



MC Works64™

HMI/SCADA Overview

Customers continuously seek to stay informed, driven by the need to act immediately in order to maintain or improve efficiency. Many companies must achieve these continuously stretching goals with a shrinking and often mobile workforce. Mitsubishi Electric MC Works64™ is a suite of products that provides a quick deployment platform that integrates all available plant and business data into a high performance, real-time, distributed platform. MC Works64 includes all of the tools necessary to create and deliver rich visualization of actionable information, in real-time, anywhere, anyplace, and at any time.



At the highest level, MC Works64 is comprised of the following components and technologies:

- **Universal Connectivity** – OPC, OPC UA, SNMP, BACnet, Web Services and any Database
- **GraphWorX64™** – Vector-based 2D and 3D Real-time Graphics to Contextualize Data
- **MC AppBuilder** – Software tool for PLC and SCADA
- **AssetWorX™** – ISA-95 Intelligent Asset Technology
- **AlarmWorX64™** – Distributed Enterprise-wide Alarm Management
- **FDDWorX™** – Fault Detection and Diagnostics
- **TrendWorX64™** – Application-wide Data Collection, Logging, Charting and Analysis
- **EarthWorX64™** – GEO SCADA Visibility for Geographically Dispersed Assets
- **GridWorX64™** – Database Visualization of Any Data Set
- **ReportWorX™ Express** – Quick Access to Any Mitsubishi Electric Data Source via Excel Add-in
- **ScheduleWorX64™** – Advanced Time/Date Event Scheduling
- **Windows Presentation Foundation and Silverlight Displays** – Client Flexibility
- **Workbench** – Centralized Configuration and Runtime Interface
- **WebHMI** – Web-based Read/Write SCADA Functionality
- **Redundancy** – Mission Critical HMI/SCADA Solution

Optional Products:

- **MC Historian™** – High Speed, Reliable and Robust Plant Historian
- **AlarmWorX Multimedia™** – Multimedia Alarming with Text, Email, Phone and More
- **MC Mobile™** – Instant KPIs and Alerts, Anytime, Anywhere

Mitsubishi Electric MC Works64 provides a complete solution for all HMI/SCADA applications. MC Works64 bridges data connectivity, aggregation and visualization to provide the most flexible and comprehensive software suite for your HMI/SCADA needs, across all industries, now and in the future. Mitsubishi Electric markets MC Works64™ (SCADA) solutions for Process Automation, Factory Automation and Energy Management, based on ICONICS technology. ICONICS is our close partner and we develop together integrated software solutions. ICONICS is Microsoft Gold Certified Application Development Partner. Mitsubishi Electric is uniquely positioned to utilize the most advanced technology available. MC Works64 is the product of this relationship. The HMI/SCADA package seamlessly combines the newest proven technologies while leveraging years of experience gained from its predecessor, MC WorX - 32bit.

Mitsubishi Electric' automation philosophy is to offer full software-based customization to achieve exactly what is needed for customer applications. An important part of that philosophy relates to the universal connectivity provided by the specifications of data protocols. Mitsubishi Electric believes that anyone who wants to enjoy the benefits of HMI/SCADA should be able to use software without upgrading their devices. That is why Mitsubishi Electric is an open standard software vendor that can easily connect with hundreds of devices regardless of brand or protocol.

Mitsubishi Electric MC Works64 was the first of its kind in the world. Based on 64-bit computing, its architecture is designed at the core to take advantage of the multi-processing, multi-threading and hardware acceleration of graphics. The larger addressable memory not only improves performance, but also allows more information to get to operators, letting them contextualize, consume and act faster.

The 64-bit revolution has been growing for a few years now and Mitsubishi Electric made sure that MC Works64 is based on true 64-bit technology. Mitsubishi Electric has gained an advantage by not only utilising the best proven technologies of the day, but also investigating new technologies going forward into the future.

MC Works64 has been designed to take advantage of the latest technology that includes:

Platform Services

With the organization of MC Works64 into Platform Services, Mitsubishi Electric has centralized a key development concept. With the centralization of data, services and redundancy, MC Works64's performance and communication is better than ever. Real-time connectivity to multiple data sources, as well as the shared services essential to applications, is included within the Platform Services. The shared services include the Unified Data Manager (UDM), Global Aliasing Engine and Expression Engine.

Shared Services

With the Platform Services organization, much of MC Works64's core functionality can be found within the Shared Services such as Global Aliasing for indirect addressing, Language Aliasing for localization and the Rules/Expression Engine for triggers or expressions. The Unified Data Manager (UDM) has been updated with an OPC third party interface to allow the UDM to be exposed as an OPC DA data source to outside applications. With the updates and new organization, the Workbench and contained Platform Services are more powerful than ever.

FEATURE	PROVIDES
Microsoft .NET Framework	Enhanced computing experience with highly integrated communications and information. .NET includes secure, reliable and transacted messaging and interoperability.
Windows Presentation Foundation (WPF)	Real-time visualization in 2D or 3D through GraphWorX64.
Microsoft SQL Server	Comprehensive data management platform. Utilized for configuration and logging databases.
Microsoft Office Style	Ribbon and gallery technologies for user-friendly interface and easy-to-access operations for rapid development.
Microsoft Operating Systems	Integration and Support for all of the latest Windows Operating Systems including Windows 7, Windows 8, Server 2008 R2 and Server 2012.
Bing, Google and Esri Maps	Real-time visualization of widely dispersed assets via EarthWorX64
Hardware-accelerated 3D Graphics	High speed 3D imaging capability through GraphWorX64.
Scalable Vector-based 2D Graphics	Object based graphics fit any screen and can be reused at any size with absolute clarity.

Real-Time Connectivity

Mitsubishi Electric is committed to providing the most open HMI/SCADA solution with full support for OPC standards. MC Works64 is able to natively communicate through OPC UA, but support for OPC Classic (DA, HDA and A/E) and OPC .NET is included for full integration of OPC standards. Aside from OPC, MC Works64 Platform Services includes native support for Web Services, database access, BACnet and SNMP devices.

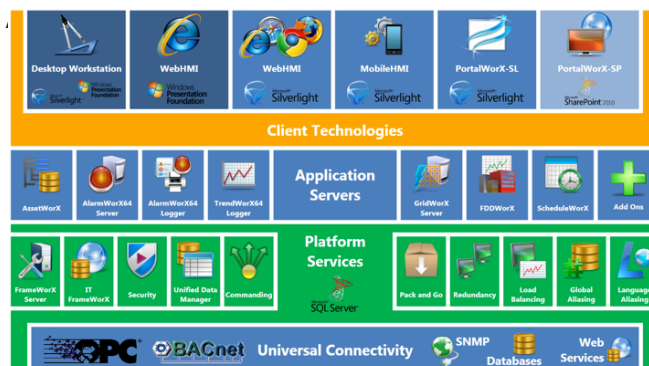
- OPC Classic: DA, A/E, HDA
- OPC Unified Architecture (UA): UA DA, UA A/E, UA A/E Historical, UA HDA
- BACnet: BACnet Advanced Workstation (B-AWS) Certified
- Simple Network Management Protocol (SNMP)
- Databases
 - Microsoft SQL 2003, 2005, 2008, 2012
 - Oracle
 - MySQL
 - SAP
 - x64 OLE DB
 - x64 ODBC

ITFrameWorX

Included in the Platform Services is the new categorization of ITFrameWorX which includes support for Web and Database Services. Web Services are new to MC Works64 and the product will come pre-configured with a Weather Web Service from NOAA. Standard symbols are pre-configured within the Symbol Library to take advantage of the default Web Service to get users up and running with Web Services quickly and easily. Other Web Services can include any type of SOAP Service, but examples include oil prices, electricity prices, exchange rates and conversions. Database Services include a number of data sources such as SQL, SAP, x64 ODBC, x64 OLEDB, MySQL, Data Sets and more.

Commanding

With the introduction of assets to MC Works64 through AssetWorX, Mitsubishi Electric has added unified commanding to improve integration of product modules and significantly reduce scripting needs throughout the product. With the use of the AssetWorX Navigator for selection and navigation users can trigger commands directly from assets. Commands range from simple "Load" instructions to parameterized AlarmWorX64



Commands	
General	Set Language, Custom, Set Global Alias, Save Configuration, Group, Sort, Expand/Collapse
AlarmWorX64	Load Configuration, Set Filter, Acknowledge
AssetWorX	Select Asset
BridgeWorX	Run Transaction (Server Side)
EarthWorX64	Go To Location
AX Energy	Load Configuration
FDDWorX	Load Configuration
GraphWorX64	Open URL, Call Method, Write Value (Server Side), Load Display, Set Visibility, Navigate, Print, Export Image
GridWorX64	Load Configuration, Select Element
MC Mobile	Send SMS, Phone Call, Send Email
ReportWorX	Run Report (Server Side), Load Report, Load Executed Report
TrendWorX64	Load Configuration, Set Time Range, Set Period, Create Pen, Delete Pen, Set Freeze Mode, Export Statistic
OPC Connectivity	
OPC A/E	Server/Client
OPC DA	Server/Client
OPC HDA	Server/Client
OPC UA	Server/Client
BACnet	
Object Discovery Type	Automatic
BBMD Functionality	Yes
SNMP	
Version	v1, v2
MIB	
Discovery Type	Pre-configured and Automatic
Browsing	Yes (Uses MIB Dictionaries to Load MIB Data)
Import Custom	Yes (Import any MIB file)
Walk Mode	Yes (Discover All OIDs Before Building Tree)
Traps	
Receive Traps	Yes

