BMA - Oscillating vertical cooling crystallisers (OVC) in cane sugar factories: Return on investment after just one year

PRODUCT FEATURE

In order to achieve optimum crystal yields, sugar factories have to use cooling crystallisers for low-grade massecuite. However a number of basic conditions have to be fulfilled for excellent crystallisation results and, therefore, a high crystal content in the massecuite.

Functionality of cooling crystallisers must be such that they will provide for constant crystallisation throughout a campaign, with no incrustations occurring on heat exchange surfaces. Another requirement is that the temperature difference between the massecuite and the cooling medium must be constant at any time and any point, in order to achieve uniform supersaturation, which will prevent the formation of fine crystals. Constant massecuite flow velocities across the entire crystalliser cross section are another important criterion. The retention time, too, should be constant.

BMA's oscillating vertical cooling crystalliser (OVC) complies with these requirements.

Figure 1. Schematic view of an oscillating vertical cooling crystalliser (OVC)

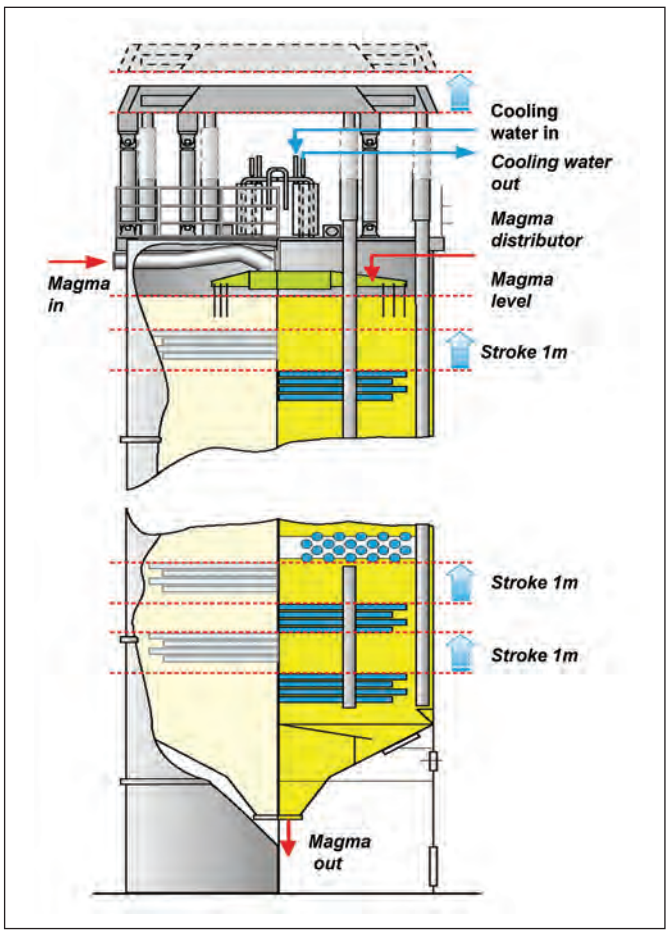

Figure 2. OVC at Puga factory, Mexico

The centre piece of the system are the cooling elements, which are steadily lifted and lowered by a hydraulic unit. Because of the staggered arrangement of the cooling tubes, the massecuite permanently passes around them. One effect of this relative motion between massecuite and cooling tubes is an improved heat transfer, while ensuring that the cooling tubes are "cleaned" at the same time. A specially designed distribution system uniformly distributes the massecuite across the entire cross section of the OVC. This top-end distributor, together with a deflector upstream of the massecuite outlet, provides for a narrow massecuite retention time distribution.

The cooling water flows countercurrent to the massecuite through the cooling elements. Care must be taken to ensure that the gradient between the cooling water inlet temperature and the massecuite outlet temperature does not exceed 12 Kelvin. To uniformly maintain this temperature difference throughout the entire OVC, the cooling water flow rate has to be adjusted at a specific ratio with the massecuite flow rate. Only

Figure 3. BMA molasses-magma mingler (MMM)

Figure 4. BMA massecuite pump

with a constant temperature difference can supersaturation be assumed to be constant, so that the rate at which the crystals form will also be constant. At higher temperature differences, excessive supersaturation will result in formation of fine crystals. The consequence from the production of new small crystals is that they will pass through the centrifugal screen in the centrifugation process and get into the molasses resulting in reducing crystal yield, and increasing molasses purity.

The massecuite outlet temperatures attained with the OVC can be down to 40°C. At temperatures around this value, the viscosities are so high that considerable pressure losses may occur in the pipelines that take the massecuite to the centrifugals. Furthermore it is not possible to uniformly distribute the massecuite in the centrifugal. By means of a molasses-magma mingler (MMM), heated molasses is added to the high-viscosity massecuite. To maintain a constant viscosity in the massecuite, the current input of the MMM motor can be used as a reference value for the molasses flow rate. With a uniform massecuite viscosity, centrifugation can be optimised. Because of the MMM, the large tank volumes that were previously required to reduce the viscosity by raising the temperature are no longer needed. This is possible thanks to a powerful drive and the sturdy stirrer in the MMM. The addition of heated and almost saturated molasses prevents the crystals from becoming dissolved or even partly dissolved.

The sturdy, slowly rotating BMA massecuite pumps lend themselves perfectly to conveying massecuite to the OVC's magma distributor and afterwards to the centrifugals. Different types of pumps are available to meet specific needs.

At the beginning of January 2012, BMA's OVC was put into service in Puga, Mexico. The C massecuite, which has a temperature of approx. 65°C, is cooled in the OVC to a uniform 40°C. Since the molasses purity could be reduced by approx. 5% in comparison with the previous campaign, the investment costs can be said to have almost paid for themselves after just one campaign. The campaign lasted for about 150 days. With longer campaigns it will therefore be possible to more than redeem the invested capital in the course of one year.

With OVC units that have been designed, fabricated, installed and commissioned for sugar factories throughout the world in the past 25 years, BMA has acquired the experience that is necessary to present its customers optimum cooling crystallisation solutions for C massecuite. It goes without saying that the necessary engineering services are included.

For further information please contact:

BMA
Tel: +49 531 8040
Email: sales@bma-de.com

www.bma-worldwide.com