Getting Ready to Find and Confirm Problems by Trend Logging

Introduction

Trend logging is used to identify and confirm time-dependent symptoms of energy-efficiency problems. It requires a good operational understanding of the building's HVAC control system. In addition, you may also need the assistance of your Direct Digital Control (DDC) operator/programmer. Newer DDC systems can create trend logs. You may need portable data loggers for older DDC and pneumatic systems.

If you have a complex system, you should investigate each area or system separately. You may miss opportunities if you try to assess too many things at once.

In addition to the pointers provided here, you should familiarize yourself with the Symptom-Diagnosis Tool, which provides specific guidance on how to use trend logs to diagnose the cause of many symptoms of energy waste.

Allotting Time

Spotting problems by trend logging is not a quick process. The time period required for a trend log may vary from several hours to several months, depending on the type of system being investigated.

Trend logging should be set up for constant monitoring. Some problems are only evident when the facility is unoccupied.

Carefully select the appropriate interval for reading data for each trend log. Fifteen-minute intervals are typically too long for a dynamic system, while five-second intervals may give you more data than you can effective use.

Do the work in an appropriate season. Do not trend log the chiller plant in the winter when it is shut down, or the boiler plant in the summer when it is not operated. For effective trend logging, the monitored system must be operating under representative conditions.

Preparing to Trend Log

Studying As-Built Plans

Study the as-built plans of the DDC system before starting the trend logging. Check them for accuracy. (Sometimes the as-built plans are actually final engineering drawings that were wrongly stamped as as-built plans.)

If the as-built plans are not accurate, you have the following options:

- If the building is still within the warranty period, ask the contractor for the correct as-built plans of the building.
- Hire your system representative to conduct a field survey and create as-built plans for you.

Observing Safety Precautions

If you are installing portable data loggers:

- Get familiar with all safety regulations in effect on-site.
- Do not alter the operation of any system or equipment while doing the installation. Note unusual conditions for future analysis and correction.
- Report any life-safety concerns immediately to the facility manager.

- Make sure all areas are adequately lit. (Mechanical rooms are often under-lit due to pipe and duct interference with the lighting layout. If you can't see well you can't safely install the loggers.)
- Install the data loggers so that they are easily accessible.
- Write down the locations of all installed data loggers. Take pictures when possible, as someone else may retrieve the loggers at the end of the monitoring period.

Analyzing the Data

Once the data is collected, it should be sorted and graphed to look for abnormal conditions. This is where the operational knowledge of the systems is essential. Here is a short list of commons issues to look for.

- Does the equipment start and stop as scheduled?
- Does any equipment short-cycle (start and stop every few minutes)?
- Are the temperatures setpoints maintained or does the equipment cycle more frequently than required?
- Do the Variable-Speed Drives (VSDs) track setpoints properly or cycle their speed erratically?
- Do temperature resets look appropriate based on outside-air temperatures? (Does the chilled-water supply get colder when the outside air gets hotter or the heating-water supply gets hotter when the outside air gets colder?)
- Do both chilled and heating water pumps operate at the same time?

Analyzing graphical information can take years to master so don't hesitate to ask for help if you are not sure what the graphs indicate.