

Jack Methods

Lift-up Method
Up & Down Method

Slide Method



Lift-up Method and Up & Down Method

(Jack systems that safely and accurately lift up and lower heavy structures and equipment Heaviest structure ever lifted: 6,500 tons)

Features

- 1 Use of step rods → Less slip than with a wire system (highly reliable)
Adjustment of positioning in millimeter orders is available.
- 2 Integrated, remote operation and automated control of multiple jacks (accurate optical-fiber control)
Synchronous and automated control of up to 48 jacks is available.
- 3 Accident-free operation for 35 years since being developed and entering practical use in 1969
The up & down method was put into practical use in 1981.
- 4 Engineering, installation guidance and operations are tailored to the size, weight and rigidity of the structures and equipment to be moved



Lift up of large roof at Saitama Super Arena
(lifting weight: 3,540 tons)



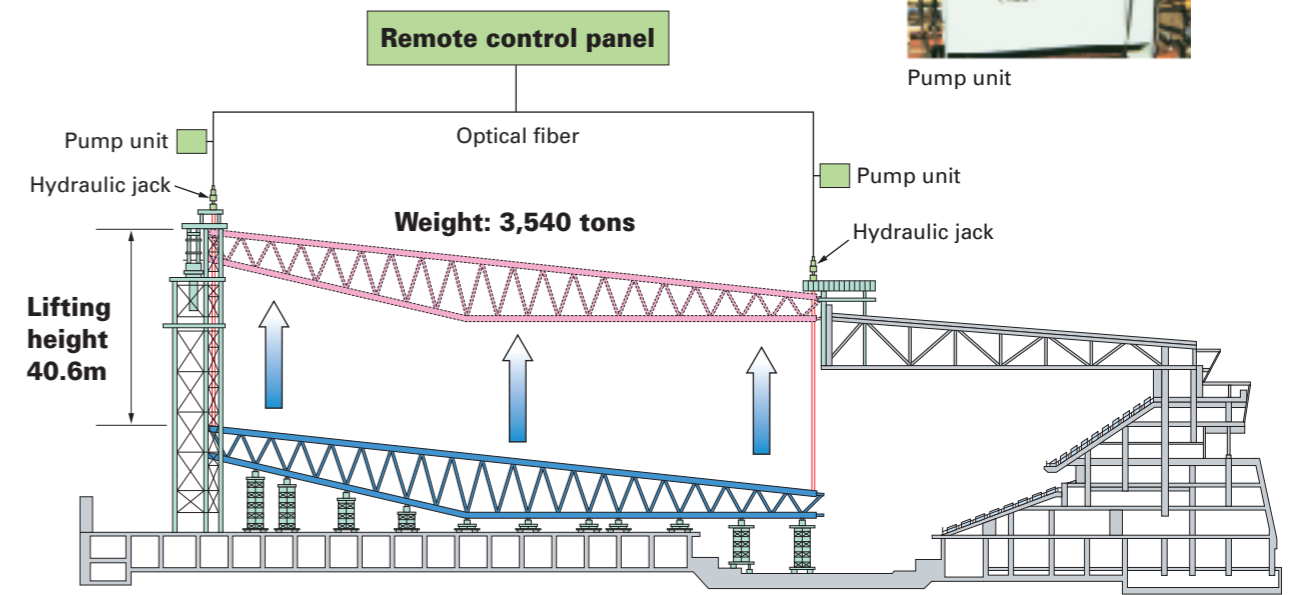
Hydraulic jack



Remote control panel



Pump unit



Conceptual Drawing of Lift-up and Up & Down Methods

Type and Capacity of Hydraulic Jack

Type	Max output (T)	Stroke (mm)	Outside diameter (mm)	Weight (kg)	Step rod diameter (mm)
KLH-J-UD-200	200	220	φ600×H1891	1490	SCM-435 φ140
KLH-J-UD-150	150	220	φ540×H1891	1250	// // φ120
KLH-J-UD - 80	80	220	φ460×H2283	1100	// // φ85
KLH-J-UD - 50	50	220	φ410×H1893	750	// // φ70
KLH-J-UD - 25	25	220	φ280×H1713	350	// // φ55

Lift-up Method

This safe, labor-saving method lessens work at high elevations and allows one-block lifting operations.



