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RIG TYPES & COMPONENTS

1- OFF SHORE RIGS.
2- LAND RIGS..

1- OFF SHORE RIGS

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1.Jack - up Rigs.

- Those rigs drill in water depths up to 400 ft

- *Advantage*

1- Provide a fixed platform.

2- does not need a marine riser or subsea stack.

3-Can withstand storms.

- *Disadvantage*

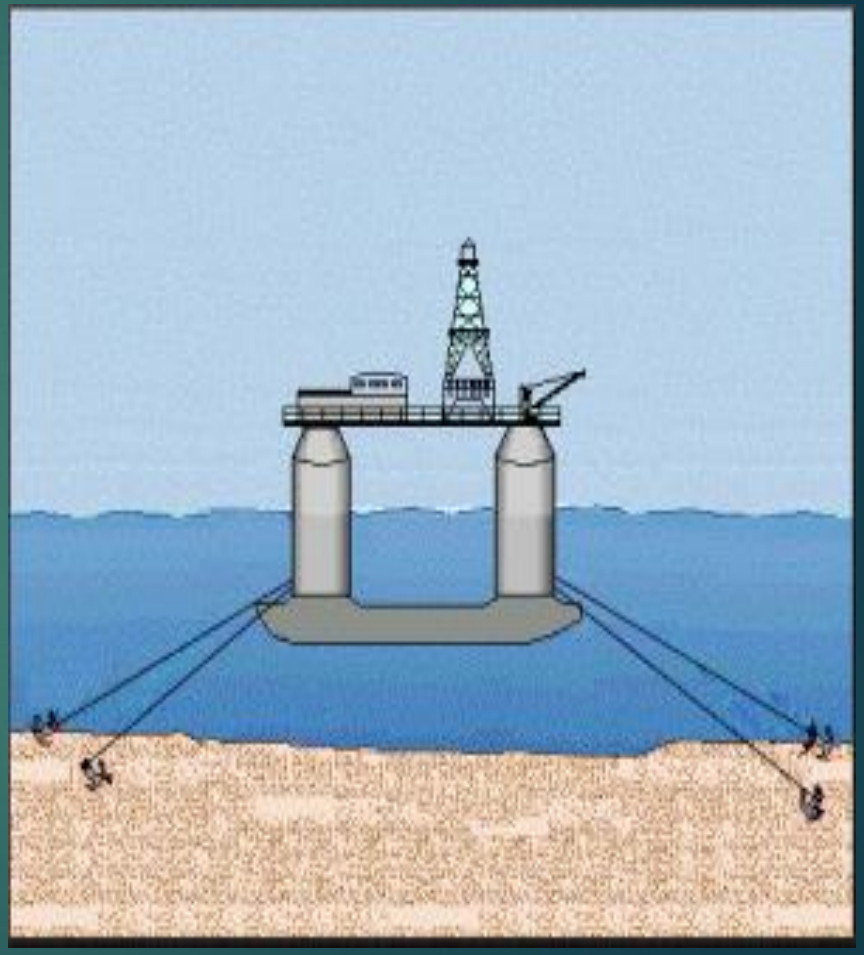
1-Difficult to tow

2-Hazardous for going on and off locations

OFF SHORE RIGS

2. SEMISUBMERSIBLES:

Work in water up to 2000 ft.
Floating rigs fixed to the sea floor with anchors
1-Can be self-propelled
2- Can function under more severe weather conditions

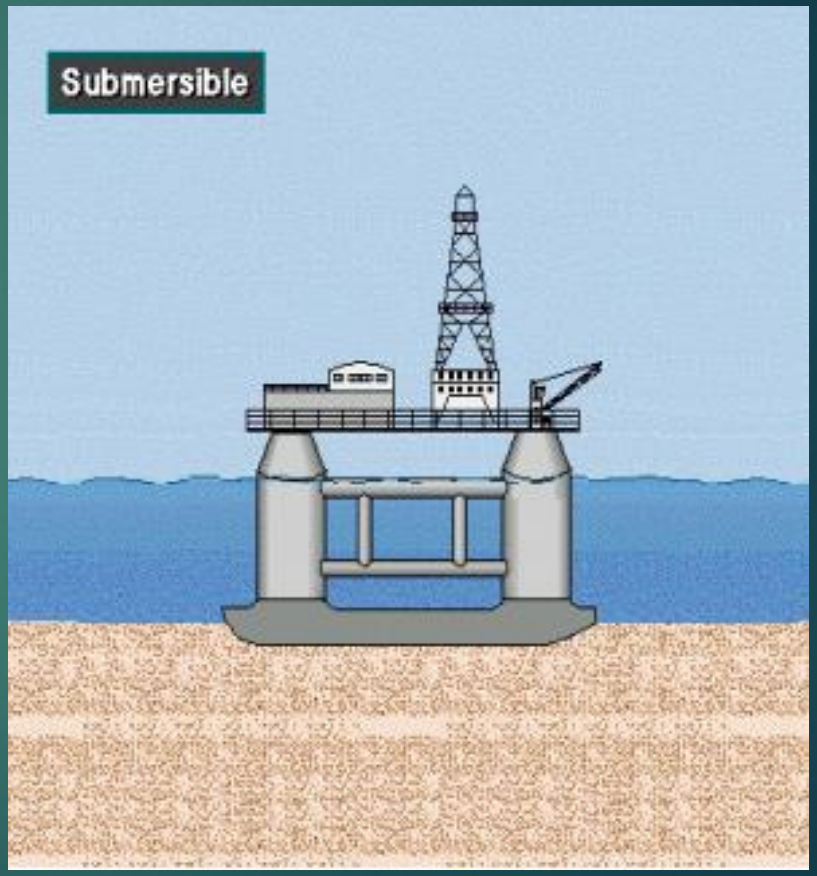


Disadvantages:
1- need marine risers and subseastack.
2- has limited cargo capacity.

OFF SHORE RIGS

3. Submersible Rigs:

- work in up to 1,500 feet of water.
- Rest on the sea floor
- These rigs are outfitted with drilling, production, and storage facilities on board



OFF SHORE RIGS

4. Drilling Ships.

can work in ultra deep water; more than 2000 ft.

1- self propelled.

2- High carrying capacity.

Disadvantages:

1- need marine risers and subseastack.

2- not as stable as jackups and semisub.

OFF SHORE RIGS

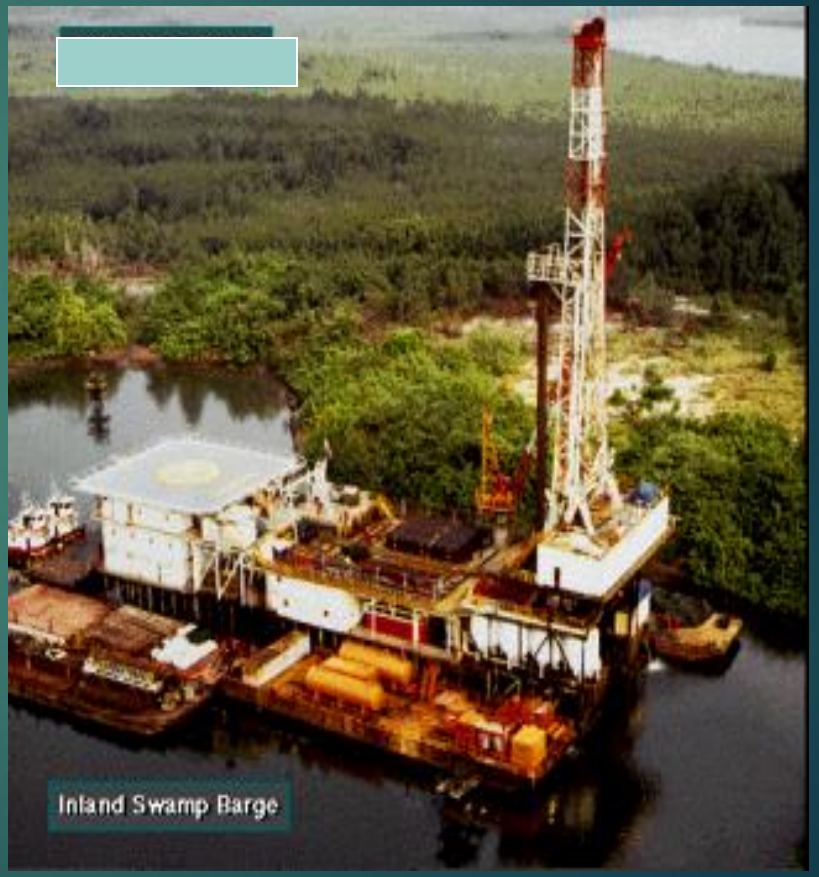
5. Platform Rigs.

A rig installed on a fixed marine plateform.
Can support several rigs.

