

On the Work of Santiago Calatrava Gothic After the Death of God

When we look at the work of Santiago Calatrava, we see lively urban scenes, incomparable constructions and elegant details. The bridges and canopies to which he generally applies himself look like an unrestrained game with the basic concepts of statics, a pure manipulation of natural laws. But take note: this is a *plastically* articulated manipulation, determined not only by the constraints of physics but by a subjective preference for forms derived from animal skeletons. Calatrava's monumental images are reminiscent of the gigantic rib-cages, vertebrae and whalebones in a natural history museum.

In Calatrava's best projects this skeleton is a thing of great autonomous beauty. The bones shine through the complex living tissue as in an X-ray. He orchestrates the slumbering potential of an infrastructural node with great virtuosity. The place becomes a memorable experience, a stage in an ordinary journey which is elevated to the status of ritual.

Calatrava clearly finds himself in good historical company, with Viollet-le-Duc, Antoni Gaudí, Robert Maillart, Pier Luigi Nervi and Felix Candela. Like them, Calatrava makes poetry out of the kind of civil engineering usually treated as just a prosaic business of applied mathematics. As art approaches science, science turns irresistibly back to art. Calatrava's zoomorphic structures of concrete and steel, his technical precision and his fabulous *mis en-scène* (descended from that of Gaudí) make his architecture into compelling *Gesamtkunstwerke*. At times it approaches the grace of the Gothic.

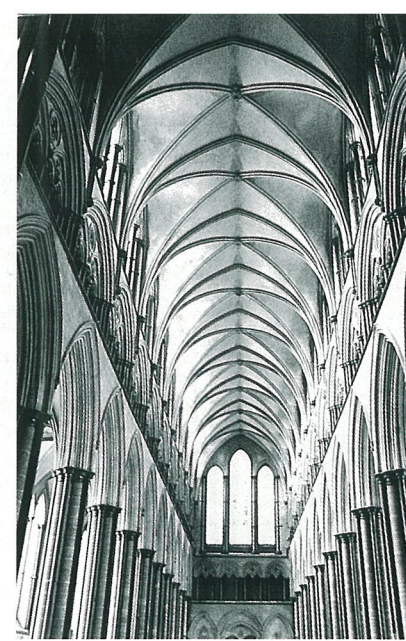
Calatrava is not especially concerned with designing a novel ground plan, but with investigating the spatial and tectonic character of the structure. This obtains its distinctive quality through a design method based on cross-sections and three-dimensional models. Calatrava takes the programme for what it is and concentrates on staging an overwhelming experience. Now that Calatrava's soaring international fame is bringing him a growing and increasingly varied stream of commissions, the fine, generative added value of his architecture is coming under pressure. His X-ray bone structures are undiminished in their beauty, but what of the flesh and blood? Does the social tissue really benefit from continual exposure to this penetrating radiation?

Bridging the Historical Pillars of Modern Architecture

Calatrava's architecture is characterised by a fusion of civil engineering and sculpture. Extreme abstraction materialises as a figurative image, and the end result of a complex series of calculations turns out to be art. No wonder he reaps boundless admiration and seldom more than muted criticism. For critics, Calatrava's work is a puzzle but at the same time it offers a potential way out of the trap that has hampered them since the Enlightenment: the disciplinary dichotomy between architectural design and technical construction. The Modern Movement of the first half of this century did its best to rise above the historic split between Beaux-Arts and Polytechnique, but it continued to be true and is now more so than ever that the architect is concerned largely with design while the engineer (and the investor) determine the underlying structure. This long-



BCE Place, gallery and heritage square, Toronto, 1992



Salisbury Cathedral, 1220

established split has deprived everyone of the capacity to think about meaning and structure simultaneously. In this light, Calatrava's genial inventions seem to offer deliverance from the institutional impediments. The artist can appear in the guise of the engineer (and vice versa) and expression and structure prove perfectly compatible. *Poiesis* and *techne*, having degenerated as the result of a misunderstanding to become the opposing poles of architecture, find their reconciliation in Calatrava's work. But because the strict dividing line between the areas of competence has also seriously clouded the perceptive powers of the critic, this work is seen by many critics as being no more than a mythic synthesis that is inevitably unique to Calatrava. Calatrava himself never places the institutional conditioning of the profession in jeopardy. By virtue of the intense power of the image his work presents, he avoids this danger and even adds to the strength of the *métier*.

