EFFICIENCY THROUGH REPOWERING WITH ULTRASOUND

DesiUS
AT BIOGAS PLANTS

MORE GAS
LESS SUBSTRATE
INCREASED OPERATIONAL RELIABILITY
PERFORMANCE GUARANTEED
Inhomogeneous substrates with a high dry matter content are a particular challenge for ultrasonic technology. With conventional systems, e.g. those equipped with rod transducers, the expansion of the cavitation field is severely limited. As a result, the full ultrasonic output cannot be emitted. The BioPush ultrasonic reactor, which forms the technological heart of the DesiUS, generates a homogeneous cavitation field through powerful planar transducers. This technique is thereby proven to be far superior to the rod transducer technique conventionally used in other applications. The special design of the BioPush reactor avoids any kind of obstruction, thus making the ultrasonic unit 100 % maintenance-free.
INCREASED GAS YIELD AND REDUCED COSTS WITH ULTRASONIC DISINTEGRATION

Ultrasound disintegration is causing cell lysis, which increases the substrate surface. Thus, the organic degradation accelerates, which in consequence leads to an increased biogas yield. In addition, the release of exo-enzymes from the outer cell layer increases enzyme activity in the digester.

### Physical Principle

**Cavitation**
- High energy impulses through cavitation implosion in μm range
- Temperatures of up to 5,000 °C
- Pressures of up to 1,000 bar
- High acceleration – high shear forces

Multiply enlarged cavitation bubble in the moment of implosion

### Effect

1. **Disintegration**
   - Permanent decrease of substrate viscosity in the digester
   - Improved mixing
   - Increased diffusion
   - Higher organic degradation of the substrate
   - Accelerated degradation process
   - Increased substrate surface

2. **Mobilisation of Exo-enzymes**
   - Increased enzyme activity coefficient
   - Accelerated hydrolysis
   - Improved organic degradation of the substrate

### Your Benefits

**Optimised Profitability**
- Increased gas yield / substrate savings
- Significantly increased degree of degradation
- Stabilisation of biology
- Improved flow properties
- Avoidance of floating layers
- Reduced wear of stirring components
- Reduced energy requirement for pumps and agitators
- Use of substrates that are difficult to process but often cheaper can be increased, thus reducing the use of maize
- Operational reliability of the biogas plant is increased
Inhomogeneous substrates with a high dry matter content are a particular challenge for ultrasonic technology. With conventional systems, e.g. those equipped with rod transducers, the expansion of the cavitation field is severely limited. As a result, the full ultrasonic output cannot be emitted. The BioPush ultrasonic reactor, which forms the technological heart of the DesiUS, generates a homogeneous cavitation field through powerful planar transducers. This technique is thereby proven to be far superior to the rod transducer technique conventionally used in other applications. The special design of the BioPush reactor avoids any kind of obstruction, thus making the ultrasonic unit 100% maintenance-free.

**BioPush ultrasonic reactor**

Weber Entec GmbH & Co. KG is a subsidiary of Weber Ultrasonics AG – one of the global leaders in ultrasonic components. Focus of the company is the plant construction of ultrasound based applications in environment technology, especially ultrasonic treatment of biogenic materials – known as disintegration. Because of its broad range of performance, the company is a one-stop source for manufacturing, plant construction, sales, system analysis and process optimisation.

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**Increased Gas yield and reduced costs with ultrasonic disintegration**

The ultrasonic reactors (1) of the turnkey plant are fed via a progressive cavity pump (3). The substrate passes the sound field at a specific speed such that the ideal specific energy input for treating the substrate is achieved. A macerator (2) protects the machine from hazardous materials (e.g. stones) and pre-homogenises the substrate in order to ensure the optimum ultrasonic coupling. A PLC-based control system allows robust and reliable operation.

Furthermore, the plant is equipped with temperature, pressure and volume sensors (4). The PLC control can be accessed remotely. Using the Siemens touch panel, temperatures, pressures, volume flow, times and other parameters can be set or viewed in a user-friendly manner. For example, the intelligent control system clears blockages when required and immediately informs the plant operator via SMS if necessary.

**MACHINE DESIGN-HIGH STANDARDS REGARDING EFFICIENCY AND OPERATIONAL RELIABILITY**

- Very high energy efficiency – 50% saving compared to other disintegration systems
- Extremely low-maintenance plant technology
- High degree of operational reliability
- Long standing times
- Can be ideally adapted to the respective requirements
- Lower space requirement thanks to compact design and simple plug & play installation
- Fast amortisation

**ADVANTAGES**
Taking into account specific substrate properties, the ultrasonic disintegration system can be integrated into the existing process technology in a variable and uncomplicated way and without affecting operating processes.

Possible integration of ultrasound through repowering with ultrasound

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GAS YIELD BEFORE - AFTER

- Increased gas yield through ultrasound disintegration
- Gas yield without ultrasound

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SERVICE

- System analysis for determining the potential for reducing operating costs associated with biomass
- Planning, manufacturing, installation and commissioning of a customised disintegration system
- Measurement and process technical support while transition into continuous operation
- Process optimisation
- Analysis calculations
- Quotation and implementation as a turnkey solution – no hidden costs
- Leasing models available
- Personal, competent and non-binding advice at any time

Taking into account specific substrate properties, the ultrasonic disintegration system can be integrated into the existing process technology in a variable and uncomplicated way and without affecting operating processes.

Increased gas yield through ultrasound disintegration

Weber Entec

Possible integration efficiency through repowering

WITH ULTRASOUND

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