

# Throughput increased 33% through Automation at Koppers Timber Preservation

A Rockwell Automation plant-wide solution improves inventory control of costly timber preservative by 5%. The new automation system permits a 50% saving in operating costs, and provides the process repeatability, efficiency and fast turnaround necessary to succeed in the third-party timber treatment market.

### Background

Koppers Australia Pty Ltd is Australia's largest manufacturer and exporter of coal tar by-products, carbon black, wood preservatives and treated timber. As part of its treated timber sector, Koppers Timber Preservation operates six timber preservation plants around the country. At these sites, a range of softwood and hardwood species are treated with water-borne preservatives that protect timbers against attack from fungi, insects and marine borer.

One such plant — and the only one serving the western part of the country — is the Koppers Timber Preservation plant at Picton, south of Perth. A small site established in 1960, the Picton plant is run by a staff of just 14 people and treats around 30,000 cubic meters of sawn pine per year, plus a substantial volume of softwood and hardwood power distribution and transmission poles.

The preservative treatment plant comprises a range of storage and mixing tanks, plus three 1.8 meter diameter 'autoclaves' (pressurized chambers). Preservative concentrate is diluted with water to the appropriate concentration in the mixing tanks, and the timber stacked onto rail trolleys. Four or five trolleys (known as a 'charge') are rolled into the autoclave, where the timber is subjected to a three-stage pressurization cycle that forces the preservative into the timber's structure.



In addition to process controllable parameters such as concentration strength, autoclave pressure and time duration, the plant operator must also factor in less controllable 'organic materials' parameters relating to the natural variability of the timber itself. Where most similar timber preservation plants would treat timber to just one or two preservative levels (known as 'Hazards' or H levels), the Picton site prepares timber to five different levels, making operations particularly complex.

Due to its age, the Picton plant was fully manual, presenting the site operators with a complex network of valves, tank agitation systems, and autoclave pressures and time controls that all required manual intervention to run the charge cycle. Operators were also required to complete manually entered 'charge sheets' describing the volume of

the preservative concentrate — known on site as 'oxide' — forced into the timber, the pressures, times and so on. Due to the manual operations, the specific cycle of treatment plant operations would vary from operator to operator. The manual charge sheets were known to be unreliable, and tracing the reason for a bad charge was often difficult, leading to unacceptable levels of charge re-treating. The operators were under continued pressure to get the charge sheets "right" — it was felt that too much operator time was being spent on balancing the charge sheets, and not enough focus on the actual operations.

### Challenge

Towards the end of the last decade the Koppers Picton site faced a significant shift in its operations: primarily a diminishing requirement to treat its own 'Koppers brand' product range at the

site, coupled with increasing local market demand to treat 'third-party timbers' (timber products from outside manufacturers). Koppers Picton needed to move quickly into this third-party treatments sector, as some of the larger regional timber groups were already considering installing their own preservative treatment facilities.

When treating its own brand timber products the company could accommodate the many weaknesses of the fully manual process: the operator variation in process setting and the imprecise charge sheets; the practice of 'overtreating' timber to meet specification; and the occasional 'wet charge' that would require lengthy, time-intensive drying.

With third-party timber treatment the rules changed. The cost of operation needed to be trimmed, wastage reduced and flexibility of operations increased. Margins were no longer available to accommodate overtreating practices. Third-party timber customers demanded precise traceability and repeatability of treatment, so operator variation in treatments and poor charge sheet recording could no longer be accommodated. Achieving efficient turnaround on each batch was also vital, explains Picton process and production manager, Barry Cater. "With third-party timbers, the customers want their product back quick, because their market is driven by sales. If we don't get them back quick, they want to know why!"

## Solution

An extensive study by Koppers Australia determined that automation of the Picton plant would help achieve the repeatability and efficiencies necessary for the third-party timber market. The company commissioned local Rockwell Automation systems integrator BNC Technologies to develop the automation system. It stipulated three important criteria for the automation solution: it should be fully integrated and from a single source, it should be easily supported by resources local to the plant, and it should be deployed within a very tight capital budget.

Working with local Rockwell Automation distributor, Bunbury Industrial Controls, the BNC Technologies team came up with a powerful and workable automation solution for the Picton site. The automation platform would be founded on the Allen-Bradley small logic controller SLC 5/04, coupled with the powerful Rockwell Software RSVIEW32 PC-based human machine interface software. Recipe parameters for a wide variety of timbers, hazards and solutions strengths would be permanently stored within the new automation system, guaranteeing charge repeatability. Variable speed drive technology would provide precision oxide dosing measured to the liter.

A further challenge remained — just how to connect up the 50 solenoid valves located across the site that determine the flight-path for the preservative as it makes its way from concentrate tank, to work tanks and on to the autoclaves. "We considered discrete I/O at first," explains Brian Johnstone of BNC Technologies. "Then our contact at Bunbury Controls, Mike Hogan, pointed out that a DeviceNet valve interface was available." DeviceNet — the open, device-level network — ultimately proved the most practical and cost-effective means of networking the 50 solenoid valves, while providing powerful valve diagnostics.

The new system also features a voice card modem in the RSVIEW32 PC coupled with Rockwell Software RS Messenger software. This provides dial-up voice based alarm messaging to supervisors' cell phones during out of hours plant operations.

Installation of the entire automation system was carried out by BNC Technologies while normal plant operations continued in the six months prior to Christmas 2000. As a result, the plant operators were able to view the system's development as it happened. "I would have the operators view the RSVIEW32 screen development and make comments and corrections. They took ownership of the project as it was being developed!" Johnstone explains. Cutover from manual to automatic operations of the tank farm and one

autoclave was completed during the ten day Christmas / New Year shutdown period of that year. The remainder of the plant was converted to automatic operations in quarter one, 2001.