The Phenomenology of the Dynamic Structure

Calatrava's civic works have an almost indescribable charisma that leaves few passers-by or users untouched. What holds our attention is the phenomenology of the dynamic structure: a pronounced organic presence that expresses the power of natural forces in materials. When this captivating quality coincides with a programme of infrastructural development in town or country, the architect succeeds in blending everything into a virtuoso expression of social traffic, physical sensation, architectural insight and the laws of bending moments.

At the core of all Calatrava's designs is a movement curbed, a restrained force that gives the impression of being about to break into motion; and this is present in every work down to the level of the finest particulars. His control over that movement is subtly exerted by a perfectly detailed interplay of contrasts – light and shadow, convex and concave, weightless and heavy.

Another noteworthy aspect, observable for instance in the façade of the distribution

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When searching in the library of the ETH in Zürich under the lemma Gaudi, I found a little book which I looked through. It had astonishing beautiful drawings, carefully put together. It had chain-models, constructed in a simple way, economically too, but I thought it highly important. I looked it through again and again and studied it. The interesting thing is that it was made in that university, and also in other places far from Spain there are people who are interested in Gaudi. I like that very much. My relation to Gaudi is pure admiration for his work. The direct Modernism of his work, I think it is a tremendous experience. What fascinates me enormously in Gaudi's work is the human dimension behind it, and also the whole circum-

stances under which these buildings were made. How they are tremendous engagement, as for example the canopy of the cathedral in Mallorca, which is for the people who know it a wonder of Modern art.

Santiago Calatrava

It is interesting to ask oneself if architecture or engineering can be art. It is a question I asked myself more than once, and I think it is connected with the work of one person and with his development. I do not think that any of my buildings can make the claim of being a work of art, not even a *Gesamtkunstwerk*. So I think my work must be seen as an evolutionary unity, and I think I have at least tried to indicate my curiosity for several things with

this miscellanea of subjects, projects, or interests.

Santiago Calatrava

The modern engineer has two things I like very much. One is an empirical understanding of nature. Engineers look at phenomena and try to describe them, for example taking a slope and its movement and modelling these in terms of, say, shear forces. The second is pure creativity. The conceptual work in devising forces which cope with the problem. And I think that is why the evolution of respect for the landscape can be achieved more successfully by the engineer than by the architect.

Santiago Calatrava

The connection between a projected work and the urban context is of great importance. First of all any architectural or engineering work has a technical or practical purpose, for example to span a river, to cross an obstacle. From that stage onwards, the task of the architect consists in learning, educating, in urbanising, in practising urbanity with the design.

Santiago Calatrava

Drawing and architecture are two different things. Architecture is a phenomenon in itself. It comes more from the world of ideas directly applied to the materials used in building. Graphics intervene: they have now become almost a hindrance.

Santiago Calatrava

centre in Coesfeld-Lette (1983) and the Stadelhofenstation in Zürich (1984), is that however daringly the construction may be exposed to view it is never used to convey the technocratic message that is typical of so much high-tech architecture. There is no technician mask that exalts technology as an end in itself. Calatrava opts for a formal vocabulary derived from biology and thus distances himself from the explicit glorification of technology. Moreover, he treats the social, urban and topographical elements that underlie his commission with great care. In his early work, especially, Calatrava shows much respect for the public space. His concern for a social meaning of the place is illustrated by the separation of pedestrian and motorised traffic, and by the *belvederes* and little *piazas* which produce a momentary pause in the circulation so strongly suggested by the structure, allowing people calmly to take over. Especially in his bridges, these points of rest are linked by lines, for example in the form of staircases or linear elements of the basic structure. He thus clarifies the inner logic of the architectural object as a whole and enhances its relationship to the landscape.

The everyday movements of the public and the specificity of the landscape interact with the plasticity of the architecture. At the same time, the structure functions as an imposing urban monument. In his recent work this monumentality, which is an essential constituent of Calatrava's fame, seems to be gaining greater autonomy. A powerful architectural vitality is emerging independently of local and social context. This vitality does not so much generate force as represent it. The hidden potential of the place is no longer mobilised as the source of the image. The rationalist approach of the construction is becoming ever more clearly revealed by a subjective preference for skeletal anatomy. Thus the architecture loses in social meaning, but gains in force and autonomy. It seems to do more good than bad for the popularity of this work.

