Facility AnalytiX®

Product Brief v10.95

November 2017

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Microsoft Partner

VISUALIZE HISTORIZE MOBILIZE ANALYZE IoT CLOUD

ICONICS

Make the Invisible Visible™

Predictive Software for Facilities Management

Corporations and Government entities today demand that their facility portfolios are managed with ever tightening goals for both cost efficiency and environmental impact. The ability to integrate information from all building equipment, environmental sensors, occupancy tracking and energy metering, and to visualize it in a meaningful manner is critical to achieving operational goals.

Facility AnalytiX® Dashboard for the Water Industry

Facility AnalytiX® is a predictive building automation solution that leverages ICONICS' advanced Fault Detection and Diagnostics (FDD) technology at its core. It incorporates algorithms that weigh the probability of faults and advise management, operators and maintenance personnel of actions to prevent equipment failures or excessive use of energy. When equipment failures occur, advanced software technology provides automatic guidance to a list of causes sorted by probability, resulting in reduced downtime and lower costs to diagnose and repair. Information obtained from Facility AnalytiX can be used to:

- Predict, reduce and eliminate equipment downtime
- Automate fault detection and deliver real-time notifications
- Reduce maintenance and determine probable causes
- Improve reliability and control
- Improve overall environmental quality
- Be notified "anywhere, anytime and on any platform"

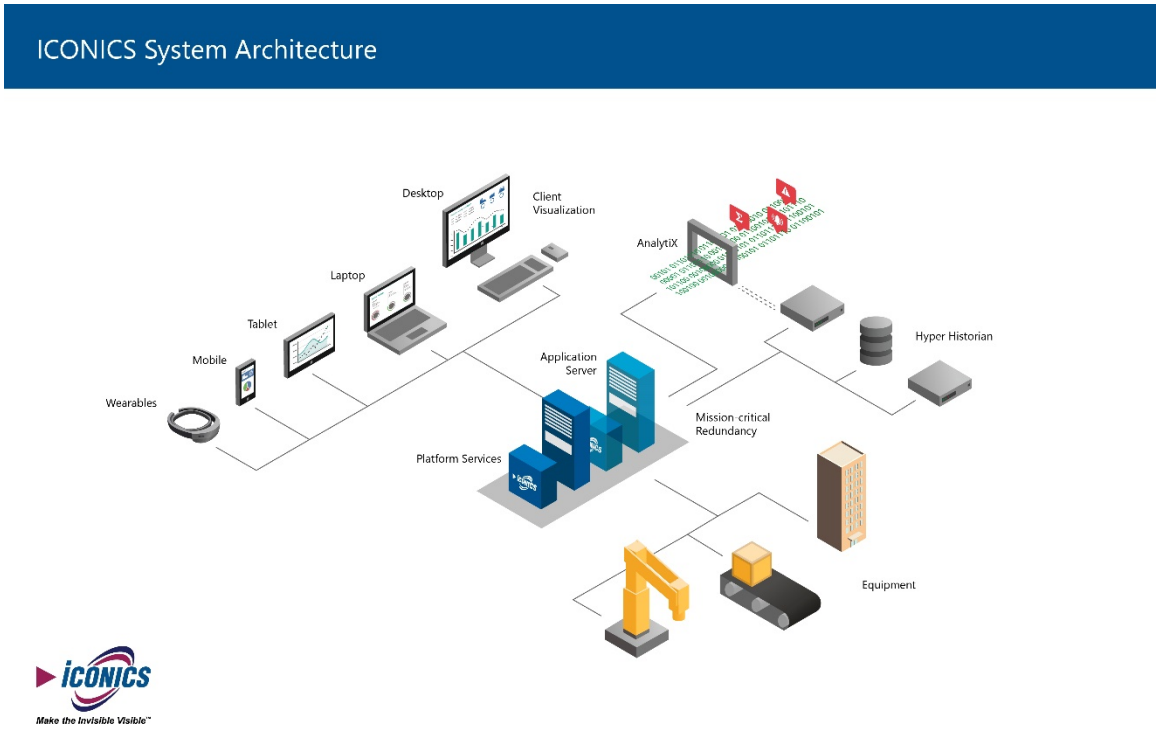
Features and Benefits

The goal of Facility AnalytiX is to detect and diagnose faults for various types of building and manufacturing equipment. The Facility AnalytiX service uses powerful Fault Detection and Diagnostics algorithms for determining probable causes when abnormal conditions are detected on monitored equipment. The following is a list of high-level features and benefits of Facility AnalytiX:

Feature	Benefit
Automatic Fault Detection and Real-time Notifications	Enables users to predict, reduce and eliminate equipment downtime.
Universal Connectivity	Universal Connectivity includes integrated OPC, OPC UA, BACnet, SNMP, Modbus, Databases, Web Services and many more, enabling immediate collection of data.
Robust and Scalable	Built on top of the powerful ICONICS Platform Services, the system is proven to collect data from just a few assets, to multi-campus or multi-site deployments.
Quick to Deploy	Faster ROI leads to more immediate realization of maintenance savings achieved through the insight provided by Facility AnalytiX.
Highly Configurable Visualization Interface with Drill-down Charts and Grids	Insightful analysis results in reduced maintenance time by determining probable causes, and allows users to drill down into the root cause of equipment faults.
Standard Fault Diagnostic Models for Popular Building Equipment	Speeds time to deployment by allowing users to leverage pre-defined models and templates.
Preconfigured Fault Reports	Reports delivered on a schedule, on demand or on event help to pinpoint efficiency offenders.
Be Notified Anywhere, Any Time and on Any Platform	Information can be delivered to the desktop, to any browser, be built into Microsoft SharePoint® collaboration portals, or to mobile devices.

Facility AnalytiX Solution Architecture

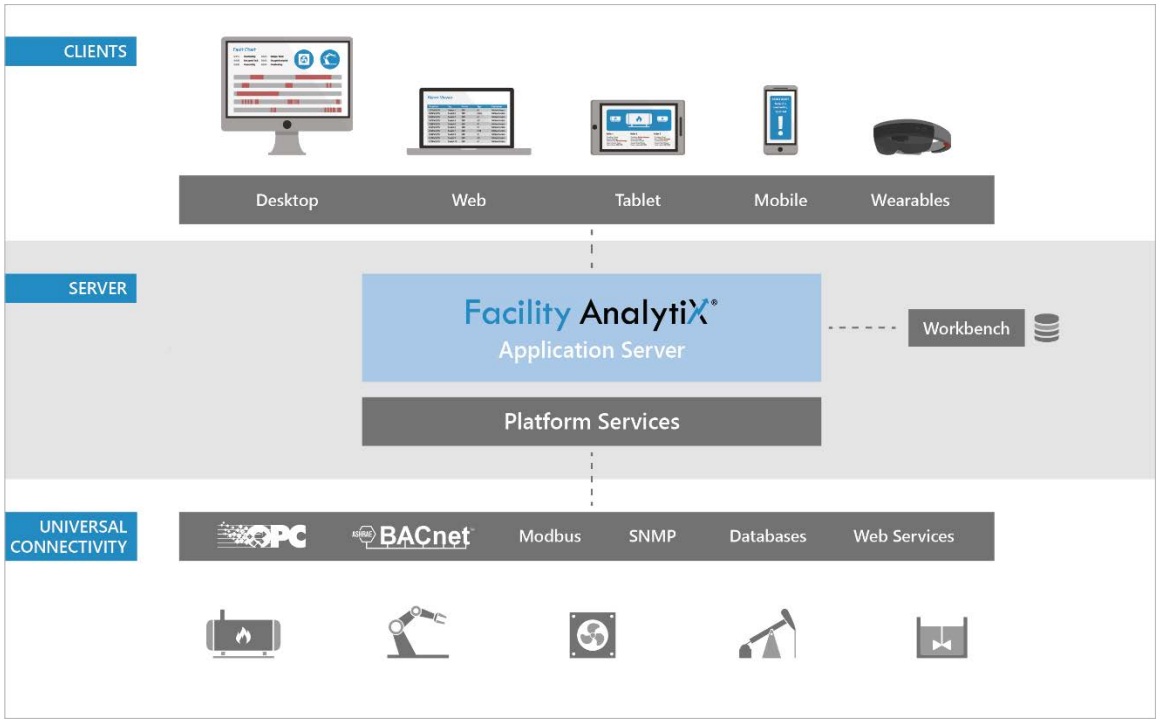
Facility AnalytiX is part of the AnalytiX suite of operational excellence solutions from ICONICS, built on top of the powerful Platform Services and fits into the overall ICONICS V10 system architecture as shown in the diagram below:



ICONICS System Architecture

Facility AnalytiX monitors the system for faults and uses its advanced Fault Diagnostic Engine to determine and suggest the most likely causes for each fault to the user. The Fault Diagnostic Engine populates the Facility AnalytiX application database tables with information about each fault along with its probable causes and some relevant metadata for querying purposes.

