



Headquarters at Aichtal near Stuttgart, with central warehouse, design and administration buildings, including central after-sales service

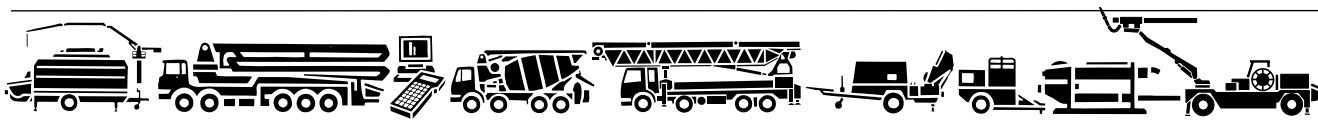
Putzmeister is a dynamic company with the most modern assembly and manufacturing plants.

At the main plant in Aichtal near Stuttgart, the specialists of Putzmeister systems engineering (PAT) prepare successful tailor-made system solutions for solids transportation problems for customers throughout the world.

Numerous subsidiary companies world-wide means Putzmeister can offer a high degree of closeness to the customer.



Putzmeister spans the whole world



Putzmeister Products and Services:

- PM-Concrete Pumps
- PM-Systems Engineering PAT
- PM-Telebelt
- PM-Mörtelmaschinen GmbH
- PM-Aqua Pressure System A/S
- PM-Services
- PM-Concrete Project Division CPD
- PM-Consulting und Data Technology PCD
- PM-Academie GmbH



Putzmeister AG
Max-Eyth-Str. 10 · D-72631 Aichtal
P.O.Box 21 52 · D-72629 Aichtal
Tel. + 49 - 71 27 - 599-0
Fax + 49 - 71 27 - 599-520
Internet: <http://www.putzmeister.de>
E-mail: pmw@pmw.de

Putzmeister solids pumps

Tackling the hardest applications and materials



File under:
A 1.00, IP 1.05, A 4.00, IP 4.05

Putzmeister solids pumps

– totally indispensable to the industry



Sewage works

Sewage sludge, screenings, flotation sludge

- dewatered by machine, contains foreign bodies
- charging incinerations
- long-distance conveying
- transportation and distribution on landfill and intermediate dumps
- mobile sludge treatment units
- PM Mixopress process (lime conditioning)
- receiving and storage silo

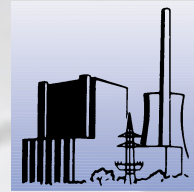


Waste recycling

Paste-like hazardous waste with foreign bodies

Waste sludges, oil sludges, paint sludges, sewage sludges, shredded barrel waste, organic waste

- feeding incinerators
- mixing in reactor tanks
- composting plants
- silo systems



Power stations

Broken coal, large coal, flotation coal and sludge, fly ash, bed ash, desulphurization gypsum

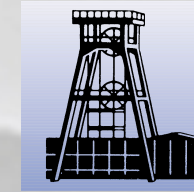
- feeding fluidized bed incinerators
- wet ash removal
- long-distance conveying
- simultaneous incineration of sewage sludge
- loading ships
- dumping on landfills
- distribution equipment
- loading stations



Dredging

Excavated earth, water sludge, silt

- de-sludging lakes
- dredging harbours
- de-sludging dumps and landfills
- de-sludging sludge lagoons
- de-sludging rivers



Mining industry / steelworks

Flotation tailings, wash dirt, desulphurization gypsum, electrostatic filter ash, gold slime, red mud, salt sludge, special waste, radioactive waste, mine water

- backfilling
- long-distance conveying of sludge
- cavity filling in blast furnaces
- waste disposal concepts



Miscellaneous

Fodder industry

- raw materials, bones, skin and rinds, seaweed, straw, sugar-cane waste, animal feed
- production of meat and fish meal, carcass disposal plants, animal feedstuffs

Sugar industry

- carbonation sludge, soil from beet washing

Paper industry

- chemical wood pulp, paper pulp, groundwood screen rejects, clarification sludge, long-distance conveying, feeding incinerators

Building industry

- washing sludges, clay slurry, bentonite, transportation and onward conveying, depositing

Chemical industry

- feeding spray-drying towers, long-distance conveying to deposition locations, intermediate deposits, transportation between production facilities, waste disposal, feeding kilns and furnaces

Mineral oil extraction and processing

- mixer feeding, reactor charging, de-sludging of storage tanks, drilling platform applications



With solids pumps and silo technology leading pioneers in the sewage treatment technology



Economic and reliable solutions for sewage treatment plants

Putzmeister solves problems in sewage treatment technology

In sewage treatment plants Putzmeister solids pumps will help dispose of the thickest types of sludge. Even solid-matter contents as high as 50% do not present any problem for these pumps.

Large-scale treatment plants in particular make the highest demands as regards fault-free continuous operation. This is precisely where PM solids pumps have proved their worth world-wide, demonstrating their high economic efficiency in conveying mechanically dewatered sewage sludges.

Advantages of pipeline transportation

- Odourless, no contamination of the environment
- Space-saving, can be routed to suit the configuration of buildings
- Precise metering
- Pipeline is not subject to wear
- Technology has low maintenance requirements and low wear
- Maximum availability for continuous unmanned operation
- Remote control from the control room
- Stiff, free-flowing and sticky sludges can be transported

Leaders in pump and silo technology

Most-favoured characteristics of Putzmeister piston pumps:

- Robust design
- Flow-optimised suction characteristics

- Continuously filled, circular suction cross-section in the S transfer tube
- High volumetric efficiency for the delivery cylinders
- Long piston strokes

Your advantages:

- Long service life
- High operational reliability
- Extremely quiet in operation
- Can handle even the stiffest sludges

PM sludge pumps can be extended with a feeding device in order to further improve the effectivity. This device is equipped with large self-cleaning augers and supports the optimum filling of the delivery cylinders.

PM silo technology

Our silo technology with the 'sliding frame principle' has been specially developed for dewatered sewage.

The silo can contain several hundred cubic metres of sludge, feeding it reliably onwards to the pumps.

From the various models of pump to silos and the corresponding fittings and accessories Putzmeister can provide everything you need for an effective and comprehensive solution for sewage treatment plant conveying requirements.



