

# I/A Series<sup>®</sup> Information Suite AIM\*Track<sup>™</sup> Batch and Lot Tracking Software

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AIM\*Track provides a full batch monitoring and analysis capability including the ability to define batch processes, compare completed batches, and visualize batch events in relation to key process variables.

AIM\*Track is an advanced batch and lot tracking software set that addresses the tracking and analysis requirements in a wide variety of processing industries. With AIM\*Track, you can quickly and easily do the following to improve quality and enhance profitability:

- Identify factors for golden batches based on actual conditions and known results
- Compare critical variables in a wide variety of batches and time frames
- Provide relevant data for shift analysis, equipment utilization, and procedural analysis

- Visualize batch time lines and process variables to aid in troubleshooting, training, and quality assurance
- Document processes using S88 compliant terminology and definitions
- Export data to spreadsheet applications and other analytical tools
- Simplify production and regulatory reporting
- Create and maintain a highly focused, easily accessed relational database for a variety of production and management needs.



#### **AIM\*TRACK OPERATION**

With AIM\*Track, you model your batch-oriented processes by defining events, equipment, procedures and other critical factors, and then associating the batch models with process variables sourced from AIM\*Historian<sup>™</sup> instances. The resulting database allows you to analyze completed batches, isolate key variables relating to quality and efficiency, and make planned, well-documented plant-floor improvements. For example, AIM\*Track allows you to compare a series of similar batches of varying lengths to determine the factors which result in the quickest completion. You can easily apply AIM\*Track to troubleshooting, production planning, shift reporting, and analysis.

While designed to track batch processes in chemicals and similar industries, AIM\*Track is also a powerful tool for monitoring and analyzing lot-oriented production and other processes that can be defined with a series of condition-triggered events.

## **Visualizing Events**

When combined with the AIM\*Explorer<sup>™</sup> desktop trending software, AIM\*Track allows you to visualize batch events and associated process variables in multi-color desktop displays. These views, which can exploit a wide variety of chart formats, enhance your understanding of the processing dynamics and your ability to communicate needed changes to other decision makers.

AIM\*Track data is easily exported to spreadsheets and other tools for further analysis or documentation.

## **Client/Server RDBMS Environment**

AIM\*Track operates as a client of a customer-supplied relational database management system (RDBMS) to maintain event definitions and store batch information. The AIM\*Track software creates database tables and manages interactions between the RDBMS and sources such as the AIM\*Historian.

The AIM\*Track software is an integrated set of programs that includes the following components:

• The **Segment Configurator** allows you to model various processes by defining segments, events, and conditions, and associating these components with actions, procedures, and equipment.

- The Segment Detector is a Windows NT<sup>™</sup> application that acquires data from one or more AIM\*Historian instances and generates event data into the AIM\*Track database. It can be installed on the same processor as the RDBMS and the AIM\*Historian instance, or operate remotely from either or both.
- The Segment Utility provides you with the working status of the Segment Detectors. Its graphical interface allows you to manually post events into the database and supply segment/batch header information. The Segment Utility also enables you to organize batch information and export it to Microsoft Excel<sup>™</sup> or other desktop applications for additional analysis.
- The **Segment Browser** is used to chart production events and related process information. The Segment Browser, which is implemented in the AIM\*Explorer application, queries the AIM\*Track database for event data, and sends the data to AIM\*Explorer for visualization and analysis.

#### **DEFINING BATCH EVENTS**

AIM\*Track Segment Configurator is a client application used to model the batch processes and connect them to process variables recorded by the AIM\*Historian.

The model is built by defining relationships for batch events and time stamps. An event is an occurrence based on a user-defined condition (which in turn can be based on multiple conditions). The events then form a segment which is created with a *begin* semantic and an *end* semantic. You can use the Segment Configurator to define equipment and procedures to be associated with events, and select real-time points from the AIM\*Historian. The real-time points determine whether conditions have been met for each event and characterize the process during each batch run. The final step is to assign the defined batch processes to a Segment Detector for monitoring.

The Segment Configurator is a multi-page wizard which prompts you through each phase of the definition process. AIM\*Track fully supports use of the Instrumentation Society of America standards in ISA-S88 01-1995 Batch Control Models and Terminology (S88). However, the software does not require S88 implementation. The Segment Configurator allows a great deal of flexibility in the way you define processes to reflect unique plant conditions. The wizard even allows you to define elements in any order you want. Figure 1 shows the wizard page for defining events.



