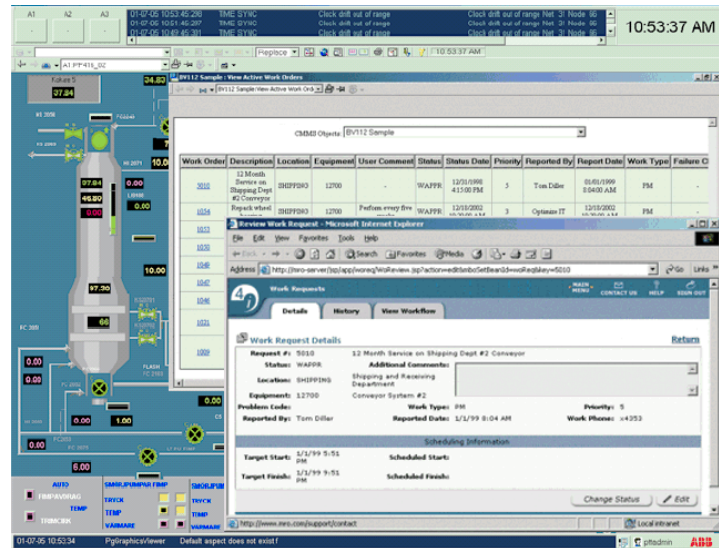


Features and Benefits

- Common user environment for maintenance and process operations:** Navigate seamlessly between process graphics, CMMS views, and native CMMS portals.
- Operator supervision of plant assets facilitated by seamless integration of maintenance and process information:** Simultaneous display of process and maintenance alarms allows quick and efficient assessment from one interface.
- Streamlined maintenance activities:** Electronic submittal of fault reports minimizes latent time between maintenance request and service.
- Flexible CMMS displays:** Include any or all data columns in desired order. Customizable CMMS data displays meet specific installation requirements or preferences.
- Real-time integration:** Integrates CMMS systems, condition monitoring systems, and real-time asset information into single application view.
- Access flexibility:** Process Portal A and Process Portal B access via context menus. Thin client access via web technology.
- Automatic monitoring of maintenance conditions and automatic alarms:** Facilitate fast, reliable implementation of corrective measures.
- Alarm Integration:** Seamless alarm integration with Process Portal systems.
- Provides consistent reporting method of plant asset health status:** Asset Condition Tree provides visualization of current health conditions with the ability to drill down and determine root cause of problems.



TC04871A

CMMS Connectivity consists of the Asset Optimizer Server and Maximo[®] Connectivity system extensions to Operate^{IT}™ Process Portal A. It includes aspect systems and other components that are packaged for installation on Process Portal A.

CMMS Connectivity establishes the link between the process control system and maintenance system environments. It makes information within the Maximo Computerized Maintenance Management System (CMMS) transparently accessible to both types of users. One of the issues that traditionally inhibits free interchange between these functional areas is their different naming conventions; an asset often has one name in the operations environment and another in the maintenance environment. These systems have vastly different focuses, purposes, and needs that their naming conventions must satisfy. CMMS Connectivity removes the barriers by pointing to the right context, regardless of the naming convention.

Successful businesses demand that all data be communicated seamlessly and in real time. Traditionally with most enterprises, tight, real-time coordination between the control system and maintenance system is desired but seldom achieved. These systems are designed to support different functional environments with very different objectives and constraints. However, the just-in-time requirements of the competitive marketplace of today, as well as rising expectations created by the PC revolution are powerful forces driving toward elimination of this separation.

As part of the award winning Industrial IT™ Enterprise Optimization productivity suite, CMMS Connectivity provides the technology to achieve a sustainable, competitive advantage in the marketplace. It enables maintenance resources to perform smarter and better at substantial cost savings.

Using the Aspect Object™ technology of Industrial IT, CMMS Connectivity makes asset information from process control and maintenance systems available on one user interface. To access this information, the user does not need to switch between several systems with different workplaces, application environments, and navigation schemes. The user can stay within the Industrial IT environment, regardless of where the information resides, or the naming conventions employed in the various systems. This reduces time consuming and error prone data hunting, and provides immediate access to the most up-to-date information.