Screenings



Sewage sludge dewatered by means of chamber filter presses: solids content > 35% solids



Sewage sludge being fed into a fluidized bed incinerator



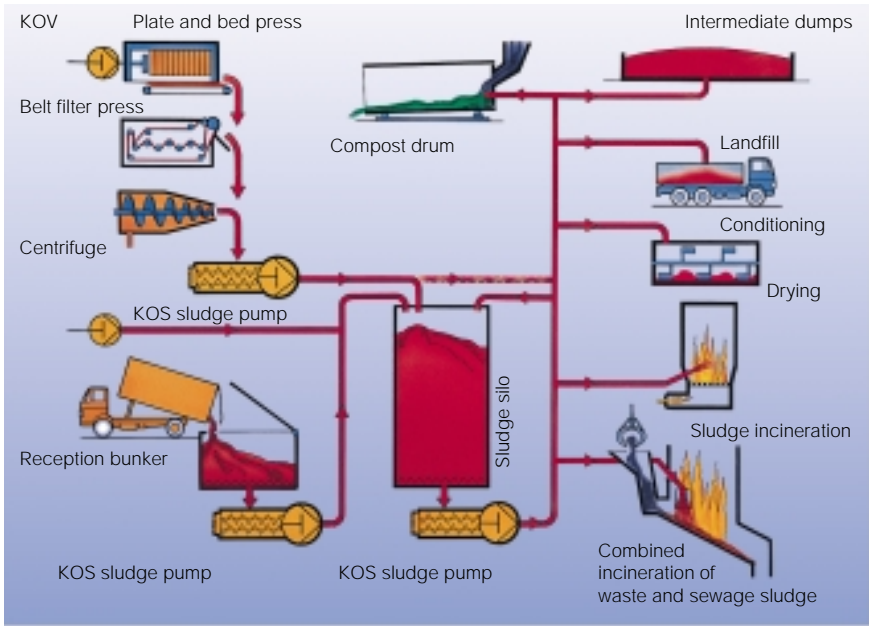
Central control room of a sewage sludge incineration plant



Sewage sludge reception station consisting of reception and storage silos: incineration of foreign sludges at the main sewage works in Stuttgart Mühlhausen



Sewage sludge reception silo with four KOS 1040's at Sarcelles, France



Flow diagram of a sewage treatment plant application

Pumps without valves mean optimum waste utilization



Putzmeister solids pumps without valves for pumping beyond limits

PM solids pumps without valves may be regarded as outstanding specialists. Particularly in conjunction with the conveyance of the most problematic materials. In closed pipework systems these solutions have proved themselves world-wide, in situations where the use of pumps has previously been inconceivable. Plants which include these pumps are environmentally friendly, reliable in operation, straight-forward to control from the control room and and, last but not least, very economic.

Applications in waste disposal

- municipal and industrial waste disposal
- conveyance of sewage sludge
- conveyance of compost
- hazardous waste incineration plants
- industrial waste treatment
- metered feeding of sludges into waste incineration

Decisive advantages of pumps without valves

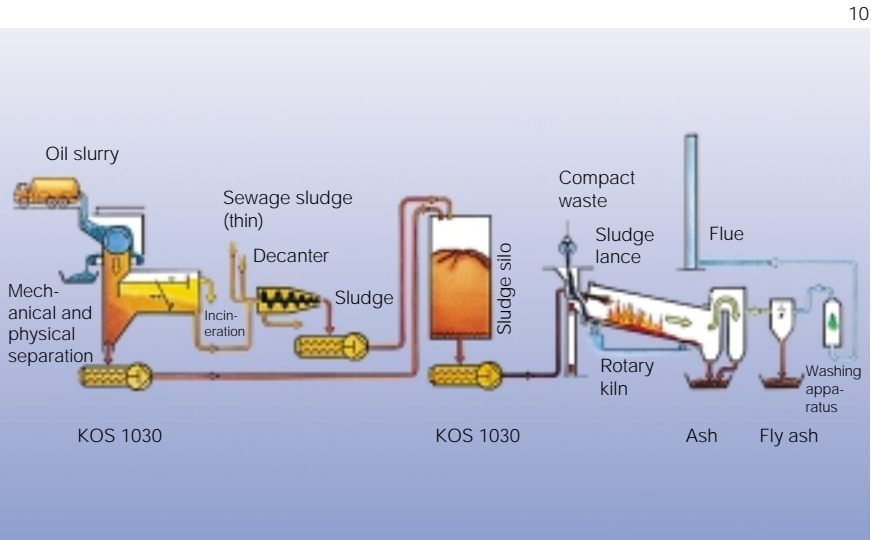
- foreign bodies of any hardness or shape can be pumped in the material without any difficulty
- the size of foreign bodies can be as much as one half of the cross-section of the piping
- corrosive material can be pumped due to the use of corrosion-resistant materials
- cutting up long foreign bodies during pumping makes new kinds of application possible
- conveying of most dry material
- fully automatic infinitely variable output adjustment guarantees correct metering and matching to the incineration process
- fully explosion-proof versions of the pump and control systems

Optimized incineration

The delivery output adjustment to the incineration process

- reduces the exhaust gas considerably

- increases the material flow
- extends the service life of the brick lining of the rotary kiln



Flow diagram of hazardous waste preparation and incineration



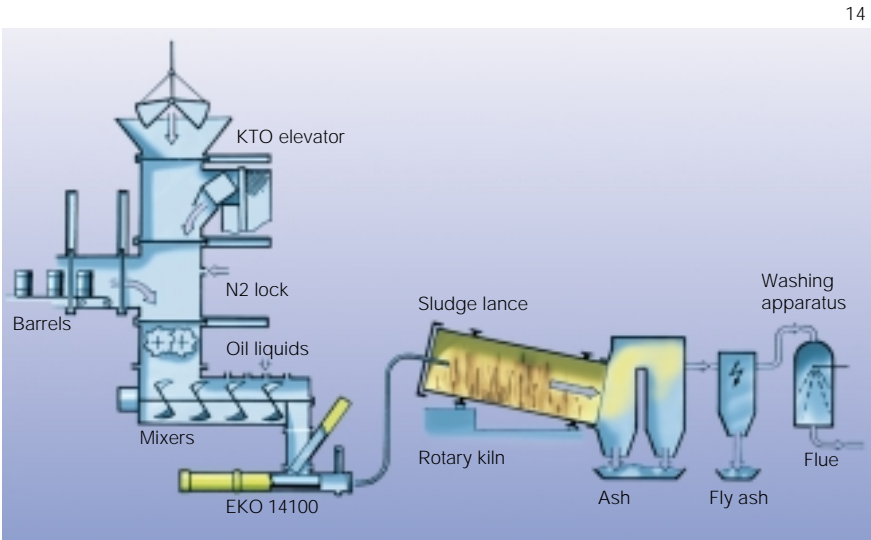
Paste-like hazardous waste being fed by the KOS 1030 into a rotary kiln at Schwabach hazardous waste treatment plant in Bavaria



Central control console of a hazardous waste treatment plant which controls the entire incineration process



A KOS 2180 pumping organic waste at the Valorga refuse gasification plant in Amiens, France



Flow diagram of the Schöneiche hazardous waste incineration plant

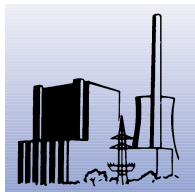


The EKO 14100 feeding the rotary kiln with shredded barrel waste at Tredi Salaise



Coarse hazardous waste from the reception bunkers is fed by the grab to the EKO piston pump

Putzmeister engineering for clean power stations



Pressurized fluidized-bed incineration – the hallmark of clean coal technology

This technology is distinguished by its low environmental impact and a higher degree of efficiency than conventional coal-burning processes.

