action matters for business

Industrial Refrigeration:
Variable cooling water temperatures

You don't have to spend a million dollars to get worthwhile energy savings.

David Tolson
Managing Director
Elf Mushrooms

Elf Mushrooms: taking one small action to save big

By putting in variable cooling water temperatures for our water-cooled chiller system, we've reduced our energy costs by eight per cent, and saved an estimated $30,000 per year.

ABOUT US

Based in Sydney, we are a 100 per cent Australian, family-owned business. Founded in 1960, we have 110 full-time equivalent staff, with year-round 24/7 operations delivering three million kilograms of mushrooms throughout the country.

OUR SITUATION

Mushrooms need a climate-controlled environment throughout their growing cycle. This requires constant refrigeration to control humidity and temperature in 21 growing rooms – with cooling capacity provided by a large chiller and twin cooling towers. As a result, our energy bill is more than $360,000 per year.

BY THE NUMBERS

Cost of upgrade: $12,700

Estimated cost savings:
$30,000 a year

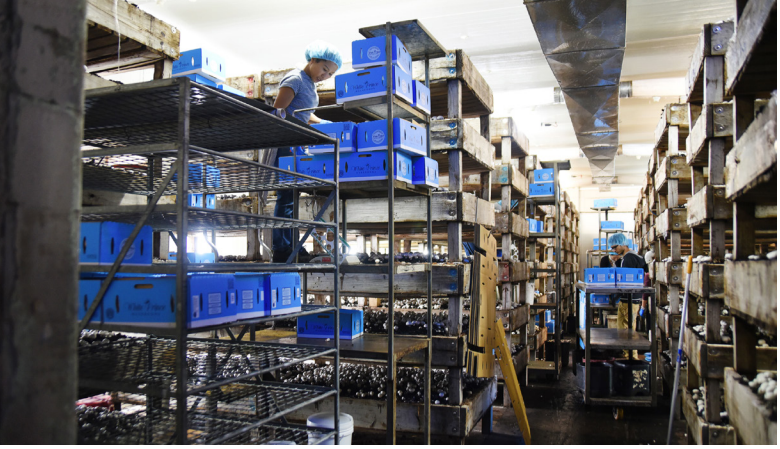
Energy savings:
8 per cent or 200 megawatt hours per year

Simple payback: 5 months

THE TECHNOLOGY

- Refrigeration systems use dramatically less power if their condensing temperature is reduced, with power consumption typically reducing by 3 per cent for every 1°C reduction in condensing temperature.
- However, that cooling water temperature depends on ambient wet bulb temperature and the rate of air circulation through the cooling tower.

NSW GOVERNMENT Office of Environment & Heritage



Mushrooms being collected for sale.

The twin cooling towers at Elf Mushroom's site in Vineyard, NSW.

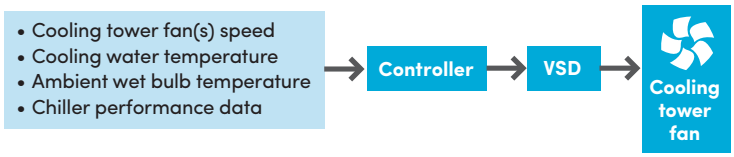
WHAT WE DID

We began with an energy audit, which was commissioned through the NSW Office of Environment & Heritage. After extensive monitoring of our refrigeration and hot water systems, the audit was able to identify variable cooling water temperatures as our key energy efficiency opportunity.

The main recommendation was for us to install a new smart controller for our cooling tower fans. This would enable us to maintain optimal energy use all year round by taking into account ambient conditions – something that wasn't happening before and which the audit found was unnecessarily increasing our energy spend by nearly $30,000 a year.

Because the cooling tower fans were already fitted with variable-speed drives, the upgrade was achieved without major changes to our existing equipment. This meant that our refrigeration plant only needed to be shut down for a few brief periods.

Variable cooling water temperature



The controller receives chiller performance data and temp/humidity sensor data which in turn are used to control and optimise the fan speed on the cooling towers via a VSD.

THE RESULTS

Aside from a reduced energy bill, the improvements were obvious. The cooling water temperature is better controlled, with fans operating more efficiently by taking into account ambient temperature and humidity.

It has been a project that we believe will provide us with substantial and ongoing improvements at our site. All that was required was a small outlay of around $13,000, with a return on investment in less than one year.

THE TECHNOLOGY

- The issue for Elf Mushrooms was that the cooling water temperature in its chiller was simply set to minimum. In other words, the cooling tower fans were programmed to maintain a constant cooling water supply temperature of 22°C, regardless of ambient conditions. This meant that in summer, the fans were operating at maximum speed every day – trying to reach 22°C even when this was not achievable.
- To fix this, control logic was installed to optimise total power consumption. This saw a new controller and sensors added, so the controller could monitor the ambient wet bulb temperature, the cooling water temperature and the percentage load from the chiller – and then calculate the best combination of chiller and condenser fans' energy consumption at any given time.
- More information on how your business can save energy on variable cooling water temperatures at your site can be found in the **Industrial Refrigeration technology report** (Technology 15).

TAKE ACTION

To find out how you can save on your business' energy costs, contact the Energy Efficient Business team.

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CALL

1300 361 967 (ask for the Energy Efficient Business team)

VISIT

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