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The Importance of Human Factors Between a Drill Crew and an MPD Supervisor – A Human Factors Case Study by Boots on the Ground

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Abstract

Over the past several years, MPD has become a hot topic and a standard practice in our industry. More operators are seeing and accepting the benefits of this practice, and the rig contractors and MPD service providers are rising to meet this demand. Despite all the benefits MPD provides, there still is a part of our industry that is still skeptical of its utility and efficacy. These misgivings usually grow exponentially around the competence level of either the driller or choke operator/supervisor, or at times both.

This abstract/paper will explore the importance of the relationship between the driller and choke operator and its benefit to the overall operation. The areas of discussion will include the human factor topics needed in high-stress situations on rigs. Specifically, the atmosphere builds up during critical situations of gas at the surface (flaring gas), increase and/or decrease in returns from the well, and an MPD supervisor's overall role in well control responsibilities on jobs. It will also explore the importance of an MPD supervisor's role in setting up and nurturing the drill crews' competence during operations with MPD. It will detail the importance of an MPD Supervisor's understanding and "feel" for a well, and how vital it is to a Driller's confidence, especially now when many "green" Drillers feel the full burden of responsibility for well control related events and practices on the MPD wells.

MPD Rig Up

For rigs that are not MPD ready, the rig up process sets the initial tone for an MPD supervisor to show their level of competence to the rig crew. The crew typically measures their competency by deciding how well/if the MPD supervisor can efficiently direct and guide the crew during the process. Part of this competence is determined by the supervisor's ability to efficiently develop, communicate, take part in, and oversee the execution of the rig up plan.

Plan Development – Situation Awareness

"Should've, would've, could've..." are the typical words we want to avoid hearing after an MPD rig up. Part of a drill crew's first assessment of an MPD Supervisors' competency is pending how effective equipment installation goes. Typically, a rig dedicates a block of time to this process, however this time can be scattered

intermittently throughout the day as operations (or space) allow. Therefore, as these time windows become available, the supervisor is expected to have developed a rig up plan. Then it is their goal to share the steps of that plan and guide the rig crew through when called upon. The plan should focus on installing the equipment in an area that allows for quick and easy maintenance (if needed) with little to no disruptions to daily operation that could be performed with minimal personnel.

Plan Execution – Communication, Decision Making, Teamwork & Leadership

When it comes to rig up execution, a drill crews' response is very matter of fact. The phrases "It isn't my equipment" or "whatever you tell me to do" are typical responses an MPD supervisor hears once on site. Although that may be true, this at times puts extra pressure on the MPD rep to execute. To assist with the execution, we found that if focus is placed on communication and decision making with the crew along with a hands-on involvement approach are vital components to building that initial competence. Feedback shows that this is the best chance for the MPD rep to contribute to the rig's teamwork and leadership.

Establishing lines of communication with the rig crew is an important part of any aspect of the job. The difficult part of the job is getting them to talk back to you. To help with this, it is best to be an active participant and be present during the rig-up decision making. Being active and present requires the MPD rep to physically help with the job. Field feedback showed these are the best steps to help build trust with the rig crews. Feedback shows that being present on the job involves the MPD rep being there to coach and more importantly anticipate the upcoming steps along with providing the crew with the tools or steps needed to keep the job moving forward.

Being present is one of the best forms of non-verbal communication that is seen/expected in our industry and the one crew members appreciate the most. This helps build/establish trust between parties, which helps to set up verbal communication between the drill crew and MPD rep needed to build on the teamwork and leadership that will be expected and needed during the drilling operation.



Figure 1—Fluid Overflow at flare.

MPD Execution – Drilling the Well

"You know MPD is going to stick around when they even got it in the well control exam."

Traditionally, when it comes to the different practices in drilling a well, the driller has always been in the ultimate authority in making well control decisions. With a person acting as this ultimate authority,

along with the intense cognitive daily work demands and trying to satisfy the economic and safety demands on conventional wells, it opens the doorway for outside factors that can lead to distractions. Now with MPD becoming more popular, it is important for the industry to provide Drillers with the right training and competent MPD personnel available to minimize distractions.

Competence & Human Factors

When it comes to drilling the well, the first in-casing tests (fingerprinting) done before drilling out the shoe are critical. The tests allow the MPD team to gather data that fine tune the choke to the proper BHP & SBP requirements to stay within the desired operating window. But more importantly, it gives the crew a chance to see and understand how the system works in real time. At this point, the MPD rep should discuss, review and if possible, prove issues that may arise with the MPD equipment; along with how those issues are resolved. Once the MPD rep and driller are comfortable to begin with the drilling operation, the tandem can now focus on monitoring and controlling the wellbore pressures.

It is important to have ongoing management and optimization of this relationship to create a smooth working environment. Field personnel see the topic of "human factors" as understanding what is going on around you. Therefore, analyzing, projecting, communicating, and acting on what is going on in the well contributes to a MPD Rep's competence and the best attributes they have in building a trusting relationship with drillers.

Situation Awareness

"When you pay attention to details, the big picture will take care of itself" – GSP

Throughout the drilling operations an MPD operator is expected to maintain constant observation on the well and develop a feel for how the well is behaving. This helps build both a Drillers' and MPD rep's downhole vision and heighten their situation awareness. By building this vision together, the MPD rep can anticipate, decide, act, and advise the driller how to best proceed during MPD operations. This vision also builds the drill crews trust in the MPD operators' competency.

