The Australian Wine Research Institute

Fact Sheet
ENGINEERING

Improving refrigeration and heat transfer

Key opportunities at a glance

- Ensure effective temperature control and heat transfer to wine.
- Review wine and brine temperature set points.
- Identify waste heat streams which could be used for pre-heating of boiler feedwater or for space heating.
- Identify opportunities for wine-wine heat exchange –e.g. heat exchange chilled wine leaving cold stabilisation with warm wine entering cold stabilisation.
- Ensure effective tank mixing.
- Use appropriate refrigeration compressor settings and plant operation.
- Review influence and effect of environmental variables –ambient temperature and relative humidity, peak versus off-peak operation.
- Review site placement of refrigeration plant –is there adequate ventilation, impact of solar loading?
- Explore opportunities to employ absorption refrigeration systems and co- or tri-generation to reduce electricity requirements

Case study – using waste heat for pre-heating of boiler feedwater

Energy use for heating or refrigeration can be as high as 50% and 70% for many wineries, respectively. But when water is heated for equipment sanitation purposes (for example,

to sanitise a filling machine on a bottling line), it is typically passed just once through the equipment and then flushed down the drain to the sewer or to the wastewater treatment.

In such circumstances, the temperature of this water is still quite high when it is discarded to the drain, well above the feedwater temperature into the boiler and, in many cases, quite close to the boiler outlet temperature. However, rather than losing this waste heat, it could be recycled back into the production cycle by using it to pre-heat the feedwater entering the boiler. Modelling conducted by the AWRI has shown that simply reusing hot water for pre-heating or other purposes could potentially save wineries up to 30% of their water heating bills – resulting in environmental and economic benefits.

Opportunities for further savings in water heating could also be realised simply by changing to a different, cheaper and/or more efficient heating fuel or heat source, particularly in situations where an upgrade or replacement boiler is already required. For example, replacing an electric hot water boiler with a natural gas boiler or even a heat pump could result insignificant savings and a simple payback of less than four years.

Further reading

A reference guide on improving winery refrigeration efficiency can be accessed at:

http://www.awri.com.au/wp-content/uploads/ImprovingRefrigerationEfficiency.pdf

Contact

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