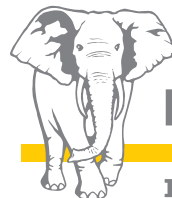
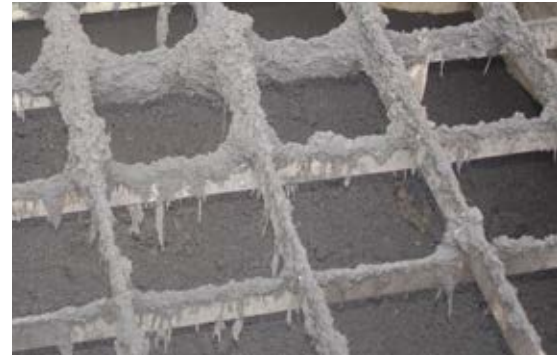


# Putzmeister silo engineering

For highly dewatered and highly viscous sludges



**Putzmeister**

**Industrial Technology**

Mining · Energy · Environment · Oil & Gas



# Silo technology

Putzmeister silos have been designed especially for highly dewatered and viscous sludges.

## Advantages when silos and pumps from one source are combined

- The shared silo discharge and pump feeding auger reduces costs and increases availability.
- The perfect tuning between pump and silo leads to an overall optimized concept.
- Common components for pump and silo reduce the number of spare parts required and simplify maintenance work.
- No interface clarification necessary, the customer does not have to deal with sub-suppliers.

## Sliding frame systems

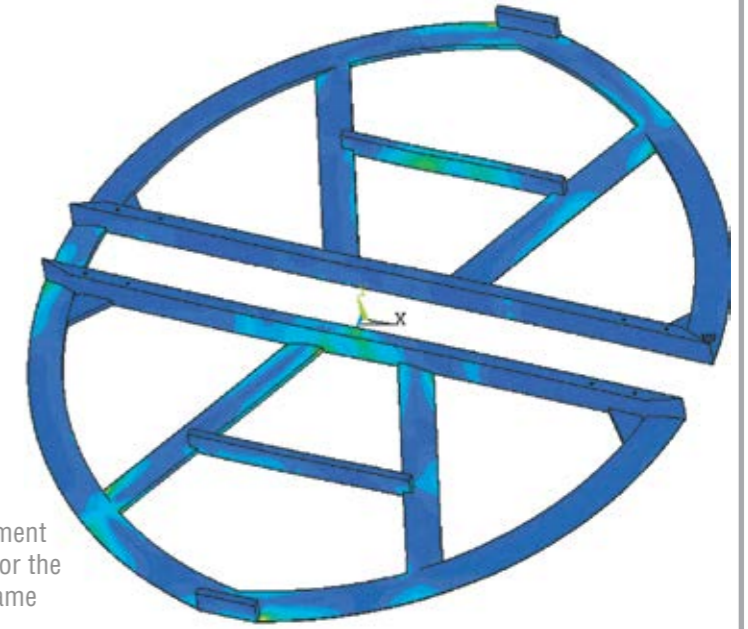
The Putzmeister sliding frame system has been designed especially to meet the requirements of 24/7 operation. Thanks to modern Finite Element Analysis and proven Putzmeister hydraulic components the sliding frame's design, as well as its service life is optimised.

