NATIONAL COLLEGE OF ART & DESIGN
FACULTY OF CRAFT DESIGN - METAL

# THE PSYCHOLOGICAL EFFECTS OF TWO SELECTED WORKS OF TRANSPORTATIONAL ARCHITECTURE

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"Ever since [the Industrial Revolution started in Britain in 1750] a large section of the male population has been obsessed with machines and their performance [in particular cars trains and aeroplanes]"(Buchanan, Peter., 1983 p.15).

The constant contemporary preoccupation with developing technology and its appropriate application to architectural work, which drives the architects like Norman Foster and Nicholas Grimshaw, stems from the time of the Industrial Revolution.

Two of the greatest examples of the British "tradition of introducing rationalised industrial technology into building construction" (ib, id.) are Joseph Paxton's Crystal Palace of 1851 and Decimus Burton's Palm House (1844-1866) at Kew Gardens in London.

One of the most striking elements about these buildings was their expansive use of glass. The use of this transparent material enabled them to make maximum use of available daylight which, during a time before electric lighting was widely available, was of the utmost importance.

Despite the convenience of the many electric lighting systems of today's world, many architects still give a considerable amount of thought to making maximum use of natural light in their designs. This concern with replacing artificial light with natural light is related both to reasons of health (a deficiency of exposure to natural light can lead to a condition known as 'S.A.D.' - seasonally affected disorder) and a growing awareness in areas of energy conservation.

The positive aspects of daylight have been captured in different manners by contemporary architects Norman Foster and Nicholas Grimshaw, in their respective buildings, Stansted Airport, Essex (1991) and Waterloo Terminal, London (1993), which will be subsequently discussed at length.

An acute awareness of the benefits of modern technology from the construction industries, sometimes not directly related to architecture (e.g. in aeronautical, automobile and nautical design and engineering), is another aspect of Foster's and Grimhaw's work which gives it the edge over some of their contemporaries. By refusing to settle for 'off the shelf' components and instead designing their own fixtures, they have reached new and innovative solutions. This has provided them with the freedom to create the buildings exactly as they were designed, thus achieving a high level of success in both functional and aesthetic areas.

A number of their buildings, Foster's Renault Centre at Swindon (1983) and Grimshaw's Exhibition Pavilion in Seville (1992) will be studied in order to illustrate this point.

Other transportational architectural works which involve the application of similar design criteria, construction methods and similar concerns with aesthetic quality, such as Richard Brosi and Robert Obrist's bus and train station at Chur, Switzerland (1993) and Grimshaw's Pier 4/4A at Heathrow (1993), are of relevant interest.

Like Foster and Grimshaw, Eero Saarinen, architect of one of the most famous terminal buildings, the Trans-World Airlines building at the John F.Kennedy Airport in New York (1961), was deeply committed to the use of innovative methods of construction and a high level of original and aesthetic expression. It was, however, Saarinen's commitment to achieving such a high aesthetic level that in later years led to the deterioration of this building.

Two buildings renowned for their aesthetic qualities are Foster's Stansted airport and Grimshaw's Waterloo station. The functional effectiveness of these two works of transportational architecture will be considered with regard to both their functional and aesthetic qualities and the positive or negative psychological effects of these on the users of the buildings.

Foster worked from the principle that airports should be tranquil places that are simple to understand thus easy to use, this concept can also be applied to the design of railway stations. A remark by an unrecorded German in reference to stations (1973) "Die beste Bahnhoefe sind solche die man vergisst" (The best stations are those which one forgets) (Schneider, 1995, p.21), indicates a similar wish for easy to use, stress-free railway stations.

There are many aspects of Stansted and Waterloo which seek to fulfil this aim (a calm, stress-free terminal). I will analyse these aspects under the headings of structure (space allocation), light (natural and artificial), materials (colour and texture) and communications systems.

Initially, some buildings designed by both Foster and Grimshaw, prior to the above mentioned two, will be studied to illustrate how both architects have always had user satisfaction as one of their top priorities.

# INTRODUCTION

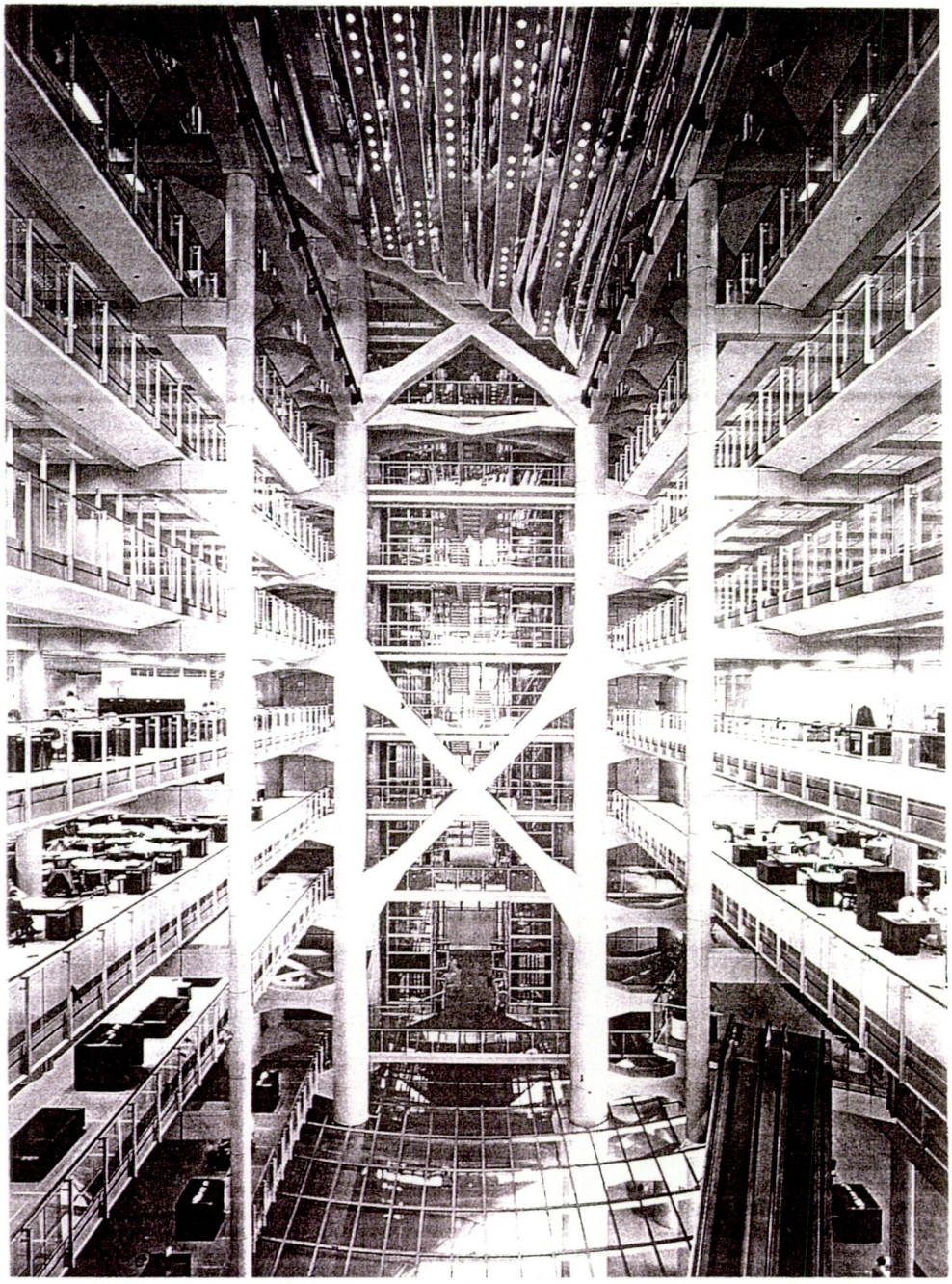


Fig. 1.0 The central atrium of N.Foster's Hong Kong - Shanghai Bank.

Although natural light plays a major role in the design of two buildings of transportational architecture, Stansted Airport and Waterloo Station (the two buildings which I will consider in detail at a later stage), as far as serving the inhabitants is concerned, the work of Foster and Grimshaw goes a lot further. This will be indicated in a study of some of their work prior to these two terminals. Both architects have always striven to create environments that serve their inhabitants completely, both in areas of function and aesthetic. "Foster's concern to create structurally logical buildings is matched by his concern to create buildings with a clear purpose" (Glancey, 1989, p.40).

Although their projects are mainly financed by private corporations, many of the resulting buildings are inherently 'public' (used by large numbers of people as opposed to smaller units like the family unit). Foster has acquired semi-celebrity status by being the designer of one of the most expensive buildings of modern times, the Hong Kong and Shanghai Bank, Hong Kong (1986) at a completion cost of $1,700,000 ( approx. £900 million), considered by some well-spent: "a magnificent and perfectly detailed advanced technology architecture that can be compared in precision and sophistication to the finest examples of automobile and aerospace design" (Pawley, 1990, p.46).

The experience of being inside the building has been compared by some critics to that of being inside a conservatory. The Hong Kong Bank incorporates an atrium in the centre of the building which contributes to the distribution of natural light and creates an airy feel to the interior spaces (see fig. 1.0). Another "office block" built by Foster also incorporating a central atrium, is the Tokyo office for the Obunscha Publishing Group - Century Tower (1991). This full height atrium is fully open to both towers of the offices on either side of it, thus providing them with daylight from both within the building as well as from the conventional window areas on the outside.

Grimshaw's concern for the working inhabitants of his office buildings is also strikingly obvious. In two of his works he transformed the lives of print workers. In the Financial Times Building in London (1988) he incorporated large areas of glazing, a luxury the print workers would not have experienced in the previous building. Some years later, in 1992, Grimshaw designed an office for another newspaper, the Western Morning News in Plymouth. This building houses all departments of the newspaper, from the graphic artists to printers, and avoids discrimination between levels of stature by creating a common entrance for all employees.

Grimshaw's Expo Pavilion in Seville (1992) is a perfect example of the innovative use of technological know-how and materials from areas outside the realm of architecture. He has employed the use of PVC-coated polyester fabric (similar to that used for the sails on yachts) - for use as a shading material on both the north and south ends of the building, Seville being one of the hottest cities in Europe.

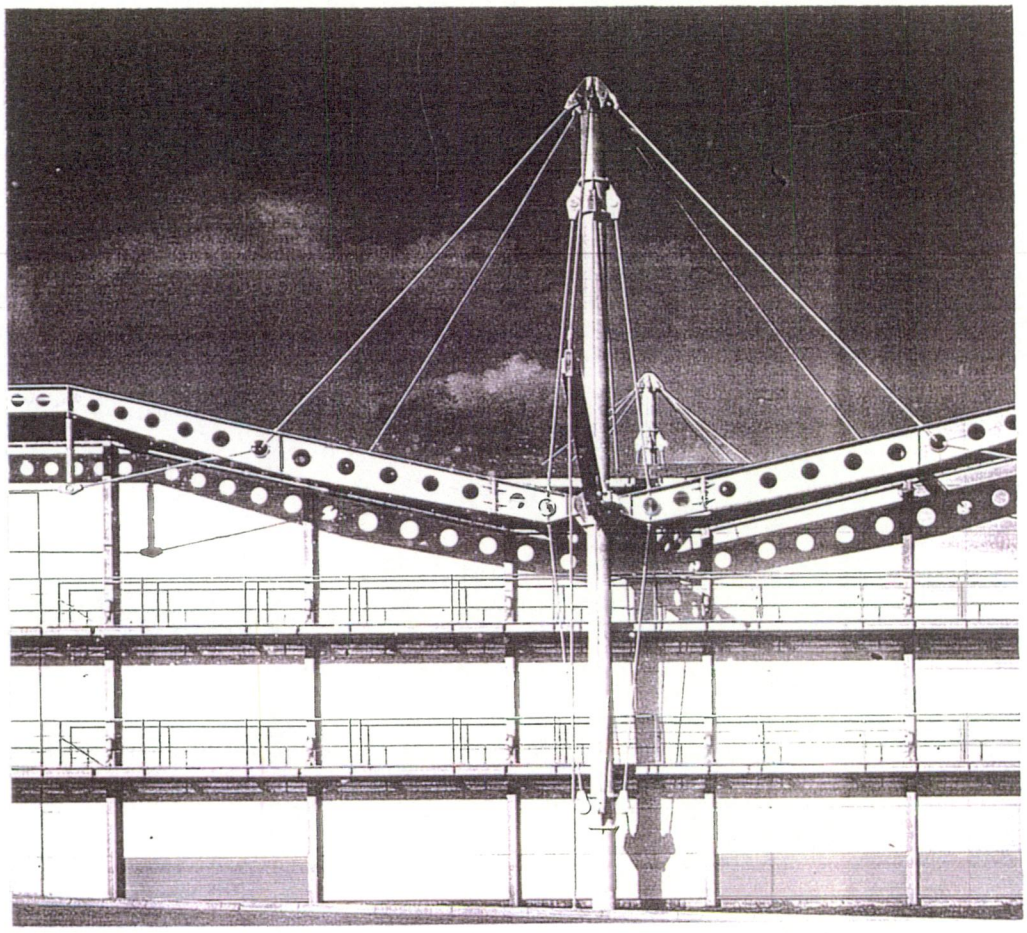


Fig. 1.1 Renault Centre - Swindon (1983) by N. Foster.

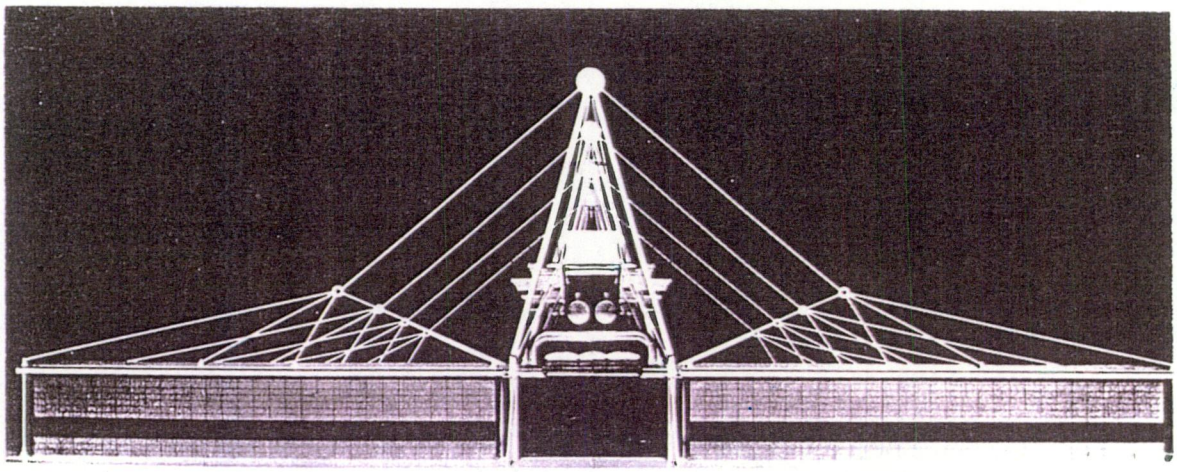


Fig. 1.2 Patscentre - Princeton (1982) by R. Rogers.

The remaining east and west sides of the building are kept cool through the use of water. The west side 'wall' consists of shipping containers filled with water which act as insulators, keeping the inside of the building cool. The east wall is glazed with a curtain of water flowing down it. The pump which ensures that this is a continuous flow is ingeniously powered by solar panels mounted on the roof, (whose form pays tribute to the Menil Collection Museum, Houston of 1986, by Renzo Piano).

As this building was for use as an exhibition space, the specific use of the spaces to be decided on by the exhibition director, Grimshaw was only required to provide open spaces which could be manipulated at will. The building has since been dismantled and shipped back to Britain where it's proposed use is to form part of the Asian Centre a development by Asiansky Television (Partington, 7/2/97).

Foster has also been called on to design large flexible spaces which can be filled or altered by the client, according to his or her personal needs. At the Renault Centre in Swindon (1983), Foster created a roof support system which left a maximum of floor space available for storage. The building is divided into forty-two $25m^2$ bays, the corners of which are defined by 16m high tubular steel poles; these poles extend outside, up through the roof, and provide a support for tension rods from which the undulating uPvc roof sections are suspended (see fig. 1.1). Similar suspension techniques have been used by other architects where open plan spaces were a priority. e.g. Grimshaw's Ice Rink at Oxford 1984, and Richard Rogers Patscenter Princeton, New Jersey 1982. (see fig. 1.2)

In order to achieve an uncluttered area, Foster appears to have reversed the system of suspension, but adapted similar lay-out systems for his terminal at Stansted Airport.

