



BHF Technologies & Vinpac International

(WIIA) Wine Industry Impact Award Application

2024

Engineering & Equipment: “Automation of wine pre-filtration to provide consistent pre-treatment maximizing efficiencies and sustainability”

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Overview

BHF Technologies has been a prominent supplier of oenological products and filtration consumables to the Australian wine industry for over two decades. Our unwavering commitment to quality and efficacy is integral to our product offerings. Less widely recognised is our extensive expertise in process automation. This foundation was established through the design and fabrication of purified water systems for the pharmaceutical sector, which naturally transitioned into wine processing applications.

BHF further broadened its capabilities by developing wine separation and treatment systems through our former sister company, Memstar. These systems are designed for alcohol and volatile acidity removal, as well as tartrate stabilization. Recently, we have shifted our focus to the design and fabrication of automated filtration systems, with notable implementations at Accolade Berri and Torresan Estate. These two systems were designed for final filtration, including sterile membrane filtration steps, and the associated monitoring of these.

Vinpac International saw the need for an automated pre-filtration skid, specifically engineered to address several critical concerns, including the reduction of staff workload and manual handling, improvement in production efficiency, and ensuring pre-filtration modules were well maintained and run within the manufacturer specifications. This submission is entitled “Automation of wine pre-filtration to provide consistent pre-treatment maximizing efficiencies and sustainability,” showing the critical flow-on effect in terms of labour, wine quality and production uptime.

Additionally, the system was designed for exceptional adaptability, enabling the integration of new functionalities as needed, and all integrated within the Vinpac operating system.

Background

BHF Technologies (Supplier)

Australasia’s leading filtration specialist, BHF Technologies supplies filtration and oenological products, as well as designs, fabricates, installs and services liquid, gas and water purification solutions that improve critical process across a wide range of industries. Our technical knowledge, custom solutions and vast product range enables our clients to improve operational efficiency, while reducing costs and environmental demands.

Founded in 2000, BHF supplies and supports some of the world’s leading manufacturers across industries including Food & Beverage, Biotechnology & Healthcare, Mining & Energy, Water and Wastewater Treatment. It’s the diversity of the industries we work within that give our team exceptional experience, allowing us to compete successfully against global corporations.

BHF supplies products and services across the Australian and New Zealand wine industry, from small family operated wineries, to the biggest multi-national corporate enterprises. BHF’s commitment to exceptional customer support, stock holding and service has solidified its reputation as a leading supplier in the wine industry, particularly in the areas of wine filterability analysis and process improvement.

Previously, BHF had a sister company, Memstar, which required the design and fabrication of a series of reverse osmosis systems. These systems were capable of removing undesirable components, such as ethanol and acetic acid, through evaporative perstraction. This endeavor demanded a high level of automation, as these processes often necessitated extended on-site treatments.

Off the back of previous Automated Filtration System's designed and built by BHF, the lessons learned and intricate details involved allowed us to increase the range of applications we could automate rather than simply focusing on the final filtration step. By leveraging experience and intellectual property from various industries—including purified water production and wine separation and filtration—BHF developed a highly versatile and automated wine filtration system that has now been successfully commissioned.

The BHF Pre-Filtration System is designed to autonomously perform all operational functions, including prolonged operation, cleaning, sanitizing, flushing, product heating or cooling, and system purging without user intervention. This combination of flexibility and automation has addressed the key areas which Vinpac International saw a need to improve.

Vinpac International (Customer)

Vinpac, Australia's largest contract bottler, stands as a beacon of excellence in the industry, serving over 500 customers and bottling more than 10 million 9LE cases annually. This impressive scale of operations underscores Vinpac's pivotal role in the beverage sector, where it has established itself as a trusted partner for numerous brands.

Central to Vinpac's success is its unwavering commitment to quality and sustainability. The company boasts industry-leading accreditations, reflecting its dedication to maintaining the highest standards in its operations. This commitment extends to its strong relationships with packaging suppliers, ensuring that every product that leaves its facilities meets rigorous quality benchmarks.

Environmental stewardship is another cornerstone of Vinpac's corporate philosophy. The company is deeply invested in minimizing its environmental footprint, a goal it pursues through various initiatives in wastewater management, recycling, and solar energy projects. These efforts not only demonstrate Vinpac's responsibility towards the environment but also its proactive approach to sustainable business practices.

The Problem

Vinpac International's Angaston site recently upgraded its high volume bottling line with a new filler from an overseas manufacturer. The configuration included a final membrane stage and one membrane pre-filter cartridge stage filtration system, located close to the filler. However, as a contract bottler, Vinpac requires various stages of wine filtration, including lenticular polish, which would not fit within the space available on the bottling hall floor due to the expanded footprint of the new equipment.

Some of the key issues Vinpac was looking to address through this project included being able to keep ahead of the production demand to ensure liquid availability was not a factor which may cause downtime, to be able to undertake the bulk of the filtration with minimal direct supervision by staff, and to ensure the liquid delivered to the bottling tank(s) was within the required quality requirements e.g. temperature and turbidity. Therefore, ensuring the system could still operate during a lenticular recharge or replacement process was important to the success of this filtration skid.

Temperature control during the filtration process was particularly important, not only to ensure that the product was in specification for bottling but to also reduce the environmental impact and improve the energy efficiency of this process. Previously, this process was done in tanks, resulting in a significant energy draw. The idea of inline cooling or warming emerged as a potential energy-saving method, and BHF was engaged to incorporate this into the design.

