Mobile container plant

Ultrasound treatment and digestion of sludge and biomass under controlled conditions



ULTRAWAVES
WASSER & UMWELTTECHNOLOGIEN GMBH

Mobile ULTRAWAVES container plant

Test system with five pilot digesters and ultrasound



Looking into the mobile container plant with one Ultrawaves high-power ultrasound system and five digesters

Varying operating conditions make it difficult to reliably assess treatment processes. This also applies to the process of anaerobic sludge stabilisation in wastewater treatment plants and fermentation in biogas plants. The mobile Ultrawaves container plant offers the opportunity to precisely determine the effects of ultrasound treatment on the anaerobic degradation of sludge and biomass under controlled and practical conditions. The advantages of the ultrasound disintegration can be seen in direct comparison to conventional digestion process. In addition, in biogas plants, it is possible to simply test the influence of varying substrate composition on the biogas production.

"Ultrasound treatment and digestion tests under controlled conditions."

Effect of ultrasound

Ultrasound causes difficult to access bacteria biomass to break down, which results in better availability for the subsequent degradation process. The digestion process is intensified. As a result, the production of biogas increases and the organic fraction of residual sludge is reduced.

Equipment and technical layout

The plant is installed in a 20' container and is made up of 5 digesters each with a volume of 200 litres and fitted with stirrers for complete mixing. The temperature can be regulated from 32 to 60°C. The gas volume is measured by five separate gas meters.

Our standard Ultrawaves ultrasound unit is installed to sonicate the sludge. The high-power ultrasound system can be connected to any number of digesters (maximum five) upstream. The operation is semi-continuous from the sludge collection tank. In parallel operation of the digesters a range of parameters can be modified: the sonicated volumetric flow, the hydraulic retention time and the ultrasound energy input.



The following elements compose the container plant:

- 20' container (6.1 m x 2.4 m x 2.6 m)
- 5 digesters (each 200 litres, fully mixed)
- 1 Ultrawaves ultrasound system (connected power 5 kW)
- 1 supply pump (Q = 100 - 900 litres/hour)
- 1 sludge collection tank
- 5 automatic, individual gas meters

Incorporation of the mobile container plant

For the installation of the mobile container plant only connections for sludge inlet and outlet as well as water for rinsing are necessary. A power connection for 400 V and 32 A is also required. The installation is carried out with the assistance of the Ultrawaves service staff. With our support, the operation and monitoring of the mobile container plant are secured.

"Easy installation and monitoring of operation."

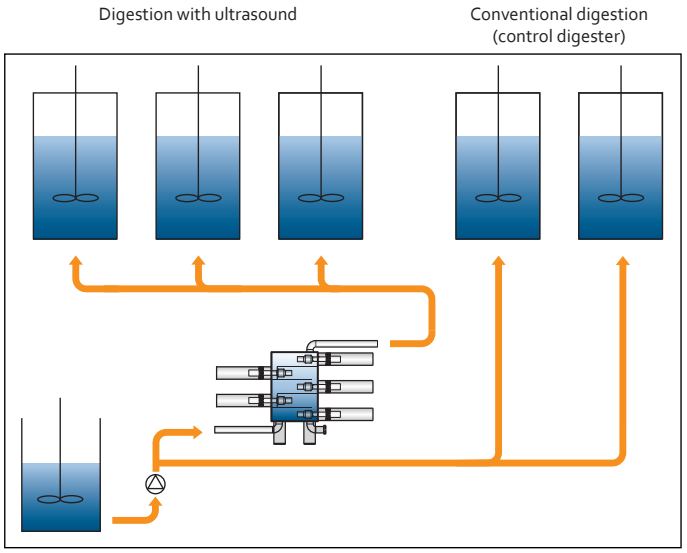
The provision of the mobile container plant is carried out on a rental basis. Generally, we plan an operation time of three to six months for sludge digestion pilot tests. If necessary, the plant may be rented over a longer period of time.

Advantages

Pilot tests by using our high-power ultrasound system on your plant provide you reliable data on the impact of ultrasound regarding:

- Improved biogas production
- Decreased organic fraction in the residual sludge
- Reduced amount of substrate load to the fermenter
- Increased methane content of the biogas

