

Delivering Strong Production Performance through Workover Wellservice Materials Management Integration and Digitalization in PT. Pertamina Hulu Rokan - WK Rokan

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Abstract. Behind the strong production performance in Pertamina Hulu Rokan WK Rokan, there is one element that holds crucial role to ensure oil gain opportunities are executed as per plan, which is Workover Wellservice (WOWS) materials. Managing WK Rokan WOWS materials is a complex system, in which relies responsibility to control more than 500 types of materials and accountability to prevent risk of shortage and excess from happening. This publication elaborates successful effort done in WK Rokan to improve materials planning and optimization through integrated materials management in a single enhanced system.

There were two major issues in WOWS materials management process in WK Rokan: (1) No integration in materials planning and monitoring process between stakeholder teams; (2) Minimum and manual system available for autonomous and proactive monitoring. WOWS materials inventory was managed by Drilling and Completion (D&C) team with minimum collaboration with Asset Development (AD) function. During this period, materials planning was assessed purely based on historical data, while future business plan and campaign plans were not fully considered. This resulted to lower material forecast reliability and high risk of discrepancy between material supply and demand. Now, the system has been improved by integrating material management efforts from separated teams into one cross functional material system. In the new system, accountability for WOWS materials is shared between D&C, AD and Procurement teams. Through this process improvement, the team has more control to handle risks regarding material supply and demand. The new system also offers opportunity for Material Management Digitalization (MMD). Digitalization long term objective behind MMD is to have online system, with single click can retrieve information of current inventory level, historical actual usage, and forecast moving forward. MMD in WK Rokan has been deployed through several applications, such as e-MUP (e-Materials Utilization Plan) Tool, Warehouse Availability Tool, and Artificial Lift Readyline Online Monitoring. This improvement allows user to access and retrieve data efficiently with less manual steps, reduce homeless data and reduce risk of collecting wrong data due to human error.

The initiative was deployed since April 2019 under 2 stages. Stage-1 improvement (in 2019-2020) was successful to reduce deferred oil production due to materials availability by 43% and consume slow-moving materials by \$ 3.0 M. Stage-2 improvement (in 2020-2021) was successful to reduce deferred oil production by 37% and consume slow-moving materials by \$ 4.5 M.

Keyword(s): Workover; Wellservice; Continuous Improvement; Materials Management; Digitalization

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1 Introduction

Rokan Block (WK Rokan) is a national asset for oil resources and production with major contribution towards the national oil production of Indonesia. This asset is located in Central Sumatra Basin - Riau Province and operated by Pertamina Hulu Rokan. The strong production performance from WK Rokan is preserved through various aggressive activities, where one of them is contributed from Workover Wellservice (WOWS). In WK Rokan, number of WOWS jobs consistently reached more than 12,000 jobs yearly and played important role to optimize existing wells production and recover down wells.

One of the key elements in WOWS job preparation is materials readiness, because any issue lack of material at high risk to delay operations. In WK Rokan, managing WOWS materials is a complex system, involving more than 500 types of materials from Wellhead until toe of the wellbore. Rate of replenishment in WK Rokan is massive and running in continuous mode to ensure materials resilience for more than 12,000 jobs in a year. Considering all these factors, WK Rokan deployed materials management improvement initiatives to avoid lack of materials. Next sections in this publication will explore the successful effort done in WK Rokan to improve materials planning and optimization through integrated materials management and digitalization.

2 Problem Statement

Materials management process consists of three main cycles, which are planning, procurement, and monitoring. Out of these 3 cycles, only planning phase and monitoring phase that are fully under internal company control. Lack of organizational capability in planning and monitoring phases can result into shortage risk, especially in large scale of operations like WK Rokan. WOWS materials management process in WK Rokan faced two major issues in 2019 and before, they were: (1) No integration in materials planning and monitoring process between stakeholder teams; (2) Minimum and manual system available for autonomous and proactive monitoring.

In 2019, materials management in WK Rokan already had planning and monitoring processes running in place. There were two teams involved in these processes, which were the Drilling & Completion team (D&C) and the Asset Development team (AD). Each team had its own planning, monitoring, and a dedicated person in charge (PIC). The only glitch is there was no integration nor collaboration between teams. WOWS Materials Utilization Plan (MUP) in WK Rokan was historically managed by a single team, which is D&C. During this period, materials planning was assessed by D&C purely based on pro-rate of historical data. Involvement of AD and Procurement and Contracting (P&C) in that process was very minimum. With no dedicated PIC to oversee material needs from all teams and no process to allow collaboration in developing plan, the process was established with unreliable materials demand data.

The lack of control in inventory monitoring was another issue to resolve. The fact that each user or a project team only put attention on their own needs against the available inventory, had resulted into a minimum control in monitoring. This condition generates risks of double reservation, late of replenishment request,

and ultimately an unexpected run out. This is the reason why an integration in monitoring is very essential with one dedicated PIC looking at the supply and demand from holistic view. Furthermore, the existing monitoring process was running with manual system. It involved manual updates, homeless data, and no helpful dashboards to make decision. Such condition caused longer time required for data processing and less time for evaluation and decision making.

3 Methodology

The improvement plan to strengthen materials management in WK Rokan is prepared as main resolution. The plan is called the Materials Management Initiative (MMI). It consists of process and people integration in planning and monitoring phases and introducing digitalization in materials management. MMI quick wins are to deliver long term materials resilience, reduce deferred oil production, and develop monitoring tools with record system.

3.1 Materials Management Integration

First integration feature is forming a dedicated cross function materials team to oversee planning and monitoring process comprising one person each from D&C, AD, and P&C. Rather than having different teams working separately, the integration offers different teams working under one system reporting to Materials Steering Committee (Leadership Task Force Team for Materials Management) to create alignment in materials management.

The existence of the dedicated materials team leads to the second integration feature, which is the materials planning integration. In the integrated planning process, the Materials Utilization Plan (MUP) evaluation is run by the dedicated team, implying that the new evaluation process involves not only D&C but also AD and P&C. The forecast component in the MUP is also reformed to achieve a reliable planning, where previously only Regular component is considered. Going forward, it will consider any upside and downside potential during the period of one year forecast. The new forecasting approach has three components, which are Regular, Campaign Based, and Safety Factor (Table 1).

Table 1. MUP Forecast Components

Component	Details	Approach
Regular	Very common utilization in WOWS execution, direct dependency with activity level/rig count.	Normalized plan with respect to target rig count
Campaign Based	Campaign-driven utilization. Key component to ensure "Regular" component is adjusted with additional demand from specific campaign.	Campaign plan and bill of material assessment with material users
Safety Factor	Adjustment factor to anticipate additional activities in the middle of the year. Usually driven by additional rig activities, filling the gap, etc.	Apply safety factor based on statistical look back, for example: 10%, 15%, or 30%

The third integration feature is established in the monitoring stage. Monitoring is done in periodical basis by the dedicated materials team. The analysis in the monitoring looks at total inventory across warehouses and staging areas in WK Rokan, total demand according to MUP, and on-going procurement processes. Moving forward, the concept of monitoring has been transformed from a reactive-mode to a proactive-mode. A flagging system is introduced to proactively alert about remaining inventory (Table 2). Any material that shifted from "Blue" flag into "Green" flag should be proactively responded by new purchase order request as part of proactive monitoring mode.

Table 2. Flagging System in Inventory Monitoring

Flag	Inventory Resilience	Mitigation Plan
Blue	> 6 Months	Keep monitor utilization rate
Green	3 - 6 Months	Request new purchase order
Yellow	1 - 3 Months	Request delivery acceleration to vendor; Prepare alternate materials
Red	< 1 Month	Prepare for order arrival; Request for delivery acceleration to vendor; Prepare alternate materials

3.2 Materials Management Digitalization (MMD)

Solution for a reliable, effective, and value-driven materials management is digitalization. Key digital transformation for materials management is building a system of record (SOR) for supply and demand data. Once the SOR is available, wide range of digital tools can be developed to improve planning and monitoring process. Key benefits of digital monitoring system are:

- All data are stored in SOR, no more homeless data
- Remove manual works. Less time for data update & reporting, more time for data evaluation
- Integrated monitoring system. Provide proactive alert instead of fire fighting
- Increase information visibility and provide easy access to stakeholders

The next session will discuss three main digital tools in MMD. The derivation of these three tools have been successful to develop other digital dashboards.

3.2.1 Electronic Materials Utilization Plan (e-MUP) Tool

A powerful digital tool to track WOWS materials plan, inventory, utilization rate, and progressing backlog in Rig Schedule (Figure 1). This tool can be used to analyze reliability of actual utilization against the monthly plan and calculate next replenishment plan. The tool also has the information of inventory flag alert as explained in Table 2.

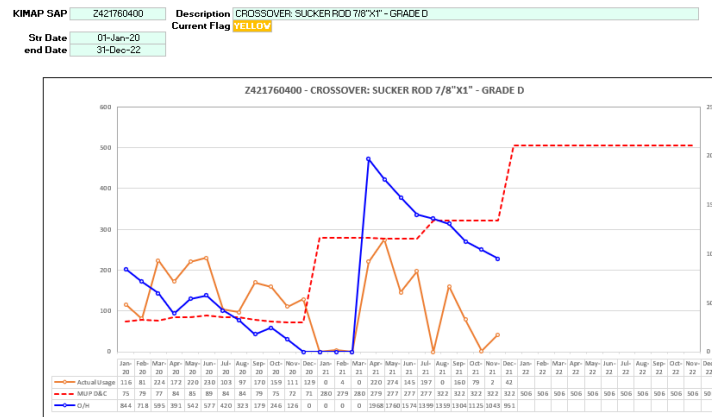


Figure 1. E-MUP Tool Dashboard

3.2.2 Warehouse Availability Tool

A one stop dashboard that provides information about inventory status of any material across Warehouses in WK Rokan, the complete specification of the material, and the status of alternate materials (if any).

Normally these updates are available in separate sections in SAP®, unfortunately not all users have the access to the application. This dashboard is published in a web-based Power-Bi, therefore anyone with the link in the organization can access the web, just like browsing any website at the internet (Figure 2).

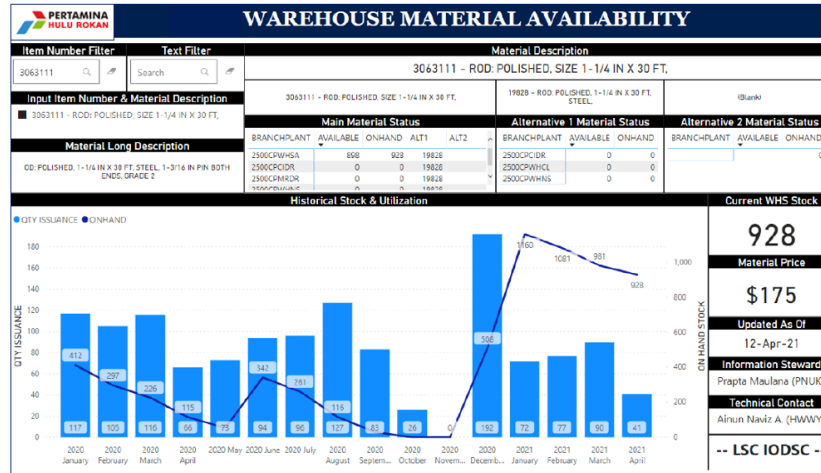


Figure 2. Warehouse Availability Tool

3.2.3 Artificial Lift Readyline Online Monitoring

Critical monitoring tool that tracks daily availability, monthly forecast, and reservation status of artificial lift unit in WK Rokan (Figure 3). Using a dedicated SOR, this tool can provide availability status in the present and past at each equipment level. Before the improvement, the monitoring effort was done manually using excel report and distributed through email with no SOR. Risk to loss data was very high. Now, collecting availability data and performing forecast compliance analysis can be done easy by using this tool.