The ideal solution for Vinpac would involve removing operator variability in CIP/SIP and regeneration processes through automation of these processes, reduce the OH&S risks associated with such processes while still allowing for full traceability, and reduction or near elimination of the possibility of human error during filtration through the use of sensors and other technologies to monitor volumes and product interfaces, with high importance during start-up and end-production sequences. Vinpac needed the system to deliver single-operator management while maintaining optimal conditions for pre-filtration, as the commissioning of this system would be undertaken with no increase in staff. Further to the above Vinpac was also looking for enhanced overall filter performance and lifespan, thereby reducing waste and costs.

Vinpac partnering with BHF on this project was an almost natural extension of the filtration supply relationship and other collaborative interactions between these businesses over the years. Not only through the current supply of filtration consumables, but also through previous interactions in the Memstar years. Vinpac has also observed other filtration projects completed by BHF in the wine industry in more recent years, which provided comfort in the knowledge that BHF had the team to understand what Vinpac was after, and the capabilities to be able to deliver a workable solution. With BHF being local, the interactions during the various stages of this project were able to be conducted during normal business operation hours, including on site, and also ensured that where changes needed to be enacted, the response time between the organisations was much quicker. The final solution has operated as per the designed expectations and has ensured that the tank farm team at Vinpac have been able to supply product, within specification and without delay to the new filler, even when scheduling changes have needed to be made.

The Solution

BHF Technologies collaborated closely with Vinpac International's key stakeholders to understand their requirements and high-level goals. The resulting system boasts several advanced design features: The final result provided a system with the following design features:

Multi-Stage / Multi-Train functionality:

- **Single grade, single housing operation** for maximum single housing flow of 15KL/hr
- **Dual grade, 2 housings operation** for maximum single train flow of 15KL/hr
- **Triple grade, 3 housings** for maximum single train flow of 15KL/hr
- **Single grade, dual parallel housing operations** for maximum dual train flows of 30KL/hr
- **Dual grade, 4 housing operations** for maximum dual train flows of 30KL/hr
- **Dual system flows** up to 60KL/hr across 2 skids

Integration and Efficiency Upgrades:

- **Fully integrated remote pump integration** utilizing existing pumps onsite, allowing remote pump operations from any tank onsite to supply skid
- **Inline heating and cooling options** for maximum +20°C or -20°C at all flow rates (up to 60KL/hr)
- **Housing bypass option** to allow for just warming or cooling of wine if filtration is not needed
- **Integrated crane jib** to allow single operator filter change outs, previously a two-person job
- **Temperature and pressure logging/trending** with full traceability
- **Batch data recording** for each run to ensure full traceability – recorded to HMI/USB and integrated to site data collection system (Ignition)
- **System visibility** from the operator cellar tablets
- **Integration with existing tank automation** – fully automated tank filling with overflow protection and accurate volume measurements

The BHF Technologies APFS (Automated Pre-Filtration System) offered bespoke solutions to meet Vinpac International's criteria. Of particular importance was the inclusion of flexibility in production modes to suit the variable wine specifications that their customers demanded. This level of flexibility was not possible on the standard system which was included with their packaging line upgrade, however was integral to the daily operational requirements of the site.

In addition to this, the benefits of reducing energy consumption through smart in-line heating and cooling, along with controlled lenticular module conditioning and cleaning has had the benefit of contributing to the group's site sustainability goals.







The Results

The implementation of BHF's APFS led to significant improvements for Vinpac, including:

1. **Extended Filter Life:** Achieving over four times the service life from Beco discs compared to the old manual system
2. **Flexible System Design:**
 - Multiple operation modes for varying flow rates (up to 60KL/hr)
 - Integrated remote pump operations and inline heating/cooling options
 - Housing bypass for non-filtration heating/cooling
 - Integrated crane jib for easier filter changes and operator safety
3. **Enhanced Data and Automation:**
 - Temperature and pressure logging with full traceability
 - Batch data recording and integration with site data systems
 - System visibility from operator tablets and integration with tank automation
4. **Waste Reduction:** Improved filter life and consistent regeneration, thereby reducing landfill and wastewater production
5. **Labor Cost Savings:** Automation allows single-operator functions, freeing up cellar hands for other tasks and ensuring system protection through alarms

Vinpac International have seen measurable improvements in their filter life, reducing landfill and operator intervention, thereby increasing productivity overall. The automated selection of filtration grades and flowrate flexibility gives production planners options to best suit the schedule and size and specifications of the particular job to be packaged.

BHF Technologies continue to support and service the system, ensuring efficiency and operator understanding.

Industry IMPACT

BHF Technologies solution provided to Vinpac International met their specific criteria, offering:

- Flexibility
- integration to their site systems
- improving operator safety
- improved filter life
- reducing environmental impacts through inline temperature adjustment and reduced wastage
- reducing labour requirements

This innovative approach sets a benchmark for the industry, demonstrating the potential for automation and system design to drive efficiency and sustainability in wine production. By addressing Vinpac's specific needs with a tailored, automated solution, BHF Technologies not only improved operational efficiency and sustainability but also positioned Vinpac as a leader in the wine industry.

Steve Brunato

BHF Technologies

Greg Edwards

Vinpac International