

# Modern Theatres: Sydney Opera House

The Modern Theatres series continues with David Staples discussing the Sydney Opera House

*"It stands by itself as one of the indisputable masterpieces of human creativity, not only in the 20th century, but in the history of humankind".*

Expert evaluation report to the UNESCO World Heritage Committee 2007 on the Sydney Opera House.

*"Help mould a better and more enlightened community"*

The words of New South Wales Premier Joseph Cahill in 1954.

*"Jørn Utzon made a building well ahead of its time, far ahead of available technology – a building that changed the image of an entire country".*

Frank Gehry in 2003 when awarding the Pritzker Prize (architecture's highest award) to the Sydney Opera House.

Jørn Utzon won the competition to design the Sydney Opera House in 1957.

He left Australia and the project in 1966.

The building opened in October 1973 to universal architectural acclaim. Utzon never returned to Australia and never saw the

finished building, possibly the most famous building of the 20th century. He died in 2008.

The Sydney Opera House is undoubtedly one of the most important pieces of architecture of the twentieth century. But as an opera house and a concert hall it is severely flawed.

## Planning

Planning for a new performing arts building in Sydney began in the late 1940s and was led initially by Sir Eugene Goosens, an English composer and the director of the New South Wales Conservatory of Music.

Joseph Cahill, the Premier of New South Wales, got behind the project although he initially preferred a site near the Wynyard railway station. Goosens insisted on the Bennelong Point site. The site was known to the native Gadigal people of the Eora Nation as Tubowgule meaning "where the knowledge waters meet".

Cahill declared "This state cannot go on without proper facilities for the expression of talent and the staging of the highest forms of artistic entertainment which add grace and charm to living and which help to develop a better, more enlightened community and surely

Photo by Andrew Fysh



it is proper in establishing an opera house that it should not be a "shadygaff" place but an edifice that would be a credit to the state not only today but also for hundreds of years".

Goosens' ambitions were for a fine concert hall for the orchestra, with perfect acoustics and seating accommodation for 3,500, a home for the opera company and a smaller hall for chamber music.

### Competition

The government announced an international architectural competition and the guidelines were released in February 1956.

These called for a large hall to seat between 3,000 to 3,500 persons designed for:

- Symphony concerts;
- Large-scale opera;
- Ballet and dance;
- Choral;
- Pageants and mass meetings.

The small hall should seat approximately 1,200 persons for:

- Dramatic presentations;
- Intimate opera;
- Chamber music;
- Concerts and recitals;
- Lectures.

Jørn Utzon, a 38 year old Dane with a small office north of Copenhagen, prepared his 12 page entry for the opera house competition, and it was given the number 218 out of the 233 schemes submitted.

### Judges and Judging

The jury included Sir Leslie Martin who had been part of the design team for the Royal Festival Hall in London and the eminent Finnish American architect Eero Saarinen.

An oft repeated, although occasionally disputed, story is that Saarinen was delayed travelling to Sydney and by the time he arrived the other judges had already established a shortlist that did not include Jørn Utzon's design. Saarinen allegedly reclaimed Utzon's drawings from the rejected pile and argued its merits. At that time Saarinen was designing his most famous building, the TWA passenger terminal, at New York's Idlewild Airport (subsequently renamed JFK Airport). The TWA terminal opened in 1962 with a distinctive wing-shaped, tiled concrete roof. There is a considerable affinity between its design and Utzon's opera house.

These projects were designed at the height of the Modernist Movement and many of the



other competition entries for the Sydney Opera House proposed similar modernist buildings.

Saarinen, in New York and in some of his other work, was proposing a much more organic flowing form of architecture. Utzon in his early sketches was advocating a similarly radical design for Sydney.

In January 1957 Premier Cahill announced the winner was Jørn Utzon, a virtually unknown Dane. The jury noted "because of its very originality, it is clearly a controversial design. We are however, absolutely convinced of its merits". The cost was estimated at 3.5 million Australian dollars.

The architectural competition was a loosely structured competition with a broad brief and minimal requirements for the competitors. Utzon won the competition with a series of loose sketches. Architectural competitions are often intended to service and develop young emerging talents and Sydney succeeded in this.