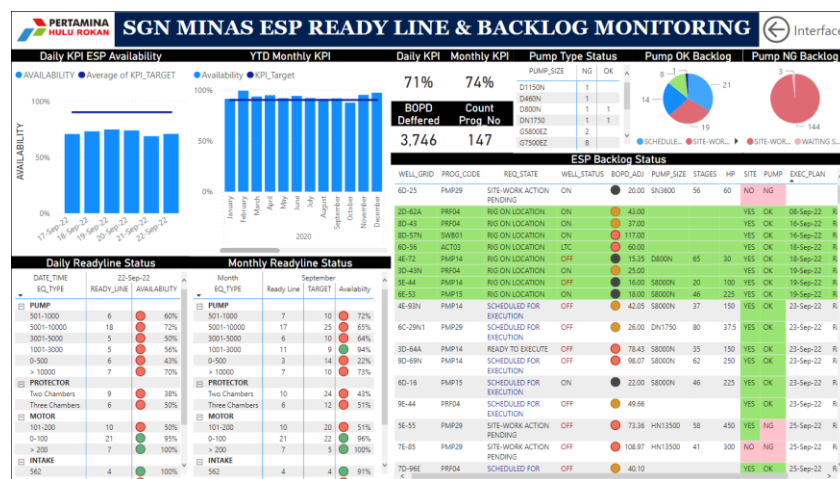


Figure 3. Artificial Lift Readyline Online Monitoring

MMI was launched in April 2019 and deployed in two stages: Stage-1 with focus on planning and monitoring process integration (2019-2020) and Stage-2 with focus on MMD (2020-2021). The span of success in MMI implementation was measured through the reduction of deferred oil production due to lead time waiting on WOWS material readiness.

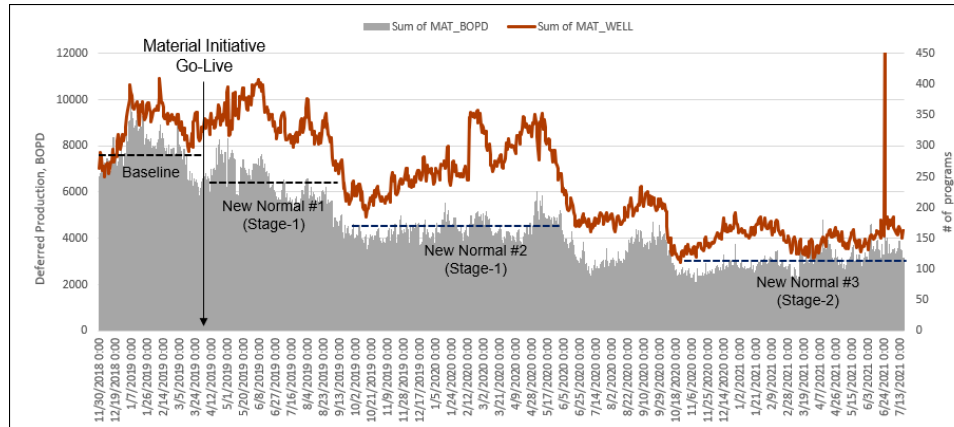


Figure 4. Materials Management Initiative Improvement Tracking

As illustrated in Figure 4, Stage-1 (in 2019-2020) was successful to reduce deferred oil production due to materials availability by 43% and consume slow-moving materials by \$ 3.0 M. Stage-2 (in 2020-2021) was successful to reduce deferred oil production by 37% and consume slow-moving materials by \$ 4.5 M.

5 Conclusion

Integration and digitalization of materials management have been successful to deliver long term materials resilience, reduce deferred oil production, and develop monitoring tools with system of record. The significant impact from the initiative became a driver to expand similar integration and digitalization approach to other segments, such as Drilling Engineering and Surface Facility Operations. In many cases, material stock management; therefore, it is crucial to establish a system with high reliability and strong planning and monitoring capability.

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