

# CFS UPDATE

## Consideration of Detector lowering method

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Mini-Workshop on Infrastructure and CFS for Physics & Detectors

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# CFS Update

## Consideration of Detector lowering method

### Contents :

- Background and some topics
- Current status of heavy load transportation in Japan
- Issues on Detector lowering in mountain site

*Companies that cooperated in hearing and research are followings:*

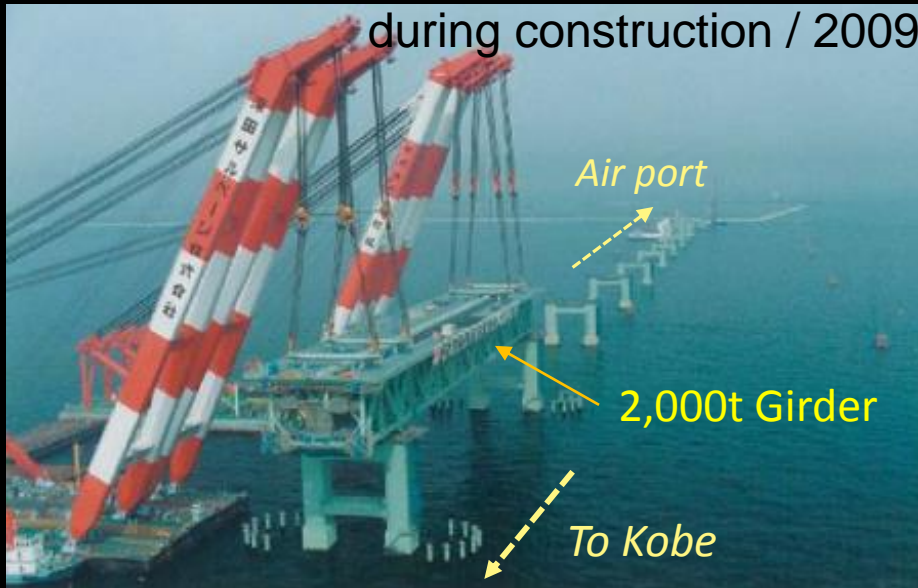
*-IHI, -JFE, Taihei Dengyo, -Takenaka, -Kajima, -Nikken-Sekkei, -CB-agent(China),etc.*

Topix-1:

# Tanker crashed! Kansai Airport bridge damaged accident caused by typhoon/Sep 2018



新聞 金経 SANKEI NEWS



# Topix-2: 4,000t Cargo ship landed! By Tsunami/2011



The largest crane ship in Japan  
unloading capacity:4,000t



# Reference: **Heavy load conveyance at sea**

*Co-hanging the **7,800 t** bridge girder  
by 3 big Crane ships  
(each ship: 4,000 t class)*