Putzmeister is making a major contribution towards clean power stations. PM solids pumps from the KOS series without valves feed fuel into the fluidized bed in the form of a coal-limestone-water mixture. Solids contents of over 85% are pumpable, depending on the granular structure of the material. The pumps offer reliable continuous operation, give no trouble and require no maintenance.

Example:

One example is the domestic heating power station in Värtan, Stockholm. The Putzmeister pumps installed here operate maintenance-free throughout the entire winter heating period, which in Sweden is as much as 6500 hours.

Putzmeister solids pumps meet the critical requirements of power station designers and operators

- constant availability
- long service life
- low maintenance and operating costs
- easy to service

In order to ensure that its systems can be fully integrated into power stations Putzmeister works closely with the leading suppliers of power station equipment. These include ABB Carbon in Sweden, the USA and Japan, Deutsche Babcock and Steinmüller in Germany,

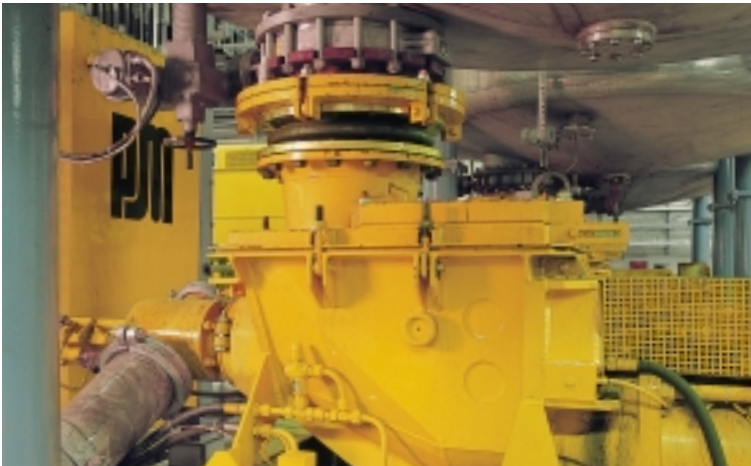
Foster & Wheeler in Finland and Babcock Hitachi in Japan.

Further important areas of application for PM solids pumps in power stations are the pumping of fly ash, bed ash and sulphurization gypsum.

As a way of increasing the economic efficiency of the power station Putzmeister can supply entire systems for the parallel incineration of sewage sludge and waste coal in the coal-fired power station. This turnkey solution consists of silos, solids pumps, pipework and includes all necessary accessories and services.



Clean air above and around the Värtan heating power station. The illustration shows the coal preparation plant with the coal transportation lines carried in the pipe bridge with inspection walkway



KOS 2180 coal transportation pump for long-distance coal delivery



Conveying fly ash with a high solids contents of over 60% (Australia)



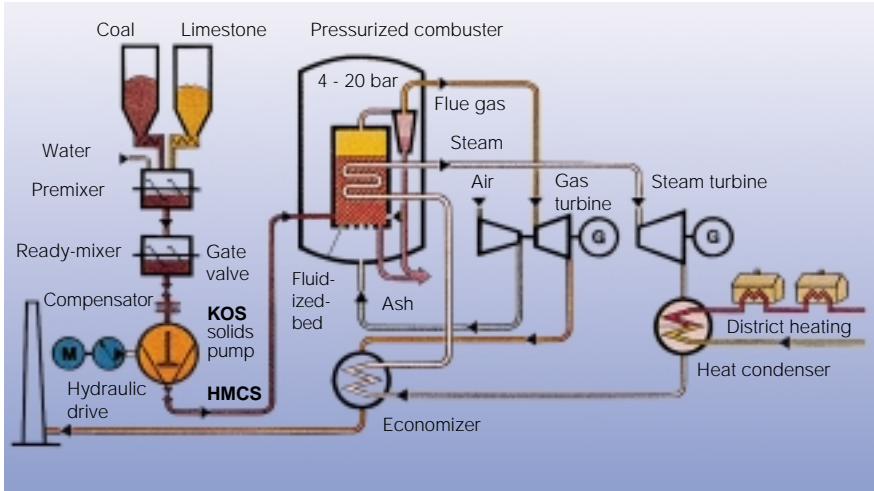
Coal with a dry solids content of up to 85%



Fly ash hardens within a short time



KOS 1070 coal sludge injection pump



Coal injection with pressurized fluidized-bed combustor. The flow diagram shows a combined gas and steam turbine process with pressurized fluidized-bed combustion (ABB Carbon)

Pumping and transportation systems for economical, environmentally friendly dredging of lakes and rivers



Putzmeister offers new solutions to the removal of sludge and its transportation.

Sludge is removed by means of bucket-wheel excavators or directly using immersion-type PM solids pumps. These pumps can operate even with extremely high solids contents. There is no need for dilution with water.

Particular emphasis is placed here on environmental friendliness and economic efficiency. Experienced engineers come up with the right solution for the individual case, which is then implemented technologically. The rated performance of the PM solids pumps is of decisive importance here.

Top figures with solids pumps

- Outputs up to 285 m³/h
- Delivery pressures up to 130 bar
- Conveying distances of more than 2000 m

Putzmeister solids pumps for economic solutions without damaging or contaminating roads.

Advantages of the process

- In practice solids contents up to 68% and more have been pumped without water having to be added. This means no flushing or waste water.
- This environmentally friendly, clean way of solving the transportation problem means less space is required for dumps.
- Due to its gentle delivery and solid consistency the material dries out extremely rapidly and no dams are therefore required.
- Rational disposal and processing

- Delivery of large foreign bodies
- Rapid placing of pipeline systems

We offer rational and environmentally friendly solutions due to the fact that multiple components from a single source are used.

