

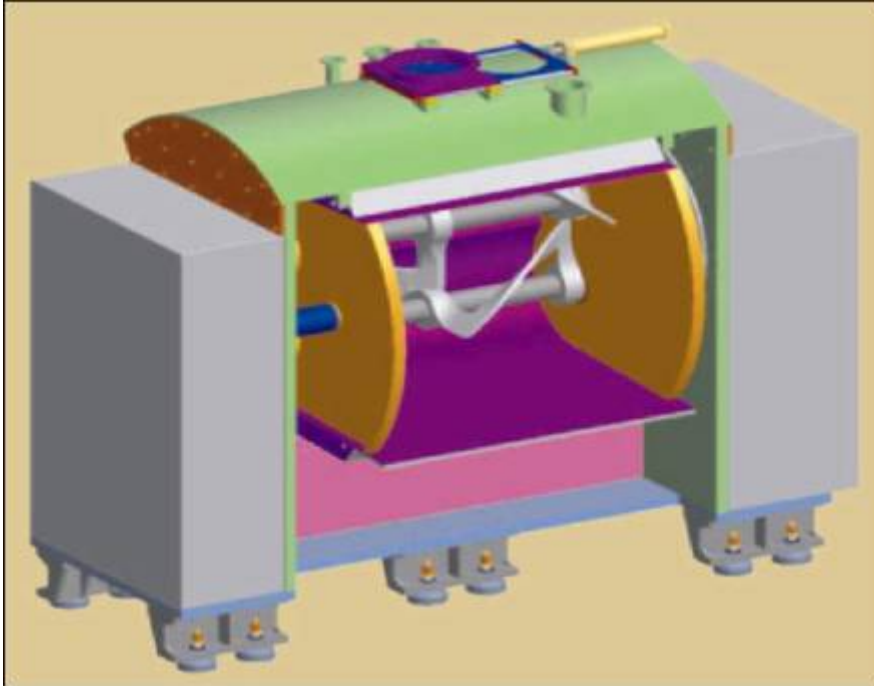
## Dairy Production Process

### 1. Production Equipment

Production lines are designed by means of CAD/CAM systems using 2D drafting, solid modelling and rendered from concept to paper to prototype by means of various CNC machines. Production lines in the biscuit industry are subdivided into various stages, each of which makes use of a variety of machinery.

Some of the various types of equipment used are here listed. These include:

#### *Double blade high speed mixer*



#### *Cooling conveyer*



### **Salt/flour sprinkler**



### **Engraved dies and moulds**



### **Other machinery include:**

- Baking equipment consisting of various types of oil/gas fired biscuit equipment
- Post baking equipment consisting of cooling machinery such as, packing tables and oil spray machines
- Sandwiching equipment used particularly for sandwich biscuits
- Dough sheeters and laminators which render the dough to a specific thickness.

## **2. Confectionery Equipment**

Within the biscuits industry there exist also the confectionery equipment. The main pieces of equipment are

### **Chocolate Temperer:**

The temperer provides the means for the crystallisation of cocoa butter by heating, subsequent cooling and finally re-heating. This is also equipped with refrigeration systems and a vibratory mesh system for filtering.

This procedure is made in order to obtain:

- a good gloss
- a hard snap
- a prolonged shelf life

### **Melter:**

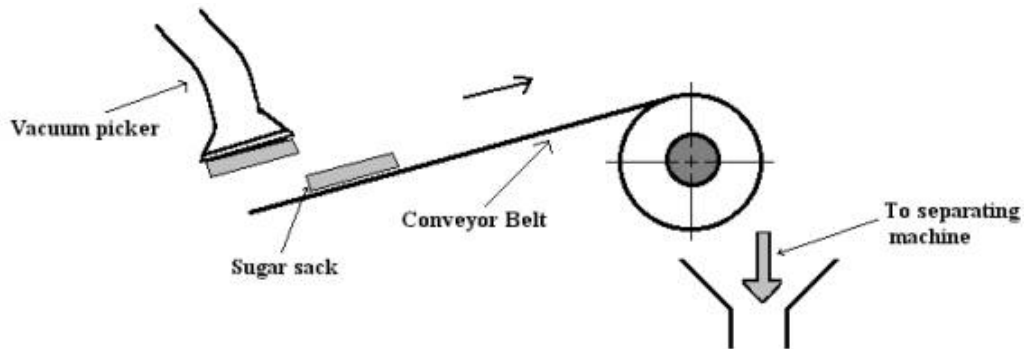
This is used to melt chocolate in combination with stirrers, whereby with the help of which, a homogenous composition is maintained. Also the machinery is covered with glass blocks for monitoring contamination.

### **Enrober:**

This is used for coating confectionery products with chocolate. Again machinery here is well sealed due to contamination risks and heat retention. Also the machine is generally combined with conveyor belts.

