

Petroleum Production Technology

module2: Drilling Operation

Lecture:3



By Mukunda Madhab Gogoi

Department of Chemical Engineering, BBEC, kokrajhar

Hoisting system:

- The hoisting system on a drilling rig does the heavy lifting on the rig. It is used to raise, lower, and suspend the drill string and lift casing and tubing for installation into the well.
- It includes:

Derrick
Crown Block
Travelling Block
Draw Works
Cable Drum
Deadline Anchor

- **Derrick** is a substructure with sufficient height and strength. It is a tower like structure.
- **Crown block** and the **Travelling block** is known as **hoisting tackle** as a whole.
- **Drilling line** is a heavy duty multi-thread twiated Wire rope. One end of the drilling line is mounted with the deadline anchor while other is conneted with the cable drum, from where it can be withdraw while necessary

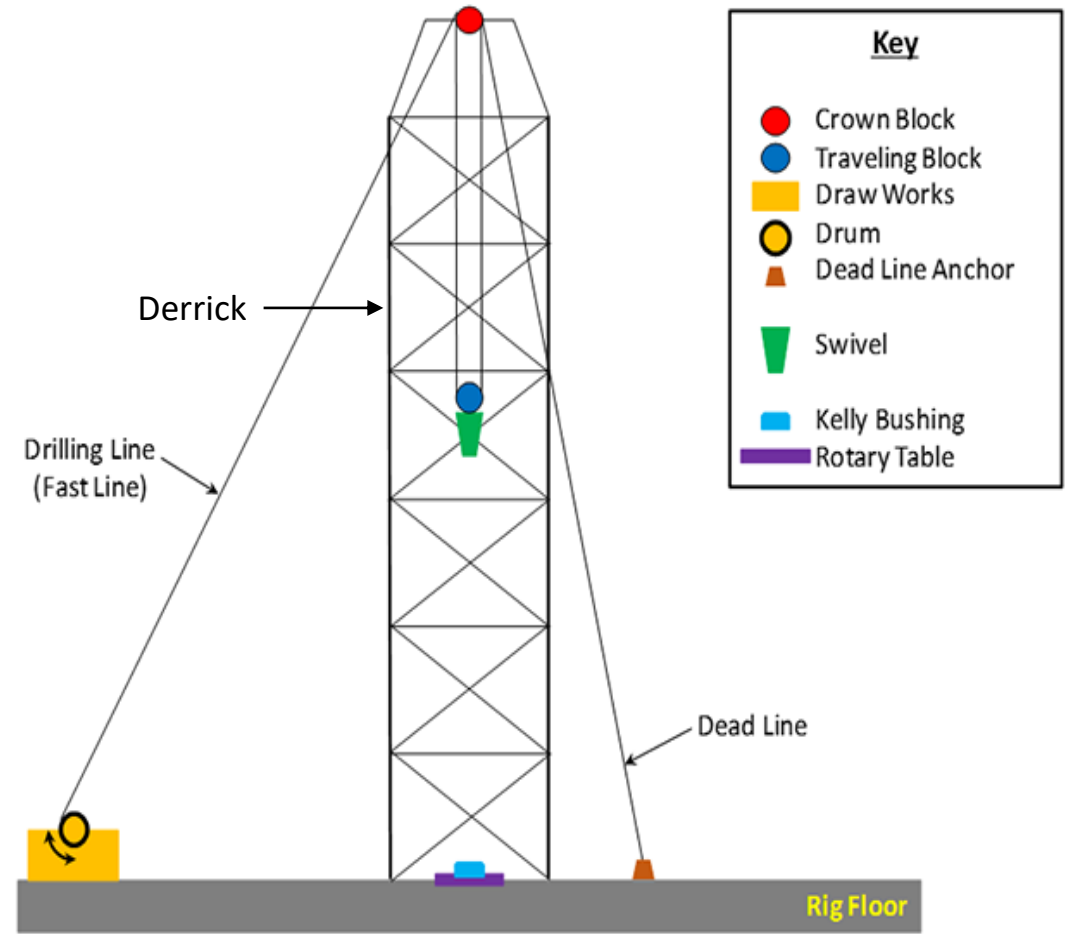


Fig: Hoisting system in a drilling rig

- In this figure, the derrick provides the structural support for the hoist system. It must be capable of supporting the entire load on the system including the weight of the drill string (accounting for buoyancy effects) and any frictional forces.
- The crown block and the traveling block form a **Block and Tackle System** on the rig. The drill line can be strung as pairs of 2 through 12 lines (six pairs). The greater the number of lines (and pulleys) in the block and tackle system, the greater its lifting power but at the expense of slower upward and downward movement of the system.
- The drawworks of the hoisting system is a winch that reels the drilling line in or out causing the traveling block to move up or down. The drawworks is the component of the hoisting system that consumes energy from the power system. The drum on the drawworks is grooved to accommodate a specific size drilling line.