## Results

The entire automation project was successfully completed in April 2001, on time and within budget. Setting up the plant for a new charge is now a simple on-screen activity, requiring just minutes. Where once the company struggled to achieve an average of six charges in an eight-hour shift, it now achieves eight or more charges in the same period, improving the process throughput by 33%.

"With automation we have a repeatable schedule and can actually plan the sort of shifts we're going to run and how many charges we'll do," Cater says. "We were on two shifts the other day and we pumped out eleven charges. This is something that would've been impossible to do manually."

Efficiency of resources is also up. Charge sheets recording the oxide use and batch cycle details are no longer manually completed by the operator, but automatically developed by RSVIEW32 as an Excel spreadsheet. This accuracy is most telling for the site's oxide 'reconciliations' — a careful mass balance comparing the oxide supplied to the site against that present in the treated timber. "I've kept the reconciliations for the past three or four years — it was a devil of a job before automation," Cater says. "Reconciliations used to be major guess work. They could run up to being out by 10% sometimes. Now, with automation, they are always within 5%."

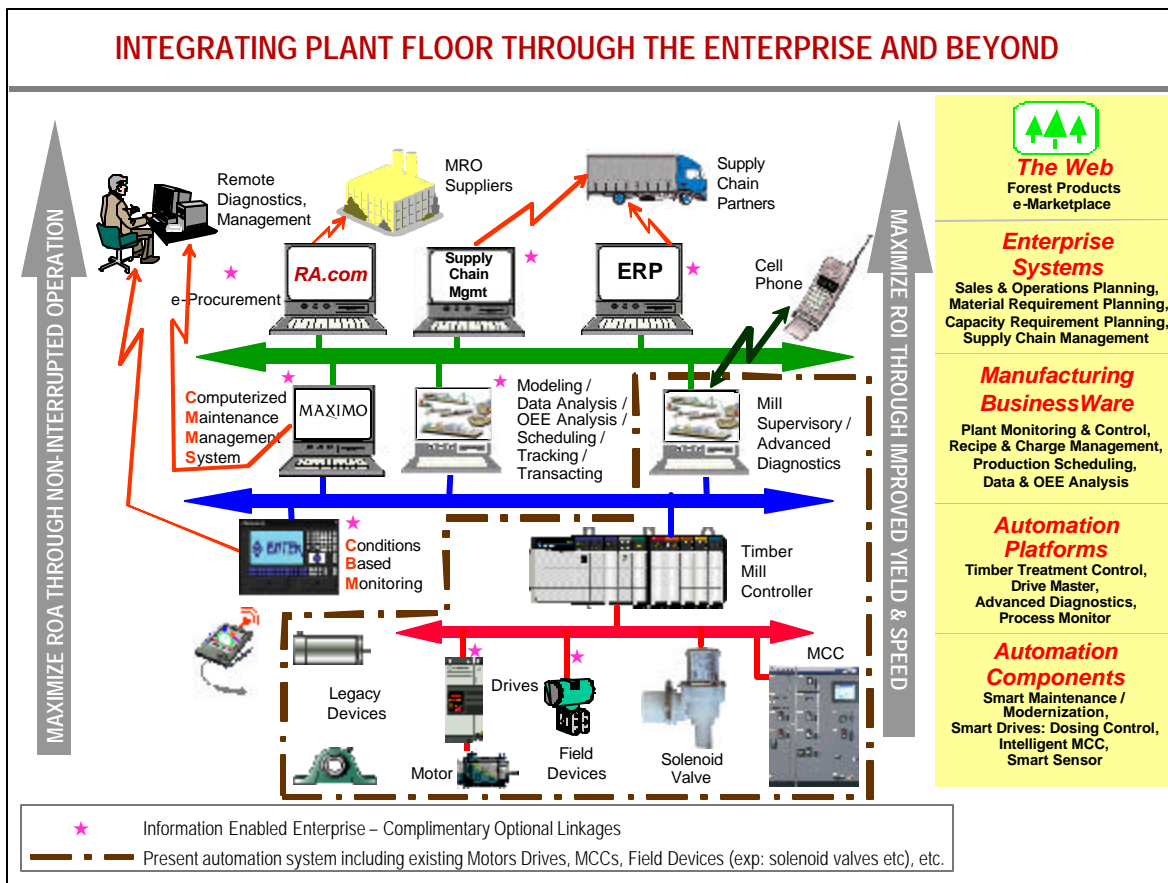
Operations staff requirements at the site have also been reduced. Where once there were two operators per shift, we now comfortably get by with just one per shift — a 50% reduction in staffing levels. Similarly, the operations staff now has more time to carry out site improvements.

With improved plant efficiency there has also been a reduction in the total hours worked per charge. It is estimated that work once requiring a ten-hour shift can

now be completed at the Picton site in just eight hours. Essential '24 by 7' operations such as tank farm sump pump discharges and oxide storage tank agitation cycles can now be carried out during the night and weekends on an unmanned site, thanks to the support of the RS Messenger voice-based alarm notification system.

The entire automation upgrade has seen Koppers Picton achieve new levels of process repeatability, efficiency and turn-around time, and helped in the plant's successful transition to today's operation profile — where the vast majority of its work is the treatment of customer-owned product.

The architecture below depicts Rockwell Automation's concept of an Information Enabled Enterprise. The area outlined with a brown dash line represents the present automation level under discussion in this document. The remaining portion illustrates a host of solutions that Rockwell Automation can provide today to integrate the plant floor to the enterprise and beyond.



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