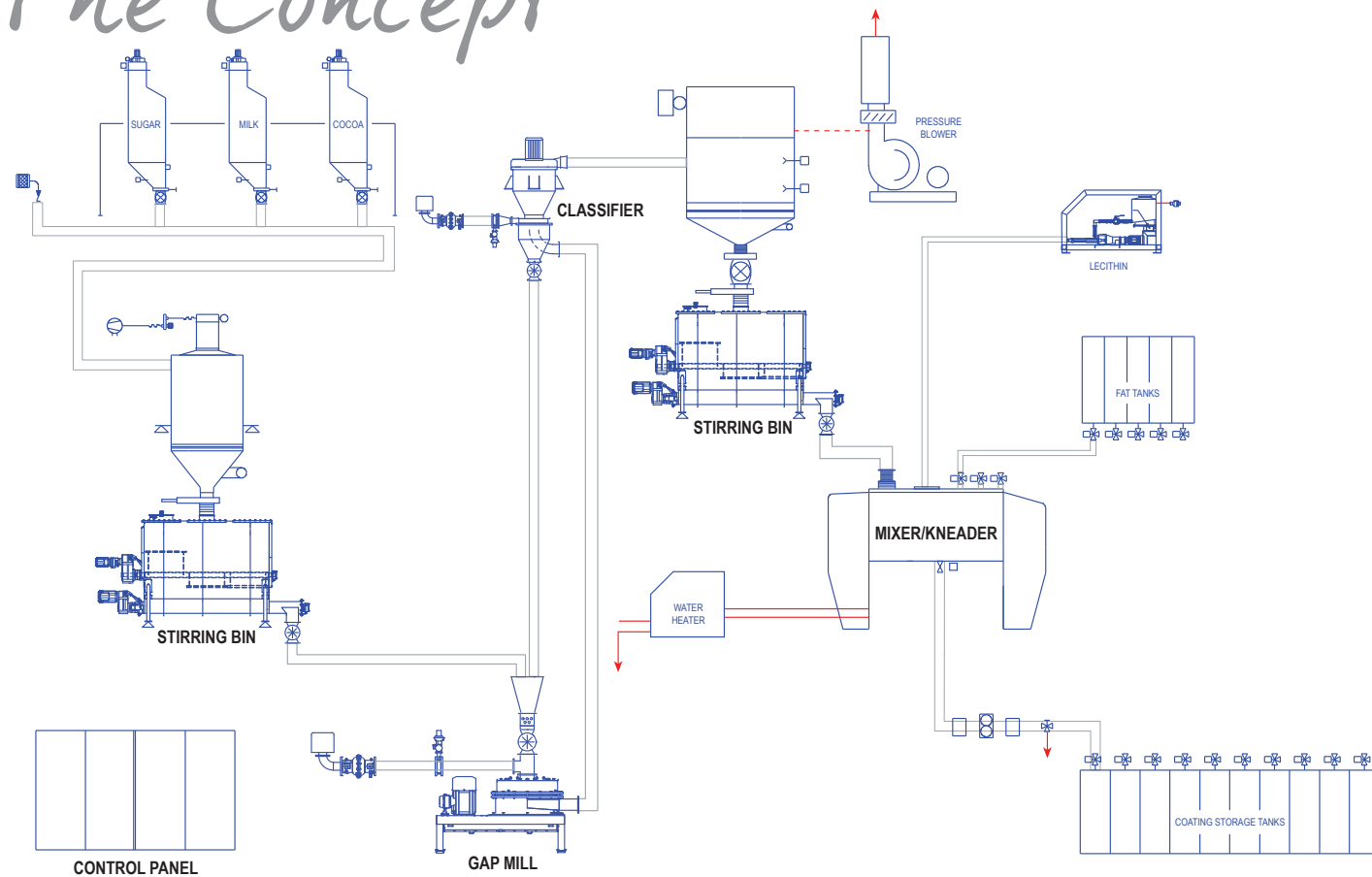


# COMPOUND COATING SYSTEM

*SEMI-CONTINUOUS SYSTEM TO PRECISELY BLEND DRY  
INGREDIENTS THEN GRIND AND CLASSIFY TO DESIRED SIZE*



# The Concept



Bauermeister currently has dozens of dry grinding coating systems installed worldwide. These systems produce compound coatings, work exclusively on chocolate or can produce both chocolate and compound.