Other Data Protocols

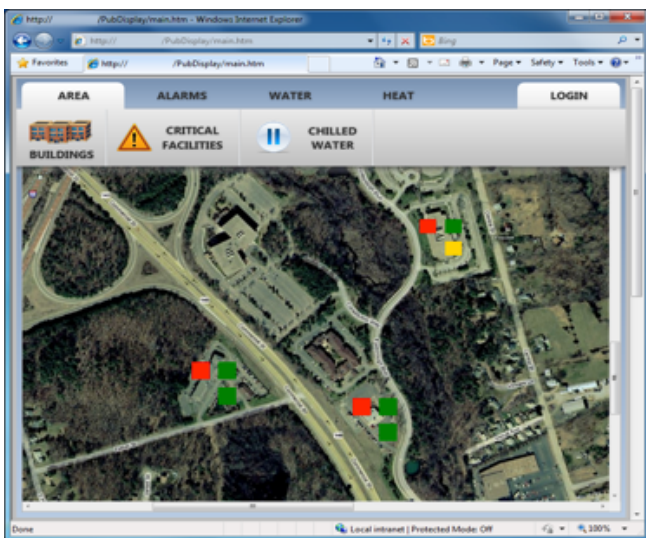
ICONICS OPC UA Standard	Allen-Bradley (1609 UPS Driver, Bulletin 900, ControlLogix, DH+/DH485, DF1, Ethernet, Unsolicited Ethernet); Analog Devices; Aromat (Ethernet, Serial); AutomationDirect (EBC, ECOM, DirectNET, K Sequence, Productivity 3000 Ethernet); Beckhoff TwinCAT I/O; BUSWARE Ethernet; Contrex (Serial, M-Series); Custom Interface Driver - CID; Cutler-Hammer (ELC Ethernet, ELC Serial, D50/D300); Dataforth isoLynx; DDE Client Driver; Fuji Flex; GE (CCM, Ethernet, Ethernet Global Data (EGD), SNP, SNPX, Focas Ethernet, Focas HSSB); Hilscher Universal Driver; Honeywell (UDC Ethernet, HC900 Ethernet, UDC); IA Super SEL; Idec; IOtech PointScan 100; Krauss Maffei MC4 Ethernet; Mettler Toledo Continuous Mode Serial; Micro-DCI; Mitsubishi (CNC Ethernet, Serial, Ethernet, FX, FX Net); Modbus (ASCII Serial, Ethernet, Plus, Serial, Unsolicited); ODBC Client Driver; Omron (FINS Ethernet, FINS Serial, Host Link, Process Suite, Toolbus); OPC (DA Client Driver, UA Client Driver); Optimization OptiLogic; Opto 22 Ethernet OPC Server; Partlow ASCII; Philips P8/PC20; SattBus (Ethernet, Serial); Scanivalve Ethernet; Siemens (S5, S5 (3964R), S7-200, S7 MPI, TCP/IP Ethernet, TCP/IP Unsolicited); Simatic (505 Ethernet - CTI 2500 Series, 505 Serial - CTI 2500 Series); Advanced Simulator; Memory Based; SIXNET (EtherTRAK, UDR); SquareD; System Monitor; Uni-Telway; Thermo Westronics (Ethernet, Serial); TIWAY Host Adapter; Torque Tool Ethernet; Toshiba Ethernet, Serial; Toyopuc (Ethernet PC3/PC2, Serial); User Configurable Driver; Wago Ethernet; WeatherBug Driver; InTouch Client Driver; Yaskawa (Memobus Plus (SA85), MP Series Ethernet, MP Series Serial); Yokogawa (Controller Serial, CX, Darwin Ethernet, Darwin Serial, DX Ethernet, DX Serial, DXP, HR, MW, MX, YS100);
ICONICS OPC UA Premium	DNP (Master Ethernet, Master Serial) [Premium]; Fisher ROC (Serial, Plus Serial) [Premium]; Ping [Premium]; Triconex Ethernet [Premium];
Database Support	
Standard	SQL, SAP, ODBC, OLEDB, DB, DB2, SQL Query, MySQL, Dataset
Web Services	
Weather	CDYNE: http://wsf.cdyne.com/WeatherWS/Weather.asmx
Custom	Requires WSDL URL (Configure in Workbench)
Expressions	
Arithmetic	
Basic	Addition, Subtraction, Multiplication, Division, Modulus, Parenthesis
Functions	Sine, Cosine, Tangent, Arcsine, Arccosine, Arctangent, Square Root, Power, Logarithm, Natural Logarithm, Exponential, Absolute Value, Integer Ceiling, Integer Floor, Integer Round, Round to Decimal Places, Minimum, Maximum
Constants	Circumference/Diameter (pi), Natural Logarithm Base (e)
Relational	
Basic	Less Than, Greater Than, Less Than or Equal, Greater Than or Equal, Equal To, Not Equal To
Logical	
Basic	And, Or, Not
Functions	IF THEN ELSE
Constants	Boolean True, Boolean False
Bitwise	
Basic	And, Or, Not, Xor
Functions	Shift Left, Shift Right, Bit Test
Constants	Hexadecimal (0x), Octal (0t), Binary (0b)
Functions	
OPC	Quality, Set Value
Conversion	To String (Culture Invariant), To String (Current Culture), To Format (Culture Invariant), To Format (Current Culture), To Number (Culture Invariant), To Number (Current Culture), To Number Base , To Boolean, To Boolean (Current Culture), ASCII to Char, ASCII to WChar, Char to ASCII, WChar to ASCII
String	Wildcard String Compare, String Length, Exact Substring, Left Substring, Right Substring, Concatenate Strings, String Search, String Replace, Trim Left and Right, Trim Left, Trim Right, To Lowercase, To Uppercase
Date and Time	Convert to DateTime (Culture Invariant), Convert to DateTime (Current Culture), Convert to TimeSpan (Culture Invariant), Convert to TimeSpan (Current Culture), TimeSpan from Milliseconds, TimeSpan from Seconds, TimeSpan from Minutes, TimeSpan from Hours, TimeSpan from Days, Total Milliseconds from TimeSpan, Total Seconds from TimeSpan, Total Minutes from TimeSpan, Total Hours from TimeSpan, Total Days from TimeSpan, Elapsed Time Since Last Value Changed, True for Duration, Get Current Local Date and Time, Get Current UTC Date and Time

Clients

MC Works64 offers a number of options for viewing displays and interacting with data. For GraphWorX64, the following clients are used to access HMI displays at any time from a variety of devices. To learn more about our mobile device support and further client capabilities reference the MC Mobile Product Brief.

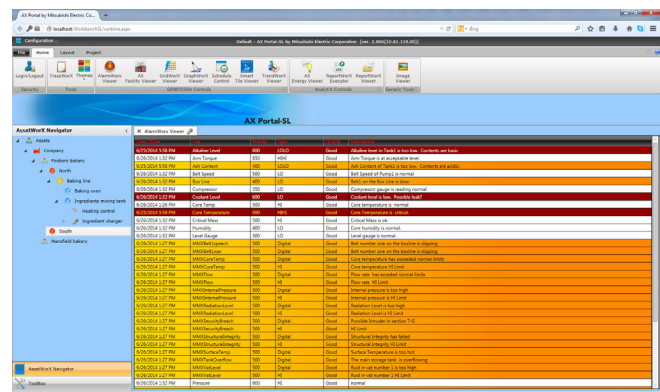
WebHMI™

Fully utilize the capabilities of GraphWorX64 by publishing your displays to the Web. View them through a multitude of client types and retain full control of your application wherever you are. Through the GraphWorX64 Web Publishing Wizard, any display can be published for consumption and bring the display to the operators. Displays can be published based on Windows Presentation Foundation (WPF) or Microsoft Silverlight technologies. While WPF displays can be consumed through traditional Web and desktop clients, Silverlight displays can be adapted for viewing on Windows Phone 7 mobile devices, Web-based clients and placed into AX Portal dashboards for a full range of client viewing methods. Regardless of the desired client type, features can be configured once through GraphWorX64 and saved or published as the different client types afterwards. While limitations exist based on the technologies themselves, most features can be used in all types.



AX Portal-SL™

AX Portal-SL is an innovative frame-based runtime environment used to force an organized screen layout typically referred to as a portal or dashboard. AX Portal-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, AX Portal-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 will also provide options to send messages between frames such as GraphWorX64 displays, AlarmWorX64 Viewers, TrendWorX64 Viewers, FDDWorX Viewers and AX Energy Viewers.



Workbench

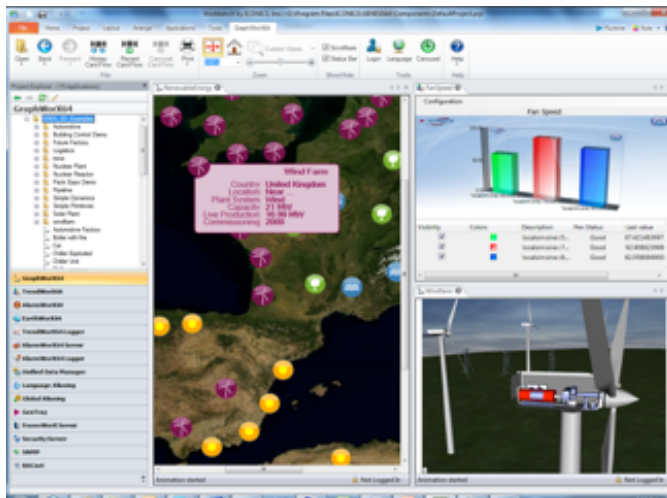
Workbench is the centralized Web-based configuration environment for all MC Works64 components. The Workbench can also act as a simple operator interface for service management and has built-in project management functionality such as project Pack and Go, layout tools and a file browser interface. The Workbench can be used as a Windows Presentation Foundation (WPF) application on the desktop or Web and can also be used via the Silverlight Workbench through Web browsers.

Workbench Classic

- WPF-based Web or Desktop Use
- Redundancy Configuration
- Server Configuration
- Built-in Runtime Mode

Workbench Silverlight

- Silverlight-based Web Configuration
- AssetWorX Configuration
- Analytics® Add-On Configuration
- AX Portal-SL for Runtime Mode



Configuration and Project Management

The Workbench is the centralized configuration environment with mass import and export tools for moving or editing application data. The Workbench allows configurations to be exported into Microsoft Excel, .CSV and .XML formats. Whole or partial configurations can be moved for easily making mass edits or batch changes. With the Pack and Go Wizard in the MC Works64 Workbench, users can use the simple step-by-step process to move configurations into a package for deployment. Features like Find and Replace node names or changing asset names beforehand guarantee a working application. Incremental Pack and Go also allows for versioning support and delta roll-out where developers need only

move what has changed and the software does the rest. Other options like project statistics, packing log and security through encryption are available.