OFF SHORE RIGS

6. In Land Barge Rigs.

- can work in relatively shallow water; less than 50 ft.
- Not easy to move



2- LAND RIGS

Land Rig Components

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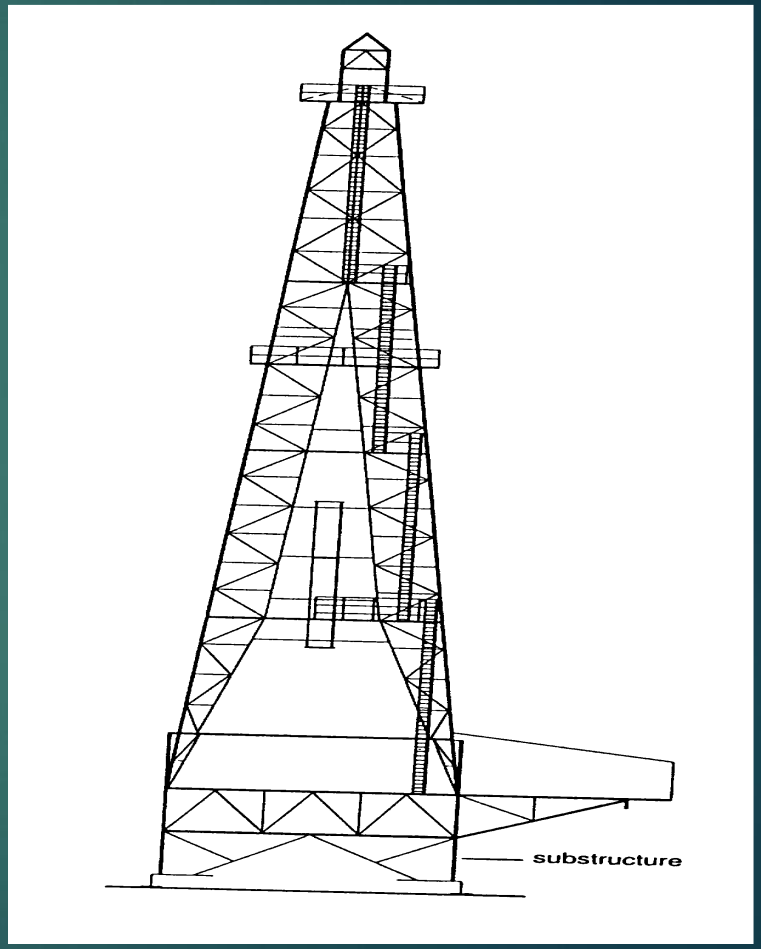
Mast or Derrick:

Is the framework-tower type of support usually associated with oil well drilling.



Land Rig Components

Substructure:

-This is the support on which the derrick rest.
- support the rotary table and the full load of string when in slips.
- Provide space for well control equipment. (BOP)

Land Rig Components

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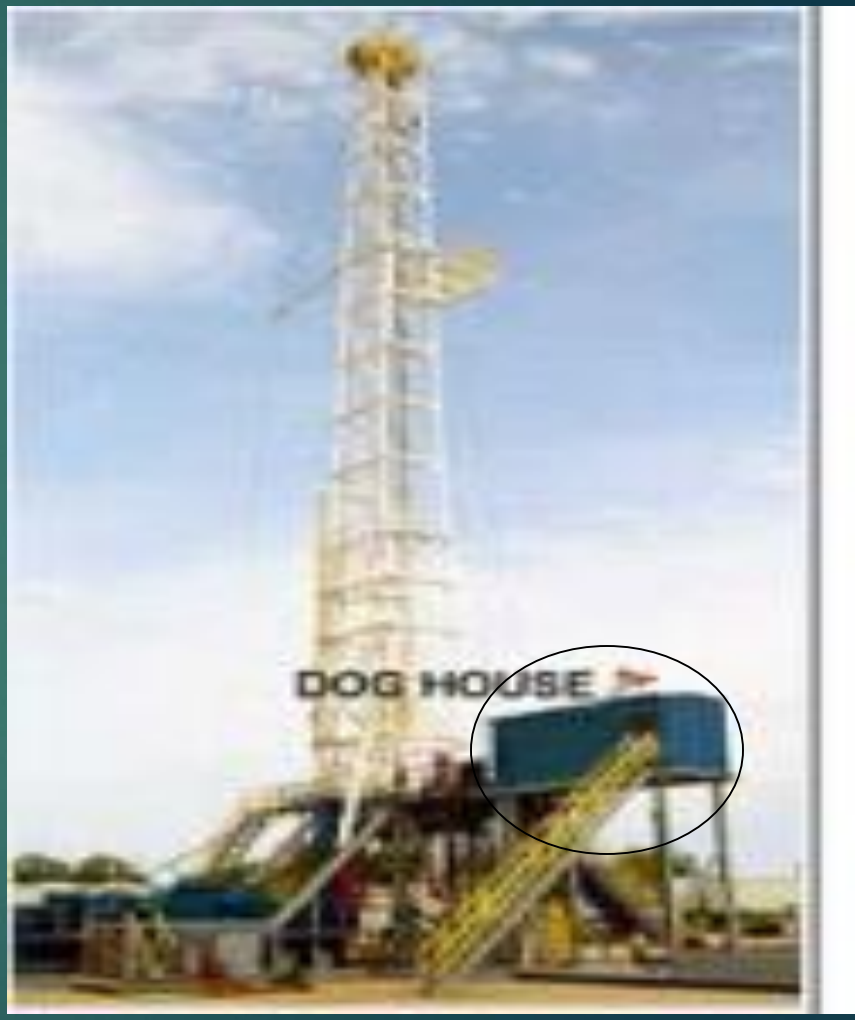
Dog House :

- A small enclouser in the rig floor used as an office for the driller or as store house for the small objects



Land Rig Components

Monkey Board :

- This is a platform situated at a specific height from the rig floor, typically 60 to 90 feet, on which the derrickman works during trips. This platform also supports the fingers that are used to rack the stands of drill pipe .

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The major components that need to be selected and sized for the purpose of rig sizing are:

1. Hoisting System
2. Rotating Equipment
3. Circulating System
4. Tubular Goods
5. Pressure Control
6. Derrick Capacity And Substructure
7. Total Power Requirements for the above

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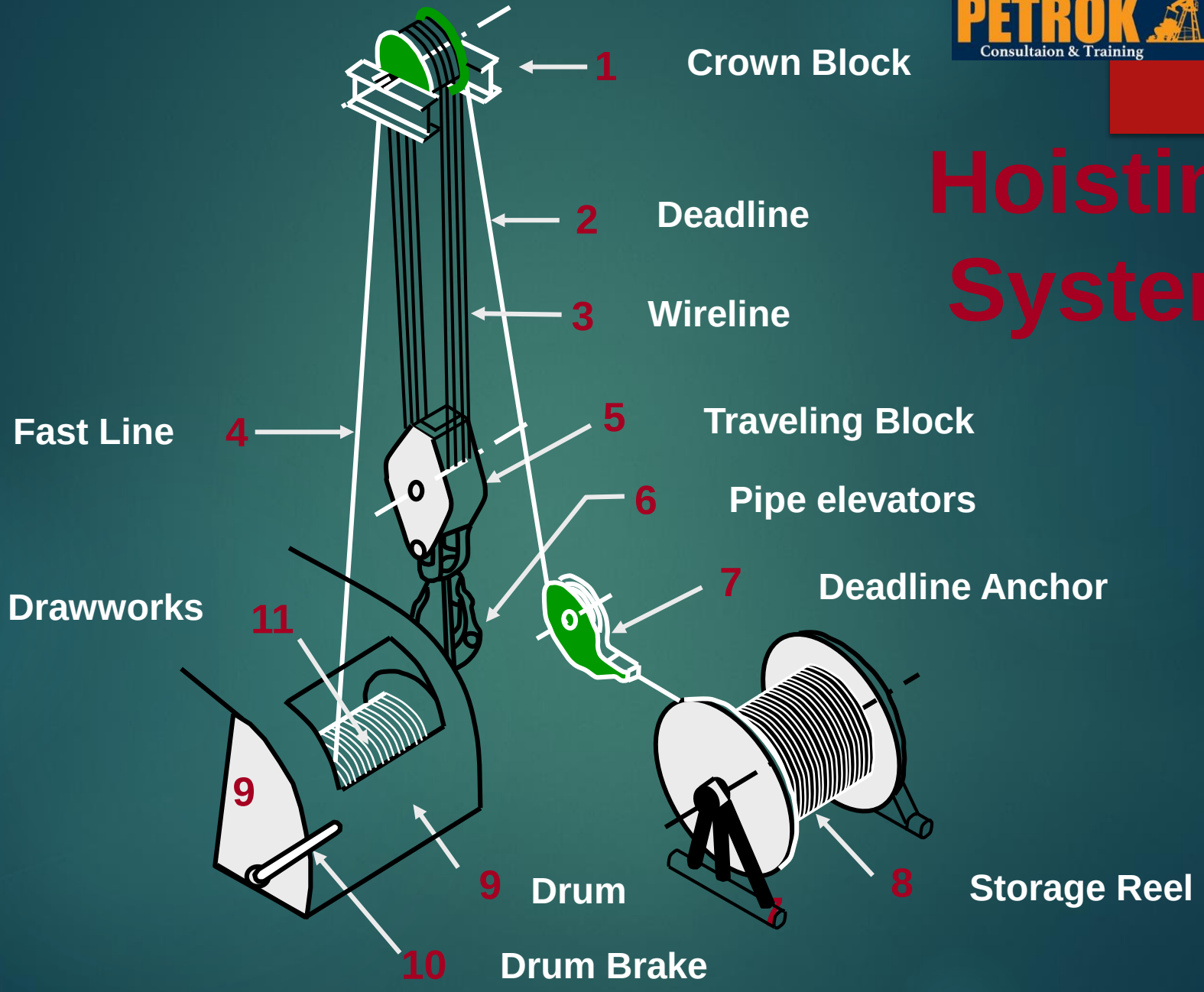
Hoisting System