Maximo Equipment ID

The Maximo Equipment ID provides information for mapping the Industrial IT object to the Maximo equipment in the CMMS database for a particular Maximo Server. Multiple Maximo Equipment IDs can be associated with the same asset, thus providing the ability to map to more than one piece of equipment defined in Maximo.

Maximo Credentials

Maximo Credentials contains the Maximo user credentials used to access the Maximo Server by the specific Process Portal user.

CMMS Views

Note: The CMMS views consist of Industrial IT views and Maximo portal views. The supporting text indicates which type of view is shown. The Maximo portal views consist of views from Maximo 4.1 and Maximo 5.1 to show the compatibility of Optimize IT CMMS Connectivity with several Maximo versions. When different, the figure caption indicates which version of Maximo generated the view.

The CMMS Views consists of:

- **Active Work Orders View.**
- **Work Order History View.**
- **Equipment Status View.**
- **Preventive Maintenance Schedule View.**
- **Spare Parts/ Availability of Spare Parts Views.**
- **Fault Report Submitter.**
 - **Create Fault Report Form/Submit Fault Report.**
 - **Fault Report Viewer/Submit Fault Report.**

Active Work Orders View

The Active Work Orders view lists all active work orders in the CMMS for a particular asset or group of assets. Figure 1 shows the Industrial IT Active Work Orders view. Columns can be sorted with respect to the column header topic with a click of the mouse.

The screenshot shows a web browser window titled 'BV112 Sample - Active Work Orders - Microsoft Internet Explorer'. The page displays a table of work orders for the asset 'BV112 Sample'. The table has the following columns: Work Order, Description, Location, Equipment, User Comment, Failure Date, Status, Status Date, Priority, Reported By, Report Date, Work Type, and Failure Class. Four work orders are listed, all with a status of 'WAPPR' and a failure class of 'CONVEYOR'.

Work Order	Description	Location	Equipment	User Comment	Failure Date	Status	Status Date	Priority	Reported By	Report Date	Work Type	Failure Class
2624	Group of 100: Total: 1001	BPM3100	HAS50	Auto Generated		WAPPR	Tuesday, February 25, 2003 3:45:00 PM	-	Jeff Rochow	Tuesday, February 25, 2003 3:45:00 PM	PM	CONVEYOR
2623	Group of 100: Total: 1001	BPM3100	HAS50	Auto Generated		WAPPR	Tuesday, February 25, 2003 3:45:00 PM	-	Jeff Rochow	Tuesday, February 25, 2003 3:45:00 PM	PM	CONVEYOR
2622	Group of 100: Total: 1001	BPM3100	HAS50	Auto Generated		WAPPR	Tuesday, February 25, 2003 3:45:00 PM	-	Jeff Rochow	Tuesday, February 25, 2003 3:45:00 PM	PM	CONVEYOR
2621	Group of 100: Total: 1001	BPM3100	HAS50	Auto Generated		WAPPR	Tuesday, February 25, 2003 3:45:00 PM	-	Jeff Rochow	Tuesday, February 25, 2003 3:45:00 PM	PM	CONVEYOR

TC04852B

Figure 1. Industrial IT Active Work Orders View

The **Work Order** column contains links to the CMMS. Clicking on a link opens a portal that contains a CMMS bpm view of the selected work order (Figure 2).

The screenshot shows the Maximo 5.1 Active Work Order Portal for work order 2982. The interface includes a navigation bar with tabs for Search, Work Order, Plans, Actuals, Safety Plan, Failure Reporting, and Linked Documents. The main content area is divided into several sections: Job Details, Problem, Follow-up Work, Scheduling Information, and Responsibility. The Job Details section contains fields for Work Order, Location, Equipment, Reported By, Status, and Parent WO. The Problem section contains fields for Failure Class and Problem Code. The Follow-up Work section contains fields for Originating WO and Has Follow-up Work. The Scheduling Information section contains fields for Target, Scheduled, Actual, Estimated Duration, Remaining Duration, and Crew. The Responsibility section contains fields for Supervisor, Labor Group, and Lead Craft/Person. The Modified section contains fields for By and Date.

