Site report

Transportation of biomass with hydraulically driven piston pumps

Nowadays the treatment of biomass to produce methane gas for energy production is becoming increasingly popular due to the rising costs of primary energy.
As a result, the processing of biomass for the production of methane gas is becoming appreciably more important in energy production. There are now a number of processes available for the methanisation of biomass, and there is also an increasing range of biomass sources such as corn, wooden chips or food waste that can be treated.

Putzmeister Solid Pumps has more than 25 years of experience in transporting biomass. The unique design of our pumps makes it possible to convey various types of biomass material, including those that are contaminated with foreign objects like knives, spoons, bottle-caps or glass, which can dramatically disturb the fermentation process.

By using hydraulically driven piston pumps it is possible to convey biowaste through the treatment process whilst guaranteeing reduced life cycle costs compared with other transportation methods. Furthermore Putzmeister has also developed a process to separate out foreign particles during the pumping process.

Biomass

Wrapped food

Biological household waste

Above: KOS 25100 with hydraulic power pack and twin screw feeding device, transporting biomass to the fermentation tank

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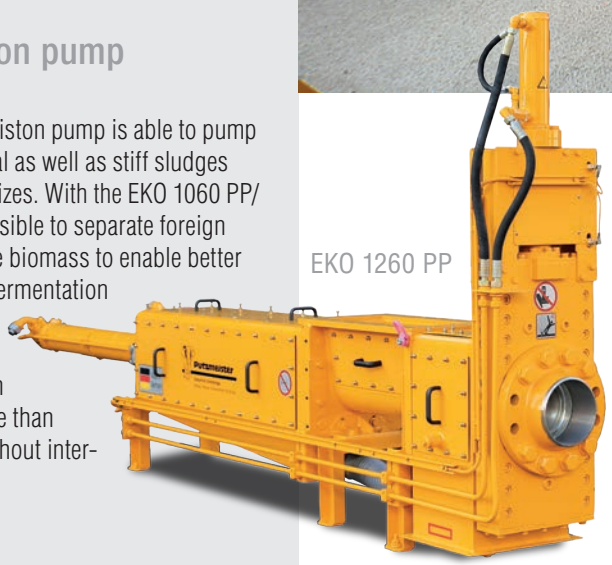
Different pumps for different kind of biomass

For biomass and biowaste collected from households, restaurants, supermarkets or other sources, it is necessary for there to be no obstructions to the flow of material through the pump or possible feeding devices. This design is required as biomass material is inconsistent, and will be prone to blocking if there is anything interrupting the material flow.

EKO – Single piston pump

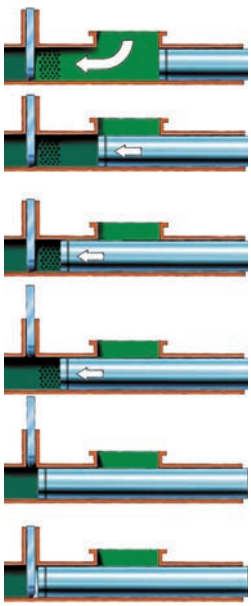
The EKO single piston pump is able to pump bulky wet material as well as stiff sludges with large grain sizes. With the EKO 1060 PP/ 1260 PP it is possible to separate foreign particles from the biomass to enable better digestion in the fermentation process.
Some EKO pumps have been pumping for more than 60,000 hours without interruption.



EKO 1260 PP

Above: EKO 1060 PP at the biomethanisation plant in Kössen, Austria for the transportation and de-wrapping of expired food

Separation of packaging from wrapped food with an EKO 1060 PP/1260 PP



The pump will be fed with material.

The delivery piston moves forwards and drives the material into the perforated delivery cylinder.

The delivery piston compresses the material and the liquid fraction is squeezed out of the perforated holes. Foreign particles remain in the pump.

The gate valve is opened.

The delivery piston pushes the foreign particles into the delivery line.

The gate valve is closed.

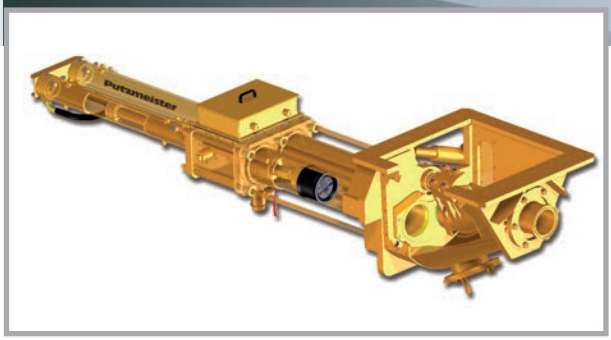
Corn stover and straw are chopped and thus made pumpable

KOS – Double piston pump with S-transfer tube

The KOS double piston pump is able to pump bulky wet and pasty material that include some large particles.
Some KOS piston pumps have been pumping for more than 160,000 hours without any serious interruptions.