Conference building of Tokyo Big Sight (lifting weight: 6,500 tons)



Fuji-Sankei Building (lifting weight: 1,200 tons)



Melan arch structure of Gokuraku Bridge (lifting weight: 600 tons)

Flat Structures

- Top roof of airport building
- Gymnasiums and airplane hangers
- Building slabs
- Lifting of building structures
- LNG and LPG tank roofs
- Bridge girders and other girders

Cylindrical Structures

- High-rise radio towers and stucks
- Steel internal cylinders of stucks
- Steel conduits
- Nuclear plant reactors



Kisogawa Monument Tower (lifting weight: 3,200 tons)

Up & Down Method

The Up & Down method safely and easily raises and lowers many kinds of heavy structures and equipment that are conventionally regarded as difficult to handle. This method meets the needs of complex and diversified lifting and lowering operations.



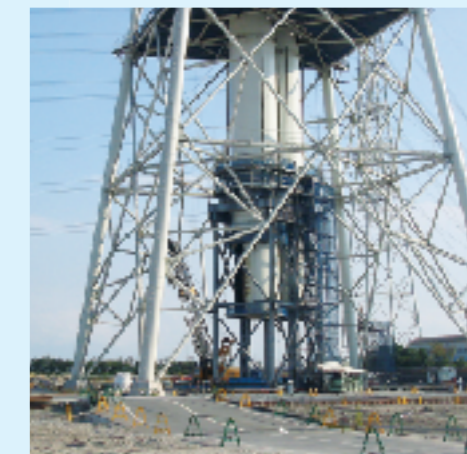
Blast furnace at JFE Steel's Kurasiki Works (lifting weight: 4,500 tons)

Installation, Repair and Dismantle of Heavy Equipment

- Power generators, turbines, transformers, deaerators
- Modular plants, Boilers
- nuclear reactor construction
- demolition method

Construction, Repair and Dismantle of Structures

- Construction and adjustment methods for oil tanks
- Lowering method for concrete slab forms of high-rise structures
- Overhead Switching Method (just above structures)
- Dismantling methods for various tanks, stucks



Dismantling of stuck at Himeji Plant of Kansai Electric Power Co.

