



ADDRESSING THE DATA CAPTURE AND ANALYSIS NEEDS OF A PETROCHEMICAL SITE USING j5 WHITE PAPER (2008)

Author: Dr. Nicholas Hurley (j5 International)

This document provides an indication of how j5 Operations Management Software can be used in the Petrochemical environment. The examples shown are for Shift Handover and a Plant Trip. j5 is an Enterprise Application Interface (EAN) that addresses the needs of Petrochemical sites in critical data capture and analysis. j5 Operations Management Software is the market leader in industrial control rooms and is utilized by many process control engineers within hundreds of companies worldwide.



Overview

This document provides an indication of how j5 Operations Management Software can be used in the Petrochemical environment. The examples shown are for Shift Handover and a Plant Trip.

j5 Operations Management Software

j5 is an Enterprise Application Interface (EAN) that addresses the needs of Petrochemical sites in critical data capture and analysis. j5 Operations Management Software is the market leader in industrial control rooms and is utilized by many process control engineers within hundreds of companies worldwide.

Shift Report Compilation

The need to effectively manage the Shift Handover period from one shift to the next is critical. The effectiveness of a Shift Handover relies on the automatic collection of key plant information, the efficient collection of manually entered data and the compilation, presentation and distribution of this information to the key personnel involved. This use case shows the main steps in the process when creating Shift Handover reports:

Scheduled Addition of the Handover Log:

- At the start of the new shift, the j5 Shift Handover adds a new Shift Handover log record to the Shift Handover database table
- Anyone clicking on the Shift Handover log tab at the top of the screen will be taken to the new Shift Handover log (users can click on the previous Shift Handover links if they want information about the previous shifts)
- Information relating to the shift is automatically added (for example, the system will know which shift and which personnel should be on the shift, based on the shift rotation procedures)
- The system generally allows information to be added immediately to the shift report and, for many of the fields, it annotates the comments with the time the information was added and who added the information

Regular Updating of the Real Time and Log Information:

- Within the Shift Handover log, there are several placeholders where the real-time information from external systems – such as the OSIsoft PI System® - is stored. This information is updated

regularly (say every 5 minutes) to show the current state of the process should anyone want to see the on-going population of the reports

- Calculations (for example, the calculation of mean values etc.) are also regularly updated
- Logs that are deemed important from other logbooks (e.g. from the running j5 Operations Logbook (see next section) are also automatically added to the Shift Handover log
- The objective of this is that the Shift Handover log is not only a document that is valid at the end of the shift; rather it is a document that reflects the status of the shift **at any time during the shift**

Status	Open for Approval	Shift Summary	Shift Report
Start Time	Aug 28, 2015 10:21 PM	Maintenance running to schedule. Current status needs to be discussed with the oncoming team to ensure the schedule is maintained. Include the following: <ul style="list-style-type: none"> • Maintenance storage • Control room 	Attachments <ul style="list-style-type: none"> • screenshot-j5plant15 j5nt.com 2015-09-25 12-48-27.png (delete) Add an attachment...
Finish Time			
Site	Process System		
Section	Area 50N		
Area	Unit 10 - Crude Unit		
Unit			
Outgoing Approval	<input checked="" type="radio"/> Approved <input type="radio"/> Not Approved		
Incoming Approval	Not Approved		

Operator Data Entry:

- Within the Shift Handover log, there are placeholders where the operators can enter the information before the end of the shift
- The business rules only allow the entry of this information within a specified time before then end of the shift (for example, operators can only enter the end of shift data half an hour before the end of the shift)
- The business rules also check the validity of data and warn the operator if the data is outside the bounds
- Certain information is only relevant under certain conditions - for example if the unit is running - the system hides placeholders if the information is not relevant at that time

