

Alarm Analytics™

V9.1 Product Bulletin

April 2008



Visualize Your Enterprise™

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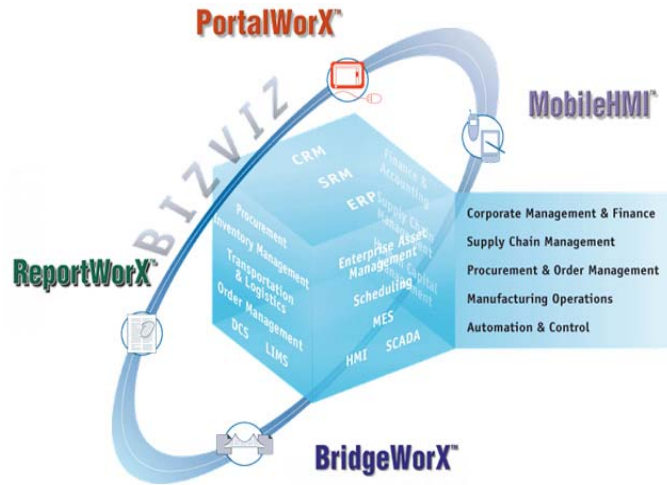
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Complies with industry standards EEMUA 191 and OSHA PSM 1910.119 for Alarm Analytics, connects to all major databases

ICONICS' Alarm Analytics product enables plant personnel to Visualize, Analyze, and Manage alarm information in accordance with the industry best practices. The push for operational excellence in the manufacturing industry is driving the need for more effective alarm analytics. Proper analysis of alarms and events in a manufacturing plant can reveal significant opportunities for improving current operations and mitigating abnormal situations. BizViz Alarm Analytics captures and analyzes all alarm and event information to identify frequent alarms, chattering alarms, cross-correlated alarms, and many more alarm-related issues. This module also records, analyzes, and displays operator-initiated process changes, which then yield significant insight into the performance of the entire system.



Features	Benefits
Store Alarms and Events to popular databases	Captures and archives alarms, operator actions, and system events into SQL, Oracle, Access or MSDE.
Analyze Alarms in real-time or by a specified time period	Identifies unusual alarm occurrences, trends in plant alarms and control modules responsible for those alarms
Benchmark alarm performance	Benchmarks alarms vs. established standard EEMUA 191 recommended best practices.
Deliver alarm information in industry standard reports	Complies with standards set by OSHA PSM 1910.119.
Leverage Microsoft Excel expertise	Alarm Analytics is built on top of widely used Microsoft® Excel
Real-time Alarm Analytics drives better process understanding	Alarm Analytics provides up-to-the-minute reports that show alarm frequency, statistics, user acknowledgements, alarm priority distributions or system events.
Easy configuration with industry standard predefined reports	Predefined reports and wizards help focus on a plant area, time period or event type.
Identify areas for improvement	Built-in Pareto charts to help rank alarms by frequency and categorize problematic areas such as tag chattering.
Distribute Alarm Analytics reports via e-mail or fax	Users can view reports in Excel, PDF, or HTML format on the Web or receive them via automated e-mail.
Simplifies Incident Investigation	Easily access all recorded events and operator actions.



Alarm Analytics: Industry Standard-based Alarm Reporting

Alarm Analytics, which is based on ICONICS' BizViz ReportWorX and AlarmWorX32 Alarm Logger, provides advanced Alarm Analytics, Alarm Reporting, and Alarm Management. Alarm Analytics supports industry standards for Alarm Management issued by OSHA and EEMUA.

The Alarm Analytics module contains 15 standard reports with advanced Alarm KPIs, including the following:

1. *Alarm Distribution by Interval*
2. *Alarm Distribution by Interval with Priority*
3. *Alarm Distribution by Priority*
4. *Alarm Rate Distribution by Interval*
5. *Alarm Tag Chattering*
6. *Alarm Tag Frequency*
7. *Alarms from Worst Actors by Interval*
8. *Average Alarm Rate per Minor/Major Interval*
9. *Cross-Correlation Analysis*
10. *Operator Changes by Interval*
11. *Operator Response Time*
12. *Peak Alarm Rate Distribution*
13. *Standing Alarms at Time*
14. *Standing Alarms by Interval*
15. *Standing Alarms Duration*



Pre-Configured Templates

Alarm Distribution by Interval

This report provides a quick insight into the frequency of alarms over a specified interval. It shows an alarm transaction count per interval over a time range. The user specifies the time interval such as daily, weekly, or monthly and the report automatically adjusts the chart with the new interval values. In addition, the alarms can be separated out by priority according to priority levels that you can customize to match the standards at your facility.

