

CUSTOMER SUCCESS STORY

BREWING AND BEVERAGE INDUSTRY

INTEGRATED ARCHITECTURE SOLUTION

Provides a Common Development Environment

Factory Talk data-sharing model allows data-tags created in one application (such as RSView Studio or RSLogix 5000 development software) to be immediately available to all applications across the Integrated Architecture.

RSView Supervisory Edition provides unified site-wide monitoring and control via the RSView SCADA terminals and numerous plant-floor PanelView Plus human-machine interfaces (HMIs).

Allen-Bradley ControlLogix programmable automation controllers (PACs) perform the hybrid functionality required of sequential, process and drives control, and controls the refrigeration temperature at all stages of the process.

Allen-Bradley PowerFlex VF drives control screw feeders, crushers, pumps, presses, agitators, and so on; and also encompasses enhanced PID control of temperature, sugar content and yeast cell monitoring.

At the supervisory level, a site-wide EtherNet/IP network connects the SCADA server and clients with each other and the ControlLogix PACs. A ControlNet communications network provides high-speed peer-to-peer and I/O communications, while device-level communications are provided by DeviceNet.

RESULTS

Achieve a continuous production flow via a sophisticated automation and control system.

YALUMBA'S MOPPA WINERY INCORPORATES THE LATEST IN WINEMAKING TECHNOLOGY



PREMIUM CONTROL VINTAGE FOR NEW WINERY

Australian wine producer and exporter, Yalumba, recently commissioned its new Moppa processing plant with the aid of a sophisticated automation and control system founded on Rockwell Automation's Integrated Architecture and process automation expertise.

In many ways, the art of winemaking has changed little over the centuries. The simple tradition of grape juice fermentation with the addition of yeast is the foundation of wineries the world over--ranging from the smallest boutique vineyards to the largest commercial processing plants. Yet the culture of winemaking is shifting. Escalating consumer demand for 'quaffing' reds or Sunday-afternoon whites means that some wines are now produced by the tank-load, rather than the barrel. To keep up with the required volume, winemakers are turning to technology to streamline the process.

One such company is Yalumba, Australia's oldest family-owned winery, and one of the country's largest wine exporters. Its Angaston winery was founded 1849 in South Australia's famous Barossa Valley, and 'all the land around' gave its name in the local aboriginal tongue to the fledgling company. In recent years, however, the demand for Yalumba wines has grown to exceed the processing capacity of the heritage-listed Angaston facility. This led to the establishment of the 'Moppa' wine



processing plant, which is now the primary producer of Yalumba's popular Oxford Landing and cask wine varieties.

After a two-year fast-track project, the Moppa winery commenced crushing in January 2005. An important goal for the new plant—which has the capacity to process 30,000 tonnes of grapes per year—was to achieve a continuous production flow via a sophisticated automation and control system. In winemaking this timing is particularly crucial, since the grapes need to be processed within a critical time-window where the acid and sugar content are at a premium. Moreover, the 'just-in-time' delivery of grapes to the site means that delays in production halt harvesting many kilometres away at the vineyard.

In keeping with the automation technology used successfully at the Angaston winery for over a decade, Yalumba selected Rockwell Automation's 'Integrated Architecture' technology as the foundation of Moppa's fully integrated control system. In a massive feat, South Australian industrial engineering group, Camms, delivered the turnkey electrical and industrial control solution in just under seven months.

SEASONAL CONSISTENCY

Yalumba Services Manager, Peter Graue, is responsible for maintaining the automated processing systems of both the Angaston and Moppa wineries. Yalumba's vision for Moppa, he says, was an environmentally friendly plant

incorporating the latest in winemaking technology, plus a new and unique process stream methodology.

"The aim was to achieve greater management of the process and the product," Graue says. "One of the main challenges with this type of winemaking is that the public wants consistency—they get used to a particular label and expect it to taste the same. But every year, the acid level is different, the sugar content is different, as are the aroma and colour of the berries. It's a seasonal thing! Nevertheless, we have to produce a consistent product at the other end." The agility needed to meet the demands of frequently changing recipes was uniquely met by the process automation solutions from Rockwell Automation. This, on top of the end to end efficiencies of plant wide control inherent in Integrated Architecture truly made this a solution real win for Yalumba.

Already, Moppa has attained this goal, with the first white vintage successfully on the shelves in London. The secret, says Graue, is the automated process streams that ensure the grapes are fermented under optimum conditions, given the high-volume throughput. It is particularly critical at all times to control fermentation rate and minimise oxidation—both of which are highly dependent on temperature.

"From the moment the skin is broken during harvesting, it's important to move the product quickly through the crushing stage,

chilled and into the controlled environment of the fermentation tanks," Graue says. "Once you get it into the tank and have control of it, the pressure's off."

Each process stream begins at one of three receive hopper/crusher bays, where loads of grapes are converted into 'must', a mix of juice, skin and seeds. The must is then pumped through one of three 'must chillers' to reduce the temperature down to around 12 degrees Celsius. To produce white wine, the juice is extracted from the skin and seeds in three steps prior to fermentation; conversely, red wine is fermented with the skin included. For both styles of wine, the premium juice/wine is drained and kept separate from the second and third streams of extracted product through subsequent processing and storage.

SCADA FOR EVERYTHING

The control and automation system plays an important role at Moppa. Designed by Camms to meet Yalumba's special requirements, the system performs sophisticated control of the numerous process streams, while at the same time allowing the winemakers to exert their influence and apply their experience to achieve the desired result. This delicate balance between process automation and human judgement is essential in winemaking, says Graue.