### Sliding frame system PDL/PDF

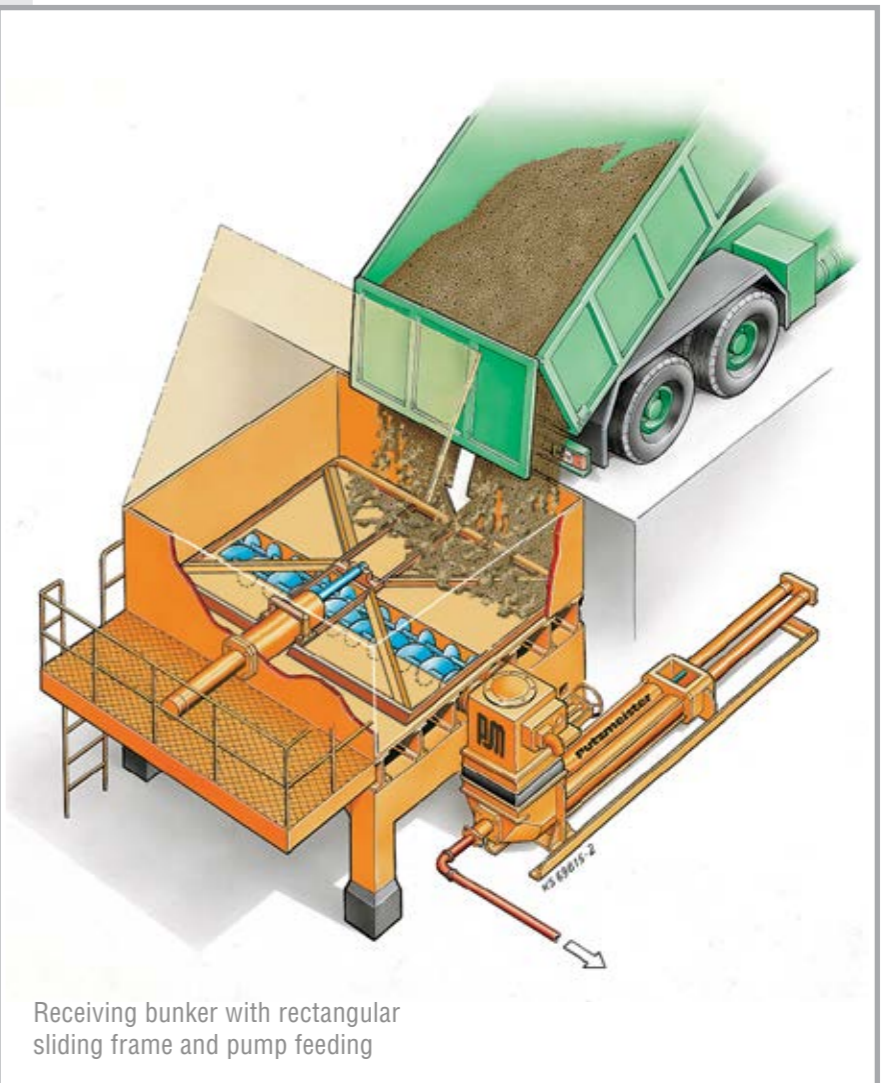
One important feature is the space-saving design achieved by integrating the sliding frame piston rod into the silo base tunnel. The piston seal used in the high pressure pumps reliably prevents the sludge from escaping.

### Sliding frame system PDSL/PDSF

One fundamental advantage of this variant is the simplified design and simple method of sealing the piston rod via a packing box to reliably prevent sludge from escaping.



Finite element analysis for the sliding frame



Receiving bunker with rectangular sliding frame and pump feeding



# Individually engineered silo systems

## Ladder systems / discharge systems for round silo

Depending on your application, the sliding frame can take the form of a rectangular silo discharge system (ladder system) / PDSL or a round silo discharge system / PDSF. The ladder system with multiple parallel sliding frames is particularly suitable for wide or long receiving bunkers. This ensures an efficient transmission of force and increases the availability of the system thanks to the redundancy.

The product range includes silos and bunkers from 10 m<sup>3</sup> to 1,000 m<sup>3</sup> for loading trucks and for feeding sludges to solids pumps and their onward conveyance.

Material is discharged from the silos by means of specially adapted screw conveyors, with a lateral or central discharge. If several end users have to be supplied, multiple discharge augers can be used.

