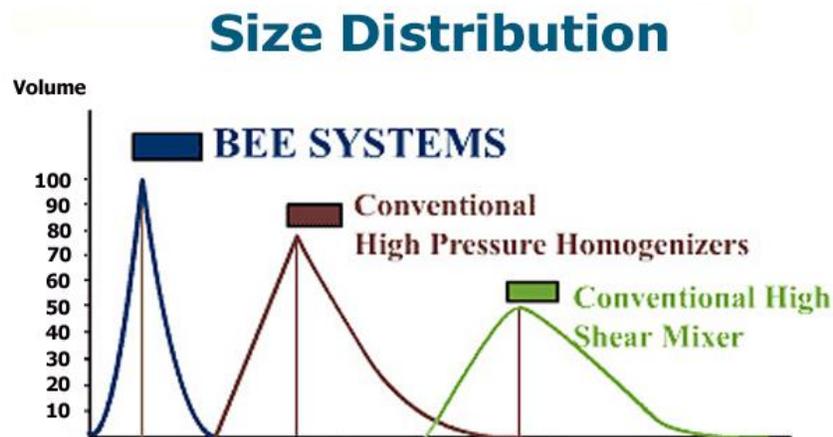


## BEE International's Place in the Market

BEE International is a worldwide supplier of high pressure homogenizing systems to the Pharmaceutical, Biotech, Chemical, Cosmetic and Food industries. Our mission is to give our customers the tools to create new products faster and to produce them more economically than ever before.

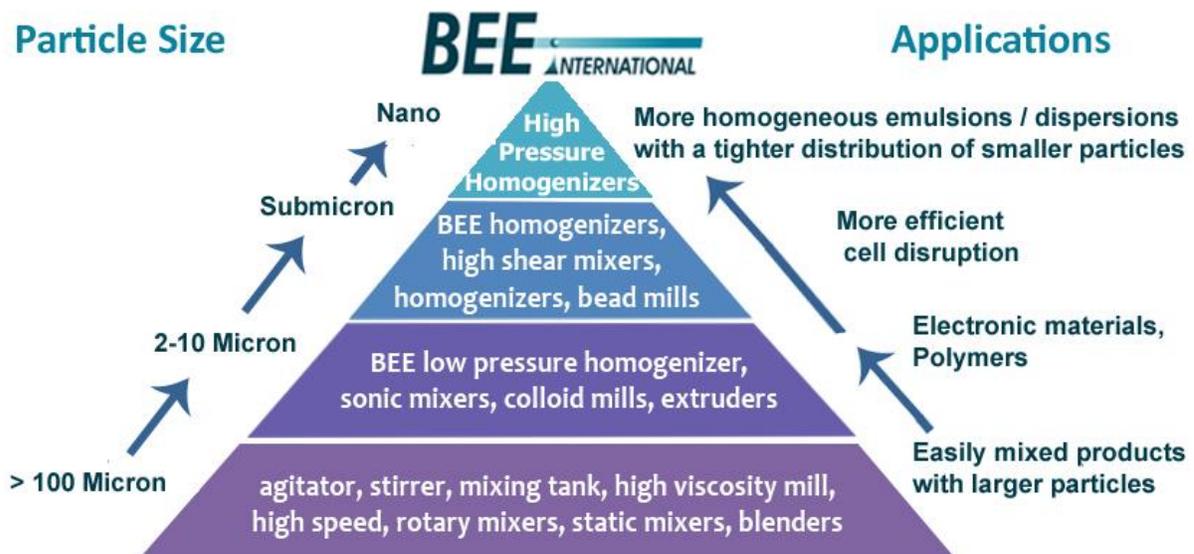
We are experienced with every nuance of particle size reduction to produce a more homogeneous mix of smaller more uniform particles. For each product there is an optimal mixing process, which accomplishes objectives, with the least timely and most cost effective method. Our systems produce unprecedented results by optimizing the mixing process to better suit product characteristics.



BEE International High Pressure Homogenizers  
for a tight distribution of smaller particles

## Technology

Homogenizers are the most efficient fluid processing equipment for particle and droplet size reduction which is critical in a wide variety of applications. BEE systems produce the most advanced results in this area of processing equipment.