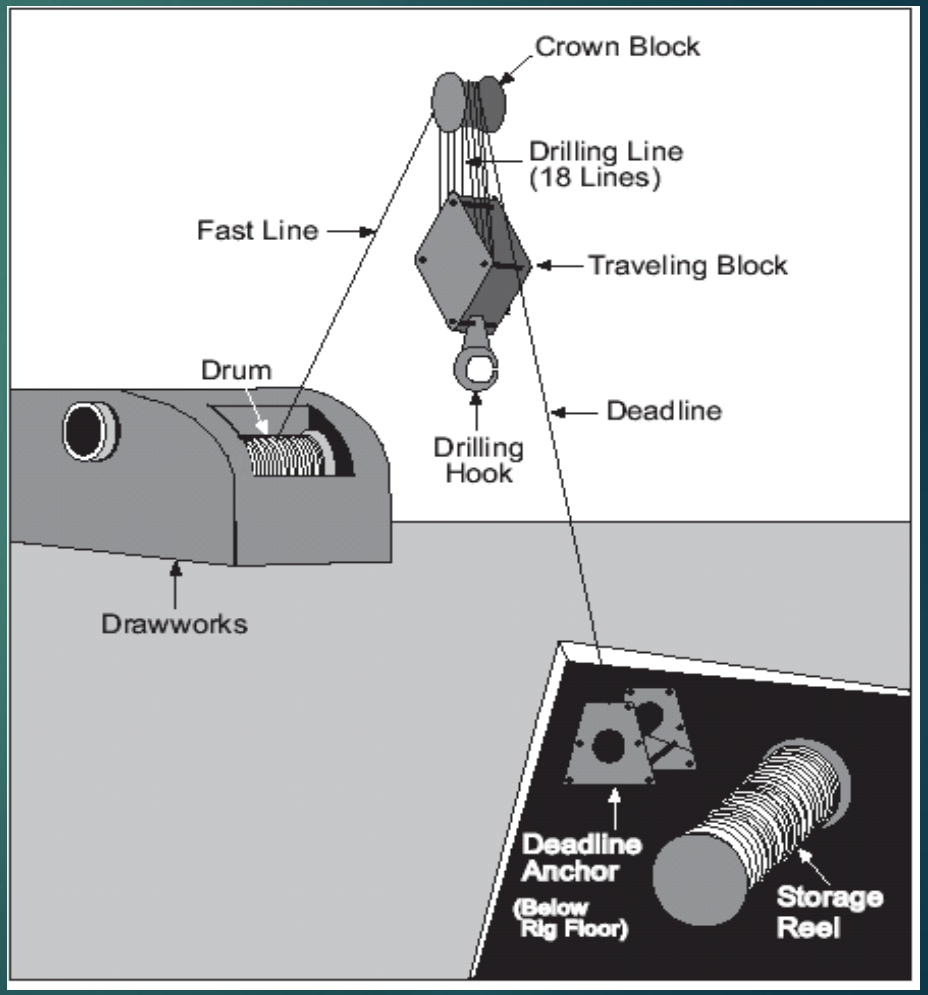
Hoisting System

Hoisting System

(Used to raise and lower drill pipe , casing and tubing)

It is consists of:

- Draw Work.
- Drilling Line.
- Crown Block & Crown Sheaves
- Travelling Block.
- Hook



Hoisting System

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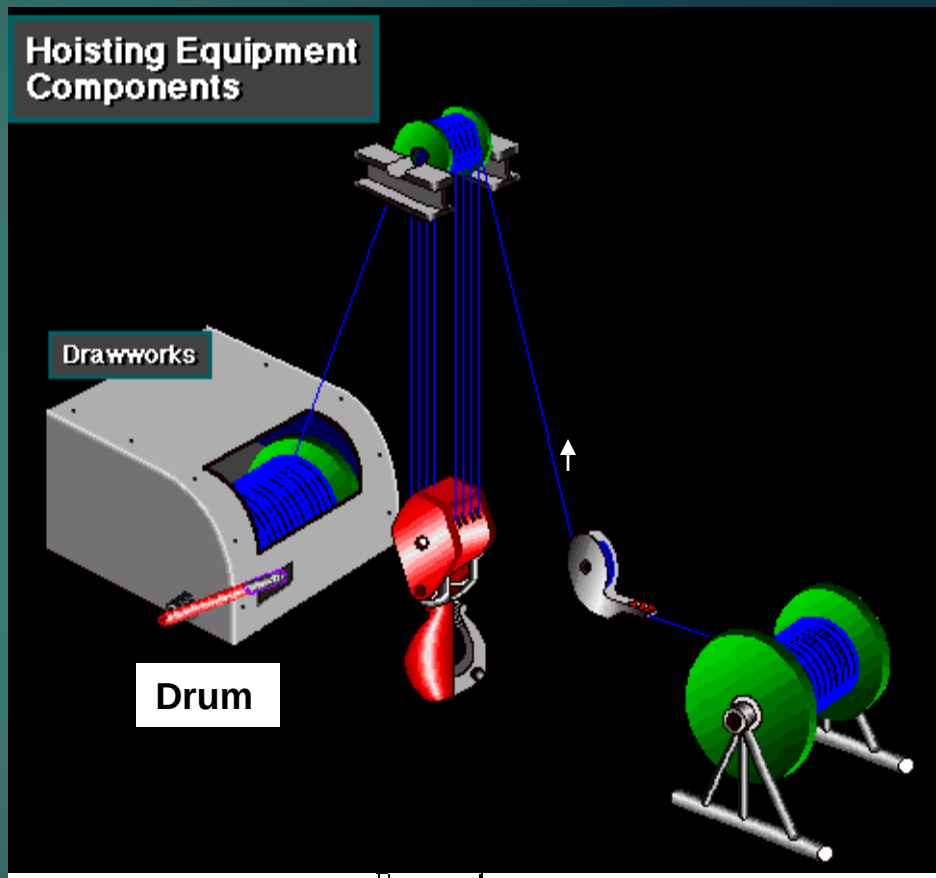
DrawWork :

- consists of a revolving drum , a cat-shaft, a kind of axle that crosses through the draw works, that has a revolving drum (called a cat-head) on either end. Several other shafts, clutches, and a chain-and-gear drive facilitates speed and direction changes.



Draw works

Hoisting System

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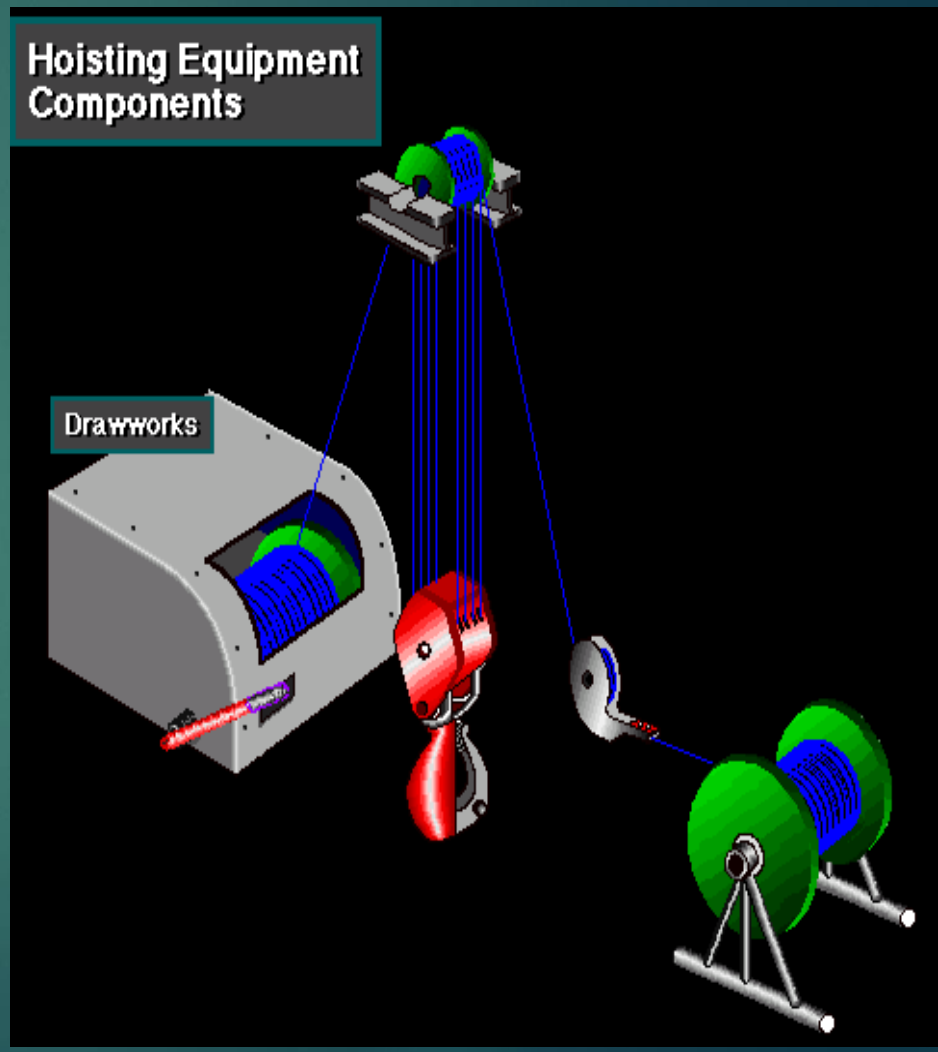
The drawworks used for:

- lifting pipe out of the hole, and to lower pipe back into the hole.

