CASE STUDY

Australian Government
Grape and Wine Research and Development Corporation

GWRDC
GRAPE AND WINE RESEARCH AND DEVELOPMENT CORPORATION

VACUUM PUMPS

Yalumba – Oxford Landing
Treasury Wine Estates – Ryecroft
Littore Family Wines

Bottling lines are a significant source of wastewater in wineries (Kumar et al, 2009). Wineries without bottling lines used 1.9 L water/ 1 L wine, whereas wineries with bottling lines used 3.1 L water/L wine, more than 1½ times more water.

This additional water is partly due to line washes and in some cases bottle washing, but the amounts of water used in these processes do not adequately account for the additional water.

Liquid ring vacuum pumps (sometimes called gland seal pumps) are one of the unseen sources of additional water use in bottling lines. These pumps use water to generate vacuum pistons in liquid ring vacuum systems using significant amounts of water.

Water from liquid ring vacuum pumps can potentially be recovered for use in other parts of the winery, but can also be directly recycled to the vacuum pump, as long as the liquid is allowed to cool to operating temperatures. Recycle systems can be retro-fitted (which can be expensive) and can be bought with the pumps. Capacity to recycle will be limited by the degree of contamination picked up in each pass of the water through the pump.

Other improvements to liquid ring vacuum pumps can include:

- installing solenoid valves that are connected to the motor's power supply so that water does not flow when the pump is not in operation;
- ensure efficient operating temperature of the water - a change of 5°C can reduce the efficiency of the pump by 20%, so pumps are often over-sized to account for this;
- use of variable speed drives;
- supplying cooling utility to the pumps to facilitate the recycling of water;
- minimising leakage in vacuum lines; and
- avoiding pump cavitation.

Dry vacuum pumps are also available and payback periods can reportedly be as low as 1.5 years.

Liquid ring vacuum pump recycle system showing the evaporative cooler and recycled water reservoir.

Yalumba – Oxford Landing Winery (Barossa Valley, SA)

As shown in the photographs, Yalumba, at its Oxford Landing Winery, recycles water from the RDV liquid ring vacuum pumps in a binary cooling cycle that is also used to cool centrifuge hood flush water. All water from the liquid ring vacuum pumps is recycled to a tank that recirculates water to a heat exchanger. The heat exchanger is supplied by a closed circuit of water from an evaporative cooler.

At Oxford Landing Winery, water used for packing earth onto the RDV drums is also recovered and reused for the next drum packing cycle.

Liquid ring vacuum pump recycle system, showing the evaporative cooler and the heat exchanger.

Treasury Wine Estates – Ryecroft Winery

At Treasury Wine Estates' Ryecroft Winery a similar system is used, but with a larger buffer tank rather than cooling the recirculation water.

Littore Family Wines – Moorabool Valley

At Littore Wines in Geelong, a RDV vacuum pump water is also recycled and cooled. The RDVs were bought with integral cooling systems, and a simple buffer tank and small pressure pump are used for the recirculation.

References

Kumar, A. Frost, P., Correll, R. and Oemcke, D. (2009) *Winery Wastewater Generation, Treatment aedn Disposal: A Survey of Australian Practice.* CSIRO Land and Water Sciene Report Series ISSN 1834-6618

Sydney Water (accessed November 2010) *The Liquid Ring Vacuum Pump* www.sydneywater.com.au/Water4Life/InYourBusiness/FactSheets.cfm

Ide, J. (2007) *Target 1:1 Wine to Water Ratio*. Towards Best Practice Through Innovation in Winery Processing, Australian Society of Viticulture and Oenology Seminar Proceedings.

Rajender, J.A., Bhatnagar, K. Bolt, D.E Butzbach T.L. (1996) *Installing Liquid Ring Vacuum Pumps.* Chemical Engineering, accessed via www.graham-mfg.com/usr/pdf/TechLibVacuum/215.PDF

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