Our technology combines all available forces that effect the process:

- Turbulent Premixing – like STIRRERS and AGITATORS
- Cavitation like SONIC mixers
- Impact – like BEAD MILLS
- Higher Shear level than HIGH SHEAR MIXERS
- Maximum Operating Pressure up to 3100 bar



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With BEE laboratory systems many process parameters can be modified to further improve results and reduce the number of passes required. This is an in-line mixing technology, so the entire product batch receives the same level of processing. It is also a scalable technology so the results developed in the lab will scale up to manufacturing.

Studies show there is a direct correlation between increase in operating pressure and particle size reduction. While this does not mean the maximum operating pressure works best for each product, it does make a strong case for experimenting with a full range of operating pressures. Operating pressure is conveniently controlled BEE systems to operate at up to 3100 bar.

### **Advantages for Emulsions and Dispersions**

The name BEE stands for Best Emulsifying Equipment. Studies show that particle size reduction, resulting in increased surface area, is a very promising approach to enhance dissolution rate and, thus, the bioavailability of poorly water-soluble drugs.

The benefits to emulsions for drug delivery include:

- Unprecedented particle size reduction
- A tighter distribution of smaller particles
- Longer shelf life
- Guaranteed scale up – all systems produce the same results
- Targeted drug delivery
- Sterilization by filtration (< 200 nm)
- Improved bioavailability
- Sanitary design



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## **Advantages for Biotechnology**

The same technology used to break particles apart for particle size reduction is used for cell disruption. This means breaking cells apart without damaging the precious intracellular materials. Cell disruption is one of the steps required for the recovery of biological products that are located inside cells. In determining the optimal conditions to disrupt the cell wall, operating pressure is a major factor in the efficiency of the cell disruption.

The ability to adjust the process brings success to more easily disrupted cells such as E.Coli to challenging cells such as yeast and fungi. Benefits of BEE technology include:

- High yield cell disruption in fewer passes
- One system for a wide variety of products
- Easy to use
- Effective product cooling
- Small sample sizes in the laboratory
- Sanitary design

## Products

BEE International offers systems for laboratory, pilot and production environments. All systems produce the same results and are designed for sanitary settings. All systems contain BEE technology and are available with a maximum operating pressure of either 2000 or 3100 bar.

### Micro DeBEE - Air operated

- Capacity: 25 LPH
- Max. Operating Pressure:
  - 2,000 bar with 100 PSI , 55 SCFM air supply
  - 3,100 bar with 150 PSI, 55 SCFM air supply
- Adjustable Back Pressure
- Heat Exchanger for product cooling
- Designed for easy clean-up and maintenance
- Stainless steel enclosure



### Nano DeBEE - Electric

- Capacity: 3 LPH or 7 LPH
- No requirement for compressed air
- Smallest sample volume: approximately 20 ml, 12 ml with Small Volume Option
- Easy cleanup and maintenance
- Special tools and spare parts supplied



### Mini DeBEE – Electric Bench top

- Capacity: 24 LPH
- Adjustable Back Pressure: 0 -4,500 PSI
- Product Cooling Heat Exchanger Coil
- Electronic Control (PLC) with digital display
- Sanitary (flow through) Pressure Transducer for operating pressure
- Pressure Gauge for back-pressure
- Sanitary design, easy clean-up and maintenance



### Pilot Scale

- Bridge the gap between R&D and manufacturing.
- Suitable for 24x7 operation
- Many options available
- Clean in Place
- Efficient in-line process
- Adjustable back pressure
- Heat exchanger for product cooling
- Stainless steel enclosure



### Production

- Touch screen user friendly operator interface
- cGMP manufacturing ready
- Fully automated Clean in Place (CIP)
- Data gathering and SCADA
- Robust electro-hydraulic drive system
- Reliable and long-lasting industrial components built to withstand fatigue and stress
- Full documentation packages and support for qualification (IQ/OQ)
- Sophisticated touch screen control and monitoring for simple operation
- Redundant, on-line intensifier
- Take components off-line for maintenance to minimize downtime and continue operation

