Maximising sugar beet processing

When British Sugar decided to upgrade and expand its facility at Allscott, it required a process control specialist who could offer proven project management along with knowledge of disparate control systems

British Sugar, part of Associated British Foods, provides sugar for the top brand names in sugar confectionery, chocolate confectionery, soft drinks and preserves etc. The company has six factories in the UK, with each one split between a "beet end" and a "sugar end". Typically, a factory processes "beet" between September and March, termed the "Campaign". The "beet end" employs various processes to create "thick juice", a liquid which has a 65% sugar content. The "sugar end" boils the "thick juice" and seeds it with tiny sugar crystals, providing the nucleus for larger crystals to form and grow to create sugar.

Process challenges

The business of processing beet gives rise to several challenges which directly affect process efficiency, sugar yields from the beet, and ultimately factory profitability.

British Sugar has to carefully manage relationships with beet growers so that the sugar content in the beet is at the highest percentage at the time of harvest. Also, the process plant needs to be thoroughly tested and operational in time for commencement of the campaign and factory managers must quantify and schedule the amount of beet which can be received at the factory to match process plant capacities, knowing that once the beet is harvested, its sugar content reduces over time.

Outside of the "campaign" a factory undergoes a maintenance programme. If a factory can store the "thick juice" the "sugar end" processes can continue to produce sugar long after beet harvesting has finished. This enables the factory to utilise its sugar end equipment, and maximise Return on Capital Employed.

As part of a business development programme to maximise economies of scale and usage of process plant across each sugar factory, the factory at Allscott, Shropshire was identified for expansion. The planned expansion would approximately double capacity to 850,000 tonnes of sugar beet every year and extend the production cycle of the "sugar end" processes beyond the end of the campaign. This target was met by enhancing 50% of the factory (beet end) over a two-year time frame.

This expansion involved the construction of two "thick juice" storage tanks, with a combined storage capacity of 86,000 tonnes, and associated process control. The scheme also involved the implementation of replacement process control schemes for another six sub processes, (see Figure 1).

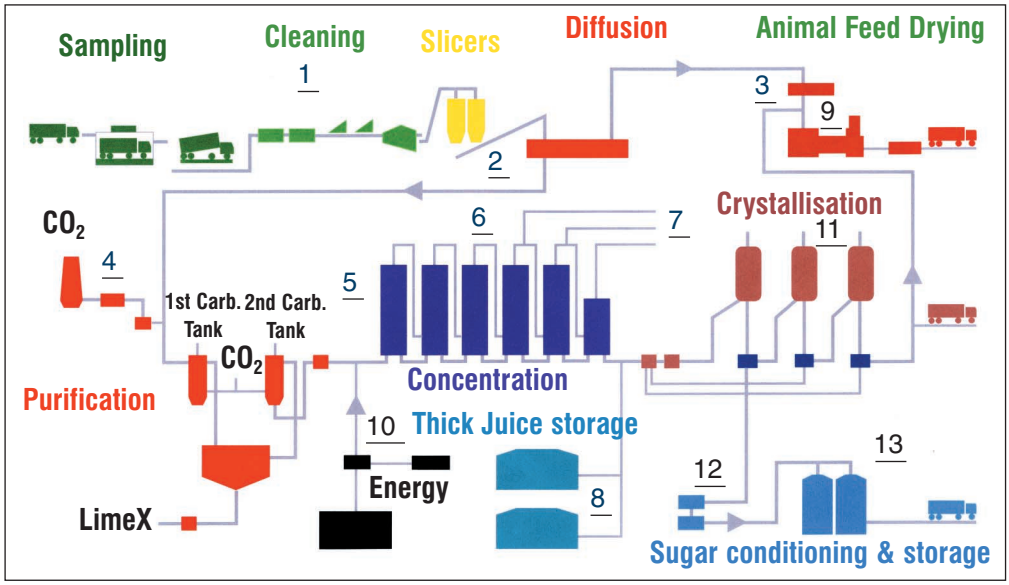

Figure.1: The expansion at British Sugar's Allscott plant involved the enhancement of the beet end processes (1-8) and the implementation of replacement process control schemes for six sub processes. (9-13 previous upgrades)

When selecting the process control specialist, emphasis was placed on proven project management and in-depth knowledge of disparate control systems, in this case Rockwell Allen Bradley for sequence control, and Eurotherm for complex continuous control.

The process control aspects required the re-configuration of redundant control equipment coupled with the integration of new control equipment. Process control programming software was used to configure nine control panels located around the site, communicating over a fibre optic network to supervisor workstations. The nine control panels contain numerous distributed processors.

To complement the changes carried out at the factory floor level, the site's supervisory systems were upgraded. Servers were enhanced and workstations added to provide operators with high visibility for control of the processes. By factory start-up, over 70 graphic pages and windows had been created or modified, and in excess of a 1000 tags had been added to the various databases.

British Sugar requires significant amounts of data to be recorded for plant optimisation and product traceability. In this instance, a dedicated, high-availability server was assigned to manage the collection and storage of factory floor data for various Manufacturing Execution System (MES) related tasks. These included: the configuration and presentation of key trend data; the management of the interface between factory data and the company's Wide Area Network (WAN); the conversion and archive of data onto the company's Oracle database and the back up of all the control server images and databases.

Any delay in factory startup would directly affect the supply chain, and process failure could result in customer commitments not being met and/or the need for costly alternative strategies.

System solution

British Sugar turned to the independent systems integrator Charter Tech, who offer experience of integrating disparate control systems, and have over ten years experience of providing solutions to British Sugar.

Charter Tech personnel assisted with all stages of the project from initial consultation to final implementation and commissioning. The engineers worked side by side with the British Sugar project team, to ensure the final solution met the business requirements and maximised plant efficiency. Charter Tech's flexible approach allowed British Sugar staff to develop solutions to problems as they occurred.

The British Sugar project engineer said: "I enjoyed the way that the Charter Tech team responded, sometimes at short notice, to problems without fuss, to ensure the job got completed."