Dosing and Mixing Principles

Key Operating Results

1. Mixing fat
2. Chocolate temperature

Key Operating Conditions

1. Sugar particle size
2. Liquor fat content
3. Milk powder fat content and type

Dosing

The dosing system delivers the raw ingredients to the mixer in a precise way. Each recipe will have a **target mixing fat**. The milk powder fat content and type will affect the mixing fat needed. The goal is to have a chocolate mixture in the mixer with the correct mixing fat, which will allow for correct roll refining processes.

Accurate dosing is critical! Incorrect dosing will cause poor chocolate plasticity coming off the 2-roll refiner, and incorrect fineness coming off the 5-Roll refiner.

Mixing

The purpose of the mixer is to:

- Uniformly combine the raw ingredients via mixing.
- Coat the dry raw ingredients with fat via mixing.
- Adjust the chocolate temperature to 40°C (104°F) via heating.

The chocolate mixing fat is set to provide enough liquid fat to properly coat all the dry raw ingredient particles. Natural variation in sugar particle size & liquor fat content may require changes in fat added to the mixer to ensure all dry ingredients are coated.

The chocolate temperature must be 38-40 °C (100-104 °F). For cocoa butter-based chocolates, if the temperature is lower than 38 °C (100 °F) the fat could solidify and no longer function as a proper coating of the dry ingredients. This will cause problems as the chocolate is roll refined.

Tempering and Moulding Process Flow

1. After the chocolate product has completed the refining process, it is stored in moulding storage tanks.
2. From the moulding storage tank, it is pumped into an intermediate holding tank called a pre-temper tank.
3. From the pre-temper tank, it is pumped through a tempering unit to start the tempering (crystallization) process.
4. The tempered product is then sent to the depositor, where it is moulded into the correct product shape (e.g., drops, chunks or bars) onto a steel belt or into a mould.
5. It is then allowed to cool in the cooling tunnel for a set amount of time, before being sent to final packaging.
6. Any product that is not sent to the depositor continues to a decrystallizer to melt the crystals down and then flows back to the pre-temper tank for reuse.

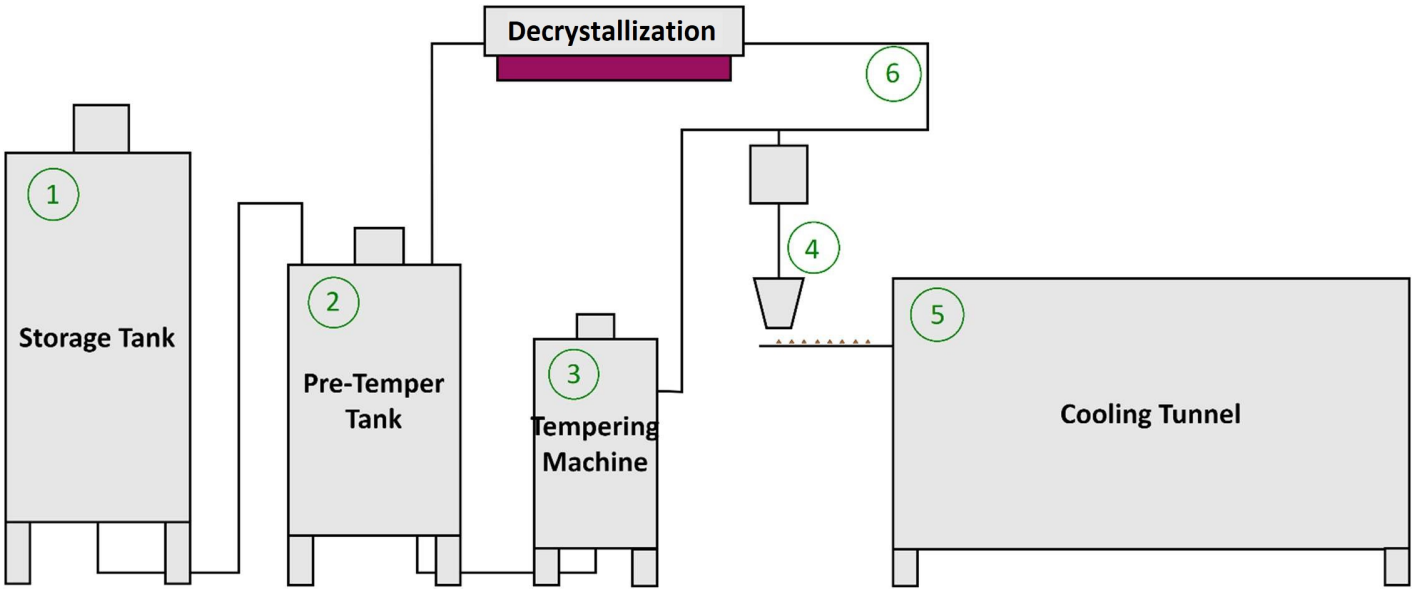

Figure 1. A diagram of the tempering and moulding process flow.

