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"Best of both worlds"

The objective of the “mixed fleet” approach is not to replace larger, more costly conventional rigs with smaller, less costly pre-set rigs. Rather, it is to utilize both within their optimum performance ranges to increase drilling and non-drilling performance, while reducing overall cost per well. In other words, get the best of both worlds.

**W.D. Martin, operations manager with Pro Petro Services, Inc., reports that they save five to six days per well and drill 10 to 15 more wells per year using the mixed-fleet approach.**
Hydraulic top-drive rig-drill surface holes and prepare for setting casing. Then the larger rig follows and drills the deeper segment of the well. The benefit is that both rigs perform at maximum efficiency. Each rig completes its part of the drilling plan in the least time and at the lowest possible cost.

**Drilling/Mobilizing Operations**

Traditional drilling is a deep well is considered a continuous process where a single, large rig drills from the surface to TD. Conversely, consider that oil and gas wells are really two or more distinct segments in the drilling plan in the least time and at the lowest possible cost.

1. Drilling surface hole and setting casing.
2. Drilling intermediate hole and setting casing.
3. Drilling production hole and setting casing.

Clearly, each of these well segments requires different rig types to achieve optimum performance and cost. A contractor's profitability depends on maintaining maximum performance and cost efficiency from the equipment in each segment of the well-drilling process. Every drilling rig has a range of optimum performance. Within that range, top-drives achieve optimum efficiency. Outside that range, performance drops off and cost-per-foot increases. For example, a large rig designed to drill holes in the 15,000 to 20,000-foot depth range is less cost and time efficient when drilling shallower holes. It has more capacity and maneuverability (and associated cost) than is required for the job. Lightweight rigs, in the 3,000 to 8,000 class, greatly reduce the time and cost of non-drilling operations like moving and rig up. These rigs are designed to drill and move shallow holes in less time and at a lower cost than large rigs.

Every drill rig has a range of optimum performance. Outside that range, performance drops off and cost-per-foot increases.

**Drilling Production Operations**

**AEOS framework and performance comparison**

<table>
<thead>
<tr>
<th>Operation</th>
<th>AEOS Lightweight</th>
<th>AEOS Traditional</th>
</tr>
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<tbody>
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<td>Rig-Up Time</td>
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**CLOSER LOOK AT THE MIXED FLEET APPROACH**

There are a number of areas where lightweight-top-drive rigs offer advantages over conventional rigs in terms of cost and performance efficiency:

- **High mobilization efficiency.** AEOS lightweight rigs can be set up in one to two hours, while conventional rigs can take 12 to 24 hours. Lightweight rigs move on location and rig up, with four to six guys, in one to four hours, including all of the related equipment. Simple and efficient drilling locations can be drilled in one to two hours with a single crew. Multiple complex small drilling locations that require a subscription or fee to complete and drilling times to four hours.

In comparison, a conventional rig can take 24 to 72 hours with a large crew, to set up.

**Lightweight Drilling Advantages, Lower Costs**

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**Conventional triple in Texas**

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**Detailed Breakdown of Drilling and Non-Drilling Operations Typically Found on a New Drill Site**

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**Casing Operations**

- **Traditional drilling** is done with large, heavy rigs. These rigs can handle casing with the drawworks and traveling block. Casing handling is labor-intensive and slow, and it requires a large crew.

- **Lightweight drilling** involves the use of small, lightweight rigs that can handle casing with “hands free” systems. These rigs are highly maneuverable and can work in tight spaces.

**Performance Advantages, Lower Costs**

- Lightweight drilling reduces operating costs and increases efficiency. This makes it more cost-effective and profitable for operators.

**CONCLUSION**

- Lightweight drilling is an efficient and cost-effective method of drilling wells. It is ideal for operators looking to reduce costs and increase productivity.

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The concept is called the "mixed fleet." Here's an idea for you to consider… a simple way to increase efficiency and reduce operating costs.

Every drill rig has a range of optimum performance. Outside that range, performance drops off and cost-per-foot increases. For example, a large rig takes 24 to 72 hours to rig up, with four to six people, in one to four hours, including all of the related equipment. A conventional rig takes 24 to 72 hours with a larger crew. Lightweight rigs move on location and rig up, with four to six people, in one to four hours, including all of the related equipment.

**Drilling Production**

- **Lightweight rigs** move on location and rig up, with four to six people, in one to four hours, including all of the related equipment. **Lightweight rigs** handle casing with “hands free” systems that improve safety and reduce manual labor.

- **Conventional rigs** take 24 to 72 hours to rig up, with a larger crew. This is faster than the lay-down systems found on lighter pre-set rigs. However, this system requires a rig hand up in the derrick and a great deal of manual labor with heavy loads moving through the rig floor.

Lightweight rigs move on location and rig up, with four to six people, in one to four hours, including all of the related equipment. In comparison, a conventional rig can take 24 to 72 hours to rig up, with a larger crew.
**Take A Closer Look**

Consider what a drilling rig does. From the time it’s delivered to go to a new location until it’s moved to the next location, there’s considerable time, effort, and money spent on non-drilling functions. The mixed fleet approach focuses on reducing the time and money spent on non-drilling functions.

**Drilling/Mobile Operations**

Traditionally, drilling in a deep well is considered a continuous process where a single, large rig drills from the start to the end of the project. Consider, that oil and gas wells are really a series of segments that require different equipment and personnel to complete each section. The mixed fleet approach focuses on reducing the time and money spent on non-drilling functions. The mixed fleet approach focuses on reducing the time and money spent on non-drilling functions.

**Deeper Segments of the Well**

- **1. Drilling surface hole and setting casing.**
- **2. Drilling intermediate hole and setting casing.**
- **3. Drilling production hole and setting casing.**

**Closely Look**

- Each drill rig has a range of optimum performance. Within that range, it operates at optimum efficiency. Outside that range, performance drops off and cost-per-foot increases.
- For example, a large rig, designed to drill holes in the 10,000-20,000 foot depth range, is less cost and time efficient when drilling shallow holes. It has more capacity and maneuverability (and the associated cost) than is required for the job.

**Lightweight**

- Lightweight rigs move on location and rig up, with four to six people, in one to four hours, including all of the related equipment.
- Rig down, setting up the rig and related equipment to drill at the next location, there’s considerable time, effort, and money spent on non-drilling functions. The mixed fleet approach focuses on reducing the time and money spent on non-drilling functions.

**Lightweight Rigs**

There are a number of areas where lightweight, top-drive rigs offer significant performance and cost advantages:

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- **1. Pre-set rigs**
- **2. Setting casing**
- **3. Drilling production**
- **4. Rigging and pressure testing the BOP**
- **5. Cementing casing and dry time**
- **6. Pulling pipe out of the hole to set casing**
- **7. Setting up the rig and related equipment to drill at the next location**

**Conclusion**

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In the oil patch, time is money. The quicker a contractor can spud in and reach TD, the more profitable the operation becomes. Clearly, a “mixed fleet” approach is a viable option for reducing the cost per well and maximizing the performance of the total rig fleet.

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