

# 12<sup>TH</sup> INTERNATIONAL BRICK/BLOCK Masonry CONFERENCE



Ade

## THE SPIRIT OF THE MILLENNIUM ARCH

Josep M<sup>a</sup> Adell

Professor, Dr. Architect. UPM. Universidad Politécnica Madrid. DCTA.

Architectural Building and Technology Department. ETSAM.

Escuela Técnica Superior de Arquitectura.

Avda. Juan de Herrera 4. 28040 Madrid.

Tel/Fax: 34 913 366 560. E-Mail: ala@arquinox.es

### ABSTRACT

*The spirit of the Millennium Arch attempts to answer a whole host of problems that do not appear to have any reply but which may be answered simply by asking the right questions.*

*Through the spirit of the Millennium Arch we may attempt to rationally explain something that is pure feeling and which does not respond to logical reasoning, though this explanation may be presented in a certain rhetorical style using the acronym of "NA-FUTEFO ST" which is presented in this article.*

*The personal experience of the Millennium Arch is the only thing that really matters. All justification is in vain when something touches the heart.*

*This article will then attempt to describe some of the sensations that may be felt in the presence of the Millennium Arch.*

*The arch which commemorates the 12<sup>th</sup> IBMaC, in the same manner as the old triumphant arches, generates the feeling that man is capable of dominating nature.*

## 1. THE SPIRIT OF THE MILLENNIUM ARCH

Even when aware that reasoning cannot compete with feeling and, in spite, of that commonly held by more rational minds, the author is inclined to state that passion still dominates reason. However, I shall attempt to analyse the millennium arch on the basis of six basic factors, which are purely logical in themselves, and which, subsequently undermine pure feeling.

In addition to the three classic principles established by Vitruvius in the first century for any work of architecture, those of *FIRMITAS*, *VENUSTAS* and *UTILITAS* (Strength, Beauty and Function), we shall add a further principle in accordance with the conceptions of our time, the principle of Nature, this being a synonym for ecology.

These four principles shall be arranged and referred to as NA - Nature, FU - Function, TE Technique and FO - Form and shall be set alongside two indispensable factors in all architectural work, that of S - Space and T - Time.

The Millennium Arch may then be subject to the analysis of the acronym - NA-FUTEFO ST.

### NA - Nature

Baked clay is the material by which God made Man in his image, and one of the most commonly employed materials throughout the ages.

The brick was the first man-made material to be employed as a repetitive or modular building component, this hand-made process giving rise to the beginnings of prefabrication.

The composition of a prismatic unit in space, with its different header and stretcher arrangements, has enabled the construction of the majority of building over the centuries, ranging from the humblest house to the grandest palace.

Ever since the Industrial Revolution, steel has been one of the essential components in the evolution of building and now, at the close of the 20<sup>th</sup> century, stainless steel is beginning to appear as the metal component of greatest quality and capacity available for construction purposes.

Steel, the building material of the 20<sup>th</sup> century, forms an integral part of the unique structure of the Millennium Arch, where its tensile strength make it an essential component and where its durability is never in question.

The delicate integration of this new brick architecture which rises out of the ground and climbs through the air, spanning the eye of the arch, before returning to the soil together with its lush and tree lined natural surroundings, creates a sensation of respect and symbiosis between nature and architecture.

## **FU - Function**

The practical function of the Millennium Arch may appear secondary, but at certain times and places, such as these, secondary aspects may become fundamental.

This is the case of the Millennium Arch which will mark the main entrance to the Palacio de Congresos from the busy Paseo de la Castellana, the conference centre currently being approached from the Avda General Perón which runs at right angles to the said thoroughfare.

As such, the Arch will serve as a visible landmark for the Palacio de Congresos from the Paseo de la Castellana, acting as an advertisement for both the conference centre and the events held at the same.

## **TE - Technique**

The technical revolution established by the Millennium Arch arises from a deep knowledge of masonry tradition and is based on thorough research into the new strength capacities of reinforced masonry.

This in association with the real possibility of combining theory with practice, calculation with construction and design criteria with construction criteria, in a totally hand-built process.

The meticulous construction process carried out by master bricklayers from Madrid, has more than satisfied the designers in what, at the outset, could have supposed a painstaking operation.

The simple technical methods employed to aid the bricklayers, such as “umbrella guides and brick course guides” has undoubtedly helped to make the execution easier and the end result very satisfactory.

