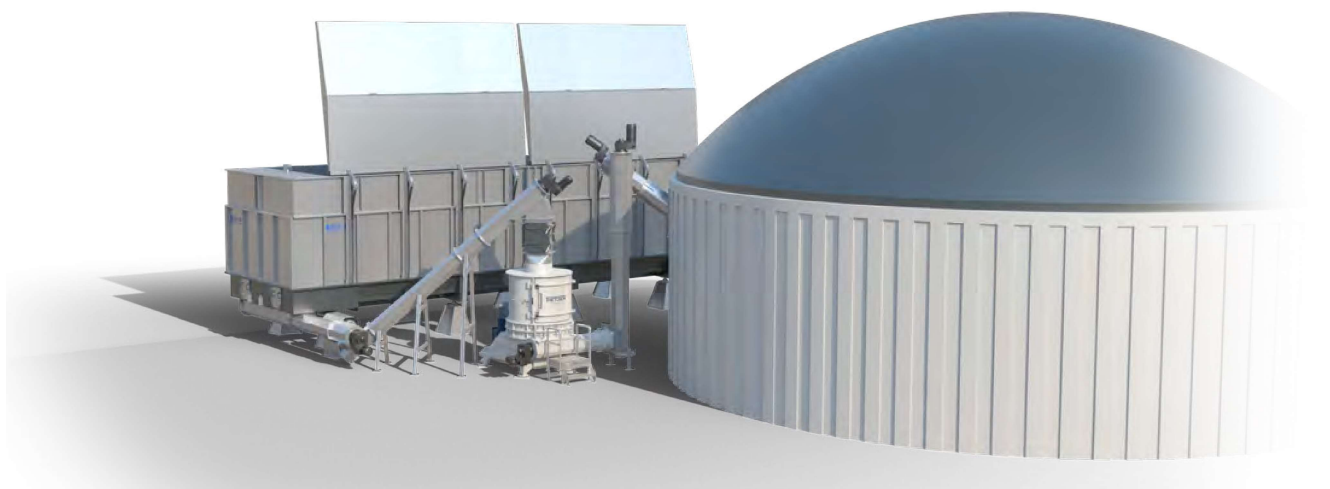


Tietjen, which is based in Germany, explains the superiority of impact grinding for processing biomass for use in biogas plants. It also introduces its Biomass Shredder BMS, which has been especially designed for use in biogas plants

# Tietjen introduces biogas-plant-specific Biomass Shredder BMS



Biomass Shredder BMS, dosing and feeding system integrated into an AD plant

**A**s energy resources become increasingly limited, the search for sustainable alternatives is of the utmost importance. Biogas is a promising solution that generates energy from biowaste and renewable sources.

However, the competitive biogas market is facing challenges due to rising raw material costs. In this context, maximising digester efficiency is crucial to achieve optimal gas yield and make good use of limited resources.

Given the competitive nature of the biomass market, being adaptable and exploring innovative approaches is the way forward.

## Why size reduction of biomass before reaching the digester is essential

A maximised biogas yield in an economical way, as

well as an error-free system operation, stands out as a primary concern for biogas plant owners. As these are the basic requirements for profitable operation of anaerobic digestion (AD) plants, the use of size reduction equipment prior to fermentation in biogas plants offers significant advantages:

- better utilisation of the digester capacity as retention time decreases
- less biomass required
- difficult to process substrates are made usable, e.g. solid manure
- less floating layers

In conclusion: higher gas yield.

Firstly, reducing the particle size of the biomass increases the specific surface area, which increases the contact area between microorganisms and biomass. This material preparation increases the gained amount of biogas, as non-digestible material such as lignin,

which covers digestible material, is destroyed.

The time required to produce the biogas is reduced as the fermentation process speeds up when microorganisms can digest on multiple parts at the same time. The substrate is optimally prepared, leading to efficient utilisation of the digester volume. Consequently, the conversion of organic material into biogas is faster and more complete. This opens up new possibilities for processing previously unused materials, like solid manure.

Another important aspect is the uniform mixing of the processed biomass. The grinders ensure a homogeneous distribution, which favours consistent fermentation and prevents a local accumulation of materials that could affect the fermentation process. A short particle size minimises

the risk of floating layers, and thus reduces possible disruptions that bring negative effects on biogas production.

In summary, particle size reduction prior to fermentation not only boosts biogas production, but also prevents the formation of floating layers and opens up the potential to utilise previously overlooked materials.

## Comparison of size reduction technologies

However, there are differences in size reduction technology used for AD plants. Here we introduce the three most common technologies and explain the differences:

### Cutting and shearing

Cutting and shearing the biomass material involves using knives or blades to cut it down into the desired size – only the

cutting surface is touched by the size reduction equipment. As with scissors, the cutting or shearing efficiency depends on the sharpness of the cutting edges working against each other and the tolerance of the space between them.

**Impact grinding by hammer mill technology**

During impact grinding the biomass is defibred with wide beaters, whereby the entire structure of the biomass is broken up and destroyed. This method, which is especially used with grinders, excels in efficiently handling diverse materials and offering a controlled breakdown of the whole biomass in one step. The versatility of impact grinding or shredding is shown in its ability to process a wide spectrum of materials, ranging from softer compositions to tougher fibrous biomass.