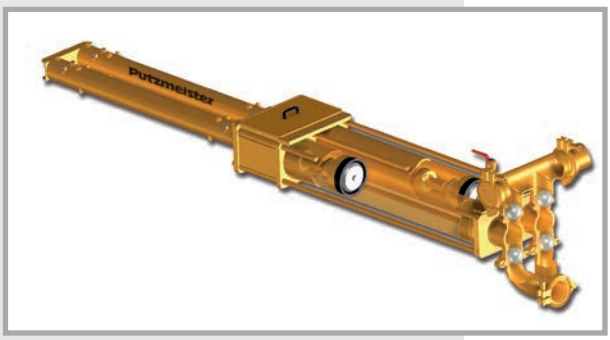
Biowaste recycling plant in Varenne-Jarcy, France: KOS 2180 pumping biomass material into a fermentation plant

Green household waste or NaWaRo, biological household waste



KOV – Double piston pump with ball valves

The KOV double piston pump is able to pump liquid and wet material. Due to having large inlet and outlet openings this pump type can also digest some large particles without any disturbance of the pumping process.
Some KOV piston pumps have been pumping for more than 100,000 hours without any interruptions.



Liquid biomass

Methods of processing biomass

Dry-anaerobic fermentation of biomass: Organic household residues

This waste is collected and transported to a bio-methanisation plant. Because there are still many non-organic foreign particles present in the waste material, it has to be passed through a shredding device, rotating sieve and magnetic separator. This material will then be fed into a piston pump together with steam and digested material, and this mixture is then pumped into the digester.

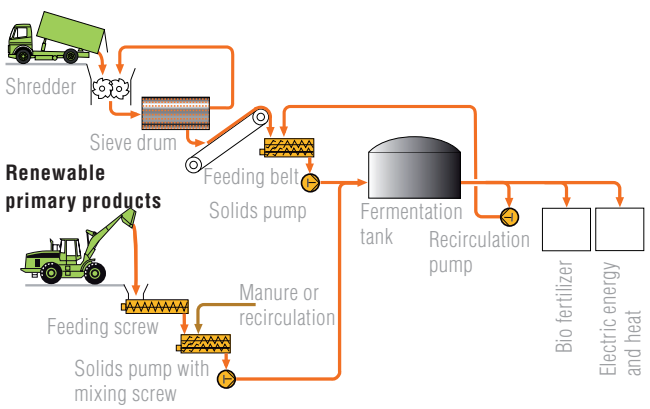
Separation of easily degradable material flows

Following reconditioning, the biological fraction is separated into two material flows. Using the Putzmeister EKO 1260 PP single piston pump, constituents that are difficult to degrade anaerobically such as bulk material are separated from the easily degradable content and, in this way, are conveyed to the most suitable downstream processes in each case. These systems are already being successfully employed in Austria and Germany.

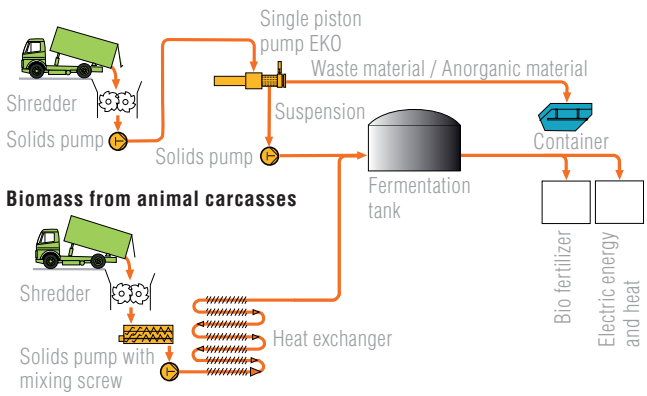
Biomass from food remains and packaged foodstuffs

With an innovative separation process, for example in the Bio-Power (Bernau), M.U.T. (Kössen, Austria) and Bioenergie (Schlitters, Austria) plants, food remains are processed together with packaged food. In a process for which a patent is pending, food no longer good for consumption is unwrapped in a separation stage (separator). In the separation stage, the high-density solids pump directs the more solid components (e.g. packaging and containers made of plastic, glass, paper and aluminium foil), after heating, to a container. The substrate, i.e. the valuable residual material, flows through the separator and is then pumped by a KOS high-density solids pump into the fermenter. In order to extract the remaining biomass, the residue is again boiled and compressed. The remaining packaging material is then disposed of in a household waste incineration plant.

Dry-anaerobic fermentation of biomass



Biomass from food remains, wrapped food and household waste



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