Autarchitecture

However self-referent and autonomous the finished result may be, the ideological choice shows through. By means of its ontological treatment of the material and construction, the work aims to stimulate a genuine communication that is not yet sullied by the mediated, touristic habit of vision. With Calatrava, architecture is not a cultural metaphor but a modest platform, a possible basis for regaining a kind of moral integrity. In his structures, this need is condensed and furnished with an ostensibly pure image. It becomes a kind of manifesto of the unrepresentable. An essential feature of Calatrava is the non-cerebral way he communicates this manifesto. That is why Alejandro Zaera connected Calatrava's work to Robert Vischer's aesthetic theory of the symbolic empathy (*Einfühlung*) in which the architect imparts his building with an *anima* that cannot be deduced logically or grasped in conventional linguistic terms, but which can be felt through an almost mystical relationship with the material, a relationship that is somewhere halfway between animism and pantheism. ★ Material, space, light, proportions and construction come together at an unconscious level to form a meaning that can scarcely be reduced to rational terms. Calatrava's zoomorphic skeletons seem to

★ Zaera, Alexander, 'The Living Structure', *El Croquis* 43 (1990), p. 174.

appeal to this kind of perception. It is not the radicalised distinction between beauty and utility that is at issue here, as it was in the aesthetics of the avant-garde, but the healing force of the pre-conscious experience: in other words, the region in which we are all equal. Thus Calatrava's bridges are also bridges in a spiritual sense, bridges leading the way from an overheated sign system to an unsullied world. The principle of symbolic empathy produces, in Zaera's words, 'a subjective action capable of impregnating with emotion the process of creating objects'. We might call it 'autarchitecture', architecture that is self-sufficient. Man is offered a framework, but is confined by that framework at the same time. Escape from this 'theology of the beautiful' is possible only in a physical sense.

Ultimately Calatrava's organic architecture can offer no more than a temporary way out of the malaise of meaning. Nature provides the images of vitalism, but the annexation of these images by architecture does not produce vital architecture of its own accord.

Horizontal Gothic

Analysis of the architectonic components of Calatrava's work produces inevitable reminiscences of the Gothic – but as a horizontalist construction between mortals rather than a verticalist building style of the divine. The architecture manifests itself in the interaction of structure and light. The actual circumscription of space is postponed; space is not delineated by walls so much as by openings. Calatrava creates a diaphanous structure which makes the incident light critical to the architectural experience (this works at night too, with artificial light). Similar correspondences with Gothic architecture are present in the skeletal structure with its web of constructive ribs, the alternating system, the penetration of light into even the smallest of internal spaces,



Bach de Roda – Felipe II Bridge, Barcelona, 1987

Rather than the reflection of an *idea* (which never can be grasped as such), Heidegger understands the thing as the 'gathering of a world'. The meaning of a thing or form thus consists in what it gathers. As examples he analyses nameable things such as 'jug' and 'bridge'. (...) Heidegger intends 'gathering' in a very concrete sense. The description or 'saying' of a thing is possible because it has a name which belongs to language. Language 'contains' the world, and is called by Heidegger the 'House of Being'. It serves to reveal things as they are, to interpret something that remains in relation to the here and now.

Christian Norberg-Schulz

Calatrava escapes from the tautological construction of abstract language to introduce relations that are external to the project's reality. In the analogy, which is the subjective perspective that animates the object, the totality of the project is absorbed without any waste. (...) The projects made by Calatrava cannot be interpreted as either abstract creations or mimetic interventions with reality, that reject the utopia as well as the contextualist adaptation, in search of an individual identity for the organisms that he builds.

Alejandro Zaera

It is a question of having the spectator participate in our own artistic or inner experiences. Abstraction allows this possibility because it

replaces objective truth with one's own subjective interpretation.

C. Th. Dreyer

I understand the rules of the architect - just as a *maestro di opera* understands his. You have to feel responsible for every person on site. I like to be with the work force because the human component in buildings is hugely important.

Santiago Calatrava

It is my intention to produce buildings that are built for their environment and which seek a relationship with their surroundings. The aim is to reach once again an understanding between engineering and architect-

ture in the sense of the creation of static, formal and plastic possibilities of the respective materials. Behind all this stands the search for a unity between the art of architecture and the art of engineering.

Santiago Calatrava

There are no rules, absolutely no given truths in any of the arts. There is only the sensation of a marvellous freedom, of an unlimited possibility to explore, of an unlimited past of great examples of architecture from history to enjoy (...) Structural honesty for me is one of those infantile nightmares from which we will have to free ourselves as soon as possible.

Philip Johnson



Railway Station at Satolas Airport, Lyon, 1993

the pointed arch form present in many of the roof constructions, the translation of divinity into structural integrity, and the predominating stress on the emotional effect that the architecture is intended to invoke. There are Gothic associations too in the way the work is carried out: a guild-like band, the master mason and his mates. However, in contrast to the medieval way of doing things, the *maestro di opera* is here anything but anonymous.