Figure 1. Segment Configurator Event Definition Page

In Figure 1, the user is defining the END\_BATCH event. The event has already been included in the segment definition (MAKE\_PVC\_BATCH\_1), and has been associated with a defined procedure (Make PVC) and with an equipment group (Cell 1).

The event occurs when the named condition (END\_BATCH) is met and a prerequisite event (START\_BATCH) has occurred. The definition can include an event description, and can be categorized by a user-defined or S88 compliant event category.

## **Defining Conditions**

Figure 2 shows the wizard tab page for setting up event conditions. The conditions are configured using the expression-building tools in the center of the page. The equation consists of the data items, or a data item and a numerical value, joined by an operator (for example, = or >) or a Boolean (such as AND). The data items can include: real-time points in one or more AIM\*Historians on the network, a realtime point that has already been incorporated in the AIM\*Track database, or a previously defined condition expression. Thus, you can define and cascade multiple expressions as the condition for a single event. For example, you can define two End\_Batch conditions: (a) a mix time has elapsed, and (b) a tank has reached a specified level, and then set a third condition (c) that states that both (a) and (b) are true.

🕮 AlM*Tra	ack Segment Configurator	_ 🗆 >
Overview	Segment Detector Segment Event Conditions Actions Procedure	Equipment Tagnames
	Condition Definition	
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1		<u> </u>
	END_BATCH	
Ass Eve	ents: END_POLYMERIZE	
	New <u>Apply</u> <u>Clear</u> <u>D</u> e	lete

Figure 2. Condition Definition Page

# **Connecting Process Variables**

The configurator provides additional database filters to assist you in selecting real-time points from the AIM\*Historian, and associating them with various definitions in the AIM\*Track database. Figure 3 shows a wizard used for selecting these Tagnames for the Results page.

	V	iew Name: E	Filter	
Add		Refresh	Select All	Clear All
Descriptor	Туре	Server	Item	
0	RTP	MEGARON	hist01\TANKS:SACID_CALC.RI02	
0	RTP	MEGARON	hist01\TANKS:TEMP_CALC.R001	
0	RTP	MEGARON	hist01\TANKS:TI_400.PNT	
0	RTP	MEGARON	hist01\TANKS:TI_300.PNT	
0	RTP	MEGARON	hist01\TANKS:TI_202.PNT	
0	RTP	MEGARON	hist01\TANKS:TI_201.PNT	
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, Check H	listorian I	Membership		

Figure 3. Data Object Wizard

#### SEGMENT DETECTOR OPERATION

The AIM\*Track Segment Detector generates batch and event data into the AIM\*Track Segment Database. Using the procedures, equipment, and conditions configured in the Segment Configurator, the Segment Detector monitors the changes in current values of selected process variables in the AIM\*Historian and stores satisfied conditions as batch and event occurrences. The generated records can then be used as batch and lot boundaries for analysis and reporting purposes.

The Segment Detector can operate as a Windows NT console application or as a Windows NT service. In either case, it is a background process that monitors selected AIM\*Historian real-time points, and generates batch and event occurrences.

You can deploy multiple instances of the Segment Detector program on workstations throughout the network to interface the same AIM\*Track database and perform different monitoring tasks (configured by the Segment Configurator).

The Segment Detector logs its startup, shutdown, and other status messages through the Windows NT Event Log. The Segment Detector captures batch and event occurrences at the time of the occurrence and stores them with other event information. Optionally, you can use the Segment Utility to manually edit occurrence records or trigger event occurrences managed by the Segment Detector.

#### VIEWING BATCH EVENTS

#### Segment Utility

The Segment Utility is the user interface for controlling the working condition of the Segment Detectors. In addition to starting and stopping the detector, the utility allows you to post events manually into the AIM\*Track database, enable or disable event recording, trigger batch or event records, and enter batch, product, and campaign IDs.

The Segment Utility operates as a client application to the Segment Detectors operating on the network. It displays both configuration and operating information for a selected detector and allows you to correlate the components or parameters of what is operating in your plant. For example, if a batch is not running, but the Segment Detector is recording it as running, you can use the Segment Utility to manually record this batch as completed. A data tree on the left side of the Segment Utility window shows the Segment Detectors accessible to the application. When you select a detector, the utility displays its current status and allows you to manage the connection between the detector and its primary AIM\*Historian (Figure 4).