System components

- Solids pumps
- Mixing devices
- Vibrating screens
- Pontons
- Floats
- Pipes
- Quick-action couplings and fittings



De-sludging a tar dump using a remote-controlled Dredgemaster dredger



Mobile dewatering and pumping station



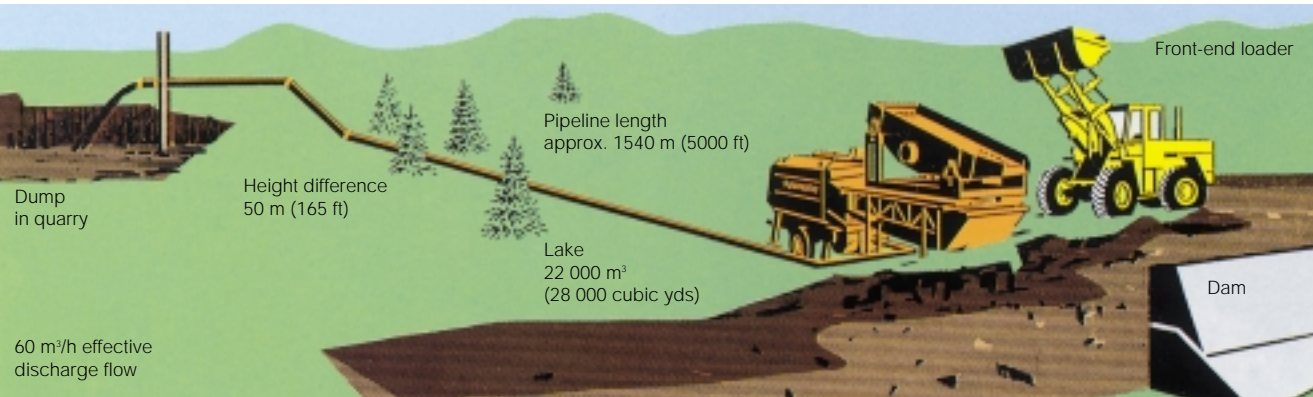
Removal of sludge from the Aswan reservoir in Egypt using the KOS piston pump



River sludge with high solids content, short drying times



Sludge treatment and pumping plant



De-sludging - easy and environmentally friendly

Mining technology – solids pumps working under the harshest conditions



Pumping slurry to the surface and backfilling

„Mine dewatering“

With mine dewatering, ‘slecks’ or mine slurries laden with sand must be conveyed up to the surface.

The Putzmeister HSP seat valve pump offers a particularly efficient and inexpensive solution to this problem. The following case study concerning a mine in Lorraine demonstrates some of the economic and technical advantages of this process.

The French mining company Houillères de Bassin de Lorraine (HBL) was looking for a better way of pumping its mine slurries with 720 g sand per litre up to the surface from a depth of 1250 m. The 43 centrifugal pumps which they were currently using were reaching their limits as the depth increased. Not only that but their linkage into a cascade meant a fivefold dilution of concentration over the distance to the surface. To solve this problem Putzmeister plant specialists decided to use two double-piston pumps with seat valves (model HSP 3080). The use of the world’s largest pumps of this type in conjunction with a 320 kW hydraulic drive brought the following results.

- A greater capacity – 90 m³/h is pumped at a flow rate of 2.7 m/s at a pressure of 100 bar
- The concentration of the solids remains constant
- Energy requirements are reduced fourfold
- The size of the 3 m stroke guarantees low wear and quiet running
- The reliable technology increases availability and considerably reduces maintenance costs

„Back-filling“

High production costs, safety considerations, environmental aspects and so on are forcing mine operators to undertake extensive restructuring. An important rôle here is played by backfilling power station and mine residues. The heart of installations of this kind are S transfer tube pumps (KOS type) and ZX pipework systems from Putzmeister. Amongst the challenging technical requirements are:

- Conveying distances of as much as 11 km from the mixing facility on the surface to the backfill location underground and with no pumps installed on this route
- Conveying capacities up to 100 m³/h
- Operating pressures in the material up to 120 bar
- Permitted pressure in the 200 mm internal diameter pipeline of up to 250 bar due to the high static pressure components encountered
- Suitability for abrasive material

Advantages of this process

- Closed wash-dirt circuit: mine - treatment - mine
- Improved stability for the coal workings
- Better exploitation of the coal seams
- Safe and clean transportation in the pipes
- High working and operational safety
- Low wearing costs
- Lower specific energy consumption
- Little water in circulation



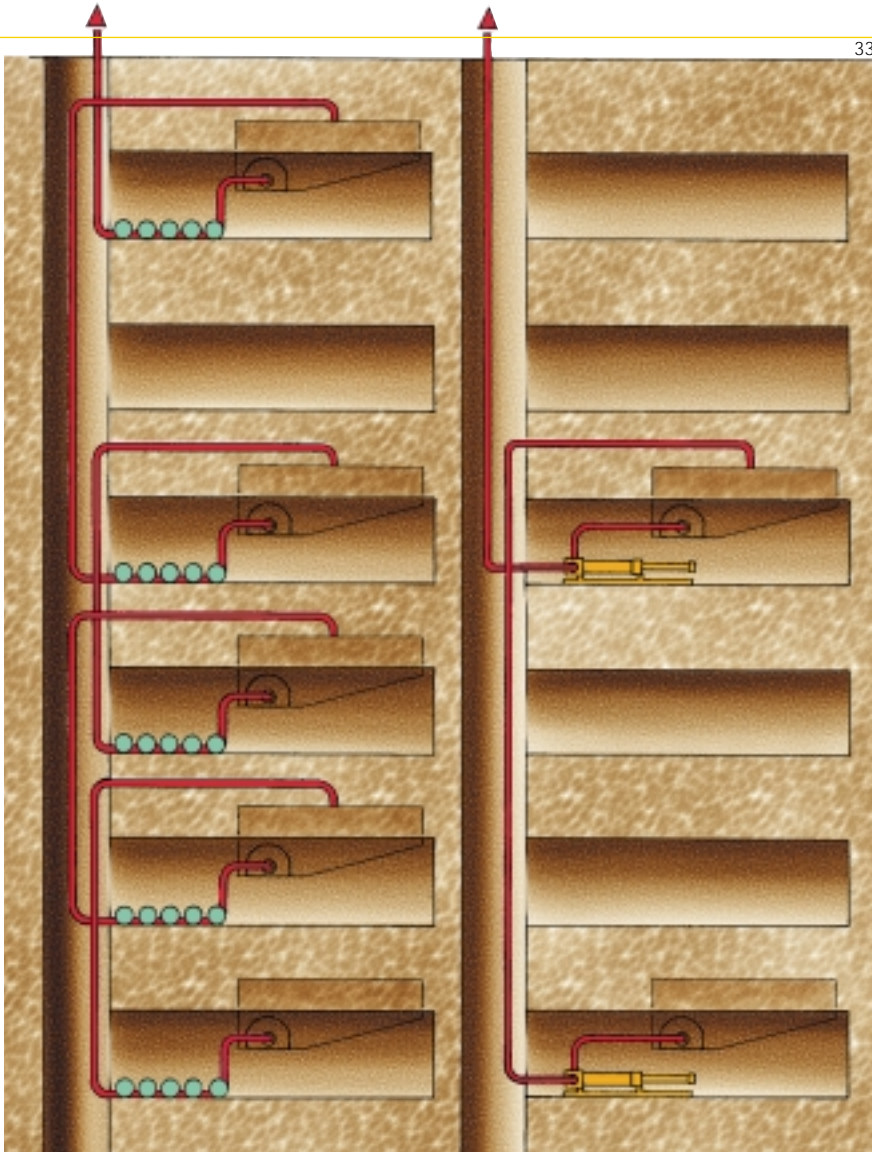
HSP 3080 slurry pump in the Vouters shaft (HBL)



