and shearing actions ensuring fat release from the surface of the particles (e.g. milk powders) and eventually particle wetting. Moreover, the fat matrix will be enriched with aromatic components that eventually will be transferred and coat the sugar particle surfaces.

The ELK-Light Conche air heating unit can reduce acidity, moisture and final chocolate viscosity. The process is completed by liquefication and bead milling in an horizontal manner (Cenomic™); which has a high grinding efficiency due to EcoMizer™ conveying discs and centrifugal cage.

The ECO²-Choc concept (Lipp Mischtechnik GmbH) combines a dry conching phase with a coarse grinding step inside a conche vessel (Figure 10.25). Both steps finish prior to the final fine grinding which usually takes place in a ball mill. The coarse grinding occurs within integrated vortex chambers that reduce the size of crystalline sugar down to 300 µm.

At the same time milk powders are dried by heating and aeration. Dry conching is performed with some addition of liquid components such as fat but in particular with cocoa mass in order to strip-off the unwanted volatiles. A liquefaction phase follows to bring the mass to a suitable consistency for pumping. The next step is a two-stage ball mill with the options of an inline scraper cooler and the addition of liquid components in between the ball milling units. Last but not least, the high shearing mixer Reflector®, can be also included after the second ball mill in order to further de-agglomerate the particles and fine-tune the overall particle size distribution. The whole process is ended with addition of the final lecithin portion in order to further optimise the rheology of the end product (Figure 10.26).

A completely different concept is the so-called Refiner Conche that has been developed and manufactured by several companies (Royal Duyvis Wiener Company, Lloveras, MacIntyre and so on) and in which grinding and conching

Figure 10.25 ECO²-Choc conche vessel with integrated grinding areas (Lipp Mischtechnik GmbH).

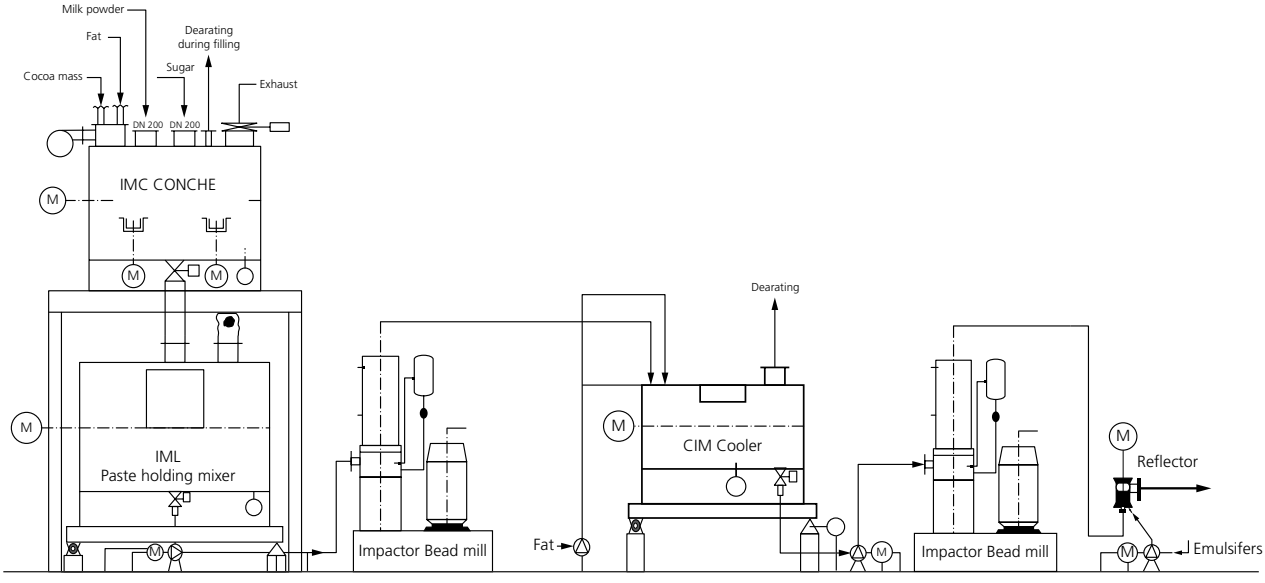

Figure 10.26 ECO²-Choc process flow (Lipp Mischtechnik GmbH).