The color coding corresponds to alarm priority levels, which by default match the EEMUA standards for "critical", "high", "medium" and "low". The Global Alarm Priority Manager allows the user to define the OPC Severity bands that correspond to their custom priorities if different from the EEMUA standards.



Each alarm count bar adds up to 100% of the total count, showing the percent of alarms at each priority. Superimposed on the chart is the total number of transitions into alarm per interval in the form of a line chart. The Alarm Distribution by Interval with Priority chart integrates into Excel's PivotTable functionality for its data.



Figure 1: Alarm Distribution by Interval

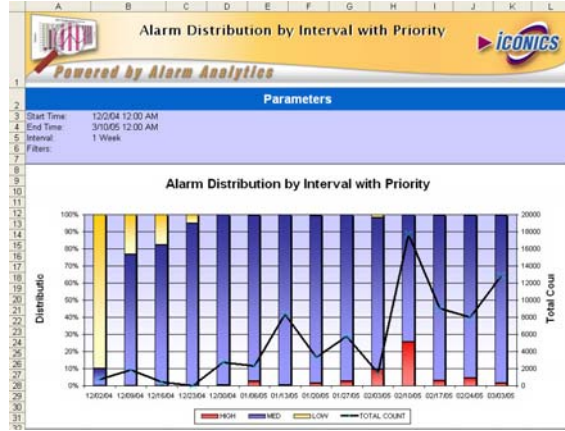


Figure 2: Alarm Distribution by Interval with Priority

Alarm Distribution by Priority

If the distribution of the alarms by priority only is important the best visualization report is Alarm Distribution by Priority. This simple pie chart allows for a quick insight into how many alarms you are experiencing at each priority level. The priority levels are set to EEMUA standards by default (critical, high, medium and low) and can be customized easily with the Global Alarm Priority Manager.

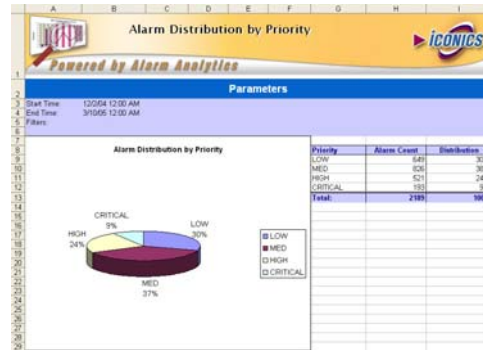


Figure 3: Alarm Distribution by Priority



Figure 4: Alarm Tag Frequency

Alarm Tag Frequency

This report indicates which alarm tags went into alarm most often over a given period of time. The report uses a Pareto chart to sort the alarms by number of occurrences, so the “worst” alarm is the first one in the chart. The user can configure the maximum number of rows to return in the report, effectively turning it into a “Top 10” or “Top X” Pareto chart.



Alarm Tag Chattering

This report is represented by a table that shows alarm tags that go in and out of alarm repeatedly in a short period of time (chattering). The user specifies a time window and the maximum number of rows. If an alarm repeats within the time window it is considered a chattering alarm and part of a cluster. For each tag, the table also includes the number of clusters, the average occurrences per cluster and the total number of occurrences. The table is sorted by the Cluster Member Percentage.

Tag	Condition Name	Priority	Tag Description	Cluster Member Percentage	Avg Number of Cluster Members	Number of Clusters	Total Occurrences
10	127FC202	Limit	HIGH GASOLINA LCC AL M-202B	100%	2	1	2
11	127F305	Limit	LOW GASOLINA LCC AL M-201A	92%	6	2	13
12	127Q2113	Limit	MED VIB COMPR PB4	84%	5	15	81
13	127LCA208	Limit	LOW SEPARADOR N°16	80%	4	1	5
14	127BBA112	Deviation	LOW SENSOR DE LLAMA QUEM 3	80%	7	24	222
15	127HGA133	Limit	MED BLOO DESIC COMP PB4B	71%	10	3	41
16	127ELS 7123	Limit	HIGH NV BAJO AGUA SEP	67%	2	1	3
17	127Q2113	Deviation	MED VIB COMPR PB4	64%	2	3	11
18	127FC202	Limit	HIGH GASOLINA LCC AL M-202B	58%	4	2	13
19	127LCA2123	Limit	HIGH NIVEL DE AGUA SEPARADOR	50%	2	1	4
20	127F416	Limit	HIGH REFLUJO A TORRE 3	36%	5	2	26
21	127BBS 7125	Limit	HIGH BOMBA AGUA DE BESECHO	33%	2	1	6
22	127HGA137	Limit	HIGH PARADA EMERGO LOCAL	33%	2	1	6
23	127LCA208	Limit	HIGH NIVEL FONDO TORRE DA 2	29%	2	4	26
24	127L 410	State of Change	LOW SEPARADOR N°17	22%	2	1	5
25	127PZA151	Limit	HIGH BAJA PRES AC LUB	19%	3	1	16
26	127PDC007	Limit	LOW LINEA DESPOSI RISESH	14%	2	1	168
27	127PDC008	Limit	LOW INVENT CATALIZ BEACT	12%	2	3	61