Today, architectural competitions have become more and more structured and rigid in order to minimise risk to clients. The preamble to many architectural competitions says they are looking for new, emerging talents. But the formal requirements are then onerous to the extent they can only be met by established, tested architectural practices, including a

*Sir Leslie Martin, Jørn Utzon and Eero Saarinen (from left to right) c. RIBA*

requirement for the competitor to list three comparative buildings completed in the last 3 to 5 years, and the requirement to have a certain level of insurance cover or a certain financial stability.

The concept for the Sydney Opera House owes much to Utzon's undoubtedly genius. But he himself acknowledged a number of influences that helped generate his concepts.

As a young man, Utzon was taken by his family to the Stockholm Exhibition in 1930. Gunnar Asplund, a renowned Swedish architect and designer, was at the height of his powers and had a significant influence on the exhibition.

Utzon remarked "Asplund is the father of modern Scandinavian architecture" "He progressed beyond the purely functional and created a wonderful sense of wellbeing in his buildings. He even included symbolic content imbuing each of his buildings with a unique personality, one that expressly emanates the purpose of the building, completely covering and expressing the function, the lifestyle, the way of life lived in the building".

Asplund influenced many other architects and designers. He worked with Sigurd Lewerentz on the Woodland Cemetery in Stockholm. Lewerentz was the architect for the Malmö City Theatre that opened in 1944 in the middle of the Second World War, probably the only theatre built in Europe in the 1940s.

Finnish architect Alvar Aalto was also influential. Utzon worked briefly with Aalto in 1945 in Finland. Aalto went on to design the Finlandia Hall in Helsinki and the Alvar Aalto Theatre in Essen, Germany.

#### *Shells, Sydney Opera House*

*After three years of intensive search for a basic geometry for his shell complex I arrived in October 1956 at the spherical solution shown here.*

*I call this my "key to the shells" because it solves all the problems of construction by opening up for mass production, precision in manufacture and simple erection and with this geometrical system I attain full harmony between all the shapes in this fantastic complex.*

*Jørn Utzon*

In 1949 Utzon received a grant that enabled him to travel extensively in the USA and Mexico coming into contact with Frank Lloyd Wright, Mies van der Rohe and Ray and Charles Eames. His visits to South America also exposed him to Mayan temples and their influence.

During the competition Utzon apparently pored over maps of the Sydney harbour and possibly images of boats and sailing ships in the harbour – the influence of which can be seen in the roof of the opera house.

Finally, Utzon lived near Kronborg Castle in Denmark. This castle is built on a promontory with some similarities to Benelong Point. Kronborg Castle was immortalised by William Shakespeare as Elsinore Castle in Hamlet. Utzon's winning design consisted of only 12 drawings. It was a sculptural scheme using the stunning location and a building designed to be viewed from all sides.

Utzon won the competition on the basis of a few imaginative but undeveloped sketches.

#### **Design**

Once design commenced two problems were almost immediately identified –

The geology of Benelong Point had not been fully surveyed before the competition. It was now discovered that instead of good, stable sandstones the site was largely composed of loose alluvial deposits soaked with sea water and unsuitable to support the weight of the structure. Mass concrete foundations were necessary at significantly increased cost.

The second challenge was a lot of unknowns about the roofs. They had not been designed or engineered in any detail.

Politically there was considerable pressure to start construction as quickly as possible to maintain momentum and avoid political opposition. Premier Cahill was in a hurry, he was 68 when construction began.

It would have been wise to allow time to resolve design challenges and problems but this would have put the project at risk.

In March 1959 construction of stage 1 – the podium – commenced and it was completed in February 1963, two years behind schedule.

The project needed extraordinarily skilled structural engineering and Utzon was introduced to Ove Arup by Sir Lesley Martin and Eero Saarinen. Arup was one of the leading structural engineers of his generation and founder of the practice that still bears his name.





## The shells

While the podium was building Utzon and his design team struggled with the design of the shells. His competition entry had relatively low, linear shells. The auditoriums needed much higher shapes and larger volumes. Between 1958 and 1962 the shell design explored various forms including parabolic, ellipsoid and finally spherical geometry to generate the final form of the shells.

Utzon had a clear vision of the type of shapes he wanted in the shells while Arup and Partners in London struggled to devise a structural solution.

Utzon produced the "red book" which contained a complete set of plans and sections which developed the schematic concept from his competition scheme. But the drawings were structurally unsound. Each shell was different and this unique solution would add significantly to the cost and complexity of the building.