## Concrete silo

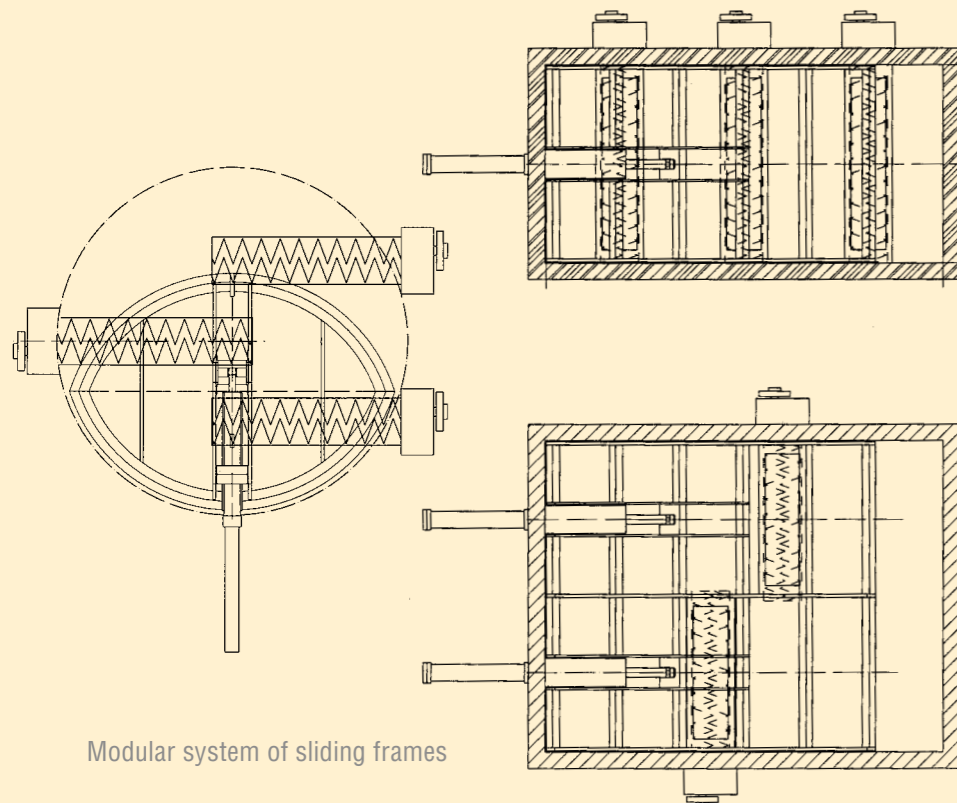
As an alternative to steel silos the receiving bunkers and sometimes the storage silo can be made of concrete. Putzmeister designs and delivers in these cases the sliding frame technology and discharge screws as well as the special concrete embedment parts.



