

Cement Silo Storage & Handling System

Selected Reference Project

Engineering, Construction, Installation,
Commissioning & Handover



Reference Project Overview & System Scope

This reference project comprised a complete cement receiving, storage, conveying and dispatch system. The project scope included engineering design, 3D coordination, equipment manufacturing, civil interface coordination, site installation, electrical automation, commissioning and final handover.

- 1 Material Receiving**
Cement receiving from bulk tankers or upstream production facilities.
- 2 Feeding System**
Vertical lifting or pneumatic transport to the silo roof.
- 3 Storage System**
Closed cement storage with continuous inventory monitoring.
- 4 Roof Dust Collection**
Filtration of displaced air during silo filling.
- 5 Aeration & Discharge**
Controlled fluidization and stable cement discharge.
- 6 Bulk Loading & PLC Control**
Bulk truck loading and centralized automatic operation.



Reference Project Design Basis

The completed system was designed based on material characteristics, storage requirements, handling capacity, site conditions and applicable engineering standards.

01 Material Characteristics

The properties of the cement were considered to ensure safe storage, stable flow and reliable handling.



Bulk Density

Affects storage volume and structural loading.



Moisture Content

Affects flowability, adhesion and silo performance.



Material Temperature

Affects material behavior and equipment selection.



Particle Size Distribution

Influences flow characteristics and segregation.



Flowability

Affects discharge performance and aeration demand.

03 Handling Requirements

Feeding, conveying and discharge systems were designed for stable and efficient material flow.



Cement Receiving

From bulk tankers or upstream facilities.



Feeding System

Vertical lifting or pneumatic conveying to silo roof.



Conveying & Distribution

Roof conveyor and diverter system to selected silo.



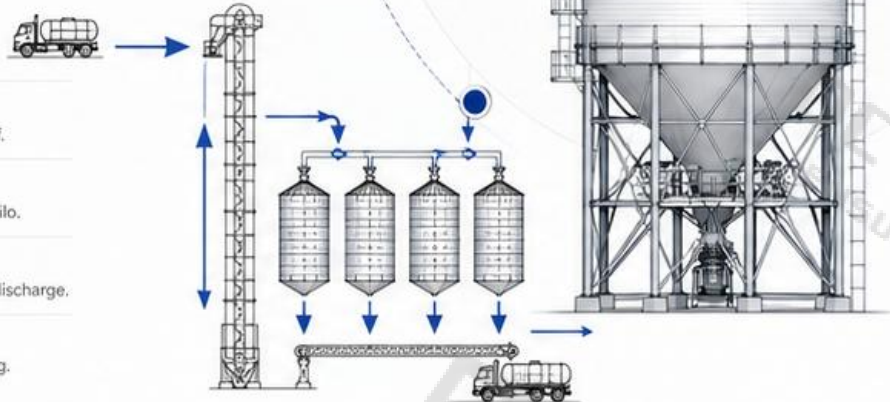
Discharge System

Aeration, flow control and conveying for stable discharge.



Dispatch System

Bulk loading station or packing / process feeding.



02 Storage Requirements

Storage strategy and silo arrangement were defined to meet operational and inventory requirements.



Number of Silos

Four silos configured for operational flexibility.



Effective Storage Volume

Provides required inventory capacity.



Operating Reserve

Additional capacity reserved for stability and safety.



Inventory Management

Supports real-time monitoring and optimized operation.



04 Site & Design Conditions

Site conditions and external loads were evaluated for safe and reliable structural design.



Wind Load

Considered for silo, steel structures and equipment.



Seismic Load

Designed to resist lateral seismic actions.



Ambient Temperature

Considered for equipment and material behavior.



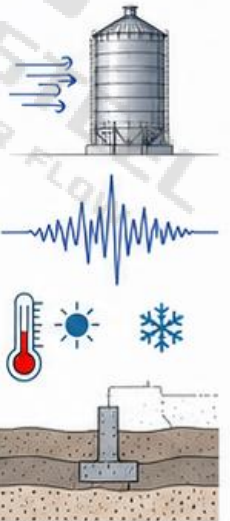
Geotechnical Conditions

Soil properties evaluated for foundation design.



Foundation Requirements

Silo and equipment loads transferred to foundations.



Cement Storage & Handling Process Flow

This is a completed reference project showcasing our proven engineering and execution capability.

