# H&P BIT GUIDANCE SYSTEM

## Q. WHAT IS THE BIT GUIDANCE SYSTEM (BGS)?

**A.** The Bit Guidance System(also referred to as BGS) is H&P's industry-leading cognitive computing system that helps make directional decisions based on economics to help lower drilling costs and increase production.

## Q. DO I NEED TO HAVE AN H&P RIG TO RUN BGS?

**A.** H&P's BGS can be run on any rig with a WITS0 feed from an EDR once LTE or satellite connectivity is in place. The system is adaptable globally with a WITSML feed from an EDR or data provider over the internet.

## Q. WHAT DO I NEED TO RUN BGS ON MY RIG?

**A.** The BGS was developed to make steering calls for conventional, bent motor directional assemblies. H&P needs a data input from the MWD provider into an EDR, and then that feed is sent to the on-site or remote computers via WITS0 or WITSML. When a directional survey is captured by the MWD provider and transmitted to the EDR, H&P then imports it to computers, where the algorithms calculate the best course forward while following the guidelines provided by the operator.

## Q. WHY DOES MY MWD PROVIDER NEED TO SEND DOWNHOLE DATA TO THE EDR?

**A.** Today's EDR systems are platforms for drilling data aggregation. When an MWD provider ties in the downhole tool's telemetry and it's combined with the surface rig telemetry, all pertinent drilling information is captured in one location for real-time viewing or as a historical record. This method provides the personnel on-site or remote with the most up-to-date information. Service providers and operators need as much information in centralized locations as possible.

## Q. WHY DO I NEED A BGS ON MY LOCATION? DON'T I HAVE A DIRECTIONAL PROVIDER FOR THAT?

**A.** The BGS is complementary to any directional provider operation. More importantly, it's an unbiased view of the downhole environment to give both the provider and the operator insight into the effectiveness of their BHA, bit selection related to steering, and motor performance. BGS will provide real-time data to apply to the current drilling operations or future wells for optimized planning purposes. One of the critical components of the BGS is the MotiViz 3D visualization program that can, among many things, highlight steering effectiveness and performance. This oversight helps avoid costly nonproductive time (NPT) trips that require motors to be adjusted to a higher bend setting, increasing tortuosity.

## Q. WHAT ARE THE KEY FEATURES OF THE BIT GUIDANCE SYSTEM?

**A.** The Bit Guidance System has multiple components:

a) MotiView dashboard with an interactive display and on-demand reports
b) MotiViz 3D visualization with spatial walk-through features from top to bottom
c) Automated reporting for survey updates, slide sheets & efficiency
d) Visual and reported anti-collision avoidance
e) Formation Top Detection with notification feature
f) State-of-the-art geosteering application built-in
g) Saphira survey corrections service built-in

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## Q. IS ANYONE FROM H&P MONITORING MY WELL?

**A.** Every system and well is monitored 24/7 by the H&P command center team. Pod operators are highly skilled in directional operation execution. They, in turn, have supervisors who monitor their overall performance and ensure the guidelines set up for the individual operators are maintained. Technical personnel oversee the data and the communications networks, keeping watch around the clock to provide seamless service quality.

## Q. HOW DO WE COMMUNICATE WITH H&P'S COMMAND CENTER?

**A.** There are several ways to contact the H&P command center if you have questions or concerns.

- There is a chat feature directly from the BGS dashboard
- By phone to the pod or command center, via text message, or email

Any of these methods will quickly put you in contact with the operations center. A 1-800 toll-free number is provided before the job begins to avoid any long-distance charges for domestic or international customers.

## Q. HOW DO YOU KNOW IF WE HAVE SPECIFIC FORMATION OR STEERING CONCERNS ON OUR WELLS?

**A.** H&P's customer support team will ask in advance if there are any regional concerns or lessons learned that the operator and their directional provider could share. Requests for historical drilling data like BHA's, slide sheets & surveys are sent in advance of deployment.

## Q. WHAT INFORMATION DO WE NEED TO PROVIDE TO RUN BGS?

**A.** H&P requires well plans, survey plats, stick diagrams, offset well data, BHA's - essentially the same information a directional provider and operator would exchange to execute a proposed well needed for data entry. In addition, a customer steering form on which to base the systems slide call is initiated. H&P and the operator will discuss the distances or drilling windows from the plan the operator wants to maintain, the dogleg severity maximums, survey frequency, highs and lows above target TVD's or slide, and no slide zones based on geological conditions. H&P can input multiple targets and make changes quickly to accommodate changing drilling conditions. The H&P team ask to be included in the communications chains from engineering, operations, geology, and the rig site to help ensure we have the most up-to-date information to meet the wellbore placement requirements.

## Q. MY OPERATIONS ARE NOT LOCATED IN THE UNITED STATES. CAN WE USE BGS?

**A.** The H&P Bit Guidance System is universal and can be used on any rig in the world so long as a few criteria are in place. The first would be access to a WITSML EDR feed, and the second would be the requirement to have the directional provider tied into the EDR with their systems outputs. As long as these requirements are in place, H&P can receive and use the data with the BGS. H&P can could then output steering decisions via a web browser through login into a dashboard. The rig floor EDR would need internet access to view the outputs on location & execute the slide calls. If the operator uses the system for purely oversight purposes, an internet connection, browser, and password to login from H&P will provide full access to the real-time dashboard and all of its features. BGS can be accessed from multiple devices (phones, laptops, tablets), any place internet connectivity is possible.

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## Q. WE USE ROTARY STEERABLE SYSTEMS (RSS). CAN BGS STILL BE USED?

**A.** The BGS was developed for bent motor drilling applications in its current form. The H&P team is researching solutions for RSS systems and will update customers when applicable. Although the steering calls are not yet configured for RSS tools, the 3D MotiViz visualization software and the central dashboard, MotiView, can still provide value. Positional information, distance from plans, boundaries, or offset wells will still be displayed as long as the feed criteria and required drilling information are output to the team. The system will continue to provide automated reporting and live situational awareness. The operators drilling team will have the most up-to-date information to make critical and time-sensitive decisions and avoid costly errors impacting production.

## Q. CAN WE JUST GET THE MOTIVIZ 3D OR FORMATION DETECTION FEATURES?

**A.** The total value of the Bit Guidance System is only fully realized in its complete form. The components work the way they do because of how the data interacts within the system as a whole. The short answer right now is no. H&P solutions experts are constantly developing new ideas and features to improve service quality.

## Q. HOW ARE THE BGS OUTPUTS COMMUNICATED TO THE RIG?

**A.** There are two ways to have the system set up. One way is to deploy a computer and communications gear to the location, tie into the required WITS0 feeds and display outputs over a WIFI network set up to our monitors (iPads). The other option is data via WITSML from the EDR provider outbound to the H&P command center, where the information is fed into a dedicated hub. The data would then be analyzed, and the output calculations sent back to the EDR through its browser tab and displayed on the H&P proprietary dashboard with the go-forward steering or rotate calls.

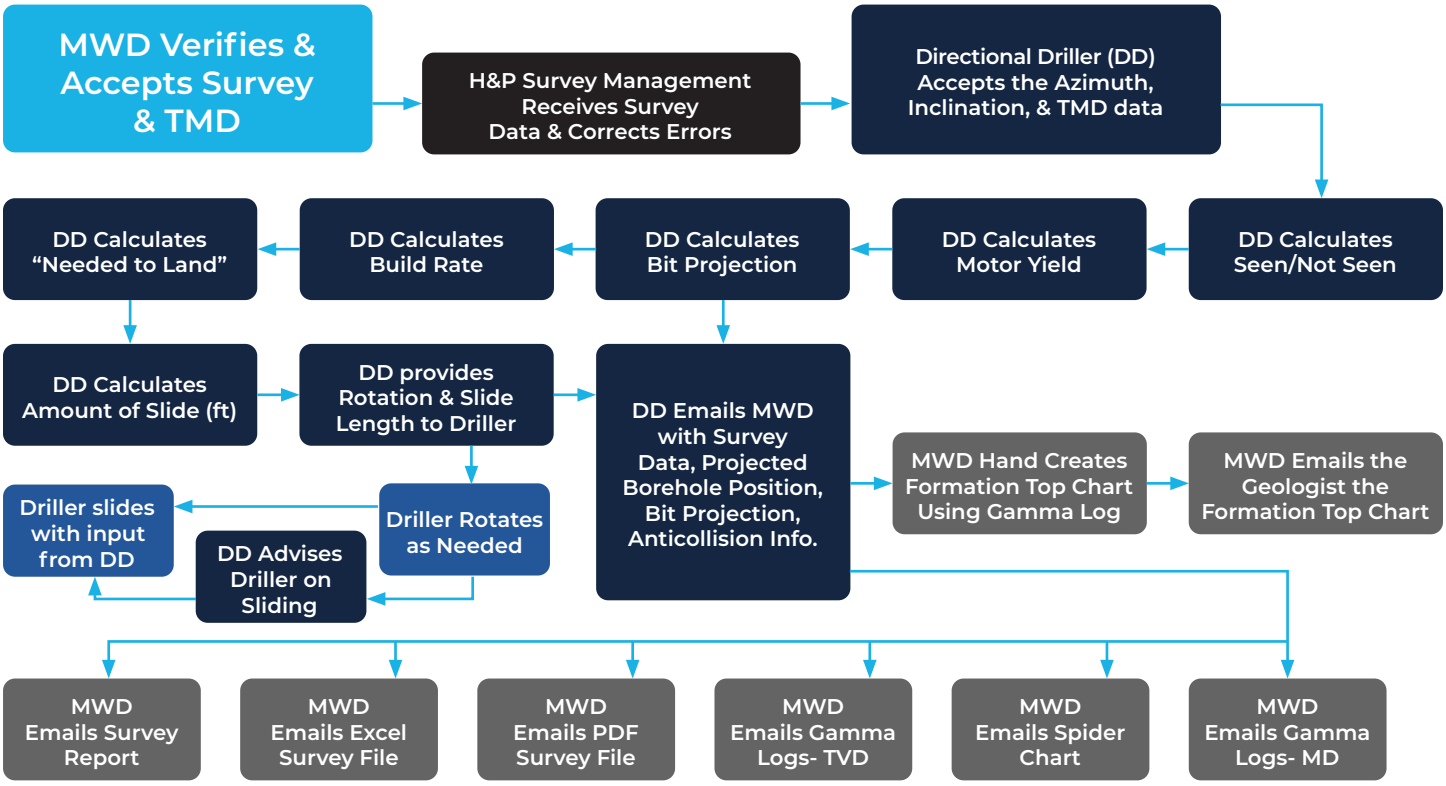
## Q. CAN WE HAVE OUR DIRECTIONAL PROVIDER USE THE SYSTEM MANUALLY WITHOUT THE H&P COMAND CENTER?

