



October 2010

Oil Service Industry

Upcoming Events

- CAM-I Fourth Quarter Meeting
New Orleans
December 5-8
- APQC Member Meeting
Houston
November 2-5

People in the News

- For all you do for CAM-I, many thanks to Dave Robinson, Elaine Jones, Derek Sandison, Tony Adkins, Bob Thames, and Gary Tharme

Links

- For more information on drilling an oil well and to see pictures and illustrations:
http://en.wikipedia.org/wiki/oil_well#drilling
- <http://www.lloydminsterheavyoil.com/rotary.htm>
- For a list of oil service companies:
http://en.wikipedia.org/wiki/list_of_oilfield_service_companies

Led by big public companies like Schlumberger, Transocean, and Halliburton who rent drill rigs and sell products and services to oil companies and oil producing countries, Oilfield Service and Supply is a \$100 billion global industry.

The best way to understand this industry and the process of drilling a well is to start with a visual of a completed well, a cross section of which looks like a telescope: bigger at the top and smaller at the bottom.

Depending on depth, one might start with a 36" hole at the surface and end with 9" at the bottom. At each transition, steel casing is run and cemented from top to bottom.

Most wells are drilled by rotating the drill string to turn the drill bit. The cutting surface of the drill bit (steel, tungsten carbide, and even diamonds) is what makes the well.

Drilling fluid (mud) consisting of water, clays, and chemicals is pumped down the center of the drill pipe and serves three primary purposes:

- Cool the drill bit
- Control the well. The weight of the column of drilling mud and pressure being applied by the pumps is what controls the well
- Remove cuttings. As mud is pumped down the hole, the cuttings are pushed upward in the space between the drill pipe and the casing

A big innovation in drilling was the Mud Motor, powered by the drilling mud and no longer requiring rotation of the drill string. With the Mud Motor only the bit turned, providing the ability to control the direction and inclination of the hole.

Mud motors led to Measurement While Drilling (MWD), where direction, depth, and even the bottom hole temperature of the well are provided in real time to the drilling crew on the rig. The two relief wells drilled for the Macondo blowout in the Gulf of Mexico are good examples of these advanced technologies... hitting a target about the size of a watermelon two miles deep and a mile away.

Drill bits are a very small part (less than 2%) of the total cost to drill a well but a significant **cost driver** (cause of cost) of total well cost. The cost driver **bit selection** can impact the total cost of the well plus or minus 10%

Depending on depth it can take a day or more to pull the drill string and change a bit. With a drilling rig and crew costing thousands of dollars an hour, the cost of changing the bit far exceeds the cost of the bit.

Bit selection is a tradeoff between penetration rate (feet drilled per hour), bit life (2 days is better than 1), formation drilled, drilling depth, the cost of the bit, and the daily cost of the drilling rig and crew.

Know your business cost drivers...
John A. Miller