TC04853B

Figure 2. Maximo 5.1 Active Work Order Portal

Work Order History View

The Work Order History view (Figure 3) lists the history of all work orders in the CMMS for a particular asset or group of assets. Columns can be sorted with respect to the column header topic with a click of the mouse.

The screenshot shows a web browser window titled 'BV112 Sample - Work Orders History'. Below the browser title bar, there is a search bar with 'BV112 Sample' entered. Below the search bar is a table with the following columns: Work Order, Description, Location, Equipment, User Comment, Failure Date, Status, Status Date, Priority, Reported By, Report Date, Work Type, Failure Class, and Priority. The table contains two rows of data.

Work Order	Description	Location	Equipment	User Comment	Failure Date	Status	Status Date	Priority	Reported By	Report Date	Work Type	Failure Class	Priority
3163	-	BPM3100	HAS50	-	Monday, November 29, 1999 7:16:59 PM	CLOSE	Monday, March 17, 2003 3:06:59 PM	3	Optimize IT	Monday, March 17, 2003 3:04:59 PM	PM	CONVEYOR	
2625	This is FR 1002	BPM3100	HAS50	Manually Generated		CAN	Tuesday, February 25, 2003 3:55:59 PM	-	Jeff Rochow	Tuesday, February 25, 2003 3:55:59 PM	PM	CONVEYOR	

TC04858B

Figure 3. Industrial IT Work Order History View

The **Work Order** column contains links to the CMMS. Clicking on a link opens a portal that contains a CMMS view of the selected work order (Figure 4).

The screenshot shows a web browser window titled 'Review Work Request - Microsoft Internet Explorer'. The address bar shows a URL: http://mro-server/jsp/app/woreq/WoReview.jsp?action=edit&mboSetBeanId=woReq&key=6010. The page has a navigation bar with 'Work Requests', 'Details', 'History', and 'View Workflow'. The main content area is titled 'Work Request Details' and contains the following information:

Request #: 6010 12 Month Service on Shipping Dept #2 Conveyor
Status: CLOSE **Additional Comments:**
Location: SHIPPING Shipping and Receiving Department
Equipment: 12700 Conveyor System #2
Problem Code: **Work Type:** EM **Priority:** 5
Reported By: Tom Diller **Reported Date:** 1/1/99 8:04 AM **Work Phone:** x4353

Scheduling Information

	Current Estimate	Estimate at Approval	Actual
Labor Hours:	6:00	6:00	0:00
Labor Cost:	\$100.00	\$100.00	\$0.00
Material Cost:	\$71.28	\$71.28	\$0.00
Tool Cost:	\$23.00	\$23.00	\$0.00
Service Cost:	\$0.00	\$0.00	\$0.00
Total Cost:	\$194.28	\$194.28	\$0.00

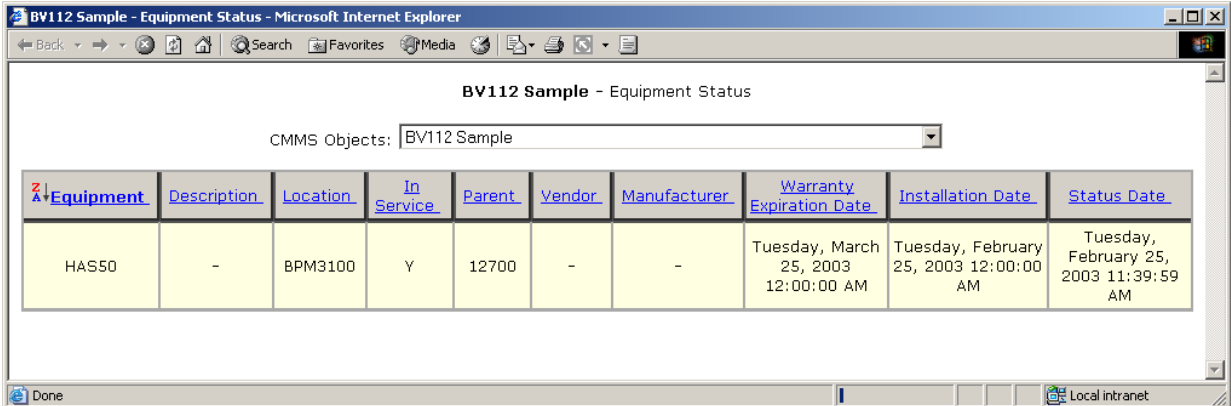
GL Account: 6500-300-???