The cantilever arch beam, which technically forms the arch, is a simple sequence of perforated bricks set flat, with some of them left complete and others laterally opened in order to house the corresponding hoop bars. The arrangement is combined with longitudinal bed-joint reinforcement and the surrounding mortar, creating a heterogeneous assembly which works in a far more isotropic fashion than was initially thought.

## **FO - Form**

The combination of such a diversity of technical situations within the same geometric figure, a leaning cylinder, reveals the propriety of the selected form.

The design is based on a simple 14 m diameter circle set 30° to the ground and

subdivided into four segments, a frontal access, and a diametrically opposite exit, with two support walls bordering the same.

The continuous and gentle transition in shape around the oblique circle of the cylinder, between the front and back openings of the arch and the supporting side walls until the formation of the arch (or arch beam), conceals the original technical variations housed within its interior.

The brick employed as the exposed material is in stark contrast to the surrounding buildings of reinforced concrete and steel, and adds artistic value and human warmth to the architectural environment formed by large glass skyscrapers.

## **S - Space**

The spatial dimensions of the Arch, which spans 10 m and rises to 6 m in height, exalts the access to the Palacio de Congresos in the manner of a crown. The slender proportions of the Millennium Arch appear to float in space and give a sensation of weightlessness (the vast majority of onlookers being unaware of the techniques involved to create such an impression).

The contrast in scale created by the new arch within its surroundings, serves as a focal point for the conference centre from the Castellana, to the point where the Picasso tower, the highest skyscraper in the surrounding Azca district, may be seen to be hidden within the arch if observed from a certain perspective,

The spatial conception of the Millennium Arch and its diverse front, side and back elevations, create a strong visual impact due to the manifold nuances offered by the object.

When seen from the surrounding tall buildings, the Millennium Arch appears as a exceptional creation emerging out of the gardens of the conference centre.

## **T - Time**

The interrelation between space and time is fundamental in this work.

The visual aspect of the Millennium Arch varies from every point and is only repeated after a complete examination of the object in space and time.

An external-internal overview offers completely different sensations from the reverse internal-external examination.

Constant contrast is achieved by setting open spaces against secluded spaces, blurred edges against confined borders and spaces which open out against those that open in.

The side elevations seen from North and South also vary in that one frames the Palacio de Congresos while the other embodies the Azca Towers.

This space-time equilibrium provided by the Millennium Arch, at the dawn of the new century, opens up new paths and possibilities in masonry due to this capacity for three-dimensional spatial reinforcement with no alteration to the bondwork.

With the passage of time the Millennium Arch will become an urban landmark in Madrid.

## **NAFUTEFO ST**

This attempted rational exposition of the Arch will probably have left the reader a little cold, which is the exact opposite of the emotional sensation offered to those viewing the Millennium Arch.

Nether words nor pictures can express all the sensations which are felt in the presence of the Millennium Arch.

The harmony between the components of the acronym NAFUTEFO ST, between NAture, FUnction, TEchnique and FOrm obtained by the Millennium Arch in both Space and Time, serves as the undercurrent for this sensory experience.

Rarely have so few elements managed to create so many perceptions.

The architectural theory of “less is more” is clearly revealed in the Millennium Arch and shows the marked tendency towards the new ecological architecture of the Third Millennium.

## **3. THE MILLENNIUM ARCH EXPERIENCE**

The passer-by is invariably drawn by the spatial magnetism generated by the Arch, and is forced to reflect on the particular spatial location of the arch and its peculiar technical characteristics which have never been seen before.

The reflections and resulting conclusions made by each respective onlooker will vary according to their technical knowledge or interest. However, the emotions produced by the Millennium Arch do not require any technical or formal understanding and merely require certain attention and sensitivity.

The Millennium Arch breaks all previously established moulds of design, calculation and construction.

The Millennium Arch is not strictly speaking an arch, but a heavily reinforced arch beam.



Unlike all masonry arches built to date, gravity does not help to stabilize the Millennium Arch but, instead, attempts to overturn it.

The Millennium Arch does not exert thrust on its abutments, as otherwise occurs in all arches, but twists and turns in space and attempts to draw the abutments out of the ground.

The foundations of the Arch appear to be a prolonged continuation of the oblique cylinder, giving the impression that it is firmly anchored within the ground.