## Production Process

### Raw Material loading and conveying to silos.



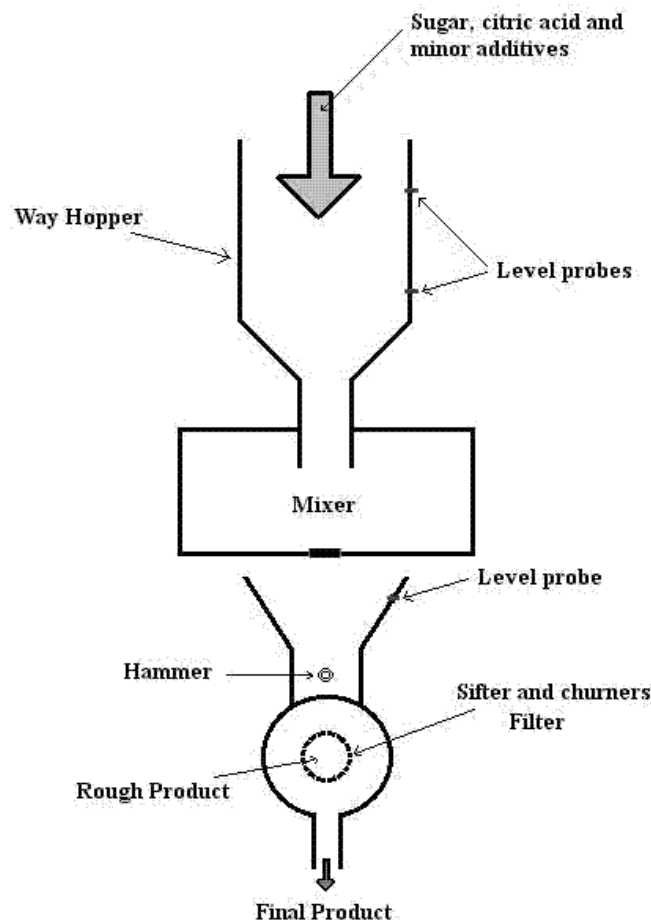
### Conveying & Silo Parameters:

- Air is the conveying medium having a humidity percentage within levels of 48-50%.
- Air separated from raw material by means of fabric filters.
- Internal silo pressure of 0.7bar to reduce moisture.
- Explosive panels to prevent damage.

### Production and Processing

From the silos, a rotary valve at the bottom of the tank picks up equal amounts of product at each turn according to the bulk density of the material. Then again air is used coming from specifically designed blowers to transport the material to *weigh hoppers*.

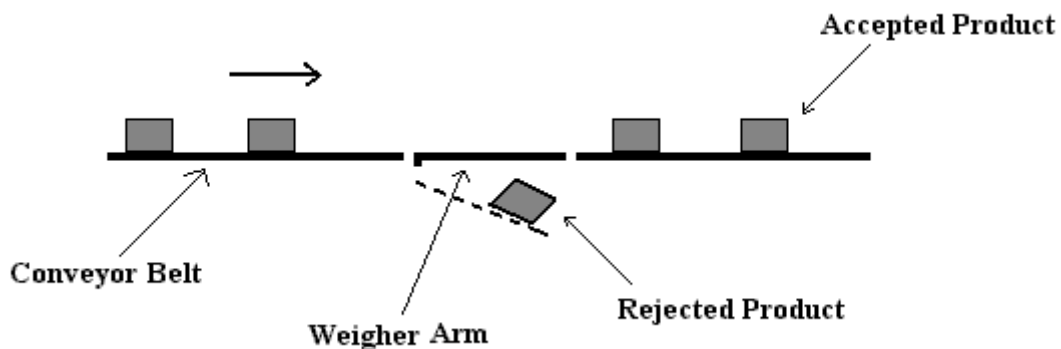
Now other additives, such as citric acid must be added and this is carried out manually in the sack-tipping units. Since the additives added are in small amounts there is no need for machinery to accomplish these jobs.



From there additives pass to receiving hoppers which act as filters. The filtered additives again move to blenders and to the way hopper where they get mixed with the bulk material. Then they go to mixers where other minor additives (colouring agents and flavourings) are added manually. These three products are mixed thoroughly for 6 to 6.5 minutes. When mixing is ready the final product goes to a container which is known as *buffer*. In the buffer, *hammers* help the movement of the mixture with high pressure injected air into a *sifter* consisting of a rotating screw and churners. The mixture is sieved and the oversized granules are thus removed. In the sifter the filtration system depends on the material being used, as for example cornflower needs a finer sieve to be filtered.

### Automation Control

- Level probes fixed to tanks, silos and buffers to keep track of volume levels.
- Main computer controls mixture ratios, air/product flow velocities and monitors faults.
- Also quality control checks are performed whilst packing and labeling concerning mainly weight.



The finished mixture, by gravity falls to packing machine. Packets of powders are filled and then hit by *dampers* so as to remove all the air from the packets. The packets are then heat sealed and moved in a horizontal position where another machine hits them several times from one side to distribute the mixture evenly throughout the packet. As the packets pass on a conveyor belt they are weighed using an *electronic weight control sensor* which in case of incorrect weight drops the packet off the line.

Finally, before the packets are packed into larger boxes, a part of the conveyor (about 1.5m) is made to oscillate in a horizontal plane to further distribute the product inside the packets. This process of distribution of the powder evenly along the packet is very important when it comes to store batches of ten packets into boxes. If the powder is collected at the bottom of the packet this will have a triangular shape thus wasting space.

### Reference:

<http://food-bev.blaut.net/>