TC04859A

Figure 4. Maximo 4.1 Work Order History Portal

Equipment Status View

The Equipment Status view (Figure 5) allows viewing of data returned from a status assessment of an asset or group of assets. Columns can be sorted with respect to the column header topic with a click of the mouse.

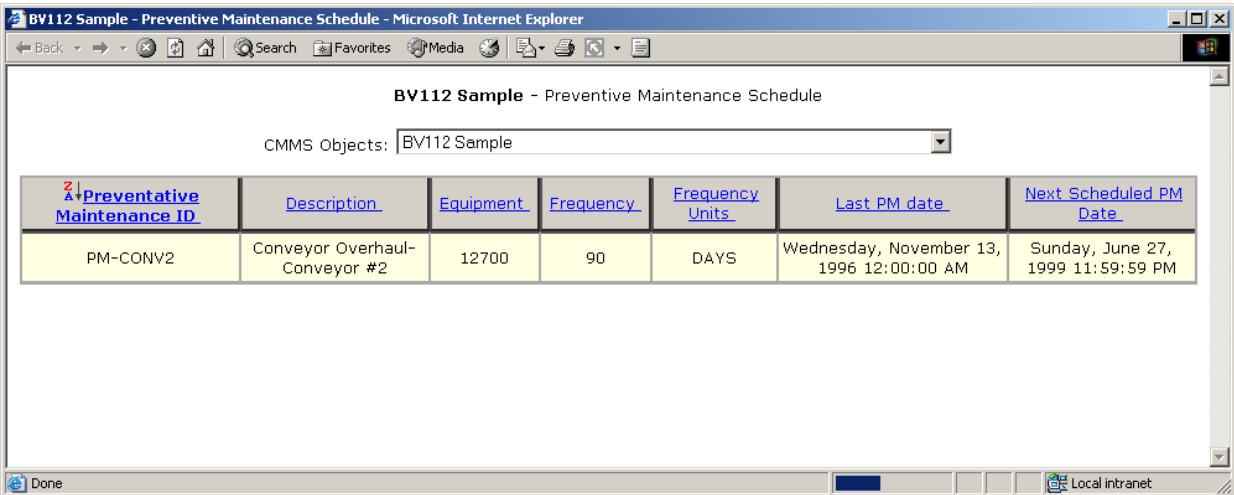


TC04854B

Figure 5. Industrial IT Equipment Status View

Preventive Maintenance Schedule View

The Preventive Maintenance Schedule view (Figure 6) lists the preventive maintenance schedule for an asset or group of assets. Columns can be sorted with respect to the column header topic with a click of the mouse.



TC04855C

Figure 6. Industrial IT Preventive Maintenance Schedule View

Spare Parts/Availability of Spare Parts Views

The Spare Parts view (Figure 7) lists spare parts in the CMMS for a particular asset or group of assets. Columns can be sorted with respect to the column header topic with a click of the mouse. The **Item Number** column contains links to the Availability of Spare Parts view (Figure 8) that shows the location, quantity available, measurement unit, and cost of the selected spare part.

Item Number	Description	Equipment	Quantity Required	Remark
560-00	Tubing, Copper-1 In ID X .030 In Wall	HAS50	1.00	-
230-00	Elbow, Street- 90 Deg, 1 In	HAS50	1.00	-
217213	Plate, Stainless Steel	HAS50	1.00	-

TC04856B

Figure 7. Industrial IT Spare Parts View

Clicking on the 560-00 link produces a view such as the one shown in Figure 8. Columns can be sorted with respect to the column header topic with a click of the mouse.

