

Validating Comfort Complaints With Data Loggers

Employee productivity is, at least in part, influenced by the indoor environmental conditions in which people work. Temperature is often a major factor, and, according to a recent survey by the International Facilities Management Association, thermal comfort complaints were the single most common office complaint in 2003. It almost seems that in any work environment, whether it's an industrial plant or an office park, some employees are always too hot, and others are always too cold.

While the complaints themselves may not always be warranted, the potential dollars lost in productivity due to employee discomfort can be substantial. Since salaries typically make up over 90% of the total operating cost of a commercial building, even tiny increases in employee productivity can mean a lot to a company's bottom line. Studies have shown, for instance, that just a three percent productivity gain can translate into a nearly \$3 million gain in a 500,000-square-foot facility.

Before determining what the root cause of a comfort complaint might be (e.g., lack of proper zoning, poor workspace design, lack of ventilation) and taking corrective action, facilities managers must first figure out whether the subject area is in fact too hot or too cold.

Getting answers

To validate temperature-related comfort complaints, an increasing number of facilities managers and HVAC contactors are relying on battery-powered data loggers. Data loggers are low-cost, compact instruments that incorporate built-in micro processing, high-accuracy temperature sensing, recording, and battery power in a self-contained package. Temperature data loggers employ sensors that can measure temperature, relative humidity, light, and other parameters. The logger monitors and records at user-defined intervals (e.g., every 10 minutes) and stores it digitally into its onboard memory. Many temperature loggers are small enough that they can be placed in hidden, "out-of-the-way" locations to gather information in a workspace without being seen or disturbed. Depending on the amount of built-in memory and the interval for taking readings, data loggers can realistically collect data for several months at a time before reaching their full capacity.

According to Steve Walker, an HVAC Supervisor for Massachusetts-based Genzyme Corporation, data

loggers have been an important tool in investigating comfort complaints at the company's 11-building campus in Framingham, Massachusetts.

"In one of the administration buildings, employees were complaining about their feet being cold," explains Walker. "We put data loggers underneath desks in the area and actually showed that the air was four to six degrees colder than the air above the desks. From this, we were able to determine that there was not enough velocity of heat coming out of the registers to get the air to circulate under the desks, which were built into the walls. Realizing there was a problem in how the workspace was configured, we went back to the design firm and had them make modifications in the configuration."

Ron Mincks, a district energy manager for the Rapid City School District in South Dakota, also uses data loggers to investigate comfort complaints from teachers and other school employees.

"When a teacher complains about classroom temperature," he explains, "we are now able to monitor conditions very easily. In one building I had computerized univents, and the custodian had them coming on at 7am. The teacher was saying that at 9am the room was cold. We couldn't figure why the room would still be cold, so we deployed a few data loggers, and from the data we were able to determine that there was a computer operation glitch that was causing the temperature to drop."

Mincks adds that just the process of using data loggers itself can help with comfort issues. "We've really increased student and teacher comfort just by documenting temperature." Mincks also uses loggers on an ongoing basis to verify that classroom thermostats are working properly, and collects a daily log of temperatures in the classrooms each day.

Using data loggers

Using a data logger involves four basic steps: logger set-up, deployment, data retrieval, and analysis.

Setting up a logger is typically done by connecting the device to a PC and using accompanying logger software to make a number of point-and-click selections. These include how often the logger should take a temperature measurement, and the specific data and time the logger should start recording. Deployment involves determining optimal placement of the logger(s) in the workspace and

placing the logger in the area. Data retrieval involves offloading the collected data onto a PC, laptop or data shuttle. Analysis of the data is typically performed using accompanying data logger software, which allows the facilities manager to quickly and easily translate the temperature data into time/date-stamped graphs that show spikes and drops in temperature over the given data collection period. This temperature data offers facilities managers an accurate and complete picture of the actual temperature activity that occurred throughout the entire monitoring period. The data, in turn, can be used to determine where problems exist.

Capabilities to look for

When evaluating data loggers, there are a number of features and capabilities to look for. First, it's a good idea to make sure that the logger offers an option for offloading data without having to bring the logger back to an office PC each time. Dedicated data logger "shuttles" allow users to conveniently retrieve data from loggers deployed throughout a facility quickly and conveniently.

Secondly, make sure the accompanying logger software enables you to quickly and easily perform tasks such as configuring parameters, launching the logger, and offloading data, with point-and-click simplicity. At the same time, it should offer powerful data plotting capabilities, and enable you to easily export data to other programs, such as Microsoft Excel, for additional analysis.

Finally, look closely at the total cost of ownership when shopping for a data logger. Here are some questions you may want to ask your supplier:

- Will the logger need to be calibrated by the manufacturer periodically, and if so, what are the cost implications over time?
- Will you need to invest in a pricey software package to analyze your results?
- Will you be able to use the AA batteries in your kitchen drawer, or will the logger require a proprietary or hard-to-find power source?
- Are cables included with the logger?

Conclusion

While facilities managers may never be able to put a stop to the age-old "too hot/too cold" battle, they at least have access to compact, affordable tools that can validate the complaints. Data loggers have become the instruments of choice among facilities managers and contractors due to their 24/7 operation, high-accuracy, ease-of-use, and PC-based analysis and reporting capabilities.

For more information about data loggers, please contact Onset Computer Corporation at www.onsetcomp.com or call 1-800-564-4377.

About Onset

Onset Computer Corporation has been producing small, inexpensive, battery-powered data loggers and embedded controllers since 1981, and has sold over one million loggers that are used around the world by over 50,000 customers. The company manufactures a broad range of data logger and weather station products that are used to measure temperature, humidity, light intensity, voltage, and a broad range of other parameters. Onset products are used widely in research, commercial, industrial, and educational applications.

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