The principal difference between the two systems is in the mixing/kneading/conching. For compound coatings only one mixer-kneader is required, since the batch time is between 30 and 60 minutes. For chocolate, several kneader-conches are required depending upon the total production rate and the required conching time. The other difference between the manufacture of compound coatings and chocolate is that the latter requires a finely ground cocoa liquor. If you desire to produce your own cocoa liquor, the Bauermeister SMM nib grinders can fulfill that task. For more information about our cocoa processing equipment, please enquire.

## A Simple Process

The flow chart above shows a typical system for the production of compound coatings. The process is fairly straightforward and starts with weighing and pre-mixing the dry ingredients, such as sugar, milk

powder, cocoa, etc. according to the recipe. This procedure can be automated using pneumatic or mechanical conveying, or by manually dumping the dry ingredients into a weigh scale. From here, the pre-weighed ingredients move into the pre-mixer, prior to entering the grinding and classifying system which generates a predetermined particle size with a narrow particle size distribution. The finely ground product with the desired particle size passes to the product receiver, whereas, the "overs" or larger particles are returned to the mill for regrinding. Bauermeister's system maximizes the efficiency of both the mill and air classifier. In Addition, this also gives better control of the airflow and temperature. The finely ground product then passes into the Kneader-Conche where it undergoes a specific conching process along with the remaining ingredients, such as cocoa butter or vegetable fat, cocoa liquor, lecithin and any other liquid ingredient.

## A Semi-Continuous Process

The whole process is semi-continuous. There is a batch process for the dry ingredients weighing and pre-mixing, a continuous operation for grinding and classifying, and finally a batch process for the

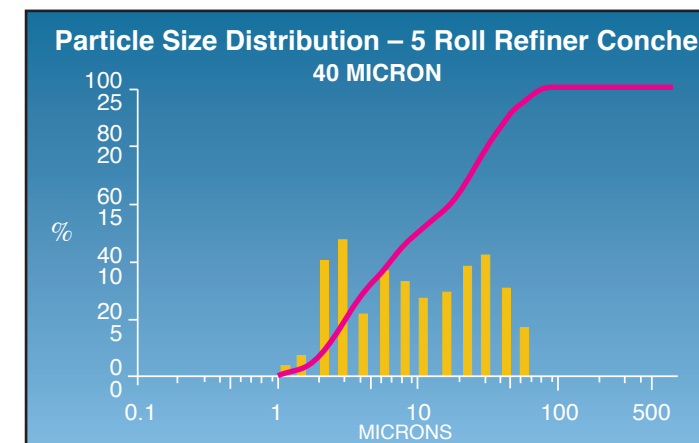
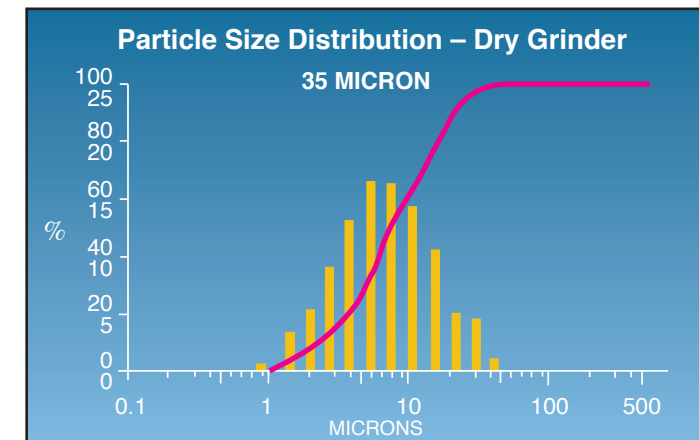
Kneader-Conches. The whole system is sized in such a way that the mill operates more or less continually and delivers sufficient ground material to ensure the optimum loading and unloading of the conche with a minimum of downtime. Depending upon the degree of automation in the bulk handling and the PLC equipped control panels, one person can operate this system with subsequent savings in labor costs.

## Particle Size Distribution

Controlling the grinding system is fairly simple. In order to change the fineness or to optimize the particle size distribution, there are some variables which can be utilized:

- the total airflow through the grinder and classifier
- the classifier speed
- and the secondary air into the classifier.

Both the particle size distribution and the particle shape are very important to quality issues such as, mouth feel, grittiness and the viscosity of the chocolate. Optimizing the particle size could also mean savings due to a reduction in the excessive use of cocoa butter and lecithin.



The above two graphs show the distribution profile for a 35 micron product from a dry grinding system and a 40 micron product from a 5-roll refiner system.

The dry grinding system has a very defined bell curve with a more favorable particle size distribution than that of the 5-roll refined product. The flattening of the bell curve of the 5-roll refined product around 10 microns indicates that the cocoa fibres are not ground further.