Moulding Lines

A moulding line is a grouping of all the parts of the tempering and moulding process: storage tank, pre-temper tank, tempering machine, depositor, decrystallizer, and cooling tunnel. Each facility has several moulding lines, and each line typically specializes in certain types of moulding. You will learn to operate each of these lines.

Feed Pump Speed

The feed pump sends the tempered chocolate from the tempering unit to the depositor. The pump speed should be fast enough to make sure that the hopper of the depositor stays full, with a minimum amount of chocolate being sent to the decrystallization unit.

Equipment

Operators are the first line of defense in maintaining equipment! Observations made while operating equipment during a normal shift can help determine operational issues before they become major problems or cause catastrophic failures.

Pumps

In the chocolate and compound-making processes, moving product is essential. Moving products through a plant can be compared to the digestive and circulatory systems of our body. To achieve the end goal, we have to move solids, liquids, and gases using various pumps.

Moving low moisture solids is accomplished by conveyors, blowers, rotary air locks, and other equipment. **Moving slurries and liquids** is accomplished by using various pumps and piping.

Sometimes gravity can be used to move fluids, but most of the time pumps are needed to move liquid where it needs to go. The majority of the pumps used in chocolate manufacturing are positive displacement (PD) pumps, but centrifugal pumps are also used.

Dynamic pumps, such as centrifugal pumps move product mechanically, using a propeller or impeller. **Positive displacement pumps** can also be driven mechanically, or move product using air or water pressure.

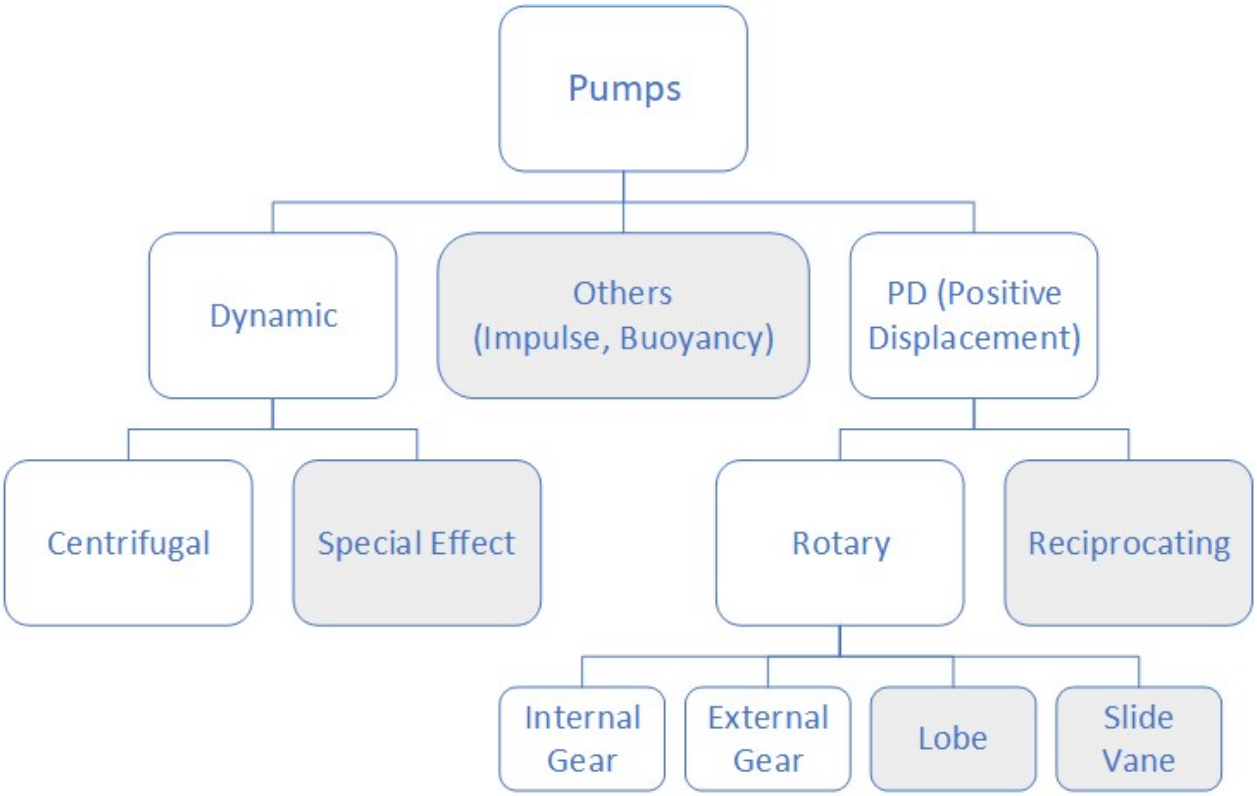

Figure 26. A diagram of pump categories and subcategories. Pumps that are grayed out are not discussed in this document.