For R&D • For Small amount sampling

Wet Grinding/Dispersing

STARMILL Lab Series

A Single Common Frame for 3 Different Uses
Scale-up to Production Size
Corresponds to the Microbeads

Best for Nano Level Dispersing
Easy Handling
Batch Type

Your Partner for Fine Particle Technologies
Ashizawa Finetech Ltd.
When you are facing problems related to micronization, Ashizawa offer you the best solution by deciding whether the material is grinded or dispersed. Labstar Mini is a laboratory sized bead mill with changeable chambers and agitators according to type of micronizing (grinding or dispersing). It is also changeable to batch type which is best for sampling a small amount of slurry.

**1. For Grinding LMZ015**

1. **The Laboratory size LMZ Mill**
   LMZ015 is excellent for grinding particles to sub-micron size.

2. **For Strong Shear Grinding**
   Particles are ground into pieces from strong shear movement of the beads. Dispersing in high viscosity slurry needs strong shear power, which can be achieved using LMZ015.

3. **Centrifugal Separator with Screen**
   Combination of Centrifugal separator and screen, high viscosity slurry can also be operated.
   - Microbeads can be used, and this enables finer grinding level

4. **High Energy Density Chamber**
   Narrow grinding area and the projections on the rotor produces great energy within the chamber, and move the beads strongly.

**2. For Dispersing NANO GETTER DMS65**

1. **The Laboratory size mill of NANO GETTER**
   The smallest size of NANO GETTER which is excellent for nano dispersing.

2. **Mild Dispersing**
   “Rolling” power of beads can separate particles into pieces (see the right diagram). This “rolling” method reduces the particles’ damage to the minimum.
   - Prevents re-agglomeration and contamination

3. **Screenless**
   Our original centrifugal separating system now allows to operate without screen.
   - Easy handling of microbeads
   - Eliminates the pre-grinding process

4. **Small L/D**
   Homogeneous movement of beads leads to higher efficiency of energy.

**3. Batch Type MAX NANO GETTER HFM02**

1. **Ideal Beads Movement for Dispersing**
   Straightening vane in the bead mill controls beads movement. This realizes “Mild Dispersing” maintaining high efficiency and high quality.

2. **The Minimum Sampling from 100cc**
   Batch type chamber doesn’t require other equipments such as pumps, pipes, etc. HFM02 is ideal for tests using a small amount of slurry.
Swiveling chamber makes it easier to handle. Chamber angles can be adjusted for each process.

**Grinding**
Break /shatter a particle

**Dispersing**
Separating fine particles

### Grinding
- Break/shatter a particle

### Dispersing
- Separating fine particles

#### Grinding vs Dispersing
- **Grinding**
  - Break/shatter a particle
  - Dispersing area: High density

- **Dispersing**
  - Separating fine particles
  - Area without beads: Low density

#### Advantages and Disadvantages of Re-circulation System / Batch System

<table>
<thead>
<tr>
<th>System</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Re-circulation System</strong></td>
<td><em>Can manage large amount of slurry using small sized mill</em></td>
<td><em>Need pumps, pipes and other components.</em></td>
</tr>
<tr>
<td><strong>Batch System</strong></td>
<td><em>Can run with small amount of slurry.</em></td>
<td><em>Unsuitable for mass production.</em></td>
</tr>
</tbody>
</table>

#### Slurry IN
- Movement of Slurry and Beads

#### Slurry OUT
- Beads Discharge Position
- Operating Position
- Beads Filling Position

#### Diagrams
- **Diagram of LMZ015 and the movement of beads**
- **Diagram of DMS65 and the movement of beads**
- **Diagram of HFM02 and the movement of beads**

#### Particle Movement
- Homogeneous movement of the beads
**What is Mild Dispersing?**

Mild Dispersing is Ashizawa Finetech Ltd.’s original dispersing technology, which maintains size, shape, a crystal structure, and a surface condition of a primary particle.

**Mild Dispersing can disperse particles...**
- to primary particles without damaging their crystal structure
- without re-agglomeration by suppressing the surface activity
- with little wear and contamination

**The result of X-ray diffraction (Processed Sample)**

<table>
<thead>
<tr>
<th>2θ (°)</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
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<tr>
<td>40</td>
<td></td>
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<tr>
<td>50</td>
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</tr>
<tr>
<td>60</td>
<td></td>
</tr>
<tr>
<td>70</td>
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</table>

**Specifications**

<table>
<thead>
<tr>
<th></th>
<th>LABSTAR mini</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LMZ015</td>
</tr>
<tr>
<td>Grinding Chamber Volume (ℓ)</td>
<td>0.17</td>
</tr>
<tr>
<td>Batch Volume (ℓ)</td>
<td>0.25~0.5</td>
</tr>
<tr>
<td>Motor (kW)</td>
<td></td>
</tr>
<tr>
<td>Circumferential Velocity (m/sec)</td>
<td>4~14</td>
</tr>
<tr>
<td>Bead Diameter (mm)</td>
<td>0.1~0.5</td>
</tr>
<tr>
<td>Separation System</td>
<td>Centrifugal Separator with Screen</td>
</tr>
<tr>
<td>Operating Method</td>
<td>Re-circulation</td>
</tr>
<tr>
<td>The Shaft Seal</td>
<td>Double Mechanical Seal</td>
</tr>
<tr>
<td>Agitator/The Inner Surface of Grinding Chamber</td>
<td>Ceramics</td>
</tr>
<tr>
<td>Dimension, Weight (W×D×H)</td>
<td>Bead Mill: 400×550×600mm · 40kg / Whole Unit: 1400×600×590mm · 90kg</td>
</tr>
</tbody>
</table>

**e.g. Dispersing Photocatalyst (Titanium Oxide)**

- High transparency achieved by Mild Dispersing
- Primary particle size: 30nm
- Beads size: 0.1mm

**After one year of processing**

- High transparency achieved
- Primary particle size: 30nm
- Beads size: 0.1mm

**Conventional Dispersing vs. Mild Dispersing**

- Conventional Dispersing: Particles are easily damaged thus causes re-agglomeration
- Mild Dispersing: Particles are not damaged, thus particles’ attributes are kept