As the construction of the podium progressed resolution of the shells became a critical issue. Utzon struggled to develop a rational concept that could be engineered. A major breakthrough occurred when he observed that they could be derived from a single, constant form – a sphere. This would considerably simplify the sails, allow ease of repetition and allow the opera house shapes and forms to be engineered and realised.

In January 1962 Utzon submitted the "Yellow Book". In 38 pages of plans and elevations this set out the shapes, details of the ribs and the tiling. Its cover showed the principles of the spherical geometry.

## Construction and disputes

With the design of the shells resolved, stage 2 – construction of the roof – began in 1963 and took three years. Utzon had moved with his family to Australia in 1963 but relations with the New South Wales government deteriorated. There were problems over rising costs, originally estimated at 3.5 million Australian dollars in 1959, they had risen to 13.7 million in 1962. There were concerns over Utzon's ability to deliver all of the drawings required for the fitting out and interiors of the project.

In 1963 there were significant changes to the brief for the project. At the insistence of the Australian Broadcasting Commission which ran the orchestra, the major hall which was originally to be a multi-purpose opera/concert hall became solely a concert hall. All of the stage equipment needed in this hall to accommodate opera and other types of performance were scrapped although a significant amount had already been installed.

The minor hall, originally for stage productions only, was now required to house opera and ballet and renamed the opera theatre.

*Under Construction, 1968.  
Photo by Philip C*

Ove Arup stepped back from the project as he moved towards retirement. Arup's Sydney office queried Utzon's ability to deliver the number of drawings needed for stage 3 – the interiors.

A change of government in May 1965 led to further disputes over the cost of prototypes and an impasse ensued. Following meetings in February 1966 between Utzon and the Minister for Public Works, Utzon resigned. There were demonstrations in favour of Utzon and attempts at a reconciliation but the government moved to appoint a new team led by Peter Hall in April 1966 to take charge of the design of the interiors.

Nine days after Hall was appointed on 28th April 1966 Utzon and his family flew out of Australia never to return.

January 1967 saw the last pre-cast shell installed effectively completing stage 2. Stages 1 and 2 had cost 13 million Australian dollars to complete.

### Interiors

On appointment Peter Hall and his team found little information on the proposed interiors.

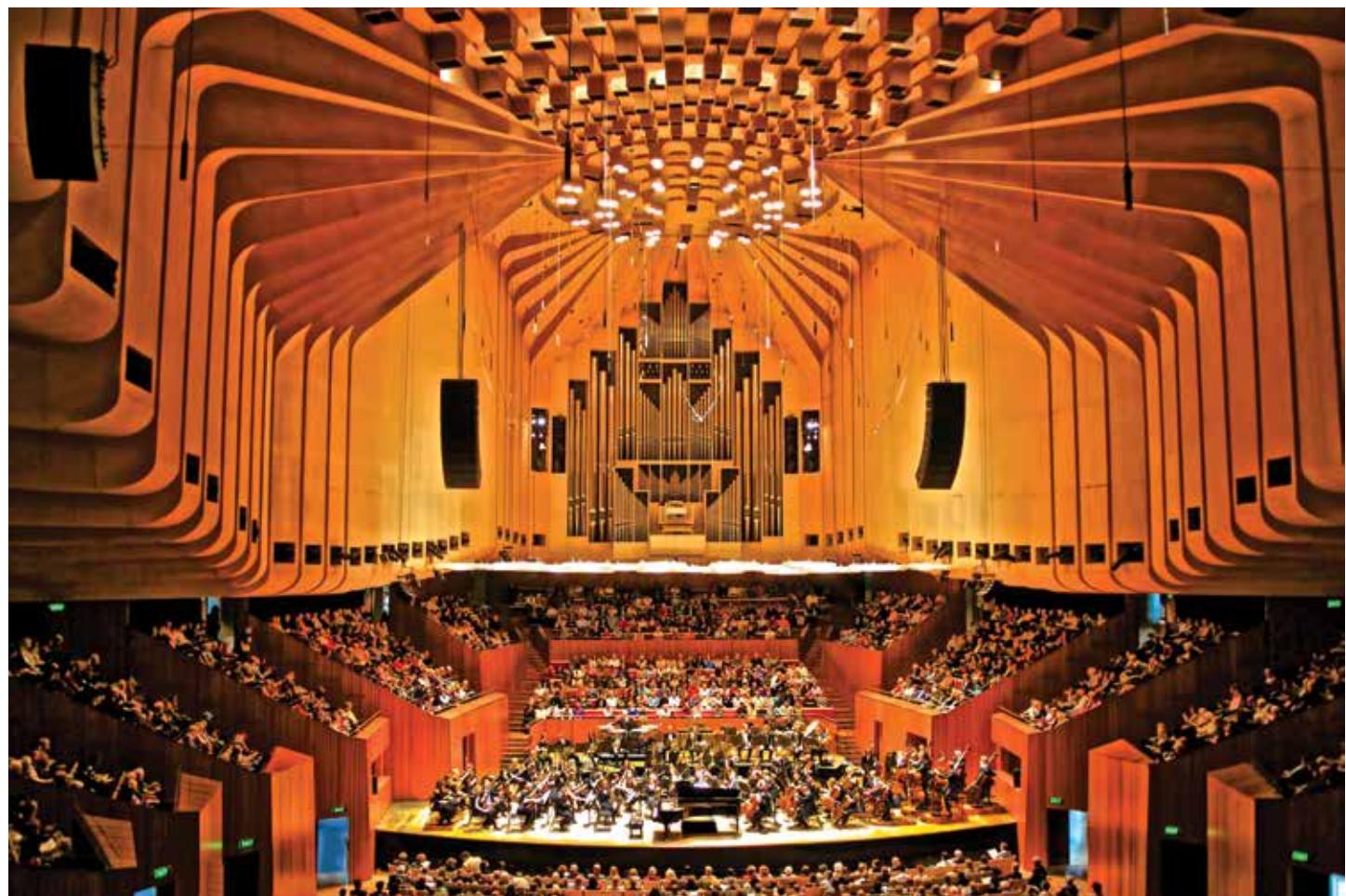
*Concert Hall interior,  
photo by Jason Tong*

