

Putzmeister-High Density Solids Pumps feed rotary kiln with hazardous waste

Putzmeister EKO 14100 for media containing high percentage of foreign bodies

In France PEC Tredi operates four plants for incinerating hazardous waste with an annual capacity of 175,000 tons. The largest plant situated in Salaise-Sur-Sanne, 50 km south of Lyon has a capacity of 100,000 tons.

The first two rotary kilns providing a total capacity of 50,000 tons per year were commissioned in 1985. In 1991 the system was expanded by Salaise II (see fig. 2) to a total capacity of 100,000 tons per year.

New methods were used for the Salaise II plant in the handling of waste (mainly in 200 litre steel barrels) and in the feeding of the material into the rotary kiln. Putzmeister EKO 14100 high density solids pumps pump the waste at an even feedrate – in a 24 hours non-stop operation and within a hermetically sealed system into the rotary kiln. The operation and the technology of the EKO 14100 is described in the following.

Process Flow Scheme at Tredi Salaise

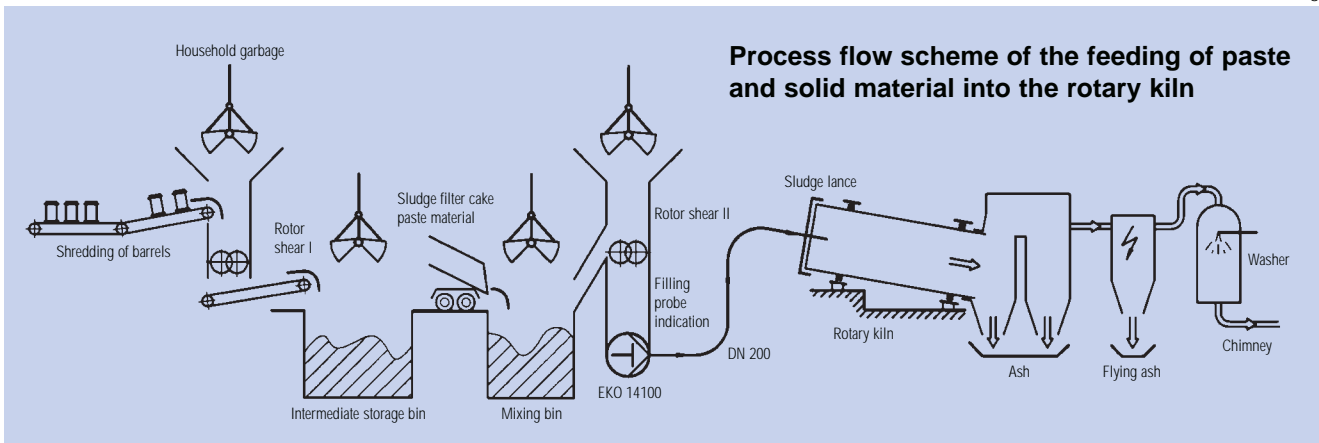
The solid, paste and liquid waste materials arrive from all over West



View of the plant at Salaise



Two EKO 14100 machines for feeding the rotary kiln, the pipeline is being reduced from 350 to 200 mm



Europe, of which 75 to 80 % of the deliveries come from France itself. According to current legislation the percentage of waste arriving from abroad may not exceed 25 %. The hazardous waste consists of 200 litre steel barrels with recyclings (150,000 barrels/year), sludge filter cakes, household garbage (approx. 20 %), plastic and other materials. The Salaise II plant is designed to also handle waste containing chlorine (max. 7 to 8 %).

The customer demanded shredding, homogenisation and continuous feeding of the wastes to maintain complete and uniform incineration. The process flow scheme is shown in fig. 2. Wastes such as sludge cakes or cardboard containers are fed directly into the large mixing bin.

In contrast, steel barrels and domestic rubbish are shredded in the first rotor shear stage in a 5 to 8 hour operation per day and then collected in an intermediate storage bin. In each case 1 to 4 steel barrels are transported on a conveyor belt together with their wooden pallet on which they were delivered into the rotor shredder to be shredded (see fig. 5).

A large grab mixes the waste in a large mixing bin (fig. 6) and transports it to a second shredder stage and the underneath installed Putzmeister EKO 14100 single ram pump (fig. 7). Using a large square ram as a stuffing and bridge braking device, the material is pressed into the feed orifice of the EKO 14100. The filling level in the intermediate shut is measured with a microwave probe and the shredder switched automatically on and off accordingly.

The EKO single ram pump handles without problems this difficult to pump material, in a 24 hour non-stop operation. The material contains up to 350 mm long pieces of metal from the steel barrels, splinters of wood from the pallets and corrosive solvents and abrasive material from the wastes. Results gained from first operations show that wear parts have yielded several thousand hours of serviceability under operational conditions of this plant.



