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3. Tokyo Dome «Big Egg», Tokyo (Japan)

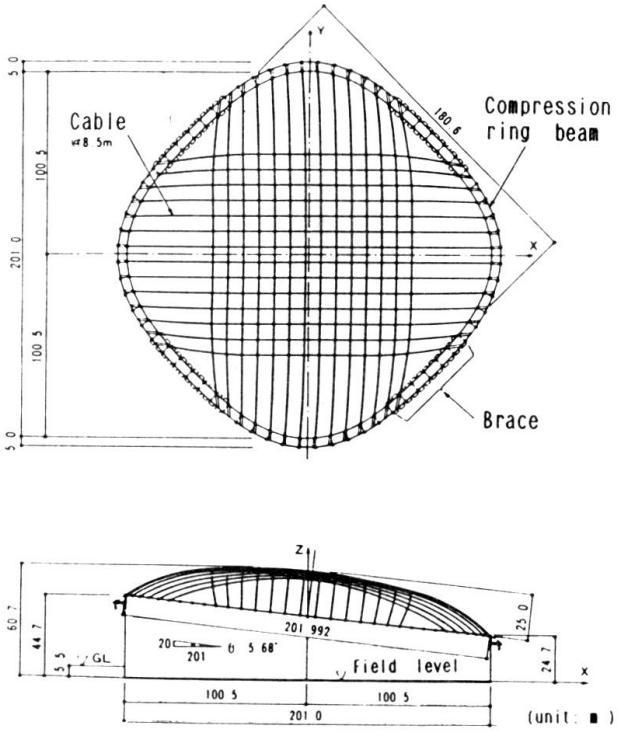
Owner:	*Korakuen Company, Ltd.*
Architects and Structural Engineers:	*Nikken Sekkei Ltd. and Takenaka Komuten Co., Ltd.*
Contractor:	*Takenaka Komuten Co., Ltd.*
Construction period:	*May 1985–March 1988*
Service Date:	*March 1988*

Introduction

As a franchise stadium of the Yomiuri Giants, the most popular baseball team in Japan, Korakuen Stadium has been very popular among many people for 50 years. This stadium will become Japan's first domed stadium with a large scale air-supported structure.

This dome arena constitutes a large space with a diagonal span of 201 m and an air volume of 1,240,000 m^3. The interior of the dome consists of the lower level spectator stand (infield and outfield) enclosing the playing field which is on the second basement floor. The middle level and upper level spectator stands are on the infield side. In addition, the concourse is provided at the back of the spectator stands on each level.

The roof is higher on the infield side than on the outfield side with an angle of about six degrees which is the first attempt in the world. This was designed to offer some shade in the adjoining park and to increase the composition ratio of the infield stand.



Roof structure outline

Korakuen Air Dome

Outline of the Structural System

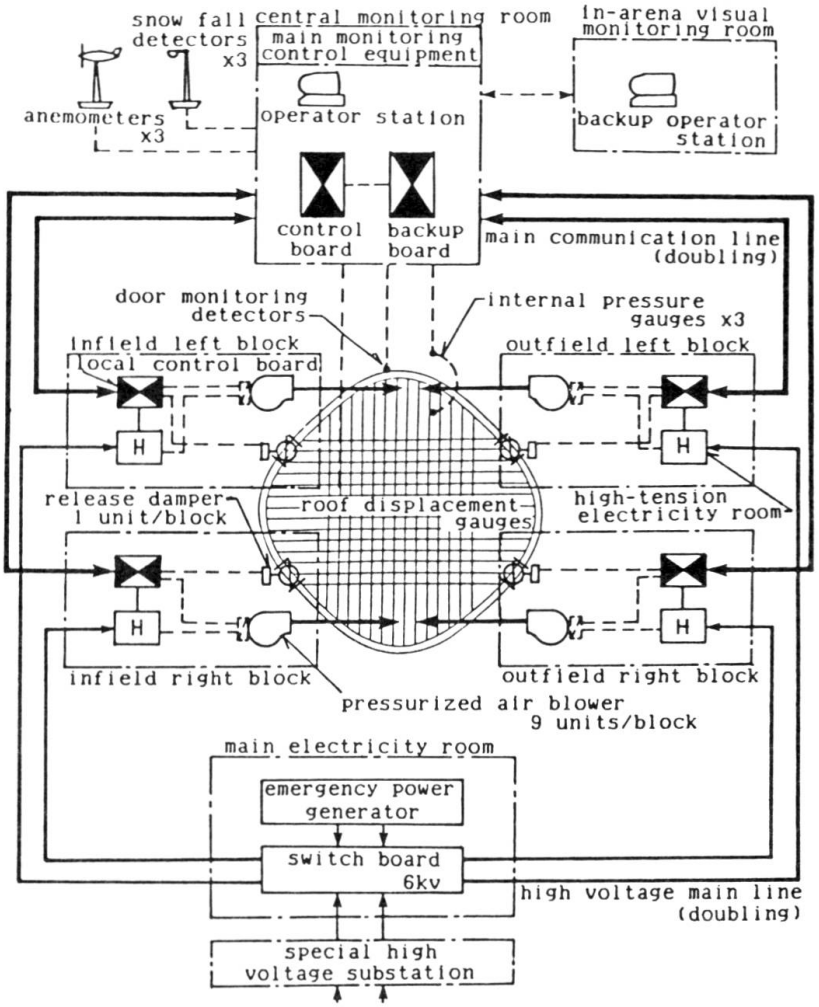
The plan of the dome is a super ellipse inscribed in a square with a side length of 180 m. The double-layered fabric is reinforced by 28 cables spaced 8.5 m apart. A normal operating pressure of 30 mmAq supports the roof weight of about 15 kg/m^2.

The internal pressure control system has been designed to keep the roof inflated against all types of adverse conditions, e.g., severe weather, mechanical breakdown, and human error. In order to ensure an improvement in reliability, redundant systems have been adopted. In most cases, these backup systems automatically come on line. For example, the air-supply system is divided into four equivalent blocks in which there are nine blowers, a local control board, a high-tension electricity room and a release damper. Therefore, even if a breakdown occurs in one block, it is fully possible to maintain inflation during evacuation. Also, sensors for the control, operator station, main control board, main communication line and high voltage main line are respectively multiplexed or duplexed.

(Hideki Magara)

Main Data

Main Purpose:	Multi-purpose playing field with emphasis on the baseball field
Building Area:	45,570 m^2
Total Floor Area:	115,221 m^2
Maximum Height:	56 m
Spectator Capacity:	50,000 (in case of baseball)
Roof:	Low profile cable-reinforced membrane structure
Membrane material:	Fiberglass cloth coated with tetrafluoride ethylene resin (thickness 0.8 mm)
Cable:	Structural spiral rope (Ø 80 mm)
Substructure:	Steel framed reinforced concrete structure with partial reinforced concrete structure
Pressurized air blower:	36 limit load type turbo-blower
Internal pressure:	30 – 90 mmAq
Wind Load:	Cable: W =C · 210 kg/m^2 Membrane: W =C · 220 kg/m^2
Snow Load:	60 kg/m^2



Outline of internal pressure control system