Another well-known airport architect, Helmut Jahn has also used a similar roof support system for the small terminal of Alliance Airport at North Fort Worth, Texas (1989). This has provided not only an extremely successful space functionally, but has also resulted in an aesthetically pleasing structure.

Although, like most practically minded people, I believe that function must take precedence over form (especially relevant with buildings for public use), I believe that a great deal more could be done regarding the forms of many of today's buildings. One public building famous for its aesthetic qualities due to its free organic form (despite the use of concrete, a material that often has connotations of immobility) is the Trans-World Airlines (TWA) Terminal at John F. Kennedy (JFK) Airport in New York designed by Eero Saarinen (1961) (see fig.1.3). Like Foster, Saarinen was motivated by the advancement of architecture through the use of ever-developing technology in the industrial world. This interest is reflected in his use of thin shell constructions, which he had worked on for a time prior to this with the American architect/designer Charles Eames. It is also evident in his innovative use of glass in the terminals radial glazing system, referred to by critic Peter Papdementnou as "one of

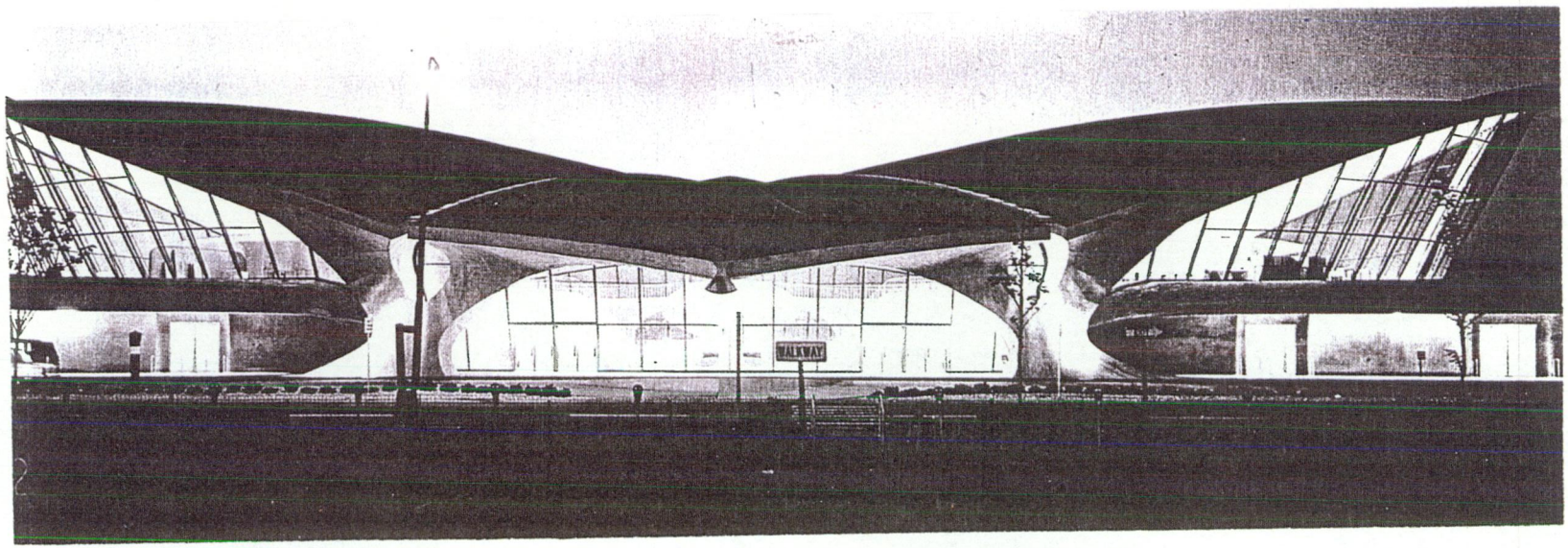



Fig. 1.3 Trans-World Airlines Terminal - New York (1961) by Eero Saarinen.

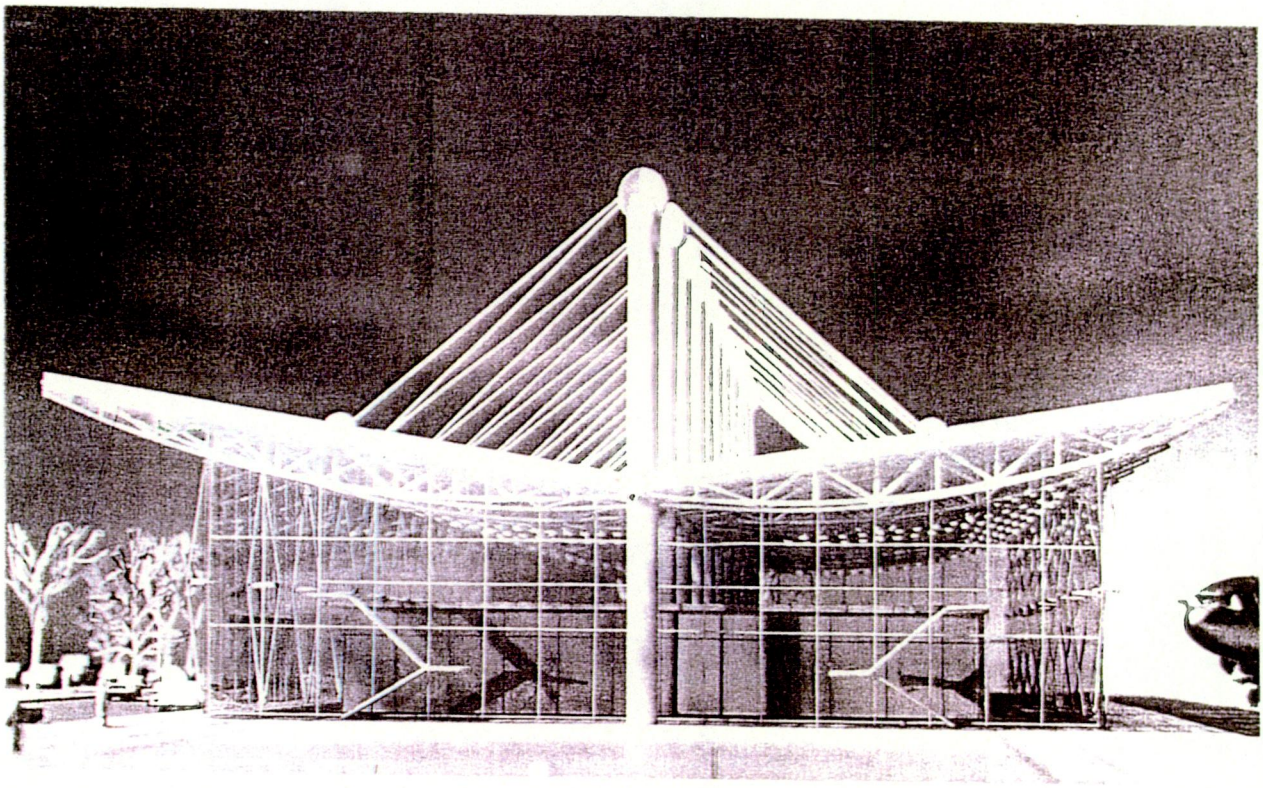


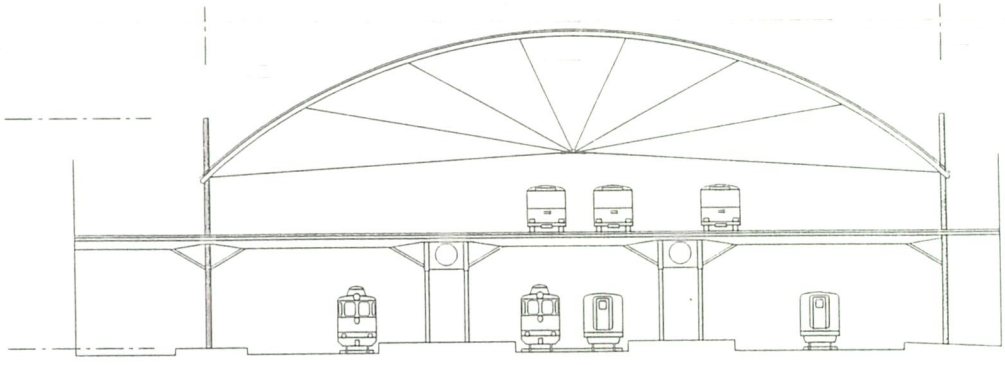
Fig. 1.4 Alliance Airport - North Fort Worth (1989) by Helmut Jahn.

the most successful attempts at neutralising the impact of glazing in terms of reflections and transparency" (Papementnou in interview with Fisher, 1992, p.102). The TWA terminal was one of the earliest airports to provide a solution to the problem of providing adequate accommodation for arriving and departing passengers. Saarinen tackled the concept completely, no detail was overlooked in either interior or exterior spaces (another trait often seen in the work of Foster and Grimshaw). Elements such as Check-in desks and Flight Information stands were treated with the same importance as the rest of the building, resulting in a complete and coherent building. "Its sculptural forms have an integrity and a completeness that almost preempt any attempt at altering or adding to the building" ( Fisher, 1992, p.96).

Saarinen in a sense disregarded the possibility of future expansion. The demands of growing passenger numbers must however be met and it is with the measures taken to do this, by present authorities, that Saarinen's aesthetics are beginning to jar. A recessed waiting lounge which had a view out over the tarmac has been filled in and replaced with new ticketing areas which block this view. Even the the simple addition of pay-phones "created problems of fit" (Fisher, op.cit. p.98). The original flight information desk is now used as a place for advertising. Externally, the addition of a glazed canopy to shelter passengers arriving through the main entrance obscures the front of the building and detracts from the building's bird-like shape. An intended temporary walkway (left in position for a lot longer than originally intended), connecting the TWA building with its neighbouring terminal, by architect I.M. Pei, is also at fault for interfering with the view of the building. Although Saarinen is not directly accountable for these changes he cannot completely escape the blame for having designed such an unadaptable building. It is possible that at the time when he designed the building such a huge growth in the industry was not foreseen. Architects of such public buildings must not merely design for the present but also for the future. Foster's Terminal building at Stansted is a perfect example of design for the future, incorporating separate satellites plus a service system in the main terminal building which is segmented, thus enabling expansion without disturbance of existing facilities.

Having referred to the aesthetic qualities of Eero Saarinen's powerful soaring eagle at JFK, it is interesting to look at some other transport buildings the whose shapes make close reference to the type of transport they serve.

Helmut Jahn's Alliance Airport at North Fort Worth Texas (1989) makes reference to flight in a manner completely contrasting with the approach of Saarinen. Jahn's building, built some twenty-eight years after that of Saarinen, is heavily influenced by the machine aesthetic. The two sides of the suspended roof look very much like aeroplane wings and the angle at which they are suspended gives the impression that they are soaring or gliding through the air (see fig. 1.4). These suspended 'wings'



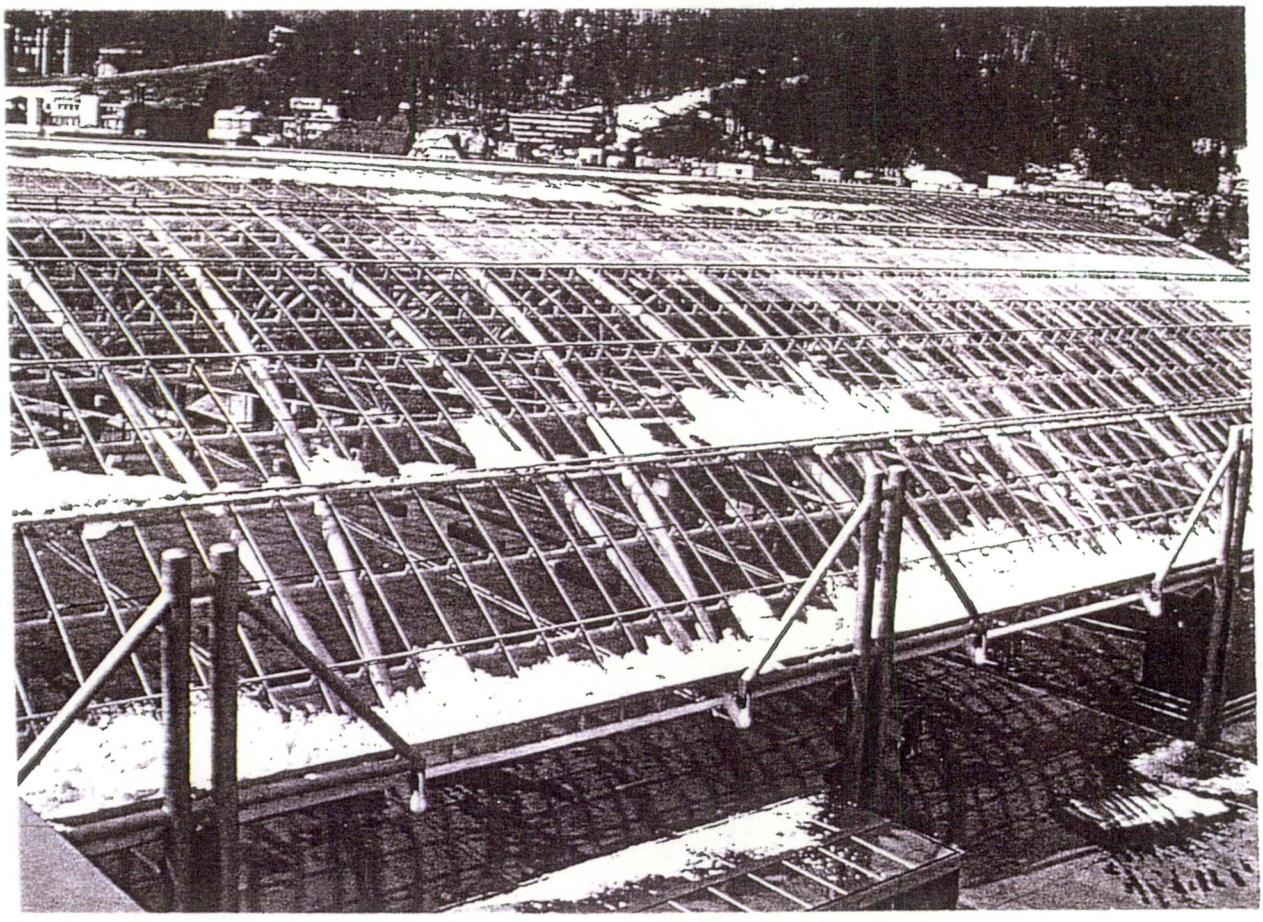


Fig. 1.5 Bus and Train Station - Chur by R.Brosi & R. Obrist.

allow for the walls to be completely glazed, thus allowing for maximum use of daylight, a positive attribute in any building.

A station tucked away in the Swiss Alps in the town of Chur bears a certain resemblance to Grimshaw's terminal at Waterloo. Like Waterloo, the curved shape of its barrel-vaulted roof reflects the curve of the roofs of the engines that pass beneath it (see fig 1.5). This combined bus and train station by architects Richard Brosi and Robert Obrist, has a completely glazed roof in order to reveal the splendid mountainous view to newly arriving passengers. Like Waterloo, this glass structure also had its initial teething problems. Having to provide solutions for wind up-lift (the tied arch or bicycle arch) and snow load (specially designed brackets to stop melting snow sliding off the roof in one great mass) resulted in not only a functionally successful building but also an aesthetically pleasing one.

Grimshaw's contribution to Heathrow, Pier 4/4A (1993) is another building which relates its shape to the transport vehicle which it serves. The long walkways linking the gates and also the lounges at the gate areas themselves are contained within large oval tubes, similar in form to that of the main body of an aeroplane. It could be said that this complex, originally designed only as a temporary construction (to serve the airport for a term of nine years), involves a certain celebration of the machine - in this case the aeroplane. Not only in the main form of the structure but also in the finest details of fixtures, such as light fittings, references to the aerospace industry are evident. The light fittings themselves are shaped like plane wings and consist of panels riveted together in a similar fashion (see fig. 1.6).

The ordered seat alignment and windows in the departure lounge give the feeling of sitting inside a giant stationary aircraft (see fig. 1.7).