The primary user interface for the system is a fully redundant SCADA server supported by five onsite clients, each running Rockwell Software RSVIEW Supervisory Edition software. Winemakers and operators use the SCADA to specify process streams, crushing speeds and fermentation schedules; plus monitor the operational status of the entire plant. "Everything is SCADA-based—even our manual control," Graue says. "We're about to install a sixth client at Angaston [seven kilometres away] and that will allow us to keep a close watch on trends without having to come to site." Another important function is the SCADA system's integration with Yalumba's proprietary 'wine management system', a non-commercial database of all vintages for the purpose of label integrity.

A key component of Moppa's automation system, RSVIEW Supervisory Edition is also key to Rockwell Automation's Integrated Architecture, an open information and control system infrastructure upon which

Moppa's automation system is founded. At Moppa this includes unified site-wide monitoring and control via the RSView SCADA terminals and numerous plant-floor PanelView Plus human-machine interfaces (HMI). "Having everything on a common visualisation platform was an attractive part of the package," Graue says.

From a programming point of view, Integrated Architecture provides a common development environment for all applications, utilising Rockwell Automation's flexible FactoryTalk data-sharing model. FactoryTalk allows data-tags created in one application (such as RSView Studio or RSLogix5000 development software) to be immediately available to all applications across the integrated architecture.

According to Johan Snyman, Camms project engineer, this ability to share data-tags considerably reduced the software development time. "The whole network was connected up in the workshop and everybody programmed at the same time," he says. "We had one tag database available to both the SCADA and the PLC programmers. Any tag created was immediately available to everybody. There was no importing, exporting, connecting, or waiting. From the beginning we were able to program concurrently, meaning there was absolutely no time delay."

FLEXING MUSCLE

At the heart of the system, more than 10 Allen-Bradley ControlLogix programmable automation controllers (PAC) perform the hybrid functionality required of sequential, process and drives control. This includes overseeing a myriad of Allen-Bradley PowerFlex VF drives that control screw feeders, crushers, pumps, presses, agitators, and so on; and also encompasses enhanced PID control of temperature, sugar content and yeast cell monitoring, by which the fermentation rate is strictly controlled.

ControlLogix also controls Moppa's advanced refrigeration plant--perhaps the most critical function of all. "The refrigeration plant is our main tool for controlling temperature at all stages of the process," says Graue, explaining that three ammonia compressors and a pumping system circulate liquid ammonia



through the must chillers, 'rack and return tanks', and fermentation vessels as required.

"The control system works out the required load and directs which should be the lead compressor and what the optimum settings are, based on how much cooling is needed for the required fermentation rates."

To link the automation system all together, the Moppa plant utilises Integrated Architecture's three-tiered communications network, where a common protocol allows a seamless flow of information throughout the plant. At the supervisory level, a site-wide EtherNet/IP network connects the SCADA server and clients with each other and the ControlLogix PACs. A ControlNet communications network provides high-speed peer-to-peer and I/O communications, while device-level communications are provided by DeviceNet.

COLLABORATIVE DEVELOPMENT

To facilitate field installation and commissioning, Camms constructed all electrical switchboards and control cabinets in its workshop prior to transport to site, also conducting comprehensive Factory Acceptance Testing (FAT) and some pre-commissioning. This played an important role in meeting the tight timeline objective, which Camms describes as one of its most challenging ever.

"One of the keys to this project was collaborative development," says Snyman. "We worked very closely with Yalumba, along with the suppliers of other technologies--such as the refrigeration plant--that we had to integrate into the control system. The whole time we kept a close eye on the project lifecycle and came up with a parallel development strategy that saved about 25 percent of engineering development time."

"Camms made a tremendous contribution," Graue says. "We wanted a total solution, and so we sat down very early in the piece with Camms and our project team to come up with a concept and develop a specification. Ultimately, Camms did all the design for the electrical layout, distribution, general power services, switch boards as well as all the process control. We worked together really well."

The fact that Camms, as a referred Rockwell Automation systems integrator, had experience with the selected control technology was another advantage. "We've now standardised on Rockwell Automation technology to the point that we request it to be used for all OEM equipment--even if the OEMs usually use another brand," says Graue. "All our technicians are familiar with the technology, it's easy to use, and it's locally supported by both Camms and Rockwell Automation here in South Australia."

TWO SHADES OF GREEN

Graue is proud that the greenfield Moppa plant is 'green' in more than one sense, with a number of strategies in place to ensure environmentally friendly practices. The refrigeration system is highly efficient, with the option of off-peak loading to reduce both electricity costs and power consumption through maximised compressor efficiency. In addition, the hot return ammonia gas heats the water used for washing tanks throughout the plant--plus Moppa has its own complete wastewater recycling plant.

But at the end of the day, the ultimate goal has always been to achieve a continuous production flow through the plant. Graue believes that Rockwell Automation's 'Integrated Architecture' is key to ensuring this objective is met--and maintained. "The SCADA allows us to see trends in real time, and we can backtrack to specific batches as required," he says. "Troubleshooting is also easy. For instance, we can delve right down into the drives remotely, change programming and configuration--pretty much anything. That's the advantage of a fully integrated system, which has a consistent look and feel across the board."

Graue adds that the infrastructure is now in place for full automation of the Moppa winery, should they so choose in the future. For the moment, however, Yalumba is content to nurture the human touch--long a key element of winemaking. It is the juxtaposition of high-volume processing technology and winemaking art that is making Yalumba successful--granting it the ability to deliver bottles of red and white that are finding favour--and flavour--the world over.



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