ENGINEERING
TOMORROW

Case Study | NEXTDC and Smardt Chiller Group

A Quest for Perfection

Improving **efficiency**, increasing **energy savings** and **reducing maintenance** in a top-rated facility.

Danfoss worked with the Smardt Chiller Group to provide leading solutions for a NEXTDC Cooling Plant in Melbourne, Australia.

30%

The low-lift solution can save more than 30% in energy costs.

THE LOW-LIFT OPERATION PRODUCES THE **HIGHEST EFFICIENCY POSSIBLE TODAY**

NABERS

NABERS, or **National Australian Built Environment Rating System**, provides simple, reliable and comparable sustainability measurements for hotels, shopping centers, apartments, offices, data centers and more.

Much like the efficiency star ratings used for appliances, NABERS provides a rating from one to six stars for a building's efficiency, taking energy, water, waste and indoor environment into account.

A Quest for Perfection

NEXTDC is a market leader enabling business transformation through innovative data center outsourcing solutions, connectivity services and infrastructure management software. It provides enterprise-class colocation services to local and international organizations. In July 2012, its M1 Melbourne data center — a 15MW hyperscale colocation facility — went live.

NEXTDC is committed to sustainability and renewable energy, so it was no surprise when the M1 data center received a 4.5-star NABERS (National Australian Built Environment Rating Systems) rating in 2016 for incredible building performance. One major factor contributing to this excellent rating was NEXTDC's decision to install Smardt Chillers using Danfoss Turbocor oil-free compressor technology.

But they didn't stop there. NEXTDC improved their systems even more, receiving a 5-star NABERS rating in 2019. The M1 data center became the first to ever receive 5 stars in Australia. Because of this reputation, maintaining and continuing its sustainable, efficient systems is essential to upholding its core business values and maintaining its 100% uptime guarantee for its customers.

Yet, that begs the question — how can you improve something that's already top-rated?

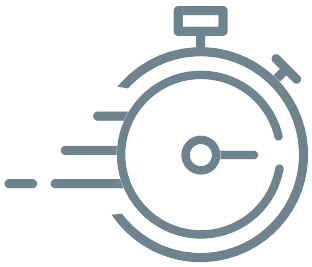
Test for the best

NEXTDC consulted with the Smardt Chiller Group, a longtime OEM partner of Danfoss, to help further improve the efficiency of NEXTDC's cooling system. When NEXTDC expanded in 2016, they added three additional Smardt chillers to maintain maximum efficiency of its M1 facility.

In applications like data centers, the cooling system typically has a high number of run hours in order to protect the servers that generate quite a bit of heat on a 24/7 basis. This is much different from traditional cooling applications for office buildings and schools, where the system may only run 50% of the year. Therefore, any improvements in efficiency for data center cooling systems can create major annual energy savings.

In recent years, data centers have utilized various technologies to cool their equipment in the most efficient way possible. Furthermore, they have pushed the operating envelope in the server rooms by operating at higher temperatures. While this enables the chiller to consume less power, it also challenges the compressor operating map. In response, Smardt collaborated with Danfoss to expand the operating map of its oil-free Danfoss Turbocor® compressors, allowing them to operate at higher water temperatures while also enabling operation at lower ambient conditions.

Compressors operating in these two areas, high chilled water temperatures and low ambient conditions, run at low compression ratios or "low lift." Operating in this area offers significant energy savings but requires some changes to the compressor. Smardt and Danfoss engineers overcame these challenges by developing a technology which implements software changes and other improvements needed to allow the oil-free centrifugal Turbocor compressor to run at low lift. The Smardt team then developed the software to optimize the operation in these low lift conditions.



The Danfoss solution supports the data center's 100% uptime guarantee and offers a 30-second fast restart — the shortest restart time in the industry.

Low lift, high reward

Smardt piloted this new low-lift configuration, SmardtLift™, with NEXTDC and it was installed on one of their Smardt chillers at the M1 data center facility. The pilot proved that the chiller could run quite efficiently during low-lift scenarios. This means that it will activate when the ambient temperature of the data center is within an optimum threshold of what the cooling system requires.

This method significantly cuts energy costs of the chillers — by just over 30% depending on the ambient conditions. This validation of savings paves the way for upgrading the remaining chillers and creating even greater savings for the facility as a whole.

This low-lift operation produces the highest efficiency possible today for oil-free chillers. Another characteristic of oil-free chillers is that there is no performance degradation over time. In contrast, an oil-based chiller typically loses 10% to 30% of its capacity and efficiency over the life of the chiller — mainly caused by oil coating the heat exchangers and acting as an insulator, which inhibits optimum heat transfer.

The Danfoss Turbocor compressor also supports the data center's 100% uptime guarantee requirements, due to a multiple compressor chiller configuration versus single-compressor oil-based chillers. And because there is no oil system to hinder fast startup times, Smardt chillers powered by Danfoss Turbocor compressors offer 30-second fast restart — the shortest restart time in the industry.

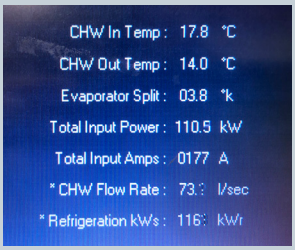
Total solutions provider

Not only were Danfoss and Smardt able to engineer a solution that can operate efficiently in low-lift conditions, but they also collaborated closely to validate this new solution. In this world-class plant, the large heat exchangers and the variable speed drives that were needed to complete the hydronic system were also manufactured by Danfoss. This demonstrates Danfoss's understanding of the total cooling system.

The solution has performed so well at the M1 Melbourne plant that NEXTDC has decided to roll out the SmardtLift low-lift chiller configuration across its fleet of data centers — improving their efficiency across the board.

Who knew that the trick to improving the most well-oiled machine was a customized oil-free chiller?

Danfoss engineers developed a solution that could **operate efficiently** in **low-lift conditions**, and also worked with **Smardt** to validate this new solution.



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