*The world's largest crane ship  
12,000 t /China*

- *Currently under construction  
**20,000 t class** ?*

# Background: Maximum load capacity of mobile cranes in Japan

The world's largest crane vehicle

Max. load: 1,200t



The largest crane car in domestic production

Max. load: 550t



# Background: Maximum load capacity of Gantry cranes in Japan & World

## Largest Gantry crane in Japan



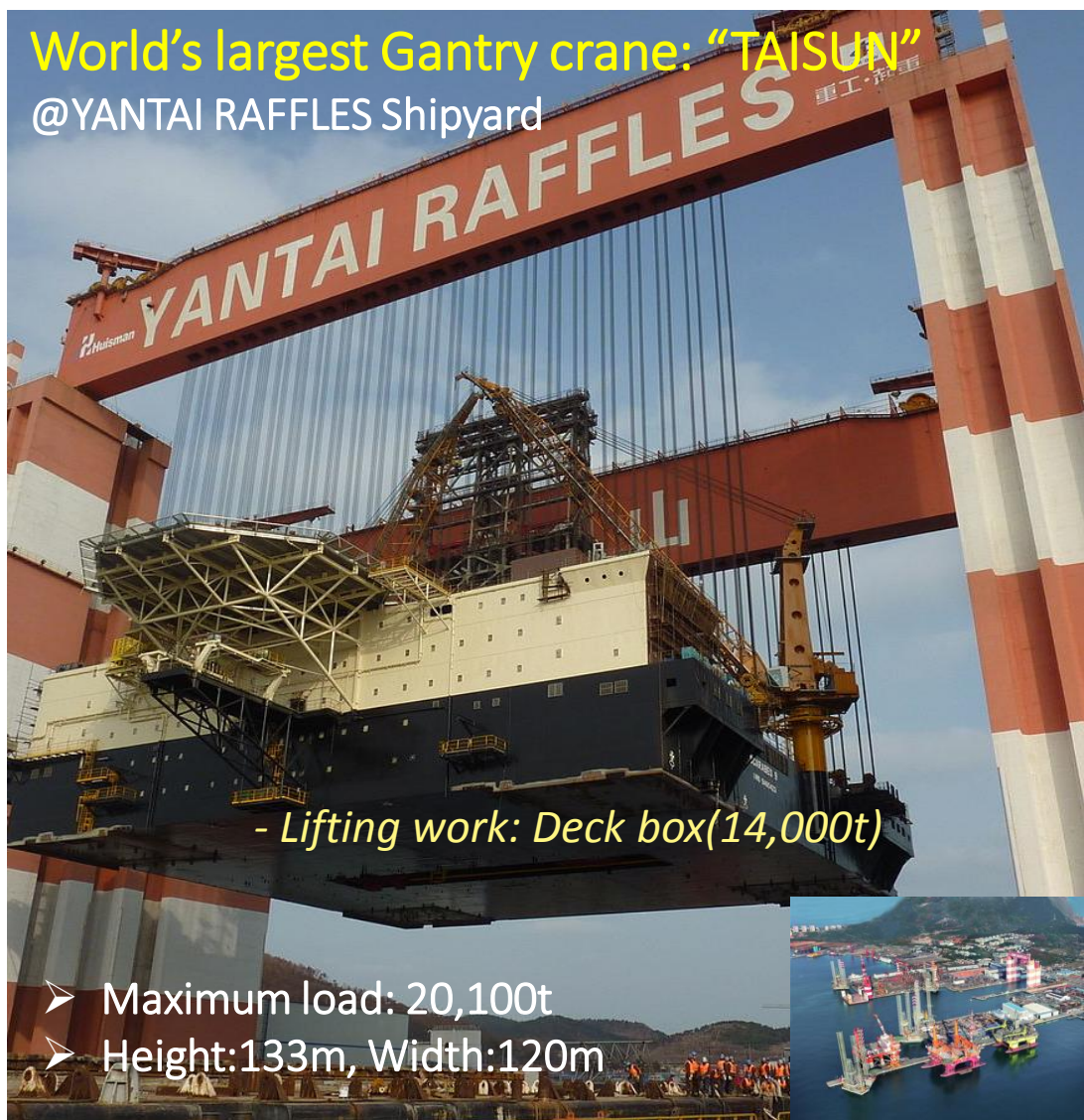
Port Niigata



Port Yokohama

## World's largest Gantry crane: "TAISUN"

@YANTAI RAFFLES Shipyard

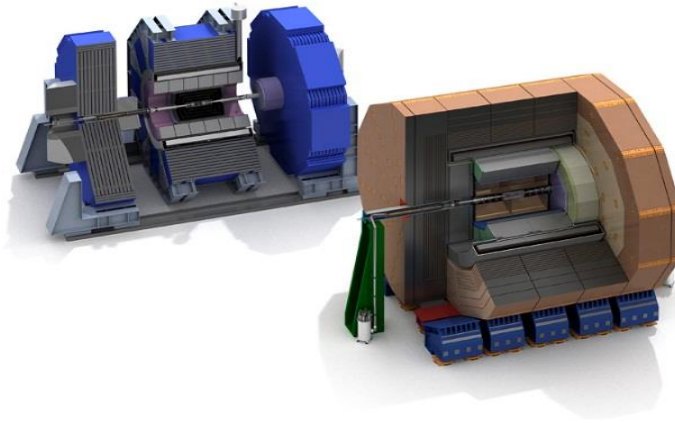


- Lifting work: Deck box(14,000t)

