

Santiago Calatrava (b.1951)

Satalos Airport Railway Station 1989-1994

(now known as Saint-Exupéry)



Key Facts:

- **Location:** 24km east of Lyons, France
- **Commission:** National Open Competition with invited foreign architects through French Railways (SNCF), the Rhone-Alps regional authority and Lyon Chamber of Commerce; cost exceeded 600 million francs.
- **Materials:** Reinforced concrete, steel, aluminium, glass
- **Site and scale:** 5600 m² linked to airport in landscape setting.

1. ART HISTORICAL TERMS AND CONCEPTS

The commission explicitly sought an exciting symbolic High-Tech structure – in this case the aerodynamics of a bird are a metaphor for movement- to serve as a landmark. Calatrava was expected to incorporate his iconic trademark forms with dramatically inclined concrete supports holding up an open curved steel skeletal framework covered in glass.

Function: This transport hub is a key example of functionally necessary civic architecture for public use. The station is designed in two parts: above ground the station hall straddles the railway tracks, while below ground are the 500m-long covered concrete platforms where the high-speed French TGV trains enter and leave. The station hall is linked to the existing 1960s airport, which is preserved and framed by the new building, through a 180m-long covered steel gallery with travellators. The station, built in a cutting, allows the central two tracks to pass through a caisson'shockwaves'designed of the to cope with the -stop 300 km an hour TGV trains. The glazed station hall (120m x 100m, height 40m) is bordered on the east side by basement (cloakrooms, staff etc); ground level (concourse, ticket sales, shops etc.); mezzanine level (station master, airport police); top level (bar, restaurant with balconies and exhibition space) with access tunnel to the airport.

The design needs to take into account the circulation of trains, buses, cars and pedestrians, and ensure clarity of passenger orientation for effective movement. The rhythmic repetition of forms literally suggests movement, and the spacing between ribs affects the speed of walking. The size allows for maximum capacity at peak times, and the orientation in relation to the light draws passengers from the sparsely lit interior towards the light of both the tracks and the exterior.

Style: Calatrava is not interested in the early Modernist mantra *form ever follows function* (Sullivan) but says “*form follows form*” as he takes his aesthetic stimulus from nature and from his knowledge of mechanics distilled to an “*essence*”. For Calatrava, light, space, material, form and structure are all inter-dependent.

Functional and practical elements come together in the distinctive aesthetics of the zoomorphic configuration of the roof – an identifiable image of movement which mimics the silhouette of a huge bird with wings that unfold longitudinally over the platforms appearing to be ready both to land, and take off. Initially Calatrava said “*honestly I am not looking for metaphors*”. However he later admitted that the station “*resembled the wings of a bird in flight*”. Some travellers have the impression of “*being inside the skeleton of some prehistoric giant*” (Petroski). Calatrava’s drawings reveal the origin of the design also lay in the eye and eyelid, while the ground plan “*resembles a manta ray*” (Jodidio). The shape and dynamism of the structures generate satisfying anthropomorphic feelings for those who reject Modernism.

Calatrava’s style is associated with High Tech and also known as Structural Expressionism - with a “*combination of force and mass, you can create emotion.*” High Tech as a term was first used in 1978 by Kron and Slesin to describe the expressive use of industrial components and advanced engineering technology. It is sometimes regarded as being in competition with Post-Modernism, while at others as a part of that general trend.

Structure and Form: The dominant structure is created by two arched steel beams that support the station hall roof like a spine and weigh 1300 tons, and also define the north and south facades. A further two further steel curved beams follow the line of the middle ribs of the roof. All four of these span 100m and are supported by the distinctive V-shaped concrete abutment at the west end. The uppermost arch is a steel box of triangular section; the lower arches are steel tubes. The crossing, bracing supports are assembled four by four. At the east end the beams embrace the concrete service core. In the triangular main hall the spine is formed by arches braced together by diagonal beams. There are also two large lower concrete arches that span the length of the station, with portals to the walkways below the smaller arches. Between the large arches are glass sheets, each 8ft wide, which can be rotated for ventilation. The support structure forms a continuous skeletal black-painted vault, interrupted by the station hall, and which is denser in the middle with heavier supports while the webroof is more transparent. This concrete nave appears -like’ and is glazed in the areas where passengers move so they are drawn along and the whole form appears light. The strong contrasts of light and shade are used to articulate the structures, in sequences and repetitions, with equal attention paid to exterior and interior, and to the undersides. The exterior wings are cantilevered out over the side walls of glass.

Below this the platforms’ vaulted roof is assembled out of a lattice arrangement of V-like concrete rib elements. On the airport side this is an open support; on the other side is the solid wall of the caisson.

Composition: Symmetrical design with the central rib of the bird-like form of the hall bordered by the wings, crossing the long low platforms at right angles in a series of repeated rhythmic arches.

Volume and Mass: The glazed skeletal form reveals that Calatrava does not think of walls as containers of space but as sculptural surfaces that communicate “crystallised movement” in line with the mobility of the public using the space.