He had to undertake research, establish new relationships with the consultant teams and create effectively a new brief for the interiors to fulfil the users and especially the orchestra's needs. They recommended the large hall be designed solely for concerts. Opera was relegated to the smaller hall. In September 1968 Hall and his team advised the Government it would cost a further 85 million Australian Dollars to complete, which considerably exceeded that of the first two phases.

### Opening

The first production in the Opera Theatre was Prokofiev's epic War and Peace by the Australian Opera. British lighting designer Robert Ornbo encountered an opera house without adequate lighting positions and a stage simply too small to house large scale opera. The first performance in the Concert Hall was a program of works by Wagner performed by the Sydney Symphony Orchestra and featuring the legendary Swedish soprano Birgit Nilsson and conductor Charles Mackerra.

One month later on October 20th 1973



Queen Elizabeth II opened the Sydney Opera House and with British understatement observed “The Sydney Opera House has captured the imagination of the world, though I understand that its construction has not been totally without problems.”

In 1957 the project was expected to cost A\$ 3.5 million Australian Dollars and be completed on Australia Day (January 26th) 1963. The building was completed ten years late at a cost of 102 million Australian Dollars – some 29 times over the original budget.

Australians often say they have the best performing arts centre in the world, the problem is the exterior is in Sydney at the opera house and the interior is in Melbourne at the Victorian Art Centre.

### **Impact and resident companies**

The Sydney Opera House is now home to seven significant performing arts companies including Opera Australia, Sydney Symphony Orchestra, The Australian Ballet, Sydney Theatre Company, The Australian Chamber Orchestra, Bangarra Dance Theatre and Bell Shakespeare. It is now the largest performing arts centre in Australia and has hosted many performing arts groups from across the world.

