Moulds and Moulding: Examples and Techniques

My personal interest in automatic chocolate moulding plants began in 1975 when my father returned from a tour of European chocolate factories and described automatic "three-stage" shell moulding lines that he had seen in operation. I began designing and building chocolate moulding plants in 1981. Utilizing special machine designs, Whetstone Candy Company has had the opportunity to co-manufacture a wide range of moulded chocolate articles for many companies. This paper is limited to those moulding processes for which I have direct experience.

Moulding is a sequence of process steps

Chocolate moulding should be thought of as a modular process. Thinking in this way has allowed us to build specialized machines and to arrange unusual process sequences to produce many new, different and difficult products. Consider the steps required to mould a solid chocolate bar:

- mould heating
- depositing
- vibrating
- cooling
- demoulding

In order to mould a layered chocolate bar, an additional depositing, vibrating, and cooling step must be added between the cooling and demoulding steps shown above.

Shell moulding, which is the most complex of all chocolate moulding, utilizes three depositing steps, three vibrating steps and three cooling steps. Each of the depositors in a shell line may be different in design. For example, the first depositor may be designed for chocolate. The second depositor may be designed for caramel or sugar fondant. The third depositor may not be a depositor in the traditional sense, but a flood station designed for backing off the filled shell.

Cooling stages vary by the amount of residence time, the temperature of the air, and the intensity of the air movement. Selecting the proper amount depends on the requirements of the product. As we consider specific products, we will highlight and amplify process steps that are particularly critical to that product.

Before moving to specific types of moulded products and applications, we should first consider the characteristics of chocolate that is used in moulding.

Key characteristics of moulding chocolate

Clearly the most important factor in moulding chocolate is good temper quality. Without good temper, proper contraction and release from the mould becomes a problem. Viscosity is a relatively minor issue, since it is product dependent. Low fat and heat resistant chocolates can have extremely dough-like or plastic qualities but if the proper vibration and depositing techniques are utilized, then even high viscosity is not a problem.

The total fat content of moulded chocolate may range from 28–32 percent, while the fat content of one-shot chocolate may be closer to 30–32 percent. The viscosity for thin, hollow-moulded products should be 35–65 M acM ichael, and 50–110 M acM ichael for heavy, hollow-moulded products. Solid moulded products may be as high as 160–200 M acM ichael.

Yield value (YV) is the amount of energy required to start the mass moving. The amount of vibrating is affected by the YV of the chocolate. Plastic viscosity (PV) is the amount of energy required to keep it moving.

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