



TEN COMPELLING REASONS FOR IMPLEMENTING WEB BASED, DATABASE DRIVEN LOGBOOKS IN THE POWER INDUSTRY

WHITE PAPER (2008)

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Due to commercial turbulence in the Power Industry, operations management face a massive increase in pressure to improve performance, efficiency and safety. Despite this, many companies still use paper or spreadsheet based logbooks which results in difficulties in locating information, poor data accuracy, security vulnerabilities, limited access and little control on the documents. In contrast, modern, web-based Electronic Logs use efficient database structures, are secure and scalable, include full auditing facilities, can be invoked across multiple sites and link into multiple systems like CMMS, SCADA, OPC and Data Historians. These logbooks are multi-site and multi-functional with a single central electronic logbook replacing piles of different paper or spreadsheet logbooks across multiple sites.



What is a “Web Based, Database Driven Logbook”?

Fundamentally, electronic logbooks perform the same function as paper based logbooks (they are there to record the data that is known only to the operator). However, by making the logbook web-based and database driven, a plethora of additional uses and advantages suddenly appear. By making these logbooks web based, it means that many - often hundreds - of operators, supervisors, managers and so on can access and enter information into their browsers (like Chrome, Firefox, Internet Explorer and Safari). The system requires only a single computer to house the web server and logbook software to service all these users. By using a database as the repository for the data, the information is secure, virtually unlimited in capacity and it allows very fast searching to get to the data of interest. This image below shows a typical web based Logbook (j5 Operations Logbook):

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 UFCC-85	Open	
Jul 3, 2015 2:29 AM	Process System	Area 50N		Personnel	Employee Megan Smith issued with PTW 675	Closed	

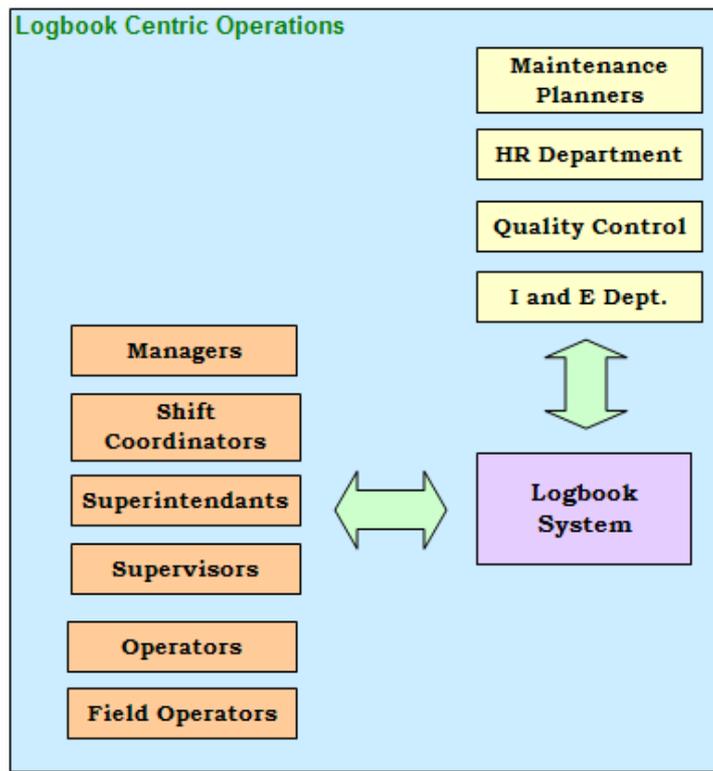
Data Distribution

Migrating to an electronic logbook increases data visibility by distributing manually entered data to more people:

- Logbook information is no longer confined to the control room; rather it is made available directly to anyone on the network
- Information is also available to departments other than the operating department
- From experience, the introduction of an electronic logbook provides an immediate boost in coordinating the plant personnel

Multi-User Entry

An electronic logbook improves access to data by allowing more people to not only read the information but also to **contribute** to the logging process. In modern sites, it is now possible for every stakeholder to provide information into the logbook. This provides a richer view of the data that represents the current status of the plant:



Formalized Shift Handover Logs

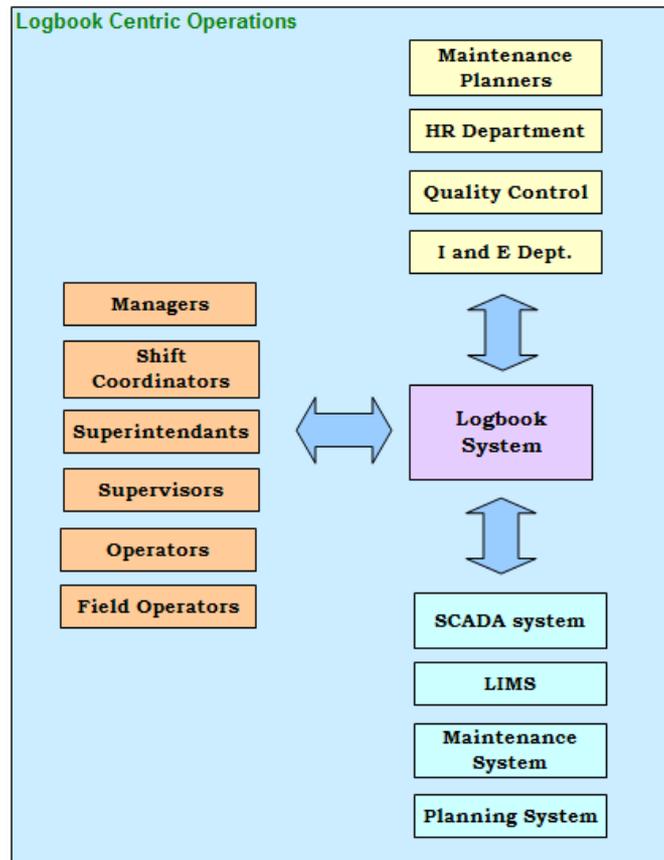
The Shift Handover log (the information provided to the incoming shift by the outgoing shift) is recognized as one of the most important documents in the operating process (it is a process where, if done badly, there is a high probability of disruption). Migrating to an electronic logbook system will ensure the following benefits are achieved:

- The electronic logbook will provide an efficient, repeatable, auditable Shift Handover procedure for multiple areas and sites
- Underlying logic forces the users follow the defined procedures
- The logging system automatically collects the bulk of the information for the Shift Handover
- The Shift Handover logs may be emailed to an unlimited number of interested recipients
- The data is online and can be queried at any stage

- Information can be dropped into a spreadsheet

Integrating Real-Time Information

Unlike paper logs, with electronic logs, it is possible to integrate the information from the DCS, PLC or SCADA system into the logbook. This means that the manually entered data is further enriched with the real-time data, therefore improving the decision making ability of the users:



High Quality View of the Information

Migrating to an electronic logbook, will ensure:

- The presentation is readable and highlights "out of spec" information, color codes the information, formats it and so on
- That users can quickly locate the information of interest and understand it without having to decipher inconsistent, scrawls
- The information is in a format that is easily searchable

The image shows a handwritten logbook page with a blue oval highlighting a note: "330 RU - main digester is showing 10% over pressure. I will have to shut down shortly." Below this is a digital logbook interface with a yellow oval highlighting the same note: "15:26 Main digester is showing 10% over pressure. Any more and I will have to shut this unit down."

22:02	We are starting to see a lot of spec granules in the lab tests on Unit 3. Suggest we take a closer look at what is
23:15	Unit 2 heater needs an overhaul. I have notified the maintenance people.
09:19	Conductivity probe on Unit 1 has gone U/S. I am going over to manual. I have informed the instrument
15:26	Main digester is showing 10% over pressure. Any more and I will have to shut this unit down.
16:04	Hand over to the next shift complete.

Enforcing Workflow Practices

With an electronic logbook:

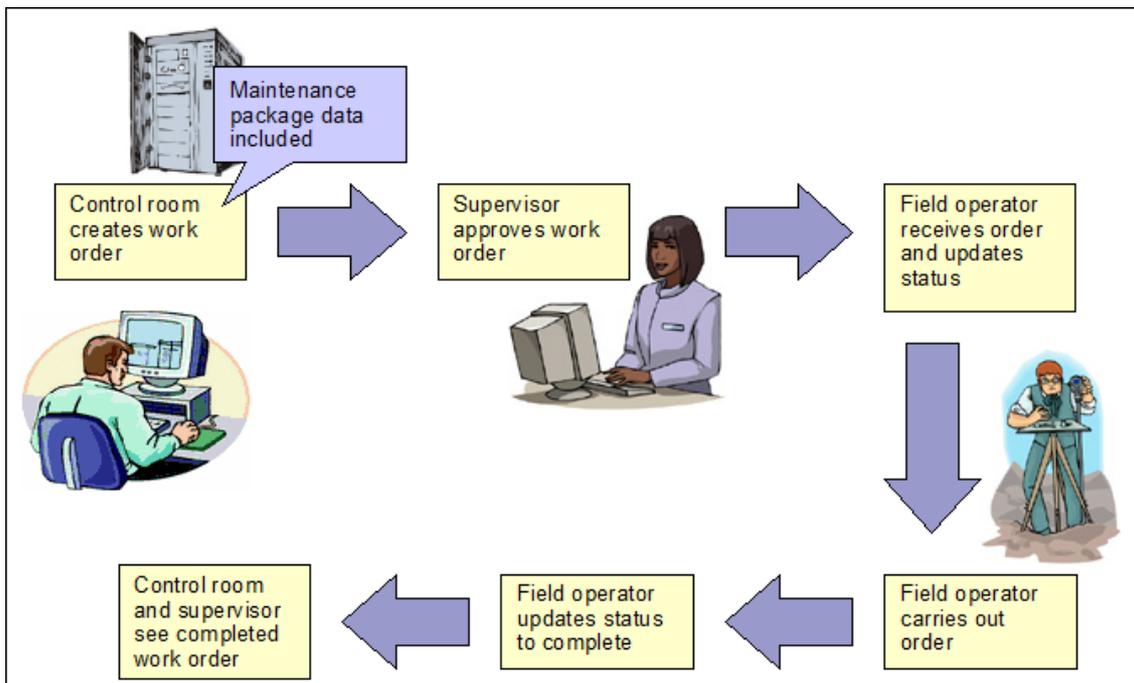
- The underlying logic within the system only allows users to access and / or change information that they have permission to (examples include signing off at the end of the shift, closing work orders and so on)
- Intelligent checks assist operators in not making mistakes and also prevent operators from "cheating"

Data Searching Capabilities

An electronic logbook provides single click filter buttons or more sophisticated Boolean buttons. Therefore, users can very quickly find the information they are interested in.

Operating Portal

An electronic logbook is an ideal operating portal to multiple 3rd party applications. An electronic logbook can also act as a portal to higher level software apps (for example, writing a work request into the IBM Maximo CMMS). This means that the operator need not learn another interface and the owner need not buy another software seat. The example below shows how an electronic logbook can interface to a maintenance application (CMMS) so that operators need never leave their logbook environment and still drive the maintenance request scenario:



Complementary Applications

Electronic logbooks are no longer just logbooks in the traditional form. There are many kinds of logbooks that are all integrated into a common structure. The diagram below shows how electronic logbooks can now drive specific functions across multiple industries:

Application	Petro-chemical	Power Utilities	General Chemical	Accelerator	Pharmaceutical	Mining	Others
General Logbook							
Handover/Turnover Logbook							
Shift Reports							
Inspection Rounds/Inspection Templates							
Work Request/Work Order							
OrderBook							
KnowledgeBook							
Oil Movements							
Operating Procedures							
Shutdown Management							
Pipeline Management							
Incident Management							
Ship Unloading							
Laboratory Records							
Target Management							
Maintenance Management							
Water Waste-Water Management							
Personnel Tracking							
Meter Calibration Logs							
Hazard Management							
Power Dispatching							
Satellite Management							
Weather Monitoring							
Quality Management							
Real-time data Collection and Viewing							
Project Management Logs							
Time Manager							
Issue Management							
KPI Dash board							
Cargo Management							
Field Data System							

Reporting Structures

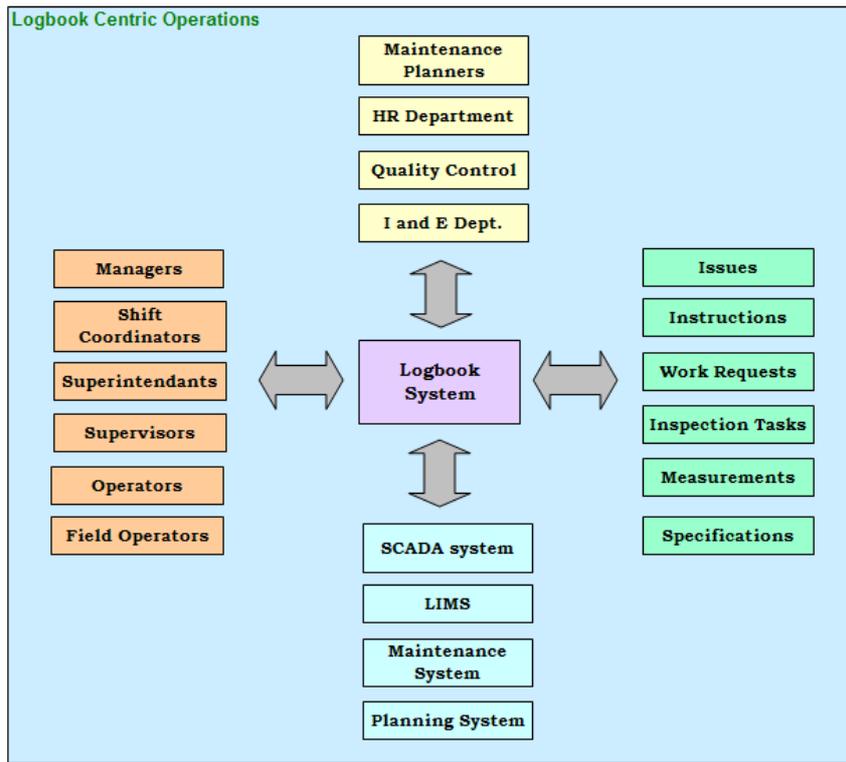
Modern electronic logbooks (with the rich spread of information they are collecting) become the ideal source of a powerful reporting mechanism:

- Reports on the composite (enriched) data can be created very quickly
- These reports are available online, can be emailed to selectable recipients - on a condition or at a defined periodicity - and can have selectable input values (for example, a report could contain a record of all logs that have an emergency priority for this month)
- Provide the basis of an accurate management reporting system (for example, Shift Handover reports, morning reports, weekly reports and so on)

Consolidate Multiple Logbooks

Because of the flexibility of electronic logbooks - the format of the logbook can be conditional on the data entered - it is quite possible to combine the information from many traditional, paper-based logbooks into a single consolidated electronic logbook:

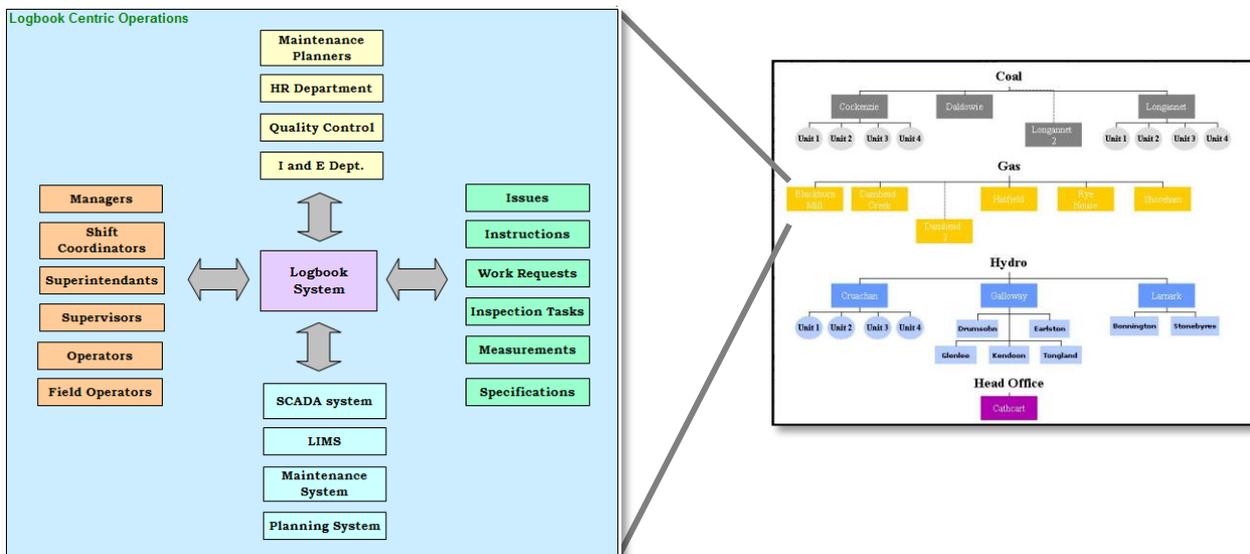
- Typically, sites may have tens or hundreds of different kinds of logs which can be combined into fewer, more powerful and richer logbooks
- By consolidating these reports, users can see the effect of an event across all the logs or - if required - by clicking a filter button, see the logs separate as in the original separate log



Consolidate Multiple Sites

Due to the web-based structure of electronic logbooks, it is quite possible for a single server to provide all the logbooks for all personnel across all sites:

- System Administration is managed efficiently in a single computer
- Backup and hot spares are activated in case of a failure
- SaaS (Software as a Service) solutions may further reduce administration to an insignificant amount



Provide a Categorization Mechanism

The electronic logbook provides a consistent categorization mechanism so that decisions can be made on structured information. By choosing a logical categorization mechanism, every log can be associated with a specific category which forms the basis of an efficient searching mechanism. These categories can be organized into a hierarchical tree structure so that, for example, every log can be associated with a specific asset or tag.