Wire rope or cable is spooled on a drum in the hoist. When the draw works is engaged, the drum turns and raise or lowering the traveling block ,Since the drill string is attached to the block by the elevators, the string is thus raised or lowered .



Hoisting System

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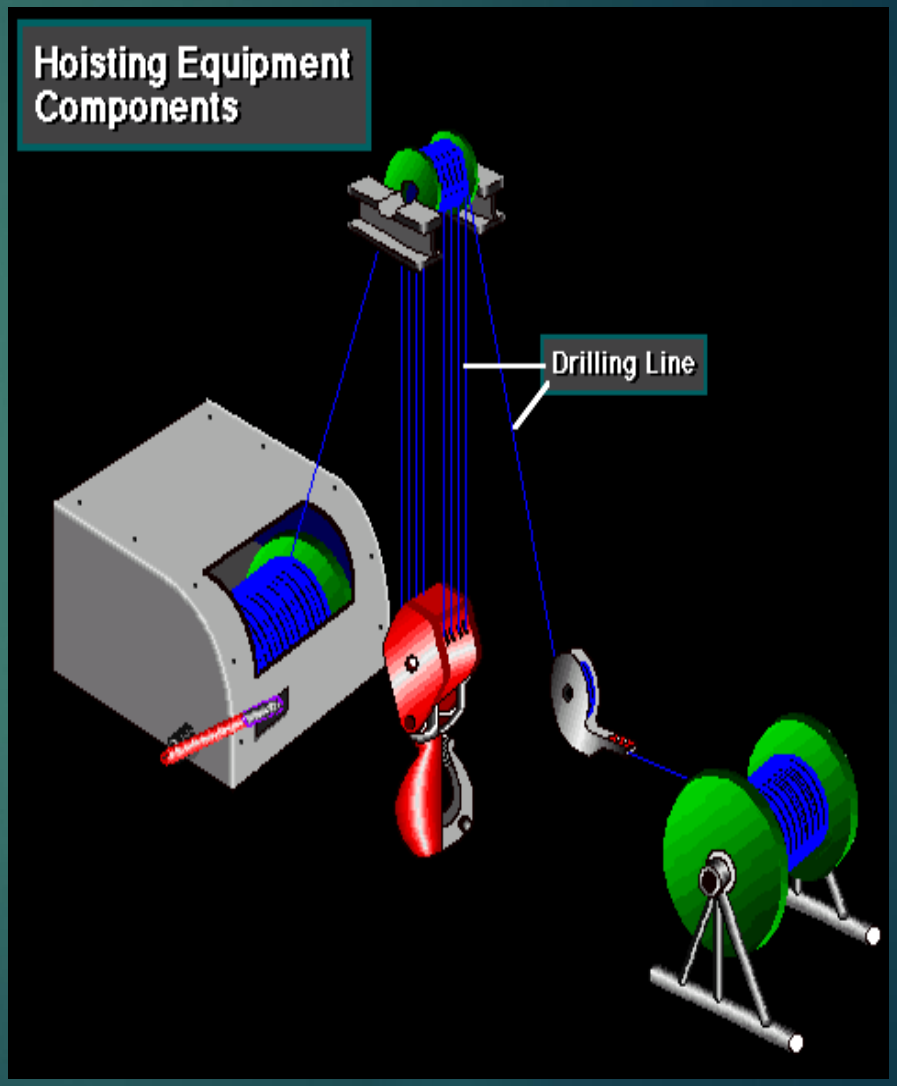
Drilling Line:

- This line affords a means of handling the loads suspended from the hook during all drilling operations.



Hoisting System

Crown Block& Crown Sheaves:

- A block located at the top of the derrick.
- It contains a number of sheaves on which is wound the ***drilling line.***
- ***The crown block provides*** a means of taking the drilling line from the hoisting drum to the travelling block. The crown block is stationary and is firmly fastened to the top of the derrick.

Hoisting System

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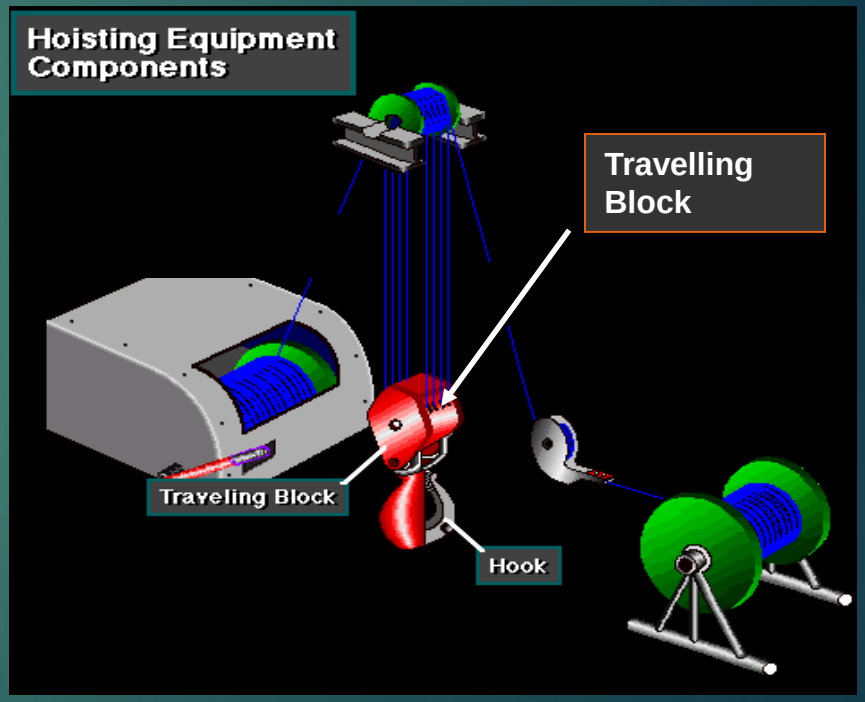
Travelling Block.

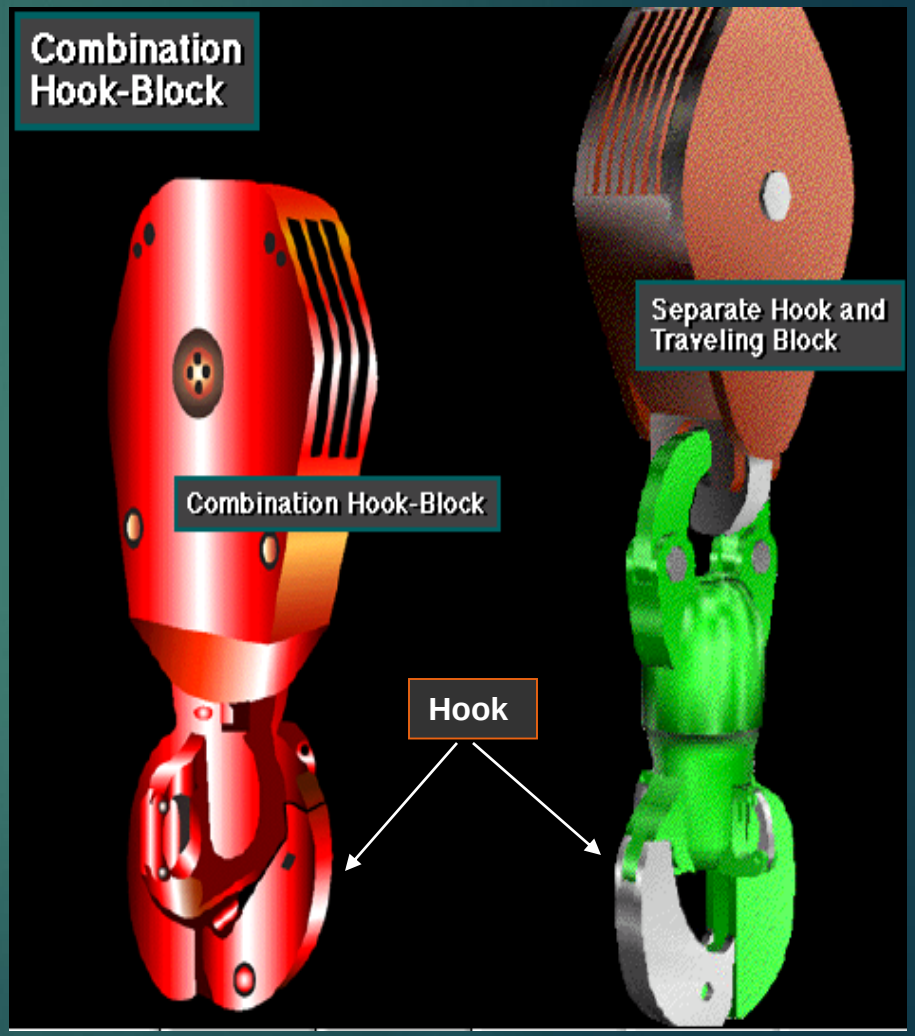
- An assembly of sheaves . It connects the drilling line to the hook and swivel .
- The combination of the crown block with the travelling block and drilling line lifts weight.