Texture, pattern, ornamentation: The clean lines and shiny clad steel and glass of the High Tech design dominates, yet the lattice of vaults in both the station hall, and below over the platforms creates a beautiful pattern enhanced by the strong shadows. The effect is of highly finished machine-detailing with a strong contrast between black-clad steel and the rougher concrete form-work creating patterns at the platform level.

2. CULTURAL, SOCIAL, TECHNOLOGICAL AND POLITICAL FACTORS

Santiago Calatrava Valls breaks down the conventional roles of artist/architect/engineer. He comes from Valencia, Spain where he studied Fine Art, then Architecture, then Urban Studies before moving to Zurich to study Civil Engineering and write a Ph.D. on spaceframes he worked at the Institute for Aerodynamics and Lightweight Constructions before setting up his practice in 1981. His earliest works focused on bridges and transportation hubs.

The aim of the Satalos Station competition was to boost trade through efficient transportation in the Rhone-Alps region linking the regional Lyon Saint-Exupéry airport to the city. Only Paris, Marseilles and Lyon were initially connected to the TGV, and the later aimed to profit from the 1992 Winter Olympics at Albertville.

French railways are nationalised and the Socialist President Mitterrand (1981-1995) invested in new technology and infrastructure including the first high-speed train running from Lyon to Paris. Satalos Station is a valuable regeneration project providing space and visual pleasure for the public. Yet Calatrava's monument to flight also marks the end of the Cold War in 1989 and the triumph of Neo-Liberal Capitalism with its inclusion of retail outlets, in an individual idiosyncratic style heavily influenced by the US Cold War architect Eero Saarinen.

This "great bird-like arch –a wing in flight, a beak, a talon" is a homage to rail travel as the high-speed "shark-nosed TGVs slide menacingly into and out of the station is something rail travel has been lacking for very many years. This station may seem a little over-the-top, yet its role is to make rail travel exciting and desirable and to make its presence felt in the subtopian landscape of the airport" (Jonathon Glancey).

3. DEVELOPMENTS IN MATERIALS, TECHNIQUES AND PROCESSES

Calatrava's initial drawings, watercolours and models are recognised as works of art and anticipate the sculptural forms, as well as the details of his final structures. The bird-like form was clearly identifiable in his early sketches and sculptures. The station uses the core materials of Modernist architecture, reinforced concrete and steel which both strong in compression and tension, and glass, yet transforms them into new organic forms. Calatrava describes concrete as the *"most noble"* construction material as it is the most *"plastic"* and can take any form. He used it for his V-shaped pedestal which supports the steel roof arch system to form the distinctive 'beak' of the bird -shaped silhouette. Steel is mixed with precast and *in situ* concrete to create a lightweight and dynamic impression appropriate for a transportation hub, in combination with aluminium clad steel and glass.

This is an extension of Modernism's use of new materials and clean lines. Calatrava looked back to the bridges of Robert Maillart (1872-1940), the early thin-shelled concrete roofs of Eduardo Torroja (1899-1961) (himself influenced by Gaudi), and Pier Luigi Nervi (1891-1979) in the 1930s, and to the engineering work of Spaniard Felix Candela (1910-1997) 'the shell builder' whose work in Mexico (for example, his restaurant at Xochimilco) explored sculptural space through parabolic hyperboloids; Danish architect Jørn Utzon (1918-2008) whose original sketches for Sidney Opera House (1959-1973) caused such problems for the structural engineers. His major influence however is the US architect of Swedish descent Eero Saarinen (1910-1961) whose expressive, organic TWA Terminal for John F Kennedy Airport (1956-1962) was described as an *"allegory of flight in re-enforced concrete"*. In the early days of air travel Saarinen said it was *"a building in which architecture itself would express the drama and specialness and excitement of travel... a place of movement and transition... the shapes were deliberately chosen in order to emphasize an upward-soaring quality of line. We wanted an uplift."*

4. WAYS IT HAS BEEN USED AND INTERPRETED BY PAST AND PRESENT SOCIETIES

Calatrava is explicit in his rejection of the Modernist ideology of art for everyone and closer to Post-Modernism in his determination to develop a distinct personal individual style. *"We are again finding the liberty to create, and this implies a new place for the architect as artist, and for architecture as art."*

Since the organic architecture of Frank Lloyd Wright (1867-1959), and the shell structures of Candela, zoomorphic architecture has become an emerging trend with more buildings emulating nature, and inspired by animal forms. Calatrava's animal metaphors are explicit and create iconic signature buildings recognisable all over the world that are satisfying functionally and aesthetically, but unfortunately exorbitantly expensive to maintain.

"Calatrava redeems the dead space, and dead time, of transit. To get somewhere, we tolerate passing through nowhere. His constructions help to turn those nowheres into somewhere." (Boyd Tonkin New Statesman and Society 1994).



Top: Eero Saarinen TWA Terminal, JFK Airport, NY 1962, bottom: Calatrava Auditorio de Tenerife 2003.

FURTHER READING & LINKS:

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