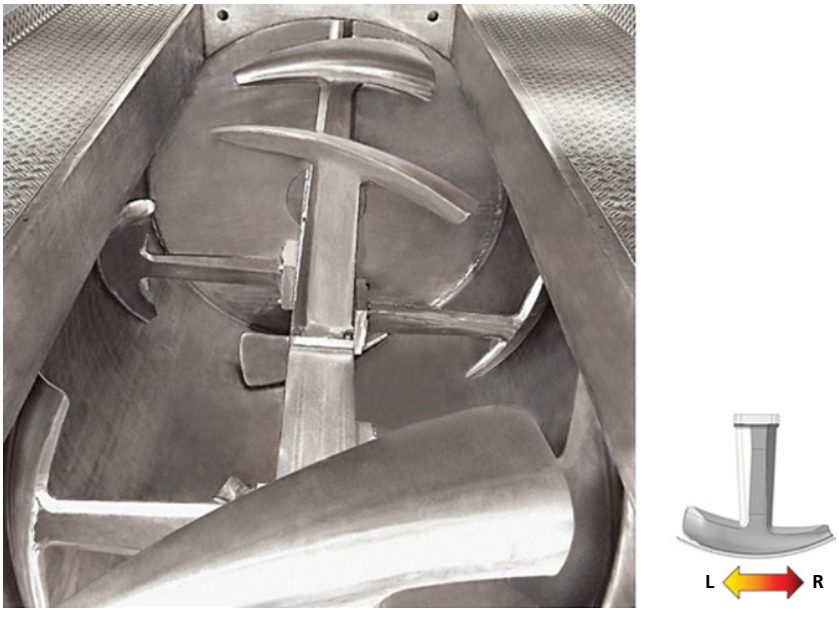

Figure 10.12 Conching paddle of Frisse-ELK conche. Source: Reproduced with permission of Bühler AG, Switzerland.

squeezed out from the surface of the particles and is also released by breaking down soft agglomerates. In order to maintain the motor current, the conche automatically reverses the direction of rotation at a preset value in order increase again the energy transfer into the mass. Subsequent liquefaction produces a homogenous and well-dispersed suspension. Process monitoring and control enable all the main objectives to be met (see Figure 10.13 and Chapter 24). These include de-agglomeration (through shearing and kneading), moisture (through aeration), fat release from the surface of some particles (e.g. milk powders) or due to the break-down of agglomerates in which fat was contained, surface coverage of particles with fats and emulsifiers/surfactants (through efficient liquefaction) and, finally, flavour redistribution (through shearing, mixing and good heat transfer).

The Frisse-ELK is constantly changing, for example:

1. Improved energy efficiency due to a direct drive without V-belts or planetary gear unit;
2. Product feeding via an inlet slide gate to ensure hygienic product feed;
3. Building the vessel in mild steel material to ensure good heat transfer;
4. Equipping the front and rear walls of the vessel with a double jacket for water cooling and heating to ensure optimal heat transfer.

This conche comes in a range of sizes from 1500 to 12 000 kg and with a drive power from 55 to 315 kW, depending on the size.

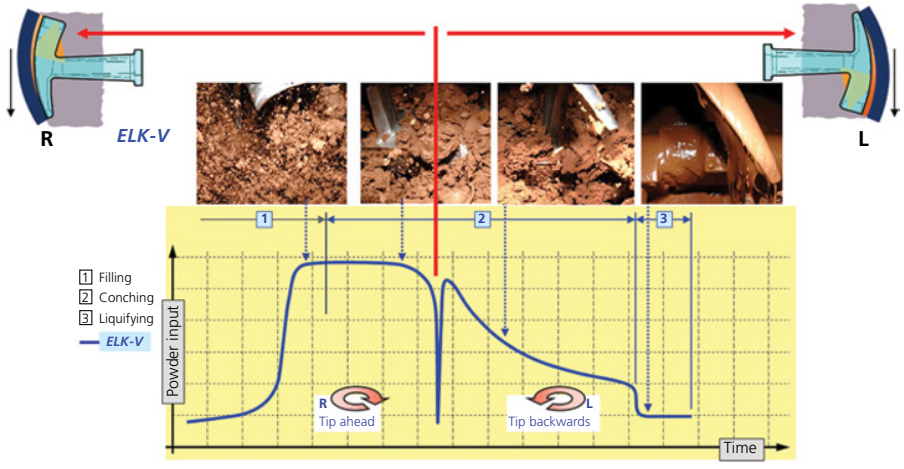

Figure 10.13 Process monitoring of Frisse-ELK conche. Source: Reproduced with permission of Bühler AG, Switzerland.

The TRIQUENCE® (Lipp Mischtechnik GmbH) is a different type of single shaft conche. It has a high-shear mixing whilst maintaining the required mass temperature. It is considered to have very good drying, reaction and dispersing efficiencies (Figure 10.14). The TRIQUENCE® can be used in two main modes: (i) as a standard conching unit whenever flavour development is needed (up to 5 h conching time) or (ii) as a liquefier whenever no significant flavour development is required (e.g. compound coatings). This mixing step then only takes 15–20 min. Different sizes are available from 5000 to 12 000 kg.

10.4.7 Two shaft conches

The Homega Conche (Carle and Montanari-OPM) is a classic example of a two shaft conche design (Figure 10.15). It has a capacity between 4000 and 10 000 kg and, depending upon the batch size, the installed power is from 92 to 150 kW. The authors have no direct experience of this technology, but it is claimed to give a high yield with improved rheological and organoleptic properties. In the process zone, shearing forces are applied against the wall of the vessel but also in between the conching paddles due to the overlapping shearing zone. An additional feature is the discharge mechanism where the two compartments in the vessel have separate outlets and, consequently, the emptying time of the mass is significantly reduced.

Alternatively, Petzholdt-Heidenauer (part of Hamburg Dresdner Maschinenfabriken GmbH) have designed the so-called HBC conche. Their catalogue includes different batch sizes (3000–12 000 kg) powered by two speed controlled drive motors (37–75 kW depending upon the batch size). A pneumatically operated louvre vent increases flexibility and enhances the flavour volatile removal. Typically, the conching cycle for a 3000 kg/h line with a 6000 kg conche is: (i) filling