



# ACOUSTIC DESIGN OF THE ROYAL OPERA HOUSE MUSCAT

## ABOUT THE OPERA HOUSE

The Royal Opera House Muscat (ROHM) is one of the few venues in the world that can transform from a “pure” opera house to a “pure” concert hall. The building is a centrepiece of Oman’s policy to develop sustainable cultural tourism.

The construction of a single, transformable auditorium rather than a separate opera house and concert hall helps to ensure that the venue remains in full use. It will host a wide variety of performance types, by international artists as well as Oman’s own Royal Omani Symphony Orchestra (ROSO) and their Arabic counterparts the Eastern Band and Folkloric Troupe.



All images courtesy of Royal Estates Affairs and Royal Opera House Muscat



FRANCO ZEFFIRELLI  
DIRECTOR, OPERA TURANDOT

“I think that you and your company have done an excellent job with the acoustics. You are to be congratulated and I feel sure that all future opera, ballet, orchestras and soloists who will perform there will appreciate your work.”

## ACOUSTIC DESIGN

Opera houses and concert halls have fundamentally different acoustical qualities. To achieve both in one building, required a radical approach to the transformation between opera house and concert hall. In the ROHM, the entire front end of the concert hall, weighing some 500T is placed on railway tracks to move 20m upstage for storage revealing an opera stagehouse above the front rows of seating and the concert platform.

In the acoustic of an opera house, the direct sound from the performers and the diffracted sound from the balcony fronts creates a better acoustic the closer the audience is to the performers; but to develop the characteristic reverberant sound of a concert hall, the sound must be reflected many times between the side walls of the hall. This is why pure concert halls tend to be long and narrow, while pure opera houses tend to bring the audience much closer to the stage. To achieve both the opera house

acoustic and the concert hall acoustic in the ROHM, the basic length of the room changes by 9m – by placing the entire orchestra pit including the pit overhang area on mechanized lifts. Thus the seat count in concert format is 1000 and in opera format 800.

## OPERA ACOUSTICS

The acoustic design of the opera house form of the ROHM draws on the traditional European horseshoe shaping with tightly-spaced balconies on three levels plus a parterre at main floor level. While the fundamental opera acoustic is generated by the room shape, within the side walls are retractable acoustic roller-type banners that allow adjustment between, say, a “Dresden” opera sound and a “Covent Garden” opera sound.

The design of the orchestra pit is of immense importance to the acoustics of an opera house: in the traditional Italian orchestra pit the orchestra is in the open with no pit overhang; in Beyreuth the orchestra is almost entirely under an overhang and there

is almost no pit opening.

To achieve the right balance for this project we ensured a cantilevered steel structure to create the pit overhang—no small feat given that the pit overhang itself is on a mechanized two-level lift so there is no “back-span” to support a conventional cantilever. The thinness of the front edge of the overhang structure helps the musicians in the pit see the audience chamber and experience the room response.

With such a pit structure, there is less acoustical difference between being under the pit overhang and out in the open allowing the size of the open orchestra pit to be reduced to a minimum. This brings the audience closer to the soloists and helps produce an opera house in which the audience can see the facial expressions of the performers, greatly enhancing the emotional impact of opera performance.

## CONCERT HALL ACOUSTICS



The acoustic design of the concert hall form of the ROHM draws on the traditional European shoebox shaping. In this concert hall form, no evidence remains of the opera house's proscenium opening; the concert platform is completely coupled with the audience chamber at the sides and at the ceiling as in a 19th century concert hall. This requires movement of the ceiling panels, the side seating boxes, the architectural proscenium, the pit lifts and seating wagons, the stage masking and even the ceiling corbels, all under motorized control.

The concert hall acoustic is generated by the room shape in plan and by the room height—a long, narrow shoebox. The design consciously follows precedents including that of the Tonhalle, Zurich so as to produce a concert hall acoustic that supports not only Western classical music but the classical Arabic music of the Eastern Band.

For larger-scale orchestral works, the concert hall has a reverberation chamber. The acoustical coupling to

the reverberation chamber is via large “swell shutters” such as the Grand Concert Hall of Kazan, Tatarstan.

When the reverberation chamber is in use, the side doors to the concert hall seating boxes are opened, and the upstage reverberation chamber is coupled via the side circulation passages within the concert room.

#### ORGAN RECITAL ACOUSTICS

The concert hall has a large pipe organ by Klais Orgelbau of Bonn. Working closely with the organ builders and specifiers we have developed an acoustic that is uniquely suited to the pipe organ. The final parts of the building construction will be completed in March 2012 and the organ dedicated in November 2012.

The pipe organ includes swell shades that allow the instrument to address the reverberation chamber directly, giving the organist direct artistic control over the room acoustics.



Plácido Domingo

Renée Fleming

Yo-Yo Ma

OPERA CARMEN

American

Ballet Theatre

Mariinsky Ballet

Magida El Roumi

Xiu Wei Sun

OPERA TURANDOT

Andrea Bocelli

London

Philharmonic

SWAN LAKE

**2011**

INAUGURAL SEASON

Teatro alla Scala Ballet

Universal

Ballet of Korea

Wynton Marsalis Jazz

at Lincoln Center Orchestra

DESIGN TEAM  
ROYAL OPERA HOUSE MUSCAT

VISION AND LEADERSHIP  
THE ROYAL COURT OF OMAN

ARCHITECTURAL & THEATRICAL  
DESIGN

WIMBERLY ALLISON TONG & GOO

ACOUSTIC DESIGN  
IDIBRI

ORGAN BUILDER  
KLAIS ORGELBAU

