



Greater efficiency supports patient care.

UTILIZING FAULT DETECTION AND DIAGNOSIS SOFTWARE

All ECM content was independently developed and reviewed to be vendor-, product-, and service provider-neutral.

DESCRIPTION

Fault-detection and diagnostics (FDD) software is a tool that uses building automation system (BAS) data to identify facility performance issues. FDD Software is used to monitor building operations, improve energy usage and overall facility performance. Facility operators can leverage existing “big-data” from the BAS to optimize buildings for high levels of performance. Fault-detection and diagnostics is occasionally referred to as Monitoring-Based Commissioning (MBCx).

PROJECT TALKING POINTS

- FDD software is a non-invasive method for improving building performance, addressing areas of concern, and solidifying a preventative maintenance program.
- BAS data is easily obtained and viewed with FDD software, which makes problem-solving easier.
- This software improves the effectiveness of building commissioning and is excellent for maintaining savings from previous energy conservation projects.
- Each building is unique; many FDD software packages provide customizability to perfectly fit any type of building.
- Easy analysis of building data allows maintenance staff to more quickly address a problem, reducing reactive maintenance time and equipment downtime.
- Existing energy savings measures can be maintained using FDD software.

TRIPLE BOTTOM LINE BENEFITS

Cost Benefits: Commissioning services are more cost-effective when supplemented with FDD software. Reduced number of reoccurring building faults corresponds to lower energy usage and associated costs.

Environmental Benefits: Reducing energy usage reduces greenhouse gas emissions. Improved preventive maintenance programs a facility’s equipment life. With reduced replacement rates of large mechanical equipment, less waste is added to landfills.

Societal Benefits: Increased building performance and reliability will help to ensure a safe environment of care for all occupants. Reduced energy and operational costs can be re-invested into healthcare initiatives, better serving the patient population.

PURCHASING CONSIDERATIONS

When pricing a fault-detection and diagnostics project, is it critical to consider what points need to be monitored and what is available on the BAS. Before doing the project, a thorough BAS survey is required to know what equipment points are trended and what points will be used in the FDD project. Even if a BAS has limited repository space, FDD software can allocate data space much more effectively and can hold decades worth of building data. Once the necessary points for the software installation are determined, then a price can be calculated for the project. Different software brands will offer unique solutions with different pricing models and these must be thoroughly researched before purchasing. Below is a more in-depth description of how FDD software is priced.

Involve organization IT and building controls experts early in project development. IT and controls barriers/requirements may dictate what software is best for an organization.

HOW-TO

1. Create a project group involving the software installation company, facilities dept/building owner, IT department, and possibly commissioning engineers. Hold a preliminary discussion of the pros and cons of this type of project. This will determine if all parties agree with the project and if opportunities exist.
2. The software installation company should perform a thorough survey of the facility's BAS to determine the following:
 - a. What data is being trended to the BAS database
 - b. What data or points are not currently available on the BAS
 - c. The approximate size of the software installation
 - i. Will it just be for a few isolated systems, or a whole campus?
3. The commissioning engineers and facility staff should also analyze the BAS data to determine where opportunities exist to reduce building faults.
4. The party performing the software installation will then proceed with IT security screening to ensure that no data will be at risk of a security breach. Healthcare networks often have security and legal procedures to determine whether a software should be allowed to interact with a facility's data or network.
5. The software can now be installed and connected to a facility's BAS database. This will begin to store data in the FDD software, enabling analysis.
6. Customization to the software can now be performed. This includes, but is not limited to:
 - a. Fault rules and flagging
 - b. Key performance metric (KPI) tracking
 - c. User interface customization
 - d. Data visualization tools
 - e. Custom apps/views generated for specific points/zones
7. Ensure regular maintenance of the software. The software may now be utilized to address the outlined project scope issues.

REGULATIONS, CODES AND STANDARDS, POLICIES

Currently no standards or codes exist for fault-detection and diagnostics software as they have been developed within the last decade. FDD software is designed to help ensure a facility stays within ASHRAE standards, but no standards exist today that define a fault-detection and diagnostics software.

CROSS REFERENCES

[LEED v4. For BD + C: Healthcare](#)

- Water Efficiency
 - Prerequisite -Building-Level Water Metering
 - Credit -Cooling Tower Water Use
 - Credit-Water Metering
- Energy and Atmosphere
 - Prerequisite - Fundamental Commissioning and Verification
 - Prerequisite - Building Level Energy Metering
 - Credit- Enhanced Commissioning
 - Credit -Optimize Energy Performance
- Indoor Air Quality
 - Prerequisite - Minimum Indoor Air Quality Performance
 - Credit -Indoor Air Quality Assessment
 - Credit- Thermal Comfort

[LEED v4. For Operation & Maintenance: Existing Buildings](#)

- Water Efficiency
 - Prerequisite- Indoor Water Use Reduction
 - Prerequisite- Building-Level Water Metering
 - Credit- Outdoor Water Use Reduction
 - Credit- Indoor Water Use Reduction
 - Credit- Cooling Tower Water Use
 - Credit- Water Metering
- Energy and Atmosphere
 - Prerequisite- Energy Efficiency Best Management Practices
 - Prerequisite- Minimum Energy Performance
 - Prerequisite- Building-Level Energy Metering
 - Credit- Existing Building Commissioning- Analysis
 - Credit- Existing Building Commissioning- Implementation
 - Credit- Ongoing Commissioning
 - Credit- Optimize Energy Performance

- Credit- Advanced Energy Metering
- Indoor Environmental Quality
 - Prerequisite- Minimum Indoor Air Quality Performance
 - Credit- Enhanced Indoor Air Quality Strategies
 - Credit- Thermal Comfort
 - Credit- Interior Lighting

RESOURCES

[Understanding How Fault Detection and Diagnostics \(FDD\) Tools Work](#)

[MIT Climate – Measuring Savings from Fault Detection and Diagnostics](#)

[Fault Detection and Diagnostics for Commercial Heating, Ventilation, and Air-Conditioning Systems](#)

[Datasets, Benchmarks, and Testing Frameworks for Automated Fault Detection and Diagnostics \(AFDD\)](#)

[Fault Detection and Diagnostics – University of Iowa](#)

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