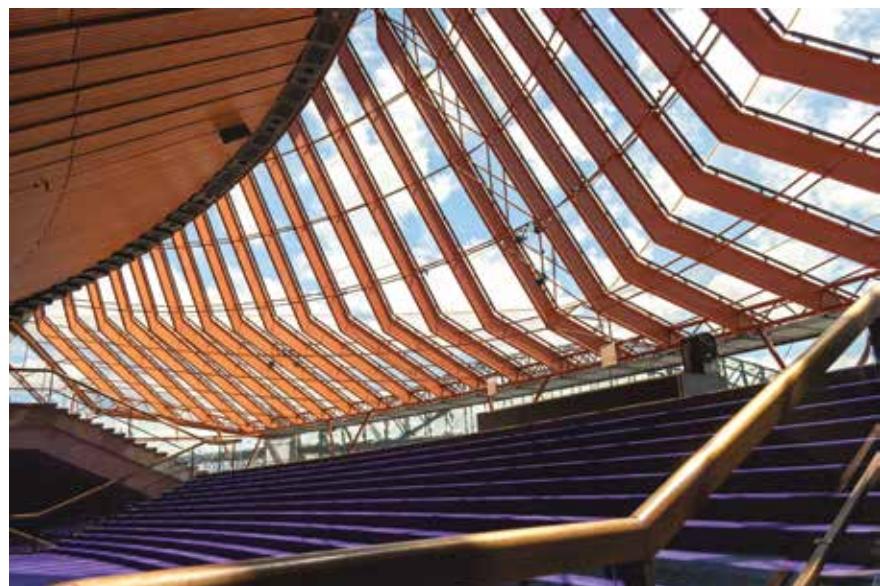
### **Impact on 20th century architecture**

The Sydney Opera House is important because it was one of the first buildings to move away from the classical and rectilinear form of civic, public and performing arts buildings. It embraced curves and proposed a challenging structure at the limits of what technology and the construction industry could delivery in the 1960s.

The latter quarter of the 20th century has seen other architects continuing this move away from the ordered, straight line and rectilinear with increasingly audacious projects. The work of Frank Gehry, Zaha Hadid and others illustrates this.

### **Utzon's design principles**

In 1999 Jørn Utzon agreed to work to develop a set of guidelines for future changes to the Sydney Opera House. This was a process of rapprochement between the architect and the building that he had never seen. The goal of the design principles was to enshrine Utzon's vision and provide a framework for the future development and renewal of the building to ensure its integrity. Part of this process was the re-design and reconstruction of the Reception Hall. This reopened in 2004, renamed the Utzon Room, and is the only interior within the Sydney Opera House designed by Jørn Utzon.



### **Opera House renewal project**

*photo by Matt Chan*

2013 marked the 40th anniversary of the opening of the opera house. It was also the start of the building's Decade of Renewal.

In 2016 the opera house announced a series of projects to be enabled by 202 million Australian dollars of financial support from the New South Wales government.

In the concert hall, upgrades to the acoustics, accessibility and stage and backstage areas will be coupled with the replacement of now obsolete and worn out theatre systems.

The opera theatre, now renamed the Joan Sutherland Theatre, will have a major renewal including the replacement of its technical systems and equipment, opening up more areas to the public and enhancing where possible other areas.

### **Conclusions**

The Sydney Opera House resulted from an international architectural competition that illustrates both the merits and risks of such a route to select the architect. The brief for the competition was poor – it asked for two multi-purpose halls at a time when the world was moving against multi-purpose halls and towards single-use spaces.

Architectural competitions are intended to offer opportunities to new, young, emerging architects. Jørn Utzon was such an architect and he produced a remarkable building. But architectural competitions also carry a degree of risk that a project will be costly, difficult or delayed. The Sydney Opera House proved to be all three.

Having started with a flawed brief, there were significant client changes to their requirements

*Photo by Bernard Spragg  
NZ*



which resulted in massive changes and huge increases in cost. The overall costs cannot all be ascribed to the innovative roof and shells, with the significant cost occurring during phase 3 of construction, the fit out of the spaces.

“Form follows function” is a phrase ascribed to American architect Louis Sullivan. It became a mantra for architects in the 20th century. Utzon conceived and designed extraordinary external shapes for the building. The auditoriums and stages had to be squeezed into these shapes. The performance spaces were compromised and will always be compromised.

The Sydney Opera House is perhaps the most extraordinary building of the 20th century. It preceded many subsequent organic buildings by Frank Gehry, Zaha Hadid and Santiago Calatrava amongst others. Its influence on architecture in the latter quarter of the 20th century is amazing.

Could the Opera House had been better if Utzon had been retained and not resigned? An impossible question to answer. The fundamental problem is the shells are too small, and coupled with the clients brief changes, Utzon could have produced a more singular piece of architecture but it would still have had practical and functional problems.



*Walt Disney Concert Hall,  
architect Frank Gehry  
Photo by Daniel Hartwig*