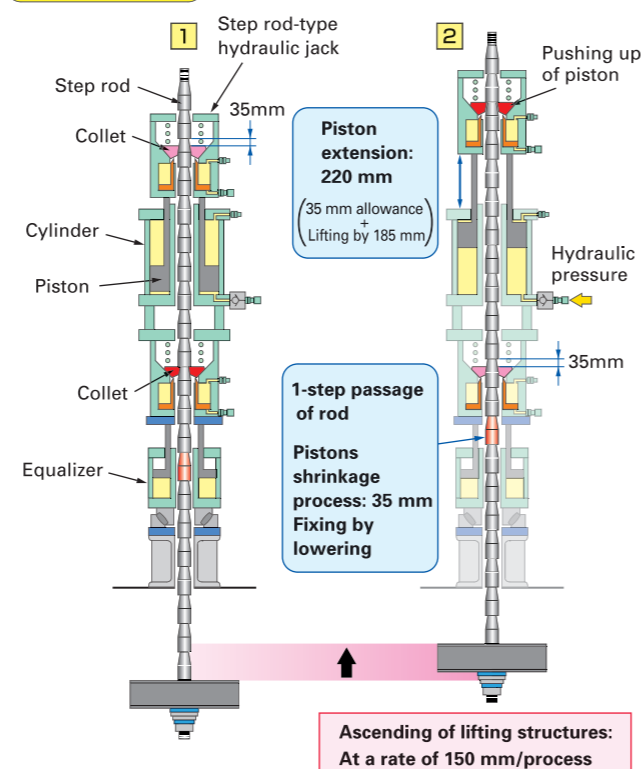
Step rod



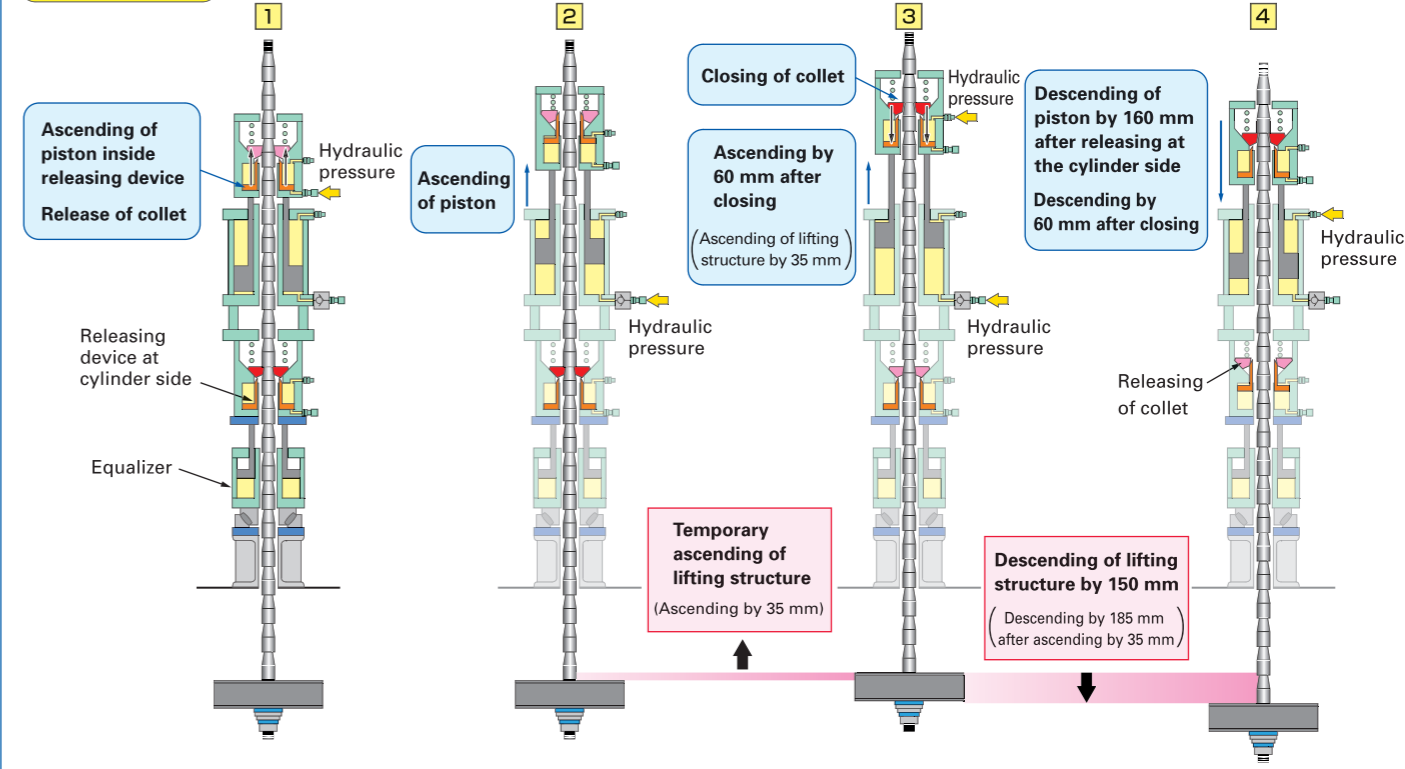
Hydraulic jack



Raising Process



Lowering Process



Slide Method

The slide method carries out concrete placing and the arrangement of reinforcing bars in a way that enables the continuous construction of structures. It can produce a diversity of sectional configurations that are high in dimensional accuracy and design performance.

Identical Section Method (silos)