KOS 2180 backfilling pump at Norilsk in Russia



KOS 3080 backfilling pump at the Walsum mine



HBL slurry pumping system. Before: 43 centrifugal pumps, after: 2 HSP 3080 solids pumps



Backfilling plant using solids pumps (source: DMT in Essen, Germany)

Economical transportation of solids in the most varied industries and processes



The knowledge and expertise gained from a wide range of projects involving solids conveyance and the unceasing further development of the technology means more and more fields of application are being opened up.

Today PM solids pumps are being used for tasks which until very recently were considered impossible.

Construction materials industry

- Pumping of bentonite
- Conveying slurries in the gravel industry
- Transportation of watery clay
- Dumping and feeding into reactors

Animal carcass industry

In the animal carcass processing industry great emphasis is laid on absolute hygiene and the very latest technology.

Pulped meat and bones are conveyed via hermetically sealed PM double-piston pumps and pipes. Heat exchangers allow distances of 600 m to be bridged with ease, with the utmost reliability and with no need for dilution with water.

Fishery industry

Putzmeister S transfer tube pumps without valves are used in the fishery industry for the gentle conveyance of large quantities of material.

Paper industry

In the paper industry sludge and waste materials are increasingly disposed of in the plant's own power station. For this purpose flow-optimized Putzmeister S transfer tube pumps or thrust single-

piston pumps are eminently suitable. They transport materials with an extremely high fibre content and dry consistency.

In production too, PM is opening up new possible applications. PM solids pumps can be used to convey cellulose and paper pulp with dry solids contents of more than 20%.

Sugar industry

In the sugar industry carbonization sludges and soil washed from sugar beet are pumped reliably and efficiently over distances of up to 1500 m.



Pumping system in a paper industry power station



A Putzmeister KOS 1030 solids pump conveying paper sludge into the rotary kiln



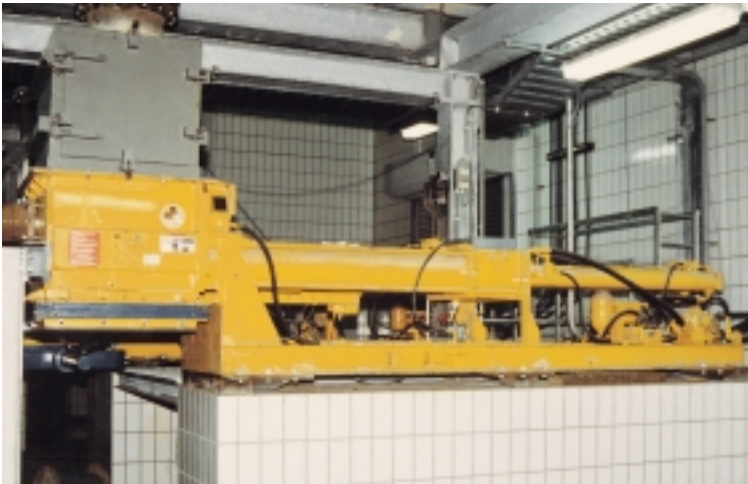
Sewage sludge from the paper industry



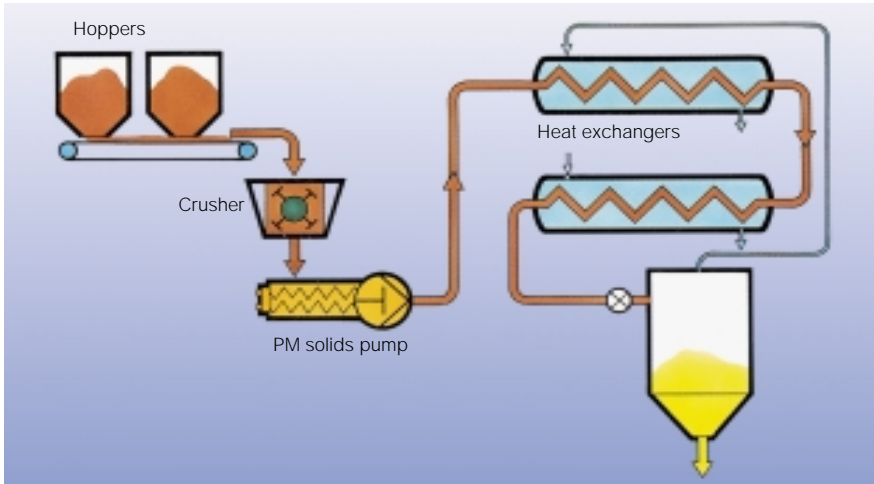
KOS solids pumps convey paper sludge into the rotary kiln. Every day more than 450 t of cardboard is produced from waste paper