- Maximum load: 20,100t
- Height: 133m, Width: 120m

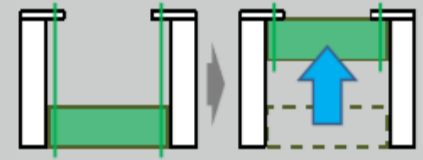

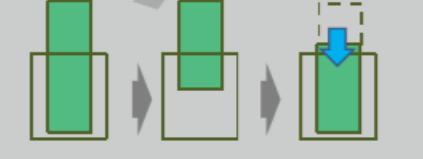
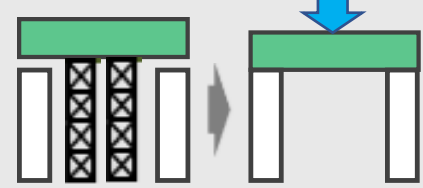


# Current status of super heavy load transportation in Japan





# Type of moving and construction method for super heavy objects (structures)

Method	Image	Characteristics
Lift up		Assemble the frame in a lower position and lift it up to a specified position Examples: <a href="#">Radio tower</a> , <a href="#">skyscrapers</a>
Traveling		Assemble the frame in one place and Move horizontally to the specified position Examples: <a href="#">Arena</a> , <a href="#">Station Building</a>
Grip down		Grab the structure and hanging it down, Then dismantle the lower part Examples: <a href="#">Dismantling work of towers</a> and <a href="#">big buildings</a>
Jack down		Assemble the frame on the support and set it down to the specified position Examples: <a href="#">Stadium</a> , <a href="#">Huge Warehouse</a>

# Case ①: Lift up construction method

## ■ Shin-UMEDA Sky-building/Osaka



● load weight : 1,040t

- Loading capacity : 1,600 tf
- Loading speed : 354 mm/min
- Loading time: 12 hours

# Case ②: Lift up construction method

## Large aircraft hangar / Haneda airport

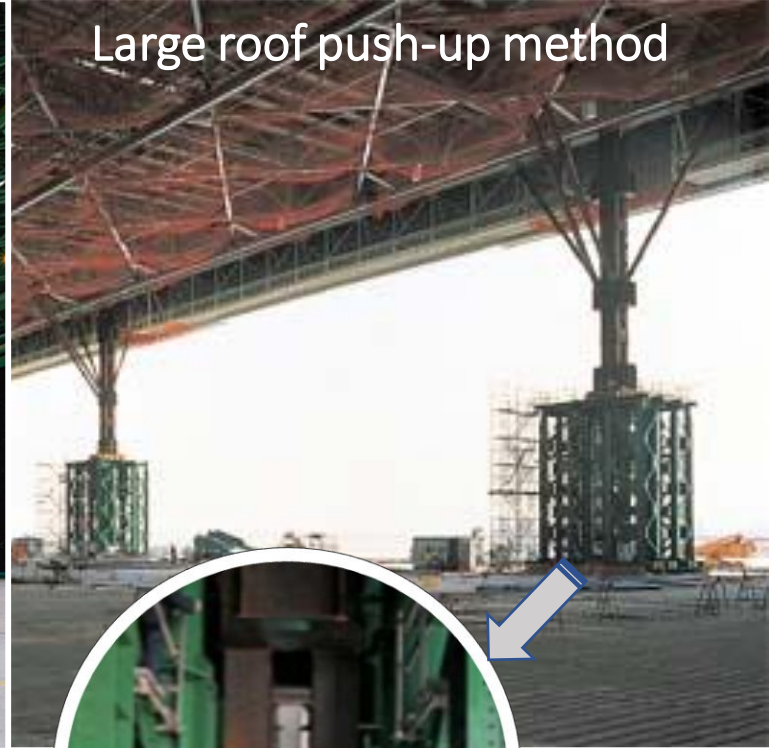


Haneda airport aircraft hangar-West no.2  
< w100m × L200m × h42m >

- load weight : 7,600 t

- Loading capacity : 1,200 tf × 8
- Loading times : 6 (7m/every time)
- Loading time: 4 hours(?)