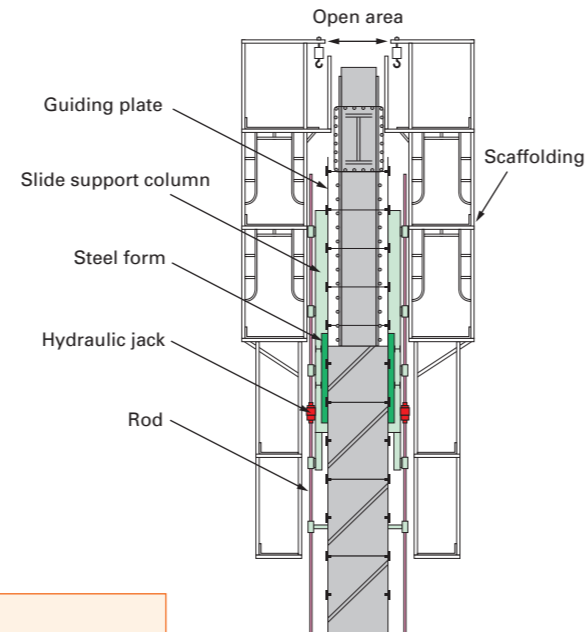
Grain silos
Rice silos
Cement silos

Deformed Section Method

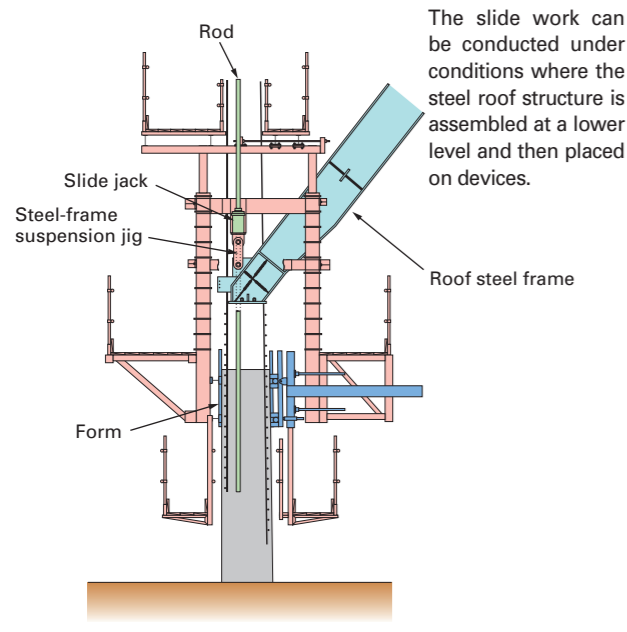
Observatories, air traffic control towers
Building elevator cores
Concrete stacks, bridge piers
Dam intake towers, lining of shafts
Caisson manufacture



OSF method for semi-circular structure of Saitama Super Arena



Coal silo for Maizuru P/P of Kansai Electric Power Co.



The slide work can be conducted under conditions where the steel roof structure is assembled at a lower level and then placed on devices.



Stuck at Hirono P/P of Tokyo Electric Power Co. (lifting height: 200 m)

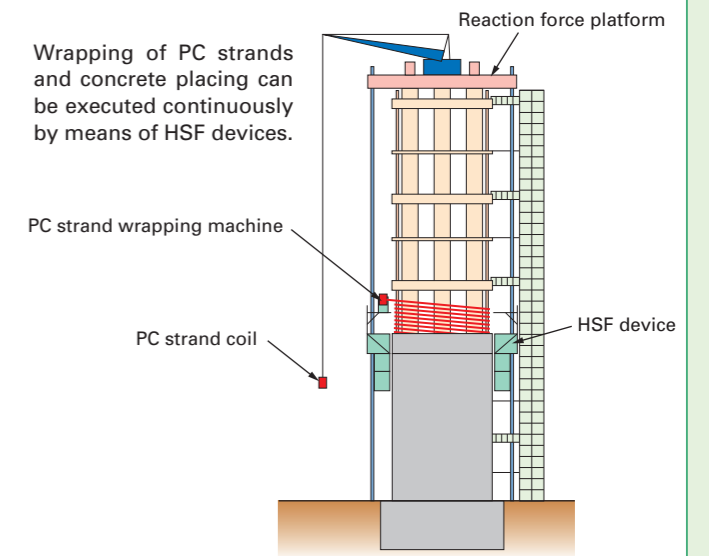
This method secures open areas in the upper section of a structure. By arranging rods and jacks around the exterior of a structure, it can carry out the major assembly of reinforcing bars.



Other Methods



HSF (Hybrid Slip Form) method for High Pier



Jump-up method for stuck at waste incineration plant of Tokyo Chuo Area



Climbing scaffolding method for main tower for Yahagi River cable-stayed bridge at Second Tomei Expressway