Location	Qty Available	Unit	Unit Cost
PKG	3200	FEET	2.05
MACHSHOP	3100	FEET	2.05
GARAGE	1200	FEET	2.05
CENTRAL	53700	ROLL	2.05

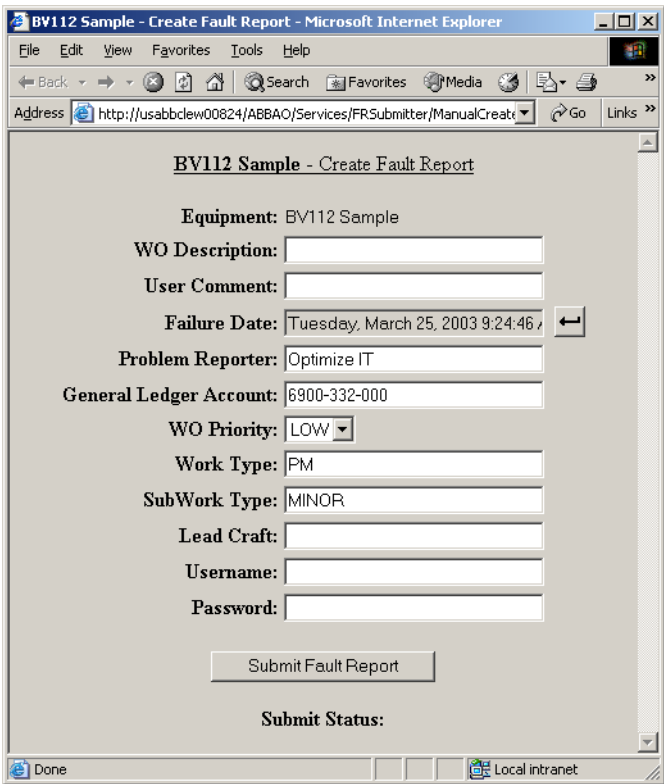
TC04857B

Figure 8. Industrial IT Availability of Spare Parts View

Create Fault Report Form/Submit Fault Report

These functions are made possible by the Fault Report Submitter. The Create Fault Report Form makes it possible to create a new fault report for the selected asset without an Asset Condition Document (ACD) being generated by an asset monitor. After filling in the fields with the appropriate information and clicking **Submit Fault Report**, the Submit Status: field indicates whether or not submission of the fault report succeeds. If it is unsuccessful, an error message will appear in the Submit Status: field. Upon successful submission, a work order is created in the CMMS.

Figure 9 shows the Create Fault Report Form.

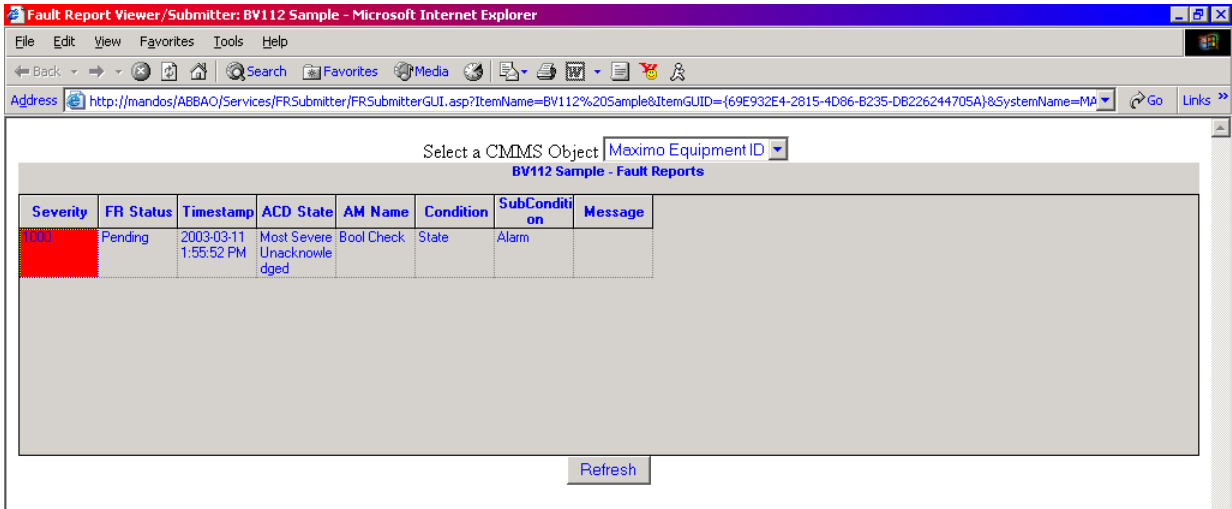


TC04845B

Figure 9. Create Fault Report Form

Fault Report Viewer/Submit Fault Report

These functions are made possible by the Fault Report Submitter. When an asset monitor generates an ACD, a fault report is created automatically. The Fault Report Viewer (Figure 10) makes it possible to see all fault reports for a selected object.