Hoisting System

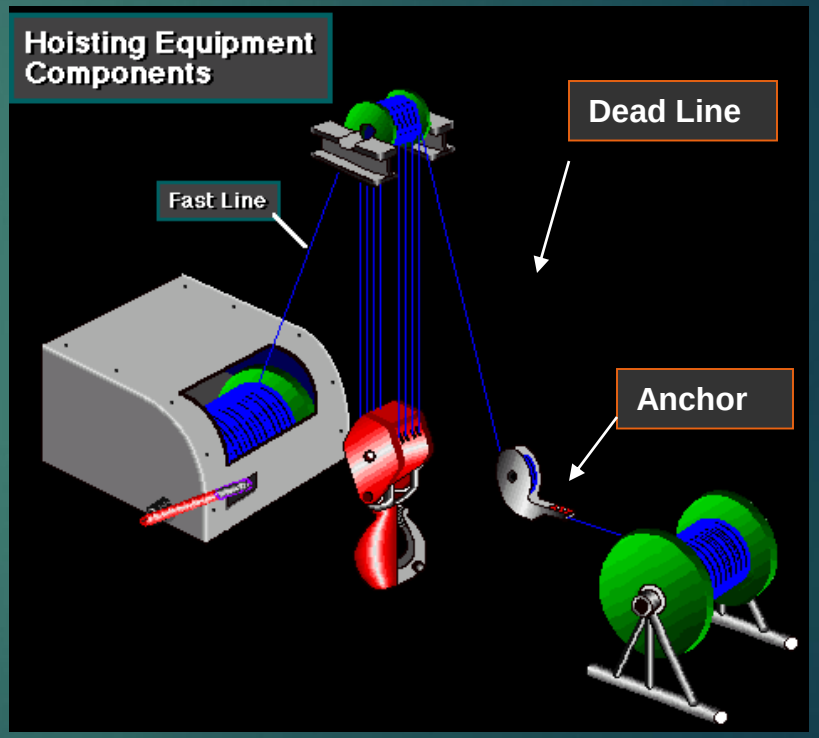
Hook :

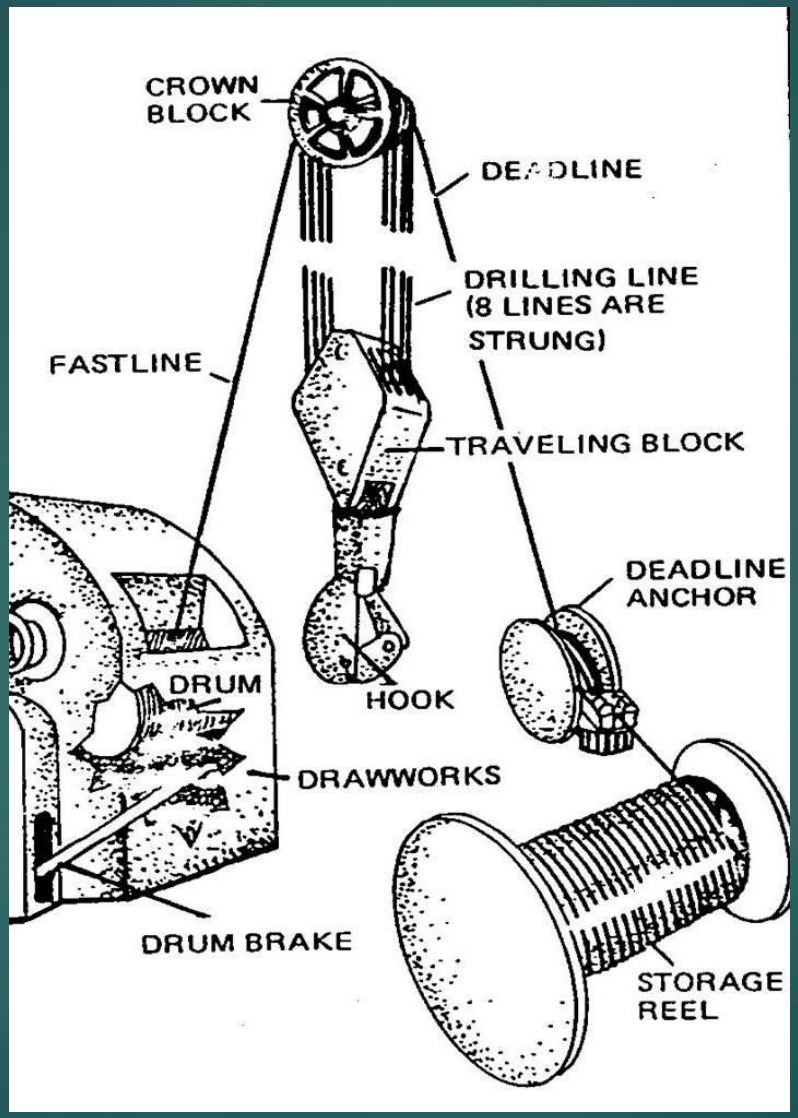
- connects the Kelly or topdrive with the travelling block. The hook carries the entire drilling load