## Viscosity & Processing Time

A dry ground product finished in a Kneading-Conche has viscosity and processing time advantages over 5-roll refined material processed in a standard conche. In all chocolate and compound applications to date, viscosity improvements were found by using the Bauermeister Kneading-Conche vs. traditional conching.

The Kneading-Conche starts out immediately with a heavy paste phase introducing as much energy as possible, but still controlling the temperature. The kneading phase permits the generation of high pressure zones within the paste which, in turn, allows the fat to distribute evenly throughout the dry particles. Moisture is also driven off rapidly during this phase.

## Chocolate Comparison Test

|                      | KNEADING  | CONVENTIONAL   |
|----------------------|---|--|
| Moisture             | 0.43  | 0.48   |
| Cocoa Butter         | 34.1  | 36.4   |
| Yield Value          | 0.9 – 1.19  | 12.88 – 14.88  |
| Viscosity Plastic    | 2.54 – 2.61   | 2.13 – 2.16  |
| Viscosity Final      | 2.92 – 2.96   | 3.33   |
| Pascal               | 99  | 98   |
| D (30 micron) %      | 70  | 64   |
| D (10 micron) %      | 36  | 38   |
| D (5 micron) %       | 6   | 8  |
| D (2 micron) %       |   |  |
| Gaschromato-graphy   | Dark Roast  | Dark Roast   |
| Peaksurface          | 130   | 222  |
| Pyrazine             |   |  |
| Peaksurface          |   |  |
| Light Volatiles      | 45  | 122  |
| Organol. Test Result | Typical milk chocolate, well balanced aroma cocoa-milk, good mouth feel | Strong cocoa-malty taste, caramelized in homogenous, weak milk taste |

*Results of Fraunhofer Institut Munich on testing chocolate made with identical ingredients and customer's recipe*

The chart above shows a comparison between a milk chocolate manufactured on a conventional 5-roll chocolate refiner and conche, and the same recipe made on the Bauermeister Dry Grinding and Kneader-Conche system. The analysis was conducted by the Fraunhofer Institute for Food Technology in Munich and speaks clearly in favor of the Bauermeister Dry Grinding and Kneader-Conche system.

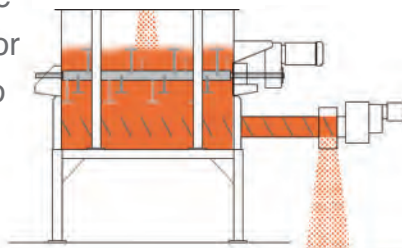




# The Reality

**The Bauermeister Agitated Bin** is designed for intermediate storage of materials which have a tendency to agglomerate and cease flow, such as powdered sugar, milk powder, etc. It is equipped with agitators for moving the product and for pushing it towards the discharge screw. This prevents any build up of the product to insure perfect discharge of the material. The high volume discharge screw is ideal for rapid refills of the mixer conche or downstream processes in other applications. The strong construction also makes it possible to mount a grinder on top of this bin.

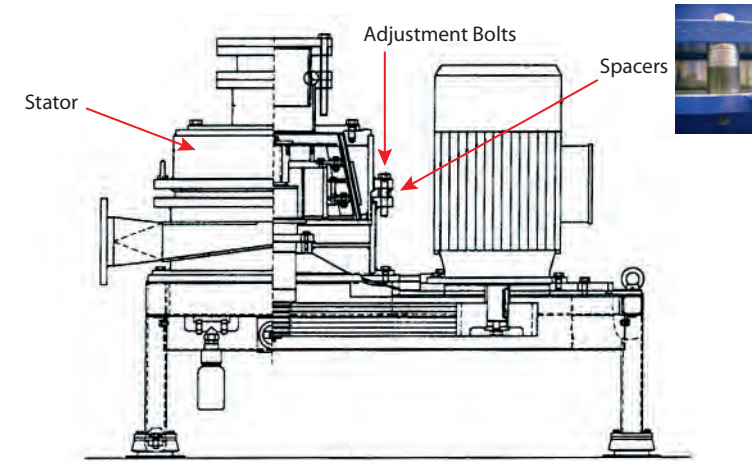
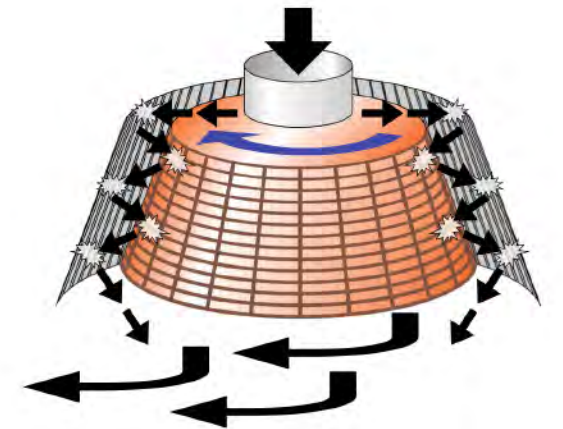
- Available from 40 cubic foot to 170 cubic foot sizes.
- Constructed of mild steel or stainless steel.



