

Conclusions

Pumps and pipelines are among the least glamorous parts of chocolate manufacture. They are however extremely important and need to be chosen and designed correctly. If done well they can run without trouble for many years. An incorrect decision can result in large losses of production and even product recalls.

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CHAPTER 13

Tempering

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13.1 Introduction

Chocolate tempering is a process in which chocolate masse is thermally treated to produce a small fraction of homogeneously dispersed, highly stable fat crystals of the correct type and size. These crystals then seed the masse and grow to form a micro-homogeneous solid fat crystal network during the cooling stage following moulding or coating/enrobing.

The important effects of tempering the liquid chocolate masse are:

- 1 Adjustment of the yield value and viscosity for moulding, coating or enrobing (Chapters 11, 12, 14 and 24);
- 2 Long-term stability of the chocolate flow properties under moulding, coating or enrobing conditions;
and also results in the final solidified product having:
- 3 Good surface gloss and colour;
- 4 Good snap;
- 5 Smooth and fast melting;
- 6 Good heat stability.

When considering the strong impact of tempering on these very important quality characteristics, there is an obvious need to quantitatively understand the effect of the tempering process on: (i) the fat crystal structure, (ii) the chocolate itself and (iii) the relationship between the two. The temper-related properties are determined by the fat micro-structure, which can be tailored by the tempering process.

From a fundamental research point of view, it is important to understand and characterise both the process–structure and the structure–property relationships.

Major *processing aspects* that have to be considered are:

- 1 The fat/chocolate masse pre-heating;
- 2 The thermal and mechanical (flow) history of the chocolate masse in the tempering device;