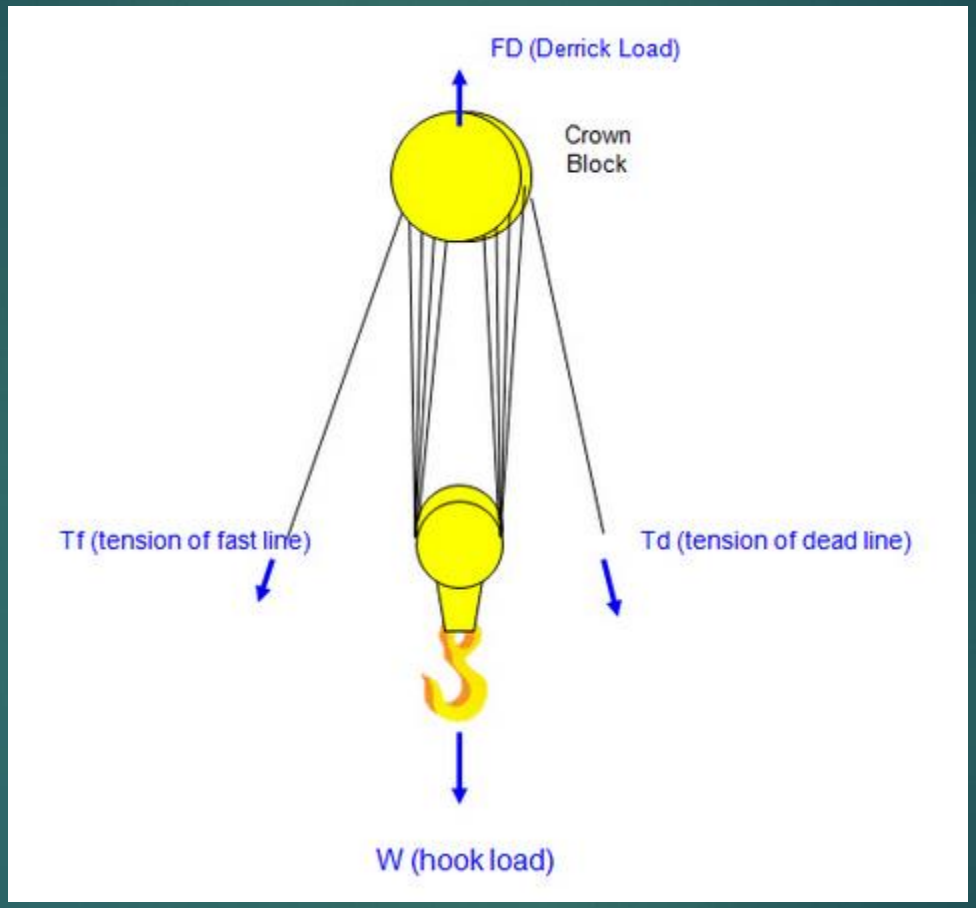


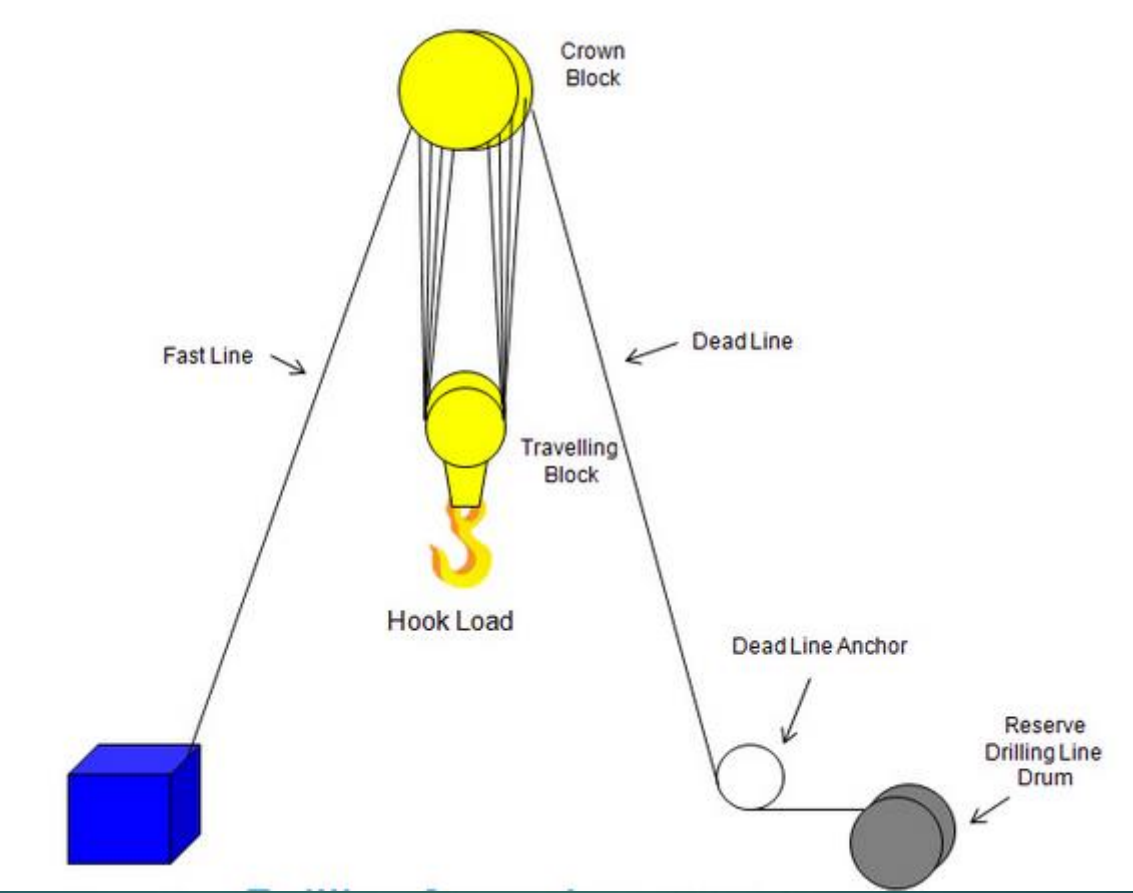
Hoisting System

The drilling line runs from the main drum up to the crown blocks (fast line) and down to the travelling blocks up again and slung several times around the crown blocks. the line goes down to the anchor in the drill floor. This section of the line is known as the “dead line”









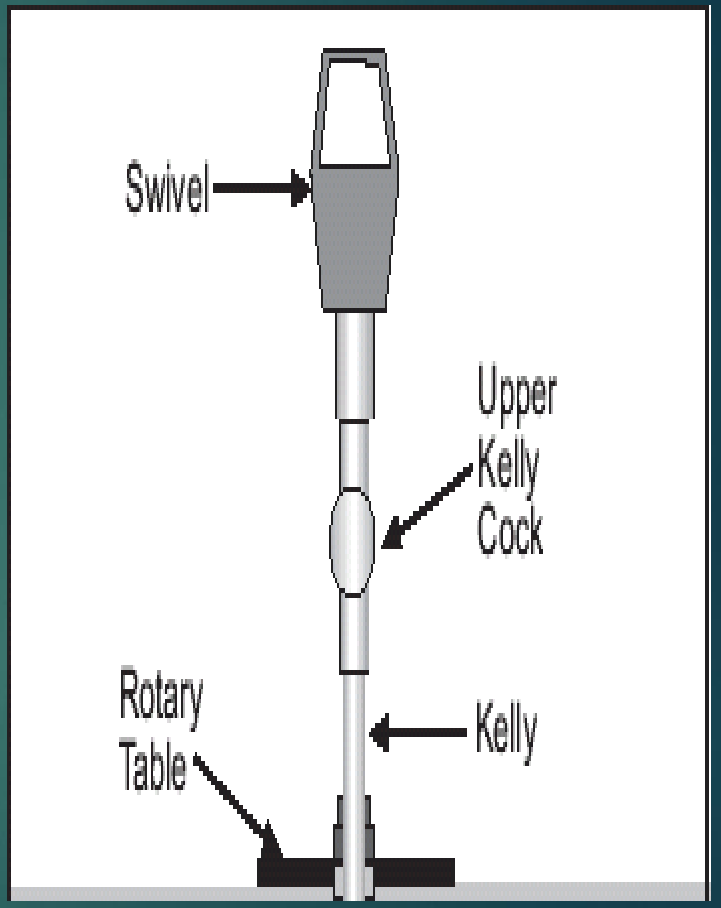
Rotating System

Rotating Equipment:

(to turn the drill stem)

It is consists of:

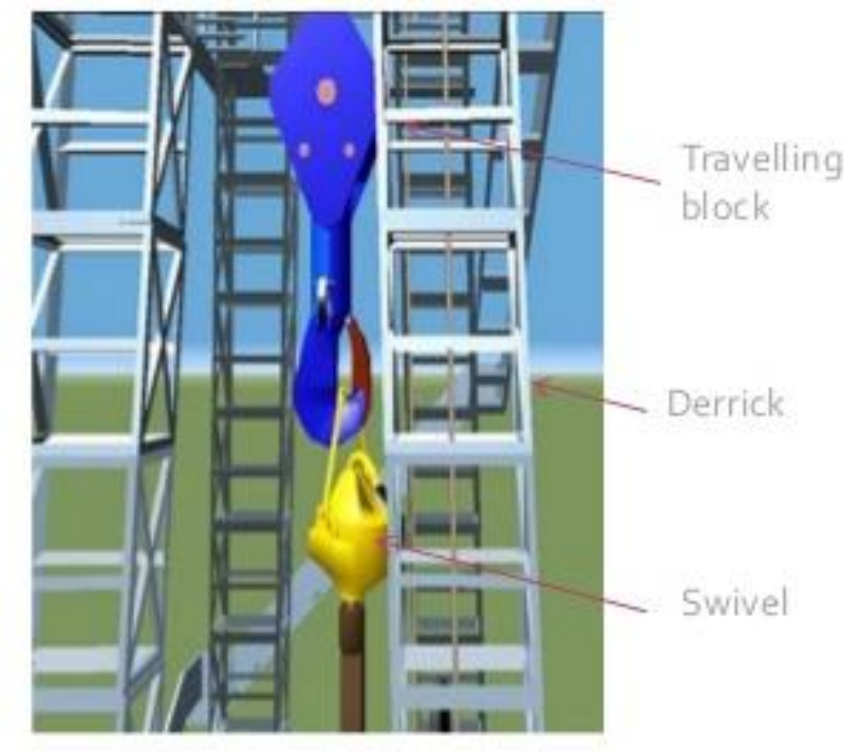
- **Swivel**
- **Kelly (kelly Bushing & Master Bushung)**
- **Rotary Table**
- **Top Drive**



Rotating System

Swivel:

- Allow the drill string to rotate.
- supporting the weight of the drill string .
- allows the passage of drilling fluid from the rotary hose into the goose neck to the drill string.



Rotating System

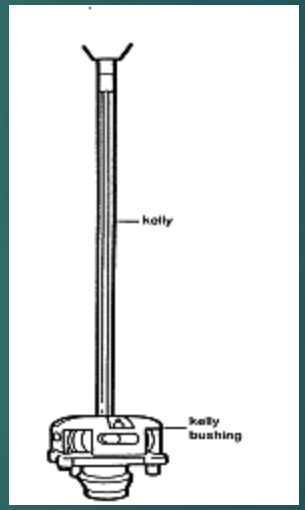
Kelly :

- It is commonly square or hexagonal.
- It is used to turn the drill string
- The kelly passes through the rotary table and transmits the table rotation to the drill string via the kelly bushing .

Rotating System

Kelly Bushing :

Device transmit the rotation from the rotary table to the kelly through the master bushing .



Rotating System

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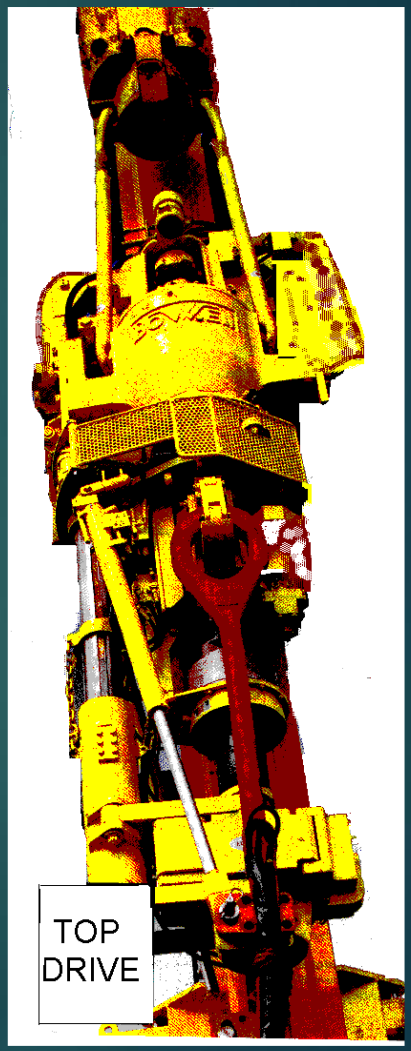
TOP DRIVE :

Replaced kelly and kelly bushing and it rotates the string as well

1. Saves time on connections and trips by allowing drilling with 3 joints at a time

2.Top drive is not removed during trips.