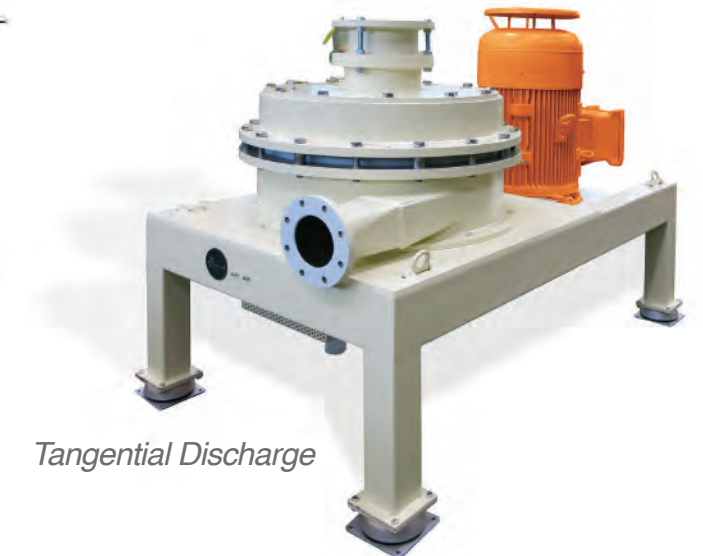
Agitated Bin

**The Bauermeister Gap Mill** is a unique design for fine and ultra-fine grinding without internal air classification. The innovative design of Bauermeister's Gap Mill features an adjustable grinding gap and conical shaped rotor and grinding baffle. This combination delivers improved grinding performance and accuracy. In addition, the Gap Mill uses less air volume and energy compared to other milling technology.

- For wet & dry grinding applications.
- Available in 4 sizes, the nominal diameter of the rotors being 200 mm, 400 mm, 800 mm and 1,200 mm.
- Drive power up to 250 hp with rotor tip speeds up to 130 meters/second.
- Grinding gap adjustable within the range of 1 mm to 5 mm.
- Lower airflow and power requirements compared to air classifying mills.
- Constructed of mild steel and stainless steel.
- 10 bar explosion pressure shock resistant.



Gap Mill

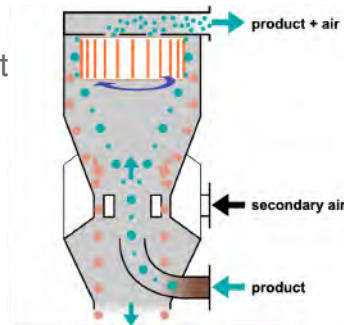


Tangential Discharge



The **Bauermeister Air Classifier** BM-ACL is used for the classifying of dry powders into two fractions, one above and the other below a determined cut size with a high degree of accuracy. The Bauermeister Air Classifiers are designed to operate in open circuit as a classifying unit, complete with its own dosing and separating system, or alternately in closed circuit with any conventional milling system, such as, turbo mills, pinned disc mills, gap mills, etc.

- Cut size can be set within the range of 10 to 75 µm by variation of rotor speed as well as primary and secondary air volume.
- Available in different sizes for throughputs from 50 kgs/h to 7 t/h.
- Mild steel, stainless steel and explosion-proof designs are available.
- Easy access for cleaning and maintenance.

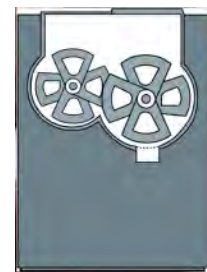


# Air Classifier



The **Bauermeister Mixer Kneader** is ideal for applications which require the blending of dry and liquid materials into a uniform, homogenized mix. Ingredient handling, bulk and liquid weighing and metering contribute to a high consistency in the finished product, including: chocolate compounds and confectionery pastes.

