consequently the recommendation is that the moulds be conditioned under controlled environmental conditions (i.e. as low as practically possible RH).

14.2.12.7 Mould material

The properties of the mould surface have a significant influence on how the chocolate solidifies and how it separates from the mould during demoulding (Keijbets *et al.*, 2009). The surface energy of the material, determined using a classic contact angle approach, has an effect on the adhesion of the chocolate to the mould. Materials with low surface energy (<30 mN m^{-1}) such as polycarbonate, teflon or stainless steel have been proven to provide the cleanest demoulding and are the best materials available nowadays for chocolate mould fabrication.

14.2.13 In-line storage systems

Unless there is a considerable excess of wrapping capacity over moulding output, a flexible store or buffer can be used to avoid costly and potentially damaging traying-off of excess product during wrapping machine stops and then having to hand feed them again. These were traditionally paternoster type with product being pushed onto trays that move up and down a series of stacks until reaching the exit, but other formats are now available. A bypass is normally provided for use when the wrapping machines can handle the full line output.

Such systems (e.g. Figure 14.11) can also be used to allow a moulding line to run more shifts than the wrapping line but, however they are used, there is a possibility of the store hiding inefficiencies in the moulding line performance that line personnel must be aware of.

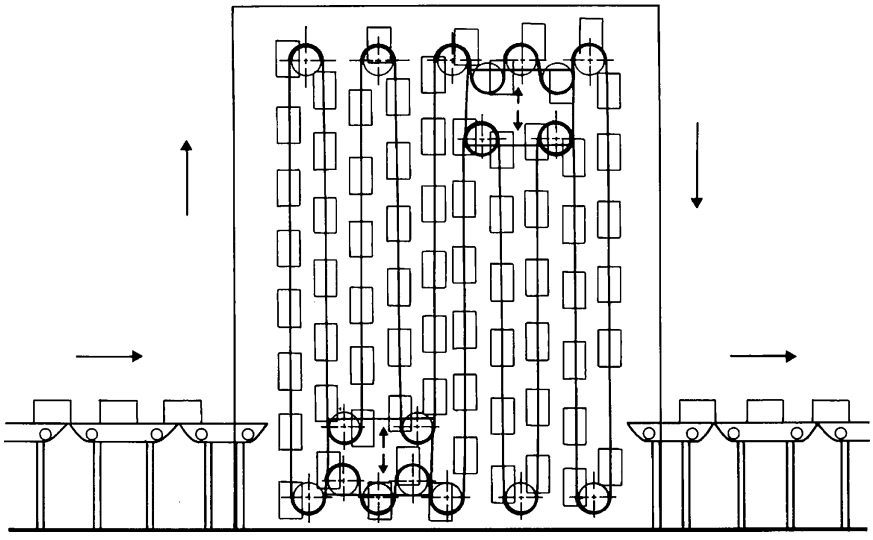

Figure 14.11 Schematic diagram of a flexible storage system.

14.2.14 Keeping moulds clean and changeovers

It is far more efficient to keep the moulds clean, rather than resort to scrapers or rollers to clean them up. Factors such as correct depositor timing to avoid depositing outside the impressions, making full use of any suck-back fitted to the depositor and avoiding drips from the depositor by good maintenance and using the correct nozzle diameter (the wider the nozzle is the more likely it is to drip) can all help.

If dirtying of the moulds cannot be avoided, then a suitable combination of licking rollers (Figure 14.12), surface scrapers and edge scrapers can help avoid build-ups that shorten runs and cause contamination.

Changeovers will always be a part of running many lines, so it is essential that their efficiency is improved as well as minimising their number. It is imperative that each line has its own Standard Operating Practice written and available locally. Analysis of downtime for changeover, against stock levels from longer runs, should be carried out to ensure that the most cost effective options are chosen. "Single Minute Exchange of Dies" is a useful tool: its aim being to systematically reduce the time lost in production for machine changeovers and set-ups.

14.2.15 Other methods for shelling forming

The traditional method of shell moulding was described in Section 14.2.7. Several other methods are available however.

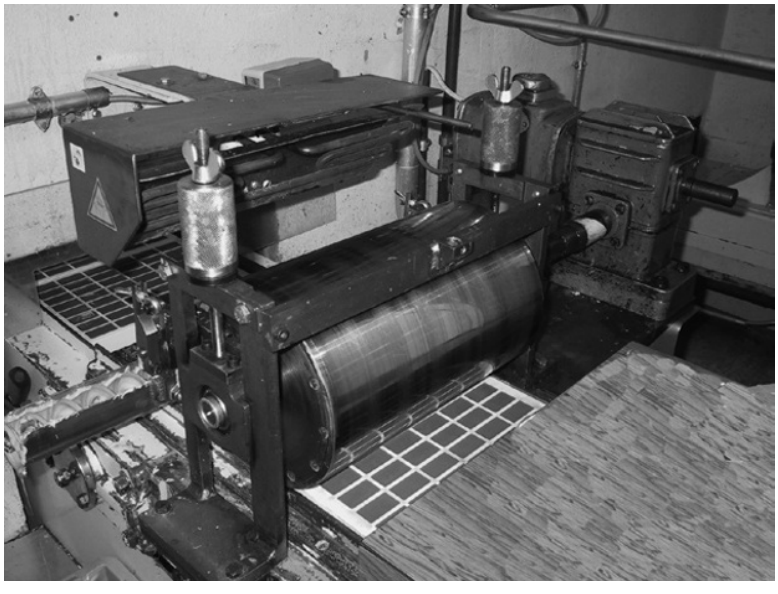

Figure 14.12 Licking roller.