FOAM PROBLEMS IN INDUSTRIAL PROCESSES

Foam is generally an unwanted by-product in many industrial processes because it causes difficulties in process control and equipment operation. A typical example is in the fermentation industry, where foam represents one of the biggest problems. Foam is also present in many other manufacturing processes. Power Ultrasound provides an innovative, green, clean and effective technological tool for breaking foams.

POWER ULTRASONICS DEFOAMING METHOD: A GREEN TECHNOLOGY

High intensity ultrasonic waves are a clean and efficient means to break foam bubbles. The PUSONICS defoamer is an airborne power ultrasonic device capable of generating high intensity ultrasonic waves which efficiently break foam bubbles without contaminating the treated liquid medium. The mechanism of ultrasonic defoaming is a combination of the following effects: high acoustic pressure, radiation pressure, resonance of bubbles and acoustic streaming. Other factors, such as the atomization of the bubble surface, may also contribute to foam rupture.
The technology for ultrasonic defoaming is based on a new type of power airborne ultrasonic generator. Such a generator is constituted by a piezoelectric power transducer with a specially designed plate radiator, and the electronics to drive and control it. This novel ultrasonic generator produces highly focused radiation in such a way that levels of acoustic pressure as high as 170 dB may be achieved at a focal area. The Ultrasonic Defoaming System (UDS) is a powerful and compact device which does not interfere in the processes; it can be easily sterilized and fulfils industrial requirements. The plate transducer of the UDS can be static or mounted on a moving device to treat large areas.

**Transducer technical data:**

- Electroacoustic efficiency: 75-80%
- Power capacity: 150-300W
- Max. intensity at focal area: 170 dB
- Frequency range: 10-50 kHz

**Standard configurations:** UDS-25, UDS21

- Power capacity: 200-300W
- Max. intensity at focal area: 170 dB
- Frequency: 25.6 kHz (UDS25) and 21 kHz (UDS-21)

**APPLICATIONS**

- Packaging lines (bottling, canning lines...)
- Fermentation reactors
- Food, chemical, cosmetic and pharmaceutical reactors
- Filling machines (manual or semi-automatic)

The defoaming ability is considerably stronger when the foam to break is dry, characterized by large bubbles, and by low viscosity. With dry or airy foams the ultrasonic effect is faster and the defoaming volume may actually be larger. Example of dry foam are found in seafood processing, food processing, brewing process, filling lines of carbonated beverages, pharma products etc.
For the elimination of foam in cylindrical or rectangular reactors a movement system has to be connected to the UDS via a shaft. Shaft rotation at pre-programmed revolution speeds or moving in a raster scan allows the UDS to perform a complex trajectory which makes possible the treatment of large foam areas.

The rate of defoaming achieved with just one plate-transducer operated at a power of about 300 W, ranges from 10 to 40 m³/h in cylindrical reactors with diameters of 6-12 m. This means an energy consumption lower than 30W·h/m³ provided by the UDS unit.

In the case of rectangular reactors a movement of the UDS along straight lines parallel to the walls of the vessel would be suitable.
ADVANTAGES OF THE UDS TECHNOLOGY FOR INDUSTRIAL PROCESSES

⇒ Green technology
  • Does not interfere in the product
  • Eliminates or reduces anti-foam chemical usage
  • Improves product safety without microbiological hazard
  • Low consumption energy
  • Reduced water consumption (reactor applications)
⇒ Improved bottle/package fill level and reduced product loss/waste
⇒ Enhanced bottling/packaging production capacity and throughput
⇒ Simplified and reduced maintenance
⇒ Lower packaging reject rates
⇒ No air or water flow to interfere with plant environment
⇒ Easily installed into existing manufacturing lines and no physical interaction with the production process
⇒ Reduced heating/cooling-related energy costs as a foam intervention strategy

For more technical information, please contact: pusonics@pusonics.es

REFERENCES: