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Mobile Application as a Tool to ensure effective Corrosion and Asset Integrity Management

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ABSTRACT

In the search to drive value for Corrosion & Asset Integrity Management, the Company has embarked on a journey towards industrial mobility. Mobile, internet-connected devices in industry, similar to the smart devices used on our day-to-day activities, are the future of our industrial operations to enable higher effectiveness by capturing event data in real time, allowing fast deployment of findings from the field for quicker data assessment, and supporting people empowerment. This paper will share the Company's journey toward industrial mobility, for the monitoring of corrosion control activities (such as operational pigging, corrosion coupon and corrosion inhibitor residual), by the use of smart devices. An application was developed to capture the field information in the smart device and further connect to a centralized/organized database with automated data processing (analysis, trends, graphs, dashboards and notifications) to ensure high quality information for the Corrosion Control Engineers to proactively action accordingly.

Key words: Industrial Mobility, Corrosion and Asset Integrity Management, Smart Device, Tablet, Application, Database

INTRODUCTION

When it comes to Corrosion Management, it is critical to have high quality corrosion monitoring data available for the Corrosion Control Engineers (CCEs) to make the most optimal decisions relating to barrier performance and, if required, barrier reinstatement. The corrosion monitoring activities heavily depend on the quality of the record management system used in a company.

The Companies main network, Corrosion Inspection Management System (CIMS), is a centralized/organized database with automated data processing (analysis, trends, graphs, dashboards

and notifications). In CIMS, the monitoring and inspection activities are planned and those plans are linked to a Data Loading Utility (DLU) where the Contractor downloads the required forms to be filled in the field during activity execution as well as the upload of the data into CIMS. The upload process is time consuming considering the amount of activities and that the field data is written in hardcopies, which need to be passed in digital form.

Corrosion in carbon steel materials is well known to be a timely dependent phenomenon (e.g. CO₂/H₂S corrosion, microbiological induced corrosion, etc.), therefore is key to have historical trends and records that capture all necessary details. If internet-connected devices (real time data capture) are included as part of the data collection system and further linked to a system that covers data processing, significant improvements in response, time and quality can be achieved which will support an effective corrosion management.

The Company journey towards industrial mobility will aid other O&G Companies to move forward with the use of mobile devices based on the benefits and advantages shared in the paper, with information relevant to the developed application, smart devices and database with automated data processing (analysis, trends, graphs, dashboards and notifications).

CASE FOR CHANGE

As part of the Company's strive to maintain the highest production whilst meeting the challenges of personnel safety, lower operational cost and preserve environmental protection, Smart Mobile Worker (SMW) concept was introduced as a solution to provide a link between site staff and technical experts located in the main offices or even across the world.¹ A first pilot was conducted with the focus on SMW 1 Audio & Video functionality, where it was observed 50% improved production in one well with a minimum investment of time and money. Furthermore, this solution has been extended to other work process such as Operator Daily Tasks, HSE audits, Construction Projects, PEFS validation, Rig Inspections and more, via a platform within the Company.

In the case of Corrosion Management, smart devices can be of great use to expedite response time. Therefore, it was reviewed its capabilities with the existing record system available. The record system used before in the Company had limitations in terms of data acquisition and possibility to provide response and assessment in the optimal time, with data being available to the CCEs within a week to a month of activity execution. Figure 1 displays the record system workflow.

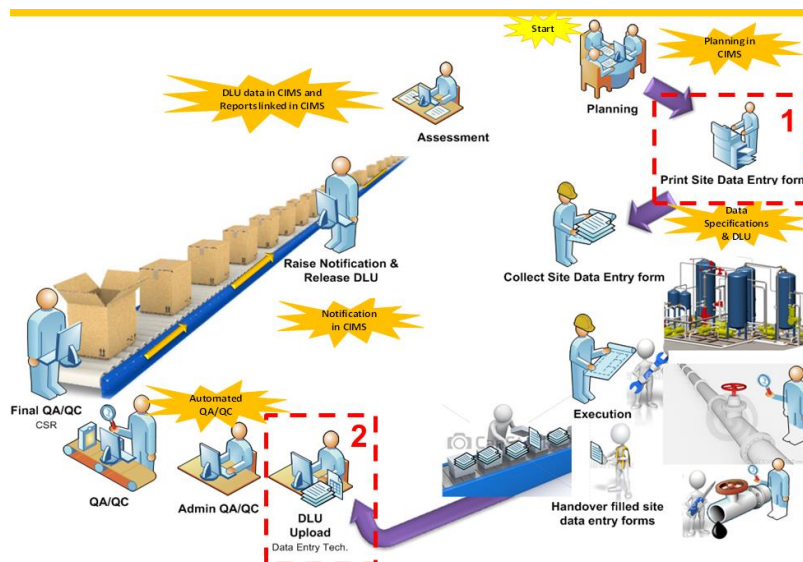


Figure 1: Data Loading Utility Workflow

In regards to data acquisition, the system was not error proof; while the contractors performing the monitoring and inspections activities recorded data on paper (hard copies known as Site Data Entry forms, Box 1 in Figure 1), a Data Entry Technician (also known as Data logger, Box 2 in Figure 1) would transcript the information into a digital spreadsheet (Figure 2) and eventually upload it into the Company network, Corrosion Inspection Management System (CIMS), via a Data Loading Utility (DLU).

	A	B	C	D	E	F	G
1	OPERPIG-Exported from CIMS By User: On:						
2	Functional Location	FLOC Description	Date of Execution	Report No	Area	Location	Overall Integrity Color
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							

Figure 2: Example of digital spreadsheet for DLU upload

The Data logger would be copying massive amount of information from all the field activities executed which could lead to typing errors and affect the data quality uploaded into the database, even do the DLU program considered a quality check (QA/QC) stage. This resulted in waste due to waiting time to get results in the system for further assessment by CCEs as well as delays due to constant communication between Contractor and CCEs when a data error was spotted. In addition, several activities require that the contractors perform calculations at site, which leads to added time for execution and might create quality issues due to human error.

Another drawback of the old system was that some useful information such as site pictures were not able to be taken due to zones limitations (HSE) and requirement of explosion proof devices. The CCE would have to give a judgement based on the description received.

From an environmental perspective, paper wastage due to hardcopies is significant due to the high amount of activities and their reoccurrence across the year.

In addition to the above, the Company has a wide spread operation in remote desert locations and extreme heat. This in conjunction with the high volume of activities that are planned across the year creates a case to look for better ways of working that allow for the information from the field to be available in a timely manner for further assessment and, if necessary, action accordingly to correct any deviation.

As an overall, the mobile app (Mobile Data Loading Utility - mDLU+) project will support the Companies drive to operate at GOAL ZERO (No harm to people, assets or environment) by reducing exposure to Staff / Contractors and at the same time increasing efficiency and effectiveness in the maintenance and inspection activities associated to Corrosion Management.

MOBILE APP (mDLU+) DEVELOPMENT

The objective of mDLU+ is to integrate the Company main network (CIMS) with the Smart device (tablet) to allow the capture of real time data in the field , together with multi-media information (photographic and video records) from monitoring and inspection activities and upload it into the network for quicker and more streamlined analysis, eliminating the DLU system requirement. This will improve speed, efficiency and accuracy of the information collected. Moreover, the device has an