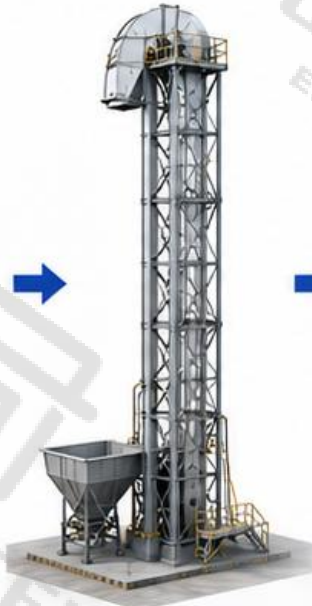
01

Cement
Receiving



02

Vertical Lifting or
Pneumatic Conveying



03

Roof
Distribution



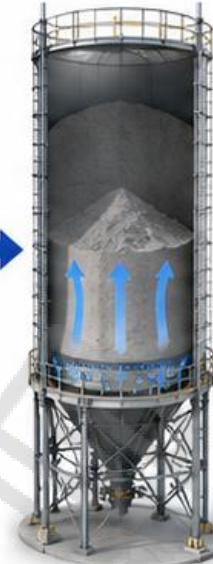
04

Closed Silo
Storage



05

Bottom
Aeration



06

Controlled
Discharge



07

Bulk Loading,
Packing or
Process Feeding



Engineering Design & 3D Coordination

A coordinated 3D engineering model was developed to integrate the silos, material-handling equipment, steel structures, piping, cable routes and maintenance access.



General Plant Layout

Overall arrangement of silos, handling systems, buildings and site interfaces.



Silo Body & Roof Modelling

Accurate modelling of silo shells, cones, stiffeners, roof structure, vents and accessories.



Bucket Elevator & Conveyor Modelling

3D model of bucket elevator tower, head section, conveyors, transfer points and chutes.



Roof Gallery & Platform Design

Roof conveyor gallery, catwalks, platforms, handrails, ladders and access systems.



Discharge Equipment Arrangement

Bottom discharge systems, air slides, valves, actuators and piping connections.



Interface Coordination

Coordination between structures, equipment, piping, electrical and civil interfaces.



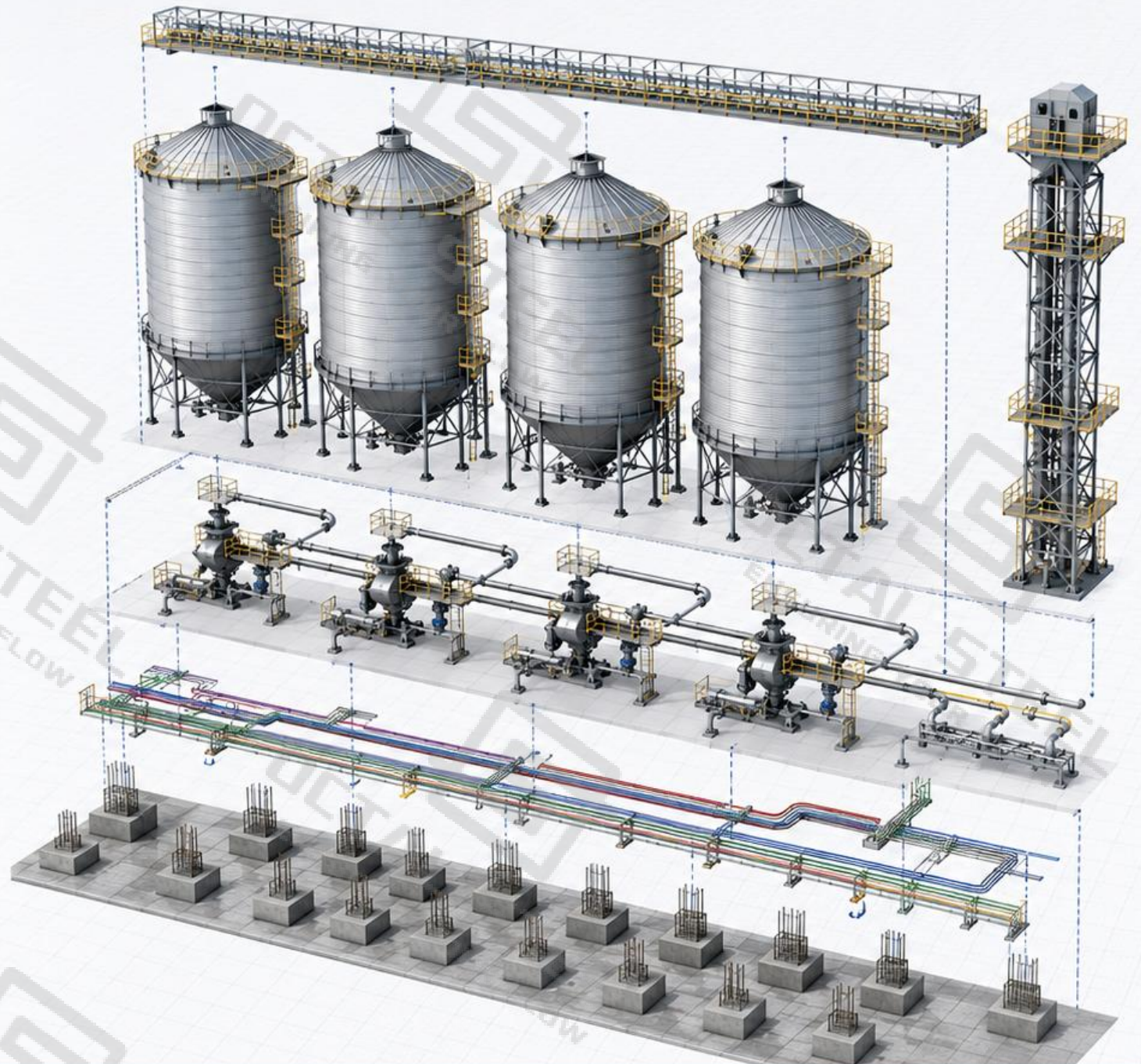
Clash Detection

Clash checks across disciplines to minimize interference and rework.