The Millennium Arch has no beginning nor end, and simply opens out and closes upon itself in a continuous perimeter.

The Millennium Arch does not have a front or back, but simply two completely different spaces within a single element of continual fluidity.

The construction of the arch was not as complicated as could be envisaged, but was built with the pride of knowing that one was raising an original work and built by following simple course guide plates and supporting the constructed structure on strutted formwork.

The Millennium Arch has both past and future and its present consists of a flash of inspiration.

While the significance of the Millennium Arch may be lost on many people, this does not detract from the aesthetic sensations received.

A work of art aims to please its author, but in the case of the Millennium Arch it has been seen that the work also pleases the public, which more than doubles the satisfaction

While onlookers may like or dislike the Arch in varying degrees, it is impossible to remain indifferent, and the structure will always cause heads to turn and provoke inner reflection.

The Millennium Arch invariably draws the gaze of all passers-by, who then have to question their own inherent ideas about gravity and equilibrium, though many will not be able to discover the simple reasoning behind the apparent reality.

From the front, the Millennium Arch is an immense and empty cavity, inviting the passer-by to enter into the gardens of the Palacio de Congressos. Once the pedestrian has entered the Arch, they will then be struck by doubts whether the whole of mass of brickwork will stand strong or instead collapse over them.

From the side elevation, the Millennium Arch is a huge slanting mass curving into space which seems to defy gravity.

At the back, the arch closes in on itself, drawing a slanting circle in space which frames the garden areas and appears to wrap itself around the spectator.

Very soon it will be unknown how, why, when and by whom the Arch was built, and it will then appear as if the arch has grown naturally out of the gardens.

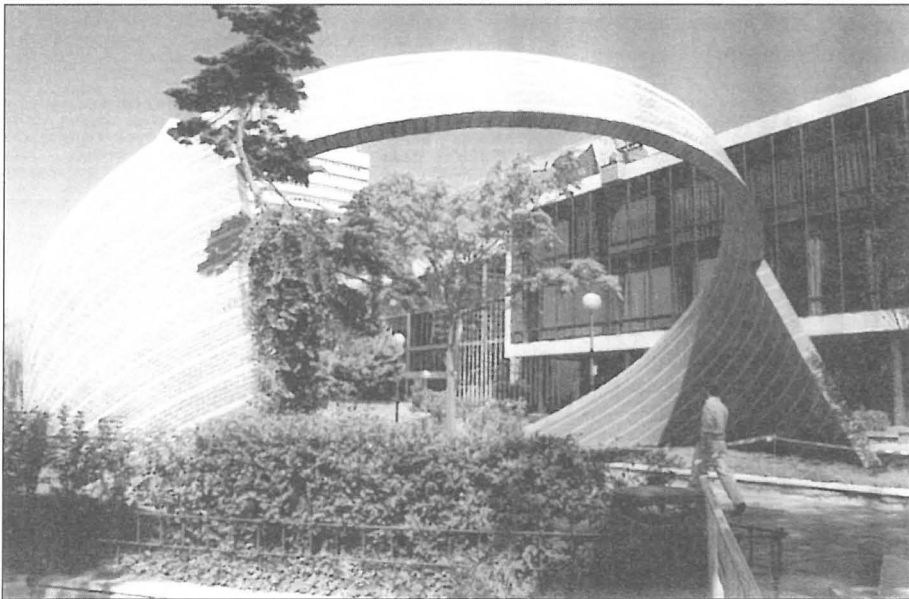
When passing below the Millennium Arch, the pedestrian feels a certain element of risk, which is only overcome when the passer-by is safely through the arch and notices that it still remains standing, giving the pedestrian the feeling that he or she has overcome some kind of challenge.

A WALK THROUGH THE MILLENNIUM ARCH IS  
A WALK THROUGH PAST, PRESENT AND FUTURE

The Arch commemorates the 12<sup>th</sup> IBMAC, in the same manner as the old Tri-  
umphal Arches, and creates the sensation that Man is capable of dominating Na-  
ture.