Segment Utility File View Window Help		
DEST_SD		
B-♥ TEST_SD B-♥ Segment_Detector_4	Status:	Running
	Start Time:	11/04/1999 14:12:35
	Server:	test964g
	Poll Interval::	1000 ms
	Default Historian Server:	megaron
	Polli	nterval: ms Apply



The data tree can be expanded so you can select among six pages of information about the detector:

- Tag Values
- Event Conditions
- Batch Definitions
- Event Definitions
- Actions
- Open Batches.

Figure 5 shows the current status of Tagnames used with Segment\_Detector\_4.

😰 Segment Utility				_ 🗆 🗡
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Segment_Detector_4 - 1	AG VALUES			
Segment Detector 1	TAGNAME	TIME	VALUE	STATUS
Segment Detector 2	TANKS T 100 PNT	08/09/1999 16:11:20	15,89998	
Segment_Detector_3	MEGARON/TAN	08/09/1999 16:11:21	13.39997	OK
e- <b>⊯es</b> Segment_Detector_4	ferfu1tx/tanks:TI	08/09/1999 16:11:20	14.10002	OK
TAG VALUES	REMIOTS_ST_C	08/09/1999 16:11:11	10.90001	UNKNOWN
🕸 EVENT CONDITII	MING/TANKS:T	08/09/1999 16:11:11	8.399996	UNKNOWN
- 🕸 BATCH DEFINITI	MING/TANKS:T	08/09/1999 16:11:11	8.199995	UNKNOWN
🕂 🏟 EVENT DEFINITI	TANKS:T_102.PNT	08/09/1999 16:11:20	15.69998	OK
- I ACTION	ARKANASAS\$PV1	08/09/1999 16:11:11	0	UNKNOWN
GPEN_BATCH	NEWYORK\$PV1	08/09/1999 16:11:11	0	UNKNOWN
🖻 🚅 TEST_SD	TANKS:TI_300.P	08/09/1999 16:11:20	12.89997	OK
- 🕸 TAG VALUES	MEGARON/TAN	08/09/1999 16:11:21	14.09998	OK
	NEWMEXICO\$PV1	08/09/1999 16:11:11	12.79997	UNKNOWN
- 🕸 BATCH DEFINITI	TANKS:TI_400.P	08/09/1999 16:11:20	12.79997	OK
🕸 EVENT DEFINITI				
🤹 ACTION				
- 🐵 OPEN_BATCH				
	•			•

Figure 5. Segment Utility Tagnames Page

The Open Batches page lists batches that have been started, but not yet completed. From this page, you can start a window for a specific batch. The window will automatically show the status of the batch as it progresses through different phases. Additionally, you can manually force events or conditions to complete the batch.

Figure 6 is a window for Batch 90624 selected from the Open Batches page. A traffic light to the left of the Batch Information grid indicates whether the Batch is running or has been stopped. In Figure 6, three of the four batch events have been triggered. The configuration for Event 1002 disables the trigger for this event, forcing the user to review conditions and then manually trigger the event for completion of the batch. The Segment Utility provides a variety of onscreen tools for managing batch event data.

<b>(</b> )	Gegment Utility ·	[Batch 90624]			_ <b>□</b> ×
3	<u>F</u> ile ⊻iew <u>W</u> ind	low <u>H</u> elp			_ 8 ×
ర					
		Batch	Information		
13	INTERN.	AL BATCH ID BATCH DEF ID	NAME	BATCH ID	PRODUC
	<b>&gt;</b>	90624 1001	TEST SEGMENT	B110399143700	product 3
	•				4
		Event	Information		
T	EVENT DEF ID	NAME	EQUIPMENT	PROCEDURE	EVENT TYPE
	1001	TEST_START_BATCH_EVENT	UNIT 1-1	Make PVC	START_BATCH
	1002	TEST_BATCH_EVENT_END	UNIT 1-1	Make PVC	END_BATCH
	1003	TEST_PHASE1_EVENT_START	EQUIPMENT 1-1-1	Heat	START_PHASE
	1004	TEST_PHASE1_EVENT_END	EQUIPMENT 1-1-1	Heat	END_PHASE
					F
P.					