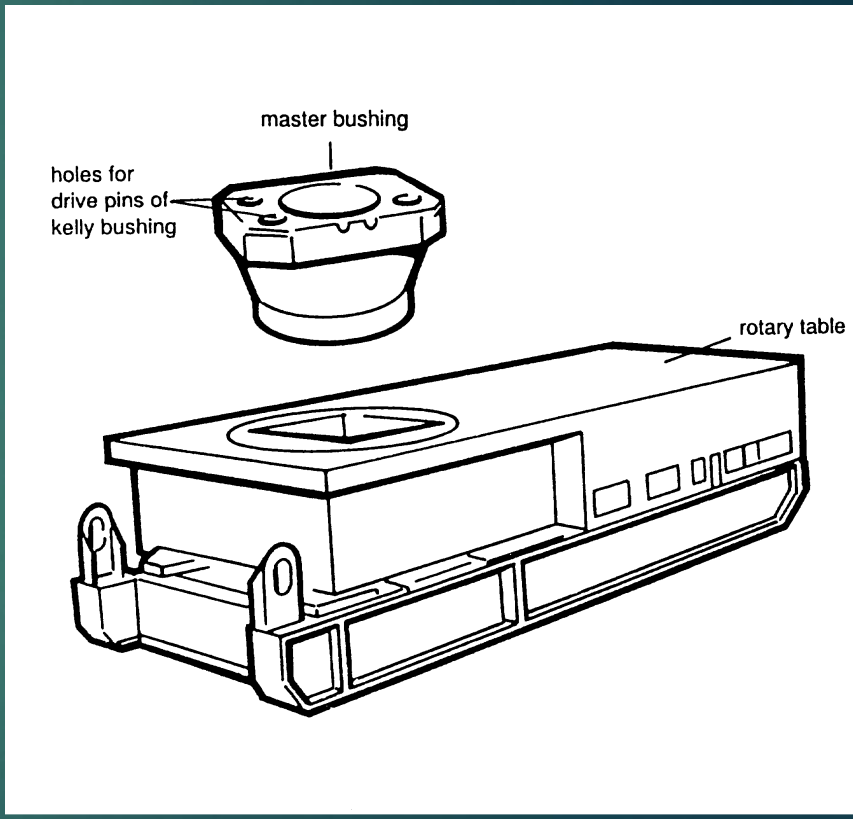
3- it can rotate the drill string while pulling it upwards.



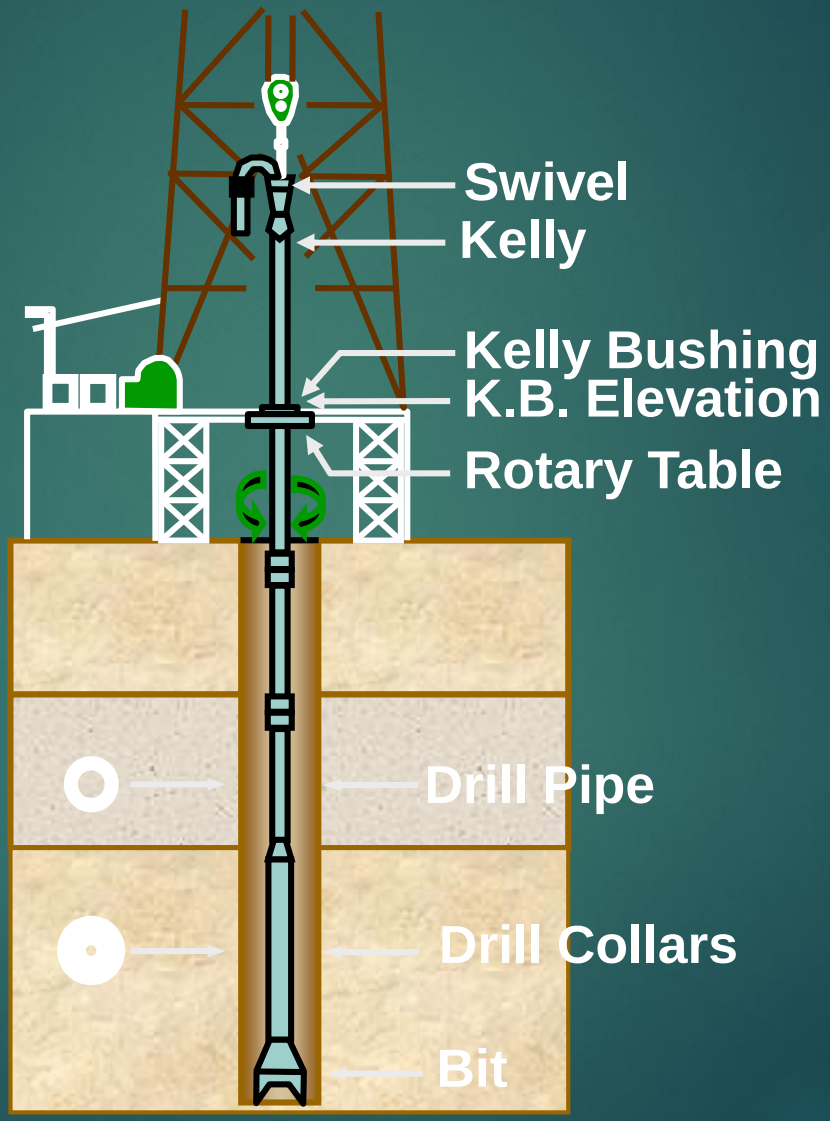
Rotating System

Rotary Table :

1.It is used in both the top drive system and the kelly system
2.The rotary table is located on the sea floor.
3. Transmits the rotation to the drill string.



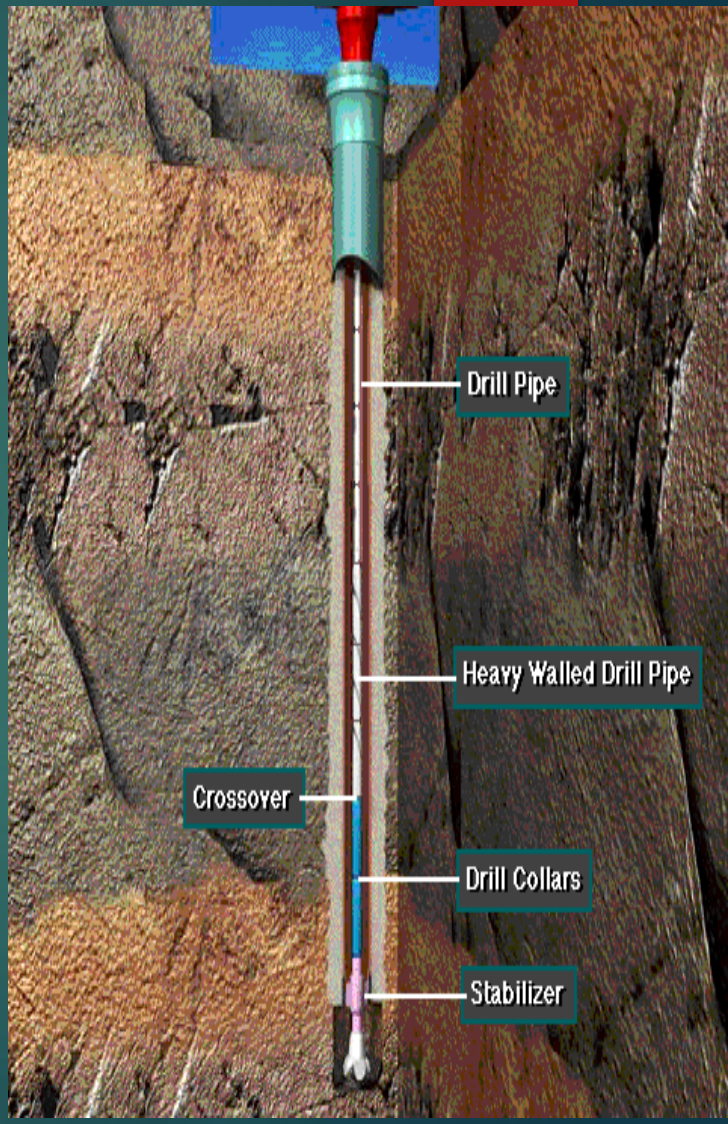
The Drill String



Drilling String Components

This term includes all the components used to drill below the kelly or top drive; and it can includethe following components:-

1- Drill Pipe & Tool Joints .
2- Heavy weight drill pipe
3- Drill Collars
4- Rotary Bits



Drilling String Components

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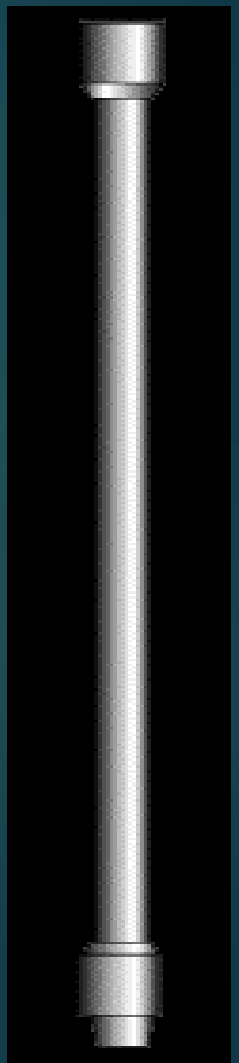
1-Drill Pipe:

- Give the necessary length for the drill string
- Drill pipe forms the upper part of the drill string .
- serves as a conduit for the drilling fluid
- Each section of drill pipe is about 30 feet (joint). Each end of each joint is threaded. The interior threads is known as (box), and exterior threads is called (pin)



