

A Method for Feeding a Digester of Biogas Equipments with Organic Material

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The Problem

The efficiency of biogas production is mainly depending on the amount of high energy organic material fed into the digester. Besides fluids like food oil there are lots of dry high energy substances which are able to increase the biogas production if they are able to be fed into the digester in a disintegrated condition.

Ordinary solution

Today the solids are fed into a digester mainly in two different ways.

The first way needs a mixing pit filled with liquid manure. With help of e. g. a front loader the solids are supplied into the pit and mixed by a propeller mixer. After the mixing process the suspension is pumped into the digester. The method needs always a separate mixing pit.

The second way operates with a screw conveyor. In this case the solids are fed directly into the digester. The latter method needs high energy for mixing devices inside the digester and additionally layers can be created but it saves a mixing pit.

New solution

The new solution saves an energy wasting mixing system inside of the digester and a mixing pit as well. The operations of disintegrating, mixing and feeding are combined in one machine.

The organic dry matters are supplied by a funnel to a double mixing ripper toothed screw conveyor. At the same time liquid manure is supplied by a separate manure pump.

The mixing screw is disintegrating the coarse material and feeding a rotary lobe pump after transforming the dry matters and the liquid into a high viscous suspension. The pump is conveying the substrate into one or several biogas digesters. A grinding process can be added.



Fig 1: View into the Funnel of the Screw Conveyor

Engineering features

Digesters in biogas systems can be supplied continuously with optimal prepared co-ferments. Only one unit is required for several digesters.

An expensive mixing pit is saved and so the emission of bad odor will be drastically reduced.

The mixing ratio of dry matters and fluid can be adjusted just as you like.

Hard big sized materials as hardened starch bags can be fed in completely. As an additional option a grinder can be added between screw conveyor and pump.

Conveyer and pump are mounted on the same shafts and are powered with the same timing gear. Only one drive is needed. This saves investment costs.

The screw conveyer is top-loaded. The pump is top-discharging. That arrangement is optimal regarding operation efficiency.

Quick and easy service is guaranteed. The Pump's spare parts can be replaced in site without dismantling the unit.

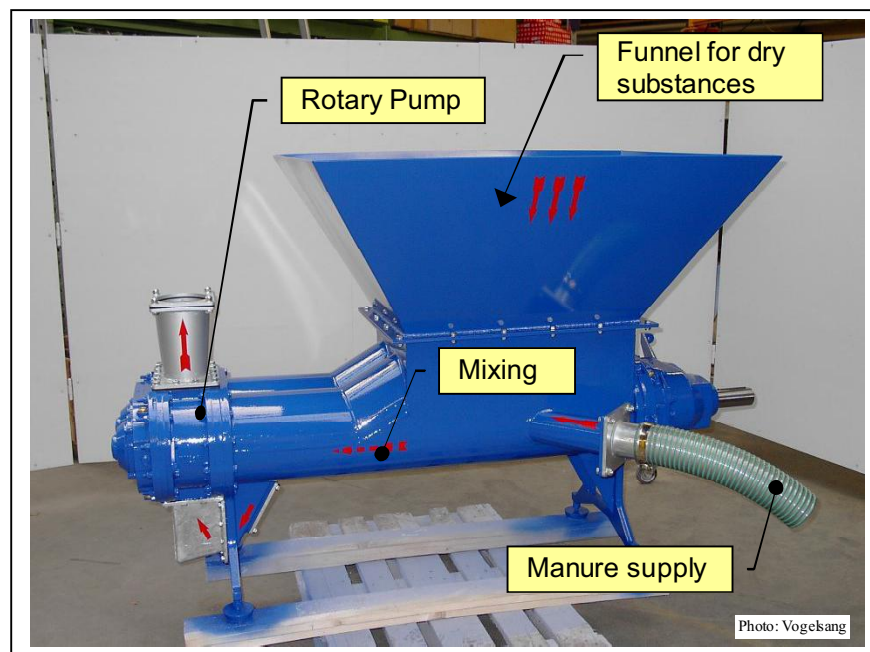
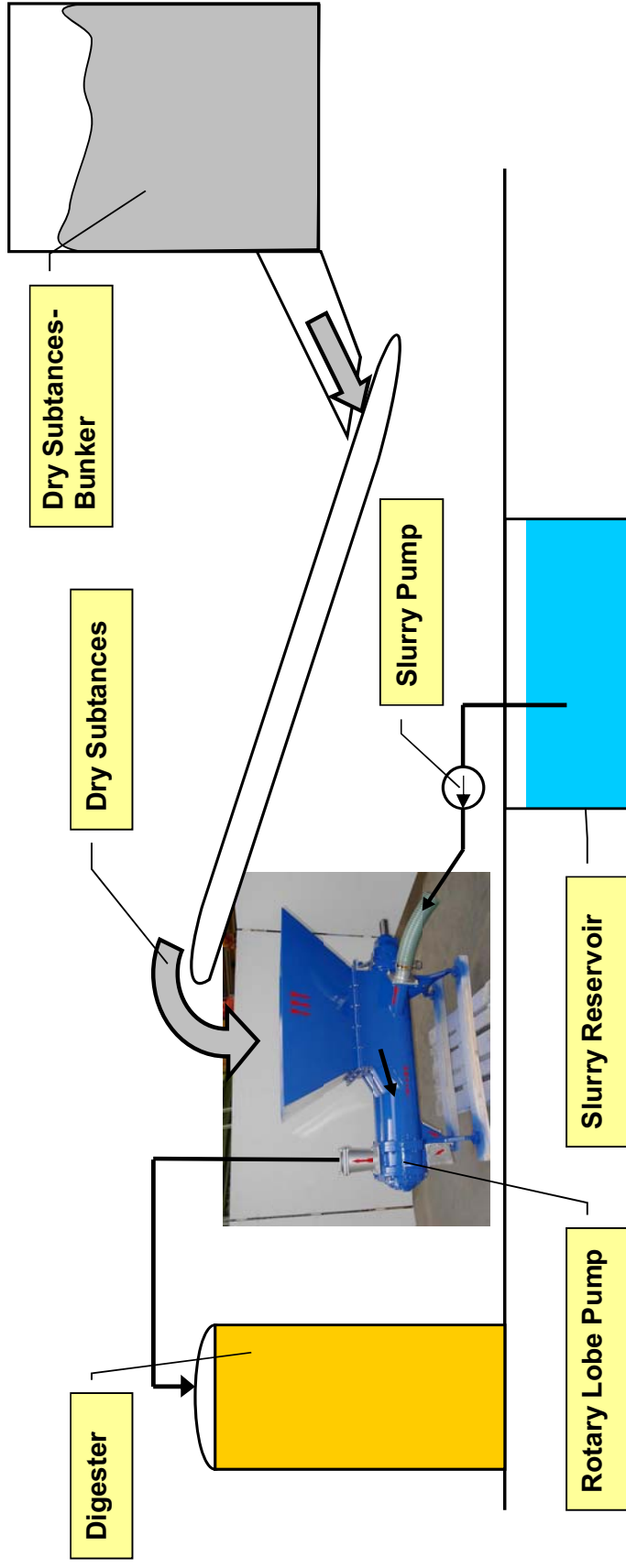