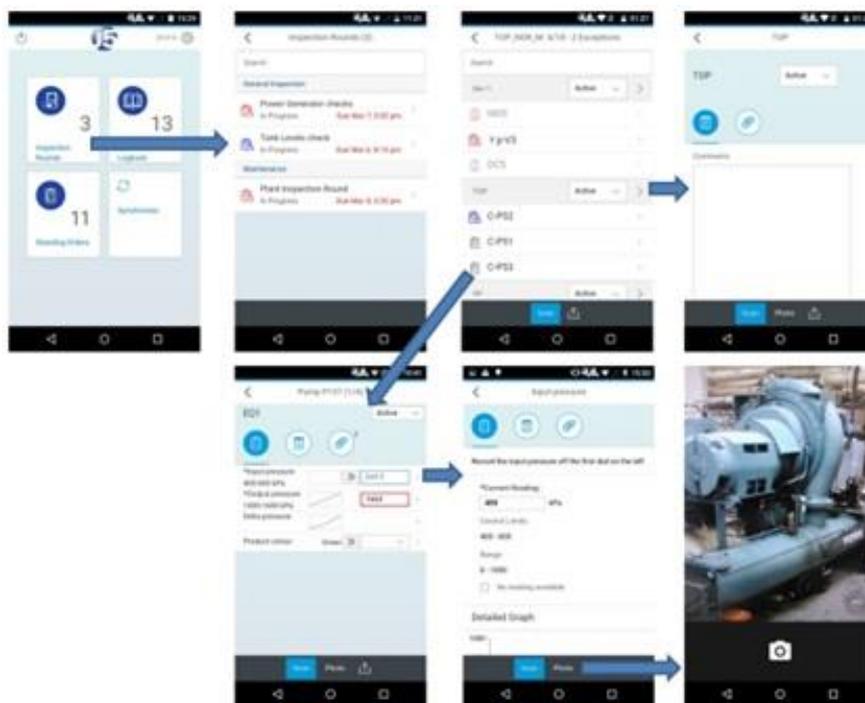
Event Time	Site	Section	Area	Category	Message	Status	Notes
Sep 14, 2015 10:17 PM	Process System	Area 50N	Unit 34 - Light Ends Recovery Unit	Operations	User can add whatever they need to	Closed	1
Aug 25, 2015 10:18 PM	Process System	Area 50N	Unit 30 - Delaying Coking Unit	Operations	add my log	Closed	
Jul 3, 2015 4:19 AM	Process System	Area 50S	Unit 88 - Fuel Gas and Thermal DeNOx System	Operations	CT2 load at 191 MW CT2 pre SCR NOx at 47 ppm, outlet NOx 4.1 ppm. CT2 taken out of AGC control. CT2 MW setpoint 177 MW to lower the NOx emissions.	Open	
Jul 3, 2015 3:28 AM	Process System	Area 50N		Environment	Checklist item has triggered an alarm. Checklist: Effluent Tests -> Category: Discharge sample collection -> Item: Arsenic. Item Value: 17.0	Open	
Jul 3, 2015 3:13 AM	Storage System	Area 12	Unit 12 - Vacuum Residuum Storage Unit	Operations	Received and pumped 25MT of UFC-85	Open	
Jul 3, 2015 2:29 AM	Process System	Area 50N		Personnel	Employee Megan Smith issued with PTW675	Closed	

Event Logging Procedure:

- At any time during the shift, an operator can add a log in the j5 Operations Logbook which is located on a separate tab at the top of the screen and this kind of log is a record of the events that occur during the shift (see image above)
- If the operator or supervisor deems that a log is important, then that log can be attached (or transferred) to the Shift Handover log (the operator simply clicks on the “Add to Handover Report” check box and the log is then attached to the Shift Handover log)

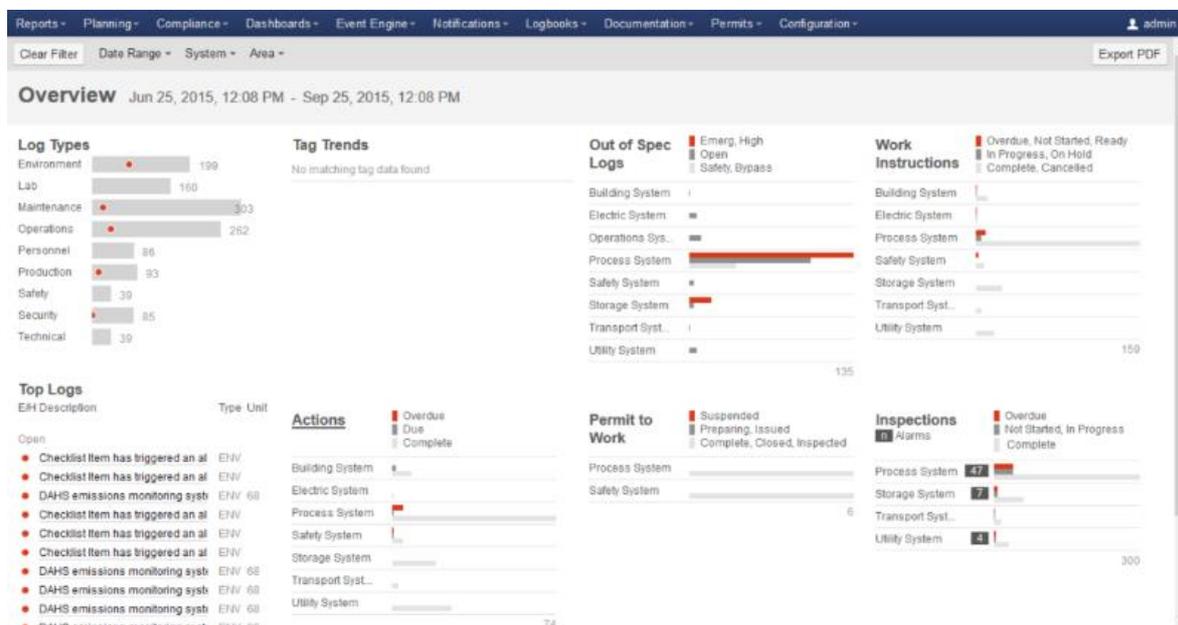
Field Entered Data:

- The j5 Mobile application includes support for field operators (using tablet computers, mobile devices or PDAs) to enter information
- At the time specified, the field operator is presented with a form to enter the information for the equipment selected in the Inspection Round (for example, the mobile device may instruct the operator to choose the appropriate pump status - whether on or off - from a predefined list)
- Once all the field values have been collected on the mobile device, the operator returns to the control room where the information is automatically transferred (via a mobile docking station or wireless / Bluetooth connection)



End of Shift Procedures:

- At the end of the shift, there is a final collection of the real-time and “marked as important” logs
- j5 Shift Handover makes any additional calculations (for example, the calculation of averages and mean values)
- If values fall outside the limits, these are highlighted in the Shift Handover report
- The supervisor examines the Shift Handover report and makes any further changes if necessary (the supervisor can do this up until a typical grace period of 20 minutes past the end of the shift)
- Additional attachments may be added to the Shift Handover (for example, documents or graphic files)
- The shift supervisor approves the report using a button and from this point on, no-one can change any of the details in the Shift Handover report
- The Shift Handover report is printed out and is signed by the operators and supervisor (or digitally approved on the j5 system)
- A PDF version of the Shift Handover report - or spreadsheet version if required - is sent via email to the nominated recipients (this is configured from within the j5 system and can be easily changed)
- A hard-electronic copy of the Shift Handover log is stored in a repository managed by j5 so that past reports can be easily retrieved (there is a menu / filter system which enables a user to easily locate the report of interest)



Typical Trip Logging

This section covers the typical scenario expected when a site experiences a trip. It is arranged in chronological order. This description is carried out in technical terms. To simplify the description, a specific example has been chosen.

Detection and Registration of the Trip:

- In this example, a trip occurs when the OSIsoft PI System® detects an alarm temperature and initiates the trip sequence
- The j5 OSIsoft PI System® interface registers the trip and activates the trip inside the j5 Event Manager application
- The j5 Event Manager application reads significant information from PI such as:
 - The register that holds the tag name that caused the trip
 - The exact time of the trip
 - Any other relevant information
- The j5 Event Manager then inserts a log into the j5 Operations Logbook and the details of the log include:
 - The Log Type (in this case a Shutdown resulting from a Trip Condition)
 - The setting of Priorities, Start Time of the Trip, the equipment information causing the trip and any other information programmed into the j5 Event Manager
 - The j5 Event Manager also gathers information from the PI tag database (for example, the tag name could be T3267.PH. and the tag database would show this as Unit 2, Main

Machine Stator Winding Sensor 3267 Overtemperature Alarm, his information is also inserted in the j5 Operations Logbook)

- j5 automatically colours the various fields within the j5 Operations Logbook
- The status of the log is marked active (when the system returns to online, this status is automatically reset to inactive)
- A unique human readable id is also added to the log (this is a serial number which can be referenced from other logs)

Operator Actions:

- An operator will notice that there is a new log in the j5 Operations Logbook (the relevant tab will change colours indicating a new log has been added)
- The new log will be shown in aggressive colours indicating that the operator must address this log
- The operator completes the required information in the log (the different fields will be discussed in more detail later)

The screenshot displays the 'Operations Logbook' interface. At the top, the title is 'Personnel did not return access badge to Bui...'. Below the title, there are tabs for 'Detail' and 'General Actions'. The 'Detail' tab is active, showing a form with the following fields:

Event Time	May 15, 2017 3:29 PM	Personnel did not return access badge to Building 1, this is a breach of security protocol.	Created By	Ben Hickaroo
Status	Closed		Group	Operator
Category	Safety		Time Created	May 15, 2017 3:29 PM
Priority			Time Closed	May 15, 2017 3:29 PM
			Last Modified	May 15, 2017 3:29 PM
Add to Handover Report	Yes	Predefined Messages		
Attachment				

Below the form, there is a 'Notes' section with a table of log entries:

Log Time	Created By	Message
May 15, 2017 3:36 PM	Ben Hickaroo	We are busy amending the procedures to ensure this does not happen in future
May 15, 2017 3:36 PM	Ben Hickaroo	Some of the badges actually were handed back, but the security officer placed them in the wrong storage container.