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The soaring spans of the Gothic were once meant as a flyover to God. Now the bond is broken, and Calatrava makes a bridge between people. That does not necessarily imply the end of the Gothic, as his civil-artistic achievements show us. But the architecture is not about the verticality of the relationship with Deus Pater nor about experiencing a Platonic mysticism of light, but about a spiritual environment for here and now, a place under a meaningful constellation. Calatrava does not use walls to convey a cultural message but resorts to the autonomous strength of the skeletal structure. It is precisely because Calatrava prefers to function as an adjunct to a natural order (a divine whisper in the ear) rather than an independent voice in a cultural debate, that the wall is not the natural medium for him. The wall, as a face or a mask, is inclined to suggest an iconographic potential that could conceivably threaten the autonomy of the structure. An architect who steers clear of the cultural debate will always place the highest value on that construction, the unconscious of architecture (Giedion). Thus the space is not sharply compartmented as it would be by walls. Calatrava always postpones the joint in a 'displacement of the point of bearing', ★ in a graceful, fluid motion.

God is dead but the Gothic lives on. This is reminiscent of the mental gymnastics of the

Neothomists who hoped to prove, around the same time as Robert Vischer invented symbolic empathy at the end of the nineteenth century, that modern science could coexist with medieval mysticism.

'Why is it not Permissible when it is Possible?'

The great attractiveness of Santiago Calatrava's work resides in the compelling overall image that results from his virtuoso elusion of the countless commandments and taboos that prevail in the discipline of architecture.

★ Frampton, Kenneth, 'Look No Hands: Santiago Calatrava and the Well-Tempered Reconstruction', in *Santiago Calatrava Engineering Architecture*, Basel.

The work escapes the dichotomy of technology and design. It escapes the fragmenting character of the avant-garde while having a similar intention to unite art and life. It escapes the linguistic codes of iconography but succeeds at the same time in telling a story, audible by *Einführung*, taking advantage of the expressiveness of the architecture as autonomous object. But perhaps the greatest secret of this work lies in the rebirth of the Gothic, now no longer as a verticalist building style in the name of God, but as a horizontalist construction between people. Especially when public commissions are involved, the work of Santiago Calatrava always contributes considerably to the liveability of the place. Qualities that we continually encounter in Calatrava's oeuvre are the separation of pedestrian and motorised traffic, an anchoring in the location that gives the structure a great unaffectedness but also makes possible a positive experience of the place, an



The laws of statics say that in the world of criticism certain things you can do and can't do. But the new moralists say there are things you shouldn't do. Why is it not permissible when it is possible? If you asked me why, for example, I designed columns in the shape of my hand, I would say because it is possible. And that is what engineering is: the art of the possible.

Santiago Calatrava

My interest is centred on introducing a new vocabulary of forms of a Surrealist character somewhat in tune with the times (even though I do not much believe in my time). In Spanish we call concrete *Horrigón* which comes from - to form. That is the most beauti-

ful quality of concrete: its ability to take on any form. You have an incredible freedom when working with it.

Santiago Calatrava

I influence the form to the extent that I make it approximately what I want. I mean, my forms were not given. I have influenced them in the way my feeling dictated me on that moment. My feeling told me to design an arch in a perpendicular form, and of concrete, but then I made it out of steel because of building-technical reasons. There are many technical demands. That is quite universal, I suppose that everyone works that way. The important thing is that in my case, cornering a certain arch, a number of para-

meters is possible. It is basically a free choice. For example, I could have made a buttress-bridge or perhaps a simple ledger, or something like a continuous layer. But yet I made arches, and that was a fundamental choice.

Santiago Calatrava

I think the feeling of lightness, floating and flying, is just like the feeling of for example illumination, always a reference to something. It is something like knowing that light exists, because the dark does too. This means that you can estimate the contrast when there is light, because light and darkness are opposites, and some parts start to shine. That is what happens when you paint, and when you

