



Sydney

Opera House

**Vojtěch Petřík**vpetrík@deloittece.com

The Sydney Opera House is the most famous Australian building which became the city's prominent feature immediately after its completion in 1973. This building, which was unique in many aspects and also very expensive, required material and construction solutions that were innovative at that time, the functionality of which is surprising even today, more than 40 years after the building's completion.

Planning began already in the late 1940s, when Eugene Goossens, Director of the State Conservatorium of Music, lobbied for a suitable venue for large theatrical productions. In 1954, Goossens succeeded in gaining support of New South Wales Premier Joseph Cahill and the Bennelong Point peninsula in the centre of Sydney was selected as the ideal location. Two years later, an international design competition for the opera house was launched; the criteria specified a large hall with 3,000 seats and a small hall for 1,200 people. A total of 233 entries from 28 countries were submitted. The winning project was created by a relatively young and unknown Danish architect Jørn Utzon.

In the course of the construction, the building itself faced numerous issues of both technical and political nature. Compared to the original budget of USD 10 million, construction costs increased nearly 15 times, reaching USD 144 million. After constant disputes between the government and the architectonic studio, Jørn Utzon was made to resign in 1966. The construction was subsequently entrusted to local architects who did not always respect Utzon's ideas. It was namely the inconsistency between the interior and the exterior that had the most adverse effects on the whole building. Utzon never visited Sydney after his resignation. The opera house was finished in 1973, which was 10 years later than originally planned. The opening ceremony was also attended by the British Queen Elisabeth II.

The building became an icon immediately after its opening and brought international fame to Sydney and Australia. The

most distinguished element is undoubtedly the building's silhouette resembling parts of shells, yacht sails or the skin of an armadillo. It is made of large precast concrete "shells" of elliptical paraboloids of different sizes. Nevertheless, the shells were the major construction issue. Concrete segments had to be dimensioned for the load of 27 thousand tonnes. The chief engineer, Ove Arup, therefore decided to construct concrete ribs using the additional prestressing technique increasing the strength of concrete which has been primarily used in the construction of large bridge-arches since the beginning of the 20th century. Another construction issue was the thermal expansivity of the concrete construction. Precasts were therefore connected by means of glue based on epoxy resin and each shell thus forms a compact whole. The façade is covered by two kinds of glossy and matte square tiles with a side of 12 cm. More than 1 million tiles supplied by the Swedish company Hogans was used in the end. The opera house has one of the most extensive glazing in the world – its glass walls take up 6,200 sqm.

The building covers 1.8 hectares and is situated in a unique urban environment between the harbour and the botanic gardens. The opera house includes five main auditoria, an exhibition hall, three restaurants, six bars, a library and a recording studio. The largest concert hall seats 2,679 visitors. The total capacity of all auditoria is 5,467 places. The opera house has also the largest mechanical organ in the world with 10,154 organ pipes.

In 2013, the building received the prestigious Pritzker Prize which, in fact, is architecture's "Nobel Prize". In 2005, the opera house was listed among Australian cultural heritage and in 2007, it became a UNESCO World Heritage Site. It was the first building which was listed as a UNESCO World Heritage Site when the author was still alive. In August 2016, the building's overall modernisation in the amount of AUD 202 million was announced. The main objective of the modernisation is to enhance the building's acoustics. Construction work is anticipated to begin in May 2017 and will take six years.



Sydney Opera House in Numbers

- 18,000 sqm** is the built-up area
- 6,200 sqm** is the glazing area of the building
- USD 144 million** are the aggregate construction costs of the building
- USD 10 million** were the originally estimated construction costs
- 5,467** seats is the total capacity of performance venues
- 233** is the number of entries submitted in the design competition
- 55** meters is the highest point of the building
- USD 126.5 million** were the sales of Sydney Opera House Trust in 2015
- 850** was the number of the company's employees in 2015
- 17** years passed between the design competition launch and the opera house opening