Figure 5: Alarm Tag Chattering

Cluster Member Percentage = (Avg. occurrences per cluster) * (# of clusters) / (total occurrences)

Cross Correlation Analysis

This analysis finds alarms that always (or usually) occur one after another which suggests correlation between two alarms. This process compares all combinations of pairs of alarm tags and the results for each alarm pair are shown in tabular format. The table shows the following important information:

Parent Tag	Parent Tag Description	Child Candidate Tag	Child Candidate Tag Description	Occurrence Count	Predictability	Significance
13	HS-CUS-009C C VALVE	HS-CUS-009D O VALVE		402	100%	100%
14	IC-FS-40A 5 DRY #6 FAN	IC-FS-40A 5 DRY #6 FAN		38	100%	100%
15	IC-FS-40B 5 DRY #6 FAN	IC-FS-40B 5 DRY #6 FAN		37	100%	100%
16	IC-FS-40C 5 DRY #6 FAN	IC-FS-40C 5 DRY #6 FAN		37	100%	100%
17	IC-FS-39A 5 DRY #1 FAN	IC-FS-39B 5 DRY #2 FAN		34	100%	100%
18	IC-FS-39B 5 DRY #2 FAN	IC-FS-39B 5 DRY #2 FAN		34	100%	100%
19	IC-F4-61B 4 DRY #6 FAN	IC-F4-61B 4 DRY #6 FAN		33	100%	100%
20	IC-FS-39C 5 DRY #0 FAN	IC-FS-39C 5 DRY #0 FAN		33	100%	100%
21	IC-F4-61C 4 DRY #6 FAN	IC-F4-61C 4 DRY #6 FAN		32	100%	100%
22	IC-F4-60A 4 DRY #1 FAN	IC-F4-60A 4 DRY #1 FAN		22	100%	100%
23	IC-F4-60B 4 DRY #2 FAN	IC-F4-60B 4 DRY #2 FAN		22	100%	100%
24	IC-F4-60B 4 DRY #2 FAN	IC-F4-60C 4 DRY #0 FAN		21	100%	100%
25	IC-F4-60C 4 DRY #0 FAN	IC-F4-60C 4 DRY #0 FAN		21	100%	100%
26	FL-CF4-03B 4 DRYER 150#	FL-CF4-03B 4 DRYER 150#		10	100%	100%
27	IC-FS-40B 5 DRY #6 FAN	IC-FS-40C 5 DRY #6 FAN		36	97%	97%
28	IC-FS-40B 5 DRY #6 FAN	IC-FS-40C 5 DRY #6 FAN		36	97%	97%
29	IC-FS-40B 5 DRY #6 FAN	IC-FS-40C 5 DRY #6 FAN		36	97%	97%

Figure 6: Cross Correlation

Occurrence Count – The number of times the child tag occurred after the primary tag, within the time window.

Predictability – The percentage of time that the primary alarm occurred and the child alarm occurred within the time window i.e. 100% if the child

alarm occurred every time the primary alarm occurred.

Significance – The percentage of time the child alarm occurs within the window of the primary, i.e. 100% if the child alarm only occurs after the primary alarm within the time window.



Operator Response Time and Operator Changes by Interval

This report analyzes the time it takes an operator to respond to each alarm condition (Acknowledge, or ACK for short) and the time for the condition to Return to Normal (RTN). Since each row summarizes multiple occurrences, the Min, Max and Average values are shown. The table is sorted in descending order according to whatever the user selects while executing the report. The Operator Changes report by interval shows operator actions as defined in OPC Tracking event in GenEvent audit tracking system.