TC05000A

Figure 10. Fault Report Viewer

Right-clicking anywhere in a fault report row produces a context menu with the option to dismiss the fault report or submit it. Selecting **Dismiss** deletes the selected fault report from the Asset Optimizer system. It also acknowledges the alarm in the Alarm and Event List. Selecting **Submit** launches the Submit Fault Report view as shown in Figure 11.

Note: This function will not acknowledge alarms in Process Portal B.

TC04999A

Figure 11. Submit Fault Report View

The **Dismiss after successful submittal** check box in the Submit Fault Report view is a configurable option. If it is unchecked, the fault report is retained with a fault report status of submitted. It can be dismissed later or automatically replaced with subsequent fault reports.

Asset Optimizer Server

The Asset Optimizer Server system extension consists of a base functionality that is common to more than one system extension (Messenger Service, CMMS Connectivity, Asset Monitor Environment).

The Asset Optimizer Server system extension consists of the Asset Tree aspect system, which consists of the following aspects:

- **ACTViewer (Asset Condition Tree Viewer).**
- **ACTReporter (Asset Condition Tree Reporter).**

The Asset Condition Tree shows the status of associated plant objects (assets) based on Plant Explorer hierarchies. Assets can be control system hardware components, control system

networks, control system devices, fieldbus networks, fieldbus components, machines, pumps, motors, process equipment (boiler, reactor), etc.

Asset Condition Tree indicators propagate the most severe condition up the Asset Condition Tree. Asset Condition Tree indicators distinguish the level of severity using OPC and Asset Monitor severity range (1 to 1,000). Each Asset Condition Tree indicator represents composite severity of an object and all children beneath the object for the current structure.

In addition to displaying composite severity for each asset, the Asset Condition Tree displays, and propagates up the tree, the quality of the condition (or the Asset Monitor itself, i.e. bad configuration or not downloaded), as well as fault report availability. Fault report availability is indicated by bold text. Quality has three states:

- Good: Displays only Asset Condition Tree indicator.
- Bad: Displays Asset Condition Tree indicator plus X.
- Uncertain: Displays Asset Condition Tree indicator plus ?.

Table 1 shows and describes the Asset Condition Tree severity indicator icons.

Table 1. Asset Condition Tree Severity Indicator Icons









Icon	Description
	No ACTReporter or Asset Monitor associated with the asset.
	Normal subcondition.
	Non-normal subcondition with severity between 0 and 250.
	Non-normal subcondition with severity between 251 and 500.
	Non-normal subcondition with severity between 501 and 750.
	Non-normal subcondition with severity between 751 and 1,000.

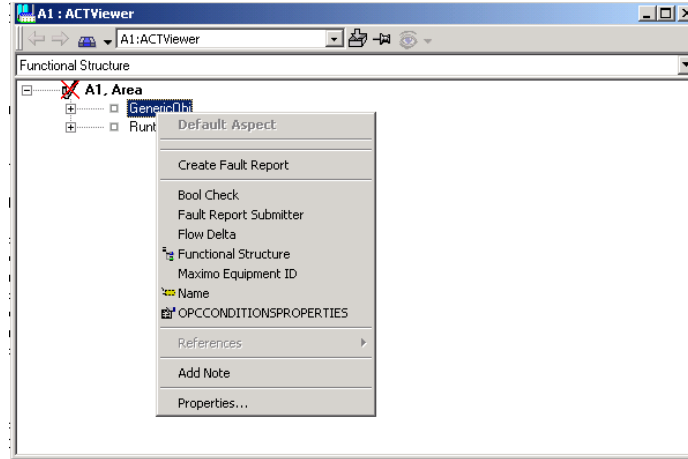
Table 2 shows and describes the quality indicator overlay icons that appear over the Asset Condition Tree severity indicator icons to represent quality.