The Facility AnalytiX solution architecture (shown below) is broken up into several different key areas: the Workbench configuration provider, which allows users to configure assets, faults and diagnostic models, and includes a comprehensive Rules configurator for faults, Runtime Visualization via PortalWorX™ for Silverlight (PortalWorX-SL™) or PortalWorX for SharePoint (PortalWorX-SP™), the Application Database, Fault Detection Engine, Fault Diagnostic Engine, and a comprehensive web services framework that connects it all together.



Facility AnalytiX® Solution Architecture

Facility AnalytiX uses a Microsoft SQL Server database engine as its configuration and runtime data storage repository. When the Facility AnalytiX engine detects a fault, it analyzes the active symptoms from the relevant Diagnostic Model in order to determine the most likely cause for that fault. This is a new and unique approach to Fault Detection and Diagnostics that relieves the end user from the complicated task of tracking the active symptoms and guessing at the most likely cause based on knowledge alone, or calculating complex probabilities by hand.

Information can then be retrieved by asset or by fault, and distributed over time: hourly, daily, weekly, monthly or annually summarized data. As a result, users can quickly leverage highly sophisticated data queries and reports with ease to visualize fault information using Facility AnalytiX' FDD Viewer or any open database compatible client.

Fault diagnostics information is available to clients such as GraphWorX64™, ReportWorX™, PortalWorX-SL, PortalWorX-SP, MobileHMI™, and third-party systems. Information can be accessed either via open database connectivity methods or through ICONICS Platform Services using the Unified Data Browser, and of course via the rich visualization tools provided out of the box as part of Facility AnalytiX.

Fault Detection and Diagnostics Solution for Any Industry

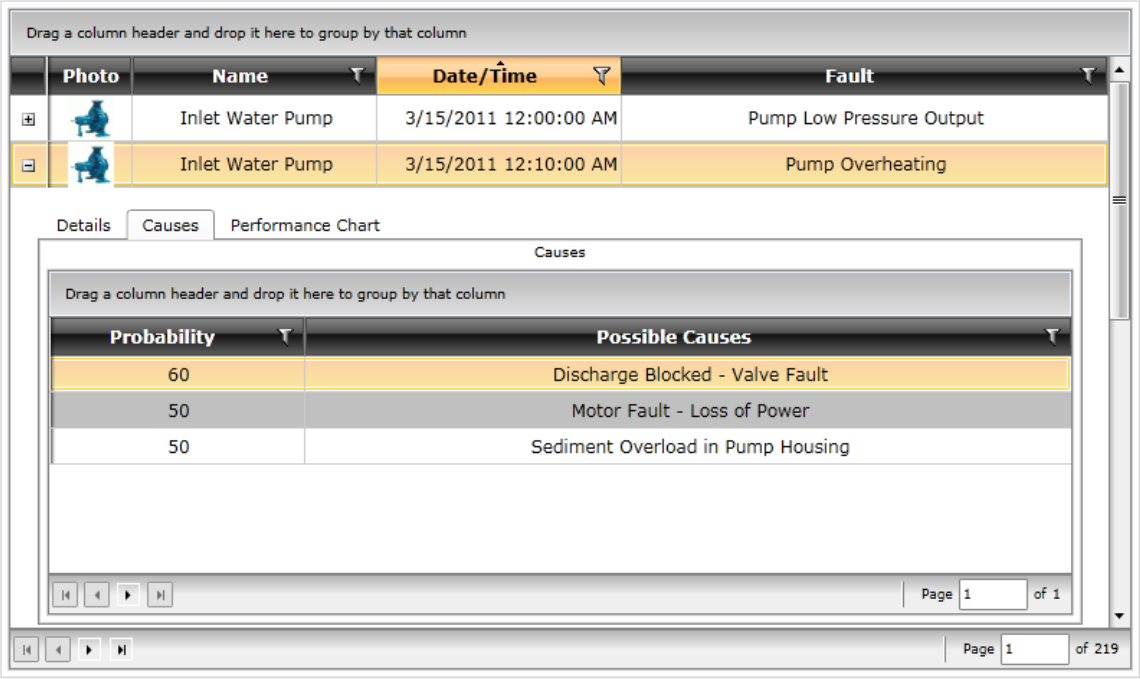
Any manufacturing plant, building or facility interested in analyzing its equipment for faults and diagnosing probable causes is a great fit for Facility AnalytiX. It is the ideal solution for reducing downtime, preventing equipment failure, and notifying users when corrective action should be taken. Facility AnalytiX simply plugs into your existing network and easily connects up to equipment as desired. It is best suited for corporations that are looking to reduce equipment downtime and reduce overall operational costs, and is most-commonly used for the industries of facilities management, utilities, large industrial plants, manufacturing plants and multi-site industries such as retail. Below are some examples of the industries that can benefit from Facility AnalytiX:

- Building Controls and HVAC
- Air Conditioning and Lighting
- Wind Turbine and Wind Parks
- Utilities and City Heating Stations
- Solar Facilities
- Geo Thermal and Bio Gas Power
- Water and Wastewater
- Heating and Cooling
- Oil and Gas
- Conveying and Packaging
- Pharmaceutical
- Heavy Industry

Automatic Fault Detection and Diagnostics Engine

In modern automation and in most control systems in general, a great deal of attention is devoted to the problem of Fault Detection and Diagnostics. One part of FDD methodology deals with the ability of a control system to detect and report (or, in some cases, predict) equipment failures or abnormal operating conditions while another part focuses on problem analysis and failure cause diagnostics.

The concept of fault detection usually falls under the area of Alarms and Events management. OPC Alarms and Events specifications define how OPC A&E-enabled servers generate events to notify operators about various occurrences in the system. ICONICS' AlarmWorX32 and AlarmWorX64 Alarm Servers are both fully OPC A&E-compliant event servers. Facility AnalytiX leverages the OPC A&E standard to make sense of complex alarm systems in order to guide operators to a list of causes sorted by probability.



Facility AnalytiX®' FDD Viewer showing causes sorted by probability

Facility AnalytiX' FDD technology addresses the need for a set of tools to perform fault analysis and diagnostics, with a goal to determine a root cause or a limited set of possible reasons that lead to the appearance of specific faults. Both ideal simulation and historical pattern search approaches to fault diagnostics require very specific detailed knowledge of the equipment types being diagnosed.

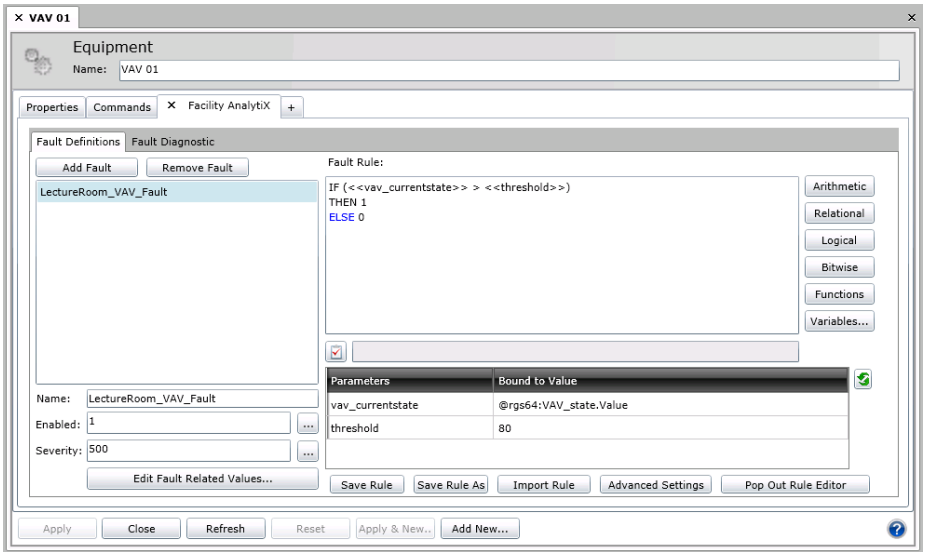
Facility AnalytiX algorithms are based on advanced research standardized by the National Institute of Standards and Technology (NIST). Traditionally, ICONICS' SCADA applications were developed to target the most generic types of devices without regards to specific details about particular pieces of equipment like boilers, air handler units, VAV boxes, etc. This alarm pattern recognition technique allows formal generalizations to be applied to any equipment type to create a powerful solution.

What is a Fault?

Within the context of Facility AnalytiX, a fault is a rule or expression based on time, change of state, and a combination of any parameters related to a particular piece of equipment, that quantifies when that equipment is not operating to specification. For example, if you have an air conditioner or chiller that is supposed to be able to cool a room by 1 degree every 5 minutes, it could be considered in a "faulted" state if after 30 minutes it has only cooled the room by 2 degrees. The chiller in this case is not necessarily broken, but there is something preventing it from operating at ideal efficiency. That can be quantified as a "fault".

Faults allow users to be notified when such conditions occur, in order to more quickly diagnose and correct potential issues with their equipment and machinery. Faults can be applied to virtually ANY type of equipment or machinery, including packaging machines, extruders, wind turbines, robots, and many more. Facility AnalytiX' Fault Diagnostic Engine detects when a fault is active and references the relevant diagnostic model along with advanced algorithms to weigh the probable causes of that fault based on the specific symptoms that are present on the equipment at that time. Possible causes are then presented to the user in an intuitive tabular format, in the order of most likely to least likely causes.

Faults are defined within the Workbench using the powerful ICONICS Rules Editor, with full equation parsing and syntax checking. The Rules Editor integrates with ICONICS' Expression Engine to offer a wide variety of functions in different categories including arithmetic, relational, logical, bitwise, string and date/time, allowing for ultimate flexibility in defining faults.



Defining Faults in the Workbench

Standard Fault Rules for Popular Building Automation Equipment

Facility AnalytiX includes over 200 preconfigured fault rules for the most popular types of Building Automation equipment. Each fault incorporates a rule, associated cost calculations, required points, description, and is completely parameterized so that you can cater it to your specific needs. The table below offers some examples of the types of faults that are included with Facility AnalytiX:

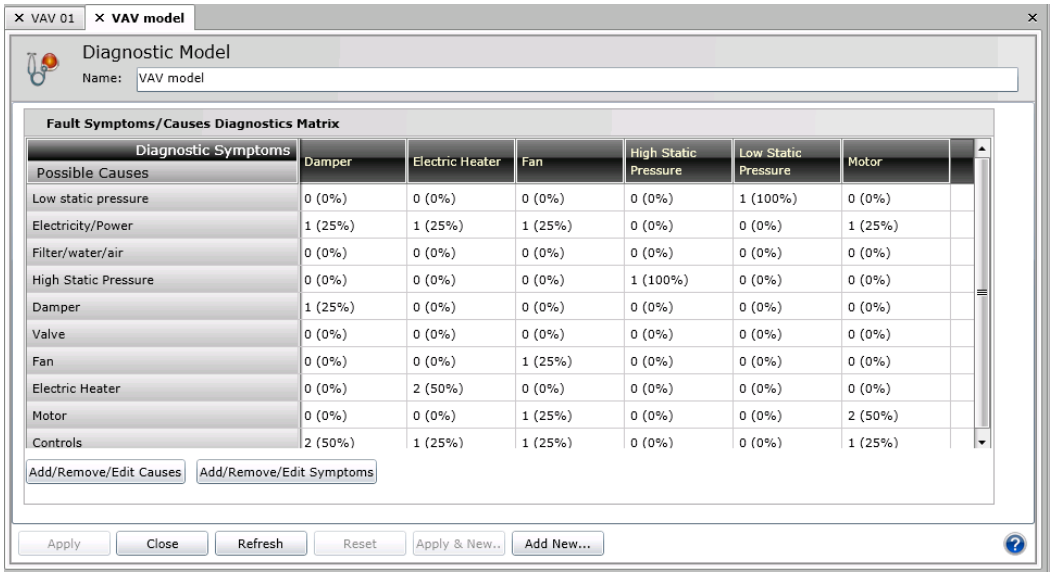
Fault Rules Library	
Air Conditioning Unit	• Bad Outside Air Temperature Sensor Location • Discharge Air Static Pressure/Temp Reset • Economizer Optimization • Minimum Fan Speed • Mixed Air Setpoint • Occupied/Unoccupied Setpoint • Outside Air Damper Stuck Open/Closed • Return Fan Speed / Supply Fan Speed • Simultaneous Heating and Cooling
Air Handling Unit	• Cooling Coil Valve Leaking • Dirty Filter • Economizer Optimization • Heating Coil Valve Leaking • Minimum Fan Speed • Off Hours Operation • Outside Air Damper Stuck Open/Closed • Overcooling • Simultaneous Heating and Cooling
Boiler	• Circulation Pump Operation • Excess Operation • High Outside Air Lockout Setpoint • Overheated Supply Water
Chilled Water and Hot Water	• Bypass Valve Operation • Excess Operation • Failed Differential Pressure Setpoint • Failed Flow Meter • High Differential Pressure Setpoint • Low Delta-T / Low Chilled Water Temp Setpoint • Minimum Flow Setpoint • Pumping Minimum • System Lockout
Chiller	• Failed Closed Isolation Valve • High Approach Temperature • Leaking Isolation Valve • Low Delta-T / Low Chilled Water Temp Setpoint • Poor Operating Efficiency

Cooling Tower	• Fan In Hand • Fan Operation • Fan Setpoint • Minimum Fan Speed • Excessive Pan Heater Operation
Fan Coil Unit	• Broken Fan Belt or Stuck Closed Cooling Coil Valve • Cooling Coil Valve Leaking • Dirty Filter • Failed Discharge Air Temp Sensor • Fan Speed • Occupied/Unoccupied Setpoint • Off Hours Operation • Overcooling/Overheating • Simultaneous Heating and Cooling
Terminal Unit (including RTUs and Mixed Air Unit)	• Damper Stuck Open/Closed • Heating Terminal Unit Fan Operation • Occupied/Unoccupied Setpoint • Off Hours Operation • Overheating • Simultaneous Heating and Cooling • Unoccupied Fan Operation / Low Fan Speed
VAV	• Damper Stuck Open/Closed • Failed Discharge Air Temp Sensor • Fan Speed • Occupied/Unoccupied Setpoint • Off Hours Operation • Overheating • Simultaneous Heating and Cooling
Create Your Own…	• Facility AnalytiX' flexible framework empowers you to add your own equipment faults and diagnostic models as they relate to your particular industry or application.

Diagnostic Models Drive Advanced Algorithms for Fault Analysis

Diagnostic Models are used to determine the most likely causes for a fault under given conditions. They consist of symptoms and causes, which are laid out in a tabular matrix format so that users may adjust how they relate to one another. The numbers within the matrix affect the weighting that Facility AnalytiX assigns to the various causes, and can correspond to probabilities from equipment manufacturers' users manuals or specifications for example. Some users may elect to fine-tune probabilities based on specific knowledge captured from maintenance technicians.

A symptom is any state of condition related to specific equipment that the user/manager would consider cause for concern or "alarm". A cause is a reason for a resulting symptom that would create concern or "alarm". Causes and symptoms vary greatly by equipment type, which is why Diagnostic Models are typically defined on a per equipment type basis. A number of Diagnostic Models are included with Facility AnalytiX, but users are of course free to create their own models as desired.

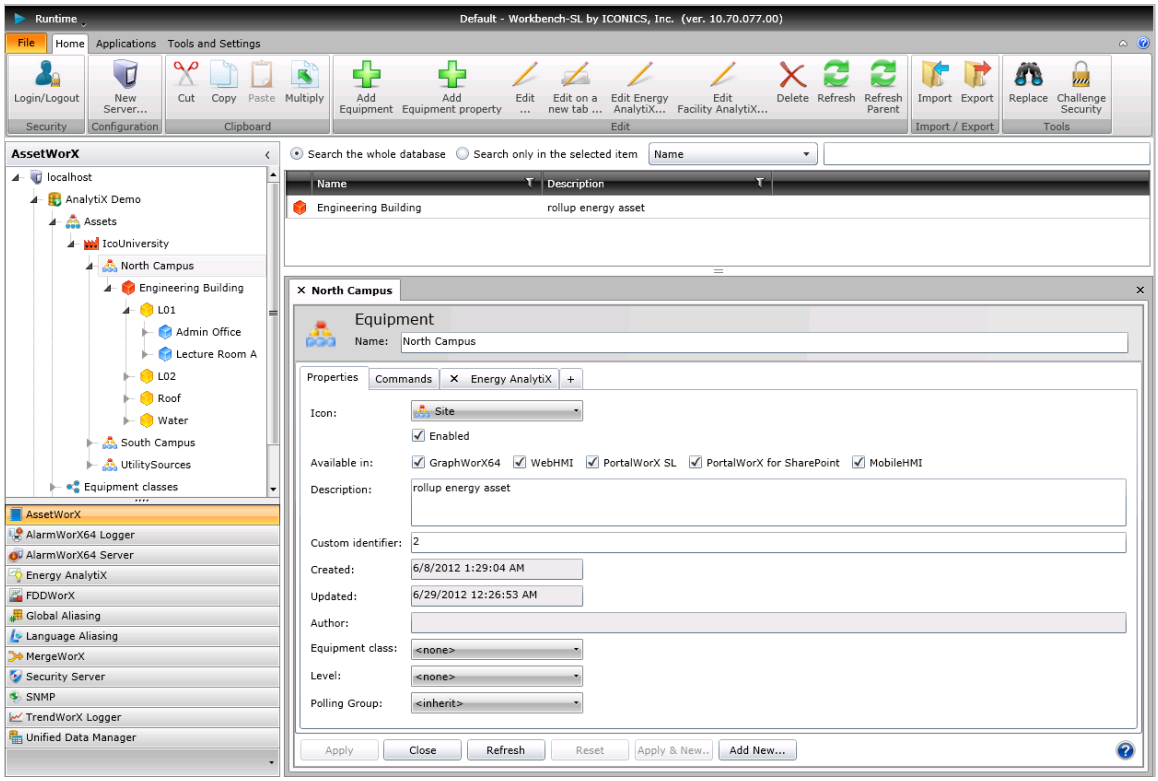


Sample Diagnostic Model for VAV

Web-based Configuration within the Workbench

Facility AnalytiX is built on top of the powerful AssetWorX provider in the Workbench. This allows users to configure Facility AnalytiX Assets right within an ISA-95 compliant hierarchical tree structure that mimics the layout of their plant, building, campus or enterprise.

With Web-based configuration, Facility AnalytiX is easy to setup and deploy, integrating with the most popular BAS, SCADA and building systems. An extensive library of standard HVAC equipment diagnostic models speed setup and configuration, while a rules based editor lets youeasily customize and add new equipment diagnostic models.



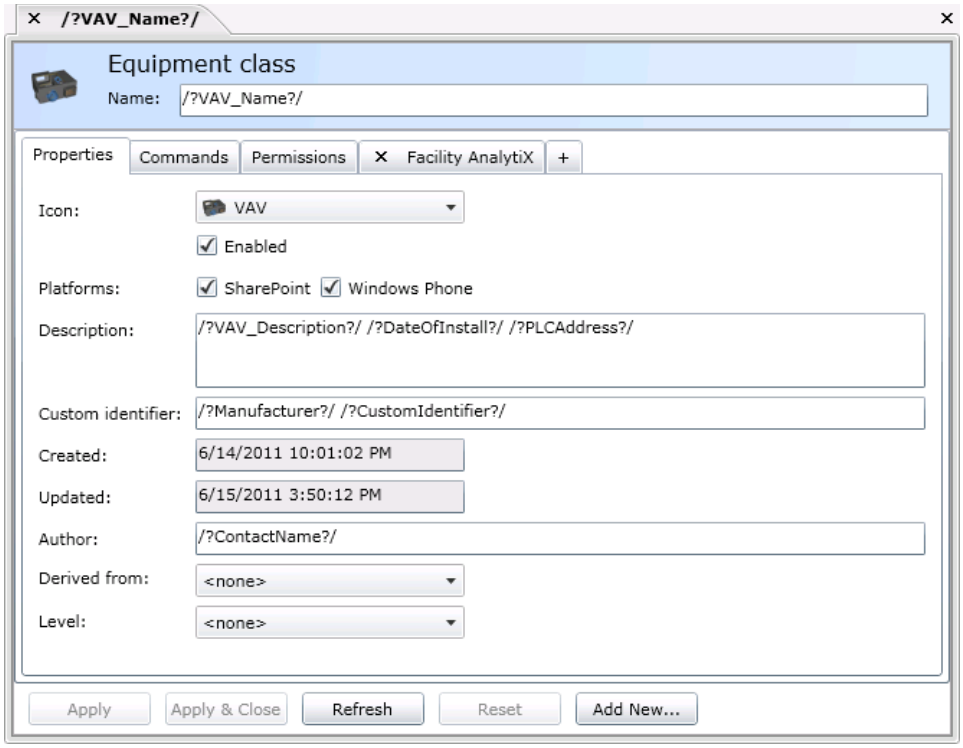
AssetWorX Workbench Configuration Environment

AssetWorX is an additional architectural layer within ICONICS Platform Services that enables the system to be engineered and operated based on an intelligent asset technology configured to represent a customer's enterprise. Assets can be defined in a hierarchical model in one centralized system for analysis, in the form of physical locations and business units, along with equipment such as buildings and machinery, as defined by the ANSI/ISA-95 standard.

AssetWorX offers a centralized repository for integrating business and manufacturing intelligence systems. The ISA-95 compliant tree structure provides a functional hierarchy for navigation and for data roll-ups, along with a way to organize data sources and physical entities. For example, rather than OPC data sources being organized based on the address space of the server itself, these data sources can be organized based on the geographic/physical locations of the associated sensors (for example, by site, building, floor, and machine).

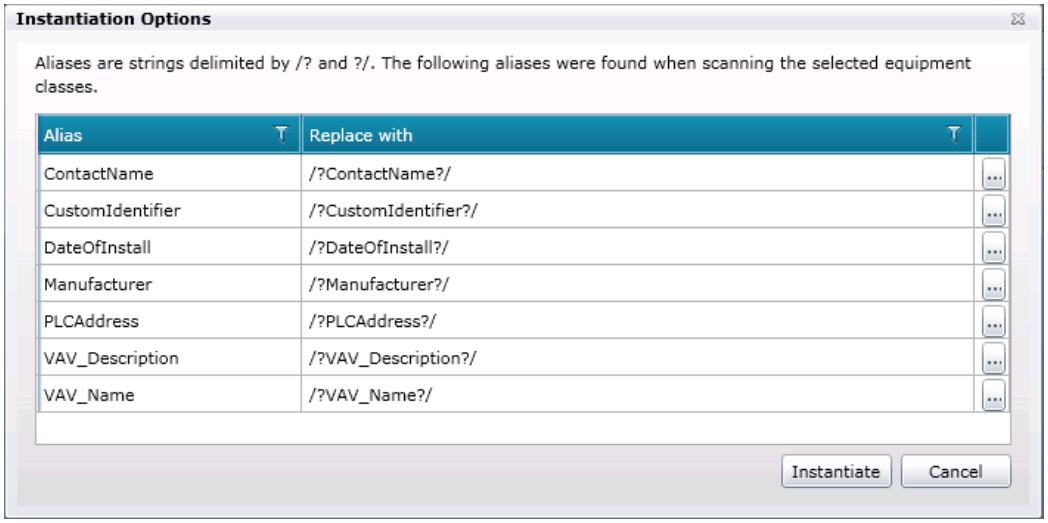
Facility AnalytiX integrates with the AssetWorX for defining assets, faults, diagnostic models, relationships between those assets, security on those assets, and a powerful commanding infrastructure for rich visualization in the runtime environment.

Equipment Classes: AssetWorX also introduces a time-saving concept called Equipment Classes, which allow you to "template" any asset or equipment type for rapid deployment. Facility AnalytiX users can define equipment classes for different types of equipment for example, which might include boilers, chillers, air handling units, cooling towers, or VAVs from a variety of different manufacturers. Users can also template machines, meters, or even entire buildings or campuses for rapid deployment.



Configuring a VAV Equipment Class

When instantiating an Equipment Class the user is presented with a list of parameters that the Equipment Class expects. For a Building-level template this might include pieces of information like Building Owner, Construction Year, Floor Space, and so on. For an equipment-level template it might include properties like Manufacturer, Description, Contact Name, Date of Install, and PLC address. This powerful concept of parameterization is what provides for such flexibility in Facility AnalytiX data analysis capabilities, and enables users to analyze their information from a virtually unlimited number of angles.

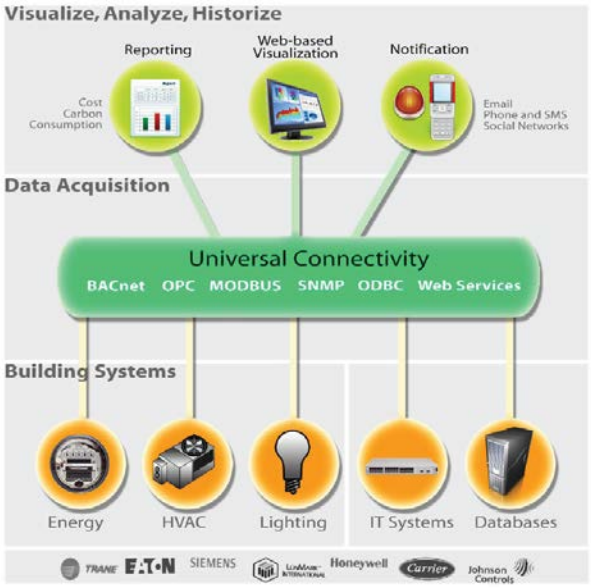


Instantiation of a VAV Equipment Class

Connect to Virtually Any Building or Factory Infrastructure

ICONICS software provides the ability to integrate information from a broad range of equipment and systems used throughout your buildings today. ICONICS' continued integration of open communications standards extends your options for equipment suppliers now and in the future.

Facility AnalytiX provides the infrastructure you need to diagnose and analyze your equipment. It aggregates and calculates derivations and provides very intuitive point-and-click roll up. With Facility AnalytiX you literally just "Plug-Us-On" and instantly integrate to almost any equipment that is already networked in a facility. In many cases no construction is necessary if sensors are already in place.



ICONICS Platform Services – Universal Connectivity Layer

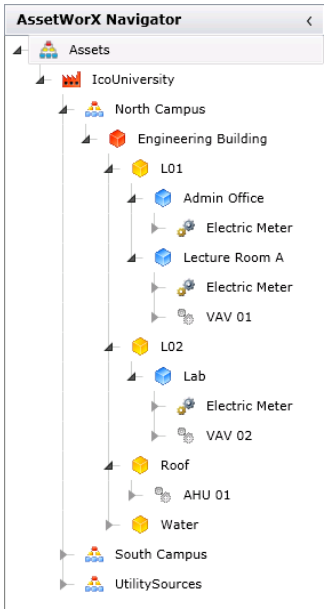
Context-sensitive Commands to Quickly Navigate Your Enterprise

The same powerful AssetWorX hierarchy that you build in configuration mode also drives much of the rich visualization for Facility AnalytiX on the runtime side. This is achieved using a flexible "Commanding" infrastructure, which is part of ICONICS Platform Services, to send information, displays, alarm views, reports, and much more between modules. Commands can be enabled at any level of your ISA-95 hierarchy and support the concept of inheritance as well to simplify configuration. The following Commands are presently supported:

Commands	
General	Set Language, Custom, Set Global Alias, Save Configuration, Group, Sort, Expand/Collapse, Refresh, Set Global Color Theme, Zoom
AlarmWorX64	Load Configuration, Set Filter, Acknowledge
AssetWorX	Select Asset
BridgeWorX	Run Transaction (Server Side)
EarthWorX	Go To Location
Energy AnalytiX	Load Configuration
Facility AnalytiX	Load Configuration
GraphWorX64	Open URL, Call Method, Write Value (Server Side), Load Display, Set Visibility, Navigate, Print, Export Image
GridWorX	Load Configuration, Select Element
MobileHMI	Send SMS, Phone Call, Send Email, Load Mobile Layout
ReportWorX	Run Report (Server Side), Load Report, Load Executed Report
ScheduleWorX64	Load Schedule Control Configuration, Schedule Clear Override, Schedule Override
TrendWorX64	Load Configuration, Set Time Range, Set Period, Create Pen, Delete Pen, Edit Pen, Set Freeze Mode, Export Statistic

AssetWorX™ Navigator

ICONICS AssetWorX Navigator is shared between MobileHMI, GENESIS64 and the powerful AnalytiX solution suite, providing a consistent navigation interface across every application. This enables the flexibility to apply the Navigator as an embedded component inside a graphic or mobile display, or as a standalone component inside a PortalWorX dashboard to launch or command other applications in the same portal. The AssetWorX Navigator enables operators to quickly and intuitively navigate to the subject of interest, and the Navigator can also browse and execute reports natively via the ReportWorX provider, if ReportWorX is installed and accessible from the ICONICS application server.



The advantages of using AssetWorX include:

- Greatly reduced engineering time
- Operator Consistency
- Virtual Naming
- Easy Navigation through the AssetWorX navigation tree
- Simple roll-up and drill down to the summarization or detail of interest
- Virtually unlimited scalability

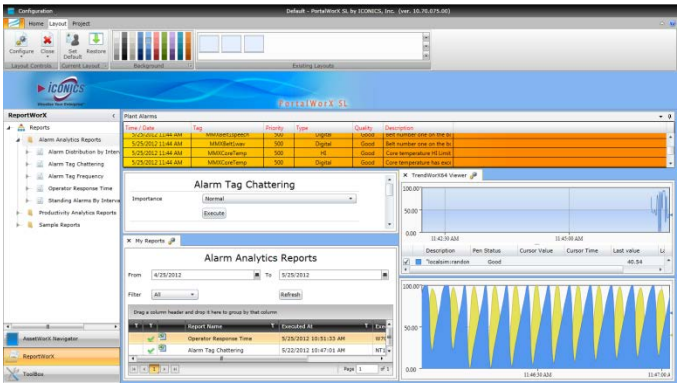
Powerful Visualization Dashboards Guide Corrective Actions

Facility AnalytiX offers predictive software for equipment diagnostics by automatically guiding operators and maintenance personnel to the probable causes of equipment inefficiencies, with powerful visualization capability. Configure side-by-side comparison charts with ease to quickly and visually pinpoint trends on similar types of equipment, comparably sized facility spaces, varying equipment operational states, and a wide variety of other parameters so that you can easily identify the abnormalities.

Faults and probable cause analysis information can be presented in a variety of different ways across the ICONICS suite of products, including the following client options:

PortalWorX-SL™

PortalWorX-SL™

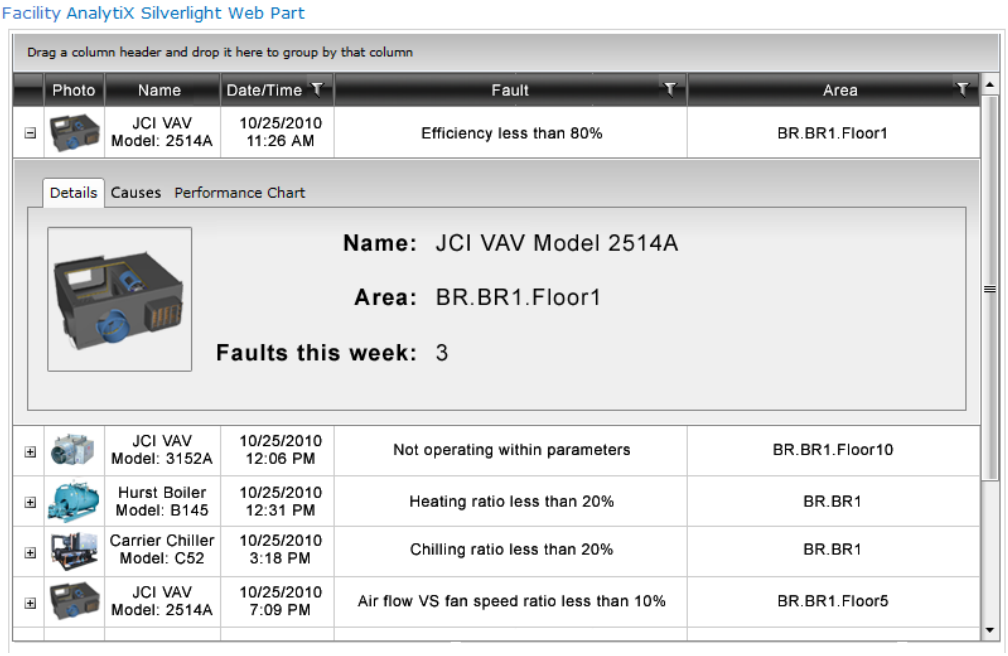


PortalWorX-SL is an innovative frame-based runtime environment used to force an organized screen layout typically referred to as a portal or dashboard. PortalWorX-SL will make it easier and faster to configure complex dashboards and layouts for functions such as alarm monitoring or operational control. Using Microsoft Silverlight, PortalWorX-SL requires very little setup and can be deployed easily on any system. The frame-based dashboards allow anyone to create and customize an organized environment with almost no training. Central to the frame-based environment is the AssetWorX Navigator, which will allow navigation and organization of assets for faster access to data. As a layer of further integration, AssetWorX Commanding also provides options to send messages between frames such as GraphWorX64 displays, AlarmWorX64 Viewers, TrendWorX64 Viewers, FDD Viewers and Energy AnalytiX Viewers.

PortalWorX-SP™

PortalWorX-SP™

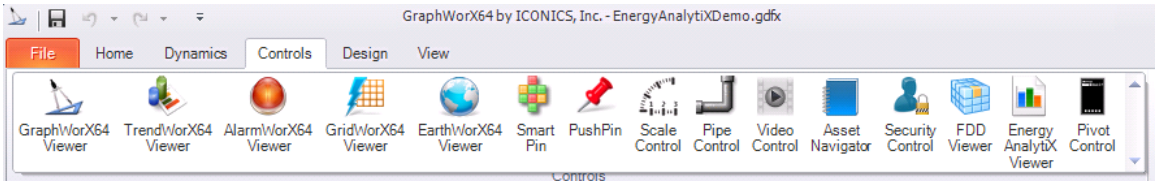
PortalWorX-SP is built on top of the powerful Microsoft SharePoint platform. Within this framework, Facility AnalytiX data is just one of the valuable pieces of information that can be integrated into your role-based portals and dashboards. PortalWorX offers a wide variety of Silverlight web parts to integrate your ICONICS application data alongside other third-party information in a single, unified view. For more information on ICONICS PortalWorX, please download the PortalWorX Product Brief from the ICONICS website at www.iconics.com.



Facility AnalytiX Viewer Web Part

GraphWorX™64 Control

GraphWorX64 is at the heart of the visualization in GENESIS64, and now you can leverage this powerful canvas for visualization your Facility AnalytiX information as well with the new FDD Viewer in GraphWorX64! With an intuitive and instantly familiar interface, the power is in your hands to easily develop displays and connect data meaningfully. GraphWorX64 offers a rich and powerful set of drawing and animation tools as well as customizable dynamics to any object. The GraphWorX64 interface can create powerful and elegant graphics without requiring advanced scripting knowledge. Using intuitive menu systems and property lists, users can point and click their way to enterprise graphics. Additionally, save yourself time and effort with simple import, export, publishing tools, smart symbols, shared objects and many other useful features.



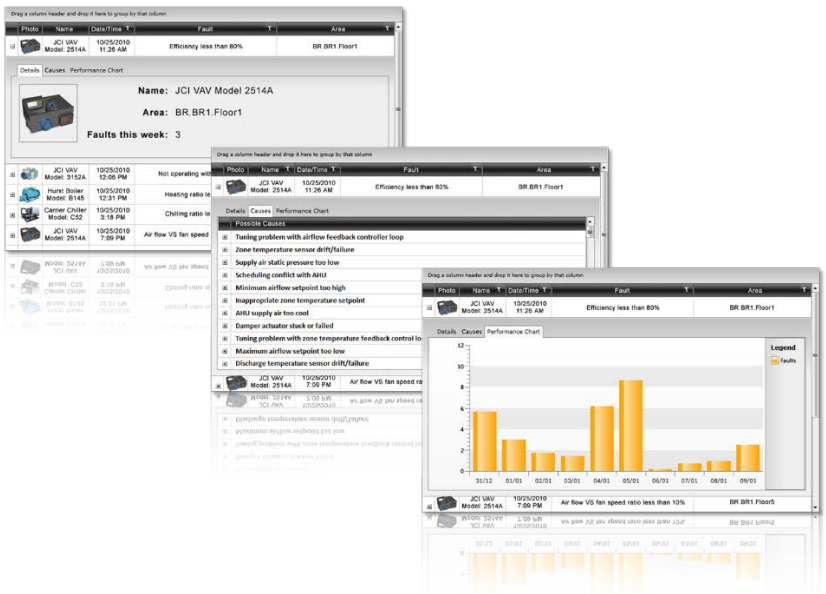
Just drop the FDD Viewer into any of the aforementioned environments and instantly start realizing the value. It is easy to quickly configure runtime views, charts, and reports. Users simply point to their desired calculations or queries for their desired asset or level, and then configure the look and feel, layout, and style of the chart or grid component from there, choosing from a number of predefined options. Stay informed from anywhere, at any time, any place!

FDD Viewer Features

The FDD Viewer is an extremely flexible visualization control that allows users to build intuitive fault detection and diagnostics dashboards through a point-and-click interface. Configuration is simple yet powerful and supports a wide variety of chart types, layouts, grids and options. Users have the option to specify a default overview configuration that should be loaded whenever they visit their role-based Facility AnalytiX dashboard, but it is easy to switch between various charts and grids using the powerful AssetWorX Navigator.