The entire space is very airy and has no feeling of clutter. Despite the fact that the walls and roof curve over one's head, a feeling of claustrophobia is never instilled. All decoration and extra unnecessary elements have been omitted; up to this time the interior spaces have managed to escape the 'privilege' of being home to awful advertising hoardings. Instead, some interesting Fine Art work, including photography, typography and sculpture, has been exhibited along the corrugated walls of the walkways. Grimshaw's reference to the mode of transport he is trying to serve appears again in certain elements of the designs at Waterloo station. The combination of function and form is clearly evident in his use of a grill section (similar to that on the engine of a train) to act as wall panelling, covering an air conditioning duct.

He also uses round glass windows in the doors of the arrivals area which may be seen as a reference to shipping and the sea under which the passengers had just passed.

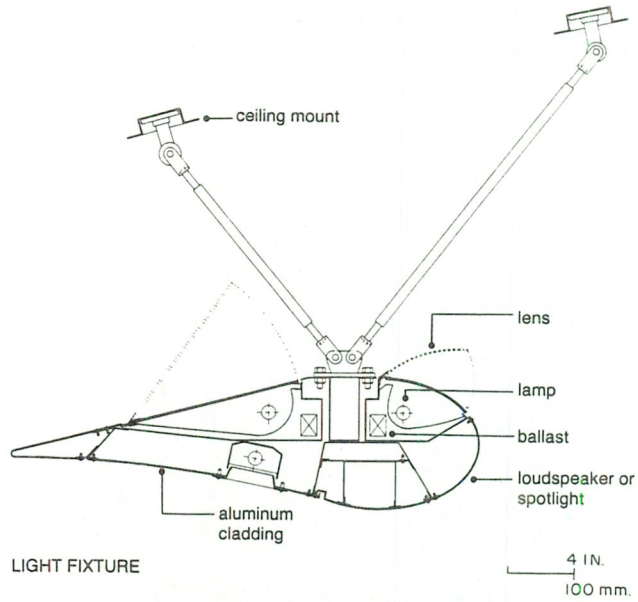



Fig. 1.6 Light fittings - Pier 4/4a Heathrow.

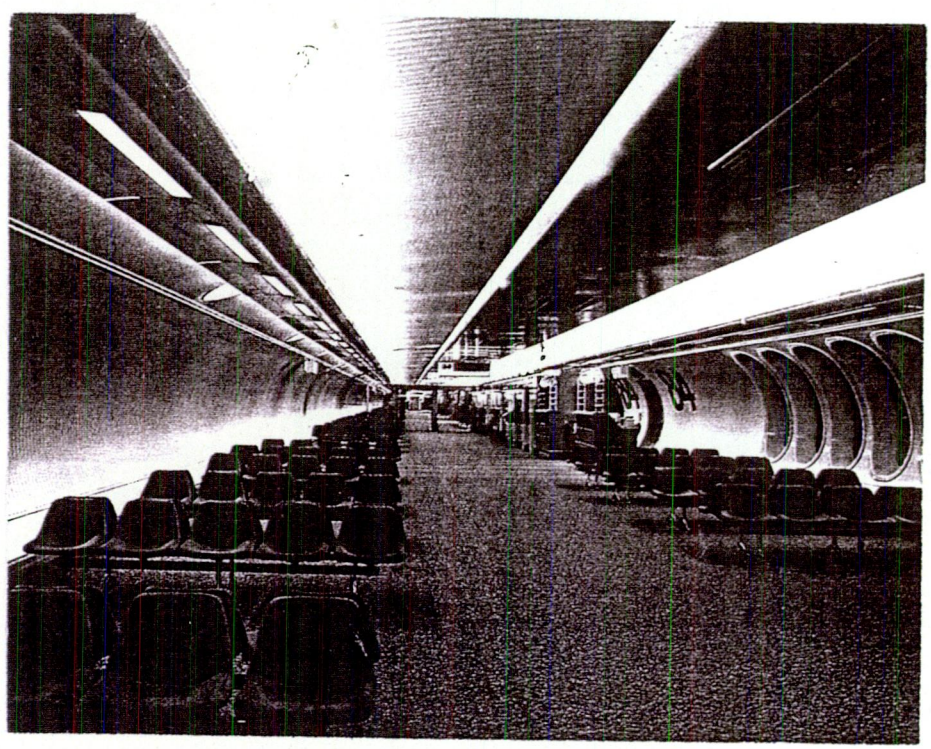


Fig. 1.7 Waiting area at departure gate no.84 - Pier 4/4a.

It is such functional and aesthetic aspects of both Grimshaw's Waterloo and Foster's Stansted that I will discuss in relation to how they deal with the problems involved with such transportational architecture. I find the connection between these buildings interesting from the point of view that, although involved with different modes of transport, both must cater for similar processes due mainly to their international involvement: check-in,customs etc. Waterloo Terminal gives an indication of the close relationship of the function of the two, the railway station and the airport. Foster's Stansted is also closely linked with rail architecture. "Foster's building perpetuates the noble Victorian tradition of the architecture of mass travel. It borrows some of the intricacy and delicacy of the train shed engineers and reemphasizes the simple direct progression implied by the railway terminus plan". (Best, 1991, p.59).

Both buildings have a common purpose, that of guiding the passenger from the entrance to his or her mode of transport (or vice versa) with minimum fuss and maximum speed. It is this 'journey' of the passenger I will use as a basis for my discussion. A successful design is one which allows the passenger to complete this journey with the minimum amount of stress both mentally and physically.

A certain knowledge of the types of passengers who may be using these facilities is important, as different passengers have differing needs. The most common classifications of passengers using 'public transport' are 'business' and 'leisure'. As these passengers will most likely spend a certain amount of time reaching the airport (anything from 1/2hr to 3hrs) they will thus be concerned with ease of transfer from their initial mode of transport to their plane or train.

# STRUCTURE

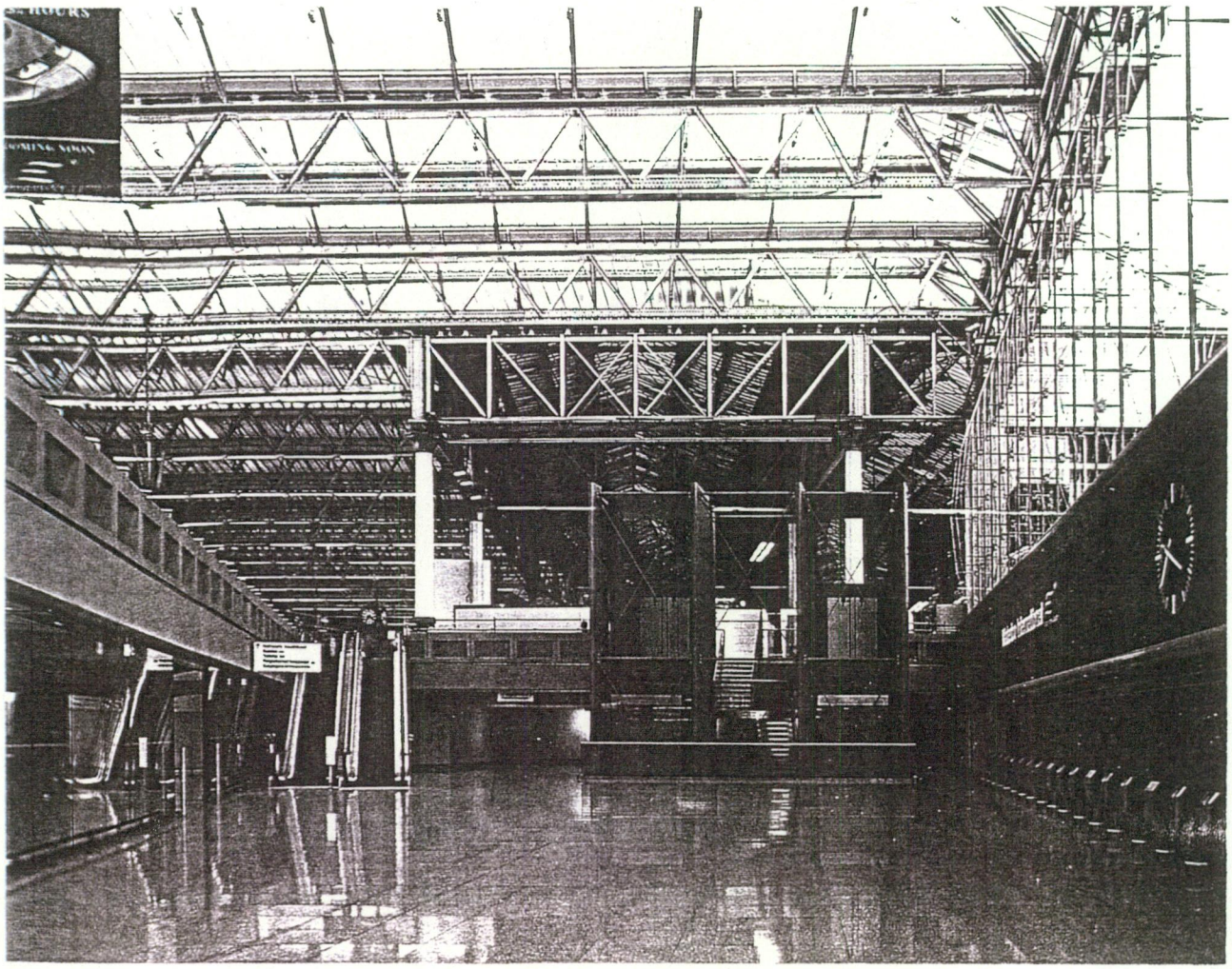


Fig. 2.0 Escalator and lifts joining the old concourse with the new - Waterloo.

There are a number of ways which passengers can arrive at both Stansted and Waterloo. Despite the the fact that the first is located in the heart of the Essex countryside and the latter in the heart of London city both are similarly serviced by public transport, trains, buses, taxis, Waterloo has one extra link, that of the London Underground (the Northern and Bakerloo lines).

For people arriving at Stansted by train, a view of the main Terminal is brief, firstly because the site on the side from which the train approaches is populated by other administrative buildings, which means one must search for a good view of the terminal. Secondly, the train sinks down underground to cross beneath the runway and, on emerging on the other side, remains too low down to allow a good view of the Terminal. I see this as a disadvantage for many first time visitors to Stansted who, due to the large amount of publicity it has received as London's third airport, may have a genuine interest in actually seeing the building as a whole rather than merely passing through it in a rushed fashion. Having disembarked from the train, entrance to the main terminal building is provided through four entrances (all within a few metres of each other on the southern side of the terminal), reached from the station by lift or escalator. This concept of a main entrance area helps instil a sense of orientation, giving people their bearings. This provision of a reference point from which people can determine their sense of direction is a very important psychological aspect of the design, most importantly in a building like an airport, buildings described by the critic Deyan Sudjic as "high-stress landscapes, full of anxious people on unfamiliar territory" (1992, p.163). This directional aid instils a momentary state of calm and a feeling of assurance, most important for strangers in a building. Having had to negotiate the journey to their airport by bus, train and car and from there find their way up escalators or ramps from the different levels, arriving at the main entrance provides people with a sense of relief - the first stage of the 'journey' successfully completed.

Those arriving by bus or car will have a greater opportunity to get a good view of the terminal and be therefore aware of its square shape and the clear directional flow between land-side and air-side. These passengers will arrive at the same main doors (the bus passengers having ascended one escalator) and make their entrance through large revolving glass doors into the main concourse.

In Waterloo, the reverse happens. Access to the main concourse for those arriving by train (via the mainline Waterloo station) occurs with a descent by means of a single escalator or neighbouring lift (see fig.2.0). The open concourse (which can be looked down on from the main station) separates the ticket sales office from the check-in area. The fact that this area has been left open plays an important role in alleviating a feeling of descending into another underground area. As the ensuing journey involves for most people a journey beneath the sea, all references to underground spaces had to be

Fig. 2.1 Arrivals Hall, with a view towards the ramp which joins it to the main concourse above - Waterloo.

eliminated as much as possible. The area through which those travelling by car enter, opposite the arrivals hall, has been kept bright and airy through the construction of an extensive glass wall on the western (road) side. This area is linked with the main concourse by a long sloping ramp in a double-height hall (see fig. 2.1). The large-scale fish mobile (constructed out of fibre-glass and metal) by French sculptor Jean-Luc Vilmouth with it's reference to the channel may not have the most positive effect on those about to embark on their journey.

Those arriving by car, because of the much lower level of the road in relation to the terminal, will not have as good a view of the phenomenal glass structure sheltering the platform as those arriving by train into the older part of the station. These initial glimpses of the intricate glass structure provide one of the few occasions when a travelling passenger is actually able to see the building. After entering the building and having proceeded through check-in, the passengers are directed through to departure lounges in the area beneath the tracks. Although many appear to give this little thought, it could be considered a rather claustrophobic and possibly frightening experience to sit in areas beneath eight tons of high speed train. The next and final view passengers get of the glass roof is when being hurried up from the bowels beneath to board their train; this process takes a matter of minutes as passengers are not allowed access to the platform until five minutes before departure. Although this policy keeps the platform space uncluttered and its aesthetic qualities uninterrupted, it has been imposed more importantly for reasons of security an issue of prime importance with regard to these trains as they travel through the channel tunnel. It is, however, a pity that passengers are deprived of the chance to properly take in and appreciate the structural glory of this great 'train shed'.

The roof of Stansted Airport, on the other hand, is constantly visible to passengers, mainly due to the fact that, unlike Waterloo, Stansted is a single level terminal. The roof and supporting structure at Stansted, although possibly less dramatic that that of Waterloo (due to less glazing) is 100% functional. The nature of the support system developed for the roof has allowed for the construction of totally glazed walls. The glass walls and also the glass sunlight sections in the roof allow passengers to observe incoming and outgoing aircraft and also the weather - which gives them a visual link with the outside world.

One of the biggest drawbacks involved with certain modes of transport, most especially underground systems, is the way in which it is possible for passengers to lose their sense of orientation; this can, in extreme cases, lead to users experiencing a sense of panic. Loss of orientation can also occur in stations and airports where glazing has been kept to a minimum. Foster's aim with Stansted was to alleviate any possibility of such a situation arising. He had, from the initial stages of the design considered the concept of a single level terminal. This later fitted in perfectly with

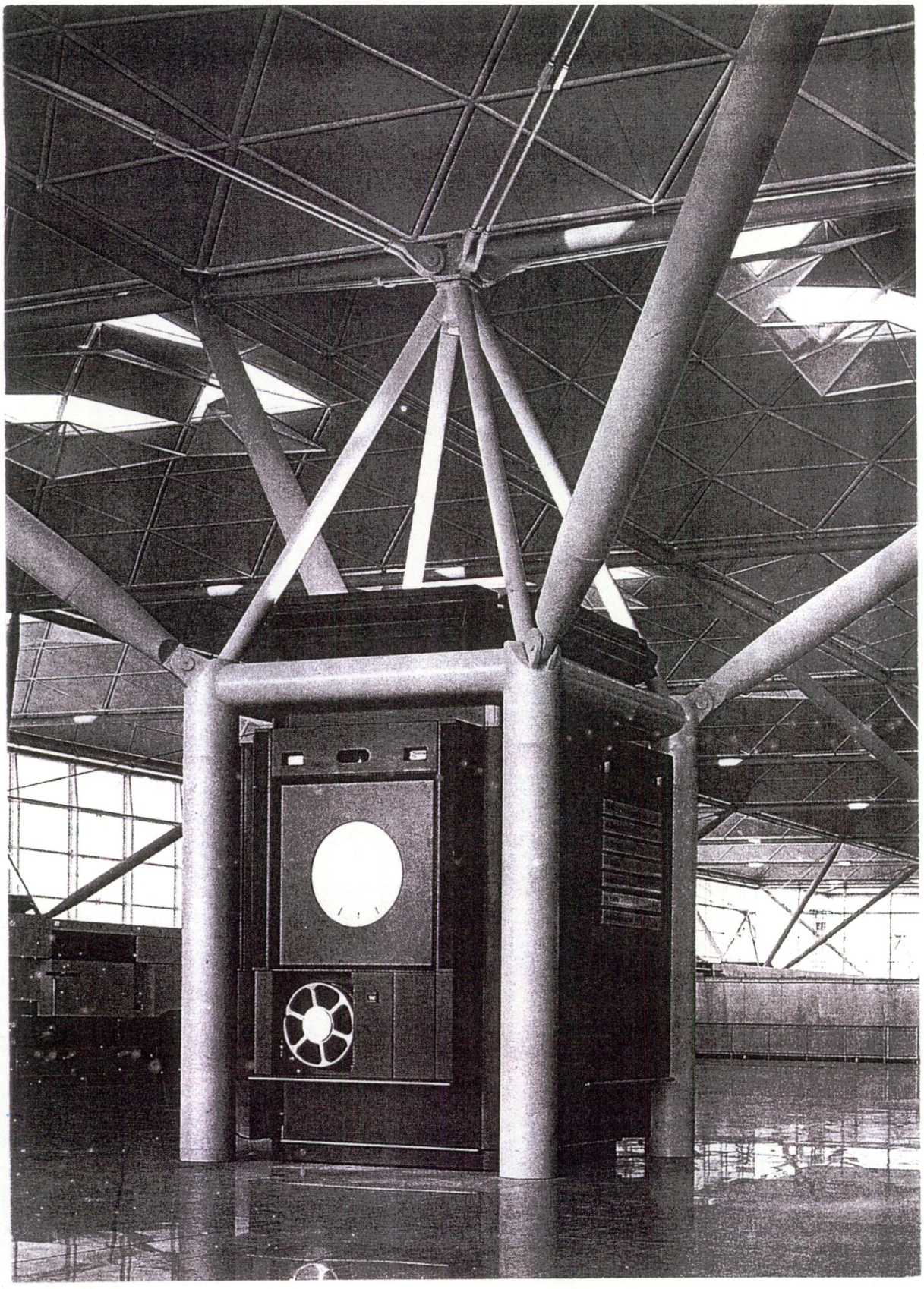


Fig. 2.2 Roof support system - Stansted.