Transport of steel barrels



Conveyor belt to the rotor shear – first shredder stage



Mixing bin



EKO 14100, consisting of conical hopper, rotor shear, feeding shaft, stuffing device, gate valve – 350 mm diam. / 64 mm diam.

The 2 to 5 tons per hour of processed waste slurry is incinerated in the rotary kiln (fig. 9) in such way that 20 % of it is finally left as residual slag and ashes. The exhaust gas is filtered in an ultra-modern filtration system.

Through continuous feeding of the rotary kiln by means of the EKO 14100 with its automatic pumping rate adjustment according to the kiln temperature, total incineration is achieved at a high and constant temperature. Surges of emissions into the environment are avoided. At the same time, the capacity of the plant is increased considerably (approx. 20 to 60%).

Of course, the material is conveyed within an hermetically sealed system, even preferred by the staff of the Tredi Salaise plant.

The EKO 14100 high density solids pump based on the „ram principle“

Older types of high density solids pumps with double pistons are limited in their applications by the fact that the cylinder must be filled with material before the feed stroke takes place. The EKO single piston pump, on the other hand, works on the thrust principle. Bulky material is fed into the feed chamber – if needed, forced in. Finally, a piston pushes the medium out of the feed chamber into the delivery line. The hydraulic gate valve, which prevents back flow of material during retraction of the piston, and the ram bridge braking are controlled automatically in relation to the position of the delivery piston.

This method even enables bulk-type materials containing coarse, undesirable agglomerations of solids, such as any bio-substance, manure, hazardous waste, pieces of tendering meat to be pumped in enclosed delivery lines. Even pieces of sheet metal can be cut by the piston forwarding force of max. 80 tons. Bulky materials are pumped through due to the large feed opening of approx. 760 x 360 mm and the piston diameter of 350 mm.

The pump system comprises the EKO 14100 core pump unit, the hydraulically activated DN 350, PN 63 gate valve, the ram bridge



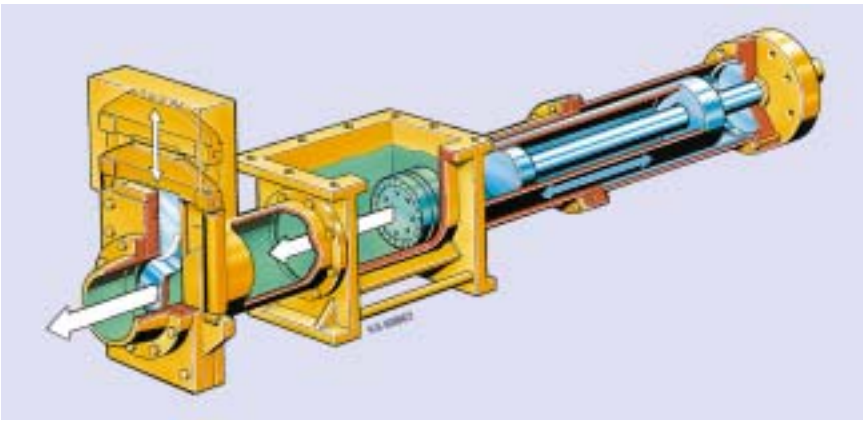
EKO 14100



Front plate of rotary kiln



Central control room



EKO system



EKO, illustration of machine



EKO feeding flange, delivery piston

braking mechanism with hydraulic cylinders and the feeding shaft with filling probe indication, plus the HA 75 hydraulic power pack.

If the piston fails to slice through a solid item, the feeding force is doubled by automatic hydraulic differential control. The applied feeding force of 80 tons can cut through even large pieces of material. The top of the piston is provided with sealing rings and a piston crown. On the opposite end (on the end face of the delivery cylinder) is a ring made of harden-

ed special steel. This produces excellent shearing results. Both parts can be exchanged simply and with low cost. All seals of the pump are manufactured from fluor-elastomer. The feeder casing has a replaceable lining. The delivery cylinder can be supplied in hardened steel having a hard chromium coating of 0.25 mm thick or in standard steel.

The spade of the hydraulic gate valve is made of hardened steel. Foreign matter is sliced in two or jammed without any effort.

Normally, the hydraulic unit is installed outside the explosion-proof zone. All operations are controlled automatically from the control room.

The EKO 14100 is very robustly designed. This is indicated by its weight of 5 tons.

Technical data are summarised in table 1.

Technical Data Putzmeister EKO 14100

Delivery cylinder diameter:	350 mm
Length of piston stroke:	2 x 700 mm
Volume of delivery cylinder:	67 l
Feeding shaft:	760 x 360 mm
Max. theo. output:	20 m³/h
Max. delivery pressure:	85 bar
Weight:	5,000 kg
Dimensions:	4,363 x 970 x 1,126 (1,900) mm
Gate valve:	Putzmeister DN 350, PN 63
Hydraulic power pack:	Putzmeister HA 75 (75 kW)
Delivery line:	Putzmeister ZX 200, PN 85



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