

Tuning your process

Application description for the cooling of special salts



Selecting a system with optimum process technology is of utmost importance for highest plant productivity. The following description of a practical solution for the efficient cooling of salt will give you an outline of the development from a concept to its successful implementation.

Existing procedure so far

Highly corrosive special salts for the use in chemical processes are produced in vacuum dryers at temperatures of more than 130 °C. Prior to filling them into the various sales packages these hygroscopic salts have to be cooled down significantly, as otherwise the foil-coated packages might be damaged.

So far the whole process had been carried out in one unit with cycle times of more than 8 hours. To increase productivity the process should now be shortened using the existing machines, without adversely affecting the structure and particle size distribution of the salt crystals.

Analysis

Dividing the structure of the production process into single sequences offered the possibility to separate the production steps vacuum drying and cooling. The cooling process was reviewed in detail using the existing vacuum devices. Based on the knowledge of the MTI process engineers it was possible to make sufficiently reliable assumptions for a first feasibility study and investment

analysis and put them in relation to the product prices – showing an enormous potential for savings and an extremely short return on investment.

The lack of specific raw material characteristics, in particular thermotechnical data, required an empirical determination of these values in the R&D Center of MTI to enable us to make accurate calculations.



Test facility in the R&D Center of MTI, Detmold

Test

A high-performance horizontal cooling mixer, type K 1600, equipped with all options and systems to obtain and record mixer and process parameters, was available and used for the trials. At first the heating process was simulated in two test runs in the R&D Center so that after this the cooling data could be determined precisely. As a result it was possible to calculate the specific heat transfer value and a material factor for the system used. Beside the product properties such as particle size and specific heat capacity this factor also includes all mixer parameters : input of kinetic energy via mixing tool speed and geometry, contact pressure of the raw material particles to the cooled surface, flow conditions in the double jacket etc.

Putting into practice

Designing the customer's plant it was necessary to also consider all other process parameters and installation conditions besides the requested increase in capacity. The long filling and discharging times of the cooling mixer due to limited installation space in the existing buildings as well as the batch sizes and the cycle times of the vacuum dryers had to be considered for our calculations. As a solution MTI finally decided to use a horizontal cooling mixer, perfectly designed for all requirements of cooling special salts and commissioned on schedule after a project lead time of less than one year. The mixer layout takes into account all energy saving potentials possible as well as the latest safety technology and is equipped with components made of acid-proof material and a drive concept adapted to the high bulk density of the raw material.



Inside view of the cooling mixer

Compared to the original operational data the total process cycle could be reduced to only 6 hours. The cooling capacity resp. the output of salt could even be improved by a further 25 % today, thus providing our customer with a crucial advantage in a field of strong competition.