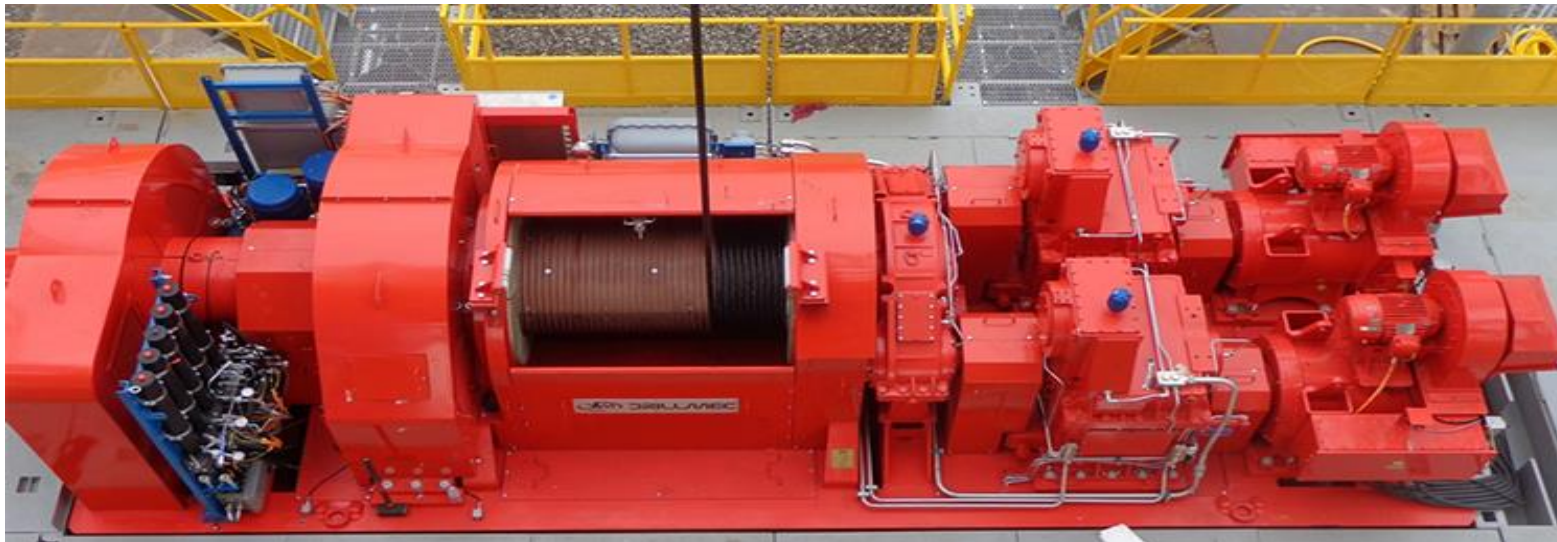
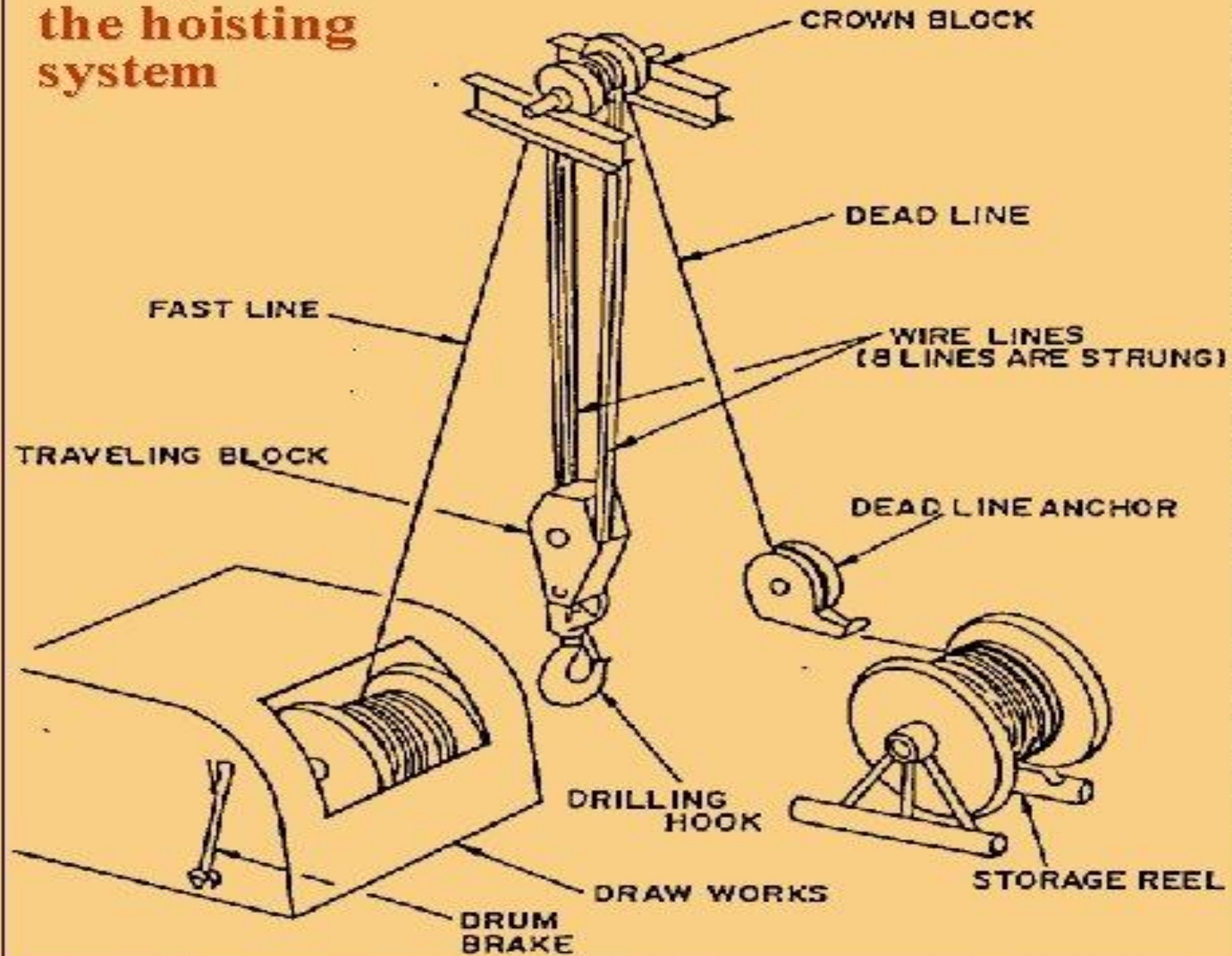


Fig: Drawworks

Note: The swivel is the link that connects the hoisting system to the rotary system and to the circulation system.