Web-Based Configuration from Anywhere

All MC Works64 configurations can be created from the Workbench, allowing for faster development and cost savings in building any application. Workbench offers remote configuration in Internet Explorer, the ability for concurrent configurations and support for online changes. Users have the choice of configuring with Workbench Classic and Workbench Silverlight.

Runtime Operation

Using the Workbench as a runtime environment is also supported, allowing users to open up GraphWorX64 displays, TrendWorX64 trends, and AlarmWorX64 alarm grids at once to visually compare and relate the information provided at any one moment by the SCADA system. With customizable runtime layouts and multi-monitor support the Workbench is an invaluable tool for any enterprise SCADA application.

GraphWorX64™

GraphWorX64 is at the heart of the visualization in MC Works64. 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.

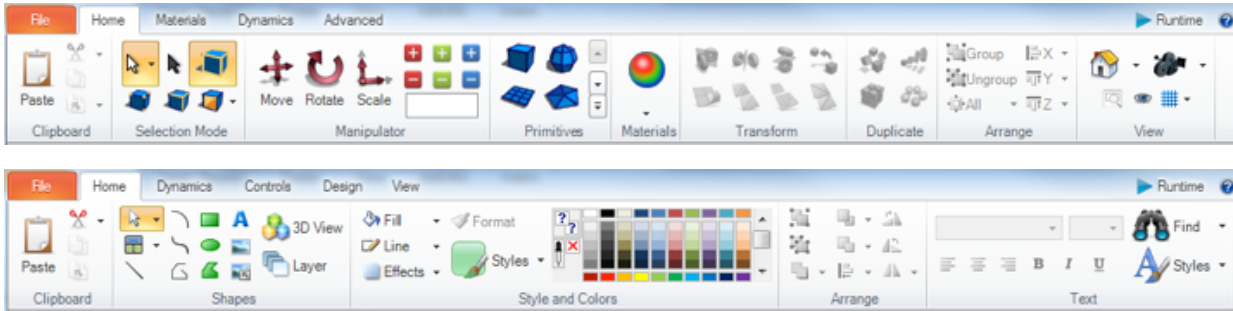
GraphWorX64 takes maximum advantage of Windows Presentation Foundation (WPF) and Microsoft Silverlight technologies for rich HMI and SCADA data visualization. It allows users to build scalable, vector-based graphics that scale and can be reused

time and again. MC Works64 also takes advantage of the Windows Office look and feel with contextual ribbons. Users can quickly browse through galleries that provide a rich preview of available actions. For instance, an operator may wish to add alarming or trending to their HMI display and with MC Works64 this task is done with just a few simple clicks, truly unleashing the power behind GraphWorX64.

GraphWorX64 leverages the power of Microsoft Silverlight which is ideal for thin-client Web-based solutions.

2D Visualization

Featuring a rich set of vector drawing tools for easy scaling, GraphWorX64 for 2D graphics is unparalleled. Offering a base standard set of shapes and objects, GraphWorX64 includes a multitude of dynamic



Unsurpassed Development Using WPF and Silverlight

Windows Presentation Foundation, Silverlight and XAML are at the core of GraphWorX64 and are widely used to provide real-time visualization of any manufacturing and business intelligence information. MC Works64 exploits both the 2D and extensive 3D capability of WPF to deliver real-time data in a variety of visualization options, giving users the richest client user experience found today. GraphWorX64 also offers a seamless switch to Silverlight thin-client displays that are configured and deployed in exactly the same way, but can be viewed in multiple Web browsers like Firefox, Chrome or Safari. Silverlight displays can also be published to SharePoint2010 through the PortalWorX64 product.

MC Works64 also takes advantage of state-of-the-art graphic hardware acceleration through DirectX11, powered by .NET 4.5 and the latest operating systems. GraphWorX64, integrated with the Windows Presentation Foundation, provides users with a compelling 3D view of their operations in real-time with live data. Imagine the ability to view how equipment is running, in real-time, from any angle and from anywhere. For thin and fast 2D graphics,

animations that can be applied to any object as well as layered on an object for synchronous dynamics, allowing for multiple responses to occur from single clicks. Dynamics range from object motion and rotation to advanced pick actions that 'on click' can set Global Aliasing Value, Open Displays or provide Webpage-like navigation. GraphWorX64 makes configuration quick and easy without sacrificing the allowance for creativity and power. 2D designs can be created for desktop and Web deployment, as well as be saved out for multiple client types.

Time Saving Controls

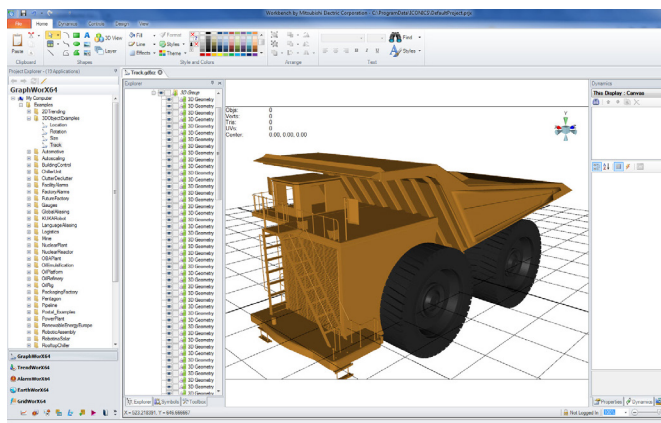
To aid in design, GraphWorX64 offers a few objects to speed up development. The Scale control object can be used to quickly configure vertical, horizontal or radial gauges for temperature, revolutions per minute, tank levels and quantities for KPIs. The Scale control is also easily configurable, customizable and reusable. A 2D Pipe control is also included to create simple or elaborate piping schematics. Helpful tools like copying the pipe path to a location dynamic will also add extra pop to your displays, as objects can follow the path of a pipe with a few simple mouse clicks.

Smart Tiles

Smart Tiles are simple .NET controls that allow users to create a simple and elegant way of displaying concise, actionable information that is easily identified. Flexible and customizable, Smart Tiles can be used in GraphWorX64 and MC Mobile for many purposes. Smart Tiles can be created to display: Key Performance Indicators (KPIs), Alarms and Alerts, Dynamic Labels and Navigation Buttons.

3D Visualization

GraphWorX64 is unique in its ability to offer 3D hardware-accelerated graphics through WPF. With an integrated, fully capable 3D editor and drawing tools, users have three options to create stunning 3D worlds that reflect their applications. Users can use native GraphWorX64 drawing tools or import 3D designs from other software using a number of industry standard formats. Mitsubishi Electric has worked with customers and partners to offer advanced tools for 3D display creation and management. The GraphWorX64 3D Pipe primitive allows users to create bends and intricate piping scenarios quickly and easily. GraphWorX64 supports the import of other 3rd party 3D models from Autodesk (.dwg, .dxf) and other standard file formats like .3ds, .dae (COLLADA) and .obj. Customers with existing models can import and use them for HMI displays.



Collision Detection & Polygon Reduction

GraphWorX64's ability to detect intersecting objects has added capabilities to visualize alarms or issues in 3D by setting up collision bodies or objects likely to intersect and allow you to show discoloration to indicate a collision. Connected to live data, this information can give operators visual feedback that is invaluable during alarm conditions. With the introduction of 3D into HMI/SCADA, Mitsubishi Electric realizes that 'real-time' requires a level of responsiveness that is difficult when dealing with large 3D objects. To combat speed drops and optimize displays, Polygon Reduction is now offered to reduce the "size" of imported objects without losing clarity. By using internal algorithms, GraphWorX64 3D can decrease the mesh of objects, saving computer processing power and releasing it for use with your data.

Day/Night Mode

Due to requirements from some applications to support for color switching modes MC Works64 includes a Global Color Palette. The Palette can be configured as part of the Unified Data Manager and allows users to name colors. In GraphWorX64 and embedded controls (e.g., AlarmWorX64) these names can be used to represent a global color. Updating or dynamically switching these colors later will propagate to all displays that utilize the named color.

Advanced Symbol Library

GraphWorX64 empowers users to take graphics to a whole new dimension with 3D visualization and provides over 200 preconfigured symbols to start off users with designing their 3D applications. GraphWorX64 3D Symbols are true 3D symbols, not just images or backgrounds. Users can fine-tune and modify any symbol to meet specific needs and save the results to the library, providing creative flexibility and the freedom to create captivating 3D graphics. Over 1,500 2D symbols are also available to get any user started. The 2D symbols have all the benefits of the 3D symbols, with the added bonus that you can create Smart Symbols that expose properties like data sources at the top level of any symbol. For ultimate control, Smart Symbols allow users to configure symbols that can just be dragged on to displays and immediately used after seconds of configuration.

