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## California High School Embraces Multi-Unit Tankless System for Reliable, Cost-Efficient, On-Demand Hot Water

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After installing six Noritz NCC199CDV tankless water heaters in a multi-system to replace a malfunctioning boiler, Mater Dei High School is meeting its hot-water needs more reliably, efficiently and affordably than ever.

SANTA ANA, CA — Mater Dei High School opened its doors in 1950 on a foundation of Catholic values and academic excellence. Today, with 2,100 students enrolled, it is the largest non-public school west of Chicago. Its acclaimed athletic program boasts several alumni who have gone on to play in the NFL, the NBA and MLB.

Like any institution, Mater Dei's success depends on the quality of its people and facilities. So when an old, 1-million BTU boiler began malfunctioning in 2017 and placing the hot-water needs of the entire school in jeopardy, officials knew they needed to act. "We had been experiencing perennial problems with the boiler over several years, but it seemed to be getting worse and worse," explains Steve Ritter, executive director of facilities at Mater Dei High School.



**James Motis, owner of Prevent Backflow Plumbing, stands in front of the Noritz NCC199CDV multi-unit system he installed at Mater Dei High School.**

The school employed James Motis, owner of [Prevent Backflow Plumbing](#), to solve its water heating problem. A 30-year industry veteran, Motis specializes in commercial projects, and his customers include Subway, Panda Express and the Natural History Museum of Los Angeles.

Motis had already dealt with multiple service calls for the boiler. Its heat exchanger was wearing out, and a replacement was no longer available on the market. The boiler had reached the end of its life, and it was time to replace it.

## Moving Toward Tankless

The disadvantages of the boiler were clear. It was large and bulky, which made it nearly inaccessible for regular maintenance. Inefficient operation meant it fired even when hot water wasn't needed in order to keep the stored water at setpoint temperature. Perhaps worst of all, it represented a single point of failure—the school was completely dependent on it for all hot water needs.

Initially, Motis and the school considered replacing the old boiler with two boilers. Here, at least, two units provided a limited level of redundancy. But the problems with the storage tank and inefficient operation would have continued.

As a result, Motis considered a second option: replacing the old boiler with several tankless water heaters from Noritz, which he had successfully installed in more than a dozen other applications and with which he felt very comfortable. "Installing six tankless water heaters banked together in a rack system would have cost roughly the same as putting in two new boilers," explains Motis. "The advantages, however, would have been their redundancy of operation, efficient performance, compact design and simple serviceability."

Director of Facilities Ritter was convinced by Motis' confidence. "The on-demand tankless system sounded extremely energy-efficient and a perfect fit for our hot water needs," he says.

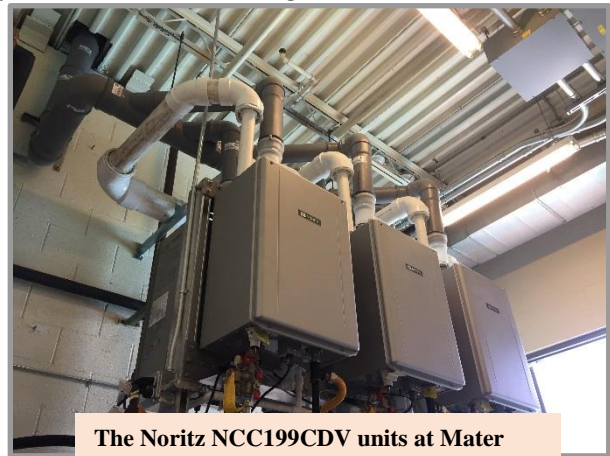
There was one problem. When the need surfaced in late 2017, Noritz did not yet have units certified for common venting—its NCC199CDV commercial tankless water heaters, designed expressly for that purpose, were due to release in January 2018.

Motis and the school insisted on common venting for the time and labor savings it would allow. "Being able to vent a system of water heaters through one, common pipe eliminates the need for multiple roof penetrations and the leak prevention concerns that accompany them," explains Motis. Common venting also allows for fewer support hangars and a cleaner aesthetic for the completed project.

