



Figure 14.2 Picture showing turning points on loose mould moulding plant. Reproduced with permission of Carle and Montanari-OPM.

Fixed-mould lines require the same components, generally in the same sequence, as those of the loose mould line. Large capacity lines are usually laid out in a straight line. Smaller or older lines are sometimes also laid out in the form of a square, but normally the return leg will also be above or below the depositor leg.

The necessary components are:

- Mould conditioning.
- Depositing:
 - There can be several depositors according to the number of products made.
- Shelling forming and cooling¹:
 - The cooler can be vertical or horizontal, and continuous or intermittent in operation.
- Centre filling/placing and cooling¹:
 - There may be several depositors, often used simultaneously to produce all the components of an assortment at the same time. Or there may be placing modules if it is a solid centre such as a wafer or a biscuit.
- Backing off¹:
 - Can be flood, deposited or sprayed according to the type of centre.
- Main cooler.
- Demoulding.

¹These sections are not required for the manufacture of solid tablets.

14.2.2.2 Pre-requisites

Other chapters in the book cover temperers and tempering (see Chapter 13), chocolate recipes (see Chapter 20) and the handling of masses before they reach the moulding line (see Chapter 12). It is imperative that the chocolate is well-tempered before reaching the depositors and that its temperature is as high as possible to maximise fluidity. The level of surfactants such as lecithin and PGPR in the chocolate must have been optimised for moulding and the viscosity must not only be suitable for the purpose, but also be consistent. Without these requirements being met, it is impossible to produce consistent glossy items of the correct weight and shape. Such defects will not only result in poor visual appearance and sensory attributes, but may well lead to problems in the wrapping area, where wedge or banana shaped items will slow down or jam wrapping machines, especially at high operating speeds.

14.2.3 Mould conditioning

If tempered chocolate is put into moulds that are not at approximately the same temperature (ideally ± 1 °C; 2 °F) problems will arise:

- If the moulds are too warm, de-tempering can occur resulting in product sticking in the impressions following demoulding, poor gloss and bloom.
- If they are too cold, poor gloss and sticking in the mould can result. The flow of chocolate in the mould can also be affected and can result in markings on the finished product as well as an increased number of air bubbles.

Moulds returning from the main cooler are usually at around 12–15 °C (54–60 °F) and so must be re-heated. If they have just been introduced to the plant, or there has been a long stoppage, they are likely to be at room temperature and will require less heating. The conditioner will take some time to adapt to these changes, and there will usually be a gap in production as a result.

Mould heating may be direct or indirect. Indirect systems use air heated by steam coils or electric heaters which is blown across the mould surface. This has the advantage of giving a precise and even control of mould temperature. However, the disadvantages include higher capital cost and greater space requirement, the need for a longer heating zone (and consequently more moulds in the circuit) and a higher energy requirement. The air is diverted during stoppage periods to prevent overheating.

Direct systems use a radiant heat source, usually an electric heater mounted above the moulds and shining down onto their top surface. Advantages include energy efficiency (as it only acts on the mould surface), simplicity and a shorter conditioning time, which in turn leads to fewer moulds in the circuit. Disadvantages are that the temperature is never completely even and it is difficult to get heat into the bottom of a deep mould cavity. The reflectors are normally moved through 180° during a stoppage to reflect the heat away from the moulds.

An optical pyrometer, infra-red (IR) thermometer or a conventional one with a contact probe can be used to check that the temperature is even across