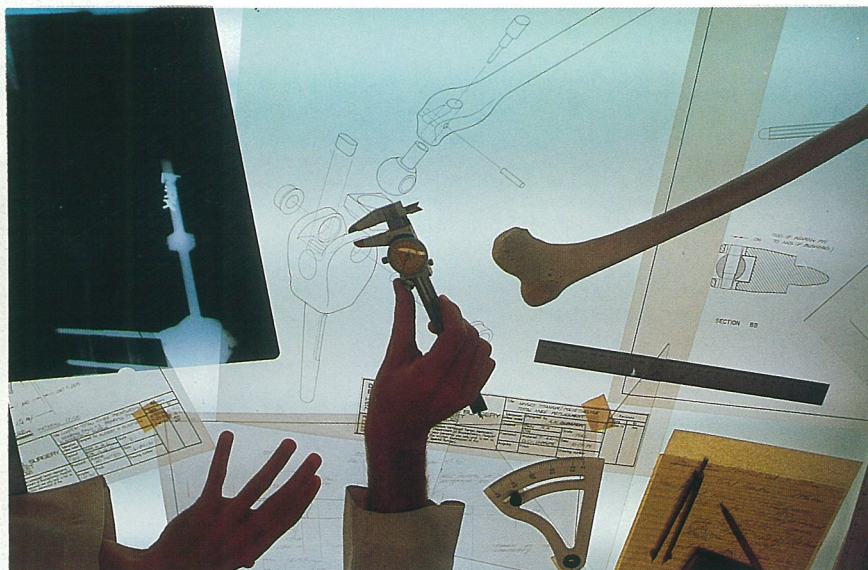
are looking for the most light, the most illuminated spots. The most light you can get is when the paint correlates with the whiteness of the paper; you cannot go further than that. You can accentuate the white by putting spots of dark next to it, so this white is much whiter than the paper as a sheet. And what is valid for paintings is so too for other things. A light weight can be obtained by putting a heavy one opposite. That is the way you make this feeling, it is this contrast which communicates the feeling of lightness.

Santiago Calatrava

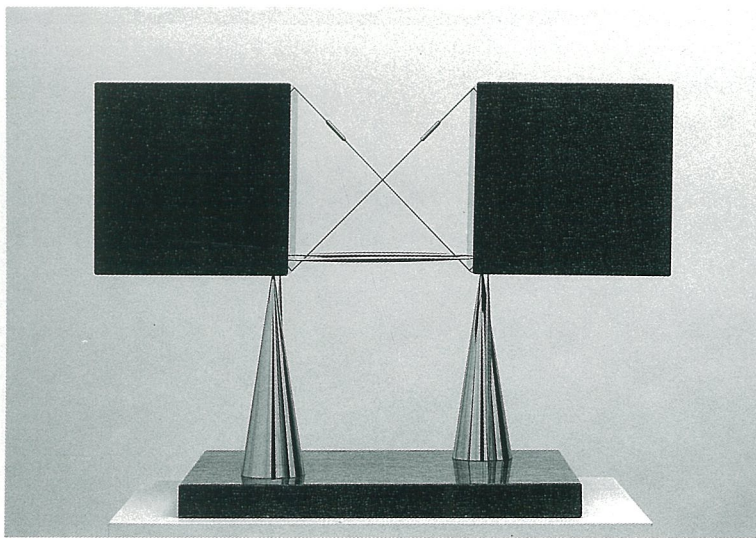
It is a quality that enables him to achieve a plastic assembly of revealed ligaments that serve to transform the *techné* of structures



Olivia Parker, Site II, Deer, 1981



Draftsman checks custom designed implant to be used in patient w/bone tumour



Toros, 1985

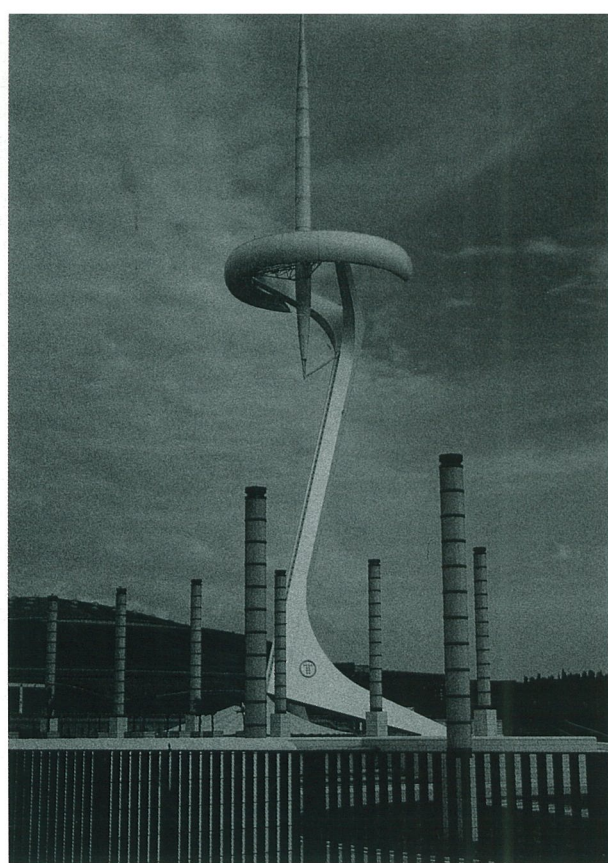
alternation of movement and rest, and a drawing of attention to the surrounding landscape combined with a place for encounter. The transparency of his construction and the reticent colours of his materials demonstrate Calatrava's sympathy towards his public.