Maintenance & Lifting-Space Review

Verification of access, lifting zones, clearances and safe maintenance pathways.



Civil Works & Silo Foundation Construction

Silo foundations were designed and constructed in accordance with material loads, equipment loads, wind, seismic actions and geotechnical conditions.

01

Excavation & Survey

Surveyed circular foundation excavations prepared to the required depth and levels for four silos.



02

Reinforcement & Embedded Items

Detailed reinforcement cages with embedded steel plates, earthing elements and accurately positioned anchor bolts.



03

Formwork & Concrete Pouring

Robust formwork installed and high-quality concrete poured to achieve designed strength and durability.



04

Completed Foundations

Finished reinforced-concrete foundations ready for spiral silo structure installation and anchoring.



Spiral Silo Body Forming & Installation

The spiral silo body is continuously formed and lifted by the spiral forming machine, ensuring precision, strength and efficient on-site construction.

01 Equipment Setup

Spiral forming machine, coil stock and auxiliary equipment are positioned on the circular foundation.



02 Initial Wall Forming

Spiral forming begins, creating the silo wall to initial height with continuous seam.



03 Roof Assembly

Roof structure is assembled at low level and connected to the silo wall.



04 Continuous Lifting

The silo body and roof rise together as spiral forming continues to full height.



05 Completed Silo

Spiral forming complete. Silo body and roof are fully installed, anchored and sealed to the foundation.



Silo Roof & Auxiliary Steel Structures

After completion of the silo bodies, the roof equipment supports, conveyor gallery, elevator tower and maintenance structures were installed to ensure safe operation and convenient maintenance.

Installation Scope

- Roof frame and roof plates
- Central feeding inlet
- Dust collector connection
- Level sensor connection
- Inspection manholes
- Bucket elevator tower
- Roof conveyor gallery
- Connecting platforms
- External access ladders
- Safety handrails and toe plates



Cement Feeding & Roof Dust Collection System

Cement was transferred to the silo roof and distributed to the selected silo through the feeding and distribution system. The roof dust collectors filtered displaced air and supported safe silo-filling operations.

System Components

- Cement receiving equipment
- Bucket elevator
- Air slide conveyor
- Screw conveyor
- Diverter valve
- Feeding chute
- Roof dust collector
- High-level alarm
- Pressure relief device

Material Route

Receiving → Elevator → Roof Conveyor →
Diverter Valve → Selected Silo



Aeration, Discharge & Bulk Loading System

The system is designed to ensure reliable material flow, prevent arching and rat-holing, and enable efficient, clean and safe bulk loading operations.



Aeration System

- Multi-zone aeration pads for uniform air distribution
- Prevents material compaction and promotes mass flow



Controlled Discharge

- Cone bottom discharge with pneumatic flow control
- Air slide ensures stable and continuous material flow



Bulk Loading

- Dedicated loading spout with dust-tight connection
- Fast, safe and low-dust bulk loading to road tankers



Air Supply System

- Roots blower provides stable air pressure
- Piping network designed for balanced distribution



Electrical Control, Automation & System Commissioning

The completed four-silo cement storage and handling system is fully integrated with PLC and MCC systems for centralized monitoring, automated control, interlocking, alarm management, and safe, reliable operation.

Automation Functions

- ✓ Automatic target-silo selection
- ✓ Continuous level monitoring
- ✓ High- and low-level alarms
- ✓ Sequential equipment start/stop
- ✓ Automatic valve switching
- ✓ Blower and dust-collector control
- ✓ Motor overload alarm
- ✓ Blockage / misalignment alarm
- ✓ Emergency shutdown
- ✓ Operating data recording

PLC & HMI Control Interface



System Commissioning Process



Installation
Inspection



Insulation &
Earthing Test



No-Load
Test



Instrument &
Valve Test



PLC Interlock
Test



System No-Load
Operation



Cement-Loaded
Trial Operation



Capacity &
Performance Test

Project Completion & Delivered System Capability

Following installation and cement-loaded trial operation, the system has successfully completed all performance tests and been officially handed over to the client after operator training and final-document submission.

✓ Delivered System Capabilities

- Stable cement receiving
- Efficient silo feeding
- Sealed and safe storage
- Roof dust control
- Real-time inventory monitoring
- Controlled aerated discharge
- Bulk or packed cement dispatch
- PLC-based automatic control
- Integrated safety interlocks
- Convenient maintenance access

✓ Delivery Scope

- Engineering documents
- Mechanical equipment
- Steel structures
- Installation support
- Electrical and control systems
- Performance test reports
- Operation and maintenance manuals
- Operator training
- Spare-parts list
- As-built drawings
- Technical support

Integrated Cement Storage Solutions
From Engineering Design to Successful Project Delivery.

