1. Descriptions

1.1 Process

The drum flaker transforms a molten product into a solid. The process that takes place is a solidification and/or crystallisation process. The product begins to solidify the moment it comes into contact with the cold, rotating drum. After one revolution the completely solidified layer is removed from the drum by a knife and typically breaks into easy to handle flakes.

The form and size of the flakes depend on the nature of the product, but also to some extent on the process conditions.
1.2 Equipment

1.2.1 The drum

The cooling drum has welded on heads and shafts. One drum head contains one inspection hole. The drum is specially designed for maximum form stability; distortion due to differential temperature gradient in normal operation is impossible. The drum design ensures equal heat transfer for uniform flake size and is normally completely made out of stainless steel, but also carbon steel or high grade alloys are possible.

1.2.2 Coolant circulation

The coolant is sprayed via a central spray tube with a special spraying pattern: directly against the drum’s inner surface and is discharged via a syphon system. The entire coolant distribution system is made from stainless steel and easily accessible for inspection and maintenance.

1.2.3 Scraper assembly

The scraper assembly has a robust design and provides uniform pressure distribution over the drum’s entire length and thus eliminates vibrations. The knife pressure can be easily adjusted by means of pneumatic pressing system that is mounted outside the casing. A selection of knife materials is available.

1.3 Various designs

1.3.1 Dip feed

For products with low viscosity and good adhesion properties a drum flaker with dip pan is used. In this type the rotating drum runs continuously through the heated melt in the dip pan underneath the drum.

1.3.2 Overhead applicator roll

For products with moderate to high viscosities, the overhead applicator roll is used. A heated applicator roll is positioned above the cooling drum. The melt can be easily fed via the trough-shaped nip between the applicator roll and the cooling drum. Contact with the hot applicator roll ensures that the product remains liquid.

1.3.3 Other designs

For products with moderate to high viscosities, the overhead applicator roll is used. A heated applicator roll is positioned above the cooling drum. The melt can be easily fed via the trough-shaped nip between the applicator roll and the cooling drum. Contact with the hot applicator roll ensures that the product remains liquid.
1.4 Features of the drum flaker

The Drum Flaker enables processing of molten products into excellent quality flakes. The well-considered concept of the drum flaker has led to a number of features:

• Compact unit, little floor space required;
• Completely closed cooling system, absolutely no cross-contamination between cooling medium and product;
• Low operational and maintenance costs;
• Gastight enclosures;
• Easy inertisation of the process;
• Unit designed with good access for maintenance and cleaning;
• Construction material ranges from carbonsteel to various grades of stainless steel, Hastelloy, etc.

1.5 Applications

(Fine) Chemical

- Fatty acids
- Oleochemicals
- Phthalic Anhydride
- Maleic Anhydride
- Calcium Chloride
- Caprolactam
- Resins
- Bisphenol A
- Sulphur

Food industry

- Cheese
- Chocolate
- Dough
- Vegetables
- Sulphur

Healthcare

- Stearate
- Soaps
2. Example Projects

Soap

2 x KBO 20/40
Cooling surface area: 25m²

Polyethylene Glycols

1 x KBO 15/36
Cooling surface area: 17m²
A unique feature and part of Royal GMF-Gouda’s R&D program is the pilot plant. The pilot plant is a valuable test centre for simulating production processes with a view to testing or optimization of a process before implementation. The pilot plant is also used for investigating the feasibility of a desired process. Combined with state-of-the-art manufacturing technologies, Royal GMF-Gouda offers an integrated approach for the set-up of food processing lines contributing to significant cost saving (for the customer) on the production process.

Royal GMF-Gouda has several pilot plants available to test new materials, generate design data and provide representative product samples. The proven calculation model for scaling up to industrial size ensures successful application to real life processing.

3. Pilot Plant

3.1 Test facilities

Feasibility test:
Requires a small amount of product to determine its ‘flake ability’.

Bench scale test:
Requires approximately 1 kg of product on a bench scale drum flaker to determine flake behaviour and produce a small sample.

Pilot plant test:
Requires approximately 100 kg of product to determine a guaranteed capacity and process parameters on a pilot plant drum flaker.
4. Dimensions

