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4. Coal Storage with Large Span Dome, Takehara

Owner:	*Electric Power Development Co., Ltd.*
Architect:	*Architectural Office, Electric Power Development Co., Ltd.*
Engineer:	*Electric Power Development Co., Ltd.*
Contractor:	*Kajima Corporation and Mitsui Construction Co., Ltd.*
Construction Period:	*32 months*
Service Year:	*1983*
Dimensions:	
Diameter:	*120 m*
Building area:	*12256 m²*
Building volume:	*446647 m³*
Maximum height:	*48.7 m*
Structure:	
Pile:	*In-situ concrete piles ∅ 1,5 m × 828*
Foundation slab:	*Reinforced concrete*
Wall:	*Reinforced concrete*
Roof:	*Structural steel dome, acid-resistant coating steel sheet roofing*

Introduction

This storage is for the No. 3 Generator (700 MW) of Takehara coal-fired Thermal Power Station (Hiroshima Prefecture) and is of 150000 ton in storage capacity.
Its main features are a dome-type steel roof and cylindrical reinforced concrete wall.

Design

The cylindrical wall is required to withstand variable coal load such as eccentric load or full load within allowable displacement at stacker and reclaimer rail (GL+19850). It has many openings for conveyors, air vents, ducts, equipment hatch, etc. In view of the above conditions, the wall is made up of reinforced concrete with 3 horizontal ring beams and 48 vertical buttresses.

The structural steel dome of large span is required
- to have high rigidity both in-plane and out-of-plane to withstand eccentric loads consisting of coal receiving conveyor, exhaust ducts, etc. and wind loads,
- to make stress distributions as uniform as possible,
- and to make fabrication and assembly easy.

Considering the above-mentioned requirements, a lamella dome using CT trusses was adopted. The dome is equipped with roller supports padded with Teflon to allow displacement in the diametrical direction at 48 points on the top of cylindrical wall. These supports permit thermal deformation of dome and deformation of the cylindrical wall due to coal load (See Fig. 1).

View of the storage coal structure

Construction of lamella dome

For the construction of the dome, the «stage method» using 25 posts and connecting beams was adopted. As shown in Fig. 2, necessary space was provided for the operation of a 150-ton crawler crane. The dome was supported by the posts with oil jacks while under construction.

At the end of erection, the dome was separated from the stage by the drawing stroke of oil jacks in 4 steps so as not to produce excessive stress in any member of the dome trusses, even if any trouble might occur in oil jack.

(I. Inatsu)

