The Pason AutoDriller – Optimal Drilling Control and Accuracy

Overview
The Pason Electronic AutoDriller takes drilling operations to an optimum level of accuracy and control. Through constant monitoring and adjustment, the system ensures that weight on bit (WOB) is automatically maintained at a precise and consistent level. As a result, it maximizes the rate of penetration (ROP) and decreases the stress on the drill string, motor, and drill bit.

Why Conventional Drilling Control is Inefficient
Most autodrillers control only to a WOB target, although some also offer a pressure setting. To set the WOB or pressure targets, the user turns a knob and then keeps checking the electronic drilling recorder or floor gauges to see if the target level has been reached. As drilling proceeds, continual calibration, zeroing, and target adjustments are necessary. Setting up dual targets is difficult because only one target can be reached or limiting at any given time, making the value of the second target unknown until drilling conditions change and the second target is reached.

Adjusts to Multiple Absolute Targets
The Pason AutoDriller, on the other hand, is designed to maintain a target WOB, as well as optional limits for drilling fluid pressure, torque, and ROP. Drilling personnel enter these target values from the Pason doghouse computer (DHC) or the Pason SideKick on the rig floor. Weight is then added to the bit until at least one of the targets is reached. By actuating the drilling rig’s drawworks brake handle, the Pason AutoDriller then maintains the WOB and other drilling targets precisely and consistently (see Figure 2).

Challenge
Customers lose valuable drilling time and resources when making continual adjustments to control multiple drilling parameters.

Solution
The Pason AutoDriller automatically monitors and makes adjustments to maintain multiple drilling parameters. Through these precise adjustments, it maximizes the rate of penetration while drilling.

Results
- Decreased drilling time
- Longer life for drill bits
- Fewer motor stalls
- Steady WOB, torque, and pressure
- Maximized ROP
- Improved drilling economics

Figure 1: Conventional autodriller inputs
Because the system requires continual adjustment to maintain the desired WOB, pressure, torque, ROP, or other drilling parameters, it’s predictably inefficient. It contributes to increased drilling times, greater drilling costs, and a lower ROP.

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Figure 2: Pason AutoDriller inputs

Maintains a Highly Precise Weight on Bit

As drilling proceeds, the Pason AutoDriller tracks and reacts to the rate of change in the WOB. It dynamically adjusts or fine tunes the control, making minute adjustments to the brake handle every 20 milliseconds. The adjustments are based on feedback from the hook load, drilling fluid pressure, torque, drawworks drum rotation, target ring depth sensors, and past performance. The Pason AutoDriller is designed to provide smooth control across the full ROP range, and this responsiveness results in an optimal ROP and a more stable system. As Figure 3 demonstrates, the Pason AutoDriller offers smoother, more efficient control of WOB, compared to the mechanical pneumatic autodriller.
Integrates with the Pason EDR
For seamless operation, the Pason AutoDriller integrates with the Pason Electronic Drilling Recorder (EDR) and its sensors, eliminating the need for another set of sensors. While the Pason AutoDriller is in operation, drilling personnel can conveniently monitor and adjust the system from the DHC, as well as the Pason SideKick on the rig floor. The Pason AutoDriller also has two emergency kill switches—one on the rig floor and one in the doghouse—to start or stop drilling operations on demand.

Demonstrated Results with the Pason AutoDriller
Based on averages from four rigs (eight wells) in multiple basins, Table 1 and Figure 4 provide actual drilling results before and after installing the Pason AutoDriller. These results clearly demonstrate the economic advantages of using the Pason AutoDriller. Substantial improvements in average ROP and depth per drilling day result in a significant decrease in total drilling days.

Table 1: Drilling results with and without the Pason AutoDriller

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Without AutoDriller</th>
<th>With AutoDriller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average ROP</td>
<td>1.16 min/ft</td>
<td>0.97 min/ft</td>
</tr>
<tr>
<td>Standard deviation – ROP</td>
<td>1.74</td>
<td>1.20</td>
</tr>
<tr>
<td>Standard deviation – WOB</td>
<td>16.07</td>
<td>9.75</td>
</tr>
<tr>
<td>Total drilling days</td>
<td>10.74</td>
<td>8.83</td>
</tr>
<tr>
<td>Average depth per drilling day</td>
<td>987.33 ft</td>
<td>1407.83 ft</td>
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Figure 4: Average drilling days with and without Pason AutoDriller
Summary
Any drilling operation can reap the benefits of the Pason Electronic AutoDriller. It enables drilling personnel and management to make the most of a rig’s valuable drilling time and resources.

For More Information
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