Tsb Sugar

Tsb's Komati Mill consolidates SCADA and industrial IT with help from Invensys Wonderware

As with many successful companies, Tsb's process control and industrial information assets were acquired as and when was necessary and on the basis of what was considered the best solution at the time. However, when Komati Mill, one of Tsb's divisions began operations in 1994, no one could have predicted the mill's needs 18 years into the future. Therefore, in 2012, Komati Mill decided it was time to modernise and consolidate its industrial automation and information assets.

Project goals

As part of an ambitious upgrade programme, Komati Mill decided to migrate from the old legacy DCS control to PLC and SCADA control while at the same time implementing an MES solution that would track plant performance and events. This would be used to measure the throughput of continuous systems, as well as downtime. Plus it would evaluate reasons for any stoppages.

It was intended that the resulting reports would assist with optimising sugar cane throughput, reducing downtime and predicting final volumes. The downtime tracking would focus on identifying repeat failures, as well as areas of concern which would require the assistance of the engineering team.

The new system would also need to provide for device-layer booking, unit-, and area-level booking, which would automatically link to the reporting layer in order to provide detailed, as well as summary reports.

This would mean having to integrate the new Quantum PLCs, legacy Provox and DeltaV Distributed Control Systems, as well as the LIMS database to provide a unified way of tracking device utilisation.

Other requirements included implementing standards that would be used throughout TSB, integrating with the SAP ERP systems, measuring plant performance and equipment availability (OEE) in real time, providing important desktop information to Management and allowing maintenance and support personnel remote access.

About TSB (Pty) Ltd

Tsb Sugar was founded in 1965 and has grown to become one of South Africa's leading producers of refined and raw sugar. The company recently refreshed its image by adopting a new brand identity, and changing its name to TSB as part of its drive to reposition itself for future growth.

TSB sugar is marketed nationally as Selati and is exported through the South African Sugar Association (SASA).

TSB's first sugar mill in Malalane was commissioned in 1967 and the company grew from strength to strength, opening a second mill in 1994 near Komatipoort, a small town bordering Mozambique In 2009 TSB acquired the Pongola Sugar Mill in KwaZulu Natal. The Malalane, Komati and Pongola mills together produce over 630 000 tonnes of brown sugar and 460 000 tonnes of white sugar per annum - a whopping 31% of South Africa's annual sugar production! TSB also has a 27.42% stake in the Royal Swaziland Sugar Corporation (RSSC).

TSB employs approximately 4700 people and provides farming support to over 1 400 commercial and small-scale farmers on 47 000 hectares of irrigated land. The Malalane and Komati mills are situated in the Lowveld region of Mpumalanga and the Pongola mill in northern KwaZulu-Natal.

Invensys Operations Management Southern Africa • Block E, Gillooly's View Office Park, 1 Osborne Lane, Bedfordview, South Africa
Tel: 0800 INVENSYS (0800 46836797) • Fax: +27 11 607 8478 • iom.invensys.co.za • contact@invensys.co.za

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Solution selection

"We chose Control Systems Integration as system integrator for this project because it's a well-established firm with good references indicating that they would 'walk the extra mile' to arrive at a good solution," says Pieter van Tonder, Instrumentation Engineer at Komati Mill. "Being certified for the ArchestrA System Platform, they also have an excellent knowledge of Wonderware's range of products and their application in the production environment."

Wonderware's solutions were selected within keeping of the standard adopted at the Malalane Mill. TSB also saw Wonderware as having the best integrated and complete SCADA solution available. "We felt sure that the System Platform and its added modules would be able to cope with our varied and disparate data sources and integration needs," adds van Tonder. "The results show that we were right."

