Wastewater systems in focus

Recycled knowledge and good relationships are key to winery wastewater management in Victoria’s Yarra Valley.

Ed Merrison

DOMAINE CHANDON’S PROWESS with sparkling wines has brought pleasure to many. But there are those who have enjoyed the benefits of its mastery of another, less alluring liquid: wastewater.

One of those is former Chandon winemaker Matt Steel, who started drawing up plans for Medhurst’s winery back in August 2009. The other is Dominic Valentine of Oakridge Wines, who began overhauling the existing system there in late 2011.

“They’re the gurus,” Valentine says of Adam Keath and the team at Chandon. “They’ve gone through various cycles of construction on winery waste, and troubleshooted to the point they have a rocking system. They don’t want anybody to go through what they went through getting to this point.”

Chandon, Medhurst and Oakridge are clustered in the Coldstream area of the Yarra Valley, where they sit outside the water grid. Chandon was the model as Steel and Valentine opted to treat their wastewater with activated sludge in a sequencing batch reactor (SBR). To work, the system needs a careful balance of reactor waste loading rate, oxygen supply and bacterial sludge. It produces treated water which can be used in the vineyard, plus nutrient-rich sludge beneficial to agriculture.

Different strokes for different folks

Though Steel and Valentine shared the same basic premise, the eventual solution would have to suit their budget constraints and operational needs. The search took them down distinct paths, and to very different conclusions.

Steel called upon JIC Group consultant John Constable, whom he’d met during his Chandon days, to help design a system to cope with a 250-tonne crush. They envisaged a flow of 500KL wastewater per annum, with a peak flow of 3KL per day during vintage and a maximum BOD (biological oxygen demand – the amount of oxygen the micro-organisms need to break down the waste) of 10,000mg/L. Simplicity and flexibility were priorities.

Steel says the project, which came in at roughly $80,000, more than met expectations. The winery waste is pumped into a 90kL capacity concrete SBR, which contains an ecosystem of bugs. A 5-kilowatt Roots-style positive-displacement blower pumps in dissolved oxygen (DO), which is dispersed via a coarse-bubble diffuser. In quieter times, the blower runs at 50 Hertz for half an hour, every four hours.

Weekly testing and monitoring

Steel tests the mixed liquor at least once a week to see how it settles out, and periodically sends a batch of samples to Melbourne where EML Chem conducts a suite of analyses. The results, along with observations in the winery, are used to inform Steel’s decisions about running the blower and recycling the waste.

“From here, we have choices everywhere,” Steel says, indicating the pipes running to and from the SBR. “All the valves are manually controlled; there’s no automation about this. The design gives us total discretion. We can either take the supernatant, the solids, or both.”

The central option is to decant to a pair of storage tanks beside the dam, from where Steel can irrigate practically anywhere on the property. He can pump supernatant or a solids-and-supernatant blend through a poly tube to feed the adjacent bush block. The solids can also be sucked from the SBR into the sludge tank for storage, or pumped directly into a spray cart for use. In addition, the sludge tank can double up as a safety net, storing wastewater when volumes are excessive or if there’s a problem with the SBR.

While the 2012 vintage was stress-testing Steel’s system, Oakridge was still carting its wastewater off site. But a rethink had been under way for some time, triggered by high fuel and waste-treatment costs. Winemaker Dominic Valentine was immersed in creating a brand-new installation for a crush which could run to 400 tonnes this year. As with Steel, simplicity and flexibility were of the essence. But unlike his opposite number at Medhurst, Valentine leaned towards a system that could be pre-programmed to run with minimal monitoring and intervention.

A drop-in unit with associated labour and consultancy costs might start at $250,000 – way beyond the budget. So instead, he teamed up with Warren Bradford, an industrial electrician with Healesville-based Deacam. Together they pored over a range of options. Valentine ended up aiming for the very top of the spectrum, a decision Bradford describes as “gutsy”. Both acknowledge it mightn’t have worked without the constant, local support of an industrial-control specialist like Deacam.
Effects of full automation

There were other implications. “To get full automation obviously took up a large portion of the budget, so it required shaving funds off the installation side of things,” says Valentine. He recycled anything from Oakridge that could be adapted for the new system, scoured the valley for secondhand odds and ends, borrowed equipment to dig holes and did the plumbing himself. “I guess the biggest thing is having resources and good relationships with your tradesmen, who you can quite comfortably call or if they’re in the area they’ll drop by, give you advice on what can and can’t be done, and then it’s up to you to make the decision whether to go ahead and perform it or to engage them.”

Matt Steel and his former Chandon colleagues were also on this unofficial advisory panel. But while Steel is reserving judgement on whether Medhurst’s lesser workflow warrants cutting-edge automation, Valentine made it the cornerstone of his set-up. Oakridge has a variable speed drive (VSD) by SEW-Eurodrive to moderate the power of the 7.5-kilowatt blower. Electronics yield valuable data

An Endress+Hauser DO probe ensures the dissolved oxygen dispersed by fine-bubble diffuser remains in the ideal range for the aerobic bugs. All the controls are set on a Unitronics touchscreen with built-in PLC (programmable logic controller). Valentine and Bradford spent hours huddled around a whiteboard with a computer-code writer, painstakingly refining its look, feel and functions. “It’s very simple, and that’s the benefit of having the touchscreen with it all laid out in this schematic, diagrammatical way,” says Valentine. “The language on the screen and the visualisation is for a winemaker, not for an electrical engineer. I want to adjust parameters that are relevant to me.”

The Unitronics system allows Oakridge to log five-minute snapshots of waste production, DO supply and the condition of the SBR. These can be graphed on demand and stored for 10 years. Such detailed feedback should pave the way for further efficiencies.

Valentine hopes to decant at 20% per cycle from the 40kL recycled wine tank that serves as his SBR. He’ll aim for two batches a day, meaning 16,000L of winery waste digested, decanted and stored in a 24-hour period.

Like Medhurst, Oakridge now has a low-odour, user-friendly system which recycles winery waste for on-site use. On top of this, automation promises to allow Oakridge to make power savings while tackling its heavier workload. And Valentine believes the investment will really tell when vintage is in full swing and he can focus on wine, not wastewater. “There’ll be some tweaking, some fine-tuning but there’s everything in there for the system to run completely by itself,” he says.