## THE SPIRIT OF THE MILLENNIUM ARCH

*Figure 1. Oblique elevation of the Millennium Arch framing the Palacio de Congressos in the background.*



*Figure 2. Front elevation of the Millennium Arch forming the approach to the conference centre through the gardens from the Castellana*



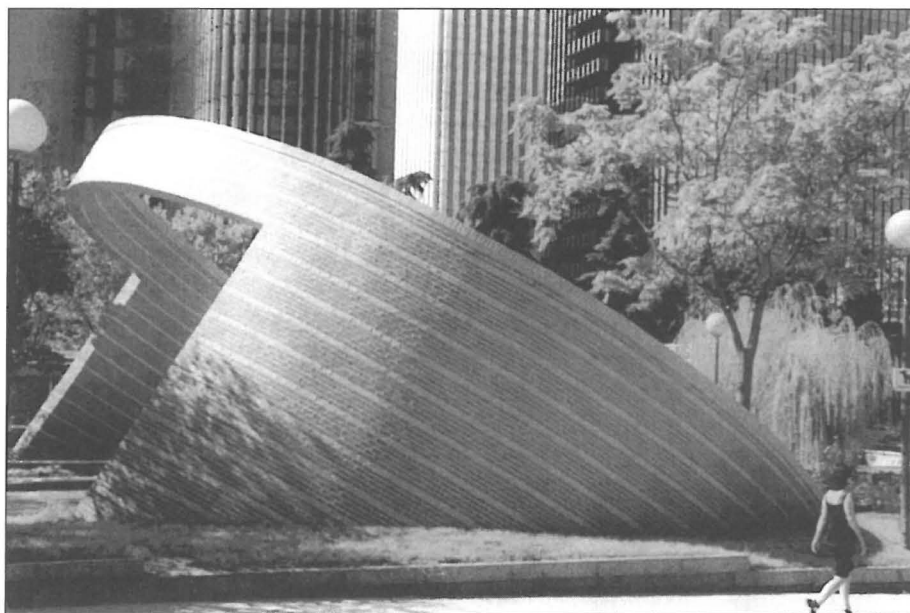
*Figure 3. Side elevation of the cantilevered Arch with its two semi-circular abutments*



*Figure 4. View of the large  
passageway  
framed by the  
Arch*



*Figure 5. Convex side elevation of the Arch with brick courses set at 30°*



*Figure 6. Internal concave view of the Millennium Arch framing the gardens*



*Figure 7. View of the Millennium Arch framing the Azca skyscrapers*

Figure 8. Internal convex view of the Arch abutments and 60° jamb

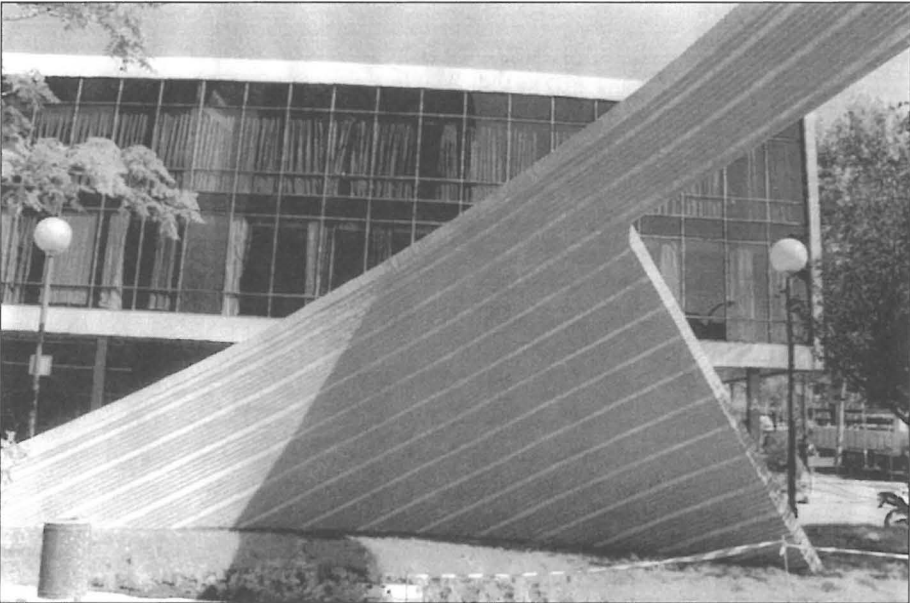


Figure 9. View of the concave and convex sections of the Arch abutment and its finial set in rowlock.