For more than 100 years Royal GMF-Gouda realizes total process solutions for the environmental, chemical and food industry. Being machine manufacturer as well as process solutions expert, Royal GMF-Gouda is able to handle all stages involved in designing and building plants, including engineering, service, installation and commissioning.
<table>
<thead>
<tr>
<th>DRUM FLAKER MODEL K</th>
<th>5/5</th>
<th>5/10</th>
<th>10/10</th>
<th>10/15</th>
<th>10/20</th>
<th>15/20</th>
<th>15/30</th>
<th>15/40</th>
<th>20/40</th>
<th>20/45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling surface</td>
<td>m²</td>
<td>0.75</td>
<td>1.5</td>
<td>3.1</td>
<td>4.7</td>
<td>6.3</td>
<td>9.3</td>
<td>14</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Drum diameter</td>
<td>mm</td>
<td>500</td>
<td>500</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>Drum length</td>
<td>mm</td>
<td>500</td>
<td>1000</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>2000</td>
<td>3000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>Length (L)</td>
<td>m</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
<td>3.0</td>
<td>3.5</td>
<td>4.0</td>
<td>5.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Width (W)</td>
<td>m</td>
<td>1.3</td>
<td>1.3</td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.8</td>
</tr>
<tr>
<td>Height (H)</td>
<td>m</td>
<td>0.95</td>
<td>0.95</td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
<td>2.4</td>
<td>2.4</td>
<td>2.4</td>
<td>3</td>
</tr>
<tr>
<td>Centre height (CH)</td>
<td>m</td>
<td>0.55</td>
<td>0.55</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
<td>1.7</td>
</tr>
<tr>
<td>Foundation weight</td>
<td>ton</td>
<td>0.8</td>
<td>1.2</td>
<td>2.7</td>
<td>3.6</td>
<td>4.0</td>
<td>10.0</td>
<td>10.6</td>
<td>11.2</td>
<td>13.0</td>
</tr>
<tr>
<td>Net shipping weight</td>
<td>ton</td>
<td>0.8</td>
<td>1.1</td>
<td>2.5</td>
<td>3.3</td>
<td>3.7</td>
<td>7.3</td>
<td>8.8</td>
<td>10.3</td>
<td>12.6</td>
</tr>
<tr>
<td>Gross shipping weight</td>
<td>ton</td>
<td>0.9</td>
<td>1.3</td>
<td>2.8</td>
<td>3.7</td>
<td>4.1</td>
<td>8.0</td>
<td>9.5</td>
<td>10.8</td>
<td>13.2</td>
</tr>
<tr>
<td>Shipping volume</td>
<td>m³</td>
<td>2.5</td>
<td>3.5</td>
<td>11.5</td>
<td>13.5</td>
<td>16</td>
<td>24</td>
<td>30</td>
<td>36</td>
<td>51</td>
</tr>
<tr>
<td>Motor power</td>
<td>kW</td>
<td>0.75</td>
<td>1.75</td>
<td>1.5</td>
<td>1.5</td>
<td>2.2</td>
<td>5.5</td>
<td>7.5</td>
<td>7.5</td>
<td>15</td>
</tr>
<tr>
<td>Maximum</td>
<td>kW</td>
<td>0.75</td>
<td>1.1</td>
<td>2.2</td>
<td>3</td>
<td>4</td>
<td>7.5</td>
<td>11</td>
<td>11</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRUM FLAKER MODEL KBO</th>
<th>5/5</th>
<th>5/10</th>
<th>10/10</th>
<th>10/15</th>
<th>10/20</th>
<th>15/20</th>
<th>15/30</th>
<th>15/40</th>
<th>20/40</th>
<th>20/45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling surface</td>
<td>m²</td>
<td>0.75</td>
<td>1.5</td>
<td>3.1</td>
<td>4.7</td>
<td>6.3</td>
<td>9.3</td>
<td>14</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Drum diameter</td>
<td>mm</td>
<td>500</td>
<td>500</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>Drum length</td>
<td>mm</td>
<td>500</td>
<td>1000</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>2000</td>
<td>3000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>Length (L)</td>
<td>m</td>
<td>2.0</td>
<td>2.6</td>
<td>2.6</td>
<td>3.1</td>
<td>3.6</td>
<td>4.2</td>
<td>5.2</td>
<td>6.2</td>
<td>6.0</td>
</tr>
<tr>
<td>Width (W)</td>
<td>m</td>
<td>1.5</td>
<td>1.5</td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.8</td>
</tr>
<tr>
<td>Height (H)</td>
<td>m</td>
<td>1.4</td>
<td>1.4</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>3</td>
</tr>
<tr>
<td>Centre height (CH)</td>
<td>m</td>
<td>0.8</td>
<td>0.8</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
<td>1.7</td>
</tr>
<tr>
<td>Foundation weight</td>
<td>ton</td>
<td>1.0</td>
<td>1.5</td>
<td>3.1</td>
<td>4.1</td>
<td>4.8</td>
<td>10.7</td>
<td>12.1</td>
<td>13.6</td>
<td>13.0</td>
</tr>
<tr>
<td>Net shipping weight</td>
<td>ton</td>
<td>1.0</td>
<td>1.3</td>
<td>3.2</td>
<td>4.0</td>
<td>4.6</td>
<td>8.8</td>
<td>9.7</td>
<td>10.5</td>
<td>12.6</td>
</tr>
<tr>
<td>Gross shipping weight</td>
<td>ton</td>
<td>1.1</td>
<td>1.5</td>
<td>3.6</td>
<td>4.4</td>
<td>5.1</td>
<td>9.3</td>
<td>11.4</td>
<td>11.0</td>
<td>13.2</td>
</tr>
<tr>
<td>Shipping volume</td>
<td>m³</td>
<td>5.5</td>
<td>6.5</td>
<td>12</td>
<td>14.5</td>
<td>17</td>
<td>36</td>
<td>43</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Motor power</td>
<td>kW</td>
<td>0.75</td>
<td>1.1</td>
<td>1.5</td>
<td>2.2</td>
<td>3</td>
<td>5.5</td>
<td>7.5</td>
<td>7.5</td>
<td>22</td>
</tr>
<tr>
<td>Applicator roll</td>
<td>kW</td>
<td>pinion</td>
<td>pinion</td>
<td>0.25</td>
<td>0.37</td>
<td>0.55</td>
<td>0.75</td>
<td>1.5</td>
<td>1.5</td>
<td>3</td>
</tr>
</tbody>
</table>

DRUM FLAKER
MODEL K

DRUM FLAKER
MODEL KBO
5. About Royal GMF-Gouda

For more than 100 years Royal GMF-Gouda realizes total process solutions for the environmental, chemical and food industry. Being machine manufacturer as well as process solutions expert, Royal GMF-Gouda is able to handle all stages involved in designing and building plants, including engineering, service, installation and commissioning.