- Available in six sizes with batch sizes from 110 lbs. to 6,600 lbs.
- Efficient, unsurpassed mixing action generates rapid mixing and reduces dwell time.
- Elimination of "dead zones" in the trough insures uniformly mixed product.
- Welded/bolted double trough design.
- Two shafts with special kneading elements.
- Water jacketed trough.
- Mild and stainless steel design.
- Drives from 7.5 hp to 150 hp.
- Designed for easy dismantling, maintenance and cleaning.



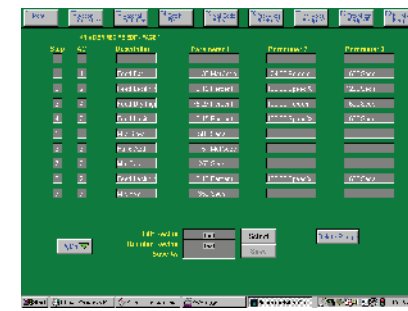
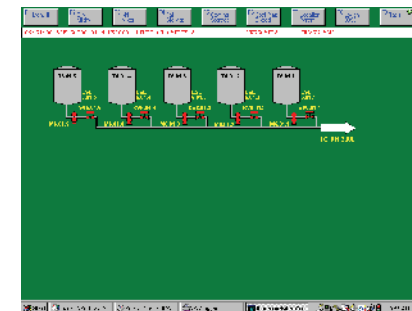
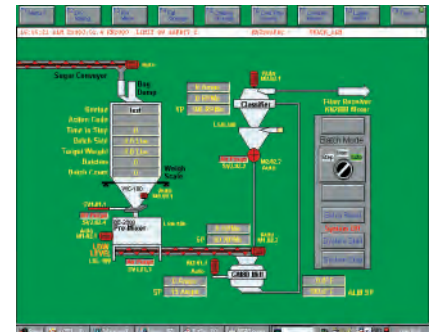
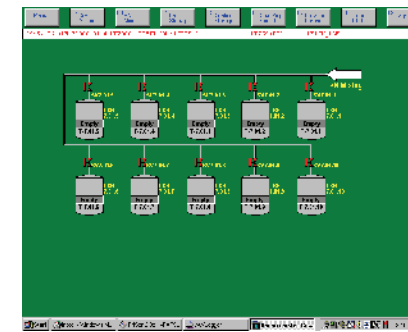
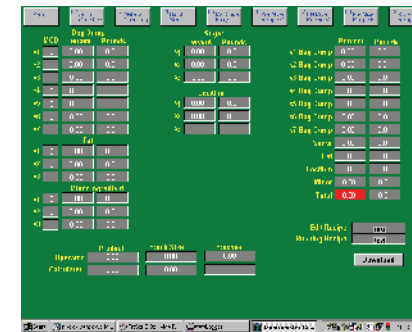
# Mixer/Kneader

Bauermeister expands its "single source" process engineering capabilities by providing advanced control systems, computer hardware, process software, sensors and instrumentation.

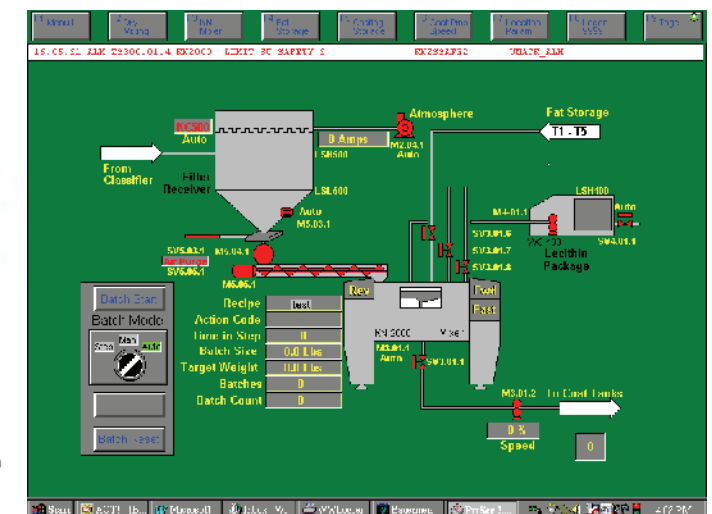
These systems provide precise control of all process related functions, grinding and material handling operations, upstream and downstream processes, production and preventive maintenance information.

Bauermeister controls utilize the latest point and click system operations with auto/manual device control pop-up windows. Devices within the system are color coded for various stages, allowing the operator to quickly identify status. By clicking on that device, the operator receives a "pop-up" window with more pertinent information and the option to manually run that individual device.

Bauermeister systems will lower processing costs, improve product consistency, strengthen management control and increase profitability.



# System Controls



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