Melting

When chocolate is delivered to the factory it can arrive in one of three forms: As block chocolate, as chocolate buttons or as liquid chocolate. In the case of the first two the chocolate has to be melted to make it workable. Ideally chocolate should be melted over a period of time to make sure the chains of stable crystals (the bits that make it rigid) are completely broken down. The best way to do this is in a water jacketed, or electrically heated melting tank. Preferably the tank should be equipped with a stirrer, as unstirred melted chocolate tends to 'separate', with the cocoa butter rising to the top and the cocoa solids falling to the bottom. To find out the optimum temperature for melting your chocolate it is best to refer to the manufacturer. However the rough rule of thumb is:

Plain Chocolate	45-50C
Milk Chocolate	40-45C
White Chocolate	40C

Tempering

The best way to describe tempering is by using the analogy of water, snow and ice. Water cannot be moulded. But once the crystal structure of water is changed, and it becomes snow it can be made to stand up. However if the crystals in the snow continue to grow and solidify, mostly because of a change of temperature you end up with ice. Tempering is simply a way of changing the crystal structure of chocolate so that it can be 'made to stand up'! Liquid chocolate (water) is tempered by lowering its temperature over a relatively short

period of time (10 to 60 minutes, depending on the quantity) to its tempering temperature, and then raising it again (also quite quickly) to its working temperature. If this is done over the right period of time and to the correct temperatures you end up with tempered chocolate (snow). If the tempered chocolate (snow) is allowed to cool you end up with set chocolate (ice). Moving from 'snow' to 'ice' is desirable if you are covering a center with chocolate or trying to make a hollow figure, but when tempered chocolate is in a machine such as an enrober is it important the chocolate is kept at an optimum working temperature to prevent it setting. Always speak to your chocolate supplier for recommended temperatures. However rough guides to tempering and working temperatures are given below:

	Tempering temperature	Working Temperature
Plain Chocolate	28-29C	31-32C
Milk Chocolate	27-28C	30-31C
White Chocolate	24-25C	27-28C

Tempering can be done manually, or in a machine, and there are three main types of machine tempering, categorised as 'In-machine Tempering', 'Automatic Batch Tempering' and 'Continuous Self-Tempering'.

In-machine Tempering

Small moulding machines have built-in wheels and agitators. Chocolate can either be supplied to them directly from an automatic batch temperer, or it can be tempered in the machine. Ideally the machine should be two-thirds full of solid chocolate and left to melt at the melting temperature of the

chocolate being used, overnight. Once melted, turn the thermostat down to the working temperature and turn on the agitator. Add solid flakes or buttons to the mass until the tempering temperature is reached.

Automatic Batch Tempering

An automatic batch-tempering machine is one that is plumbed in, in order to incorporate a jacket of cooling water. These are available in a range of sizes. The operating principle is the same for all automatic batch temperers, although the larger ones can be set by computer controlled timing and temperature devices so that no operator is needed once the machine is filled. The machine is filled with solid chocolate and set at the melting temperature on the thermostat by the operator or pre-programmed. Once melting temperature is reached throughout the mass, the automatic tempering button is pressed and the thermostat lowered to the tempering temperature. The machine stirs the chocolate, accurately cools it and brings it back up to tempering temperature with 20 to 40 minutes, depending on the batch size. The machine keeps the mixture tempered through the working period, stirring it continuously until it is ready for melting again.

Continuous Self-Tempering

A continuous self-temperer will supply a a pre-set amount of ready-to-use tempered chocolate in a continuous stream. Quite literally the solid chocolate (broken blocks, beans or melted) can be poured into the machine and it will instantly supply tempered chocolate to a moulding, depositing or enrobing machine for production. In other words,

the machine tempers chocolate itself - continuously.

Moulding

Moulding is simply pouring tempered chocolate into moulds to create shapes. This can be done by hand in a Bain Marie, semi-automatically in a small moulding machine (as shown in picture, left), or fully automatically in a moulding line. A wide variety of products are moulded: chocolate bars, cups and the vast majority of pralines or chocolates that you see for sale in selection boxes. The classic Belgian 'Fruit de Mer' is a moulded product. To make a bar, tempered chocolate is poured into a suitable mould, excess chocolate is scraped away and the chocolate let to set. After approximately 20 minutes the bar can be 'de-moulded' by tapping the mould gently until the bar of chocolate falls out.

Filling a suitable mould with tempered chocolate makes praline or chocolates. The mould is then turned upside down and scraped, leaving just a 'shell' of chocolate in each of the cavities on the mould. A centre such as fondant, truffle or ganache is piped or deposited into the mould, and then a final layer of chocolate is added to 'close' each chocolate. After a suitable cooling period the finished chocolates can be demoulded. Hollow figures and chocolate cups are made in the same way as pralines or chocolates, except that they are not filled with a centre or closed.

Depositing

Depositing is the automatic way of either filling moulds with chocolate or centres, or of forming centres prior to enrobing. A wide range of depositors are available, each being suitable for a different range of applications. Some depositors are ideal for depositing highly whipped centres, or those with inclusions (such as nuts). Generally speaking these machines have pistons. For depositing chocolate and centres with a viscosity similar to that of chocolate pistonless depositors are ideal. Pistonless depositors are highly accurate and can deposit over a large weight range, from less than 0.5 gm up to 10's of kilos per deposit. If simple shapes such as truffle spheres, where the viscosity of the centre and the chocolate is similar one- shot depositors can deposit both the chocolate and the centre at the same time, speeding up production rates.

Enrobing

Enrobing is the process of covering a centre with chocolate. Enrobing the mallow and caramel centre with chocolate makes world famous products such as Marsï¿½ bars. A moving wire mesh belt passes through a reservoir of chocolate whilst at the same time a curtain of chocolate falls down onto the belt. Any centre on the belt gets completely covered in chocolate - including the bottom. The range of enrobed products includes biscuits, fruit, nuts, fondant, fudge, toffee, coconut ice and much more. Apart from chocolate it is also possible to enrobe with fondant, which works particularly well on doughnuts.

Cooling

Cooling falls into two main categories: for moulded product and for enrobed product. Moulds generally speaking require 20-30 minutes of cooling time to ensure the product is sufficiently set for de-moulding. It is essential to ensure that cool air flows all around the mould, and for this reason moulds are usually cooled in a tunnel in such a way that all sides (including the bottom) are exposed to the cool air. With enrobed product a solid belt made either of perlon or silicon is used. The belt passes through a tunnel where cold air is circulated. Most enrobed products take between 7 and 10 minutes to cool sufficiently to be handled.

Spinning

Spinning is the method by which Easter eggs and other hollow items are made. A pre-determined amount of chocolate is placed in one half of a special two part spinning mould. The two halves of the mould are held together either by embedded magnets or clips. Once the two halves of the mould are securely fixed together the complete mould is placed on a spinning machine. Usually the mould will have a metal 'foot' which fixes onto a magnet on the spinner. The moulds are rotated on the spinner until a consistent shell thickness is achieved, and then cooled for approximately 20 minutes.

Fudge & Toffee

Fudge and toffee are made by heating butter and sugar plus a mixture of other ingredients such as cream, evaporated milk and glucose to relatively high temperatures. Depending on the product you wish to make, how the mixture is heated and the order in which ingredients are added is vital.

Moulds & Equipment

Once you have decided what type of product you are going to make - be it spun, moulded or enrobed - apart from the machinery, you will need moulds and ancillary equipment.