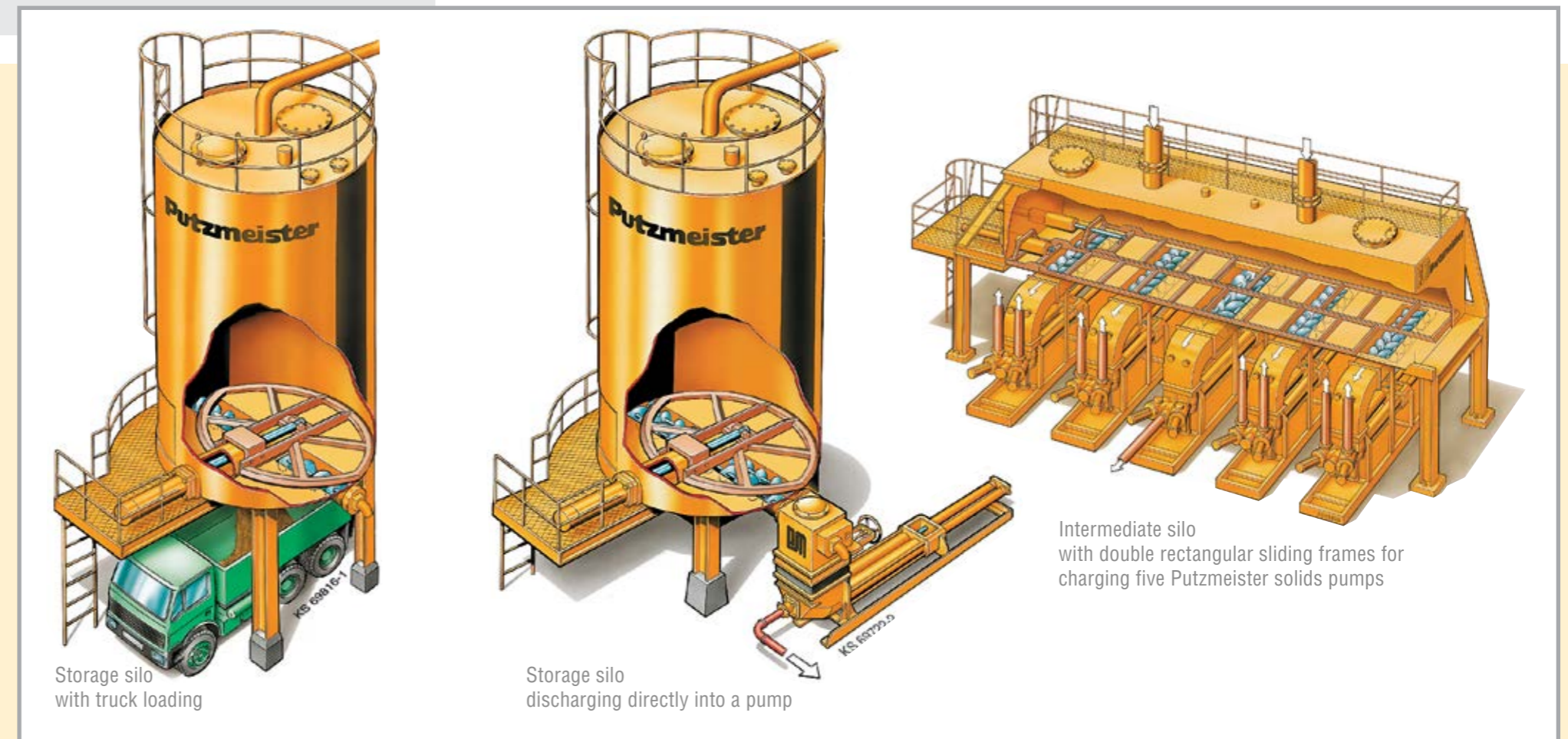
Sliding frame cylinder in a concrete silo, Sewage sludge plant Oftringen, Switzerland



PDL – rectangular discharge sliding frame



Modular system of sliding frames



Storage silo with truck loading

Storage silo discharging directly into a pump

Intermediate silo with double rectangular sliding frames for charging five Putzmeister solids pumps



# Drive systems and accessories

## Drive systems

A hydraulic cylinder powered by a hydraulic power pack moves the sliding frame. If the sludge is conveyed downstream of the reception bunker or storage silo by a high density solids pump, a dual shaft silo discharge screw conveyor supplies material to the pump. All of these consumers can be powered by a common hydraulic power pack, which reduces the number of components and simplifies maintenance and servicing. For truck loading, a separate hydraulic power pack is supplied for the sliding frame and if necessary, the single shaft silo discharge screw conveyor.

The hydraulic power pack consists of a robust steel construction with a hydraulic fluid reservoir and a suction or return flow filter (depending on the model). The fluid is cooled by an energy saving fluid/air radiator.

On request, all monitoring elements can be powered electrically.

The hydraulic system can be fitted with an automatic output control for controlled silo discharge.

The control cabinet for controlling all functions can be integrated in the contactor technology or as a programmable control and is installed separately from the hydraulic power pack.

Optional sound-insulating hoods can be delivered to meet special noise control requirements.



**Above:** Space-saving and well-proven: Drive cylinders located in the silo floor

**Below:** CI power pack with acoustic enclosure (optional)



## Accessories

A number of useful options and accessories are available for the silo discharge system and the hydraulics. Several of these are described below:

- **Silo filling level indicator**

The filling level can be indicated using ultrasonic probes or load cells, which can transmit a 4 – 20 mA signal to a central control room, for example.

- **Bunker flap opening**

Especially for foreign sludge receiving bunker, automatic door opening mechanisms are available.

- **Insulating, heating**

Offered for cold weather locations.

- **Platforms, vertical ladders, openings**

We provide ladders and stairways adapted to your application and requirements. Transitions and maintenance platforms are also available. Corresponding openings for cleaning and attaching inertisation connections as well as feeding other media can be integrated.