Table 2. Quality Indicator Overlay Icons

Icon	Description
	Uncertain quality.
	Bad quality.

ACTViewer (Asset Condition Tree Viewer)

The ACTViewer (Figure 12), when added to an object, allows the Asset Condition Tree to be displayed. When displayed, the Asset Condition Tree shows the condition of that object and all its children. The Asset Condition Tree visually indicates the presence of a fault report by displaying items in bold text. Context menus permit fault report submission directly from within the ACTViewer. Right-clicking on the item of interest produces a context menu such as the one shown in Figure 12.



TC04692B

Figure 12. ACTViewer

The ACTViewer is accessible within the Plant Explorer Workplace on the Asset Optimizer Server and rich client Asset Optimizer Workplaces. It is also accessible on thin client Asset Optimizer Workplaces. When the ACTViewer is active in the Plant Explorer Workplace in the rich clients, the status of the assets in the view update automatically when values change. Thin client views require a manual refresh to update the view.

ACTReporter (Asset Condition Tree Reporter)

The ACTReporter (Figure 13) is a detailed view of an asset condition.

Severity	AM Name	Condition	SubCondition	Description	TimeStamp	QualityStatus	Fault Report
1	Running Time Check	Runtime Limit Reached				badOutOfService	
1000	Flow Delta	FlowDelta	LimitExceeded	Flow delta exceeded allowable limit of 5.0%	2003-04-01 15:15:56	good	
1	HighLow Limit Check	HighLimit	Normal	Normal	2003-04-01 15:15:55	good	
500	HighLow Limit Check	LowLimit	LowOffset	Low offset limit reached	2003-04-01 15:15:55	good	
1	XY Profile Deviation	Reference Profile Deviation				badOutOfService	
1000	Bool Check	State	Alarm		2003-04-01 15:15:53	good	Available
1	Bad Qu Check			Asset Parameter 'ExecutionsRequiredForTrigger' must be an integer >= 1.	2003-04-01 15:15:54	badConfiguration Error	

TC04725B

Figure 13. ACTReporter

It displays the severity indicator for an object itself. It displays information available to it from all Asset Monitors and their corresponding current subconditions. For each condition, the ACTReporter will provide information about current subconditions, severity, Asset Monitor status, fault report availability, and work order availability. Right-clicking on the item of interest produces a context menu such as the one shown in Figure 13.

Table 3 lists the color scheme that appears in the **Severity** column of the ACTReporter and how the colors relate to the subcondition severity levels.

Table 3. ACTReporter Color Scheme

Color	Subcondition Severity Level
Gray	Normal
White	1 to 250
Blue	251 to 500
Yellow	501 to 750
Red	751 to 1,000

The ACTReporter must be added to each object that needs to be propagated up the Asset Condition Tree in the ACTViewer.

The ACTReporter is accessible within the Plant Explorer Workplace on the Asset Optimizer Server and rich client Asset Optimizer Workplaces. It is also accessible on thin client Asset Optimizer Workplaces. When the ACTReporter is active in the Plant Explorer Workplace, the status of the assets in the view update automatically when values change. Thin client views require a manual refresh to update the view.

® ActiveX, Microsoft, and Windows are registered trademarks of Microsoft Corporation.

™ Aspect Object, Industrial^{IT}, Operate^{IT}, and Optimize^{IT} are Trademarks of ABB.

™ Java is a trademark of Sun Microsystems, Inc.

® Maximo is a registered trademark of MRO Software Inc.

*For more information on the Optimize^{IT} suite of products, contact us at optimizeit-ao@us.abb.com
or visit us on the World Wide Web at: <http://www.abb.com/processautomation>*



WBPEEUS350261A0 Litho in U.S.A. May 2003

Copyright © 2003 by ABB, All Rights Reserved

® Registered Trademark of ABB.

™ Trademark of ABB.

Automation Technology Products
Wickliffe, Ohio, USA
www.abb.com/processautomation
email: industrialitsolutions@us.abb.com

Automation Technology Products
Västerås, Sweden
www.abb.com/processautomation
email: processautomation@se.abb.com

Automation Technology Products
Mannheim, Germany
www.abb.de/processautomation
email: marketing.control-products@de.abb.com