**A.** No, manual use of the system is not possible. Over time, automated systems provide consistency and proper decision making using hundreds if not thousands of data points. The Bit Guidance System looks at all of the input data to make real-time decisions based on the operator's best interest for the best overall outcomes.

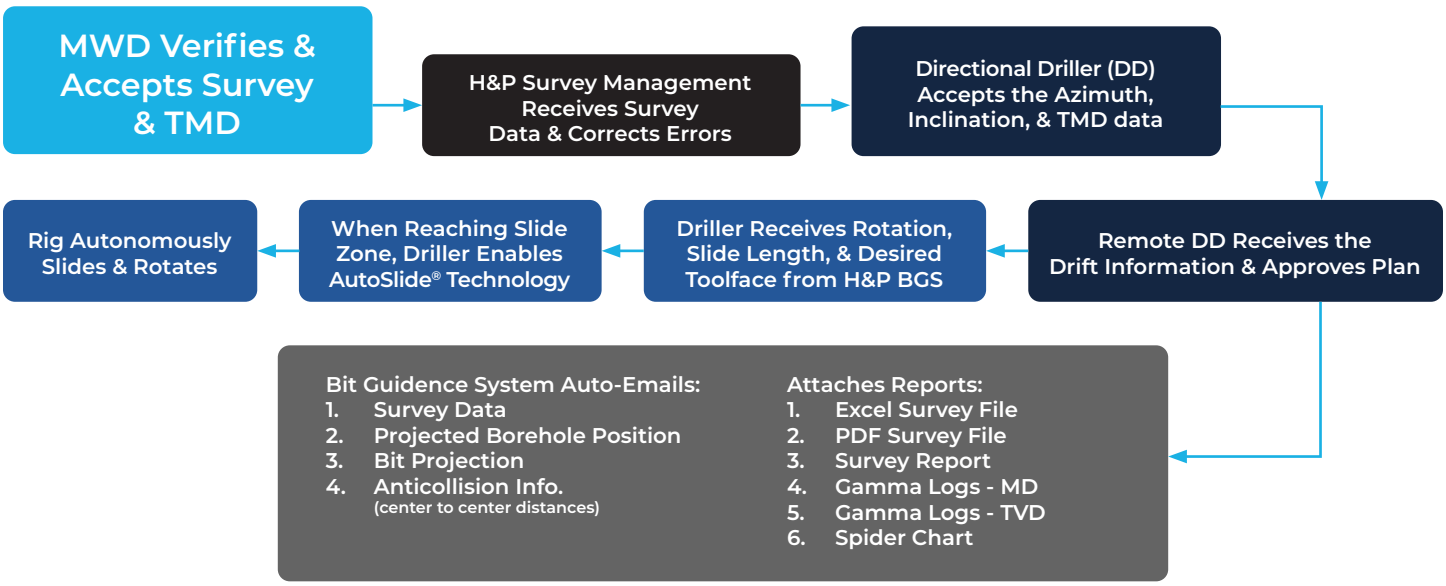
## Q. WHO IS RESPONSIBLE FOR EXECUTING THE SLIDE CALLS?

**A.** Many operators have their directional providers steer the BGS calls. H&P personnel or the operator's directional provider of choice has trained rig contractor drillers to execute the slides in many cases. This method has proven highly effective and helped reduce operator personnel costs, accommodation requirements, and ESG footprints.

# CONVENTIONAL MWD-DIRECTIONAL DRILLING WORK FLOW VERSUS H&P AUTOMATION




## BIT GUIDANCE SYSTEM + AUTOSLIDE® TECHNOLOGY

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