*Figure 10. Rear side view of the Arch from the gardens of the Palacio de Congresos*

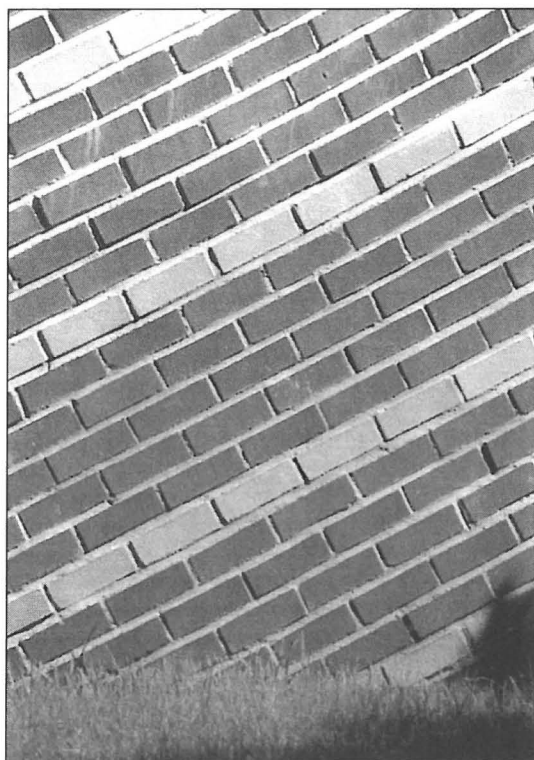
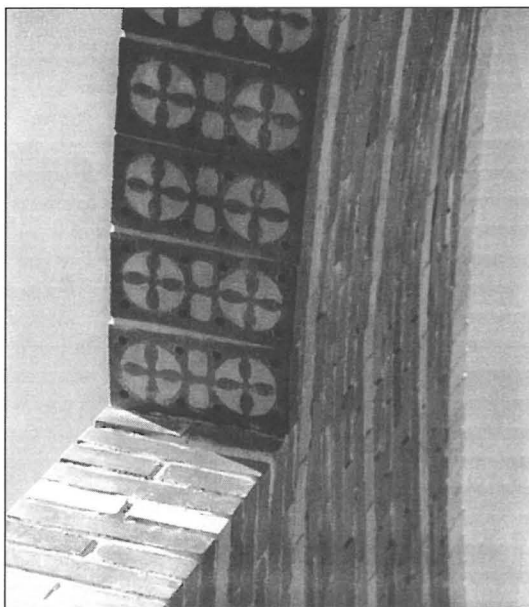


*Figure 11. Rear central view of the Arch revealing its convexity*





*Figure 12. Detail of the soffit of the Arch and the Allwall Flowerbrick which enables vertical reinforcing*



*Figure 13. Detail of the concave external brickwork, with bed and vertical joints of standard thickness and pointed in mortar.*



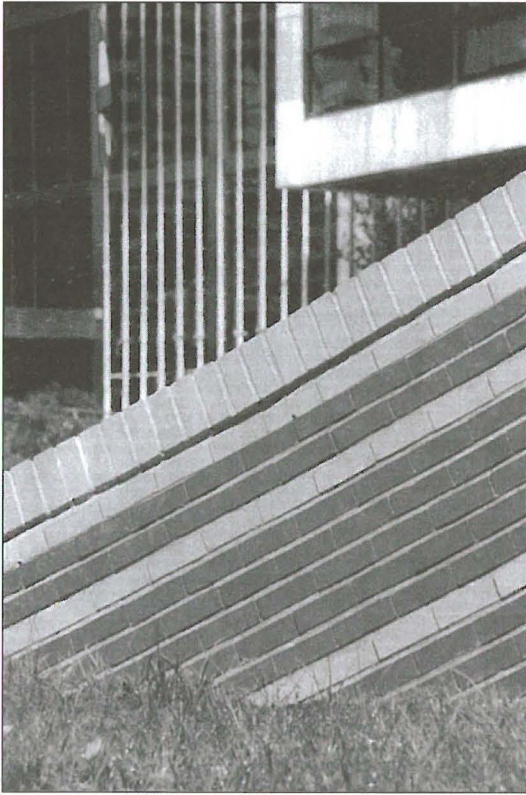


Figure 14. Detail of the convex internal masonry with tooled joints, and one course of yellow brick set every five courses of red brick.

Figure 15. Poster for the 12th IBMAC during the construction of the Millennium Arch.