Conveying seaweed



Conveyance of raw material in carcass disposal plant using a KOS 1460



Flow diagram of continuous sterilization in animal carcass processing

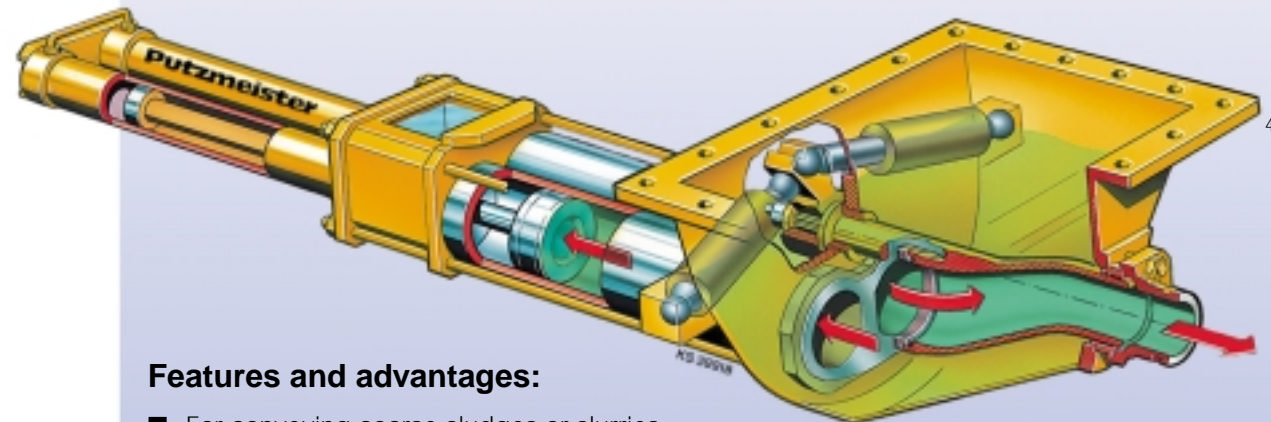
The KOS series – solids pumps without valves with transfer tube control

In the KOS series the intake and delivery cylinders are connected by an S transfer tube. This means that material can be pumped straight through without interruptions or mechanical obstacles. No valves of any kind are used. Foreign bodies within the material can therefore be conveyed without any problem up to a maximum particle size of 50% of the delivery material.

The KOS pump is particularly suitable for conveying highly viscous sludges and other material with a high proportion of coarse solids. The KOS series finds its principle application with those materials which present the most extreme requirements, such as dewatered sludges which contain solids, oil sludges, high-viscosity solids and so on.

A wide range of application-specific components and functions are available from Putzmeister.

For further information please refer to our IP 1082 GB brochure.



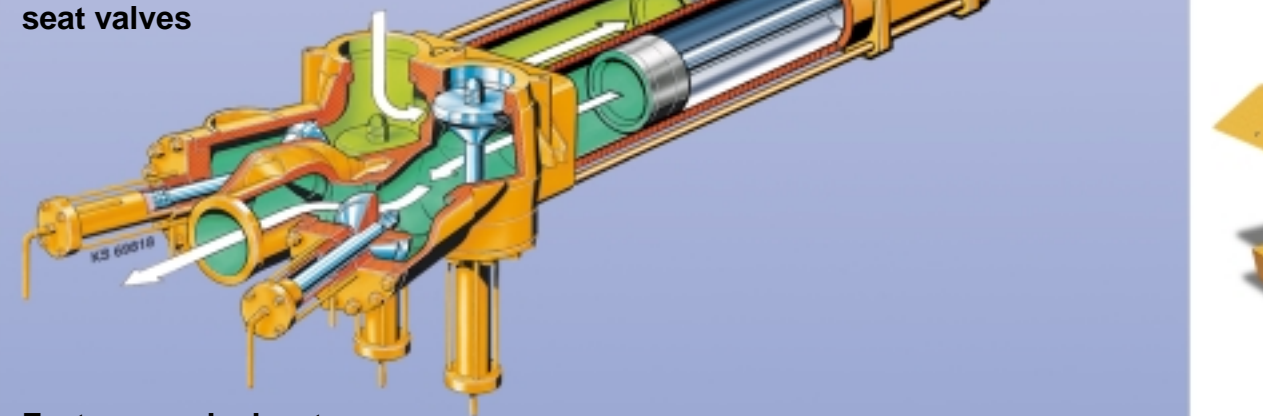
KOS – oil-hydraulic double-piston pump with S transfer tube

Features and advantages:

- For conveying coarse sludges or slurries with a high grain-size content
- Low maintenance and wear due to fewer moving parts
- Less suction resistance due to high-volume unrestricted infeed of material

- Hydraulic circuit will always remain separate from material being pumped, even in the event of poor maintenance
- Delivery rates up to 500 m³/h
- Delivery pressures up to 130 bar

HSP – oil-hydraulic piston pump with hydraulically actuated seat valves



Features and advantages:

- For conveying fine-grained sludges or slurries
- Switchover without shorting
- No backflow at high pressures
- Easy to install damping tanks

- More effective with material containing a high proportion of air
- Outputs up to 200 m³/h
- Delivery pressures up to 130 bar



42

The HSP series – seat valve pumps for difficult duties

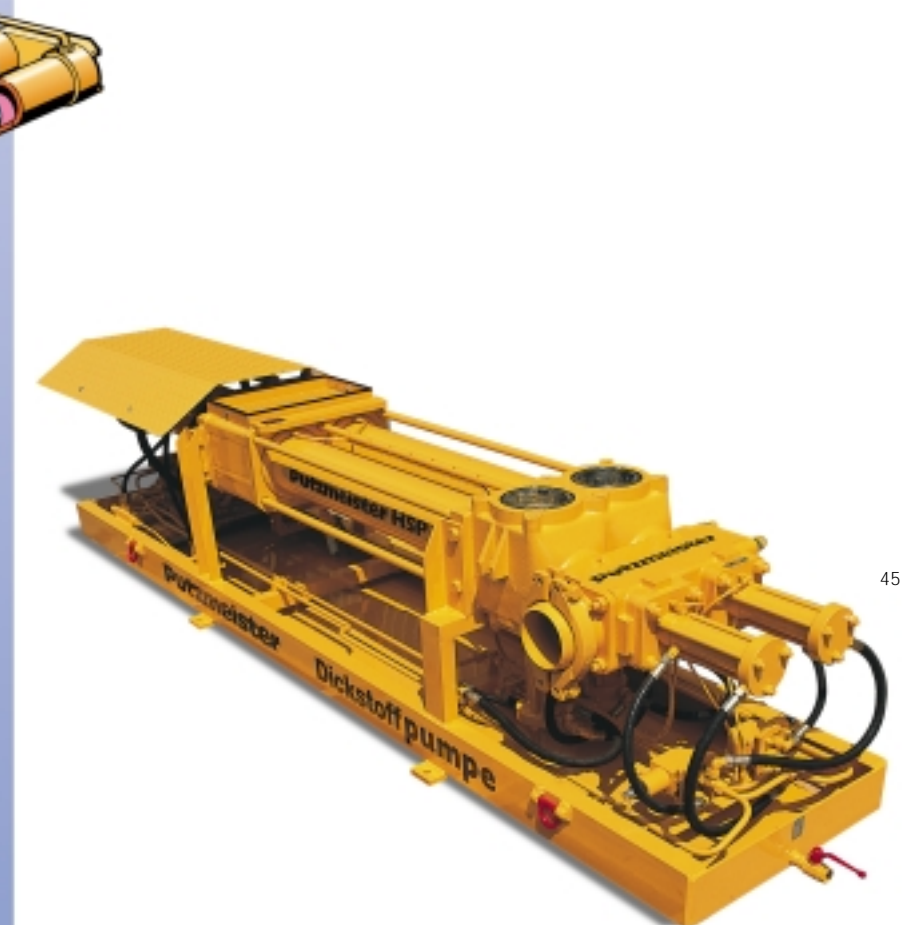
The HSP series is used with paste-like and highly viscous material with a low content of foreign bodies and small particle sizes (<15 mm).