Still, it looks as though a functional programme that can enjoy these benefits can be no more than a simple one. In the case of his bridges, roof structures, canopies and such-like structure, the strongly autonomous image can be an immense relief after all the soulless 'solutions' that we pass by every day. However, when the function implies a somewhat longer stay, these brilliant, unapproachable structures with their evident autonomy can get in the way of the social texture. It then emerges that this autonomy does not evoke an experience but ends up referring to itself in an endless process of self-congratulation. The Other suddenly seems to get alarmingly little space. The space is no longer a podium for the possible but just a physical consequence of an approach that strives for the realisation of what is possible within the discipline of building.

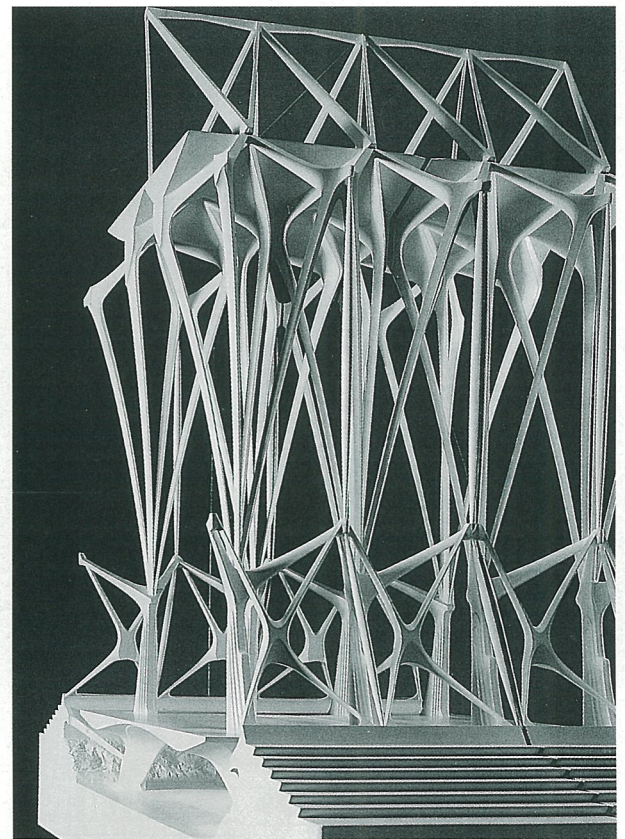
'A current problem is that in the world of criticism certain people are developing moral criteria about engineering. The laws of statics say that in the world of criticism there are certain things you can do and can't do. But the new moralists say there are things you shouldn't do. (...) Why is it not permissible when it's possible? If you asked me why, for example, I designed columns in the shape of my hand, I would say because it is possible. And that is what engineering is: the art of the possible.'★

This narrowing down of the socially possible to the technically possible is yet another proof of the reduction of architecture to a specialism of design and technology. That Calatrava unites these two aspects is a fine thing, but the fact that this is accompanied by a lessened interest in the potential of everyday life, something that has become visible in recent work, strikes us as a serious loss. It is as though we are left with *no more* than the X-ray photo. Of the living tissue, hardly a trace remains.

★ Quoted in Lyall, Sutherland, 'A Colloquy; Some Things About Santiago Calatrava', in *Santiago Calatrava, Dynamic Equilibrium*, Zürich 1991.



Telecommunication Tower for the Olympic Games, Barcelona, 1992



St. John the Divine, New York Cathedral, competition entry for completion, 1991

into the *poesis* of dynamic form.

Kenneth Frampton

Working as an architect or engineer naturally requires a source of inspiration. But because engineering and architecture are professional practices, nature cannot be the only source. My relationship with the so-called anatomical schemes has to do with the solution, by means of models, of certain structural problems which are closely related to nature. For example, a cantilever is the simplest engineering representation of a tree. The restraint is represented by the roots of the tree. Both obey certain laws of bending moments. So however most engineers think about it, I believe that the professional activi-

ty of an engineer lies mainly in the development of analytical models which describe nature in a realistic way. Working with isotropic structures almost inevitably leads one to sketching nature. When, for example a dog stands on his four legs it constitutes an isotropic body. The load is divided by the number of legs, there are no other forces present other than those supplied by the muscles.