GraphWorX64

Displays	Specifications
Types	Silverlight, Windows Presentation Foundation (WPF)
Size/Resolution	Unlimited
Support	
Layers	Yes
Zoom	Yes
Declutter on Zoom	Yes
Windows	Turn on/off menus, scrollbars, resize options and behaviors
2D Shapes	
2D Drawing	Line, Spline, Arc, Polyline, Rectangle, Ellipse, Polygon, Text, Label
2D Image	
Embedded	JPG, JPE, JPEG, PNG, GIF, TIF, TIFF, JFX, BMP, ICO, WMF, EMF, SVG, SVGZ, DWG, DXF
Referenced	JPG, JPE, JPEG, PNG, GIF, TIF, TIFF, JFX, BMP, ICO, WMF, EMF, SVG, SVGZ, DWG, DXF
2D Advanced	Smart Symbol - expose data and properties to top object level. Update Shared Keyword - update symbols across displays
2D Symbols	Over 1,500
3D Shapes	
3D Drawing	Cube, Sphere, Plane, Polygon, Torus, Cone, Cylinder, Terrain, Pipe, Annotation
3D Import	XAML, OBJ, 3DS, DAE (Collada), DWG, DXF
3D Advanced	Collision Detection - designate collision bodies for calculation. Polygon Reduction - reduce mesh size
3D Symbols	Over 300
Color	
Fill	RGB, Gradients, Image Tiling
Stroke	RGB, Gradients, Image Tiling
Effects/Style	
General	Opacity, Bevel, Drop Shadow, Glow, Blur
Objects	Line Style, Line Width, Line Cap, Line Miter
Rectangle	Rounded Corners (X and Y)
Ellipse	Radius (X and Y)
Polygon	Vertex Manipulation
Dynamics	
Text Based	Process Point, Data Entry, Time/Date
Buttons	Button, Check Box, Radio Button, Display Button
Dimensions	Size, Location, Rotation
Color	Object Fill Color, Object Line Color, Disable, Hide, Text Background Color, Text Foreground Color, Text Border Color
Selection	State, Range
Pick Actions	
Window	Close Window
Navigation	Display Back, Display Forward
Display	Load Display, Popup Menu, Set Object Visibility, Set View
Aliasing	Set Global Alias, Set Language, Set Local Alias
Values	Write Value, Toggle Value

GraphWorX64 continued

Application	Start Application
Scripting	Run Script
Mitsubishi Electric	Update Database, Run Report (ReportWorX), Run Transaction (BridgeWorX)
Security	Login/Logout Dialog
.NET Controls	
Modules	AlarmWorX64, Asset Navigator, EarthWorX64, GraphWorX64, GridWorX64, AX Energy, FDDWorX, TrendWorX64
Design	Pipe, Scale, Smart Tile
Video	
Static Protocols	WMV, AVI, MPEG, MOV, MP4
Steaming Protocols	HTTP, HTTPS, MS-WMSP (MMS and RTSP)
GEO-SCADA	SmartPin, PushPin (EarthWorX64)
Display Extensions	
WPF	GDFX
Template	TDFX
Silverlight	GDFXS
Portable	GDFXP
Portable Template	TDFXP
Compressed Versions	GDFXZ, TDFXZ, GDFXSZ, GDFXPZ, TDFXPZ
Symbol Library	SDFX

MC AppBuilder

The MC AppBuilder tool supports designs for the PLC and SCADA. Templates consisting of the function blocks and screen parts realize efficient engineering.

Automatically generate monitor screens, tag settings and PLC projects

Automatically create the monitor screen definition information (including symbol parts and face plate parts), OPC tag setting information (including alarms and trend settings), and GX Works2 projects (including sequence programs and label definitions).

The easy design helps avoid faults caused by inconsistent tag setting information, etc.

Manage system configuration with tree format

A system tree that shows the plant system configuration can be built and revised by importing a system list (CSV format) prepared with CAD or Microsoft® Visio®, etc., into MC AppBuilder. Manage the plant's system configuration with an intuitive and easy-to-understand tree format.

Reduce design hours by using templates

Designs that can be shared among device types have been put together as templates that are managed as a library. Assign a template corresponding to the device in the system tree to reduce design steps. Templates include graphic part information such as symbols and face plates, control program information such as function blocks, and various interface information (including default alarms and trend settings).

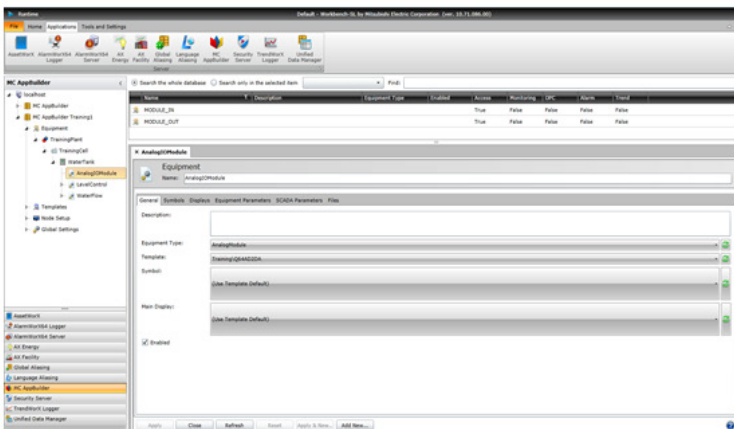
Easy system updating

Devices can be added to or removed from a completed system. Reduce the design time when updating your system.

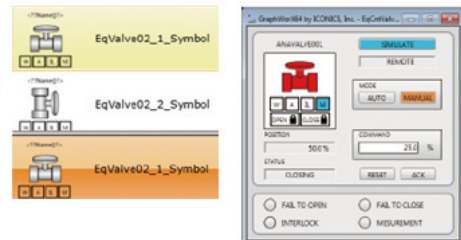
Design information export function

Design data is now portable as relevant file groups can be exported in a group. Use this function when you need to take projects prepared at the office to the site, or when moving hardware in the engineering environment, etc.

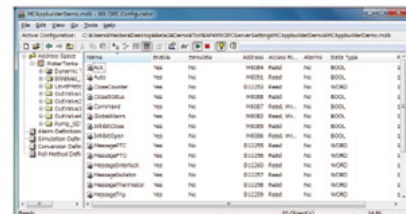
MC AppBuilder



Monitor screen



OPC tag setting



PLC Project



AlarmWorX64™

AlarmWorX64 is a distributed enterprise-wide alarm and events management system that incorporates auto-synchronization and optimistic concurrency as standard features. Available in the standard MC Works64 suite of applications, or as a stand-alone open series component, AlarmWorX64 offers the tools you need to deliver real-time and historical alarm information throughout your system.

AlarmWorX64 contains a 64-bit native server and logger and interoperates with OPC-DA and OPC UA Servers. Its integration with OPC and power afforded by the Alarms and Events (A/E) standard make it the most open alarm management solution in the market. The features within AlarmWorX64 represent an industry leading aggregation of options for developers and operators. Listed below are some of the benefits recognized by customers of the MC Works64 AlarmWorX64 users.



Developer Benefits Include:

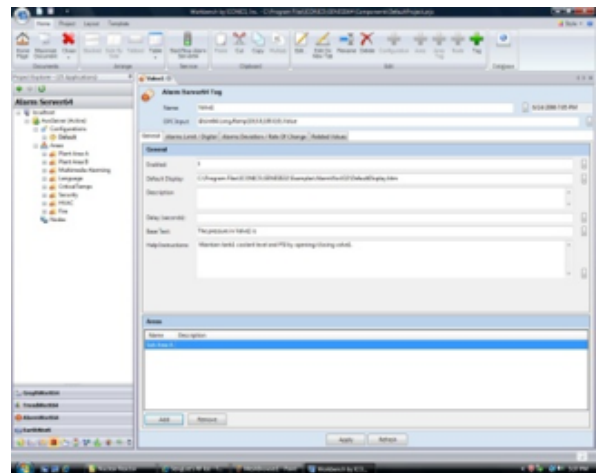
- Ease of Use – from AlarmWorX64's task-centric user interface with Ribbons
- Rapid Development Capability – utilizing Galleries for one-click styling
- Quick Deployment/Easy Maintenance – via a centralized work environment
- Robust and Secure Communications Platform – due to OPC UA Connectivity

Operator Benefits Include:

- Live Sorting, Filtering and Grouping – Operators have full control over what alarms they see or don't with live filtering or they can show specific areas or levels of severity.
- Acknowledgement Dialogs – Simple to understand and easy to acknowledge one or multiple alarms. Operators can comment on the alarms for revisiting, if desired.
- Easier High Level Viewing – Using tabs, multiple grids or side-by-side, AlarmWorX64 Viewers can be placed to give operators alarms from every aspect of an application at once.

AlarmWorX64 Configurator

Based on the next generation for toolkits and part of the MC Works64 Workbench, the AlarmWorX64 Configurator supports remote operations and is truly a thin-based client, allowing it to run inside Microsoft Internet Explorer. The Configurator supports online configuration changes and implements Optimistic Concurrency when used in a multi-user enterprise environment. Alarm configuration has never been this easy.

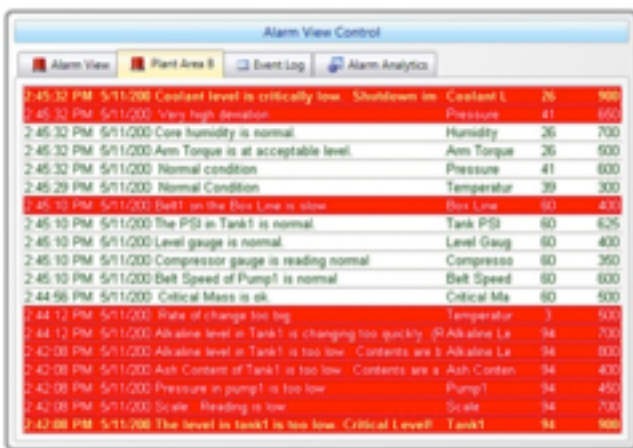


As part of configuration, AlarmWorX64 supports definable alarm conditions that allow for intelligent alarms with simple setup. Alarms can be associated with areas for logical groupings as well as easier runtime filtering.

AlarmWorX64 Viewer

Create both real-time and historical alarm views in the same OPC UA-enabled Windows Presentation Foundation or Silverlight viewer. View from multiple data sources while adding new visualization features such as color translucent gradients for identifying key alarm conditions to improve operational response. Drop as many or as few AlarmWorX64 Viewers into your displays to show operator specific areas or every alarm that's active. With client and server-side filtering, developers can limit what alarms are shown or allow operators to set filter themselves, providing ultimate flexibility on how your operators work and how quickly they can react.

Additional features include more formatting power for individual alarms, server-side OPC UA filtering of alarms, client-side filtering in charts and grids, multi-level grouping and sorting capabilities, the ability to use images and hyperlinks in grid cells, and the translation of raw server data.



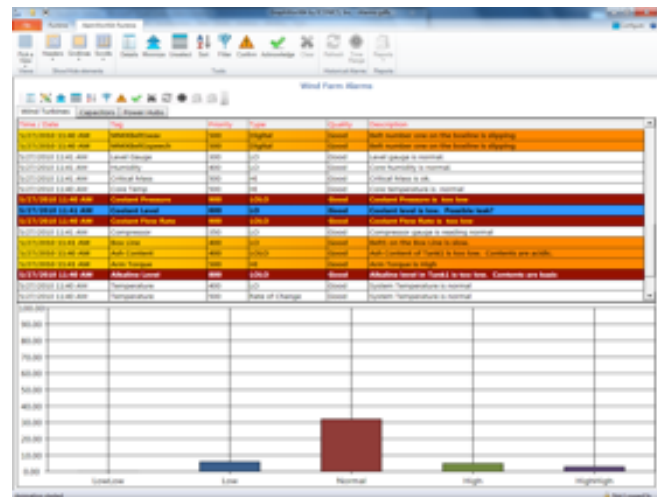
Alarm Charting and Reporting

Alarms logged to a database can be a chore to sort through and analyze. The powerful Historical Alarm Analysis/Reporting solves this problem by easily creating filtered reports, pie charts, bar plots and more. At the click of a button, you can find out which alarm is occurring most often and see if there are certain “trouble-spots,” review downtime, and more.

AlarmWorX64 allows reporting (user-configured or preconfigured) and graphing of alarms. The source of the Alarm data can be live alarms, alarms previously logged by the Alarm Logger, or a combination of both. The Alarm Report can be dropped within any GraphWorX64 HMI Display or directly in the Workbench.

AlarmWorX64 Logger

The MC Works64 AlarmWorX64 Logger is easy to set up and simple to manage. Pre-configured to log the local OPC A/E AlarmWorX64 Server and the GenEvent Event Server, logging can begin with the click of a button. The powerful AlarmWorX64 Logger can be accessed through a Historical Alarm Subscription through the AlarmWorX64 Viewer. Historical and Real-time subscriptions can coexist in the AlarmWorX64 Viewer on multiple tabs, grids or controls in GraphWorX64 displays. This database logger also includes options for Audit Trails and Event Logging. Connecting your historical alarms has never been easier.



AlarmWorX64

OPC Connectivity	
OPC UA	Client [A/E]
OPC Classic	Server [A/E], Client [A/E]
AlarmWorX64 Server	
Basic Alarm Types	Limit, Digital, Deviation, Rate of Change
Advanced Alarm Types	Rate Limit, Trigger Limit
Support	
Alarm Areas	Yes
Alarm Templates	Yes
Associated Values	Yes
Online Changes	Yes
AlarmWorX64 Logger	
Logger Type	Database
Logger Configuration	Subscription Based
Support	
Multiple Configurations	Yes
Redundancy	Yes
Database Table Management	Yes
Printer Logging	Yes
Translation Logging	Yes
AlarmWorX64 Viewer	
Extension	AWXX (WPF Format), AWXXS (Silverlight)
Data Type	Real-Time, Historical, Event (A/E, Logged Alarms & Events)
Embeddable	Yes [GraphWorX64]
Support	
Multi-Grid	Yes
Multi-Tab	Yes
Custom Styles	Yes
Live Filtering	Yes
Live Grouping	Yes
Live Sorting	Yes

AssetWorX™

AssetWorX is an additional architectural layer within MC Works64 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 as defined by the ANSI/ISA-95 standard.

Consistent and Distributed System Organization

When utilizing AssetWorX, users define Asset Classes to represent all similar entities that should be represented and operated in a similar way. For example, pumps, heat exchangers, turbines, chillers, buildings and building zones, and plants can all be defined as asset classes. An asset class contains all properties, equations, commands and operations that any user might issue, as well as graphic templates, smart symbols, and trends that are needed to visualize and provide insight for that type of equipment. Once defined, the user simply instantiates the class as many times as necessary, at the appropriate level of the enterprise hierarchy, to fully define all equipment and entities to be monitored. For larger applications distributed asset trees can be used to create a hierarchy of AssetWorX servers. Splitting assets into subdivisions based on a logical tiered structure allows for security layers and enables cloud architectures.

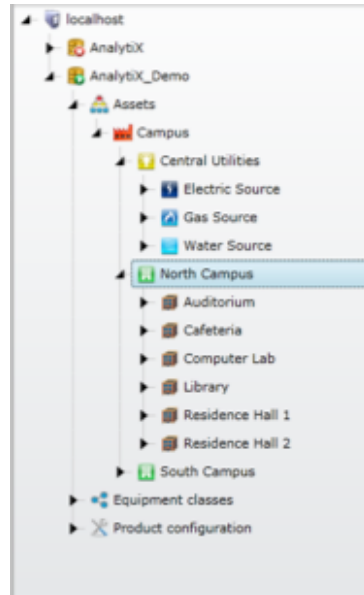
Commanding

Within AssetWorX, users will find the integration of extensive commanding capabilities. Commanding allows users to send information and direction between modules. From the AssetWorX Catalog, users will be able to load displays or other applications, set global Aliases or Alarm Filters, and command set points and status changes.

AssetWorX Navigator

The AssetWorX Navigator is provided as a Windows Presentation Foundation (WPF) object and a Silverlight Control. This provides the flexibility to

apply the navigator as an embedded component inside a graphic, or execute the navigator as a standalone component inside a AX Portal-SL portal 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.



The advantages of using AssetWorX include

- Greatly reduced engineering time - All like items are only constructed once
- Operator Consistency – All like items are configured exactly the same
- Virtual Naming – Operators no longer must relate to sometimes cryptic tag/item names. All information can be accessed by logical, meaningful names.
- Easy Navigation through the AssetWorX navigation tree
- Simple roll-up and drill down to the summarization or detail of interest
- Virtually unlimited scalability – All asset property data is stored in SQL Server, with caching to all current users. Utilization of SQL Server and the optimization included supports IT level scalability.

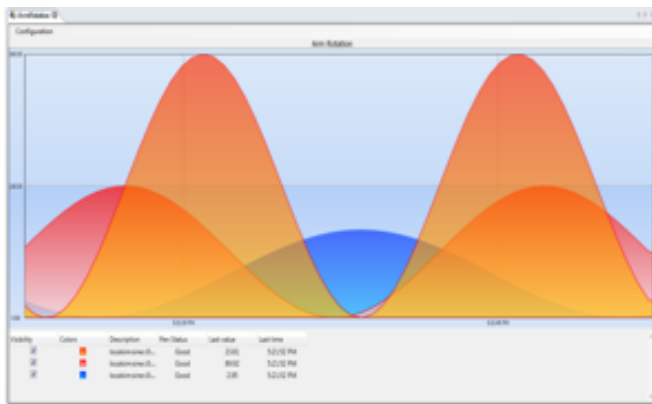
AssetWorX

Organization	
Equipment Classes	Yes
Level Definition	Yes
Product Enabled Selection	Yes
Equipment Properties	Yes
Real-Time Data Connection	Yes
Historical Data Connection	Yes
Blank Assets (Folders)	Yes
Customizable Levels	Yes
Customizable Icons	Yes
Caching	Yes
Commanding	Listed under Platform Services by Module
Client Availability	
AX Portal-SL	Yes
GraphWorX64 WPF	Yes
GraphWorX64 Silverlight	Yes
MC Mobile	Yes (via Asset Catalog)
AssetWorX Navigator	
Tree	ISA-95 Compliant
Number of Assets	Unlimited (Dynamic Load)
Commanding	Via Right-Click
Drag and Drop	Yes, Configurable
Command Targeting	Yes, by Name
Out of Process	Yes

TrendWorX64™

TrendWorX64 is an enterprise-wide data collection, logging, charting, reporting and analysis solution. Available in the standard MC Works64 suite of application, or as a stand-alone Open Series component, TrendWorX64 offers the tools you need to trend and chart real-time and historical data from all your enterprise assets.

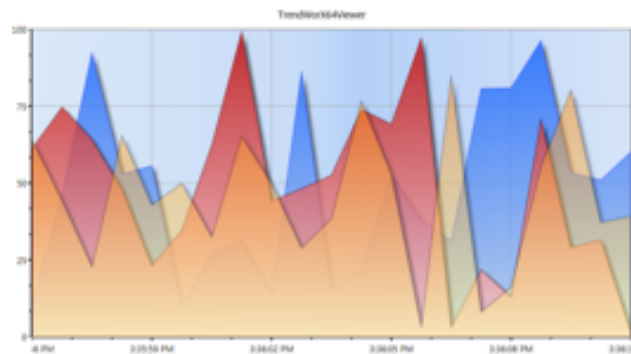
TrendWorX64 is OPC UA-to-the-Core™ and provides open connectivity to any OPC/OPC UA data source, making it an extremely versatile and comprehensive OPC trending application. This means it can easily plug and play with not only Mitsubishi Electric servers and trend components, but with other 3rd-Party trending solutions, as well. Allow your operators to see what's happening in real-time or what's happened historically to give them true predictive ability.



Developer Benefits Include:

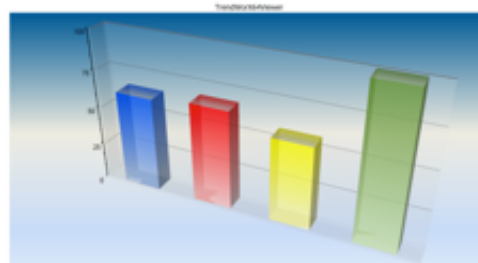
- Rapid Customization of Trends, Pens and Plots – via Galleries and one-click styling. TrendWorX64 is easy to use due to the task-centric user interface based on Ribbons.
- Ability to Use Vector-based Instead of Raster-based Graphics – due to interaction with Windows Presentation Foundation technology, which also helps to make trend graphics screen-size-independent and provides smooth animations

- Allows for Concurrent Changes Via the Web – with interactivity between remote online configuration sessions
- Multiple Data Source Availability/Historical and Real-Time Data Simultaneously Accessible – as data is collected through OPC UA technology



Operator Benefits Include:

- Powerful Runtime Controls – Operators can add more pens, freeze time and review past trends or change the range of the charts through the helpful Trend Period Toolbar
- Predictive Tools – Use trending to your advantage with optional alarm lines to indicate when trends may go into alarm
- Time Changes in Real-Time – See data change in real time visually and use time periods to give more or less detail
- Summary View – View high level information first and drill down for details
- 2D/3D Plots – Operators can view data in 2D and 3D to customize trends for better understanding
- Contextual Details – Users can hover to see details for each data point or trend



TrendWorX64 Configurator

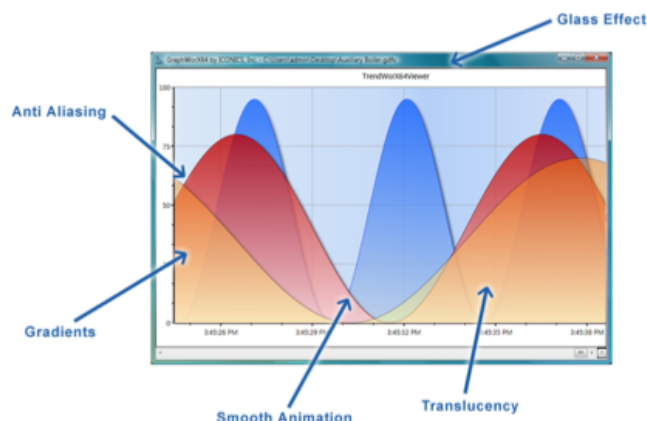
Release the power of trending with TrendWorX64. Using MC Works64 Workbench or GraphWorX64 to configure trends and charts is fast and easy with the TrendWorX64 Configurator. Integration with Windows Communication Foundation (WCF) allows users to build the most secure, reliable, transacted and interoperable distributed trending applications. Trends are fully customizable and intelligent allowing developers to give operators as much information as possible. Allow operators to predict faults and warnings by giving them a simple, easy to understand display.



TrendWorX64 Viewer

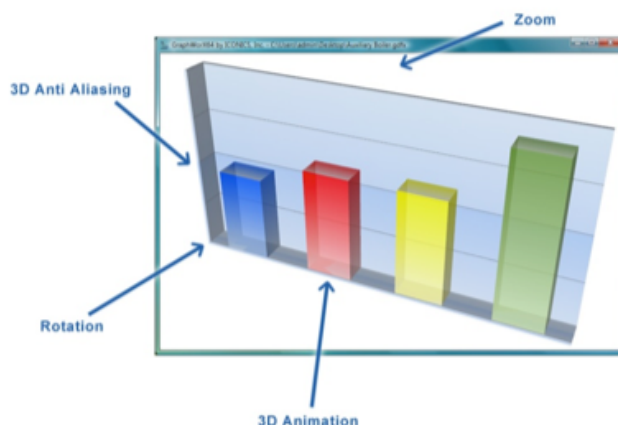
Trend and chart data in the standard Time Based Chart or quickly choose any of the following from the styling gallery: X vs. Y, Logarithmic, Bar Graph, the popular Strip Chart Recorder, Circular Charts and more. The TrendWorX64 Viewer toolbar allows operators to change time periods, show or hide the legend, freeze time and look back at trends during runtime.

Use the intuitive ribbons and galleries to customize your trend or chart by adding color, gradients, smooth animation, translucency, glass effect, anti-aliasing and more. Drag and drop data sources during runtime, view multiple synchronized trends, change the period with the customizable Trend Period Toolbar or create and visualize different plot types on the same trend.



Plotting both real-time and historical data in the same trend plot allows you to compare last week's data, for instance, to current information. Trend production numbers against a target. Users can also plot batch data against a known recipe curve. Utilizing an "ideal" pen can also give further information on current versus normal operation.

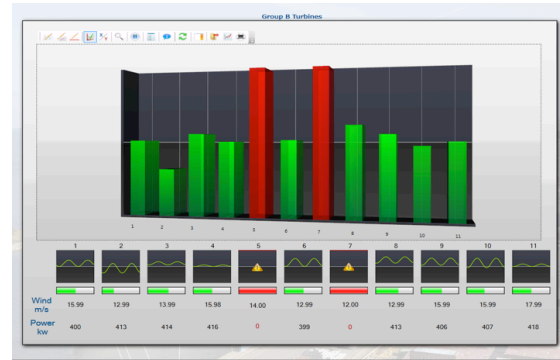
TrendWorX64 Logger



Easily configure logging for your trends with the TrendWorX64 Logger. The TrendWorX64 Logger is a SQL Database logger recommended for up to 25,000 tags and can be connected to the TrendWorX64 Viewer as you would for OPC DA data. The data can easily be shown in displays and includes advanced Pen Aggregations for OPC HDA (Historical) data. Aggregations can be performed in runtime to generate trends for Totalizers, Averages, Minimums, Maximums and Ranges. Through OPC Quality monitoring, operators can get extra information on the percent of values that are good or bad quality.

Universal Connectivity

- OPC-DA
- OPC HDA
- MC Works64
- MC Historian
- Web Services
- TrendWorX32 Server
- TrendWorX64 Server
- OPC UA
- OPC UA HDA
- BACnet
- SNMP
- 3rd Party Databases/
Plant Historians



OPC Connectivity	
OPC UA	Client [DA, HDA]
OPC Classic	Client [DA, HDA]
TrendWorX64 Logger	
Logger Type	Database
Logger Configuration	Tag Based
Maximum Capacity	5,000 Tags (Recommended)
Support	
Multiple Logging Groups	Yes
Multiple Database Groups	Yes
Store and Forward	Yes
Start/Stop Conditions	Yes
Database Table Management	Yes
TrendWorX64 Viewer	
Extension	TWXX (WPF Format), TWXXS (Silverlight)
Data Type	Real-Time, Historical (DA, HDA)
Embeddable	Yes [GraphWorX64]
Number of Trends	Over 250 (< 25 Recommended for Readability)
Time & Rate	Trend Period, Summary Period, Data Collection Rate, Display Refresh Rate, History Refresh Rate,
Time & Date	UTC, Local
Time Format	None, Long, Short, Custom (h, H, m, s, t)
Date Format	None, Long, Short, Custom (M, d, y)
Plot Types	
Line	Time, Time Spline, Step Time, XY
Area	Time Area, Time Spline Area, Time Step Area
Other	Bar, Histogram, Circular, Pie, SPC Control Chart
Pen Types	
Stroke	Solid, Dashed, Dotted, Dotted-Dash, Custom
Markers	None, Circle, Square, Triangle
Numeric Format	Currency, Decimal, Exponential, Fixed-Point, General, Number, Percent, Hexadecimal
Range	Auto, Auto Scale, Fixed (Minimum, Maximum)
Support	
Bad Quality Markers	Yes
Multi-Grid	Yes
Multi-Tab	Yes
Multi-Chart	Yes
Custom Styles	Yes
Freeze Trends	Yes
Alarm Lines	Yes
Ideal Pen	Yes

EarthWorX64™

EarthWorX64, MC Works64's integrated mapping provider allows for real-time visualization to widely dispersed assets such as factories, facilities, oil fields and many others. Mitsubishi Electric supports multiple mapping technologies and combines them with the power of the MC Works64 HMI/SCADA solution to generate powerful GEO-SCADA consoles. GEO-SCADA can be used to geospatially contextualize data for operators bringing meaning to HMI/SCADA displays. Mitsubishi Electric' unique SmartPin™ technology allows for an innovative drill-down capability to quickly view alarm conditions and status for any location around the world. Within seconds, that asset can be identified and located through MC Works64's integration with Google Maps, Microsoft Bing Maps, Esri Mapping and maps conforming to the Open Geospatial Consortium's Web Map Service (OGC WMS) standard.

Developer Benefits Include:

- Multi-layer GraphWorX64 Integration – Bringing base maps and data layers to your HMI displays; EarthWorX64 can easily be embedded in any application.
- Easy Contextualization of Data – via state-of-the-art Geographic Information Systems (GIS) and GPS Exchange Format (GPX) capabilities.

Operator Benefits Include:

- Ability to Correlate Information Geographically – This allows operators to strategically deploy maintenance where they need to be and supports the contextualization of data.
- Immediate Geographical Analysis – Let operators know visually if errors and alarms are related graphically.
- Runtime Controls – Switching Map Types (e.g., Road to Aerial) and zoom controls through the Runtime Ribbon Menu.

Map Providers

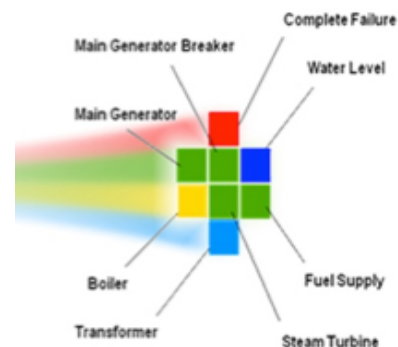
EarthWorX64 can no integrate with a number of different providers offering different base map types. Developers can choose between Bing, Google, Esri and custom WMS map tiles for displays. Each can be designated for a specific EarthWorX64 map layer to provide the operator with a choice or to include data layers from providers like Esri.



Smart Pin Technology

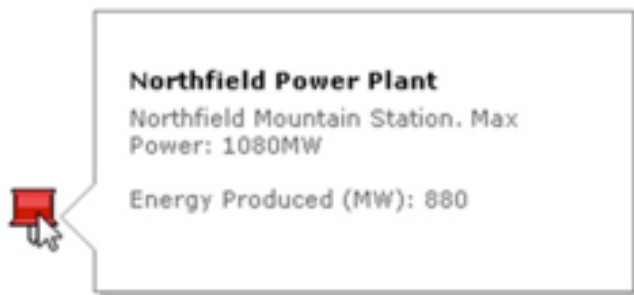
Smart Pins are completely customizable and can be made to look like any shape. They are used to quickly visualize the performance of an asset by the color of the pin. Green can indicate all systems are OK, yellow a potential problem and red an alarm condition or immediate action is needed. Smart Pins are a valuable tool when needing to quickly identify a large number of geographically dispersed assets.