Large roof push-up method

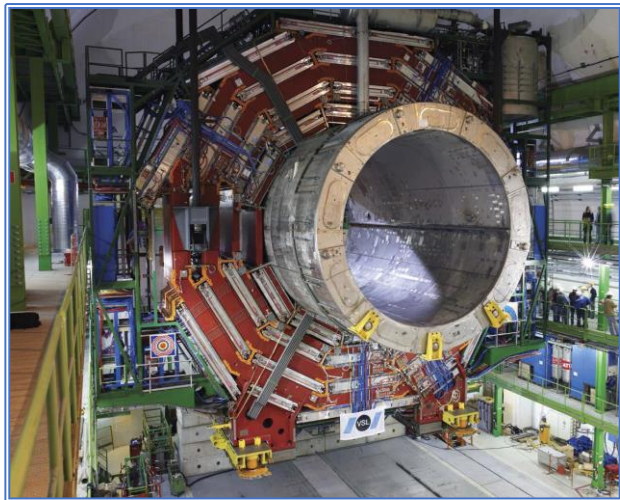


1,200t Jack system

# Case ③: Jack down method

## ■ Ring road tunnel /Tokyo Metropolitan area

Metropolitan area map



CMS at CERN

Shield Machine: Gross weight 2100 tf

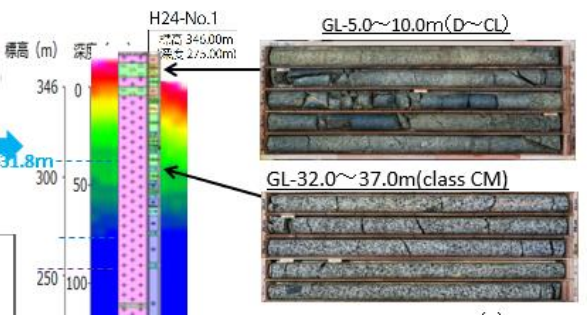
# Issues on Detector lowering method in mountain site



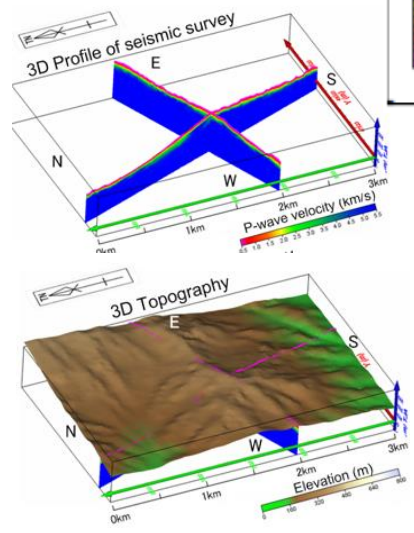
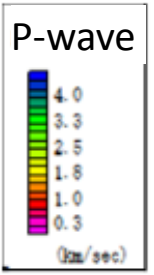
CMS@CERN



