

Basic engineering for sugar refineries



Raw sugar – a sugar refinery's feed material

One particular event has had a marked effect on the international sugar market in recent years: the reform of the EU sugar regime. This new regime will reduce sugar production in the EU member states and it will facilitate sugar imports into these countries. As a consequence, there will be a shortage of sugar in the international market, which will particularly affect regions bordering the EU. In an attempt to re-orient their sugar markets, these countries are trying to either expand their sugar factory capacities or build new factories. For countries lacking the required sugar cane or sugar beet cultivation areas that would allow them to compensate the local short supply of sugar, the solution will lie in the erection of additional sugar refineries.

Against this background, BMA received two engineering orders for new sugar refineries with capacities of 2,000 t/d and 3,000 t/d raw sugar, respectively, in the course of the year 2006.

The basic engineering services commissioned have included defining the operating conditions for the different items of equipment and preparing equipment specifications. This phase of engineering work typically comprises the following documents, which already provide an accurate idea of the future sugar refinery:

- The mass balance illustrates the main process steps in the form of a block diagram; it also includes the crystallization scheme. The differ-

ent stages of the process are represented by blocks, giving details such as media quantities and qualities.

- The heat balance, again a block diagram, uses graphic symbols to illustrate the generation, distribution and conversion of electric power, steam, and condensate. Details such as quantities, temperatures, and pressures are also shown.
- The PFD (process flow diagram) uses graphic symbols for all items of equipment in the different factory sections and shows the complete connecting pipework for product, steam, water, and process materials. An extended process flow diagram includes the main control circuits with their measuring and control equipment.
- All items of equipment in the PFD are compiled into an equipment list, showing item numbers, dimensions, and essential technical specifications.
- Separately compiled equipment specifications can be used as a basis when sending out enquiries for the required equipment.
- Depending on the commission, budget prices can be quoted for the equipment specified, and the required capital expenditure for buildings, foundations, access routes, pipelines, and electrical installations can be estimated on the basis of specific costs.

- Basic measuring and control equipment engineering comprises specifications for essential measuring and control field units, as listed in the extended PFD.
- Basic electrical engineering comprises the preparation of a motor list, with power supply specifications.
- In defining points of connection, the relevant process parameters (quantity and quality) are specified for basic-engineering terminal points.
- The draft layout shows the different buildings and facilities on the refinery premises.
- The preliminary arrangement plan defines the position of main items of equipment for the refinery process inside the building.
- A brief description of the process gives a general idea of the different process steps.
- A preliminary Gantt chart illustrates the project schedule with the start of basic engineering work and the finish date when the plant is commissioned.

The basic engineering work performed by BMA for the two sugar refineries was accompanied by regular meetings, both in the customer's offices and in BMA's offices in Braunschweig, to coordinate details with the customer's conditions on site. Starting from interim results, the customer could thus proceed with his own planning work at an early stage. This concerned above all a more exact definition of requirements to be made on the future sugar refinery site, with the necessary logistics for the supply of raw sugar, water, fuel, and electric power to the refinery, and finished-product and by-product hauling from the refinery.

For both sugar refineries, BMA planned the complete main-process sections for sugar refining: raw-sugar receiving, transporting and storing; raw-sugar affination and melting; liquor clarification (carbonation); liquor decolouration (in ion exchangers); liquor concentration; refined-sugar crystallization and centrifugation; recovery-sugar crystallization and centrifugation; refined-sugar drying and cooling; condensation.

For parts of the main process and the refinery periphery not completely covered by BMA, our basic engineering programme includes the planning services of renowned experts, who are responsible especially for process selection and

equipment specifications. BMA can thus offer a convincing one-stop process-engineering concept, primarily for the elements silo and packaging systems for refined sugar; water treatment, including sea-water desalination; steam generation in the boiler house; electric-power generation; wastewater treatment; liquor clarification with filtration; and liquor decolouration.

The basic engineering phase for the two refinery projects has in the meantime been completed. On this basis, one of the two projects will be implemented, for which BMA will also provide detail engineering services.

Dr. Andreas Lehnberger

Benefits

- Plant design in compliance with European rules and regulations guarantees clearly structured and complete planning work
- Basic-engineering concepts give a reliable idea of the new plant, respecting space requirements, consumption figures and investment cost
- Tried-and-trusted concepts ensure full operability of the plant from day one
- Individual planning, optimized to include modern technology, provides for tailor-made solutions
- Regular project meetings ensure that planning requirements and general project conditions are coordinated at an early stage