Vertical Crystalliser

- Small Footprint and Civils
- Efficient Heat Transfer
- No Mass Secuie Channeling or Short-Circuits
- Excellent Purity Drop
- Wide Choice of Drives
- Low Maintenance
- Clean, Hygienic and Fully Drainable
The Role of “C” Crystallisers

The objective of cooling and then reheating “C” massecuites is to maximise the amount of sucrose that is recovered out of the massecuite and deposited onto the existing crystals. The principles for maximising “C” massecuite exhaustion are fairly simple:

Massecuite will normally be discharged from the pan at between 67°C and 77°C, depending on the pan boiling pressure.

The solubility of sucrose in water reduces rapidly on cooling. For example, at 80°C, 1 kg of water can dissolve 3.70 kg of sucrose, but at 40°C only 2.33 kg of sucrose. However, crystallisation rates in low purity ‘C’ massecuites are slow. The massecuite should therefore be cooled slowly and steadily in water-cooled stirred crystallisers over a period of 20 to 40 hours, down to a temperature of about 40°C to 43°C. At temperatures below this, crystallisation is slowed excessively by the high viscosity.

Because the thermal conductivity of massecuite is low, the cooling element surfaces need to be significantly colder than the massecuite. However, if the cooling surfaces are dramatically cooler than the massecuite, hard deposits may develop on the surfaces and impede further cooling. To avoid this, water-massecuite temperature differentials should be limited to not more than 15 - 20°C. This usually requires that the cooling water flow is counter-current to the massecuite flow.

The Bosch Projects Continuous Vertical Crystalliser (CVC)

The Bosch Projects CVC comprises a floor-mounted cylindrical shell, through which a number of water cooled elements are installed. Both the shell and the cooling elements are of mild steel construction. If more than one unit is used, they may be connected in series or in parallel.

The cooling elements are static units constructed of multi-pass pipes, with the bends situated either internally or externally to the vessel (depending on Client’s preference). These elements are designed to provide a high overall heating surface/volume ratio for the crystalliser. The water flow rate of between 1.5 and 2.0 m/s ensures good heat transfer rates into the water.

Efficient heat transfer out of the massecuite depends upon good shear rates in the massecuite in the vicinity of the cooling surfaces. This is provided by a rotating stirrer, comprising a central shaft with radial paddle arms sweeping close to the cooling elements. This rotor is top-supported from a bearing mounted above the massecuite surface. The bottom end of the shaft is located by a simple bushed bearing.

The rotor is driven by a variable speed motor operating through a high-reduction planetary gear train.

The configuration of the elements and relatively high stirring rates ensures that massecuite cannot bypass the cooling elements, whether the massecuite flow is upward or downward.