- The operator will add general comments and information that the OSIsoft PI System® will not have known
- In some cases, there are “drill down combos” which enable an operator to locate the specific cause or piece of equipment quickly without having to choose from a large list of options
- The operator can also add attachments to further add information to the log (for example, a JPG graphic, a Word or Excel document)
- The operator can also link this log to a log in the same logbook or in a different j5 application

- Once the operator has completed the entries, the Save button is clicked and the log is added to the database
- The system calculates the duration of the event and shows this in the duration field
- An email (or SMS) is sent to the recipients that have subscribed to these events indicating the nature of the trip and all the details added by the system and the operator
- The information is also captured in the audit log and is available for viewing by any of the users authorized to do so
- Once the changes have been made, a less aggressive colour is used to indicate that the information has now been added to the log

Registration of the Return to Normal:

When the system returns to normal - the unit starts up again - the j5 system will:

- Detect the startup via the j5 OSIsoft PI System® interface
- Set the event end time in the j5 Operations Logbook and calculate the duration of the event
- Set the status to inactive
- Sends an email with all the relevant statistics to the recipients that have subscribed to the event
- Updates the availability statistics database tables

Additional Comments after the Return to Normal:

At any stage, the operators or supervisors can add additional comments and adjust the log. For example, if the reason for the trip only becomes clear later, then the operator can add to the information. Whenever a modification occurs, the system will:

- Add the information to the audit log, making a note of who made the change and at what time the change was made
- Send an updated email to the users that have subscribed to the event

Note that some information may not be modified (for example, the information provided by the OSIsoft PI System® may not be modified and the system's authorization management system will take care of this)

Statistics and Calculations:

In addition to the logs that are stored for every event, there are statistics that are stored periodically:

- These statistics are typically stored on a shift basis and record such things as the total uptime, number of trips, trips associated with causes and so on (the statistics are updated with every trip as well as updated at the end of the shift)
- The statistics are attached to the Shift Handover log and there are also fields where operators can add summary information such as information relating to the number of open work orders, ongoing maintenance, operating activities and so on
- The statistics are also available from the perspective of the effected users (via the area), the affected equipment and the cause of the events
- Since the data is recorded against specific times, charts may be created showing trends against any of the different factors
- Additionally, the MTTR / MTBF figures are also calculated against various variables such as the equipment or group of equipment (e.g. a specific)
- Statistics on any of the devices can also be pulled up using the filtering mechanism
- Finally, the statistics for each of the consumer groups based on the sector are maintained and held
- Preformatted reports may be scheduled with the in-built j5 data scheduler and these reports may be printed or emailed in spreadsheet, PDF or HTML format
- The reports are also available online and in a repository with an active index for retrieving them

Site Data Queries:

A manager, supervisor or operator can make queries on the logs and statistics at any time and the user may:

- Use the predefined filter buttons to get a filtered view of the logs
- Use the Ad Hoc filter mechanism to find specific logs of interest

Site to Corporate Data Rollup:

The preceding information all relates to information that is stored on a single site. This information is of course (via any browser like Google Chrome, Safari, Firefox or Internet Explorer) available to any user in the corporate head office. In addition to this, on any event or at the end of the shift, the information is sent up to the corporate data warehouse database. This database contains cumulative information from all the sites and can be accessed as follows:

- By using a database viewer application to look directly at the data
- By using a database query program (j5 supports Oracle, MySQL, SQLServer, Access, SQLite and PostgreSQL)
- By setting up specific queries in the in-built scripting language

On finding the information, the user may print the information directly to the screen or printer and may save the information into a spreadsheet or PDF file directly from the logbook screen. When a record is added or modified on any site, the j5 system connects to the corporate server via a j5 SOAP server and the record is pushed into the server database. Likewise, when the statistics and Shift Handover information is modified or updated, the information is also pushed into the j5 server at the corporate head office. Each record in the data warehouse contains a field which defines the site and sector from which the log originates. There are also maintenance facilities to monitor the progress and efficacy of the data rollup facility.

Corporate Statistics Queries and Reports:

- Since the corporate data warehouse contains all the logs and statistics from all the sites, updated in near real-time, the corporate user can query the information and compare the information from the different sites (for example, the user may want to get a summary of the total percentage uptime of all the sites for the last week)
- Once the information has been displayed, the user can then drill down to the individual site log level to find out the cause of specific downtime
- Corporate Dashboard displays are also available showing the relative performance of each of the sites relative to each other
- Reports showing corporate wide information may be emailed in spreadsheet or PDF format to the registered users



Visit www.j5int.com for more information