Santiago Calatrava

Architecture and nature are joined in a metaphysics of place.

Steven Holl

I am especially interested in the idea of kinematics. Strength both in architecture and in mechanics is equal to mass by acceleration. Mass is an abstract universal unit. So this means that mobility is implicit in the concept of strength. A simple way of translating all that is to say strength is like crystallised movement.

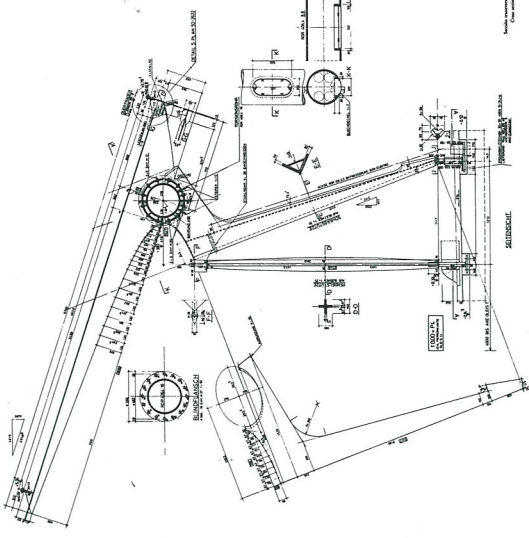
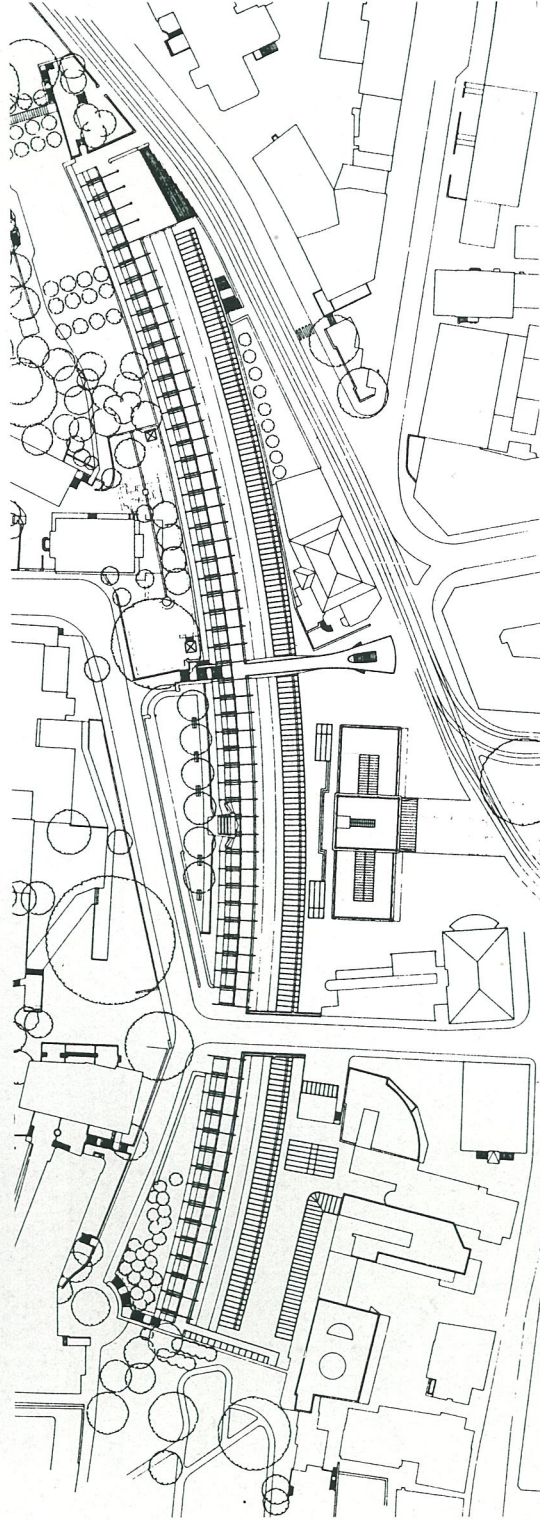
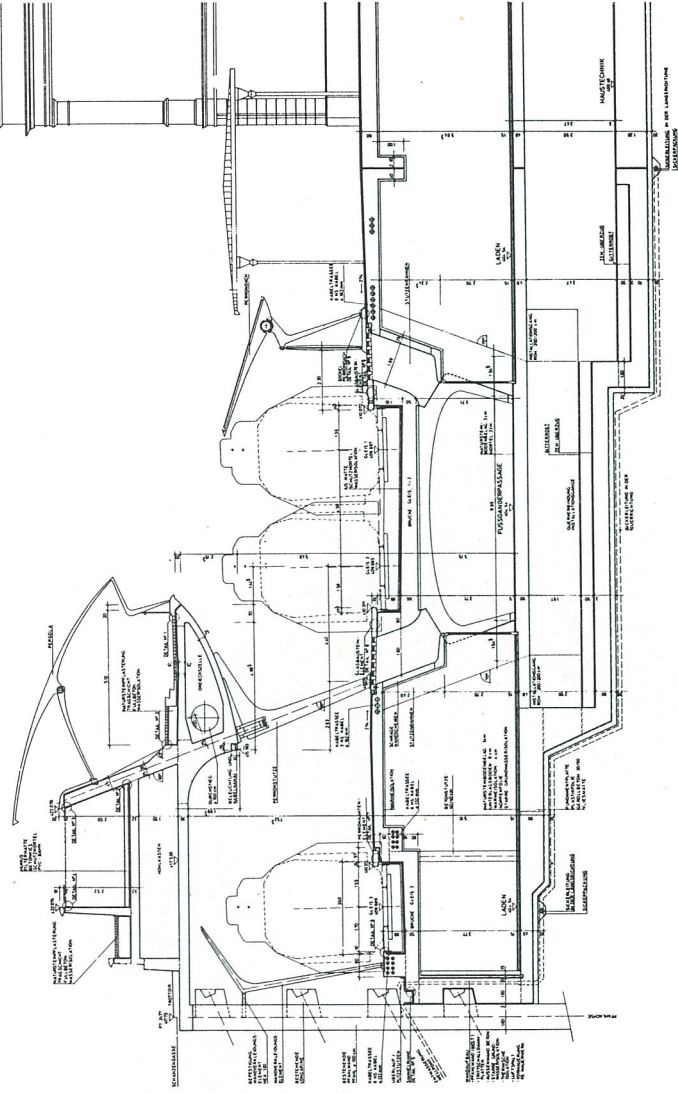
Santiago Calatrava