Smart Pins can be made into any shape, convey any signal and contain any number of Smart Icon "squares". Their color-based interpretive ability makes it possible to immediately understand and analyze huge amounts of data. Smart Pins add context to maps to understand potential problems due to geographical aspects (for instance, weather or available power supplies). Add flashing colors or customized tool tips for more information. Links can be added to bring operators to appropriate alarm displays, open up a manual of actions or bring up more detail through any other means.



Layering

With the introduction of new map providers EarthWorX64 now supports multiple EarthWorX64 layers within the same document. This provides the ability to put multiple map types (aerial, road, etc.), different data layers (Esri data layers, OGC WMS custom maps, etc.). With a button on the ribbon and integration with the Object Explorer each layer can have a different map tile source for a flexible and customizable solution for any application.



PushPins

PushPins can convey a basic-level element on a map and can use a variety of custom or pre-configured images, appropriate to the industry or application.

EarthWorX64 Configuration and Runtime

Configuring EarthWorX64 is quick and easy with the MC Works64 Workbench. The EarthWorX64 ribbon can be shown or hidden during runtime. The options to change the map appearance and zoom to different views are always available via the right-click context menu during runtime.



Track Movable Assets

Are your assets constantly moving? Users can track movable assets during transportation via GPS coordinates. Assign custom icons and configure them with fully customizable pop-up information boxes. Import .GPX data right into the display and configure options to place pins for waypoints, stops and directions.

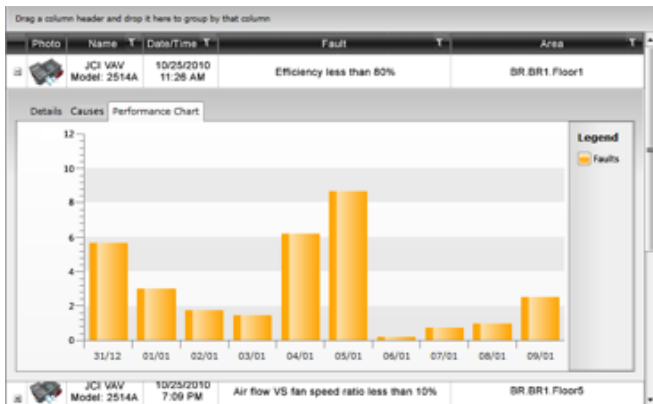
EarthWorX64

Map Sources	
Bing	Road (Shade, No Shade), Hybrid, Aerial
Esri	Imagery, World Boundaries, Streets, Topographic, Canvas, National Geographic, Oceans
Google	Roadmap, Satellite, Terrain, Hybrid
OGC WMS	Custom
EarthWorX64 Viewer	
Zoom	
Levels	1-16
Region	Configurable Bounds
Layers	
Opacity	Configurable
Visibility	Configurable - Dynamics can be attached (default: visible)
Credentials	
Bing	Bing Maps Key
Esri	Username, Password, Root URL
OGC WMS	Provider Address, Additional Parameters
Smart Pins	
Placement	GraphWorX64 Object, Latitude/Longitude
Configuration	Dialog
Size	Add/Remove Rows and Columns
Color	Per Smart Icon
Data Connection	OPC, OPC UA, Global Aliasing, Language Aliasing, Simulation, Expressions, Local Aliasing
Tooltip	Configurable, Data-enabled
Push Pins	
Placement	GraphWorX64 Object, Latitude/Longitude
Configuration	Fill, Zoom, Shadow

FDDWorX

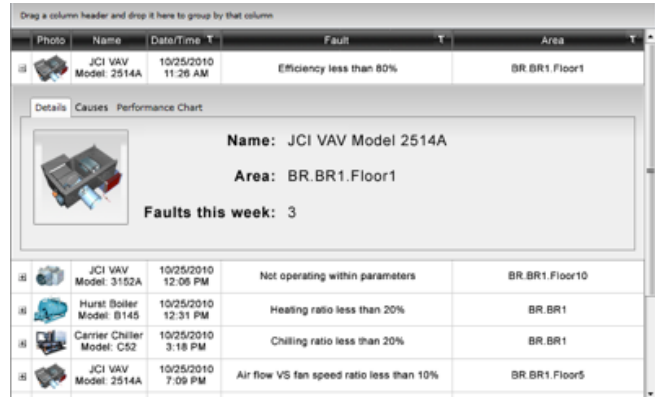
FDDWorX represents the inclusion of a predictive equipment diagnostic solution that uses an advanced Fault Detection and Diagnostics (FDD) Engine within MC Works64 to allow users to analyze all available information to detect and predict faults in equipment. It incorporates algorithms that weigh the probability of faults and advises management, operators and maintenance personnel of actions to prevent equipment failures or excessive use of energy.

When equipment failures occur, advanced software technology analyzes current and historical information along with symptom/cause relationships that the system has been taught, executes probability algorithms, and provides the user guidance with a list of probable causes sorted by probability. This immediate guidance reduces mean time to diagnose and repair, reduces equipment downtime, and lowers overall maintenance costs.



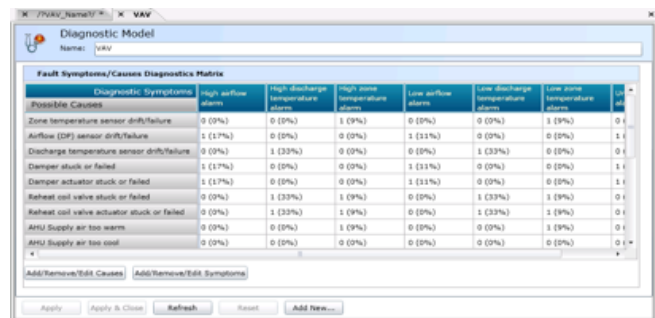
Fault Detection

Detection is based on definable logic that aggregates all available past and present data to detect current or future faults. Faults can be defined in many different ways, but are far more specific than alarm conditions, allowing users to specify enabling conditions that must be met and parameters that can help determine if a fault has occurred.



Fault Diagnostics

Diagnostics is about capturing knowledge from existing workers, work order history, alarm history, manuals and device symptoms into a single place. By aligning conditions with symptoms and probability-ranked causes, fault diagnostics can be used to present the most likely cause of a fault as soon as one occurs.



GridWorX64™

When viewing a large amount of data, it's often helpful to align values into grids for spreadsheet-style visualization. With GridWorX64, users can customize data sets and create large grid-based data visualization. Using the concepts developed with AlarmWorX64, TrendWorX64 and EarthWorX64, the GridWorX64 control can be added to GraphWorX64 displays quickly and easily. With support for SQL Server, OLEDB (x64), ODBC (x64), Oracle (via ODP.NET) and SAP data, GridWorX64 is a powerful tool for visualization that saves time in development.

GridWorX64 Development

Organize your data simply and logically with GridWorX64. Utilize the power of spreadsheet visualization with filtering and sorting of data in real-time. Configure dynamic data sources into grids easily and save on engineering time, while providing a powerful tool to your operators. Centrally configured in the Workbench, the data sets that drive GridWorX64 can be reused multiple times or updated via online change support. Add multiple grids and tabs or put grids next to each other to give the whole picture of operations.

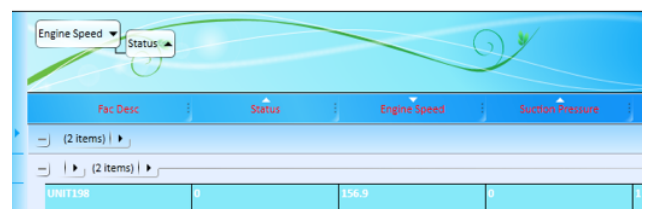
Fac Desc	Status	Engine Speed	Suction Pressure	Discharge Pressure	Suction Temp	State
UNIT198	0	156.9	0	1106.8	68.3	Error
UNIT19A	0	160.6	0	1074.5	74.5	OK
UNIT19B	0	158	0	1131.4	72.7	OK
UNIT20A	0	170.4	0	1114.8	70.6	Error
UNIT20B	0	165.5	0	1081	70.2	Uncertain
UNIT20C	0	162	0	1096.7	71.1	OK

Discharge Pressure	Suction Temp	Discharge Temp	Run Time	Available HP	Column #10
1106.8	68.3	118.7	92.7	161.2	Error
1074.5	74.5	110.7	85.5	162.8	OK
1131.4	72.7	111.6	90.9	158.9	OK
1114.8	70.6	109.3	88.4	162	Error
1081	70.2	117.4	92.8	171.8	Uncertain
1096.7	71.1	110.3	91.5	161.2	OK

GridWorX64 Operator Runtime

GridWorX64 natively supports read and write capabilities to allow operators to not just visualize data, but interact with it. Operators can view, sort, filter and group objects in real time. Sorting columns can bring the most important data to the operator and grouping can quickly create ways to visualize data in context of related data. Dynamic color changes can be included to increase the visibility of issues within data sets.

Fac Desc	Status	Engine Speed	Suction Pressure	Discharge Pressure
UNIT198	0	156.9	0	1106.8
UNIT20A	0	170.4	0	1114.8

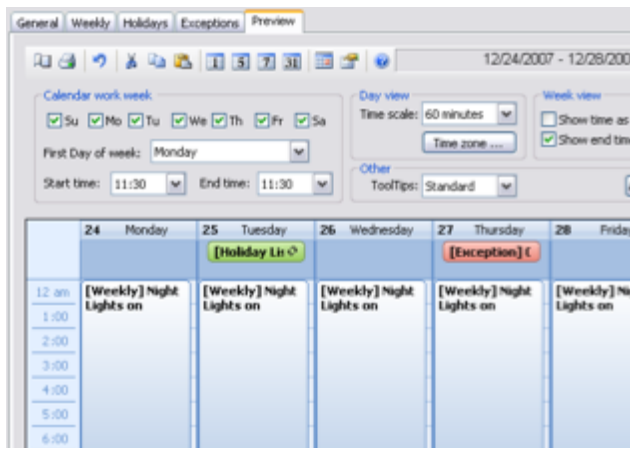


GridWorX64

Data Sources	
OPC	OPC DA, DB OPC (Matrix)
SQL	SQL 2005, SQL 2008
OleDb	x64
ODBC	x64
SAP	
Oracle	ODP .NET
Array	Dataset
GridWorX64 Viewer	
Refresh	
Manual	Configurable
Automatic	Configurable (in milliseconds)
Maximums	
Rows	No Hard Coded Limit (Recommended: 1,000,000 rows)
Columns	No Hard Coded Limit (Recommended: 100 columns)
Changeable Style	Background, Foreground, Font Size, Font Weight, Font Family, Font Style
Row Data Formats	Boolean, String, DateTime, Int16, Int32, Int64, Double UInt16, UInt32, UInt64, OPC UA StatusCode
Support	
Live Filtering	Yes
Live Grouping	Yes
Live Sorting	Yes
Read	Yes (For Readable Points)
Write	Yes (For Writable Points)

ScheduleWorX64™

Any optimized SCADA application requires a level of scheduling. Create schedules for data to lower temperatures, turn off lights and generally control your operations based on timed schedules. Now included in MC Works64, ScheduleWorX64 includes a Microsoft Outlook styling that makes it easy to configure times and dates for data control. Sequencing, exceptions and manual scheduling overrides have also been integrated.