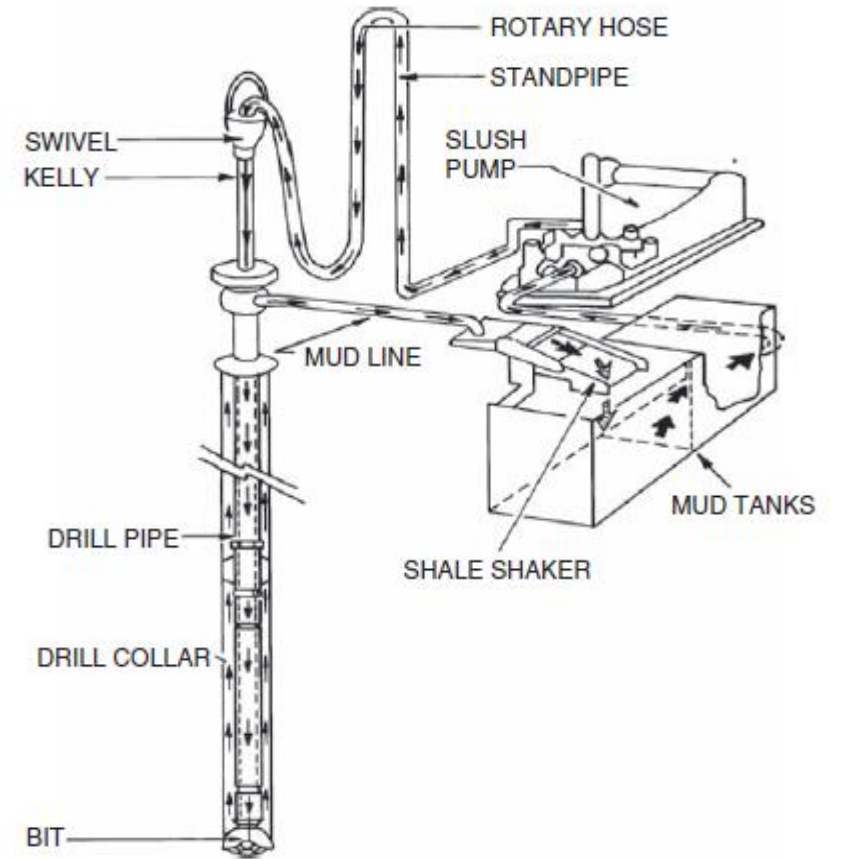
Components of the hoisting system



Circulation system:

The drilling fluid circulating system is like a **close loop electric circuit** through which drilling fluid can travel from the surface to all the way downhole and back to its initial point (mud pit). The cuttings are then separated from the mud, which is then recycled.

- Drilling fluid goes from the mud tanks to main rig pumps, and then major components including surface piping, standpipe, swivel, kelly, drill pipe, drill collar, then bit nozzles.
- Then it goes through the annulus of the borehole lifting the cuttings.
- It is obvious that the rock cuttings must be removed from the borehole to allow drilling to proceed. This is done by pumping drilling fluid down the drill-string, through the bit and up the annulus.
- Cuttings are separated at shale shaker.
- Finally it reached the initial point, i.e. mud tank.



Q: What is drilling mud and what are the functions of it?

A: Drilling mud, that is also known as drillind fluid is a mixture of liquid and required additives so that it can lift the cuttings out of the wellbore.

Various functions of a drilling mud are:

- Cool and lubricate the drill string
- Cool and lubricate the drill bit
- Maintain hydrostatic pressure
- Lifting the rock cuttings out of the borehole
- Stabilised the wellbore by formation of mud cake on the wall of the bore hole

A white, hand-drawn style thought bubble sticker is centered on a brown corkboard. The sticker has a soft, irregular shape with a small tail at the bottom. Inside the bubble, the words "Thank you!!" are written in a bold, black, sans-serif font. The word "Thank" is on the top line, and "you!!" is on the bottom line, slightly indented to the right.

Thank
you!!