height restrictions, as it had been stipulated that the terminal must not create an eyesore in the surrounding rolling Essex hills.
The main terminal covers a 200m sq. area and stands at a height of 20 metres. The roof support system already mentioned consists of thirty-six, free-standing tree-like structures (see fig. 2.2). To keep the height to a minimum, while simultaneously providing a visually pleasing and light emitting roof structure, the services (air conditioning plant etc.) were positioned not in their more conventional roof position but in a specially designed undercroft area, beneath the concourse.
As Stansted is a single level terminal, the passenger flow from land-side to air-side occurs in a straight, horizontal, progressional manner which keeps directional confusion to a minimum (see fig. 2.3). Foster's plan for Stansted was to create a transparent building from within which people could see right through, from one side to the other. He wished to revitalise the romance of flight where, in times past, passengers alighting from their automobile had a direct view of their plane across the tarmac. In those days the divisions between land-side and air-side were less distinguishable. This concept of Foster's was compromised to a certain extent with the need for opaque customs barriers which block the view from one side to the other. The layout of service areas, such as check-in and retail, is such that on entering the building the passengers get drawn in a logical fashion from one area to the next. Although signs are often sought for reassurance, the departing passenger could survive in their absence. Having checked in their bags and finished in the retail and catering areas, passengers proceed through the customs and ticket control point. It is this barrier which in every airport separates the passenger accompanying friend or relative. In Stansted it makes a very distinct physical division, being situated in the middle of the terminal.

This separation of passenger from companion takes place seemingly earlier in Waterloo. For logical reasons of security and customs, non-ticket holding persons are not allowed access to departure lounges or platforms. We are more conditioned to this procedure in airports than in train stations where traditionally accompanying friends or relatives 'put them on the train'. "At Waterloo Boccioni's tumultuous farewells have been banished, 'designed out' because 'those who go' and 'those who stay' are sundered, zoned apart so that their clamour and chaos may not disturb the business of pure passage" (Hatton, 1995, p.86).
Where Foster sought to revitalise the romance of travel, it seems the exact opposite is happening in Waterloo station. The blame cannot be given to the architect as he holds no control over security operations. In fact, Nicholas Grimshaw and his team have managed to create an amazing piece of architecture within very tight constraints.
Because of this limited amount of space (the terminal is bordered on one side by the existing station and on the other by a street providing access to offices on the opposite

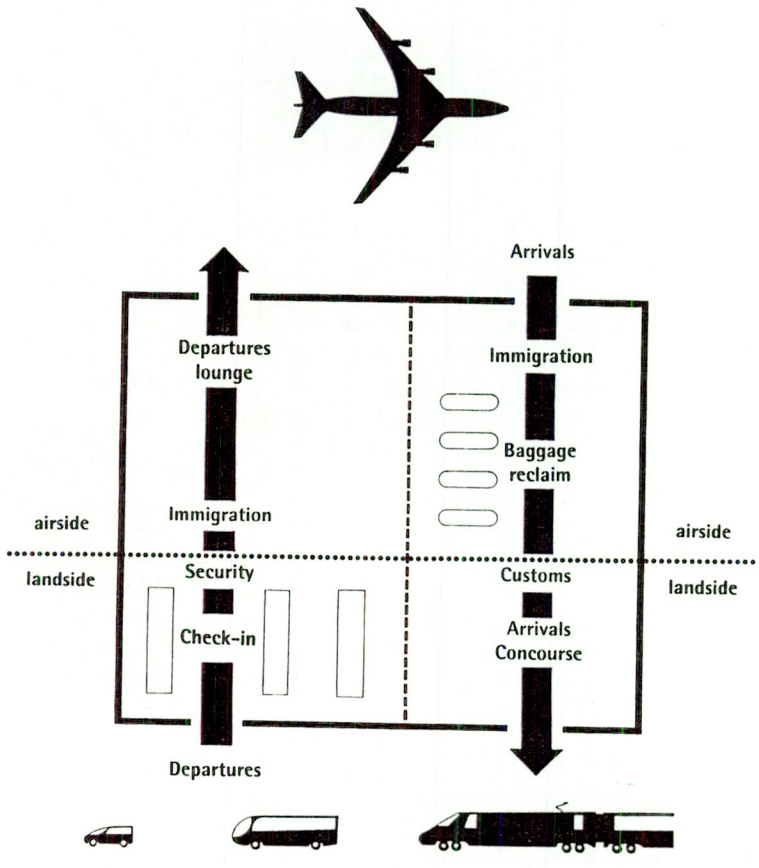



Fig. 2.3 Plan of passenger traffic flow - Stansted.

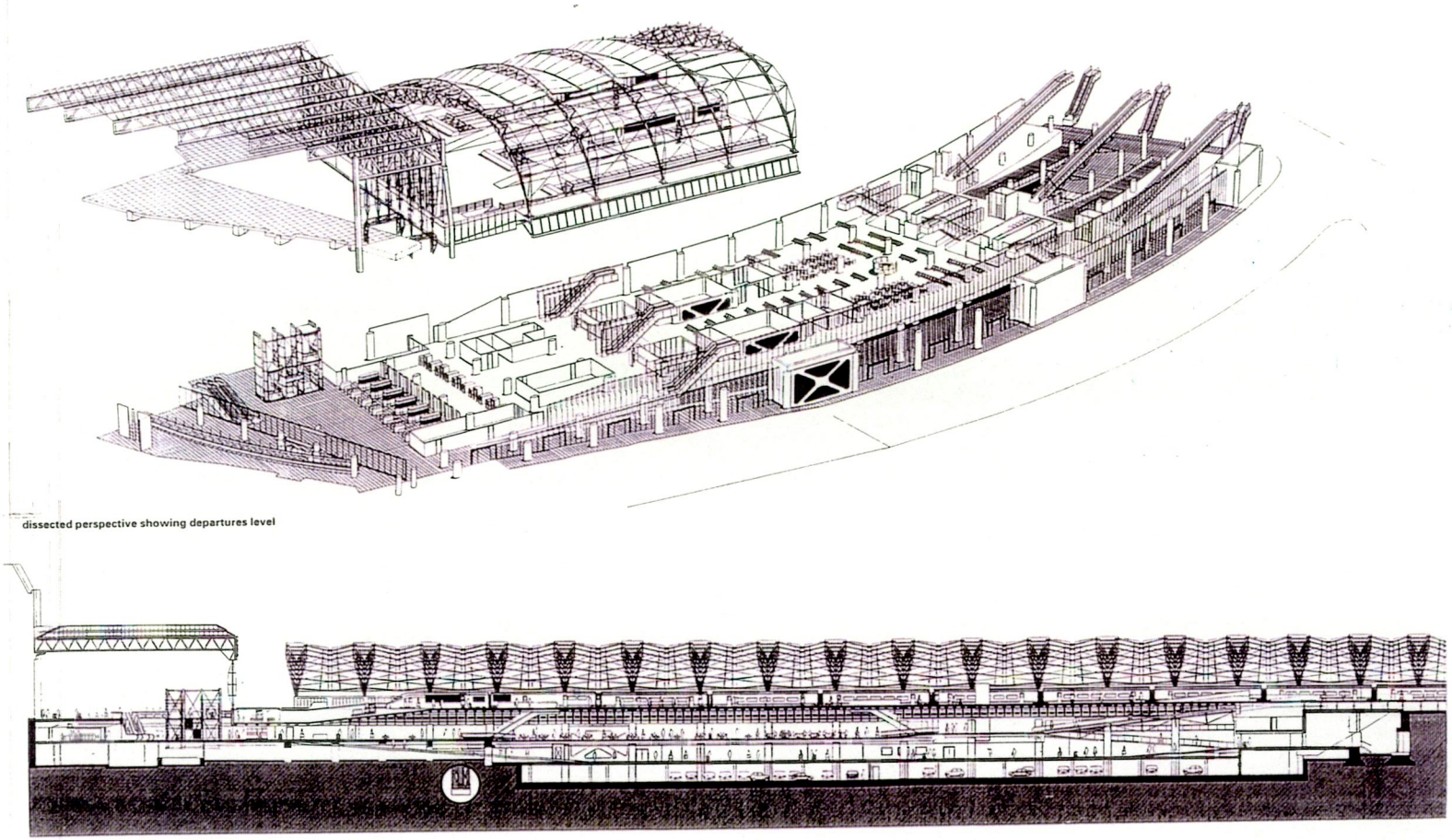



Fig. 2.4 Floor plan showing the location of connecting escalators - Waterloo.

side of the road), Grimshaw had to design a building which included a number of different levels. Access to the departure lounges is situated behind ticket control customs and passport control on a level below the platforms. As already mentioned, it is only shortly before departure that passengers are permitted up on to the platform. They can access the platform by a number of escalators along its length (see fig. 2.4). This enables individuals to emerge onto the platform as close as possible to their respective carriages. Although this is obviously of benefit to people with physical disabilities, one critic ridiculously suggests that the positioning of the escalators in such a manner was to "avoid an unwanted yomp along the platform"! (Rainford, 1993, p.33). It appears as though transportational architecture and the services it houses are being increasingly designed with the business traveller in mind. This is evident in the number of discriminative travel classifications recently introduced (Business first, Premium first, Standard and Economy Plus) and special club class lounges aimed at business travellers. This discriminatory practice is rather contradictory as, with the constant development of telecommunications technology, the number of business travellers is set to decrease. In the arrivals hall at Waterloo there is, furthermore, a distinct lack of facilities for those awaiting the arrival of a friend or relative (insufficient seating and no obvious toilet facilities).

In Stansted no obvious segregation of passengers takes place within the terminal building. All passengers are offered equal service from the retail, catering and duty-free areas. These facilities are all housed in small cabins, whose forms are based on the same structure as the main building on a reduced scale (see fig. 2.5). These structures have been chosen for reasons of flexibility to allow for possible changes of position in future years. One disadvantage of this is that the cabins have retained, to a certain extent, the look of temporary prefabs. For reasons of fire safety, it was stipulated that these cabins be enclosed spaces, and thus they were given roofs. This means that all those who work in these areas of retail and catering do not benefit from the expanse of light and airy feeling achieved by Foster's intricate roof structure. These factors however disturb the passengers little as they are merely transient occupants. The display stands in most of the cabins have been positioned in order to allow for the passing of a luggage trolley, therefore people arriving before check-in time are also accommodated. The retail and catering outlets housed in these cabins occupy 25% of the total floor space and provide Stansted Airport Ltd. with just under half of its revenue (Churchill, 1996, p.35). The duty-free part of Stansted is considered of large importance earning itself a £250,000 revamp in 1995. "To introduce new concepts and increase density of ranges" (Parish, 4/2/97). Over the last decade, the amount of space allocated to the retail industry has grown considerably - to the point that some critics have referred to such buildings as 'airports centres' or 'shopping terminals'. Even Norman Payne, chairman of the British Airports

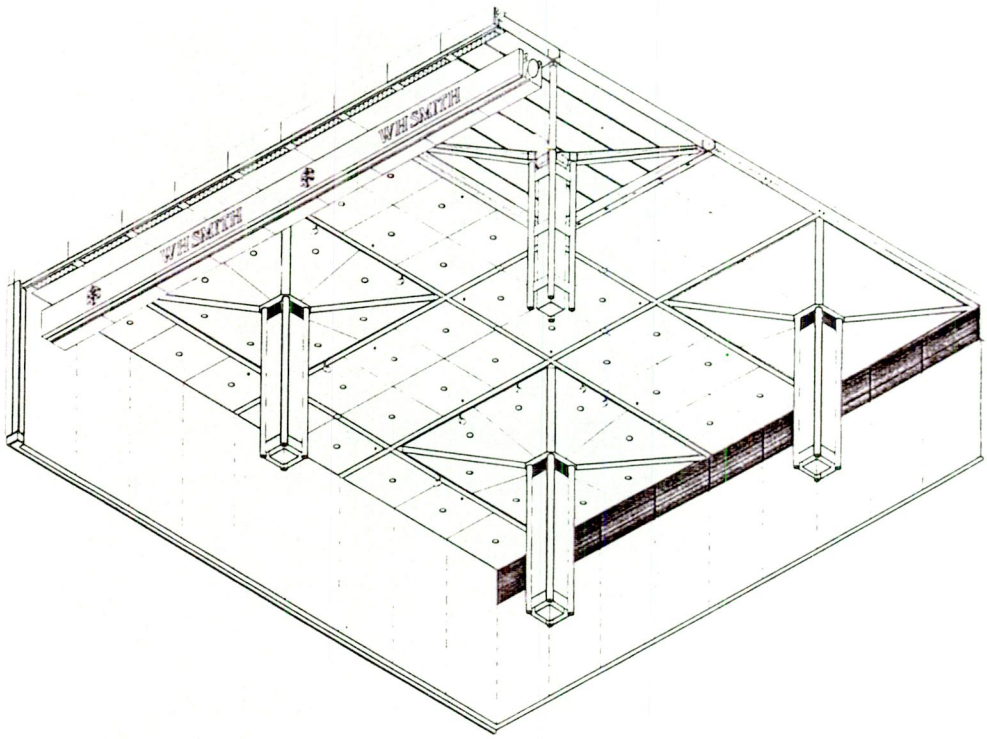



Fig. 2.5 Internal structure of the cabins - Stansted.

Authorities (BAA), has with regret referred to airports as "discount shopping centres on a grand scale with the emphasis on emptying your pockets rather that charging you with the thrill of travel". (Powell, 1992, p.23). Certain methods for the promotion of retail areas are evident in Stansted where (depending on which check-in desk is used) the passenger must either pass through or past the retail area to get to the departure lounge. Other additional marketing tactics shall be discussed under the more specific headings of lighting and materials/colour. Due to the generally quicker processing procedure of passengers in railway stations, there is a smaller market for retail outlets to target. It is interesting to note however that in Germany the (DB) Deutsche Bahn is planning a large revamp of all their major stations. (Die Welt am Sonntag, 8th. Dec. 1996) It is planned to have the stations include large shopping centres and, in some cases, schools. This should, on the whole, help clean up and improve the images of the stations which in past years have become home to pickpockets, thieves and drunks.

