fuller).
1983	Renault Distribution centre Swindon. Proposed new BBC Centre Langham Place, London.
1984	New Masterplan for IBM Technical Park, Middlesex. Major refit for IBM headquarters,Hampshire.
1985	Mediatheque Arts Centre, Nimes.
1986	ITN building. Furniture for Techno, Italy.
1989	Extension to Sainsbury Centre. Stockley Park Building B.
1990	Sackler Galleries Royal Academy. Foster Associates Headquarters Riverside 3, Battersea.

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