

New Product



The construction boom of the large-scale theaters in Japan seems to have been slowing down, but on the other hand, there are plenty of plans to build theaters in Asian countries, particularly in China. In this hot Asian area, Mitsubishi Heavy Industries, Ltd. (MHI) had the honor of supplying its stage machinery to The Esplanade Theatres on The Bay which made its grand opening on October 12, 2002 as a national performing arts center in Singapore. The Esplanade Theatres consist mainly of the Lyric Theatre and Concert Hall, with capacities of 2 000 seats and 1 800 seats, respectively. Fig. 1 shows the overview of the Esplanade Theatres. Both Theatre and Hall are equipped with various



Fig. 1 Overview of the Esplanade Theatres

Stage Machinery System for The Esplanade-Theatres on The Bay in Singapore

Steel Structures & Construction Headquarters

unique items of stage machinery, some of which have not been seen in theaters in the world. Table 1 shows the specification of principal equipment. The features of the machinery are described below.

1. Outline of stage machinery

The Lyric Theatre is principally designed for the presentation of traditional Asian and Western performing arts, classical ballet, modern/traditional dance, dramas and musical events. Fig. 2 shows the overview of proscenium in the theater.



Fig. 2 Overview of proscenium in the Lyric Theatre

Table.1 Specification of principal equipment

Category	Description	Set	Drive system	Design load	Speed	Motor capacity
Concert Hall	Elevators and wagons	16	Spiralift or manual	4.0 to 7.5 kN/m ²	3 m/min /-	5.5 to 30
	Rigging system	37	Electric winch	250 to 1500 kg	0.06 to 60 m/min	2.2 to 5.5
	Acoustic reflectors	3	Electric traction	Self + 500 kg	1.5 m/min	2.2 to 3.7
	Reverberation chamber doors	58	Electric jack	-	90 sec./stroke	0.4
	Acoustic Curtains	59	Electric traction	-	12 m/min	1.5
Lyric Theatre	Elevators	5	Spiralift	7.5 to 10 kN/m ²	3 m/min	18.5 to 88
	Wagons	11	Motor or manual	4.0 kN/m ²	3 m/min /-	-
	Rigging system	110	Electric winch	600 kg	0.096 to 96 m/min	18.5
	Windlasses	22	Balance chain	-	-	-
	Acoustic/Fire Doors	6	Counter balance	-	6 to 14 m/min	2.2 to 7.5
	Banner Curtain	8	Yo-Yo Drum	-	12 m/min	1.5

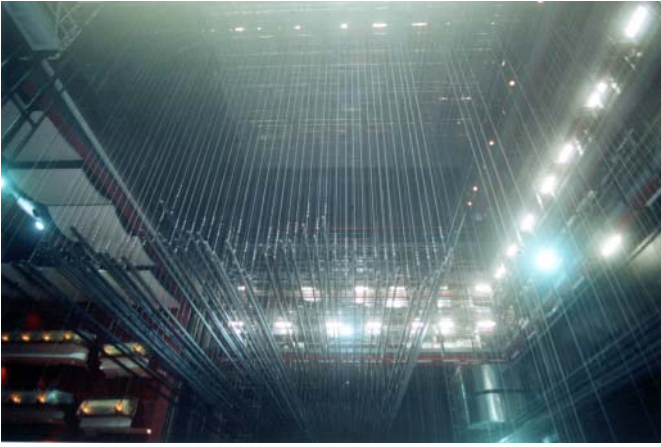


Fig. 3 Bar hoist of 110sets of stage rigging in the Lyric Theatre



Fig. 4 Acoustic reflectors and chamber doors in the Concert Hall

As major stage machinery for the theater understage, the theater has a large main stage elevator, whose dimensions are 15 m by 19 m. The overstage machinery consists of a rigging system which has 110 bars (Fig. 3). The system can suspend stage setting/lighting in every 200 mm span in the longitudinal direction of the stage. The Concert Hall has several unique items of machinery, enhancing acoustic performance according to the type of music.

2. Special Features

- (1) The Theatre has one large wagon especially for ballet in the stage pit, which uses the soft plywood for the floor to permit optimal performance of ballerinas. This wagon is designed to be placed on the main stage elevator.
- (2) Each of the 110 stage rigging has a uniform loading capacity of 600 kg and variable speed up to maximum of



Fig. 5 Acoustic curtain in the Concert Hall

96 m/min. It can suspend the stage setting/lighting anywhere above the stage. The system realized synchronized operation of up to 27 rigging (including 24 rigging for one object) with high synchronizing performance and high positioning accuracy. The theater is also equipped with 22 sets of lighting cable windlasses, which provide power supply for lighting equipment suspended by stage rigging bars.

- (3) The theater has several locations for operation on the side stage, galleries and pit to connect the operation console. Operators can thus use the operation console freely and effectively, since they can choose the position from which to watch the operation of equipment.
- (4) The Concert Hall is equipped with several items of machinery to achieve acoustic performance according to the type of music. 58 sets of reverberation chamber doors are arranged on the auditorium wall, whose angle can be varied by opening or closing operations so that the space volume of the hall can be varied for acoustic purposes (Fig. 4). This large-scale system of reverberation chamber doors is unique and impressive. Furthermore, acoustic curtains are also provided throughout the auditorium wall to achieve optimal acoustic conditions by their operation (Fig. 5).
- (5) In the Concert Hall, there are three acoustic reflectors on the ceiling, consisting of one circular reflector with diameter of 9.5 meters, and 2 crescent shaped reflectors 13.4m and 17.1m. They can move up and down to any position between ceiling and floor for reflection of sound.