Having finished in the retail areas, passengers proceed to the separate satellite buildings by means of a shuttle on rails. This tracked transit system can be seen to deny the concept of movement because of the ways in which it connects with the terminal building. The shuttle with its capacity of 100 people (A+U, Oct.1991, p.94), 'parks' parallel to the glass wall of the terminal and, when it is fully aligned, doors in both the glass wall and the shuttle open simultaneously. Entering into this enclosed space with up to one hundred others can be a very claustrophobic experience, especially after the expanse of space in the main terminal. However, when this sequence of events happens in reverse to the arriving passenger, who has been transported at speeds of up to 30 km per hour from the depths of the satellite up to the terminal building, a feeling of being released and freedom is experienced on disembarking. The sheer expanse of space in the arrivals hall is emphasised. The satellite buildings, although structured differently, operate on the same principal of maximum use of natural light, the walls being extensively glazed.
The concept of creating satellite buildings separate from the main terminal building and from each other (there are two in existence to date) was adopted to enable the construction of further satellites without the disruption of existing services. The main terminal building has also been designed with expansion in mind. The services in the undercroft are semi-compartmentalised to allow for the expansion of the east side of the building without disruption of present services. Service distribution throughout the terminal has also been designed so that necessary repairs can be carried out with a minimal amount of disruption to traffic flow within the building. A staircase has been incorporated into the design of each of the supporting 'trees' to allow unseen access to the services contained within, including air-conditioning ducts, lighting fixtures, speakers for the PA system. Such design details help add to the overall positive image created by the terminal and give users confidence in the institution as a whole.

# LIGHTING

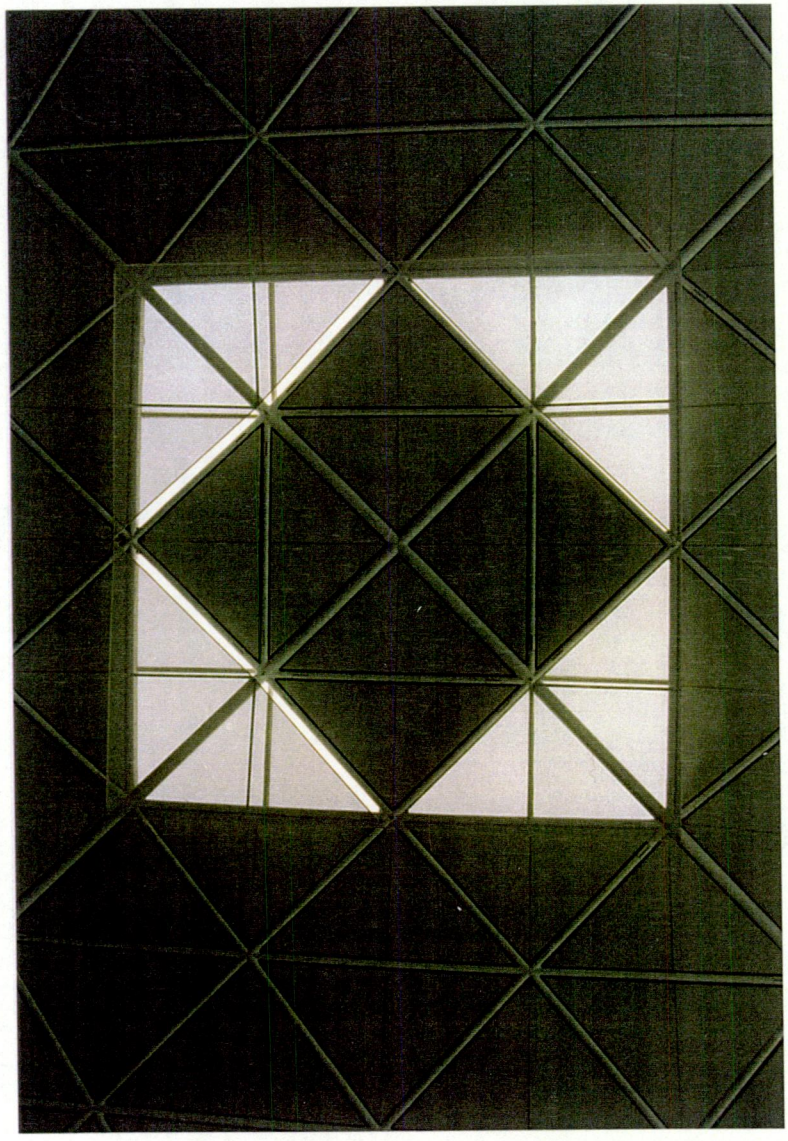


Fig. 3.0 Triangular skylights - Stansted.

"The history of architecture is the search for understanding and dominion over light". (Baeza, 1994, p. 86.)

Stansted Airport is a triumphant celebration of the virtues of natural light. From the moment of entrance into the large expansive terminal building during daylight hours the power of light is overwhelming. Foster's decision to situate the services (air-conditioning plant etc.) in the undercroft of the building allowed him to design a relatively lightweight roof structure. The absence of the plant service on the roof allowed for the inclusion of 'skylights' (see fig. 3.0). Four triangular glass panels are situated in each of the one-hundred and twenty-one 18m sq2 dome-shaped canopies. "The key element which makes the interaction of the natural and the man-made worlds is natural light." (Powell, 1992, p.13). Specially designed, perforated metal shades are suspended beneath each roof light to diffuse the light during the day, and to reflect artificial light from the up-lighters situated in the tree structure, by night. Their reflective properties serve the purpose of eliminating the appearance of big black voids in the roof after dark. Foster gave careful consideration to the size, situation and quantity of these roof lights. He was concerned that any people working in stationary positions within the terminal (e.g. those working at check-in desks) would be over-exposed to sunlight and that it might become a source of discomfort for them. The well-being of these service personnel must be constantly considered as they, in combination with the building they occupy, help create the dominant mood. If these employees are comfortable in their surroundings, they will convey a positive image to the passengers with whom they have to deal. The design for the roof-lights which was decided on allows no one area direct exposure to sunlight for more that 30 minutes at any one time. This was calculated with reference to the speed of rotation of the earth in relation to the sun. The concourse cladding is fully glazed, which not only contributes to Foster's concept, which was of a 'transparent' terminal where departing passengers can see their plane and arriving passengers their cars but allows the concourse to be flooded with natural light during the day, thus minimising the use of artificial light. This not only provides a more natural environment (the advantages of which shall be dealt with subsequently) but also a more cost-efficient running of the building. On both the land-side (south) and air-side (north) of the building the glass is fully transparent, shading being provided by the extruded roof section. On the east and west sides, heat gain is reduced by the use of translucent glass for the top two-thirds of the wall, while transparent glass is used for the bottom one third in order to allow people within the terminal to observe aircraft and other movements outside the terminal.

Adequate exposure to daylight is essential for the healthy physical and mental functioning of every human body. People who suffer from a lack of exposure to natural light have been known to suffer from a condition known as Seasonally Affective Disorder (SAD) the symptoms of which involve, amongst others, constant

exhaustion, depression and irritation. People who live or work in areas predominantly lit artificially can suffer in ways other than purely medical ones. If a person is constantly submitted to an unvarying environment their ability to respond to changing environments will deteriorate: "People require varying, cycling stimuli to remain sensitive and alert to their surroundings" (Birren, 1978, p.83).

Foster, with his expansive use of glazing, has managed to protect most of the people working in his building from suffering from any of the above mentioned problems. One group of people, however, who do not benefit in any substantial way are those employed in the retail and catering areas, situated in cabins.

The passengers in this airport are only transient occupants and it could be argued that their short stay in the airport will have no measurable effect on their health. The overall picture must not be overlooked. A certain percentage of these travellers are flying for reasons of business and probably for them this is a common occurrence. This means some of these passengers spend a considerable amount of time, arriving, departing and transferring in airports. Also if the amount of time spent in the airport prior to departure (approx. 1 hr.) is examined in relation to the time spent on one flight (anything between 1hr. and 20hrs.), it becomes obvious that most passengers spend on average more time in the artificially lit environment of the aeroplane than in the airport. This is why the the exposure of passengers to natural light during their time in the terminal is of the utmost importance. As mentioned earlier, the human body requires constant variance of its environment to function comfortably. If a person spends a number of hours travelling in environments constantly lit by artificial light, used to simulate daylight illumination levels, the experience can be very exhausting. The body clock becomes confused as even though it may be night time, a time when our brain expects a lower level of luminance, the planes and terminals are fully lit. Norman Foster's designs for artificial lighting in Stansted manage to tackle this problem of illumination after dark successfully. The most important contributing factor is that most artificial lighting provided exists in the form of uplighters, thus eliminating the problems of glare, which can cause visual discomfort for some. Direct and indirect glare can have a harmful effect on elderly people. "The elderly have a reduced tolerance to extremes in light intensity and are sensitive to disability glare" (Nuckolls, 1983, p.357).

The effects of strong lighting can lead to these elderly people's dependence on others for guidance around the building. This means they are forced to temporarily relinquish their independence, an unpleasant experience for any individual. The levels of illumination in the main terminal at Stansted after dark do not attempt to equal normal daylight illumination levels but instead provide a lower, nevertheless comfortable level. There is adequate light for any task the passengers may wish to carry out, including reading. Having disembarked from their plane, passengers have left an environment of high illumination and on passing through the main terminal building at

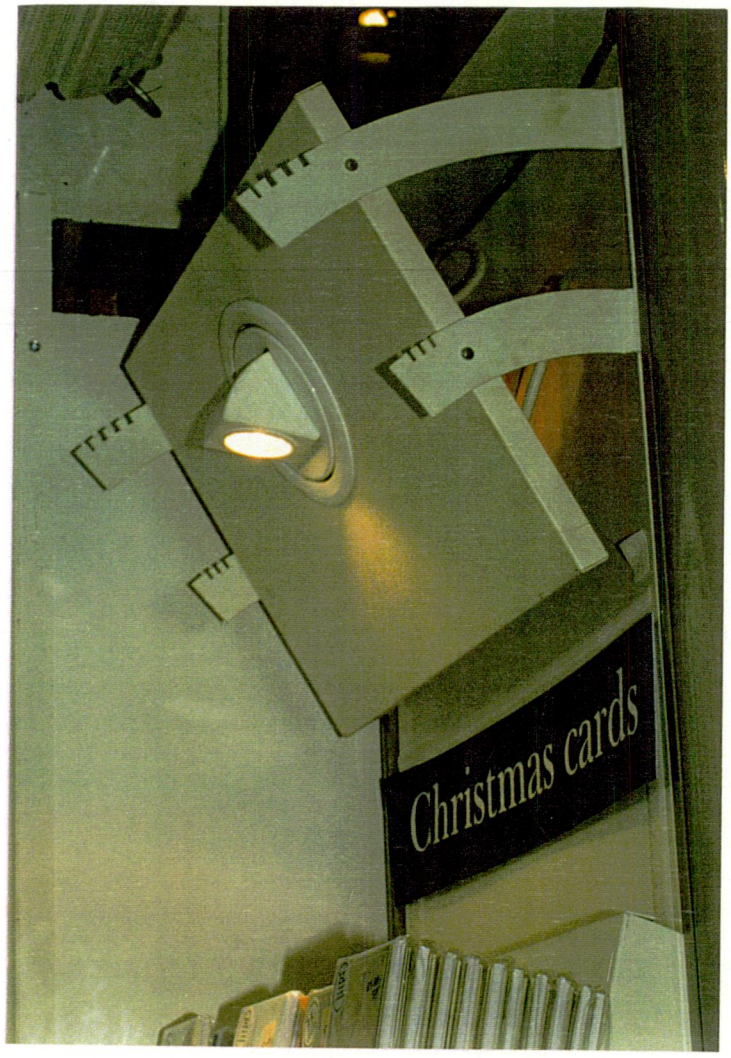




Fig. 3.1 Display lighting, W.H.Smith newsagent - Stansted.

Stansted, with its less glaring lighting system, their eyes are given time to adjust to the fact that it is dark outside (apart from street lighting), where they must in due course negotiate finding their buses and packing their cars. "One of the essential requirements of good lighting is to avoid creating situations where the eye is called upon to adapt too quickly over too wide a range" (Hopkinson, 1969, p.48).
In the evenings, levels of illumination are such that a waiting passenger could rest comfortably, possibly even sleep, if necessary. This is an important factor for those travelling long distances or awaiting a connecting flight. One of the distinct disadvantages of train travel by night, in Ireland in particular, is the distinct glare caused by the lighting systems which prevents the passenger's eyes from ever relaxing, even if they are closed!

Lighting has a number of purposes besides that of illuminating areas or specific objects. In the British Rail station situated below the forecourt area of the the terminal at Stansted, coloured lighting has been used in place of what has been described as cladding. The surfaces of the concrete walls of the station have been left untouched since construction and have been instead been 'painted' with a pale orange light. The wall is illuminated at regular intervals with large spot lights situated at the bottom of the walls, below the level of the platform. This creates a warm and welcoming feeling to an otherwise freezing station. It is interesting to see how the same approach, which has been adopted in the the tube station at Gloucester Road, can have such a different effect because of the difference of materials. In Gloucester Road the walls are old yellowish fire-brick and therefore appear much warmer. The value of the use of coloured light has been expressed by experts in the past: "We must not strive to increase the intensity of light today it is already too strong and no longer endurable. But a gentler light is worth striving for. Not more light! more coloured light must be the watchword!" (Scheerbart, 1914, p.106).

Lighting is also used as a marketing tool by retailers and caterers which form quite a profitable group, occupying the the centre of the terminal at Stansted, and also spaces throughout the Waterloo station. The lighting of display areas may appear to be a straightforward task, although not only the illumination of products must be considered but also the mood of the potential customer. The products for sale must have sufficient attention drawn to them (see fig. 3.1), without disturbing the effects of the main lighting system, the purpose of which is to create a relaxed atmosphere, and create an environment in which customers will readily part with their money. Neon lighting has been used by one outlet to draw attention to its environment. This cabin, home to computer games and slot machines, depends heavily on the use of varying flashing blinking lights to attract customers.

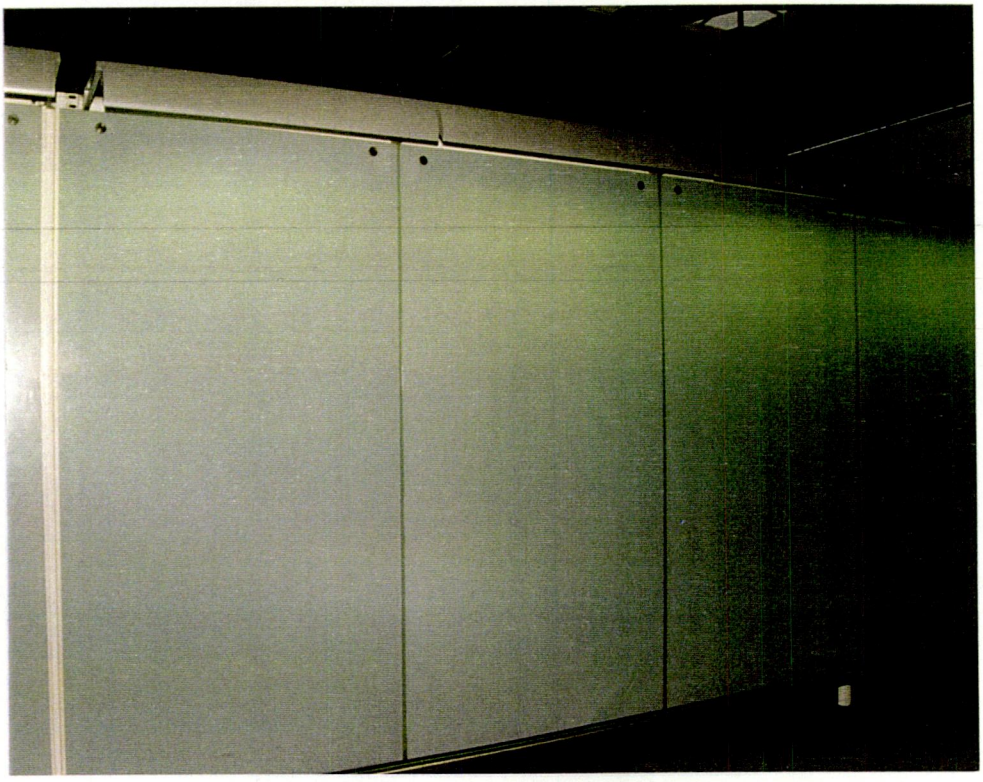


Fig. 3.2 Top-lit security screens, customs area - Stansted.

Fig. 3.3 Ticket booths - Waterloo.

Catering outlets and pubs also use lighting effects to create certain atmospheres in order to enable them to function as economically as possible. The "Burger King" outlet in Stansted Airport, like all of its outlets, is brightly lit to a most uncomfortable level. This level of illumination has been adopted with customer turn-over in mind. The ethos of such a business is to 'process' their customers as quickly as possible, and the brightness of eating areas discourages people from spending any more time seated than they have to. The opposite approach has been adopted by Bewleys Cafe/Restaurant and it's neighbouring pub, Butler's Bar. These outlets are more concerned with keeping customers on their premises for a longer length of time. In the case of the pub, an effort is made to entice the customers to remain as long as possible by seating them comfortably in a dimly lit area, thus encouraging them to drink more.

