

volatile components and the redistribution of key aromatic components (see Chapter 8) that will eventually contribute to the flavour profile of the final product. It is clear that this pre-treatment phase adapts some elements of the traditional conching process, although the structural mass changes are not necessarily present (since treatment occurs at low fat level). Often this pre-treatment step is referred to as dry conching, powder conching, light conching and so on. In an alternative approach, this conching-like step is combined with simultaneous coarse grinding step. At the end of this pre-treatment phase, addition of fats and/or lecithin takes place in a liquefaction phase, often at a fat level close to that of the end product. The process is completed by grinding the matrix, often in a bead mill.

CHOCOEASY® (Netzsch), developed in 2003, was one of the first processes for chocolate mass which combined dry conching with refining in a bead mill. Other versions such as RUMBA® have now been developed to satisfy industrial needs for larger capacities up to 6000 kg batches. The original CHOCOEASY® process also contained a specially designed universal mill (type CONDUX) for the pre-grinding of granulated sugar and/or milk powders. Today due to the efficiency of the low fat dry conching it is possible to start the process in the conche with crystal sugar without pre-grinding. A horizontally arranged, U-shaped conche version of the CHOCOEASY® concept is used to perform the low fat dry conching process in which dry ingredients are mixed together with some of the liquid components. Providing a large specific surface area and an intensive contact between the raw materials, the flavour development and reduction of the moisture is more effective. Moreover, an intensive hot air supply forces undesirable aromatic components and acids to be “discharged” from the matrix. The dry conching phase is followed by a further liquefaction and grinding step using a horizontal bead mill (Netzsch-type LME), with an integrated separation system to allow high throughput rates at a constant temperature without the ball mill blocking due to bead compression.

RUMBA® Basic is one of the latest developments by Netzsch that offers higher batch capacity (6000 kg). It comprises of the Netzsch U-Conch, a horizontal agitator bead mill (LME) and a process tank. This concept is used for real chocolate and premium compound applications (Figure 10.23).

The SmartChoc™ Plus (Bühler AG) operates using similar principles (Figure 10.24). It has a drying process phase, the so-called light conching, and a bead mill technology in a horizontal execution (Cenomic™ bead mill). Thus the process consists of a conche-like vessel, a bead mill and a mixer vessel. The process begins with the dosing of all dry ingredients together with just some of the liquid components in order to maintain a relatively dry consistency. The light conching phase occurs inside a single shaft conche, the ELK™-Light with specially designed conching tools, following the principle of Frisse-ELK conche shearing elements. Rotation in a clockwise direction (tip ahead) causes fluidising and mixing. On the other hand a counterclockwise rotation produces kneading

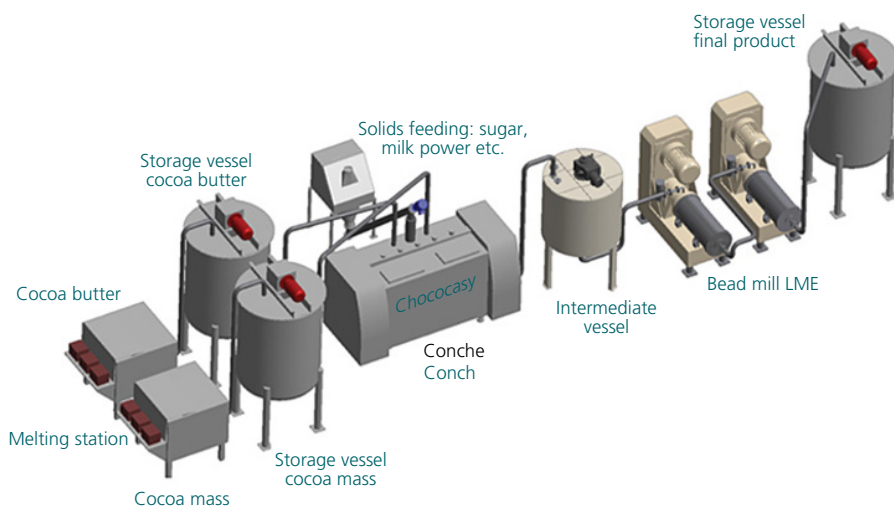


Figure 10.23 Rumba® process scheme (Netzsch).

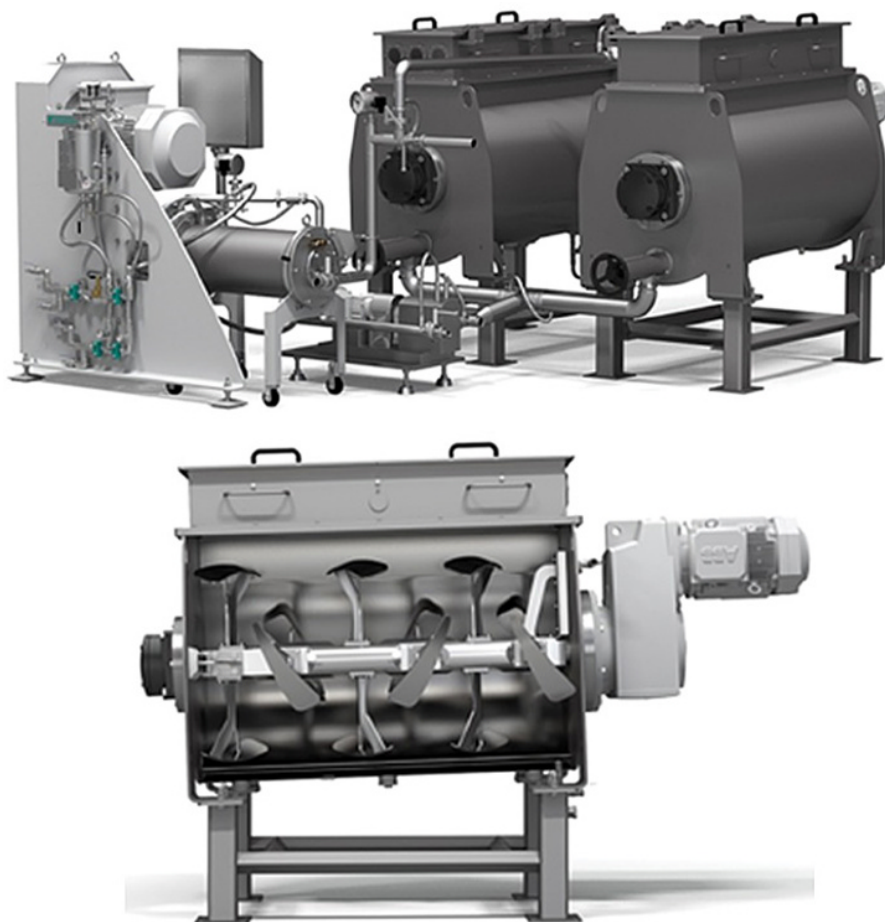


Figure 10.24 Smartchoc® PLUS and the ELK™-Light conche. Source: Reproduced with permission of Bühler AG, Switzerland.