handle. Because of the shearing that is exerted on the chocolate during tumbling and the cooling of the centres by the air system, a self-tempering takes place in the pan. Low-fat and soft cocoa butter (e.g. Brazilian) will set somewhat more slowly and will appear gummier in character at the beginning of the process. Harder and higher fat chocolate will set more quickly and harder, which may increase the throughput but make it more difficult to produce a very smooth surface. However, there are no real negatives with either type of chocolate. Butter oil (milk fat) can have a greater impact on the setting of the chocolate than the selection of the type of cocoa butter.

Untempered chocolate has one characteristic which makes it easier to pan than any of the compound coatings: the initial setting temperature of cocoa butter is lower [approx. 25 °C (77 °F)] than the temperature at which it will melt [approx. 30 °C (86 °F)]. This temperature difference will give the operator a wide temperature range to work in, for smoothing and engrossing purposes.

Compound coatings are made with either fractionated or hydrogenated fats. Fractionated fats set very quickly, which results in a fast throughput rate. Hydrogenated fats have a wider range of fractions with different setting temperatures and may include some which are still liquid at room temperatures. Setting times therefore can be long, which may make the coating stay soft for a very long time and also make it difficult to coat the centre evenly. Products made with a soft coating shell should be stored for overnight before polishing is performed. Water-based polishing agents can easily interfere with the soft or oily fraction of hydrogenated fats, forming an emulsion, which prevents the surface from getting hard (a requirement for a good and highly glossy polish). With the correct information it is possible to produce a coating that is tailored to the centre and process. This makes the production procedure much more robust and is a step towards the removal of art in panning.

16.3.4 Chocolate and compound engrossing

This section explains the actual chocolate coating step. If all the preparation and the issues previously discussed have been carried out correctly, the actual chocolate engrossing will be relatively easy.

Since there are three major panning systems (manual pans, belt coaters and jumbo pans) in use within the confectionery industry, the engrossing process will be described in general terms for all systems and the differences indicated where appropriate. No matter how automated the systems have become over the years, the principles of chocolate panning have remained the same.

The engrossing process with chocolate can be broken down into three segments for smooth-surface products and two segments for pearled-surface ones.

1 *Smooth Surface*

- **(a)** Base coating (establish the foundation);
- **(b)** Rapid engrossing (weight gain);
- **(c)** Smoothing.

2 *Pearled Surface*
- **(a)** Base coating (establish the foundation);
- **(b)** Pearling (weight gain).

16.3.4.1 Base coating

The base coating is usually the most important part of the engrossing process. The aim of this part of the process is to build a solid layer of coating and cover natural ridges, for example the edges and tips of almonds. Chocolate temperature for the engrossing process should be 31–35 °C (88–95 °F) for manual pans and 35–40 °C (95–104 °F) for automated pans with spray systems. Compound coatings should be kept 3–6 °C (5–10 °F) higher than for chocolate.

To start the process, a predetermined quantity of the previously pre-treated centres is loaded into the pan. The centres should be free from dust and other debris. Should a variable speed drive be available, the pan should be adjusted to a lower speed setting to minimise flaking of the precoating from the centres. Immediately after starting the pan, the application of chocolate can begin. Cooling of the coating should start immediately the centres have a nice even covering layer. The centres are still relatively cold at this time, so the chocolate will set very quickly. Once the first coating layer has set, this procedure is repeated three to five times. In small manual pans it can be helpful to support the product bed with your hand in the direction of rotation, in order to assist the mixing and tumbling action. Large pans have built in baffles for this purpose. Care should be taken to properly cool and set the product, but not to harden the fresh shell layer in a way such as to make it brittle and thereby cause deshelling.

16.3.4.2 Rapid engrossing

Rapid engrossing is the step in the process where most of the coating weight is applied. The pan can be speeded up to get a faster product flow. A 1.07 m (42 in) pan can be run at approximately 22–25 rpm. The product crest will reach half way up the pan wall (Note: a wet bed will be higher than a dry one). The two-thirds by two-thirds rule should be used to determine the best place for the introduction of chocolate into a manual pan, using a drip feed or spray system. This means the position where the product speed is at its greatest is a point with an elevation two-thirds up the bed and two-thirds into the pan from the front (see Figure 16.2). Other pan systems containing multiple nozzles are aimed two-thirds up on the bed and are equally spaced across the length of the pan.

As already mentioned, the speed of application can now be increased. Chocolate can be applied rapidly with cool air blowing at the same time. The bed temperature will increase quickly due to the added warm masse, the latent heat created by the crystallisation of the fat in the coating and the friction existing in the wet bed. This will be a balancing act; if the air is too cold, very rough and bumpy surfaces will develop, which will slow down the process, and additional