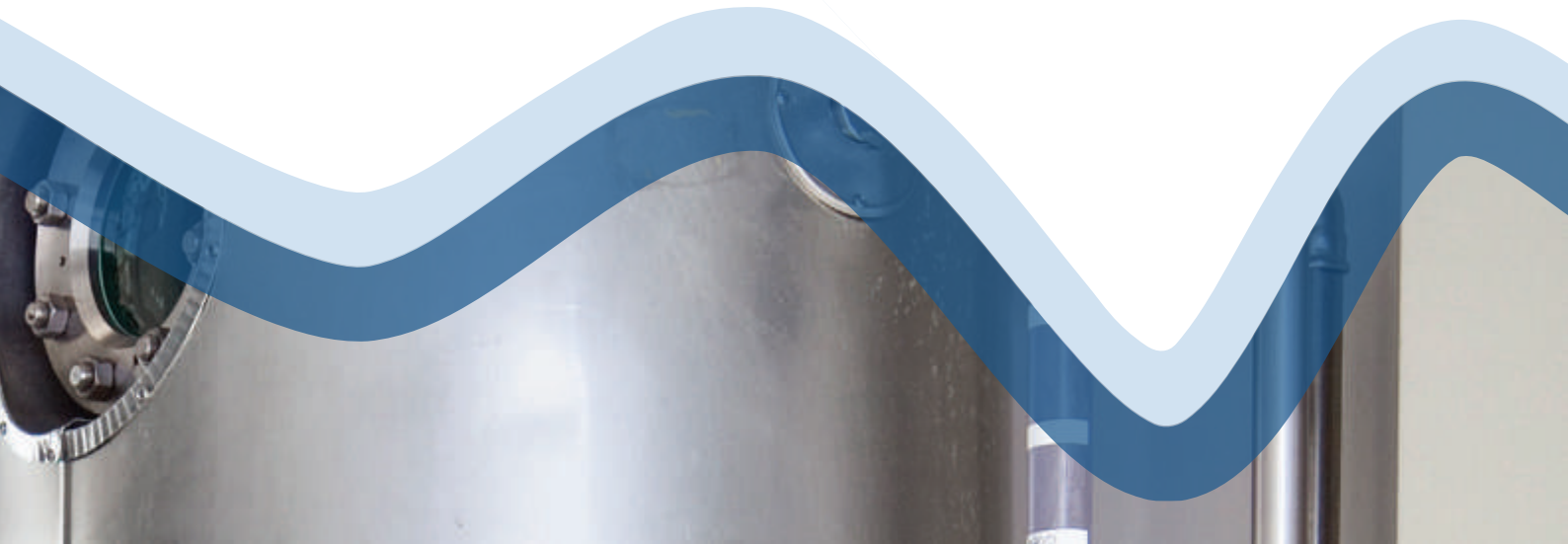
This presents the best basis that can be found to decide whether to integrate the Ultrawaves ultrasound system to improve the efficiency of your plant.



Flow diagram of sludge streams (here, for example, two control and three "sonicated" digesters)



Transportation of the mobile container plant



Practical results

Case study: wastewater treatment plant Bad Bramstedt

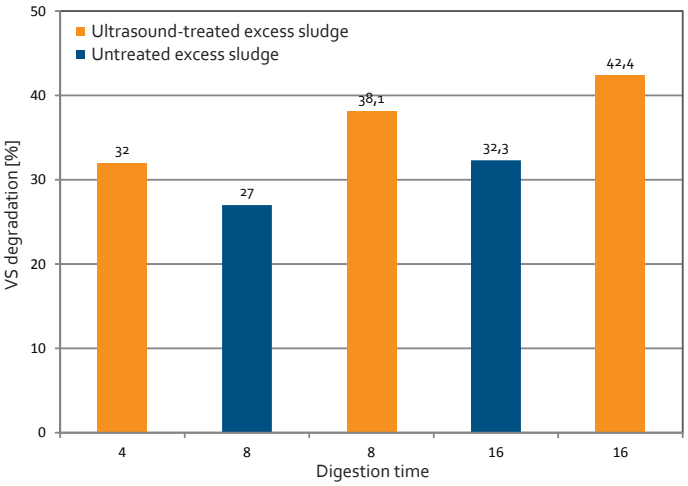
The mobile container plant was in operation at the wastewater treatment plant Bad Bramstedt to investigate the improved anaerobic digestion process through ultrasound treatment. Over several months, experiments were carried out with regard to the anaerobic degradation of sonicated primary and excess sludge.

As the figure shows, a considerably higher degradation after ultrasound treatment is always realized. Even a retention time of only four days enables stable operation, with the supply of sonicated excess sludge, in which the VS degradation is in the same range as

"Higher VS degradation thanks to the treatment of excess sludge with ultrasound."

conventional digestion with 16 days retention time. These results, for the first time, proved the effectiveness and the sustainability of the ultrasound treatment under practical conditions.

Further and more detailed descriptions of case studies and our reference list are given on our website.



Proof of the increased VS degradation of excess sludge of the wastewater treatment plant Bad Bramstedt with ultrasound

The advantages in summary

- Significant pilot testing under controlled and practical conditions
- Secured evidence of intensification of the anaerobic degradation process with ultrasound
- Best possible foundation on which to base a purchase decision for an Ultrawaves ultrasound system

About ULTRAWAVES

Ultrawaves GmbH develops and markets innovative high-power ultrasound systems for water and environmental engineering. Apart from the application on biomass in wastewater treatment and biogas plants, our systems are also used in industrial applications. The company was founded in 2001 as spin-off company from Hamburg-Harburg Technical University (TUHH) and since then has worked closely with research facilities and industrial partners. Through our extensive sales and partner network we are represented internationally and offer a worldwide service.

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