The association of light with information is a common occurrence. This knowledge is often unconsciously used by passengers seeking information. Flynn (1972) noted that " an observer who is unfamiliar with a space will move towards areas where colour is predominant and towards areas of highest brightness". (Flynn, Dec, 1972). Therefore the extra task lighting used by attendants at check-in desks, information desks and passport control areas is in a sense dual purpose - serving not only their personal needs but also acting as back up to the sign system, by indicating their positions within the building. Light has other directional qualities, in that given the choice of two routes to the same destination a person will invariably opt for the better lit one.

Light has been used in combination with glass covered in a fine matrix of white dots, to provide screens to enclose the customs areas in Stansted. The glass when top lit has the same effect as a net curtain, thus providing the necessary security measures required by customs officials (see fig. 3.2). Glass is also used as a security measure in the ticket booths at Waterloo station (see fig. 3.3). As these booths are only designed to accommodate those who check the tickets and not sell tickets, this seems a rather unnecessary security measure. Having to communicate through a glass screen, even if there is a microphone system in operation, is extremely impersonal, and passengers suffering from hearing disabilities could be at a disadvantage.

In the long, rather low-ceilinged area of the departure lounge Grimshaw has made use of artificial uplighting in order to create, as far as possible, a sense of spaciousness. Grimshaw specially designed the housing for the long-armed metal halide up-lighters which were made by Charles Henshaw & Son of Edinburgh (see fig.3.4). Their heads, manufactured in sand cast aluminium, incorporate a unique feature, a self-centring mechanism which ensures they return to their natural positions if knocked against.

Because of the nature of the site and ensuing design of the terminal on different levels, Grimshaw has had to rely heavily on artificial light in certain areas of the departure

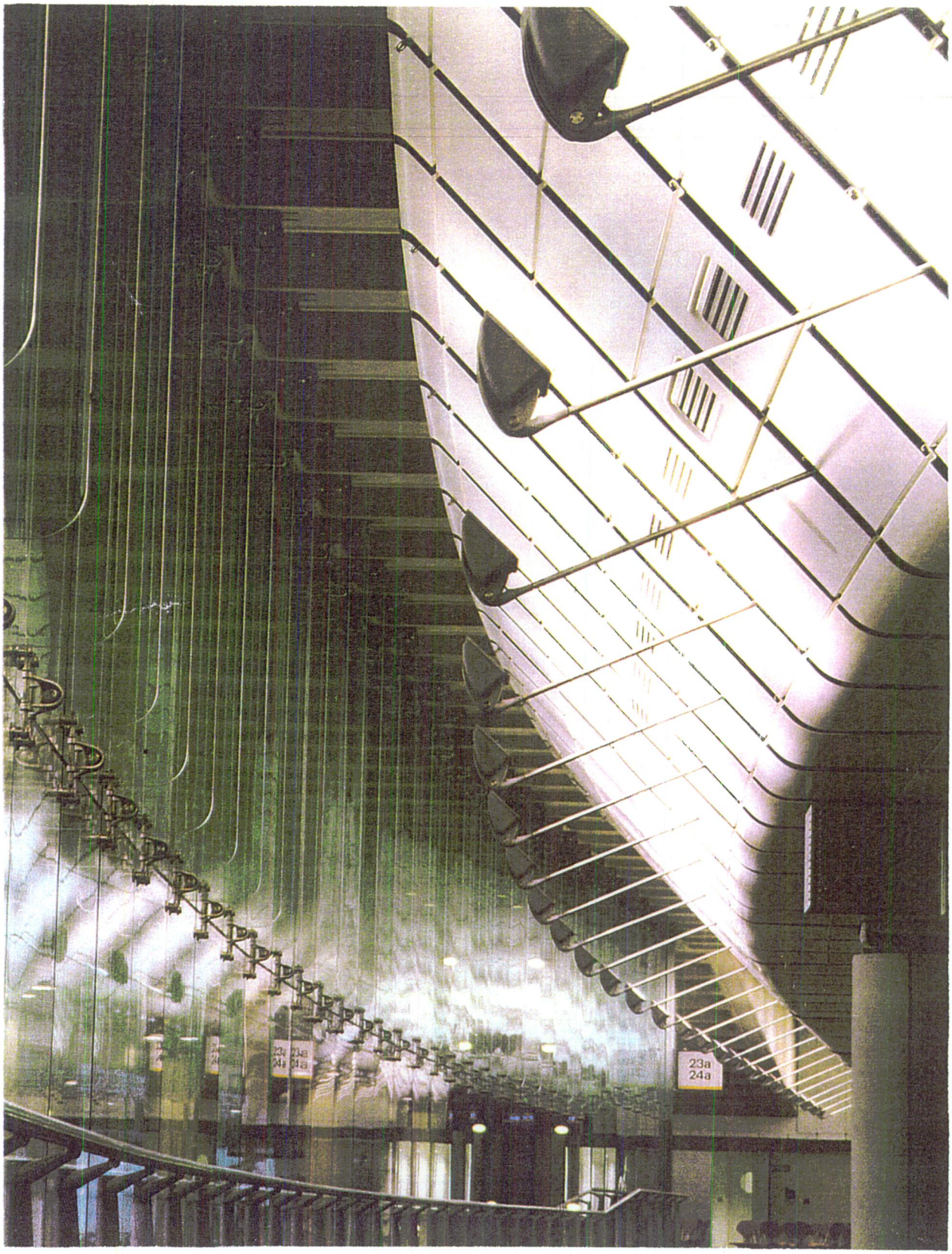



Fig. 3.4 Long-armed metal halide up-lighters, arrivals hall - Waterloo.

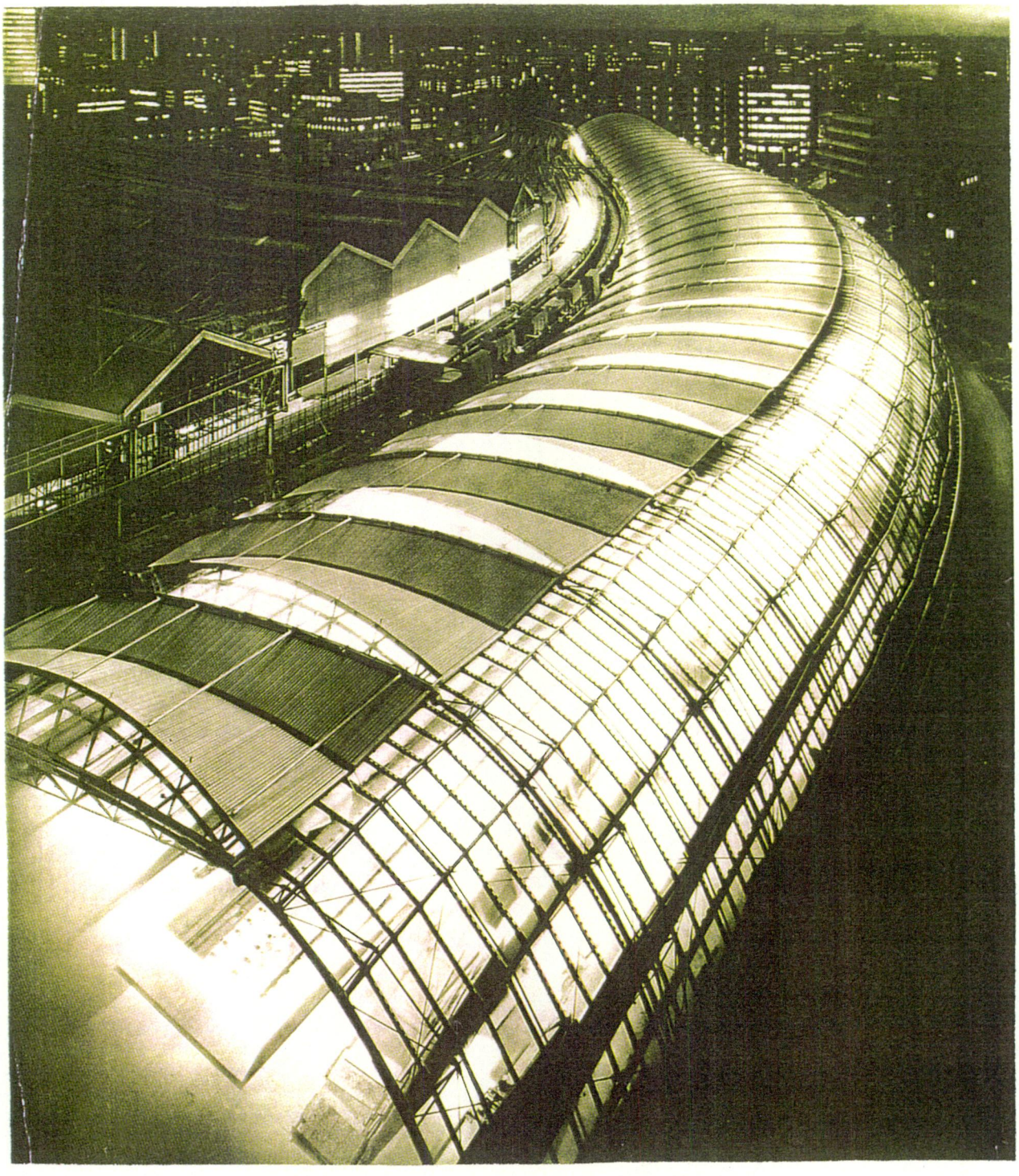


Fig. 3.5 Combination of glass and steel in the roof - Waterloo.

lounge. Because one side of the building, the east side, aligned itself with the existing Waterloo terminal, that left access to natural light on the west side only. Grimshaw has made complete use of this abundance of natural light by constructing a glass wall the length of the terminal on the west side. This provides the arrivals concourse at road level and part of the departure lounge (first level) with natural light. The amount of direct sunlight shining through these areas is minimal, due to the proximity of the neighbouring buildings on the opposite side of the road. The platform, on the other hand, is at certain times of the day bathed in sunlight. Grimshaw's combination of corrugated steel panels with the glazing on the eastern elevation provides adequate shading for the privileged few 'above deck' (see fig. 3.5).

# MATERIALS

In order to realise complete and coherent buildings, the architects of both Stansted airport and Waterloo station were given full authority, by their clients, over the design of interior spaces. With the interior areas, both Foster and Grimshaw adopted a similar process of design to that applied to the external structures. Off-the-shelf alternatives were not accepted, instead changes were made to existing designs, with the collaboration of manufacturers (seating by Tecno - Milan ), and new products were designed where necessary (check-in desks at Stansted, ticket booths at Waterloo).

Although the construction of both Stansted and Waterloo included the use of large amounts of concrete in the undercroft areas, it is the use of the glass and steel components that are more visually striking. Critic Rowan Moore compares Waterloo to Mies van der Rohe's National Gallery in Berlin (1962-1968), describing them both as "buildings which consist of a magnificent steel roof which turns out to be a horizontal facade to a massive masonry basement". (Moore, 1993, p.26). It is the ways of combining these two materials that has gained both these buildings, and the work of their architects prior to them, such a high degree of recognition and respect.

In order to construct the designs created by both architects, many connection components had to be designed in-house. One of the most important of these was the 'Jesus nut' which takes its name from the nut used to keep the propellers attached to a helicopter and rigidly fixes the branches, grid-beams and tension rods which are situated at the apex of the structural trees at Stansted Airport.

The effort invested in the design of such specific components results in not only functional success but also aesthetically pleasing structures. These buildings are designed in some ways with a similar ideology to that of bridge building, in that similar aims are sought - "a maximum of stability with a minimum of material and technical effort" (Aicher, 1994, p.58).

It is the clear simple lines and uncluttered finish of these buildings that constitutes their success as technological monuments. Although many question the need for extravagant aesthetic qualities in purely functional buildings, they are considered of great importance to their large corporate clients. These buildings undoubtedly contribute to the images of large corporations, and to some degree play a role as marketing tools. Both Lloyd's Bank (1986) and the Hong Kong - Shanghai Bank (1986) turned to prominent architects (Richard Rogers and Norman Foster) to design new headquarters for their banks. It is the predominant forms of such buildings to which people begin to relate, Rogers' Lloyd's Bank having been described by a passer-by as "the one that looks like a factory".

In the case of Waterloo station it is the expanse of glass, which has been constructed in an extremely organic manner, which makes it instantly recognisable to those who have had only a verbal (or written) description of this 'train shed' this is required to

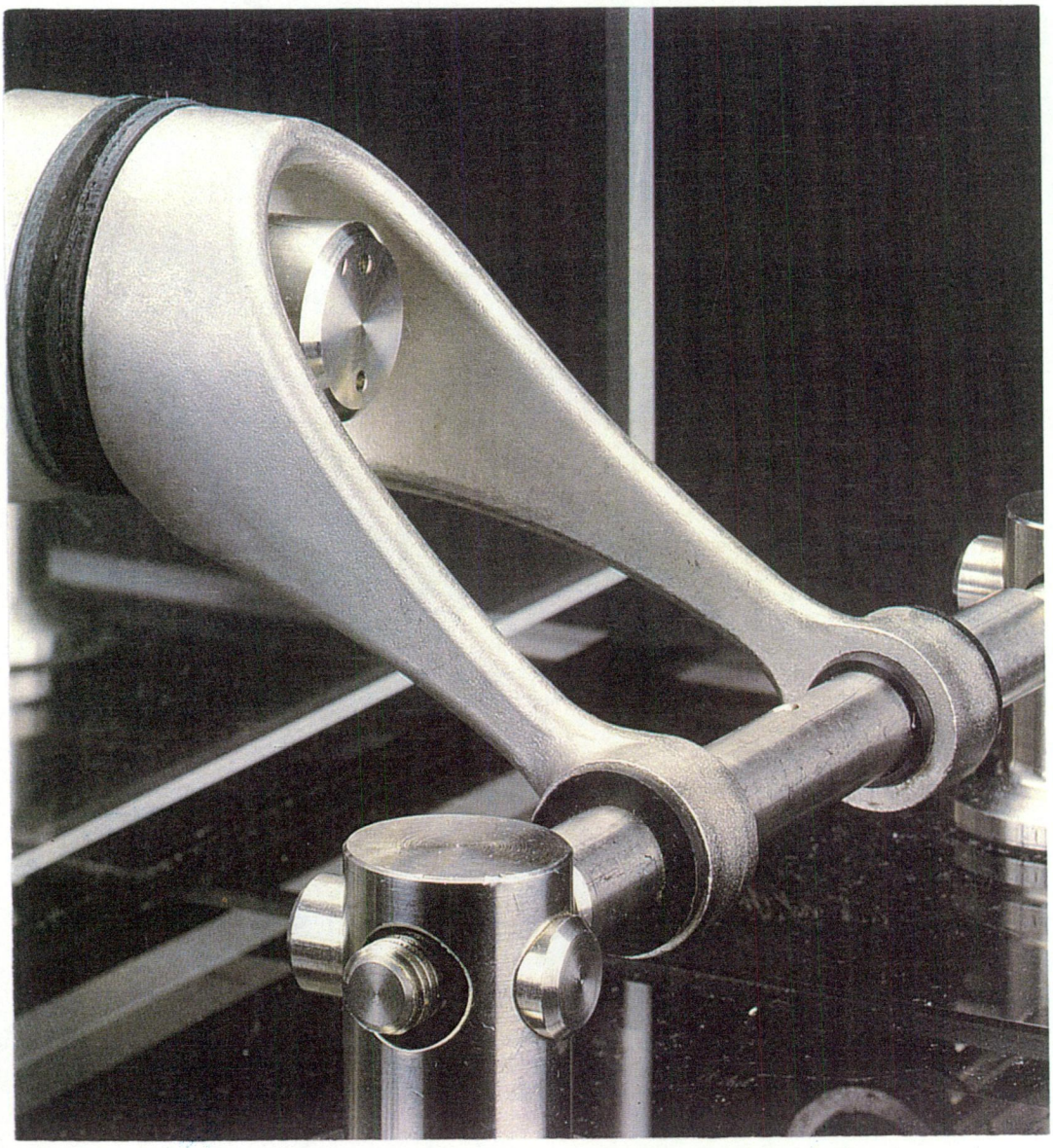


Fig. 4.0 Steel components manufactured by the lost wax casting process - Waterloo.

provide shelter for five trains while simultaneously curving, in two directions, over the trains and along the length of the platform.