Fig. 2: Flow chart

Test results

At present a test loop is operating in a 1500-kW-el biogas equipment. The mixing device is treating different organic matters and starch bags. The test results will be presented during the conference.

QuickMix- Process



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QuickMix

CUT UP

MIX UP

PUMP

QuickMix: Always the right mix.

A simplified process

The QuickMix combines the advantages of two proven machines into one simplified unit. It operates similar to a twin shaft screw conveyor equipped with tines and is powered by an integrated rotary lobe pump. Both the pump and conveyor are powered by a common drive. With the QuickMix liquid with extremely high DS (Dry Substance) content / high viscosity can be mashed, mixed and pumped in one process.

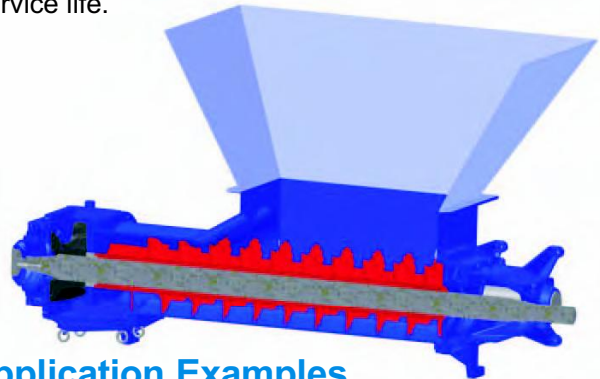
Function

As the solids are fed into the conveyor, fluid (e.g. Slurry, liquid manure or fermenting remainders) is added through an inlet positioned on the side of the unit. The tines of the double screw conveyor cut up the coarse material and mix it with the liquid creating a homogeneous mixture. The DS content can be adjusted by regulating the amount of liquid being added to the solids. As the mixture moves along the conveyor it reaches the pump chamber where it's then pumped to its destination.



Compact & Maintenance-friendly

The QuickMix utilizes many of the proven components of Vogelsang rotary lobe pump. The screw conveyor and pump share common shafts, which are isolated from the mixture. All maintenance to the pump chamber, including lobe, wear plate and mechanical seal changes are done in place, without disturbing connected piping. Even the conveyors can be exchanged if necessary. The double-sided bearing that supports conveyor operates without contacting the housing segments. The lack of contact prevents wear to both the conveyor and housing. This allows higher performance and longer service life.



Application Examples

Using QuickMix allows solids of different textures to be mixed to an even consistency. QuickMix works great on typically problematic substances such as: food waste, animal food, corn- & gras silage, straw, hay and manure. The pump can handle non-compressible solids up to 60 mm and is designed to handle stones and other debris commonly found in animal, agricultural and food waste.

Capacity: Corn silage (30% DS) and Slurry (7% DS) in ratio 50/50. Result: 78m³/h resp. 64t/h. Corn of that: 29t/h

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