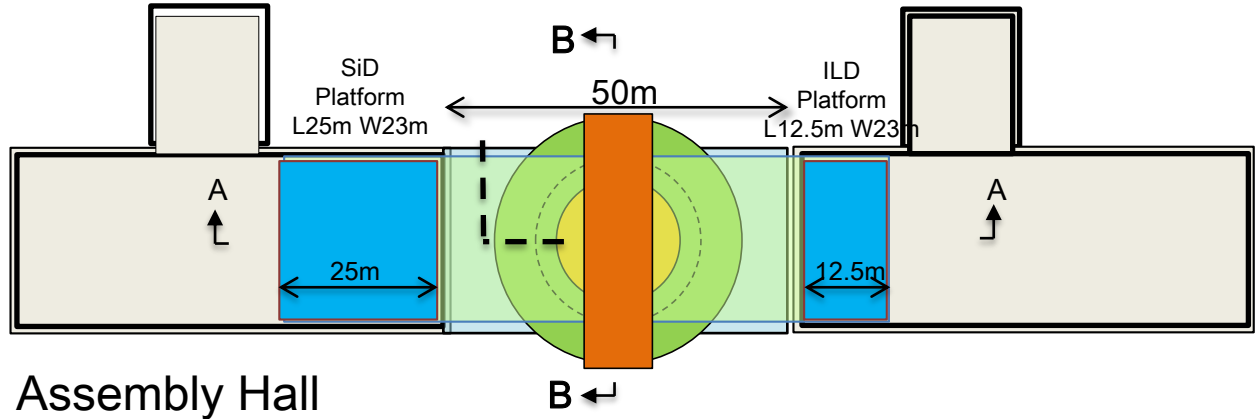
# Vertical section around Main shaft



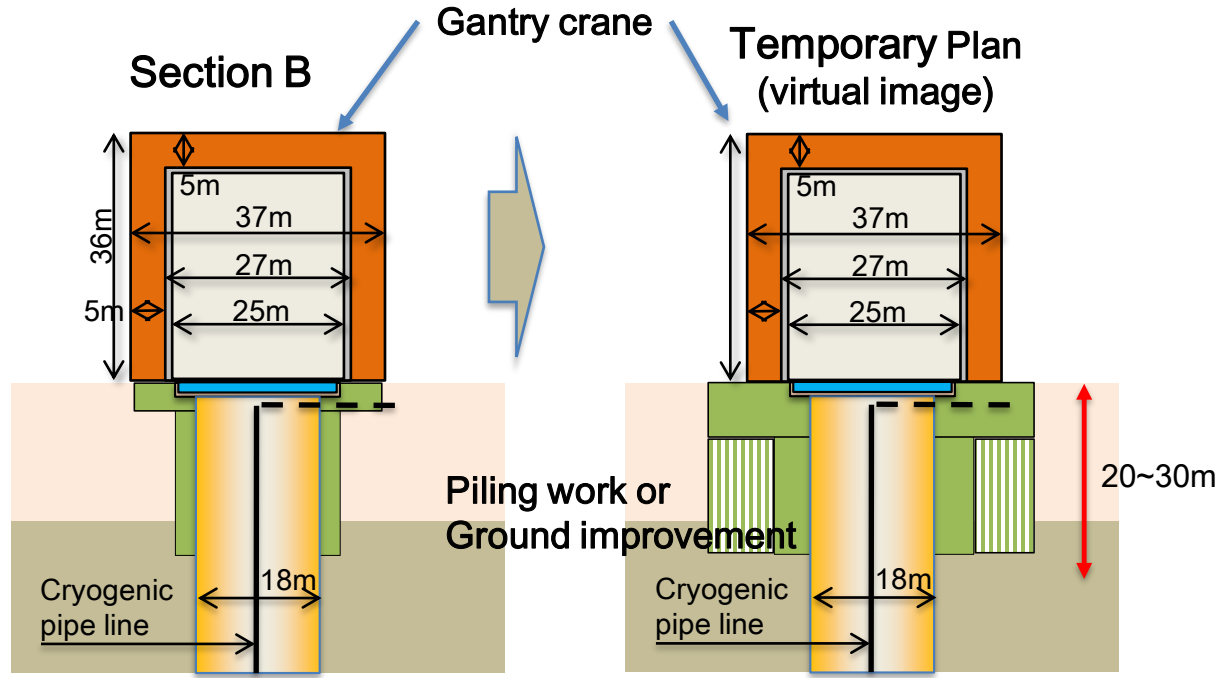
Seismic wave exploration Result @kitakami



Geology @KITAKAMI site



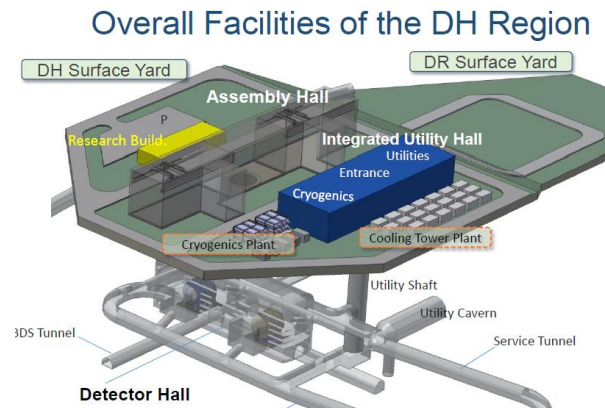
Assembly Hall



# Miyahara's report at ILC Tokusui Workshop 2015

### Main Issues toward the Design Phase

- Verification: Geological feature in the Detector Hall area
  - **Geological conditions** at the Vertical shaft position
- Re-inspection: Requirement of the Experimental Functions
  - **Platform structure** in the push-pull system
  - Basic concept of the **Pacman**, Crane, Cryogenics system
  - Vertical Shaft : Utilization form, Diameter, EV size, etc.



# Summary: today's report

## ■ Technical feasibility on super crane

- Technical feasibility limited to crane construction - no problem
- Cost outlook: still difficult at this stage because detailed requirement and specification are not clear yet

## ■ Considerations for starting basic design

- Interface between detector design and crane design
  - Crane mechanism and **Suspension structure**
  - Optimization corresponding to two Detectors
  - **Platform structure** (Dimensions and sliding system, etc.)
- Integrated design of crane equipment and facilities design
  - Verification of **Ground properties** at real construction site
  - Specific consideration of **total Cost & lowering Schedule**



End