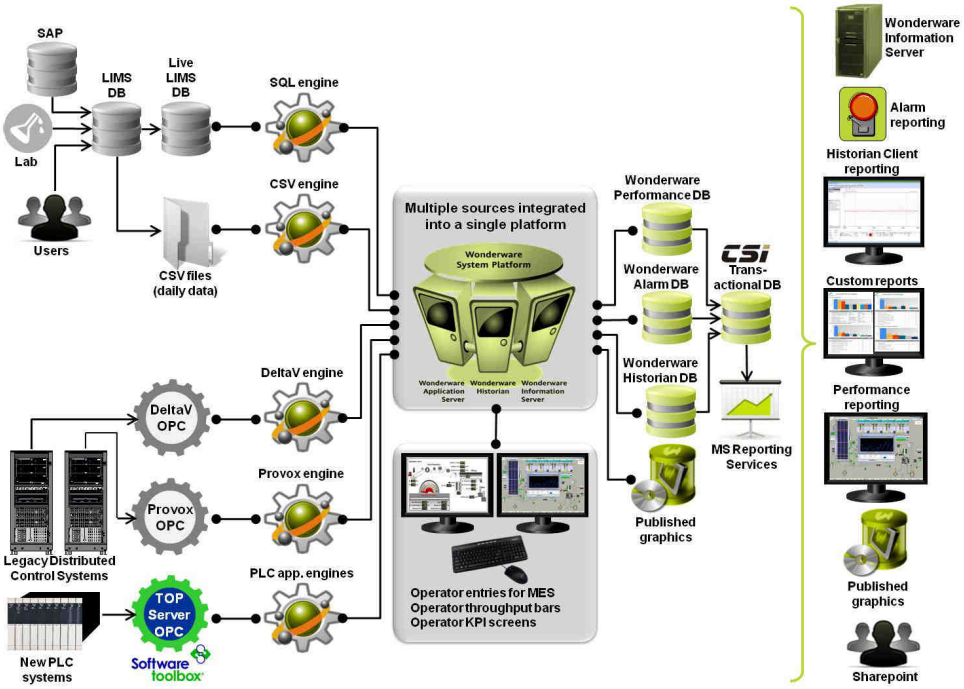

Figure 1: System data flow diagram

Apart from the System Platform, the solutions used in the implementation process included InTouch (SCADA / HMI), Wonderware Historian, Historian Client (trending and analysis tool), Wonderware Information Server, Wonderware MES Performance (OEE) and AutoSave change management software from MDT Software. In addition, TOP Server OPC solution from Software Toolbox was used to connect the system to the new PLCs.

Implementation

The project was completed in phases, with the implementation of the first phase taking place from January 2011 to April 2011. A 3-month off-crop season was sufficient time to remove the old Provox DCS and replace it with the new, integrated system on Extraction Line 2.

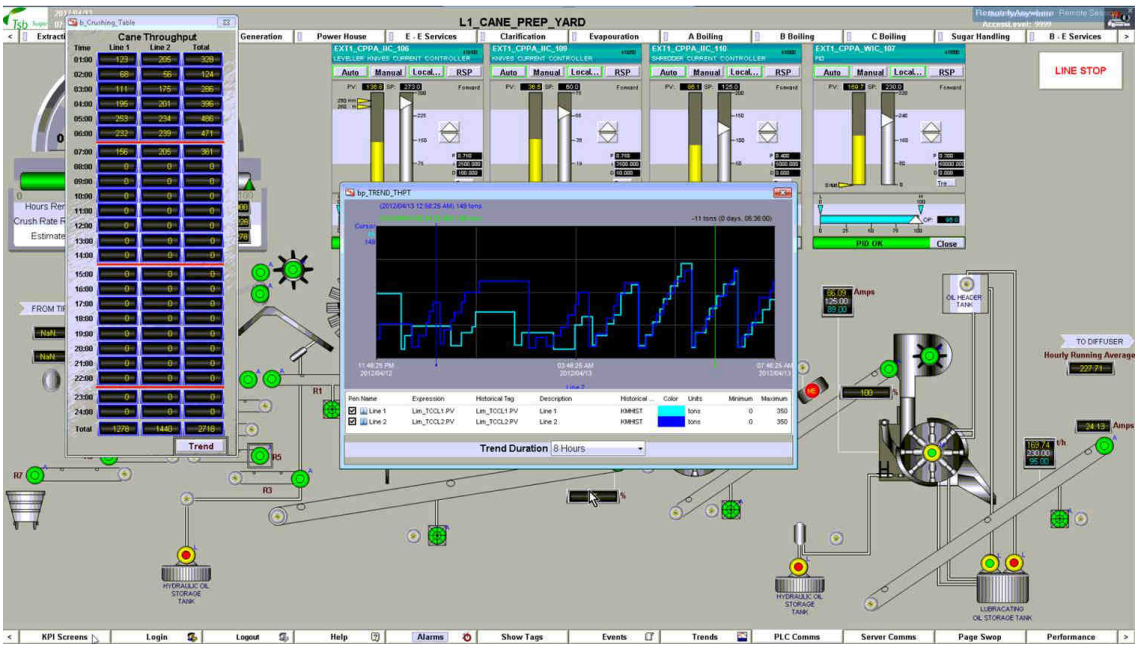

Figure 2: InTouch screen showing the cane preparation yard process as well cane throughput and trends

"All the other systems remained the same and the System Platform was built on top of the existing systems to facilitate integration," says Samantha Rabé, Systems Engineer at Control Systems Integration.

The first stage in the development of the system was the creation of standards in order to optimise the best implementation of the System Platform and PLC for the plant. Microsoft Reporting Services was used for customised Wonderware Information Server reports as this would make it easier for Komati Mill to assume ownership of the system on completion of the project.

A transactional database was created in order to integrate information from the Wonderware Historian and the LIMS data. "This database was also used to consolidate data and to make it easy to configure custom reports on Wonderware Information Server," says Rabé. "The Wonderware MES (Performance) throughput graphics were used as a base and were further enhanced to meet Komati Mill's specific requirements."

The Wonderware Information Server is now the single point of consolidated information for all current and legacy information. Its graphics are also embedded into PowerPoint presentations to display key performance indicators and the real-time throughput of the plant on large screens. This is helping operators to take action and resolve poor performance issues immediately.