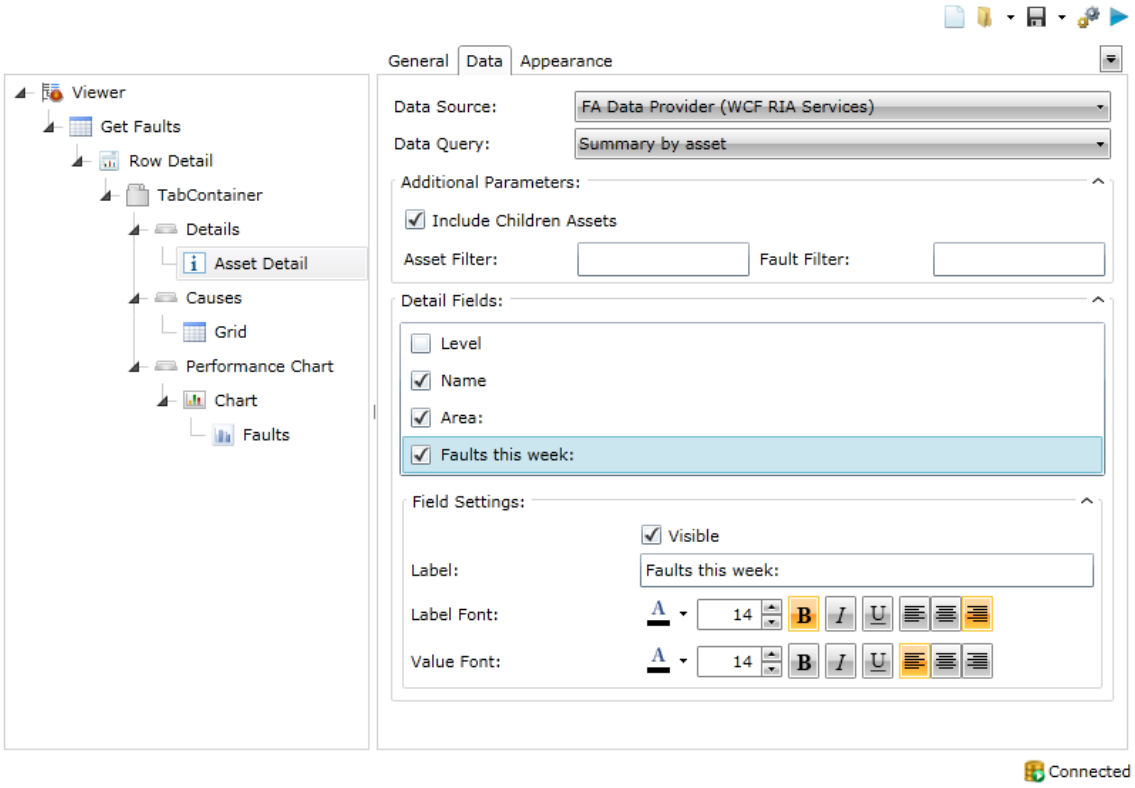
Drill down into equipment faults to uncover savings opportunities and optimizations. Charts support both vertical (asset-based) and horizontal (query-based) drill-down to enhance the ease with which users can identify areas of inefficiency. Visualize faults in a grid format or in a wide variety of chart types for enhanced analysis, and compare current data to historical data to gauge improvement over time.

A Fault Incidents View is also included in the FDDWorX Viewer. It contains a grid to view incidents and fault status, detailed dropdown and the ability to acknowledge, resolve or manually deactivate faults through the viewer.



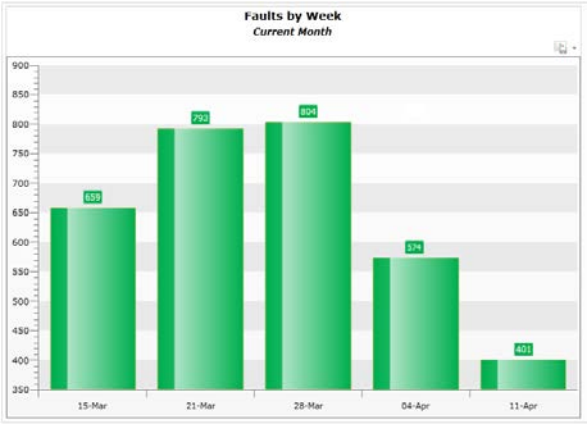
FDD Viewer Examples

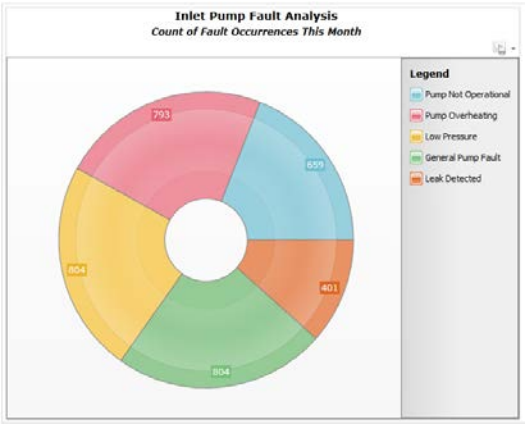
Configuring the FDD Viewer is easy. Simply point-and-click to add charts, grids, panels, tab controls, and other details to the configuration, in order to compose a rich visualization control with information that is laid out in an intuitive fashion. Each visual item can be mapped to a query or calculation from Facility AnalytiX in order to expose faults, probable causes, or any other information collected by the system.



FDD Viewer in Configuration Mode

Here are just a couple of additional examples of the types of powerful charts that can be built using the FDD Viewer:





The following specification table lists the features and visual elements supported by the FDD Viewer:

FDD Viewer Specifications

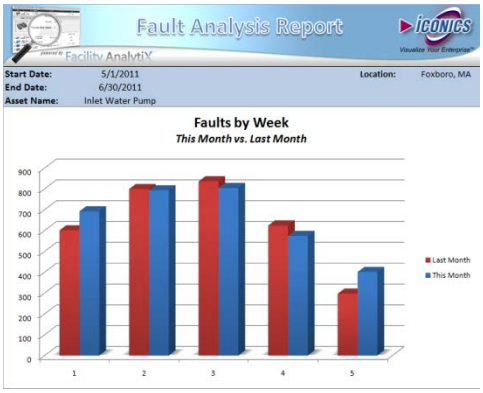
Supported Environments	
PortalWorX-SL	Thin client operator dashboard
PortalWorX-SP	SharePoint-based manufacturing intelligence portal
GraphWorX64	Supported in both WPF and Silverlight displays
General	
Supported Visual Elements	Chart, Grid, Tab Container, Panel, Detail Panel
Layout Options	Horizontal, Vertical, Embedded within other elements (Charts within Panels, Grids within Tabs, etc.)
Global Configuration Settings	Title, Created By, Created Date, Modified By, Last Modified Date, Description, Default flag (specifies which configuration should be loaded by default)
Toolbar Options	New, Load from File, Load from Database, Save to File, Save to Database, Viewer Settings, Configuration/Runtime mode switch
Time Range Options	
Now	Data initializes with the current time as the Start or End Time
Inherited	Start and/or End Time is inherited from the parent level
Relative to Start/End	Applies an offset (forward or backward) to or from the Start or End Time in Hours, Days, Months, or Years
Preset	First Day Current Week, First Day Last Week, First Day Current Month, First Day Last Month, Last Day Current Week, Last Day Last Week, Last Day Current Month, Last Day Last Month
Custom (Fixed)	Specify a fixed time to be used by default
Offset	All times above support an optional offset (forward or backward) in Hours, Days, Months, or Years
Auto Update	Automatically updates the chart/grid at the specified interval
Asset Selection	
Inherited	Inherit Asset information from parent or override at any level
Child of Inherited Asset	Show data for one of the children of the inherited asset. Allows to specify an index corresponding to which child should be shown by default (1st, 2nd, 3rd, etc.)
Specific Asset	Show data for a specific asset from the AnalytiX Catalog
Child of Specific Asset	Show data for one of the children of a specific asset. Allows to specify an index corresponding to which child should be shown by default (1st, 2nd, 3rd, etc.)
Show Runtime Panel option	Shows current asset selection in runtime and allows to switch dynamically between assets