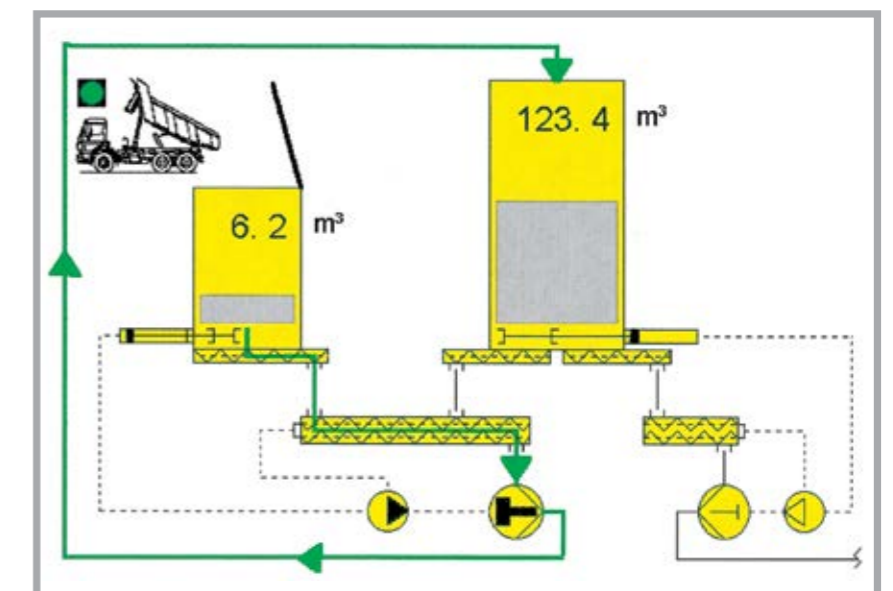
- **Central grease lubrication**

We recommend the use of an automatic central grease lubrication system for longer service life and reduced maintenance of the bearings and for enhanced piston rod sealing.

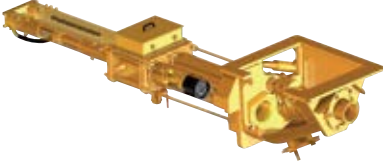



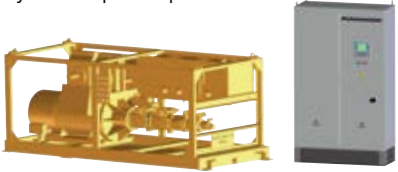


**Above:** Automatically controlled flaps are an important feature of receiving bunkers. Putzmeister offers a range of different variants.

**Below:** Process diagram with filling level indicator

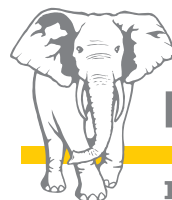


# The right pump for every application

|   | <b>Application</b>  | <b>Output</b>                                  | <b>Pressure</b>             |
|---|---|--|-----------------------------|
|  <p>KOS series S-tube pump</p>                     | Coarse sludges or slurries with a high proportion of solids, up to 80 mm grain size | 10 – 400 m <sup>3</sup> /h<br>(440 – 1760 gpm) | up to 150 bar<br>(2176 psi) |
|  <p>HSP series seat valve pump</p>                 | Fine grained sludges or slurries  | 10 – 400 m <sup>3</sup> /h<br>(440 – 1760 gpm) | up to 150 bar<br>(2176 psi) |
|  <p>KOV series ball valve pump</p>                | Fine grained pastes   | 0 – 70 m <sup>3</sup> /h<br>(0 – 308 gpm)      | up to 80 bar<br>(1160 psi)  |
|  <p>EKO series single piston pump</p>            | Large-sized and coarse particles, extremely stiff material                          | up to 14 m <sup>3</sup> /h<br>(61.6 gpm)       | up to 100 bar<br>(1450 psi) |
|  <p>Hydraulic power pack and control cabinet</p> | All Putzmeister pumps are driven by a hydraulic power pack                          | Performance:                                   | 5.5 – 1800 kW               |



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