Figure 15.19 Light aerated chocolate from Japan.

An alternative way of producing this type of product is described in a patent by Nestlé (1999) with a higher fat version in a patent by Meiji Selk Kaisha Ltd (2001) and was said to be used to produce a product called Poff® which was sold on the Japanese market (Figure 15.19). The process involved emulsifying water with liquid chocolate before solidifying it into sheets or the shape of the product. This was then freeze dried to remove the water. The space previously occupied by the water is filled by air forming a low density aerated chocolate. This too can be cut or granulated if required.

15.8 Cold forming technologies

15.8.1 Background

Traditional chocolate forming processes rely on the chocolate being cooled relatively slowly to give the fat phase time to crystalise in the correct form. Too low a temperature in a cooling tunnel will result in the creation of less stable polymorphs and the final product will be susceptible to the formation of fat bloom during storage. However, it has been known for some time that very low temperatures can also be used in certain circumstances.

Boyd and Yates (1923) were issued a patent which showed a cooled metal plunger being pushed into a mould, which was partly filled with chocolate. The idea being that the chocolate would form a partly set shell, which would retain its shape once the plunger was withdrawn. This system suffered from the problem that it was difficult to remove the plunger from the chocolate in the relatively short time allowed by a production plant and much of the patent was concerned with release agents, such as alcohol or water, which could induce a

Figure 15.20 Bindler CoolCore™ process (Source: Bühler).

quick separation of the plunger. The release agent tended to spoil the surface of the chocolate and the system was never sold commercially.

Aasted's Eriksen dragee moulding plant (Chapter 14) is the oldest commercial application of cold forming, dating back at least to the 1940s. Tempered chocolate is passed between chilled steel rolls with surface indentations designed to produce the desired shape. The chocolate emerges as a plastic sheet of dragee centres held together in a web and passes through a conventional cooling tunnel until set. The sheet is broken and tumbled to separate the dragee centres from the web and to smooth their surface. The broken pieces of web are returned to the start of the process and the centres sent forward for sugar panning and so on.

Interest in cold forming technologies resurfaced in the late 1980s and a Mars Inc. (1998) patent claims that cooling tunnels can be operated at high speeds and sub-zero temperatures [preferably below –5 °C (23 °F)] and yet produce glossy products with increased bloom resistance. Aasted applied for a patent (Aasted, 1993) with a similar process to that described in the Boyd and Yates work but with much colder forming tools and without the need for release agents. They have subsequently sold machinery based on this technique under the FrozenCone™ trademark. Other companies have similar offerings; Bindler sells equipment under the CoolCore™ name (Figure 15.20) and Knobel have their ColdPress™ system.

15.8.2 Typical cold forming process

Sufficient tempered chocolate to form the shell and to allow for a small excess is deposited into the mould. The excess is required to ensure that the chocolate reaches the top of the mould all the way around (it may preferentially be pushed