Tag	Condition Name	Priority	Tag Description	Time To Respond (minutes)			Time To Return (minutes)		
				Min ACK	Max ACK	Avg ACK	Min RTN	Max RTN	Avg RTN
93RH5_135C	Limit	LOW	SELECT AM (A) ACTIVO	0	1440	1123	1440	1440	1440
93SA117	Limit	LOW	SENSOR DE LLAMA QUEM. 10	0	1440	1123	1440	1440	1440
26T020	Limit	LOW	FONDO TORRE 3	0	1440	1080	1434	1434	1434
37F415	Limit	LOW	LPO TORRE TORRE 3	0	1440	1080	4	1444	1084
37F407	Limit	HIGH	PRESION TORRE DA2	0	1440	1080	3	1443	1083
59F1067	Limit	LOW	VAP SOBREC.A.F-1 LINEA 4	0	1440	1080	842	842	842
37F419	Limit	LOW		0	1440	1080	0	1440	1080
37FC359	Limit	LOW	SODA 10% AL M-202C	0	1440	1016	1	1441	1017
36T049	Limit	LOW	SALIDA EAG	0	1440	960	14	1384	1232
36T022	Limit	LOW	TEMPERATUR FONDO TORRE 2	0	1440	960	3	1444	970
37LC486	Limit	HIGH	NIVEL FONDO TORRE DA_2	0	1440	795	1	1441	797
58LCA465	Limit	LOW	FONDO TORRE C-2	1	1441	679	9	1449	686
34LJ_003	Limit	LOW	NIVEL TANQUE BA03	1	1441	678	174	1614	851
59F110	Limit	HIGH	TAMBOR CALDERA V-9	1	1441	678	10	1450	687
59F1106	Limit	LOW	ACEITE COMB. CALDERA CO	0	1440	677	3	1443	680
59LCA001	Limit	LOW	AGUA ENFRIAMNETO BOMBAS	0	1440	677	4	1444	681
59FZ129	Limit	HIGH	ALTA TEMPERATURA ABE	0	1440	677	49	1489	726
59FCF034	Limit	LOW	CALC DIFER FLUIDO CAL CO	0	1440	677	4	1444	681
37LC402	Limit	HIGH	NIVEL DEL FONDO TORRE 4	0	1440	677	3	1443	680
37P006	Limit	HIGH	FALLA ABE INSTRUMENTO	0	1440	598	624	2064	1260

Figure 7: Operator Response Time

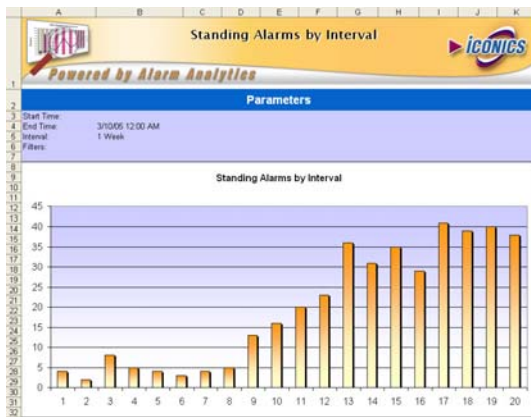


Figure 8: Standing Alarms by Interval

Standing Alarms at Time, by Interval and Duration

Standing alarms are the ones that show up on the AlarmWorX32 viewer (i.e. active and/or unacknowledged alarms). A snapshot of the number of standing alarms is captured at the end of each interval and is displayed on a bar chart. The related reports include Standing Alarms at Time and Standing Alarm Duration.



Configuring Alarm Analytics

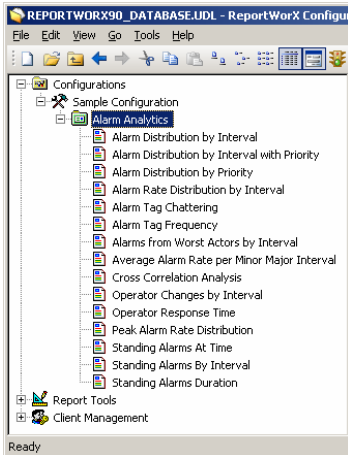


Figure 9: Report Configurator

Alarm Analytics users can now visualize all of their configured data sources in one centralized location and edit them through simple property dialogs. This leads to much better performance when loading and editing your reports.