Climbing scaffolding method for M.M. DoCoMo Building

Slide Method

Features

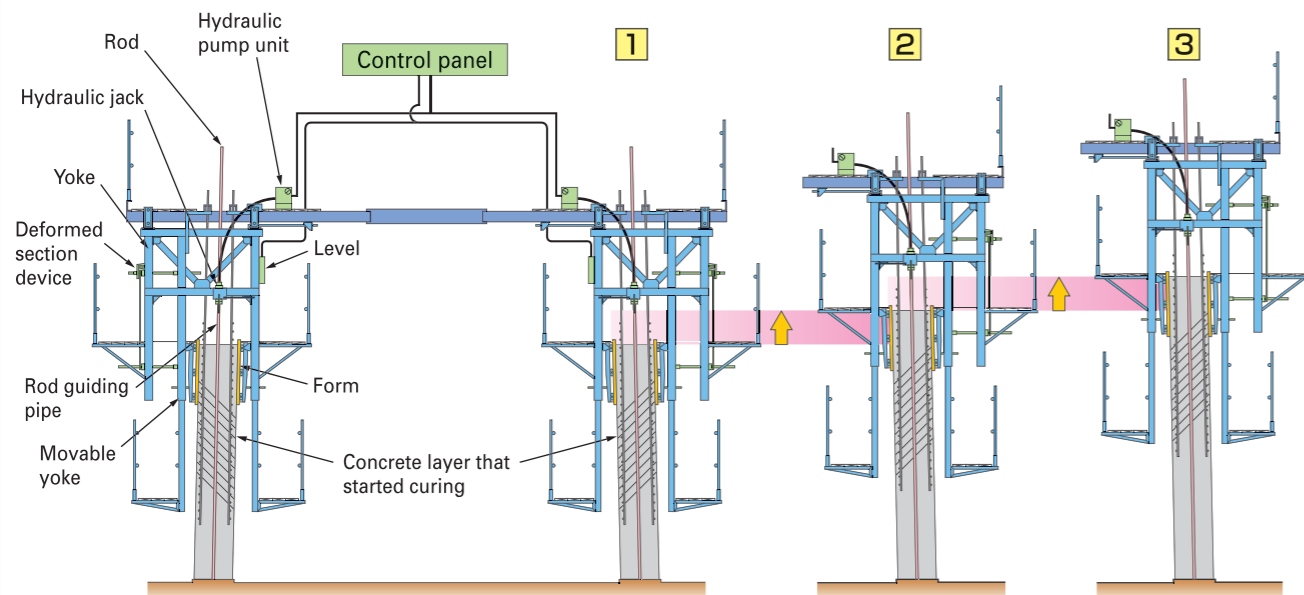
- 1 Greatly reduces construction term**
(Concrete placement at a rate of 1.8 m/8 hours/day and continuous 24-hour placement are available)
- 2 Secures safe and reliable work**
- 3 Enables structuring of various deformed sections and wall surfaces with various designs**

The slide method is used for the continuous construction of concrete structures. In order to achieve this, the slide method synchronizes concrete placing and the arrangement of reinforcing rods with the curing speed of the concrete, while simultaneously using hydraulic jacks

to raise concrete forms that are integrated into the equipment. The slide jack system adopts a one-jack/one-pump system, and the reaction force generated when the jacks are raised is supported by rods that are successively inserted into the structure.

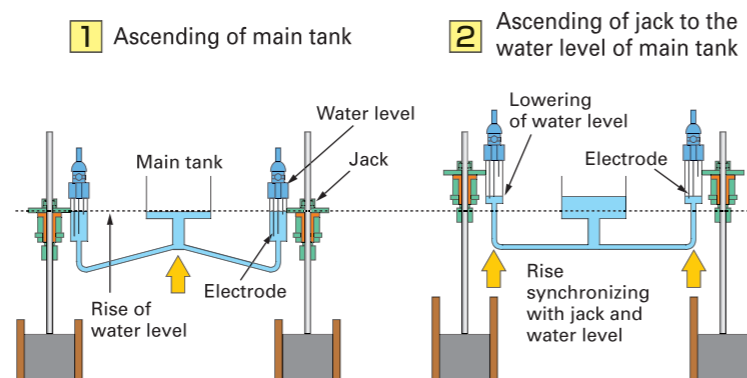
In the case of both deformed section method

Concrete placing at a rate of 15~20 cm/layer and sliding every 3~5 cm while synchronizing with placing speed



Water-level Control System

The jacks ascend at a stroke of 30~50 mm/cycle, and a water-level control system is adopted to maintain synchronous control of multiple jacks. Under this system, both levels of each jack and the main tank are pipe-connected. ①When the main tank is initially raised to the prescribed cycle height, the water level in each jack level rises. ②During sliding, the water levels fall, then electrodes are used to sense these changes of water level in order to complete the sliding operation at an identical water level. In this way, the system permits the synchronous operation of multiple jacks.



Type and Capacity of Slide-type Hydraulic Jack

Type	Max output (T)	Stroke (mm)	Outside diameter (mm)	Weight (kg)	Diameter of rod (mm)
KSH - J - 15	15.0	70	240×340×H459	95	φ76.3 t = 9.5
KSH - J - 10	10.0	70	146×246×H408	38	φ48.6 t = 5.1
KSH - J - 7	7.0	70	142×250×H360	25	φ32 RB



Up & Down Method used in relining of No. 2 blast furnace at JFE Steel's Kurasaki Works



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