The word aseptic has an association which is not necessarily connected with bacteria, but with the aseptic connection between work and hand. This is important to me. Once I experimented with sculptures which were not only designed on a plan, but could also be ordered by telephone. So that the relation

between my work and my hands would remain more anonymous.

When I say by telephone it simply means I have to control the elements of the figure in such a way, in its material and dimensional being, that I can only pass it on by a codification into words. Just like I speak of a cube, of an edge and of a way to work on a edge, I speak of a certain material too, and I speak of cones of certain proportions; and in that sense, and only codified in words, I pass it on by telephone, and it is constructed as I want it.

Santiago Calatrava



The project for the Stadelhofen station concerned the construction of a station above ground in a largely underground railway linking the suburbs of Zurich with the centre. The scheme affected an area of about 270 by 40 metres located at the edge of the old fortifications in the centre of modern Zurich. The site is characterised by two adjacent zones: a hill contour and a plain. The design method could be typified as 'design by section': the cross-section, which is split up into three levels, remains almost identical throughout the 270 metres that the slightly curved plan extends, following the layout of the tracks. The station is characterised at platform level by the portico that covers platform number three and the central platform of the station. The upper part of the portico picks up the foot of the slope, marking a sharp line that runs along the whole upper side of the station. The curved line is interrupted four times by bridges, each one different from the others. The bridges link the project to the existing road system. The steel pillars of the portico support the concrete caisson of the roof at four

points arranged in the shape of a cross. The pillars have a single base on the ground. They have a box steel structure with an H-shaped cross-section and are made up of two parts: the actual pillar with two transverse supports and an equaliser set on top of the pillar, forming the two longitudinal supports. The trellis that covers the promenade on the upper level of the station is formed out of a steel structure made up of vertical supports similar to those of the station canopy, supporting a steel tube that runs along the entire length of the promenade. The underground layer contains a road, lined at both sides with shops. This road is located under the tracks: the various subways link up here. Its roof is characterised by the concrete arches that support the train tracks. The gap between supporting arches is closed in a longitudinal direction by a sloping wall, along which filters light from the concrete-framed glass blocks set into the platforms. *Santiago Calatrava*

Location Zürich, Switzerland **Assistants** A. Amsler, W. Rueger **Client** Swiss Federal Railways **Design** 1982-84 **Completion** 1990

Santiago Calatrava Valls S.A. **Stadelhofen Railway Station and Mall**

Osborne Sherry advertisement in newsmagazine Der Spiegel, no. 43, 19 October 1992





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- Un poco macho un poco ángel -