Charts	
Linear Chart Types	Line, Stacked Line, Spline, Stacked Spline, Area, Stacked Area, 100% Stacked Area, Spline Area, Stacked Spline Area, 100% Stacked Spline Area, Step Line Area, Range, Spline Range, Stick, Candle
Column Chart Types	Bar, Stacked Bar, 100% Stacked Bar
Scatter Chart Types	Scatter, Bubble
Radial Chart Types	Pie, Doughnut
Horizontal Chart Types	Bar, Stacked Bar, 100% Stacked Bar
Drill-down Support	Asset-based (Vertical) or Custom (Horizontal)
Chart Appearance Options	
Legend	Visibility, Position, Item Orientation, Item Markers
Data Sampling	Function (Average, First, Last, Max, Min, Sum, Keep Extremes), Threshold
X-Axis	Visibility, Title, Show Labels, Label Format, Layout Mode, Step, Label Step, Label Rotation, Ticks Distance, Step Label Level Count, Step Label Level Height
Y-Axis	Visibility, Title, Show Labels, Label Format, Step, Label Rotation, Fixed Range (Min and Max values)
Chart Series Options	
Override Chart Type at Series Level	Allows to overlay different types of series on the same chart
General Settings	Visibility, Title, Line Color, Thickness, Fill Color, Foreground Color, Item Animation Duration, Series Animation Duration
Point Markers	Visibility, Marker Stroke Color, Thickness, Marker Fill Color, Marker Shape
Labels	Visibility, Format, Show Connectors, Show Zero Value Labels, Distance from Point, Support for Images
Tooltips	Visibility, Format
Data	Bound to any available Facility AnalytiX calculation or query
Grids	
Rows	Background Color, Alternate Background Color (for banded rows support)
Column Options	Visibility, Header Title, Width (in pixels or relative), Background Color, Header Font (Color, Size, Style, Alignment), Cell Font (Color, Size, Style, Alignment), Content Type (Value, Image), Sort (Ascending, Descending, None)
Filtering Options	Equal, Less Than, Less Than or Equal, Greater Than, Greater Than or Equal, Not Equal, Starts With, Ends With, Contains, Does Not Contain, Is Contained In
Grouping Options	Group By any column, with optional default sort order
Data	Bound to any available Facility AnalytiX calculation or query

Panels	
Layout Orientation	Specifies if objects within the Panel will be stacked vertically or horizontally
Asset Detail Panels	
Field Settings	Visibility, Label, Label Font (Color, Size, Style, Alignment), Value Font (Color, Size, Style, Alignment)
Asset Image	Visibility, Stretch (None, Fill, Uniform, Uniform to Fill), Width, Height
Data	Bound to any available Facility AnalytiX calculation or query
Appearance Options	(Available within all visual elements in the Viewer)
Title	Text, Format, Color, Size, Style, Alignment
Subtitle	Text, Format, Color, Size, Style, Alignment
Border	Color, Thickness
Background	Color

Scheduled Reports Help Pinpoint Equipment Inefficiencies

With Facility AnalytiX it is easy to configure powerful and detailed reports that expose information from the Facility AnalytiX database. Start from one of the preconfigured reports or customize your own report format using the flexibility of Microsoft Excel combined with the power of ICONICS' ReportWorX reporting tool.



Facility AnalytiX leverages the award-winning ReportWorX technology to turn data into actionable information in the form of reports. ICONICS brings you the most advanced reporting tool available today, taking maximum advantage of Microsoft's powerful technologies. ReportWorX, based on Microsoft .NET, enables you to push data into your reports and to control the report execution frequency and delivery format (Excel, PDF or HTML). Once generated, the reports can be automatically sent to local or remote disk drives, redundant printers, PDF files, Web servers, Fax machines, or multiple users via E-Mail.

ReportWorX allows for the execution of fault reports that highlight recurring trends in equipment failures or inefficiencies, based on scheduling triggers within ICONICS Unified Data Manager.

The criteria by which reports can be triggered include:

- Manually based on direct operator commands
- Periodically based on time and/or date
- Based on alarms or events
- Based on real-time OPC tags
- Expressions or calculations
- Based on NT events
- File system and database value changes

Facility AnalytiX charts, grids and reports help personnel to make intelligent decisions about where and when to allocate their maintenance technicians to optimize the performance of their assets. Scheduling routine or preventive maintenance on a piece of equipment before it actually fails can drastically reduce downtime and costs to repair, making a huge impact on your bottom line!

System Requirements

Facility AnalytiX requires the following hardware and software components for Minimum Requirements. System requirements may vary based on application size, system performance requirements, and loading factors.

Minimum Hardware and Additional System Requirements:

Component	Requirement
CPU	Dual Core 64-bit processors (e.g. AMD Athlon 64 X2, Intel Xeon, or AMD Phenom)
Memory	*Minimum*: 4 GB of RAM *Recommended*: 6 GB of RAM **Note:** It is recommended that the system page file size be a minimum of four (4) times the size of installed (physical) RAM.
Hard Disk	At least 50 GB of free hard disk space is recommended – for installation of the AnalytiX® suite and to allow for SQL Server database growth.
Drive	DVD Drive for installation
Video Card	Onboard Video Memory (256 MB) Display resolution minimum – 1024x768, 32-bit color DirectX 9 or 10 Video Card or better
Operating System	Windows Server 2016 x64 Windows Server 2012 R2 x64 Windows Server 2012 x64 Windows Server 2008 R2 x64 Windows Server 2008 x64
.NET Framework	Microsoft .NET Framework 4.6
Web Server/Access	Microsoft Internet Information Services (IIS) 7.0 or higher
Additional Software	Microsoft SQL Server 2016 Microsoft SQL Server 2014 Microsoft SQL Server 2012 Microsoft SQL Server 2008 R2 SP1 Microsoft SQL Server 2008 R2 SP1 or higher (Note: Express Edition is NOT supported for Energy AnalytiX). Microsoft SharePoint Server 2010 or SharePoint Foundation 2010 (required for PortalWorX-SP only. Can be installed on separte server, if desired.) **Web Access**: Edge, Internet Explorer 7 or later, Firefox 3 or later, Safari, Chrome **Notes:** 1. It is recommended that the system's page file size be a minimum of four (4) times the size of installed (physical) media. 2. The connection to a SQL Server data source may be either local or remote.

Optional Hardware

- Ethernet adapter (for remote PC connections or Ethernet I/O)
- USB port (for hardware license or license transfer)
- Serial COM ports or other adapters (for data I/O)

NOTE: The requirements described above are based on typical applications. Depending on your specific application, the minimum requirements may vary. In all systems we recommend that the virtual memory allotment be two times the amount of physical memory (RAM) on the system.

Founded in 1986, ICONICS is an award-winning independent software provider offering real-time visualization, HMI/SCADA, energy management, fault detection, manufacturing intelligence, MES, and a suite of analytics solutions for operational excellence. ICONICS solutions are installed in 70 percent of the Fortune 500 companies around the world, helping customers to be more profitable, agile and efficient, to improve quality, and to be more sustainable.

ICONICS is leading the way in cloud-based solutions with its HMI/SCADA, analytics, mobile and data historian to help its customers embrace the Internet of Things (IoT). ICONICS products are used in manufacturing, building automation, oil and gas, renewable energy, utilities, water and wastewater, pharmaceuticals, automotive, and many other industries. ICONICS' advanced visualization, productivity, and sustainability solutions are built on its flagship products: GENESIS64™ HMI/SCADA, Hyper Historian™ plant historian, AnalytiX® solution suite, and MobileHMI™ mobile apps. Delivering information anytime, anywhere, ICONICS' solutions scale from the smallest standalone embedded projects to the largest enterprise applications.

ICONICS promotes an international culture of innovation, creativity, and excellence in product design, development, technical support, training, sales, and consulting services for end users, systems integrators, OEMs, and channel partners. ICONICS has over 350,000 applications installed in multiple industries worldwide.

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