

Georgia school district learns the value of preventive maintenance

Application Note



Testing Functions Case Study

Energy efficiency, cost effectiveness, safety and comfort of students

With 134 schools and support facilities serving more than 170,000 students, Gwinnett County Public Schools (GCPS), located in the Atlanta metro area, is the largest school system in Georgia. The district is committed to carefully maintaining all of its facilities to support energy efficient and cost effective operations and ensure the safety and comfort of students so that teaching and learning can thrive.

Those efforts have paid off over the years. The school district won the Broad Prize in 2010 and was co-winner of the award in 2014. The Broad (rhymes with "road") Prize is awarded each year to an urban school district that demonstrates the greatest overall performance and improvement in student achievement while reducing achievement gaps among low-income and minority students.

Maintaining heating, cooling, and refrigeration

GCPS is divided into five building maintenance districts to keep its 134 facilities up and running comfortably and efficiently. Mark Lord, HVAC craftsman for the GCPS Norcross Building Maintenance District, based in Norcross, Georgia, is responsible for heating, air conditioning, and refrigeration in seven school buildings and two support facilities within that district.

The schools range from less than 10 years old to more than 40 years old. However, the district continues to upgrade mechanical systems so the oldest equipment Lord works on is less than 25 years old and

most equipment is between five and ten years old.

The school district runs a full preventive maintenance program on most of the mechanical equipment. "We work on most anything that affects comfort or refrigeration, which includes anything with refrigerant, water, or with a pump," says Lord. That includes walk-in freezers and coolers loaded with thousands of dollars' worth of food for the cafeteria, large cooling towers, exhaust fans, fresh air machines, boilers, and water source heat pumps, among others.

Preventive maintenance reduces trouble calls

Lord estimates that approximately 60 percent of his job is preventive maintenance and 40 percent is troubleshooting. The latter includes emergency calls due to no air conditioning, no heat, no water flow from a pump, and any type of refrigeration issue. Those emergency calls require immediate attention and the problem to be resolved within 24 hours.

"We would have more trouble calls if it weren't for our hefty preventive maintenance program. We continue to add new

Tool: Fluke 116 Digital Multimeter, 322 Clamp Meter, 1587 Insulation Multimeter and 773 Milliamp Process Clamp Meter

Operator: Mark Lord, HVAC Craftsman for the GCPS Norcross Building Maintenance District

Application: Preventive maintenance; troubleshooting motor winding problems and problems with wiring within a branch circuit; checking discharge air temperature; ensuring cooling system peak efficiency

“We would have more trouble calls if it weren’t for our hefty preventive maintenance program.”



Measuring the area of a space with a laser distance meter, then taking ambient and vent temperature readings, helps ensure the HVAC system is performing correctly.

preventive maintenance job plans for pieces of equipment that didn’t have one before, which helps keep our break-down and failure rates low,” says Lord.

In addition to checking, tightening, or replacing drive belts and greasing bearings on pumps and motors, Lord’s preventive maintenance routine includes many tasks where he uses Fluke tools. “Every time I need to use a volt meter I use my Fluke 116 DMM because it’s small and light,” says Lord. “I use the volt meter on the 116 every day along with the Fluke 322 Clamp Meter to check amperages. When I change a motor I use those same tools to make sure the motor amperage is within the specs on the name plate. Then I pull out the Fluke 1587 Insulation Multimeter to measure high voltage for the winding test.” When the budget allows, Lord plans to add a Fluke vibration meter to help predict bearing wear on motors and pumps.

Lord has worked with GCPS since 2009 and has worked in the HVAC industry for 25 years. He chooses to use Fluke tools because of their quality. “As an HVAC craftsman I have the flexibility to specify what tools we purchase that I’m going to be directly involved with,” says Lord. “I usually request Fluke because you just know what you’re getting every time. You never have to worry about the quality or the support or anything that comes along with it.”

In addition to diagnosing motor winding problems with the Fluke 1587, Lord uses it when he suspects problems with wiring within a branch circuit, indicated by blown fuses or tripped breakers for no obvious reason. “We have to determine where the fault lies and the 1587 is an invaluable tool for diagnosing and getting to the bottom of a problem so we can get it repaired.”

In fact, Lord has been able to diagnose several nagging issues with the 1587. “Several times I was able to find where the insulation had been breaking down within the conduit of a branch circuit, which had been an ongoing issue for years,” says Lord. “I used the tester to determine that the circuitry was bad, replaced it, and solved the problem.”

Laser thermometer measures ceiling registers without a ladder

Periodically during the school year Lord has to check discharge air temperatures in classroom registers. The task needs to be done quickly to minimize disruption to a class or to get the job done while students are at recess or lunch. For that, Lord uses the Fluke 62 MAX Infrared thermometer.

“If the kids are in the classroom, I can open the door and without them even realizing what I’m doing I can actually aim the 62 MAX at the register in the ceiling, measure the temperature, and close the door and leave, all within just a few



Mark uses his 62 MAX Infrared Thermometer to check refrigeration units in a walk-in cooler, as part of his preventive maintenance program.

seconds," says Lord. "That ability is even more helpful in the gym where the registers may be 30 feet [9.1 meters] in the air. I can quickly tell if the heat or air conditioning is working without doing any further checks."

Preventive maintenance changes with the seasons

Every spring GCPS HVAC technicians embark on cooling system preventive maintenance, which focuses on the packaged heating and cooling units on the roofs of many of the district's older schools. That involves several steps, including cleaning coils, checking amps and volts,

checking refrigerant charges, and cleaning drains. "We have a whole job plan for each type of equipment to ensure peak efficiency," says Lord.

When summer arrives, preventive maintenance moves into high gear. With virtually empty buildings, the HVAC maintenance staff can work on systems that can't be shut down during the school year. So the walk-in freezers and coolers, kitchen exhaust, reach-in refrigerators, pass-through refrigerators, and cold serving lines are gone over with a fine-tooth comb and upgraded where necessary.

One of the summer projects last year was to retrofit some of the older cooling tower fan

motors with variable frequency drives to enhance energy savings and bring them up to par with newer construction. That project continued in the summer of 2014 and has caused Lord to look into the Fluke 773 Milliamp Process Clamp Meter. "When we had just a few VFDs we called the manufacturer's rep out to diagnose and troubleshoot them. But now we have so many, that we need to be versed on programming and troubleshooting them ourselves," says Lord. "In researching what tools we need, I've found that the Fluke 773 is going to be a very, very nice tool to help us diagnose and troubleshoot our VFDs."

"We work on most anything that affects comfort or refrigeration."



With his Fluke 773 Milliamp Process Meter, Mark checks the control signal loop in the low-voltage relay cabinet.



Each classroom needs to be comfortable. Here Mark uses his infrared thermometer to check ceiling vents.

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