One of the areas they have had a significant impact on is wells drilled in the Austin Chalk (Chalk) formations (among others discussed throughout). The unpredictability of the chalk and the high gas levels seen at surface while drilling tend to create a stressful environment in the doghouse with each bottoms up/pump-off event. Most bottoms-up brought to the surface can create erratic (default) density and flow out readings on the Coriolis meter. When this presents itself, building an understanding of what the parameters are going to do and which parameters to trust is critical to keeping the bottom hole pressure constant, or within the working range. Therefore, it is vital for the MPD rep to analyze the data points (Standpipe Pressure, Flow in, Density in, SBP, Choke position, MGS level sensor and flare size) that are used to control the wellbore pressures and paint/maintain a picture that assists the Driller in what is going on in a chaotic situation. Feedback from both drillers and company reps show that the ability to analyze and communicate what is going on in these situations is the most important expectation from an MPD operator.

Communication

Implementing an effective communication path between a driller and an MPD rep can be tough, but essential to the job. This tends to be the highest priority for drillers that are new to MPD ops and tend to lean heavily on guidance/coaching from an MPD Rep.

Training and field results have shown that initial comms using three-way communication practice is preferable for the first 3-5 shifts shared by personnel. Ideally, this should be the case for the entire job, but realistically, it tends to fall out as the tandem form their own shorthand. Once this has developed, it is effective in the field, but it depends on the MPD rep being engaged and present in the operation. One such situation where communication is critical is the flaring of gas at surface.

Although not always done in certain areas, gas flaring while drilling is common and can become dangerous with gas in solution. During this event, the flowmeter is likely to default to factory settings with a mix of gas/condensate, cuttings, and mud. Therefore, communication between the driller and MPD rep must be clear, concise, and uninterrupted as this change in the flowmeter readings can be jarring to both experience and novice drillers.

In our feedback, while drilling with gas in solution, any rapid expansion of gas can create a tense situation. At times, gas in solution is unbeknownst to the crew and if not handled properly causes surface and downhole issues. The picture depicted here shows the aftermath of condensate enflamed around the flare stack after a rapid and unexpected expansion of gas #200 strokes from surface. This expansion of gas in the well caused an overload of fluid in the mud gas separator and led to wellbore fluids being displaced through the flare on the ground. As expected, calls to the driller were chaotic with different and at times unnecessary personnel calling the rig floor. In situations like these, it is particularly important for the Driller and MPD Rep to maintain communication and if necessary, ignore/cut-off calls from non-essential personnel. Throughout the event, the MPD supervisor assisted the driller with coaching on the appropriate pump rates and applying the appropriate back pressure. Along with deflecting excess calls that were causing distractions.

Decision Making & Leadership

Making operation decisions can be tough for experienced personnel and at times stressful when they are new to the MPD process. To ease this stress, decisions, and limitations (wellbore or surface) are planned out and decided for rig crews via an MPD Matrix or IME. Although these controls are closely followed on drilling sites, there are situations where the operation feels like it's "playing jump rope" with the yellow and green boundaries of the MPD matrix. The thought behind this principle is best summed up by the comment from a Co. Rep: "we are paying for MPD; we are going to use it."

When MPD crews are often challenged from the upper levels of the rig hierarchy, operational decision making and ownership falls to the Driller and/or MPD rep; if not officially, it is perceived this way by the crew. These self-imposed views, at times frowned upon from afar, are much more welcomed by drillers, and tend to build a good foundation for the driller and MPD rep to develop their confidence. This then plays a role in prompting/developing "what if" discussions scenarios between the Drillers and MPD Reps that develops, decision making and leadership skills that will be needed for a successful well.

As these conversations develop, they turn into actionable items that bridge procedural and knowledge gaps. Due to this, the decision making and often the leadership roles become fluid in high stress situations. The juggling of these actions helps establish and build the teamwork between the driller and MPD rep and leads to successfully overcoming challenges.

Teamwork

The benefits of a good working relationship with MPD personnel and the drilling crew are very crucial to the workflow on a drilling operation. As an MPD supervisor, you are responsible for bridging the knowledge gap of how MPD is applied into the drilling plan and guiding the rig crew throughout the drilling operation. The most interesting aspect of this dynamic is, "You don't know, what they don't know." The core of the MPD and operator relationship starts with your introduction. The first impression of an MPD supervisor to the location of a new or existing customer is the foundation of the job and working relationship going forward. A simple handshake and small talk with the driller and crew upon arrival is something I think determines the direction of the working relationship. Talking to the crew and putting in the effort of remembering names of the people you are working with goes a long way. Taking time to talk to everyone whether it be in passing or a small talk about their job duties on the rig strengthens communication with those individuals.

The most effective way of getting through to someone and educating them on MPD is to have a simple and thought-provoking conversation about it. Let them, in their own words, tell you what they know about MPD. These conversations are a clever way to find out what they know and understand before identifying

and bridging the knowledge gap. This process can be highly effective, because now you can gauge where they are and what reservations they have with this addition to the workflow. Once you set the crew up for success with knowledge and confidence, drillers can lean on MPD supervisors as additional support. This support typically means being an "extra set of eyes" and willing to advise and be a sounding board for the driller. These are the biggest factors that we have found that quickly build the teamwork between the driller and MPD rep.

Conclusion

As MPD grows and becomes mainstream in the drilling process it is important to have competent MPD reps that follow these practices. Being able to assist the driller in day-to-day operations whether it be on the choke, helping with calculations on the fly, or monitoring well control. These "boots on the ground" tactics have been proven to strengthen the driller and MPD reps working relationship. This provides the MPD reps to take the additional stress off the Driller and allows him to focus more on drilling operations, while having an extra set of eyes on the downhole operations to help detect/mitigate well control situations. Along with MPD still being the new kids on the block, it tends to come with some level of preconceived disapproval, whether it be a misunderstanding of the how the application of MPD works or a previously failed MPD reps' attitude/execution of a past project. These practices help advance MPD to the next level and win over the naysayers by showing the correct implementation of MPD that can improve the drilling experience for both parties.

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