Because of the nature of the form and the degree of flexibility required of the roof structure (wind force and vibrations of trains had to be accounted for), great care had to be taken regarding methods for connecting the 1,680 individual glass panels used. A combination of steel components and rubber gaskets produced the necessary results. The steel parts, (see fig.4.0) some of which make reference to skeletal forms, were manufactured by the lost wax casting process, a process more readily associated with the automotive and aeronautical industries than that of building construction. Grimshaw also uses glass to good effect, as a 'wall' dividing the new terminal from the existing one (see fig.4.1). The glass has the practical function of allowing passers-by in the main concourse of the old building a view of the intercontinental high speed trains, while providing the necessary barrier between the station areas. This glass wall also acts as a form of psychological barrier; it is in effect a division between England and mainland Europe. The idea of the siting of borders is challenged.

The glass also allows some people a view of their friends or relations boarding the train, depending on where the latter are seated. This is a reassuring element for those left behind that has been eliminated from partings in airports, due to their ever increasing growth and ensuing decentralisation. Friends and relatives, once passed through the ticket and passport control areas, disappear out of sight into a labyrinth of tunnels which have become commonplace in many of today's expanding terminals.

On entering the terminal at Stansted, most passengers are struck by the expanse of light. Although all four sides of the terminal are constructed out of glass, only 3% of the total roof area consists of glass; the rest is white cladding. It is the colour of this cladding (white), also adopted for the inner structures of the terminal - the cabins and supporting 'tree' structures - that is of the utmost importance. It is the reflective properties of the white surfaces that are of importance, as they help to amplify the available daylight.

Colours, however, are also associated with certain meanings and the use of white could be seen to connote images of hygiene and cleanliness (of the utmost importance in the catering areas) and thus efficiency.

The whole business of clean, efficient public transport needs promoting in order to enable it to compete with personal transport (40 per cent of cars on the roads today are company owned, and for those who must finance their own car, loans are widely available). White also helps create an illusion of space, an issue of prime importance in the retail and departure lounge areas of Waterloo. Here an off-white tone has been used for the aluminium roof panels. In both terminals rather subdued colour codes have been adhered to; white and tones of whites and greys predominate the interior

Fig. 4.1 Glass wall dividing the old and new terminals - Waterloo.

Fig. 4.2 Seating manufactured by Tecno Milan for all waiting areas - Stansted.

structural elements. Grey in varying tones has been opted for by both parties as a suitable floor colour because it helps conceal dirt. A similarly coloured material has been used for the floors in both terminals - granite.

In the concourse at Stansted, slabs of polished granite have been laid. The polished surfaces add a pristine sparkle to the area, creating a sense of everlasting newness. One disadvantage of such a highly polished surface is that it can sometimes affect individuals with sight disabilities; reflectiveness can confuse and instil a sense of uncertainty.

In an effort to keep the design of the terminal complete, the granite surface is also used as the surface for the platform in the British Rail station. Even the lift which connects the two levels has been fitted with a granite floor.

On the ramp connecting the concourse with the arrivals hall in Waterloo Terminal, the granite has been textured to provide grip for trolleys being conveyed up or down it; this has reduced its reflective qualities.

Independently of each other, both architects appear to have decided that carpeted surfaces instil a sense of comfort and both have thus decided on carpeted departure lounges. Carpet, although less easy to clean than the granite floor, does instil a sense of luxury and has the added advantage of contributing to reduced noise levels.

A calm, clear and convenient airport was what Foster intended with Stansted and in this the use of carpet definitely plays a positive role in creating a calm, relaxed atmosphere. The carpet is also used by many in their homes in rooms intended for relaxation purposes in lounges, bedrooms, etc. and certain parallells have been made in relation to this.

Foster's and Grimshaw's practices have, however, had differing ideas on the subject of seating as far as colour and texture is concerned. Both firms opted for furniture already in existence. In the case of the seating produced by Tecno in Italy for Stansted (see fig. 4.2), certain structural adjustments were made for reasons of security and comfort. On both landside and airside (excepting the restaurants areas) the same seating is used. The seats have a wire frame (rather impractical as small items can fall through it quite easily onto a possibly inaccessible area of floor beneath) and are foam-cushioned on the seat and back areas with a blue-toned woven covering material. The material is unsophisticated yet smart. The seats were produced in groups of three or five connected to each other. Although relatively economical, this is not the most efficient way of seating people, as individuals are often inclined to occupy the seats at the ends of each bank of seats and are reluctant to occupy the middle seats. Seats with individual armrests sited apart from one another are considered by some more 'user friendly'.

Unfortunately, the furniture (presumably approved by airport authorities) in the restaurant areas, in the centre of the terminal and in the cafe area on the landside of

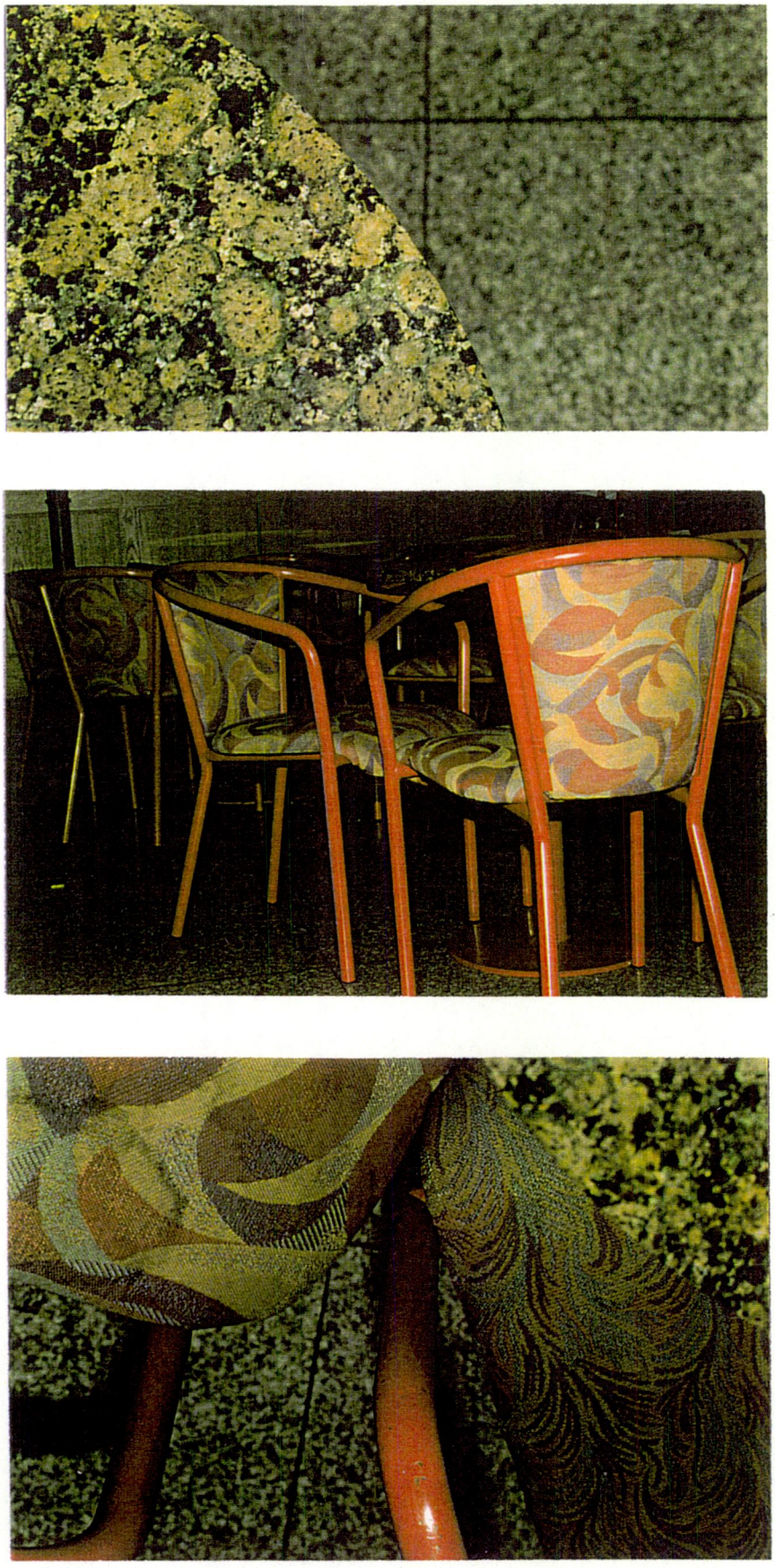


Fig. 4.3 Clashing colours in the Cafe seating, tables and granite floor. - Stansted.

arrivals, shows little consideration for existing structures. Instead of opting for a common, neutrally coloured table for all restaurant areas, a number of different tables were chosen. The most disturbing of these tables has a marble top in a contrasting colour to that of the floor, further worsened by the gaudy covers of the chairs with which it is matched (see fig. 4.3).

Bewley's cafes have remained with their reproduction traditional dark wooden furnishings, creating a 'complete' interior. This completed image, as it is situated in the centre of the terminal and is largely 'open topped' with no roof, tends to jar with its surroundings. If, while seated, one raises one's head this clash becomes evident. The steel 'branches' of the trees appear from out of nowhere behind the traditional homely wooden panelled walls of Bewley's (see fig. 4.4).

The array of different name signs used by businesses, including Cadbury's, The Body Shop, WH Smith etc., on the cabins also causes a certain amount of visual disturbance (see fig. 4.5). "The BAA has allowed each outlet use it's own cooperate signage as part of their retail strategy of promoting leading high street brands" (Parish, 4/2/97). Norman Foster's original proposal was that all business' display their name or logo in either brass or gold leaf. The retail outlets in Waterloo have used their own signs, but because they are not so prominently located as those in Stansted this has a lesser impact on the visual qualities of the building. The existence of advertising hoardings has a far more disrupting effect on the overall design. Although it may be argued that they bring colour into otherwise monotone areas, some of the displays interfere with the spaces and clarity of line within the terminal, e.g. the charity collection box at the end of the ramp leading from the arrivals hall and the advertising for Disney World in Paris at Waterloo station; huge cardboard stand-ups advertising Duty-Free goods disturb the open spaces in Stansted (see fig. 4.6).

Due to the restricted space in Waterloo, seating in the main concourse and arrivals hall is also limited. Two different styles of Charles Eames chairs have been used, both supporting the same red leather/vinyl 'upholstery' (see fig. 4.7).

This leather/vinyl material, despite the fact that it is red in colour ( a colour that usually has connotations of warmth) has a rather cold and business -like feel to it. This uninviting feel conveyed by the seating contributes to the overall feeling of unwelcomeness towards non-passengers in the terminal. These individuals are denied access to bid farewell to travellers on the platform and barely accommodated (from a seating point of view) in the arrivals hall when awaiting the arrival of someone. As the Eurostar train has a capacity of 760, nearly twice the size of a small jumbo jet, it is safe to presume there will be people waiting at the station to meet at least one tenth of these (approx. 60 people). Not including restaurant seating, there are 10 - 15 seats in the arrivals hall.

Certain details have however received more attention. The public telephones, situated in the hallway linking the station to the underground station and in the arrivals hall,

Fig. 4.4 Interior of Bewley's Cafe seen against the roof structure - Stansted.


Fig. 4.5 Differing styles and colours of name signs used by retail outlets - Stansted.

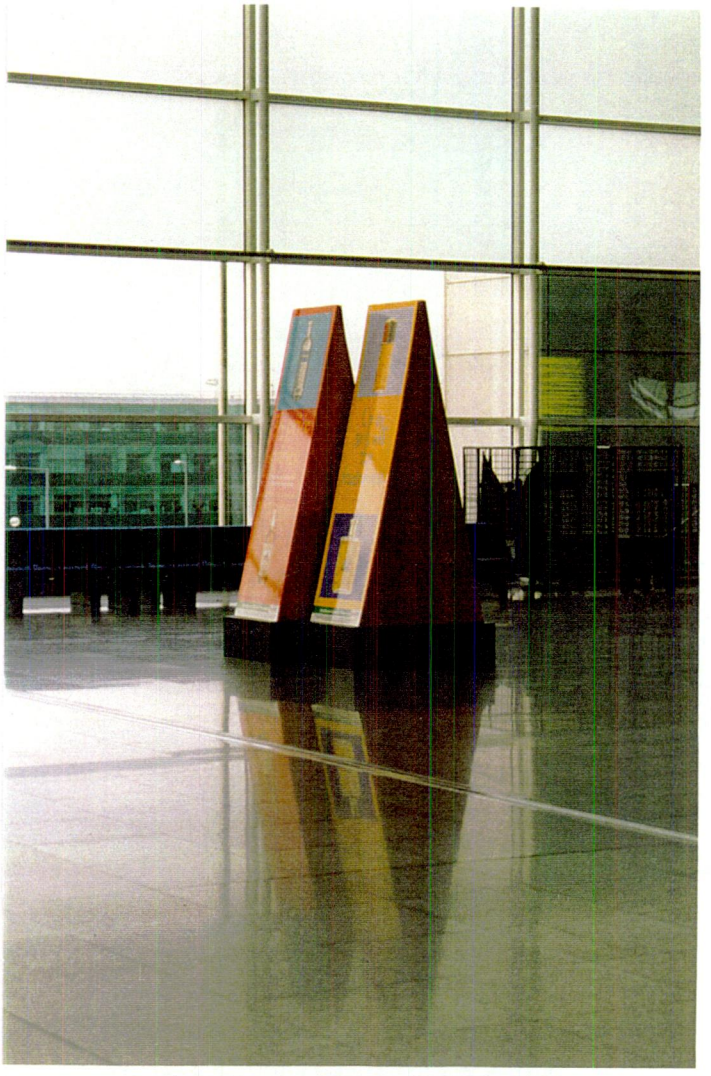


Fig. 4.6 Advertising stand-ups - Stansted.

Fig. 4.7 Two different styles of Charles Eames chairs - Waterloo.

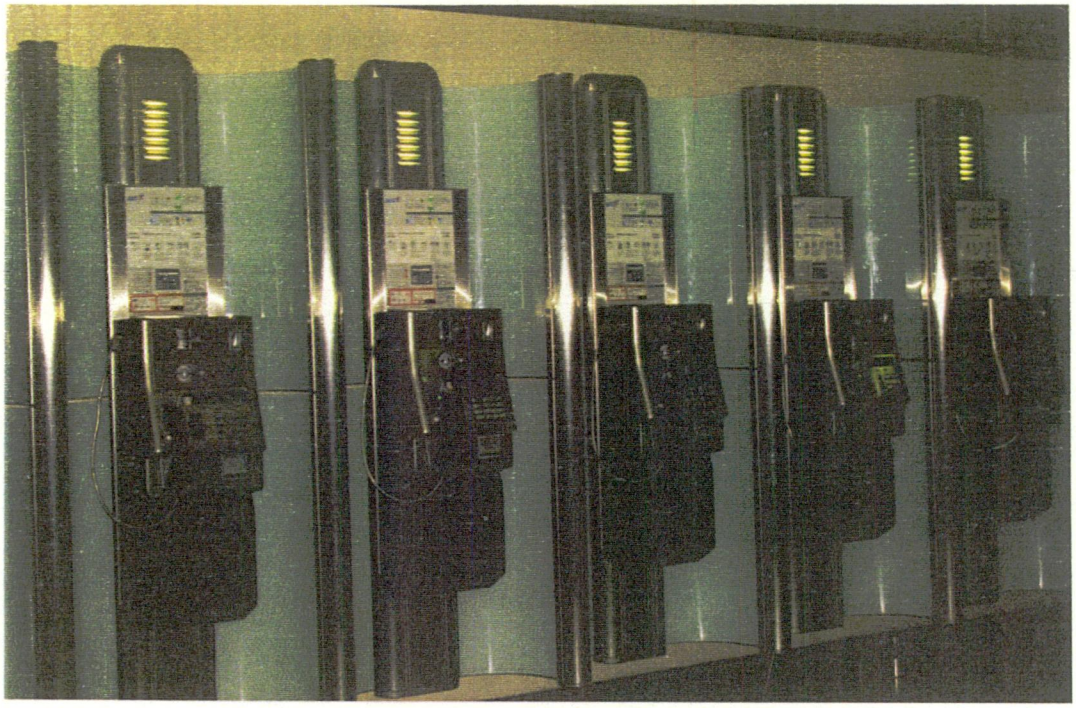


Fig. 4.8 Specially designed telephone units - Waterloo.