Precise sealing of the valves means that extremely high pumping pressures can be achieved. The principle behind the design of the hydraulic and pumping pistons is the same as in the Putzmeister KOS and KOV series. This ensures the maximum reliability and availability.

Two special features of the Putzmeister design are that not only is it a simple matter to replace the valves but the design means a long service life for all wearing parts. Valves and valve seatings are made of highly wear-resistant steels and can be used at either end. This doubles their service life. Valves

can be replaced easily without the need to remove the delivery lines. All of the familiar Putzmeister options and variants are available with the HSP series as well.

For further information please refer to our IP 1971 GB brochure.



45

The KOV series – the oil-hydraulic piston pump with ball valves

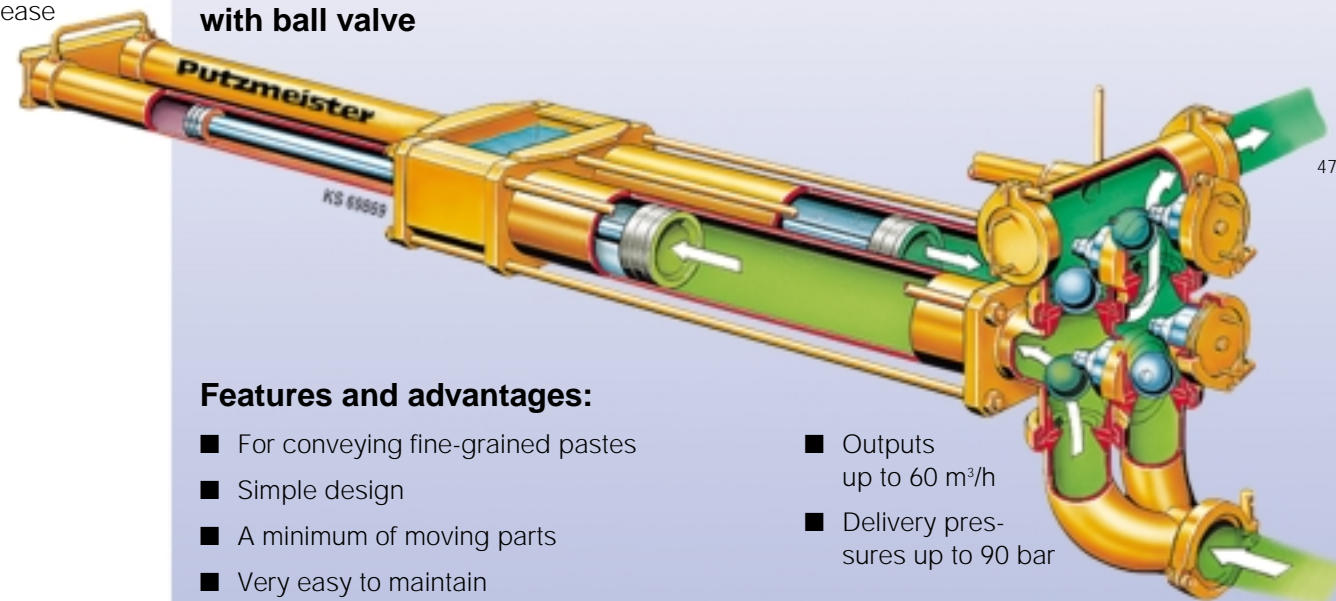
The KOS series is characterized by its straightforward design and high reliability. The suction and delivery cylinders are connected by indirectly operated balls.

The fact that no actively driven elements are used means an inexpensive pump with the maximum availability. No problems arise with pumping paste-like material such as mortar or bentonite, even when they contain foreign bodies up to 10 mm in size. Pumping pressures up to 90 bar and an output of as much as 60 m³/h apply.

Depending on the specific individual case, the balls and valve seats can be supplied in different materials and coatings.

A maintenance aperture permits easy and rapid replacement of the valve balls.

For further information please refer to our IP 1027 GB brochure.

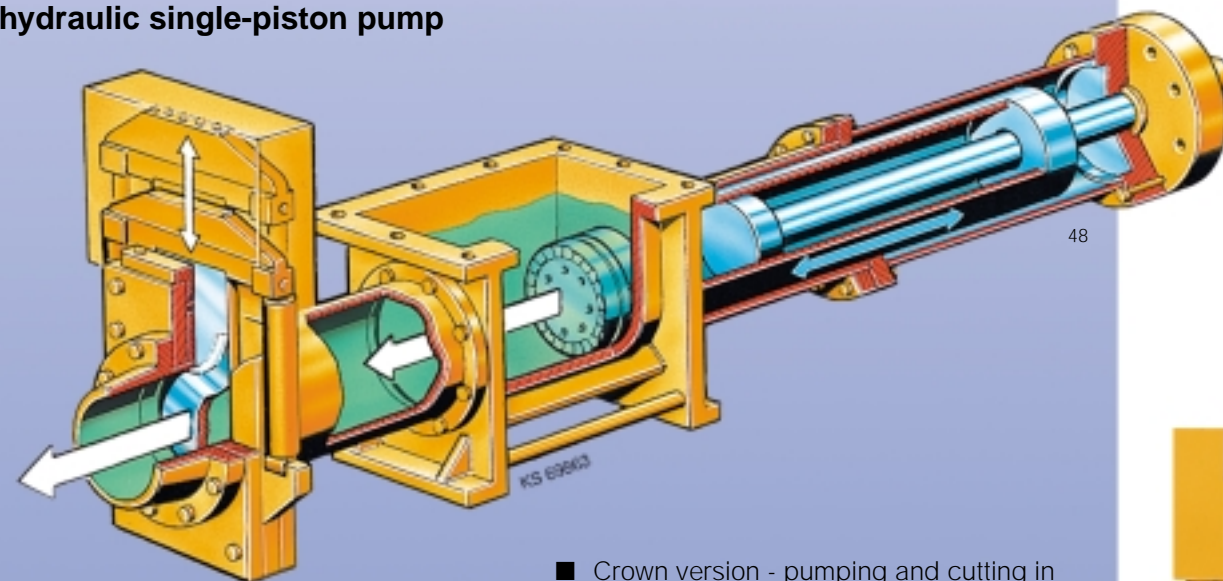


KOV – oil-hydraulic piston pump with ball valve

Features and advantages:

- For conveying fine-grained pastes
- Simple design
- A minimum of moving parts
- Very easy to maintain
- Outputs up to 60 m³/h
- Delivery pressures up to 90 bar

EKO – oil-hydraulic single-piston pump



Features and advantages:

- For conveying large-sized and coarse foreign bodies
- For conveying extremely stiff material
- Crown version - pumping and cutting in one stroke
- Simple design
- Delivery pressures up to 60 bar
- Cutting force up to 80 t
- Outputs up to 14 m³/h

The EKO series – the oil-hydraulic single-piston pump

The EKO series is designed for the most extreme pumping tasks. The open filling hoppers mean that extremely dry material, which may also contain a high proportion of foreign bodies, can be fed to the pump. Materials which until now could not be pumped, such as highly dewatered paper sludges, are thrust by the hydraulically driven piston into the delivery line.

The EKO Crown model is equipped with a delivery piston with a hardened toothed cutting crown. This pump is used in cases where the material contains large-sized foreign bodies which in other systems would swiftly result in the pumps blocking. The EKO pumps and cuts at the same time. Even with the most difficult materials, such as sewage treat-

ment plant screenings or shredded barrel waste in a special waste incineration plant, there is no problem with pumping this material into the delivery line.

Quasi-continuous operation is also possible with the double EKO version.

For further information please refer to our IP 2253 GB brochure.



PM silo engineering with sliding frame technology

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

Pump and silo working in perfect harmony

Since both pump and silo come from the same manufacturer, the customer enjoys important benefits.

- The shared silo discharge and pump feeding auger reduces costs and increases availability.
- The perfect matching of pump and silo results in an optimized overall concept.
- The fact that pump and silo share certain components means the need for fewer spares and also simplifies maintenance work.
- The customer is not troubled with sub-system interfacing problems.

Sliding frame systems – tried and tested many times and reliable

The Putzmeister sliding frame system has been designed especially to meet the requirements of harsh three-shift operation. Proven Putzmeister hydraulic components combined with the use of modern finite element analysis in the design of the sliding frame itself all increase service life. One major design feature is the space-saving shape of the frame resulting from accommodating the sliding frame piston rod in the silo floor tunnel. The piston seal used in the high-pressure pumps can be relied upon to prevent any sludge escaping.

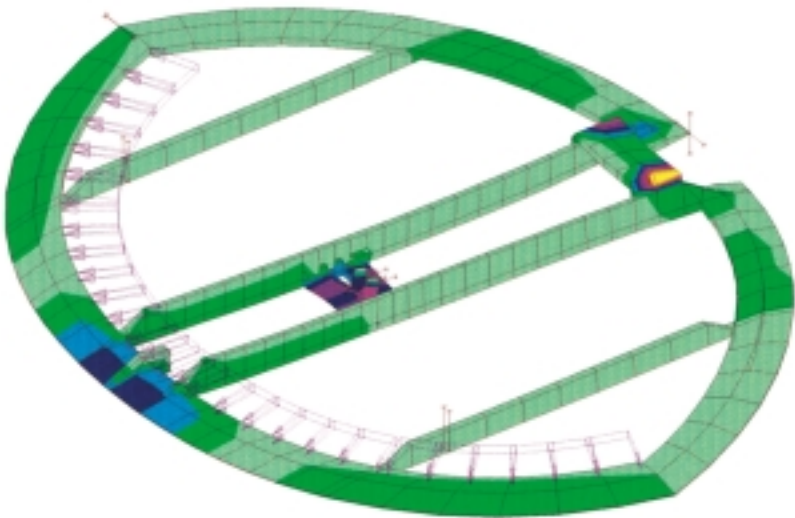
Ladder systems / round silo discharge systems

Depending on your application, the sliding frame can take the form of a ladder system (PDL) or a cylindrical silo discharge system (PDF). The ladder system with multiple sliding frames in parallel is particularly suitable for use with wide or long receiving bunkers. This ensures maximum efficiency while system availability is also increased due to the redundancy.

The delivery range includes silos and bunkers from 10 m³/h to 1000 m³/h 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 conveyor augers, with a lateral or central discharge. If several end users are to be kept supplied, no problems are presented by using multiple discharge augers.

For further information please refer to our IP 2123 GB brochure.



Finite element analysis for the sliding frame



300 m³ supply silo for highly dewatered sewage sludge

Sliding frame cylinder

PDL rectangular silo discharge frame

Putzmeister Systems Engineering – the ideal solution for every operator

Putzmeister Systems Engineering out of one hand

Putzmeister supplies complete systems for the transportation and storage of sludges and solids. The scope of services includes the planning and engineering of conveying tasks, the provision of informed advice regarding transportation in the process engineering field, the supply of pumps, silos, bunkers as well as pipes and fittings, installation and commissioning at the place of use and also a complete after-sales services after handover of the system.

Competence and effectiveness at all stages of the project

Modern automation and visualization systems are used for controlling the plant unit. These systems control and monitor the various process units from the point the sludge is received up until its metered output into the incineration furnaces or ultimate utilization unit.

Finite elements are used in our design calculations and state-of-the-art CAD systems for realizing and implementing the designs. This ensures an effective and high-quality solution.

Experienced project managers make sure that processing of systems contracts is kept right on schedule as well as transparent for all parties involved.

Comprehensive professional documentation means that system operators can count on straight-forward operation of the system and rapid fault correction.

After-sales service

A major factor in the services offered by Putzmeister's is a powerful and effective after-sales service.

In addition to a telephone hot-line we can supply parts at short notice and also carry out maintenance work as part of a maintenance contract.

The fact that systems are delivered by us as prime contractors gives our customers certain clear and wide-reaching advantages:

- Highest functional reliability
- Less time consumed in order processing and co-ordination of interfacing
- Optimum harmonization of functional units with each other
- Lower spare parts and stocking requirements due to the use of versatile identical parts in the system components
- Simplified servicing and maintenance thanks to standardized control and maintenance elements
- Clear assignment of responsibilities means rapid solutions to problems in the event of a malfunction



Supply of turnkey systems



High quality in production and assembly



Transparency and adherence to deadlines in project processing



Putzmeister AG – your competent partner



Modern design processes mean increased safety and efficiency



Technical training on the spot



Rapid response assistance from PM's after-sales service