Taming the Fault List

SMART ENERGY ANALYTICS CAMPAIGN

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In the Smart Energy Analytics Campaign, we often hear that organizations that have implemented FDD are (at least initially) in fault overwhelm. As a response, we gathered some strategies to help keep your list of faults manageable and help keep your operations staff on-board with using FDD.

1. Implement FDD gradually instead of all rules at once. We have participants that only implement a few rules on all AHUs or select one AHU to work out all the kinks before expanding to the other equipment. This also gives operators time to get used to the software, correct some faults and feel successful, and not be as overwhelmed by faults. Some common early rules to implement:

- Identifying overrides
- Sensor issues (part of commissioning the system)
- Add rules for issues that are known or suspected by operations staff in order to gain experience with the FDD and understand the severity of the fault
- Add rules for what are typically the largest energy savers: air-side economizers, valve leak-by, simultaneous heating and cooling, and supply air temperature or static pressure reset schedules.

2. Prioritize faults by energy cost waste, severity as a maintenance issue, and severity as a comfort issue. FDD tools estimate energy savings by fault automatically or have ways to program system parameters so the simple engineering calcs they use are in the ballpark. For maintenance and comfort categories, FDD tools may assign severity rankings (1-10, for instance).

3. Increase the threshold for triggering a fault, then adjust it accordingly after you address the largest issues. For the parameters you are basing the fault condition on, you can set the thresholds wide to start with, then once you've found the largest problems, narrow the thresholds to find additional issues. For example, the threshold could require the fault condition to be in place for at least an hour; or the threshold could allow for +/- 3 degrees before a supply air temperature reset fault is triggered. Then narrow this range down over time.

4. Critical alarms should still be alerting operators through the BAS. Most FDD implementers continue to use their building automation system for the critical alarms (equipment offline) and reserve the FDD rules for things that need to be fixed or are wasting energy but aren't mission critical.

5. Calibrating critical sensors can reduce faults. Outside air temp is involved in a lot of control routines so it should be calibrated regularly. Supply air temp is another. FDD systems can flag sensors that seem to have problems, so you don't have to calibrate everything if you have sensor error rules.

6. Daisy chain the fault conditions. Make sure your fault algorithms are complex enough to account for the conditions that are related to the same fault. For example, the overall fault of chilled water valve not closing properly might have these 3 faults related to it: 1) Cooling occurring when all cooling coils signaled off based on preheat and discharge air temps; 2) Chilled water coil active when signaled off based on chilled water temperature measurements; 3) Simultaneous preheating and cooling based on air handler temperature differences. Those 3 faults might be listed separately in an FDD tool, but it's easier when the software groups them together automatically as related faults. *(continued on next page)*

7. Use a fault silencer (we have one participant that programmed a fault silencing functionality in their FDD tool). The purpose of this is to silence faults that are known issues and are being addressed or will be addressed in the coming months. The operator can bring up all the silenced faults to review and update progress, but they don't clutter the list with known faults that are in-progress.