Hanson Aggregates

Automation solution substantially increases quarry's production capacity

Hanson Aggregate's operations at Wykeham quarry

Hanson Aggregates is the largest producer of aggregates (crushed rock, sand and gravel) in the world. Its Wykeham quarry in England has been in operation for over 20 years and produces approximately 250,000 tons of sand and gravel annually.

The plant operates by recovering the sand/gravel/stone mixture from the quarry diggings using a mechanical dragline. The actual workings are under water at all times and the gravel bed itself is under approximately five meters of overburden, at a depth of about 15m. The recovered material is carried by conveyor a distance of approximately 800m to a "surge heap," a local stockpile of several thousands of tons of material.

This is then fed onto another conveyor that delivers the material to the processing plant where the mixture is separated into the individual saleable products. Sand is screened off early in the process, then the rock material is separated into two sizes. The smaller size, which is effectively gravel, is then further sorted into grades and sizes used for premix concrete and other products.

The larger stones are passed through crushers to reduce to a size used for sub base.

There are a number of control loops employed to ensure a constant flow of material at an ideal production rate of 170 ton/hour.

The Challenge

With market demand for its products on the rise, the quarry realized that it would need to increase its output. Its existing control systems, however, could not adequately accommodate any increases in production.

Additionally, various plant operations were still being controlled by a hard-wired relay logic system which had undergone extensive modifications over the years. The quarry had no automation of its operations and all start up and shut down procedures were manual. Any increase in production would require either substantially increasing staffing levels or an investment in automation.

The Challenge

To urgently install an automation system at Hanson Aggregates' Wykeham quarry so that it could optimize production in meeting the increased market demands for its products.

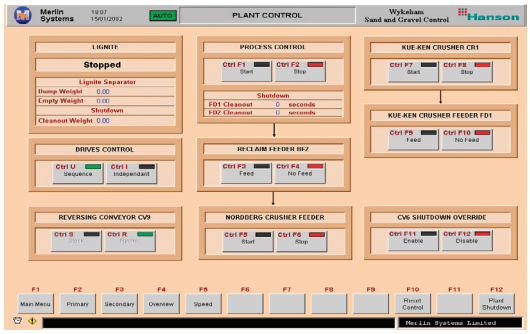
The Solution

CitectSCADA software was implemented for control and visualization and is managed on a single node server/client PC located in the weighbridge office. This created the control nerve center of the plant. From here, staff control and monitor the plant operations and all control commands are routed through the SCADA system.

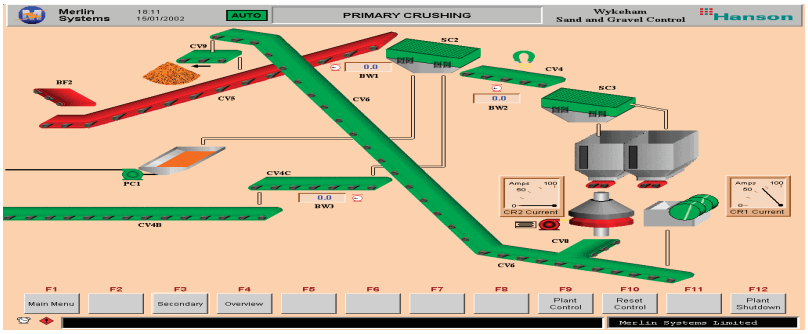
The Benefits

The newly installed automation system has optimized the conveyor feed rate and maximized its output. The Wykeham Quarry has achieved its goal of significantly increasing its production levels with little or no downtime during production shifts.

A significant increase in throughput without additional staffing costs



Primary crushing graphic



Plant control overview graphic

The need to maintain the feed rate lay at the heart of the decision to upgrade the existing manual control systems to a PLC-based SCADA system. Under the manual system, staff were required to be constantly on hand to adjust the conveyor systems to deal with constantly changing conditions.

In practice, this was difficult to maintain and, as a result, the feed rate was rarely optimized, resulting in reduced output. Since the plant operates on 12-hour production shifts three days a week, with two days for maintenance, the process is also arduous and particularly tough on equipment.

The Solution

Once a functional specification for automating the plant was developed, tenders from four systems integrators were considered. The contract was ultimately awarded to a valued local integration partner who had worked with Hanson on a number of other projects.

The solution comprised the addition of weighing controls to the conveyors and the implementation of Allen Bradley SLC 5/04 PLC and CitectSCADA software for control and visualization. The SCADA software was installed on a single node server/client PC located in the weighbridge office. From here, staff control and monitor plant operations and all control commands are routed through the SCADA system.

Technical support is also provided for the CitectSCADA software with dial-up access to the system via a modem link. This facility also enables software upgrades and system modifications to be made remotely rather than with a site visit.

Additionally, apart from a mix of graphical and text based visualizations, CitectSCADA software generates daily systems and production reports which are logged for historical and trend use as required.

The quarry also benefits from the system's maintenance support facilities in the form of equipment running times and numbers of operations. These aid in scheduling planned maintenance routines. Plant alarms are also generated and displayed by the CitectSCADA system so that staff can take appropriate actions in a timely manner, minimizing production downtime.

The Benefits

In replacing the previous manual system, plant operations have been optimized at the quarry, with all control commands centralized and routed through the SCADA system.

The newly installed automation system has resulted in an increased conveyor feed rate and maximized output. The Wykeham Quarry has achieved its goal of significantly increasing production levels with little or no downtime during production shifts.

Furthermore, the automation solution enabled the quarry to achieve an increase in throughput without incurring additional and expensive staffing costs.

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