Shardlow comes of age

Robert Barksfield, contracts manager for Batching & Blending Systems, says its new process controls system will help achieve operational benefits

In 1993 Hanson's sand and gravel quarry at Shardlow, near Derby, was praised for its innovative design, which included new measures to remove lignite.

The quarry produces sand in two grades and naturally rounded aggregate in various sizes, which is used mainly in the construction trade, with large quantities of the material being supplied to Hanson's Premix plants in the area.

While the plant itself has shown to be more than capable of the task of producing around one million tonnes a year, the old process control system was becoming less able to meet day-to-day requirements. Also it did not provide for the level of reporting and data that Hanson required to help achieve optimum plant performance and monitor output grades.

Regarded as 'state of the art' at that time, the old control system had, in more recent years, begun to display many problems associated with legacy equipment. The original GEM80 PLC system was a design around 27 years old and limited back-up or support was available. Parts supply was either difficult or unavailable with the prospect of long downtimes in the event of system failure.

The system itself was centralised, but lacked any database or data output facilities and wasn't truly integrated with both the Checkmark lorry load-out control and hyrolig controls run from separate panels. The demise of Checkmark earlier this year could have also left the plant without the ability to load trucks in the event of a breakdown!

The requirement was to find a new process control system capable of integrating all functions and provide operational and management level data for forecasting and trends.

Shardlow's process has a relatively straightforward layout; Trucks supply a reception hopper which feeds into the surge pile via a conveyor. The recovery conveyor then discharges into a splitter hopper which divides into dual conveying lines supplying the initial processing operations which are housed in the main building.

Each line is processed through initial screening, which rejects the +150mm material, selects the -150 +40mm fraction for crushing and passes the -40mm for de-ligniting.

Sub 40mm material goes to the de-ligniting station where the lignite and other low-density material is floated out of twin vertical tanks. It is then washed and graded via screens for either secondary crushing or transfer to final screening and storage.

Crushed material and product re-crushed through the re-crush loop is kept on a separate line to the other materials in order that a range of natural gravels can be produced.

The sand plant takes fluidised -5mm material and wash water to grade into either concrete or building sand. Gravel is output to final screening and then to storage hoppers which can discharge directly into trucks via the Checkmark system as required.

The challenge for Batching & Blending systems was not only to design an appropriate system to encompass the wide range of processes, but also to meet deadlines with a project timeline that was measured in weeks, not months.

The system was designed in the four weeks prior to the Easter shut down and then installed and commissioned during a week long shut down period. At the time of installation additional weighers were installed on several conveying lines to improve the level of information being captured.

The new process control system is based on the Allen Bradley SLC500 PLC range to replace the GEM80 PLC, with remote input /output modules being used in the Checkmark and hydrolig panels to link these back to form one overall plant control system. The Allen Bradley SLC500 was used here because of its exemplary backup, with 1.6 million of these PLC being used being worldwide there will be a readily available spares supply network for many years to come.

The resulting system is now fully operational and is already proving its value in use through improved information capture and feedback. Having a more integrated approach has also reduced control duplication and achieved some time savings in control terms.

As before, the plant is controlled by a single operator within the office which also has CCTV monitors. With just two initial screens, the new system is more intuitive in use and able to show key information at a glance.

As Brian Partner, the operator, explains: "I took to the new system very quickly as it is really easy to see what is happening and then go into logical sequences to sort out any issues. I tend to view the CCTV monitors less as the new system has a much better level of information. It is also reassuring to be able to run daily reports that detail all activity.

"For the future additional database and reporting functions will be used in more depth to look at overall site efficiency and to assist in further extraction plans."

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