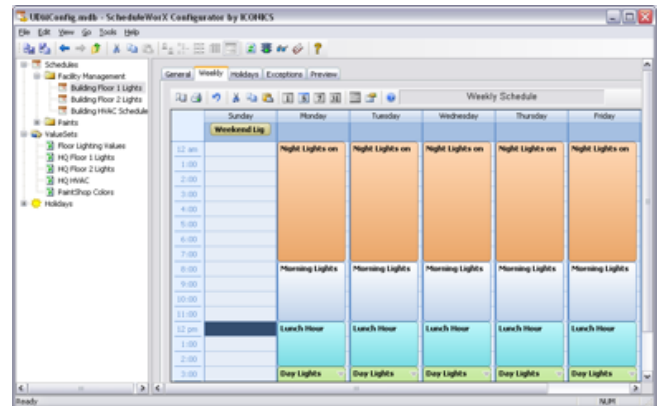


Simple Scheduling

Development is easy with ScheduleWorX64, allowing developers of your application to indicate full day or partial day events for weekdays and weekends. Connect OPC-DA and OPCUA DA data to value sets for multiple actions per schedule. Rebuild or reuse schedules as much as needed with the intuitive control. Utilize command sequencing to set up a chain of events for particular points. As with all of MC Works64, ScheduleWorX64 is configured centrally and leverages all of the advantages of the Workbench such as import, export and Pack and Go deployment.

Flexible Scheduling Support

ScheduleWorX64 allows for advanced control via Value Sets. With Value Sets, ScheduleWorX64 allows multiple points to be governed by a single schedule. Support for specific non-standard events is also central to the ScheduleWorX64 product. By allowing users to configure exception events by creating override schedules, ScheduleWorX64 is truly flexible.



Override Events Include:

- Holidays – Configure specific days of the year or utilize the pre-configured holidays to alter the commands to your data points for a day or more.
- Seasonal – Configure months or weeks of the year where the schedule should change.
- Exceptions – Create general default schedule events and add exceptions for unparalleled control of your application.
- Manual Override – Don't sacrifice control of your application and maintain the option to override for unique situations.

Configuration	
Data Sources	OPC DA, BACnet, SNMP, Value Sets
Databases	SQL 2005, SQL 2008
Schedule Types	
Recurring	General, Weekly, Holiday, Seasonal
One Time	Overrides, Exceptions
View Types	Day, Week, Month, Timeline
Support	
Outlook Style	Yes
Remote Configuration	Yes
Live Monitor Mode	Yes
Security	Yes
Manual Overrides	Yes

ReportWorX™ Express

ReportWorX Express is a lightweight Excel add-in that allows the user to pull in data from a variety of data sources. Although it differs from the stand-alone ReportWorX product in several key ways, ReportWorX Express is intended to be a simple way to quickly report on Mitsubishi Electric data sources. Integrating with MC Works64 Security and including support for numerous data types including OPC, OPC UA, TrendWorX Logger Databases, MC Historian, AlarmWorX Logger Databases, Energy Star and MC Quality, ReportWorX Express will satisfy many reporting needs without requiring the overhead of a full ReportWorX installation.

ReportWorX Express is an on-demand reporting tool that works with both 32-bit and 64-bit Microsoft Excel. Using Excel Task Pane integration and

a contextual Ribbon menu, ReportWorX Express allows users to select historical data by product or data source for inclusion. Each data connection can be formatted for a specific time range and due to the power of Excel, multiple worksheets can be saved together to create comprehensive reports for use by operators and executives alike.

With a small installation size, ReportWorX Express is a lightweight reporting solution that can be utilized alongside MC Works64 with ease. Familiar data browsing will also be seen when looking for current values or historical information to include in each report.

Historical Alarms

Please click on the Output Cell Range Button to select a range

Data Source Tag:

Output Cell Range:

Start Date Type: Custom

Start Date: 08/17/2013 Start Time: 1:18:22 PM

End Date Type: Custom

End Date: 08/17/2013 End Time: 2:18:22 PM

Filtering Expression:

Page size (Number of Alarms):

Select Event Fields:

- SourceNameBaseEventType
- ActiveTimeBaseConditionType
- ConditionNameBaseConditionType
- StatusCodeBaseConditionType

Historical Aggregate Values

Please click on the Output Cell Range Button to select a range

Data Source Tag:

Output Cell Range:

Start Date Type: Custom

Start Date: 08/17/2013 Start Time: 1:18:22 PM

End Date Type: Custom

End Date: 08/17/2013 End Time: 2:18:22 PM

Resampling Interval (min):

Aggregation Type: Maximum

Select Display Columns:

- ☒ Name
- ☐ Server Timestamp
- ☐ Status Code
- ☒ Value
- ☐ Server Name

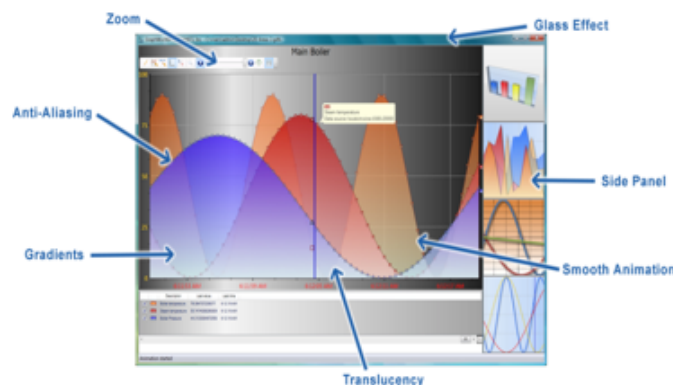
Name	Value
HICONICS.TWSQLSvr64.YDatabase Group Logging Group.Sine.History	99.94884
HICONICS.TWSQLSvr64.YDatabase Group Logging Group.Sine.History	99.97533
HICONICS.TWSQLSvr64.YDatabase Group Logging Group.Sine.History	99.99605

MC Historian™

MC Historian is Mitsubishi Electric' high-speed, reliable and robust plant historian product. In order to analyze and visualize data in real time, organizations must have access to plant data and reporting. MC Historian is designed to log large volumes of data, in excess of 100,000 tags per second, and works with multiple data sources across the enterprise including OPC UA, OPC DA, OPC XML DA, BACnet, SNMP and others. Mitsubishi Electric MC Historian also provides full, Web-based configuration. Optional redundant configurations are supported using redundant MC Historian Collectors and redundant Loggers, and MC Historian offers Store and Forward technology as part of its integrated redundancy solution.

Key Features Include:

- High Performance
- Integrated Redundancy
- OPC UA, DA and HDA Compliance
- Automatic Data Archiving and Backup
- Powerful Performance Calculation Engine
- Real-time and Historical Data Replay
- Multiple Remote Data Collectors
- Store and Forward Technology
- Industry-standard Data Connectivity
- Native SNMP and BACnet
- Optimistic Concurrent Multi-user Configuration
- Web-based Configuration and Administration
- Integration with Mitsubishi Analytics Solutions
- Diagnostic and Data Tracing with NT Event Logs



MC Historian optionally utilizes a high compression, advanced, Swinging Door algorithm and takes full advantage of 64-bit hardware and software architectures, allowing it to access more CPU power and memory than traditional 32-bit-based historians and providing highest performance possible. The Swinging Door algorithm is available with configurable compression, but is based on a space-saving design that intelligently logs data without losing precision. MC Historian includes an industry standard SQL Query Engine, enabling tight integration with any application that supports the SQL Language such as Microsoft SQL Server 2012/2008, MySQL, Oracle and many others. MC Historian also has a unique, automation archiving features that allows for routine or triggered scheduling of data archives, freeing up disk space and backing up files for long term storage and/or retrieval.

NOTE: MC Historian is an additional product to add on top of MC Works64 to access historian functionality. More information can be found in the MC Historian-specific materials.

System Requirements

MC Works64 requires the following hardware and software components. System requirements may vary based on application size, system performance requirements, and loading factors.

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 4 GB of free hard disk space is required. (10 GB Recommended)
Drive	DVD Drive for installation
Display	Recommended: Onboard Video Memory (256Megs) Display resolution minimum - 1024x768, 32bit color DirectX 9 or 10 Video Card or better
.NET Framework	Microsoft .NET Framework 4.5
Web Server	Microsoft Internet Information Services (IIS) 7.0 or higher Internet Explorer, Firefox, Safari, Chrome
Operating System	Any Windows 64-bit operating system, including: Windows 8 x64 (Professional or Enterprise Edition) Windows 7 x64 (Professional or Enterprise Edition) Windows Server 2012 x64 Windows Server 2008 R2 x64 Windows Vista x64 SP2 Windows Server 2008 x64
SQL Server	Microsoft SQL Server 2012 Microsoft SQL Server 2008 R2 SP1 Microsoft SQL Server 2008 SP2 Microsoft SQL Server 2005 SP4 Note: The user also has the option of designating a remote SQL Server, in which case the user will not be forced to install SQL Server locally.

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