(HCC75 up to 1000 kg/h, HCC125 up to 2000 kg/h, HCC 250 up to 4000 kg/h, HCC 375 up to 5000 kg/h, HCC500 up to 6500 kg/h).

The Continuous Liquid Conche (CLC) was recently developed by Royal Duyvis Wiener Group to improve mass viscosity, yield, dehumidifying and degassing (Figure 10.21) Thermal degasification and mechanical shearing of thinly layered mass is carried out in the reactor. The product enters the reactor via a shear stress device on the top and is distributed over the reactor wall in a film. This film is constantly sheared by the rotating rotor and kept at a constant thickness. The mass moves continuously downwards towards the outlet. Due to the large surface area and thin film thickness of the mass, a very intensive short duration process can be used. Preheated air is directed onto the film using a range of outlet nozzles that are, in turn, fed through the rotor (the temperature of this fresh micro-filtered hot air is pre-selectable). Finally, the mass is discharged from the bottom of the reactor.

10.4.10 Add-on solutions to the conching process

Several concepts have been developed focused on either further improving the flow properties (through high shearing elements) or on fine-tuning the flavour profile of the end product. As an example, the REFLECTOR® Inline Mixer (Lipp Mischtechnik GmbH) is used as an additional dispersing stage that combines a

Figure 10.21 Continuous liquid conche CLC. Source: Reproduced with permission of Royal Duyvis Wiener Company.

Figure 10.22 Reflector® inline mixer (Lipp Mischtechnik GmbH).

continuous intensive mixer with a rotor/stator head and pump. The centrifugal acceleration induced by the rotor blades causes particle circulation in the shear zone. Large and heavy particles tend to move into the outer area where the shear force is the greatest. In the shear zones the rotor blades with their toothed ends intermesh with the toothed rings of the stator (Figure 10.22). The reflecting faces of the active elements cause constant changes in direction within a closely confined area, splitting up the product flow, breaking up agglomerates, dispersing and homogenising the product.

Fine-tuning of the flavour profile can be carried out by the Taste-Changer concept developed by Royal Duyvis Wiener. It is based on a combination of shear stress and an efficient film evaporator. Basically, hot, dry air jets are brought into contact with pumpable mass causing moisture, volatile components and off-flavour to be extracted from the matrix.

10.4.11 Combined grinding and conching

In the above sections, various conche concepts have been illustrated that operate in either a batch or continuous mode. Traditional chocolate manufacture is based upon conching a mixture of particles which have been pre-ground either by roll refining or by other means such as air classifier mills, jet mills and so on (see Chapter 9). In the roll refining approach, raw materials are dispersed into a fat matrix prior to refining. Usually the fat content is somewhere between 22 and 30%. In the dry grinding approach, ingredients of low fat content (<10%, optimum <1%) are milled either individually, or as a blend, with or without classification.

Machinery suppliers have also pursued alternative approaches based upon a pre-treatment of the mixture at a relatively low overall fat content. The objectives are mainly the reduction of the moisture content, the removal of undesired