Since the new, common-vent-capable units were only a few months away from release, Motis decided to hold off. During the interim, he connected an NR111 tankless water heater he had in-shop to a 600-gallon storage tank at the school to provide hot water. "This makeshift install held out as long as it needed to, and I received no hot-water complaints from the school," recalls Motis.

## Advantages of a Multi-System

Finally, 2018 came, bringing with it the release of the NCC199CDV, but now there was a new delay. With school in session, Motis couldn't simply install the new water heating system whenever he pleased. The project had to wait until March, when the school would be closed for its Easter holiday.



The Noritz NCC199CDV units at Mater Dei High School provide efficiency, redundancy of operation and unlimited, on-demand hot water.

This, of course, gave him only about one week to single-handedly complete the installation, which included connecting six NCC199CDV tankless water heaters into a banked system before making the final water connections. Motis could have completed the prefabrication work offsite, but at the expense of losing several days of work on other projects. Fortunately, Noritz offered the option of prefabricating the units for Motis, saving him between three and four days of labor.

Motis went with it. Prior to the installation, Noritz connected the six water heaters on a custom-engineered rack and pre-sized the gas and water supply lines. The system was also designed for flexible transport and installation on the job site. "I really liked that they left both ends of the rack open because it allowed me to set it wherever I wanted on the jobsite," says Motis.

There ended up being several advantages to having a multi-system tankless setup. For one, as noted, the multiple units provide redundancy of operation. If one happens to go offline and needs to be serviced, the remaining units will split the BTU demand to maintain the set point temperature. This capability keeps hot water-reliant operations running, even if one or more units need servicing. If all remaining heaters have reached maximum demand, then the flow rate will slightly be reduced to lower the BTU input and maintain the setpoint temperature. For a high school that needs to meet the hot water needs of thousands of students and staff, this reliability is priceless.

Modulation technology also enables the system to track and meet any hot-water demand with pinpoint accuracy, matching energy consumption to present requirements. Unlike with storage tank heaters, there are no standby losses resulting from the burner firing during periods of non-use. When combined for larger commercial applications, the entire system modulates (adjusts) BTU usage to match demand.

Load balancing ensures that operation is equalized across all units, so one doesn't suffer undue wear and tear. This efficient performance, along with the need for one less circulator pump, almost certainly means the school will experience energy savings, although it will take several months to measure this.

### **A Bright, Hot Future Ahead**

The prefabricated tankless system arrived at Mater Dei ready to be connected. Motis spent roughly one day setting the unit and making the necessary water, venting and gas line connections.

Venting was accomplished using polypropylene for the exhaust and PVC for intake, although Motis explains he would use polypropylene exclusively on future jobs. "The polypropylene was so much lighter and easier to install than the PVC," he says. "Not having to lug the heavy PVC around the jobsite and struggle to hang in on the brackets is a huge time and effort saver.

Aside from the heavy PVC, Motis reports no challenges with the installation. "As a single-man operation, getting everything built and connected over the spring break window might have proved challenging if not for the relative ease-of-installation offered by the multi-unit system," he says.

He also notes the ease with which future maintenance can be accomplished compared with the old boiler. Not only is the multi-system more compact and easier for service personnel to maneuver around, but maintenance promises to be less expensive. "The cost of replacing the heat exchangers for several tankless units is lower than replacing one heat exchanger for a boiler," explains Motis. "That was another big selling point."

Since the installation in late March 2018, the system has been functioning as designed. “Typically, no news is good news in the facilities business, but we haven’t received any hot-water complaints,” says Ritter. “The new system generates hot water quickly, efficiently and meets our every need. Moving forward, we’re confident it will continue to outperform our old system and lead to energy savings, thanks to its efficiency.”

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**Hi-res versions of photographs to accompany this case study** are available for immediate download in .tif format by using this link:

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