**Impact grinding with hammer mill technology -- with a service provider**

Some AD plant owners do not possess their own grinder, the biomass is processed by a service provider e.g. every other week. The processed biomass is stored for several days, and in the meantime the biomass is already beginning to rot, resulting in a loss of biogas -- hence the biogas yield of these AD plants significantly decreases. Furthermore, the handling cost for feeding the fermenter and the renting of the grinder make this process inefficient.

**Biomass processing: cutting versus grinding with hammer mill technology**

A closer look at the breakdown principle of the two technologies shows that the protective lignin layers on the outside of fibrous biomass are largely retained when simply cut. As lignin cannot be



Biomass Shredder BMS: ripping combs for distribution of the material, impact parts and beaters made of wear-resistant materials such as Hardox and carbide

metabolised by the bacteria in the digester, or only to a limited extent, large quantities of lignin have a negative effect on the gas yield. When using knives, the lignin layer is only interrupted at the cutting edges.

In contrast, the use of impact grinders or shredders with hammer mill technology leads to an almost complete destruction of the entire structure. Consequently, the use of cutting devices offers far fewer areas for

microbial degradation compared to impact grinding.

This results in a more homogeneous substrate, and, therefore, faster and more complete decomposition of the organic material, less floating layers and overall better utilisation of the biogas potential.

Furthermore, if the substrate is homogeneous, small foreign particles such as sand sink more slowly to the bottom of the digester. Some particles can even be carried out of the system instead of sinking to the bottom. Hence the fermenter can be cleaned out less often. Compared to knives, hammers are much more robust and have a longer disintegration effect on the substrate. This is logical, because a knife's cutting effect is based on a maximal thin edge, which consists of very low material thickness. These edges wear fast, with a resultant loss in their cutting effect.



Maintenance friendly wide opening door, option: crane traverse for easy change of the rotor and stairs in front of the door





Setup of Biomass Shredder BMS and dosing system from Konrad Pumpe during intensive test period

**Impact on efficiency: pioneering Biomass Shredder BMS**

In the field of processing agricultural biomass, hammer mill grinders such as the new Tietjen Biomass Shredder BMS, significantly increase the biogas yield once again.

To get installed at AD plants, size-reduction equipment needs to convince AD plant owners in the areas of:

- Trouble free operation
- Low wear cost
- Easy to maintain
- High/required throughput

This is where the Biomass Shredder BMS comes into play, as it is one of the first size reduction devices which has been specially designed for the needs of AD plants.

Seamless material flow is a hallmark of Tietjen's

Biomass Shredder BMS. The smooth operation of the Biomass Shredder BMS is characterised by a bottom exit design, allowing easy discharge of processed materials. It ensures a blocking-free and bridge-free process, guaranteeing continuous material flow.

The Biomass Shredder BMS is also characterised by its adaptability. With its different types of beaters, it can be flexibly adapted to process different materials, making it a versatile solution for different agricultural requirements.

Tietjen has also developed a clever concept for maintenance. The BMS offers a wide-opening door that guarantees maximum accessibility and can also be adapted to

the conditions on-site by varying the maintenance opening in 90° steps.

The rotor can be easily replaced using the optional crossbar traverse. In addition, the resistant beaters and rotor wear parts can be used from both sides, resulting in extremely cost-efficient use.

While regular maintenance is required for optimal performance, the overall ease of maintenance reduces downtime and optimises efficiency.

Impressive throughput is another highlight, with Tietjen's Biomass Shredder BMS achieving an outstanding throughput of more than 15 tons per hour. This offers a unique throughput performance and enables the grinder to meet the demands of high-volume processing, thereby enhancing overall productivity in AD plants.

Tietjen offers the BMS in two sizes, the BMS 1500 and the BMS1200, to serve both the largest as well as the smaller AD plants.

**Testing Tietjen's Biomass Shredder BMS**

In a comprehensive three-week test, the Biomass Shredder BMS has not only demonstrated its durability but also received extremely positive reviews. This robust machine has proven its versatility by successfully processing a variety of materials, including different types of solid manure, wood chips and straw.

One notable highlight is the machine's ability to deal with contamination, it effortlessly

managed challenges such as large stones without any issues. This robustness ensures smooth operation and reliability even in less-than-ideal conditions.

**Summary**

In the highly competitive biomass market for biogas production, it is crucial to get the best value out of the raw materials, which makes the grinding/shredding process essential. As highlighted, biomass grinders, with the operational principle of impact grinding with hammer mill technology prove advantageous over cutting and shearing methods. As the specific surface for micro-bacterial degradation is maximally enlarged and lignin structure maximally destroyed, their efficiency extends to handling diverse materials such as straw, solid manure, or wood.

Among these impact shredders, the Biomass Shredder BMS from Tietjen stands out. With its impressive throughput capacity, simple maintenance combined with low running costs, robust construction and clever design, the BMS perfectly meets the requirements of the market. Rigorously tested and proven, the Biomass Shredder BMS is prepared to deliver exceptional performance and confirm its position as the outstanding solution in the biomass processing industry. ●

**For more information**  
Visit: [tietjen-original.com/en/](http://tietjen-original.com/en/)



Solid manure and horse manure, before and after processing with Biomass Shredder BMS