



**WEBER
ENTEC**

EFFICIENCY THROUGH REPOWERING WITH ULTRASOUND

**DesiUS
AT BIOGAS PLANTS**

**MORE GAS
LESS SUBSTRATE
INCREASED OPERATIONAL RELIABILITY
PERFORMANCE GUARANTEED**



WEBER ENTEC - THE COMPANY

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.

The core technology of the DesiUS (disintegration ultrasound system) is the BioPush flow-through cell, which was specially developed by Weber Entec for agricultural and industrial biogas plants.

BIOPUSH ULTRASONIC REACTOR

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

Ultrasonic 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



MACHINE DESIGN- HIGH STANDARDS REGARDING EFFICIENCY AND OPERATIONAL RELIABILITY

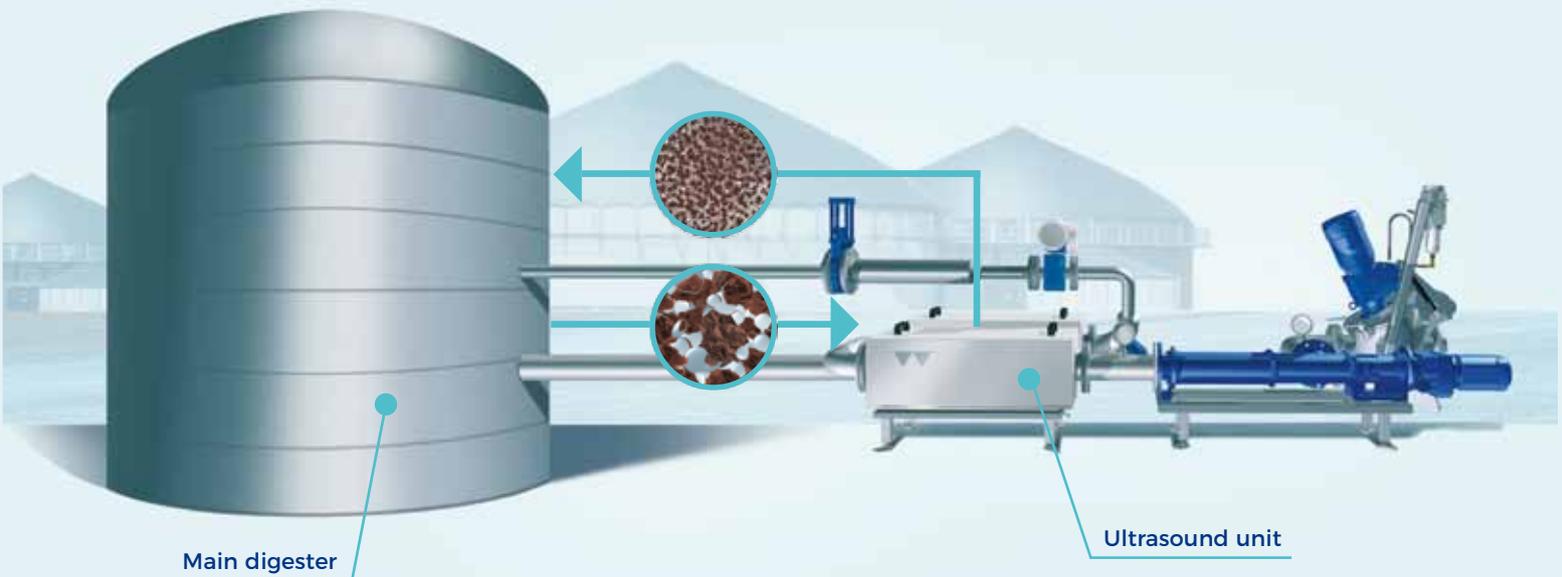
The ultrasonic reactors (1) of the turnkey plant are fed via a progressive cavity pump (3). The substrate passes the sound field at a specific speed such that the ideal specific energy input for treating the substrate is achieved. A macerator (2) protects the machine from hazardous materials (e.g. stones) 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.

ADVANTAGES

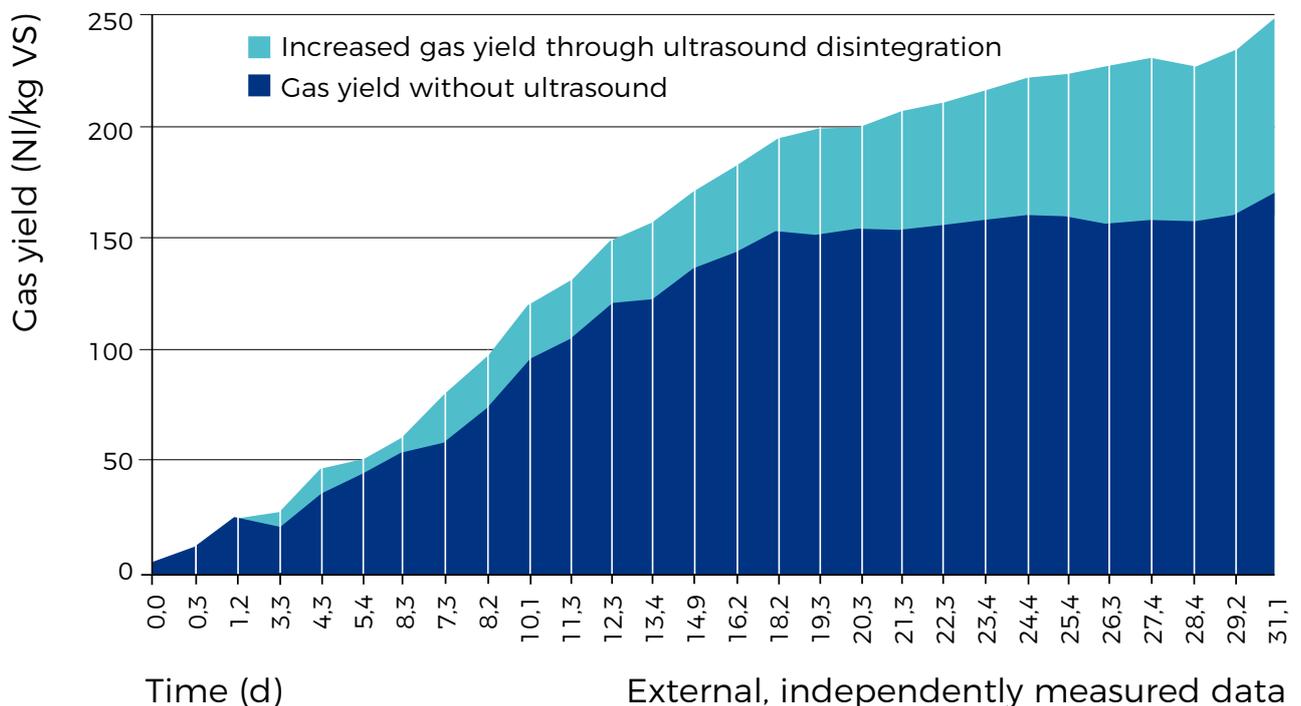
- ▶ Very high energy efficiency – 50 % saving compared to other disintegration systems
- ▶ Extremely low-maintenance plant technology
- ▶ High degree of operational reliability
- ▶ Long standing times
- ▶ Can be ideally adapted to the respective requirements
- ▶ Lower space requirement thanks to compact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

POSSIBLE INTEGRATION



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.

GAS YIELD BEFORE - AFTER





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



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