Figure 6. Window for a Specific Batch

## AIM\*Explorer Segment Browser

The AIM\*Track Segment Browser is an option that can be installed with the AIM\*Explorer trend and chart program. The Segment Browser allows you to select items from the AIM\*Track database for use in AIM\*Explorer Batch Event windows.

With the browser, you select batches by name or by time span, and further refine your selection with filters for defined equipment, actions, and procedures. The browser also enables you to select which Tagnames (each represents an AIM\*Historian RTP) are to be selected from the AIM\*Track database.

Figure 7 shows the Segment Browser display after the user has selected batches from three different time spans. The selections are shown as a hierarchy of batches, events, and related process variables defined in an AIM\*Track database.

AIM*Explorer - [Batch1]
🛒 Eile Edit View Settings Wizards RunTime DataGrid Preferences Window Help 👘
D☞₽₽₽₽
B
🖕 🗁 B110399111929 (89856) 11/3/99 11:27:59 AM => 11/3/99 11:28:20 AM
AIMSRV/TANKS:T_100.PNT
AIMSRV/TANKS:T_101.PNT
AIMSRV/TANKS:T_102.PNT
AIMSRV/TANKS:T_200.PNT
AIMSRV/TANKS:T_201.PNT
AIMSRV/TANKS:T_202.PNT
🖨 🧽 B110399111929 (89857) 11/3/99 11:29:09 AM => 11/3/99 11:30:35 AM
AIMSRV/TANKS:T_100.PNT
AIMSRV/TANKS:T_101.PNT
AIMSRV/TANKS:T_102.PNT
AIMSRV/TANKS:T_200.PNT
AIMSRV/TANKS:T_201.PNT
AIMSRV/TANKS:T_202.PNT
⊞

Figure 7. Segment Browser

To display batch events, you drag objects from the Segment Browser and drop them in a Trending Area display. The batch events are plotted on a time line with the associated process variables during each batch. You can arrange the display into separate bands for each data item, or plot the process variables on the batch event time lines. The batch events are identified with callouts based on definitions in the AIM\*Track database. You can selectively enable these callouts and determine their positions and style to enhance your understanding of the display.

Figure 8 shows a banded Trending Area display with callouts identifying events on two batch event time lines.



Figure 8. Banded Batch Events Display

#### Notes and Other Tools

The spreadsheet tool in AIM\*Explorer features two worksheets for batch information: Batch Events and Batch Notes. The Batch Events sheet lists events in the selected batch using information defined in the AIM\*Track database.

The Batch Notes sheet lists annotations which you and other users append to displayed batch events. AIM\*Explorer provides an easy-to-use dialog box for entering notes and reviewing previous annotations.

Batch Event windows also include on-screen tools for measuring the elapsed time between events or between events and variables reaching a specified value (Figure 9).



Figure 9. Time Marking in a Batch Event Display

## SUPPORTED PLATFORMS

#### **Segment Database**

The AIM\*Track database is implemented with a usersupplied Oracle<sup>™</sup> 8 Relational Database Management System. The recommended platforms are:

- Windows NT 4.0 with Service Pack 4 or later
- Sun<sup>™</sup> Solaris<sup>™</sup> 2.4 or later
- Other platforms supported by Oracle 8.0.4 or later.

Required disk space varies depending on how many events are to be stored in the database. For storage of 1000 batches, each with 100 events, the Segment Database may require at least 100 MB disk space configured as table space.

## Segment Detector

The Segment Detector operates on Windows NT 4.0 with Service Pack 4, with minimum available disk space of 20 MB and at least 64 MB of memory (128 MB recommended).

# Segment Configurator and Segment Utility

These client programs can run on Windows NT 4.0 with Service Pack 4, Windows 95<sup>™</sup> or Windows 98<sup>™</sup>, with 64 MB of memory recommended.

## **Segment Browser**

The AIM\*Segment Browser is an option in the AIM\*Explorer program. AIM\*Explorer is a desktop client application that displays real-time trends and charts of process history. AIM\*Explorer operates on desktops running Windows NT 4.0 with Service Pack 4, Windows 95, or Windows 98.

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Printed in U.S.A.