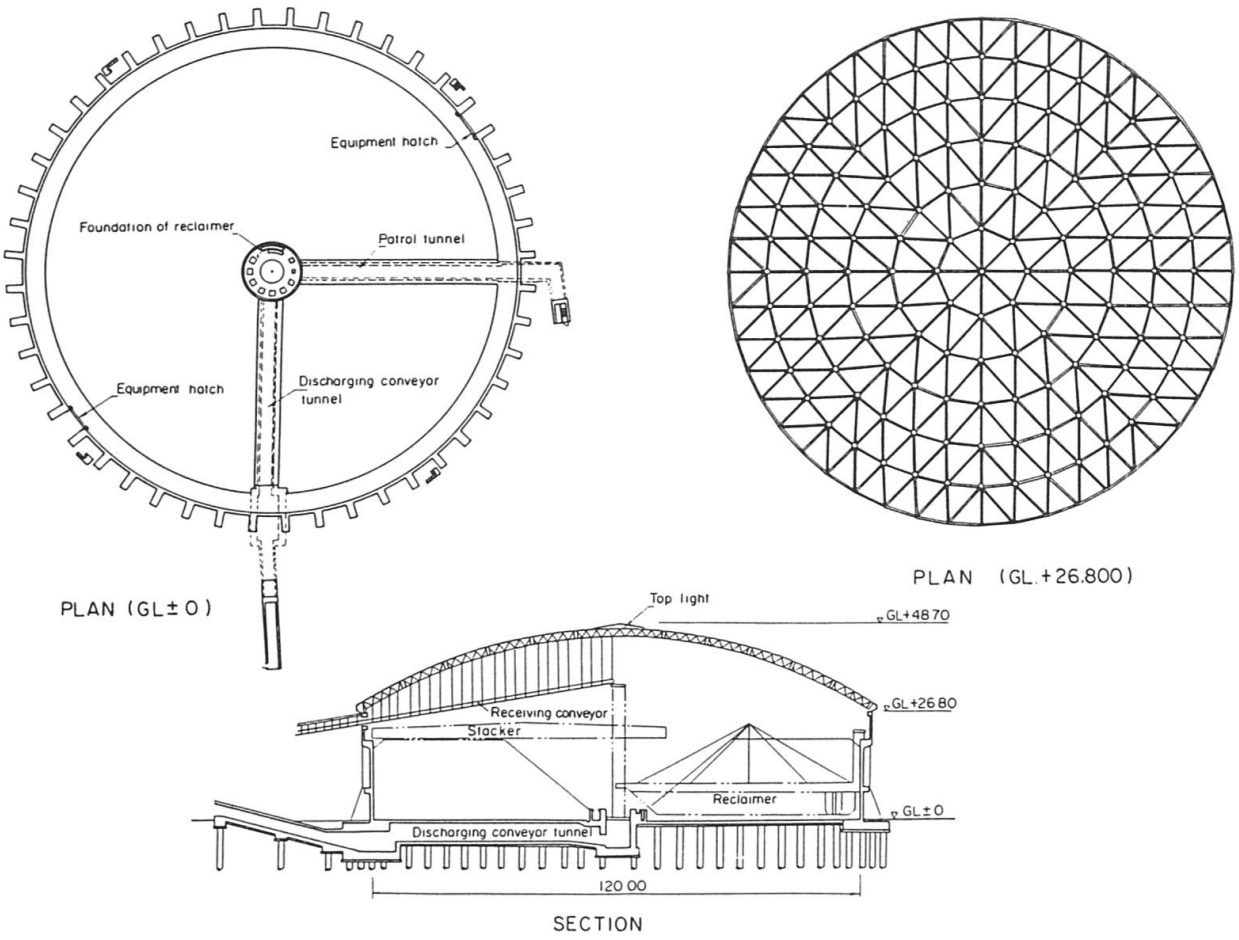

Fig. 1 Plan and section

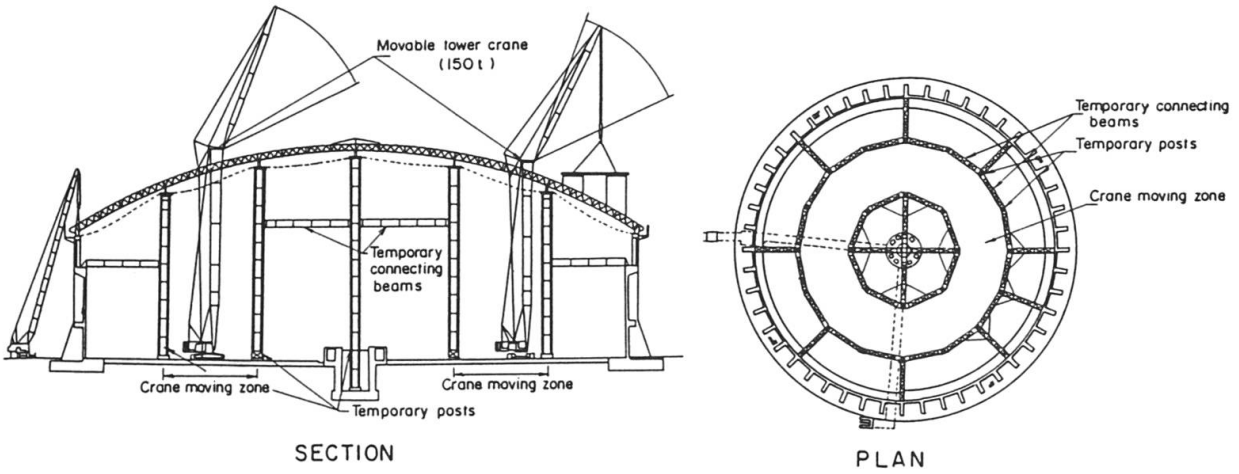

Fig. 2 Construction layout