Fig. 4.9 Check-in desk - Stansted.

have each been housed in separate booths. These telephone booths were designed by Grimshaw's office in order to enable the telephones to fit better into their environment. Each phone unit is separated from the next by a curved sheet of semi-transparent greenish-tinted glass (see fig. 4.8). The glass is positioned vertically and appears more user- friendly than some of the older claustrophobic, glass bubble booths.
The public telephones in Stansted are sited in groups around a central axis, this system is not unique and has been used in other airports, e.g. at Heathrow.

The search for the perfect check-in desk at Stansted involved extensive research of materials and construction methods. Existing check-in desks in Copenhagen were studied and people involved in their use, including check-in personnel and baggage handlers, were consulted (Evamy, 1991, p.38). In the end, it was decided that one be designed in-house. The resulting desk is steel framed and clad with gun-metal GRP panels and has a protective steel band up to knee level (see fig.4.9).
The ticket sales and information office in Waterloo station have done away with the glass windows, dividing customer from ticket seller and have replaced these with large, open, part granite-surfaced desks. These desks reduce the sense of alienation towards the passenger by making the assistants seem more approachable (see fig. 5.0).

The element of customer satisfaction and comfort is also considered in the toilet/bathroom facilities in both Waterloo and Stansted. In Waterloo quite a luxurious effect has been created with the use of polished black granite sink tops and back lit mirrors (see fig. 5.1). The only problem with the toilets is their location. Except for one small facility in the immigration hall there are only two sets of toilets serving the terminal, situated at the rear of the departure lounge. For a building which is expected to serve fifteen million passengers a year, this is a rather meagre amount of toilets. Non-travelling occupants have again been disregarded; they are obliged to return to the main station to use the facilities provided there.
The siting of toilets in Stansted is also rather questionable. The main blocks of toilets are situated in the centre of the terminal and must be accessed by a narrow walkway. This narrow corridor provides access to a gents, ladies and baby changing room, making the through passage of more than two people quite an ordeal (see fig. 5.2).
The designers seem to have overlooked older people, who may not be very stable on their feet, people in a last minute rush and mothers with prams or small buggies. To add to the discomfort of battling their way to the toilet, passengers are faced with opening a heavy door fitted with a stiff spring. This is an obstacle, virtually impassible for a person with a child in a buggy.

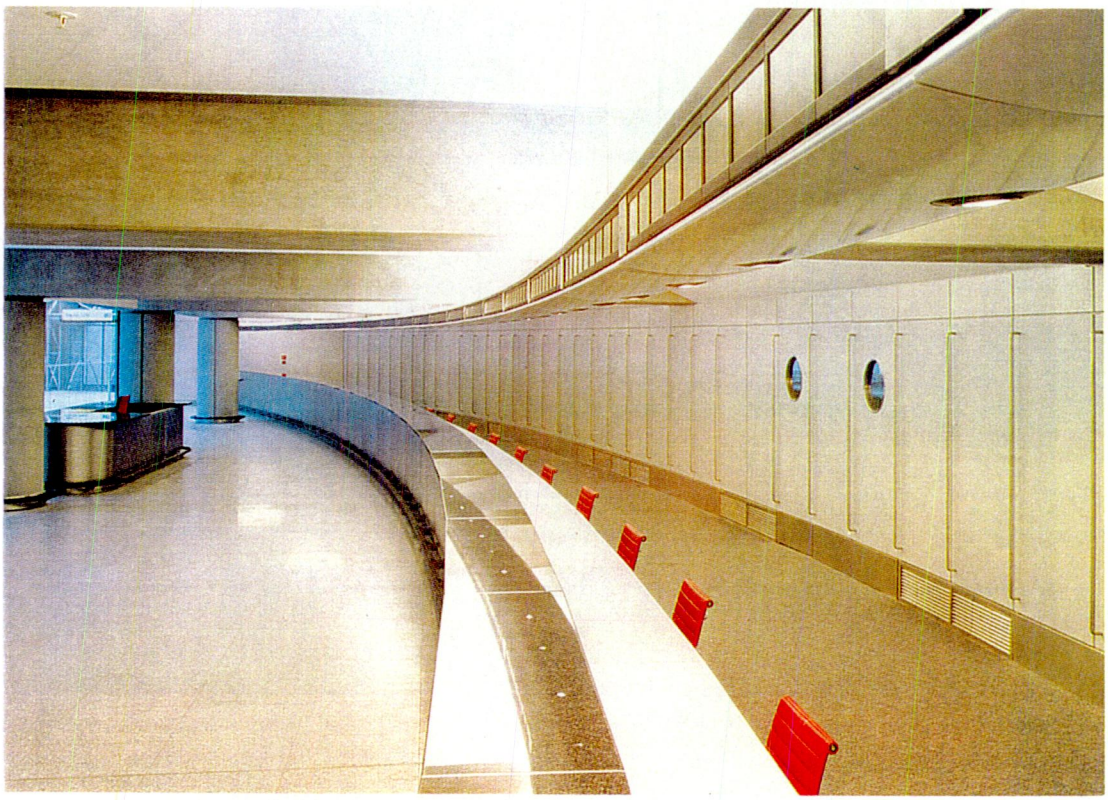


Fig. 5.0 Ticket sales and information office - Waterloo.

Fig. 5.1 Toilet facilities - Waterloo.

Fig. 5.2 Restricted access to toilet facilities - Stansted.

# COMMUNICATIONS SYSTEMS


Fig. 6.0 Sign system - Stansted.

Many different methods of communication are used in both airports and stations from the primary information conversational type to the less direct type - sign systems, and also more subtle methods using light and colour. As some of the communicative effects of light and materials have already been dealt with, some further methods of more direct communication will now be examined.

One of the most important of communicative aids is the system of signs used in stations and airports. In the cases of both Stansted and Waterloo, as with most terminals, sign systems were specially designed to suit their needs. Foster's intentions of a specially designed system, involving as few signs as possible, met with an obstacle in the form of the British Airports Authority design director Sir Norman Payne. He wanted the current BAA system in operation in Heathrow to be used, his argument being "you can't really confuse the passengers" (Evamy, op.cit. p.43).

As Stansted is unlike any of the BAA's other terminals, it was inevitable that a more sympathetic system be developed: - "prominent light and colour patterns that are in opposition to spatial information may destroy orientation, confuse spatial comprehension and distract attention" (Nuckolls, 1983, p.53).

It was for these reasons that Foster wanted to keep the use of signs to a minimum within the terminal. In the end a compromise was reached and a system was designed by the Pentagram design office. The original yellow of the BAA signs has been retained but toned down slightly. All the lettering is justified to the left and all directional arrows and icons are aligned vertically (see fig. 6.0).

e.g. <-- toilets
--> check-in

This alignment of arrows could possibly cause confusion for people trying to read the signs in a hurry, or from a distance. It might have been more comprehensible had directional arrows to the left been justified to the left and those to the right justified to the right.

e.g. <-- toilets
check-in -->

Each legend (line of directional script and icon/arrow) has been allocated its own separate slat which slides into a holder with other slats. This system allows for changes in the group without the need to produce a whole new sign. The 'pods' or information centres created in the centre of the structural tree support systems provide sites for some of these yellow signs and illuminate them from behind. The rule in most public buildings with the provision and siting of signs is that at every change of direction a sign must provided. The fact that Stansted is such a straightforward building with a straight line of flow from the main entrance to departure lounge meant that signs could be kept to a minimum. In most cases, signs are sought by individuals who are most likely on the correct path already. In Stansted, because of its open plan, passengers are often directed/led by others, for example people who have just checked

in when seeking the departure lounge may look for passengers who had checked-in in front of them to see where have proceeded to and thus find the departure lounge.

In addition to supporting the signs, the structural trees also provide sites for the flight information monitors. Because of the size of the font/print used, these monitors could pose reading difficulties for the visually impaired. The initial monitors installed at Stansted had reflective problems with the screens; this has since been rectified by the positioning of a plastic 'shade' around the top rim of the screen, and through the use of a semi-opaque glass in the screen. There are only two large, non-light emitting, electronic information boards (using liquid crystal display) in the main terminal at Stansted. One displaying flight departure information is situated at the end of one of the aisles of check-in desks opposite the central entrance. The other board is situated in the arrivals area, providing necessary information for those meeting passengers on incoming flights. Because of the nature of the building these flight information boards have been mounted at cabin level. In the arrivals area the information display is mounted in front of the glass screens which conceal the customs area of the terminal. Because of the scale of these displays, they are easy to read at a distance and a quick glance provides the necessary information - reassurance to the rushing passenger that they have not missed their flight, or to a worried relative arriving to meet someone.
People waiting to meet passengers in the arrivals hall in Waterloo terminal are kept informed through displays on television monitors. The monitors are situated at a height of approximately eight foot from the ground and have been tilted downwards towards the passengers in order to reduce reflection levels. There are similar monitors located in the departure lounges, providing information about departing trains.

In Foster's efforts to create a terminal which would have a calming experience on its occupants, as well as having signs kept to a minimum, he also intended that the public address system be used very little. The departure of each flight is only announced once; this has created an immense difference in noise levels in this terminal compared to other major terminals where the public address system is in use every few minutes. This system devised by Foster has both advantages and disadvantages. Because of the minimal use of the P.A. system, noise levels are kept at a minimum. As in many cases people don't register what is being announced, being often otherwise occupied eating, shopping or reading etc., its use is to a certain extent wasted. The disadvantages of the system is that passengers must make an extra effort to keep a check on check-in and departure times displayed on the television monitors. The visually impaired and illiterate are also at a huge disadvantage with this system of reduced public address announcements. It is possible that such individuals might not even realise that their flight departure will only be announced once, as this is only indicated through the use of signs, i.e. reading is involved. Although the idea benefits


Fig. 6.1 Lift controls with raised type and large buttons - Stansted.

the majority, it tends to alienate the minority. A point worth noting is that although flight-related announcements are kept to a minimum, the public address system is nevertheless used quite regularly to make security announcements. The nature of these announcements usually involves a request asking passengers not to leave bags unattended, or to reclaim an unattended bag.
Although these announcements must be necessary, it appears as though Foster's vision of a calm quiet terminal is being slowly undermined.

The visually impaired, although ill-served by the public address system, have been catered for in the main lift connecting the main concourse with the bus station at ground level and British Rail station at an even lower level. The larger than normal size buttons have raised symbols for each floor so that they can be read easily by those with sight difficulties and felt by those who are blind (see fig. 6.1).

People with hearing disabilities are catered for at certain points throughout the main terminal building. At Stansted, induction loops have been installed by certain seats in the different waiting areas and their existence is indicated by large pictograms. These induction loops are of benefit to those wearing hearing aids as they amplify the public address system.
Physically disabled people are accommodated by special telephone links from the car parks to the main terminal information desk, from where help can be dispatched if necessary. The car parks have large pictograms indicating the location of disabled parking spaces and the special telephone points. These small design features, although of little significance to a large percentage of the general public, provide services which help make the 'journey' through the airport a comfortable one for passengers suffering from any form of disability.

Because of its intercontinental links Waterloo has been provided with a bilingual sign system designed by London-based graphics and corporate identity company Herion, Ludlow & Schmidt. Each sign appears in both English and French. The English is on top and the French below. A distinction between the two languages has been made through the use of differing shades of background in the colour blue. The sign system used was the existing British Rail system designed by Jock Kinneir. The colours used in the signs and methods of hanging the signs helps integrate them into Grimshaw's interiors. Grimshaw insisted that the signs necessary on the platform area must not be suspended from the glass structure as they would interfere with the line of the roof and clear space beneath. Instead the signs on the platforms are mounted on purpose-built columns (see fig. 6.2). The signs have also got a special surface finish, a mineral finish designed to resist graffiti. A good sign system, apart from providing directional aids and reassurance for those who are already proceeding in the right

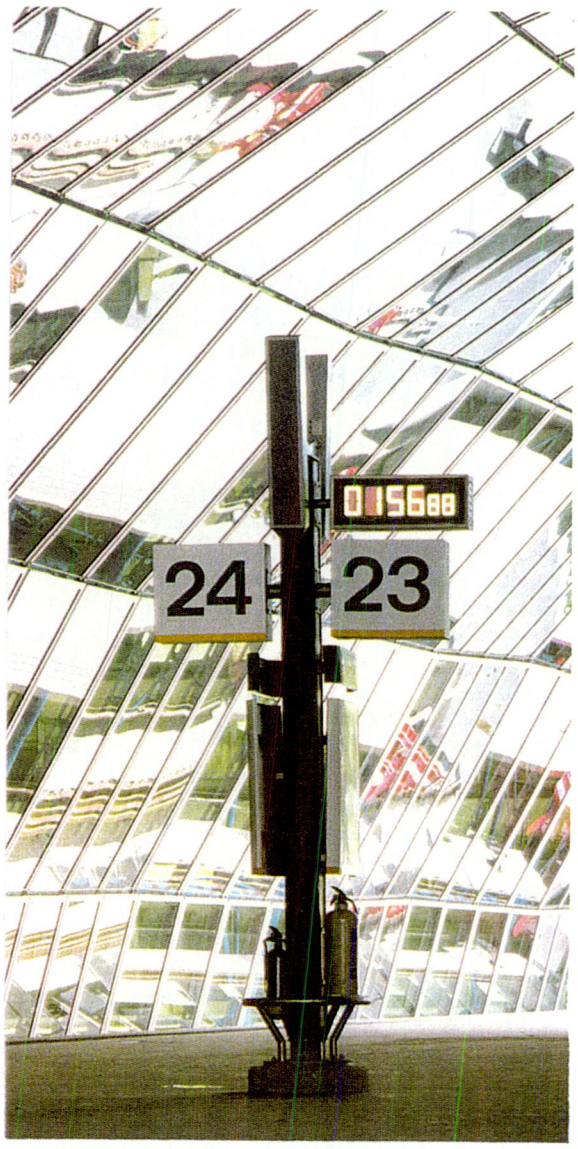



Fig. 6.2 Purpose built columns to support signs on the platform - Waterl

direction, also keeps management costs under control. When a sign system is lacking, frustrated passengers often turn to airport staff for help; if this happens on a large scale, it can result in the airport authorities having to employ extra people to cope with the demand.

Such problems can contribute to the detriment of the reputation of an architect.

# CONCLUSION

The functional and aesthetic success of both Stansted airport and the new terminal at Waterloo have been discussed with regard to their psychological effects, under the headings of structure, lighting, materials and communications systems.

From an aesthetic point of view the structures of both have used forms not often adopted in the world of transportational architecture (Stansted being a single level terminal and Waterloo having a relatively low roof for a railway station).

On the whole, the structures of both buildings have been a success functionally. The aim of creating a comprehensible directional flow of passenger traffic has been achieved. There are a few smaller details such as the siting of toilet facilities in both buildings, which are a cause for concern.

The lighting of both Stansted airport using a combination of natural and artificial light is one of the highlights of this building. The platform area of Waterloo Terminal, which makes maximum use of natural light, has stronger aesthetic qualities than the lower departure lounge areas, which are predominantly artificially lit. Both buildings were required to conform to specific lighting standards.

The choices of both architects regarding materials, especially interior materials, (seat coverings and colours, floor surfaces etc.), have been made with the highest regard for the aesthetic nature. Unfortunately, however, the influence of commerciality, using additional 'non-conforming' materials and colours, (advertising hoardings etc.) has started to infringe on the architect's original 'complete' design concepts.

The communications systems installed in both buildings also underwent particularly rigorous selection processes in order to find the most suitable system or combination of systems. Waterloo's combination of public address system and television monitors provides adequate information. Stansted also relies on television screens (and two liquid crystal displays) for the conveyance of necessary information. The minimal use of the Public Address systems in an effort to maintain the 'calm' aesthetic has come under a certain amount of criticism.

Stansted has to be deemed a success due to its continuing commercial growth; "For the 12 months to the end of January, there will have been well over 4 million passengers, including 750,000 using British or Irish flights, double the number for last year". (Elliott, 1996, p.33).

It has also been the subject of considerable public acclaim, having won more than twenty-five awards for different aspects of its design. Whether or not its expanse of open spaces will stand the test of time remains to be seen.

The terminal building at Waterloo is a success aesthetically. This was substantiated by the fact that a proposal for the development of an office block above the glass roof of the terminal was successfully prevented. Due to the fact that the terminal is only in service for a relatively short time, three and a half years, it will be some time before it's functional success can be properly accessed.

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