Another revolutionary new feature is the Layout Manager. By far the most noticeable difference for our users will be the ease with which they can now configure many cells for data. Hundreds of OPC tags can be added to a report in just seconds!

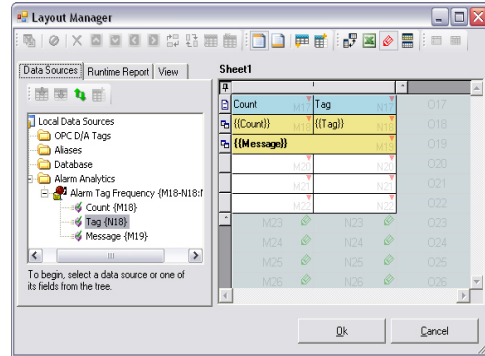


Figure 10: Layout Manager

Unified Web Interface

Alarm Analytics leverages the power of the Unified Web Interface for V9, which allows users to visualize, execute, and manage their reports and transactions from any Web-accessible, thin-client browser.

The Unified Web Interface is ideal for thin-client applications where access to the Alarm Analytics Server is restricted.

Benefits of Unified Web Interface:

- Visualize reports with thin-client browser
- Execute and manage reports from central location
- Customize look and feel of your Web interface
- Sort and group reports for easier navigation
- Create "Favorite" folder

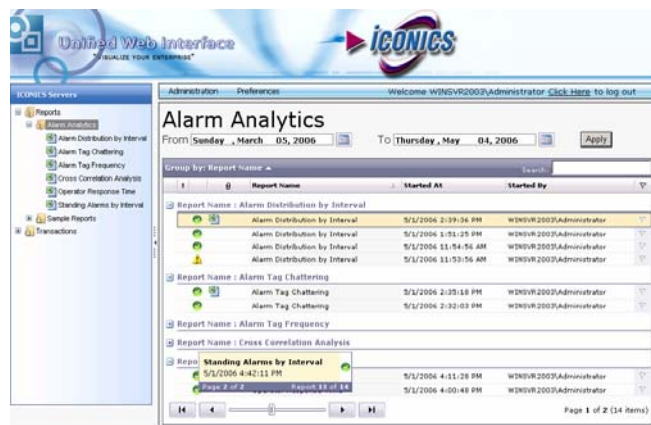


Figure 11: Unified Web Interface



System Requirements

The BizViz Alarm Analytics product includes ReportWorX and AlarmWorX32 Logger and requires the following minimum hardware, software, and operating system components. System requirements may vary based on application size, system performance requirements, and loading factors.

Microsoft Windows 2000 Professional or 2000 Server, or
Windows XP Professional, or Windows Server 2003
MSDE 2000, SQL Server 2000, SQL Server Express, or SQL Server 2005
Microsoft .NET Framework 2.0
Microsoft Excel 2000 or greater
Microsoft Internet Explorer 6.0 or greater
Pentium 4 CPU, 2.0 GHz or greater
At least 1 GB of available RAM

Alarm Analytics Licensing Options

Alarm Analytics comes in two configurations:

- **Standard:** Includes 15 industry standard Alarm Analytics pre-configured templates, ReportWorX - Standard Edition and AlarmWorX32 - Unlimited.
- **Enterprise:** Includes 15 industry standard Alarm Analytics pre-configured templates, ReportWorX - Enterprise Edition and AlarmWorX32 - Unlimited for the ability to create and run an unlimited number of custom, user defined, Alarm Analytics reports.



About ICONICS

ICONICS is a leading provider of award-winning enterprise manufacturing intelligence and automation software solutions.

ICONICS' solutions deliver real-time visibility into all enterprise operations and systems, helping companies to be more profitable, more agile, and more efficient. As a Microsoft Gold Certified Partner, ICONICS designs its solutions from the ground up to take maximum advantage of Microsoft .NET and SharePoint Portal Server technology, offering an unprecedented level of performance and ease of use.

Our award-winning GENESIS32 and new GENESIS64 automation software solutions can improve productivity, reduce integration and operating costs, and optimize your asset utilization, giving your organization a competitive edge. All ICONICS products are based on "open standards," using OPC-to-the-Core technology leveraging proven architecture and lower TCO of mainstream Microsoft platform, and connect to your existing infrastructure. We have more than 225,000 applications running worldwide serving top manufacturing companies.

ICONICS' BizViz suite of products provides real-time manufacturing intelligence from the production floor to the boardroom, turning real-time information into your competitive advantage.

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