> "The ability of the System Platform to integrate and consolidate data across the different systems and deliver the data to managers' desktops in a presentable format enables us to pro-active rather than reactive."
> **Pieter van Tonder, Instrumentation Engineer, Tsb Komati Mill**

While the Wonderware MES (Performance) solution measures the OEE parameters of plant performance and availability in real time, other key process parameters such as throughput, low throughput and the LIMS quality figures are made readily available to operators through three dual-screen InTouch stations

"We decided on using System Platform graphics whose feature of easy deployment across multiple objects was found to be most useful," says Rabé. "The OEE, LIMS, Provox and DeltaV data have been integrated into the System Platform to show KPIs on the InTouch dual-screen displays."

System Platform objects were used to import daily CSV files exported from the LIMS database, and a connection was made to the database via SQLQuery objects to track live LIMS data. Provox and DeltaV OPC links were used to interface them to the Wonderware System Platform. Furthermore, objects were created to read data directly from these distributed control systems.

Historian Client (previously ActiveFactory) was installed to track instances of breakdowns and the reasons for their occurrence. Historian Client's trending is used extensively on Wonderware Information Server by managers to track throughput and performance.

Microsoft Reporting Services was used to generate reports that filter events and alarms according to Komati Mill's requirements. Alarms are prioritised according to the type of failures on each device.

With regard to TSB's ERP system, the work breakdown structures from SAP were used for the Wonderware Performance breakdown reason. This made it easy to consolidate with the business system. A future plan is to incorporate the production information into the bigger SAP Business Warehouse platform.

> "Now we can focus on the root cause areas as identified by the plan availability and low throughput real-time feedback from the PLC into MES Performance."
> **Philip Pienaar, Production Engineer, Tsb Komati Mill**

Previously, Lost Time Availability (1) (LTA) and stoppages were recorded on SAP. This was a very lengthy exercise and it was open to faults. It was also expensive due to all users requiring SAP licences. A decision was taken to use MES Performance which records LTA and Overall Time Efficiency (OTE) (2) on the extraction process to record all stoppages and low throughput events. The entire factory's LTA and OTE are now routed to the extraction plant's MES Performance measurement. . Operators can now use system calculations to easily provide relevant feedback on stoppages and low throughput to managers thereby enabling them to make more informed decisions.

"We are able to manage low throughput because, for the first time, we can measure it accurately. Real-time feedback to record the plant LTA and OTE and have it available on the managers' desktops was unthinkable a decade ago," says van Tonder.

MDT Software's AutoSave was used to track changes to PLC code and to back-up versions automatically. This allows for instantly reverting back to a previous known working version in case of problems.

"On a project of this magnitude and complexity, a partnership between Wonderware SA, the system integrator and the end user is essential in order to deliver an optimum solution," says Rabé. "Involvement from all parties is required throughout a project that is complex and new."

"From my point of view, the most appealing aspect of this project was to give managers the power to control and view critical and live production information such as throughput and stoppages conveniently at their own offices or at home. This has resulted in better control of plant performance," concludes van Tonder.

> "Seamless integration of Wonderware MES into ArchestrA and the automation layers translates into accurate OEE information that enables our customer to better analyse and manage plant performance."
> **Dries van Schalkwyk, Director, Control Systems Integration**

"We are still seeing the benefits of the Wonderware Performance software, even months after implementation. With Wonderware Information Server and Wonderware Performance, LIVE and useful plant information representing real plant performance and efficiencies is readily accessible and easily understood by all levels within the organisation."
Samantha Rabé, Systems Engineer, Control Systems Integration

Business benefits

- Real time measurement and reporting of plant availability
- Real-time measurement and reporting of low throughput to determine lost production. This was never measured before and with measurement came an increase in plant availability and reliability
- Faster reaction time to LIMS quality figures which were out of spec. Previously, these figures were only available on a "next-day" basis
- Reduction in callouts on standby
- Downtime data, downtime information and downtime management.
- Fully-integrated system - Wonderware System Platform and Wonderware information server have provided a single point of data/ information/reporting from various sources (Provox DCS, DeltaV DCS, PLC, LIMS. etc.)
- Standards for sugar production were developed and are ready to be deployed across all TSB plants.

Operational benefits

- Improved decision making by management based on readily-available information
- Increase in plant availability due to remote access
- Potential lurking problems highlighted through low throughput measurements
- Improved accuracy and less paperwork – the automatic booking of devices causing stoppages in units/areas as well as the process interlocks or safety interlocks being automatically recorded means less paperwork for operators, as well as a 100% accurate system which records the *exact* times of stoppages and the exact resulting reason for the interlock device that caused the stoppage at the plant.

The control room at TSB's Komati mill

Conclusion

Once again, the Wonderware System Platform has shown that it is the link between the past, present and future of industrial automation and IT. By providing a single, unifying hub for disparate solutions and technologies, it safeguards past and present investments and optimises their contribution to current requirements while making provision for future (and largely unknown) needs.

(1) LTA = **Lost time Availability -** Operational and engineering downtime hours / hours available (basically the inverse of engineering and operational hours available)

(2) OTE = **Overall Time efficiency =** Total hours – total stops / total hours

For further information contact Jaco Markwat at Invensys Operations Management Southern Africa
tel: +27 11 607 8303 | e-mail: jaco.markwat@invensys.co.za