Link into Analysis Tools

With an electronic logbook, data can be dropped directly into a spreadsheet for further analysis (for example, to provide special chart presentation of the logs). The data can also be presented in RTF, PDF, XML or HTML format and this data can be emailed to nominated recipients:

	A	B	C	D	E	F	G	H
3		Condition	Day	Date	Region	Event	Type	Cause / Detail
4	Entry for							
5	Region	West	Company	MPC	Contact Name	Attachment		
6	Event	Generation Event	ThreadID		ParentID	Condition	Abnormal	
7	Type	Trip	Message					
8	Case / Detail	Other						
9	Priority	Low						Trip on Unit 2
10	Entry for							
11	Region	West	Company	DPC	Contact Name	Attachment		
12	Event	Compliance	ThreadID		ParentID	Condition	Normal	
13	Type	DCS	Message					
14	Case / Detail	Violation						Failed to maintain compliance
15	Priority	High						
16	Entry for							
17	Region	Central	Company	A&D/O	Contact Name	Attachment		
18	Event	Generation Event	ThreadID		ParentID	Condition	Normal	
19	Type	Trip	Message					
20	Case / Detail	Equipment Failure						Stator overheating
21	Priority	Normal						
22	Entry for							
23	Region	Central	Company	DYN_IP	Contact Name	Attachment		
24	Event	Generation Event	ThreadID		ParentID	Condition	Normal	
25	Type	Trip	Message					
26	Case / Detail	Equipment Failure						This was an instrumentation error
27	Priority	Low						
28	Entry for							
29	Region	Central	Company	A&D/O	Contact Name	Attachment		
30	Event	Generation Event	ThreadID		ParentID	Condition	Normal	
31	Type	Planned Outage	Message					
32	Case / Detail	Planned Event						
33	Priority	Low						Expect to go down at 15h00 for 1 hour

Other Reasons for Moving to an Electronic Logbook Paradigm

- It is possible to integrate the data with MES and ERP information
- MES or ERP applications can interrogate the electronic logbook and collect data or write data (for example, software that calculates KPIs can write a log to the electronic logbook when a KPI reaches an unacceptable level and operators must react or provide reason codes)
- Similarly, logbook software will write information from the electronic logbook to the external application (for example, energy transfer logbooks can write data to accounting applications)
- Cutting costs - and the helping the planet - by saving on Ink and Paper (electronic logbook reports, shift reports and other reports are all paperless and use the internal e-mail system)
- Modern electronic logs provide an online audit trail of any changes and additions to the logs (a record is made of every addition or change, who made the change, when the change was made, what the change was and these audit logs are usually available at the touch of a button)
- Provide an intelligent reminder mechanism because electronic logbooks are often used to remind operating personnel of tasks that must be created on a regular basis
- The electronic logging system can also maintain a record of standard operating procedures and these procedures can be available through the logging mechanism
- Reduce double entry by providing electronic links from other applications or to other applications (for example, Shift Handover reports can collect the data directly from the DCS, PLC or Data Historian and work requests can write directly into CMMS applications)
- Minimize tedious data entry, since the system fills in many of the fields automatically based on the current conditions (electronic logs are enriched by assigning additional data to the logs such as shift information, user information, plant status and so on)
- Improve the accuracy of data entry by validating the entry - for example, a tank level cannot go above 100% or below 0% - and operators are forced to enter data within bounds values or conditions
- Minimize tedious data calculations by providing these in the underlying logic - for example, tank volumes from tank level) – and a calculation engine can eliminate much of the tedious work of adding logs
- Access and log information from Mobile (handheld) devices which can be distributed to a wider audience
- Additionally, supervisors can set up Inspection Rounds from within the electronic logging system which are then downloaded to mobile devices and subsequently carried out by field operators

Summary

This paper has discussed the structure of a web based, database driven logging system. There are a host of compelling reasons for moving towards electronic logs in the power industry. From experience, these kind of electronic logging systems provide an immediate benefit to the operating personnel and other departments as well. An electronic logging system can grow into a powerful coordinating structure across multiple disciplines and sites and electronic logs are simple to install and require minimum maintenance.



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