Drilling String Components

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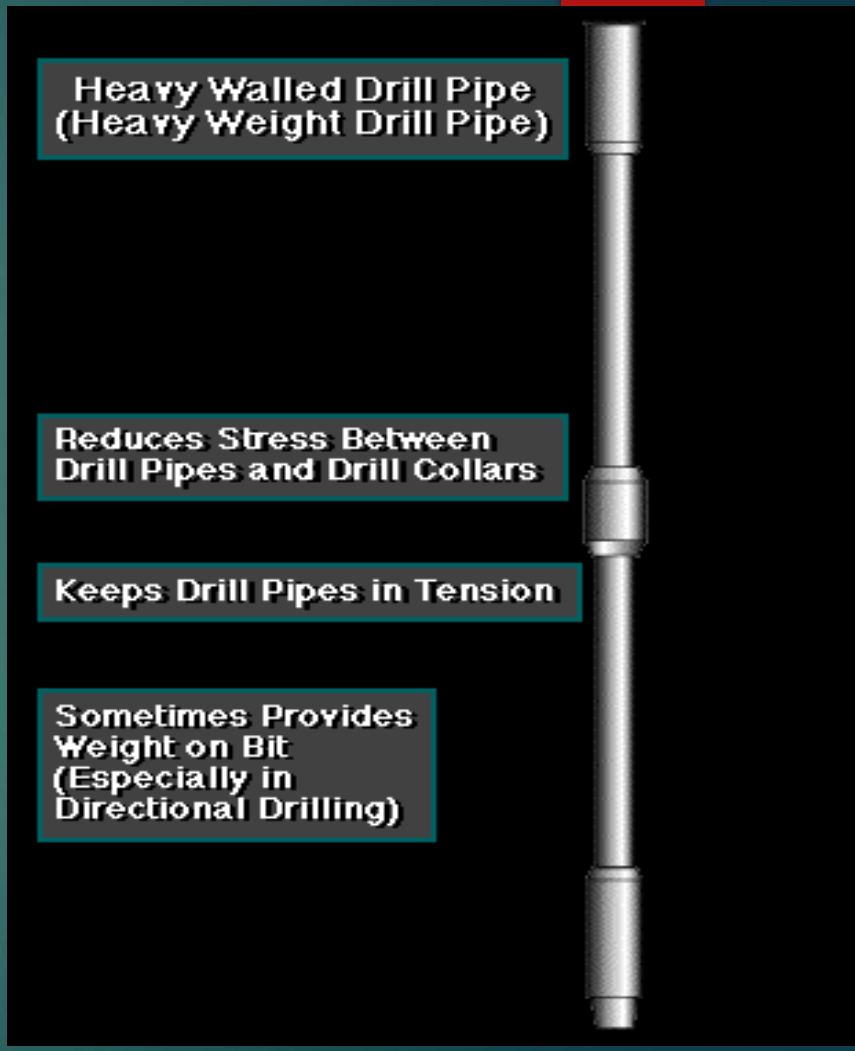
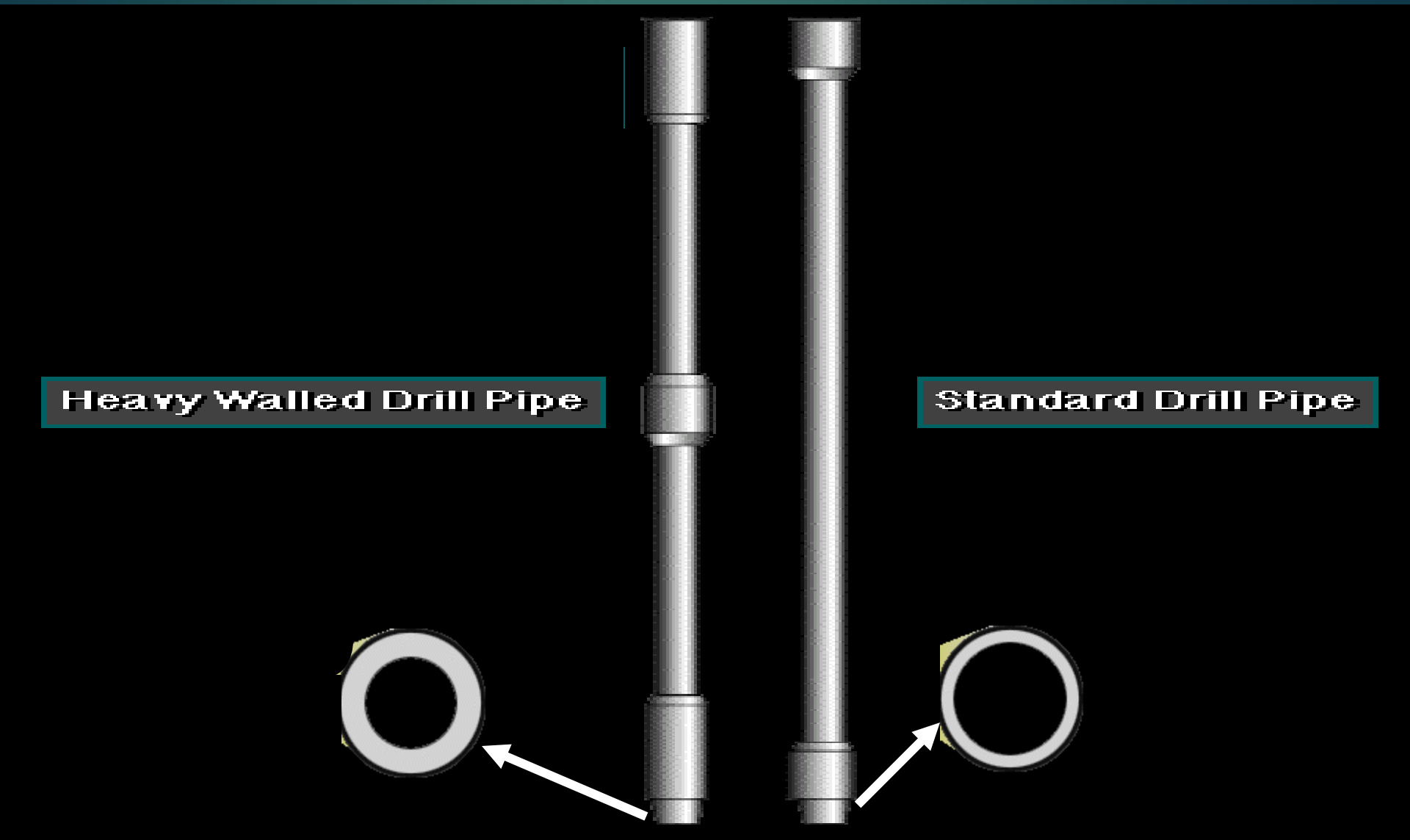
2-HEAVY WEIGHT DRILL PIPE (HWDP)

- This is the same as a drill pipe but with a smaller inner diameter and longer tool joints.
- It is inserted as a section between the drill pipe drill and drill collars, this gives the drill string the required elasticity.



Difference between drill pipe and heavy weight drill pipe



Drilling String Components

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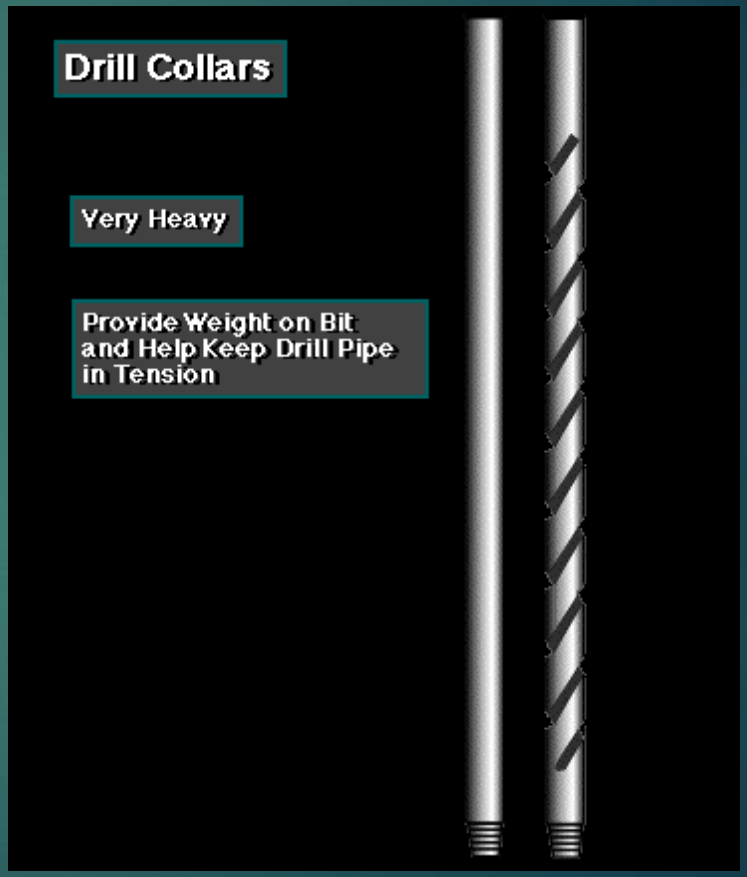
3-Drill Collars:

- These are heavy walled, spiral and large outer diameter steel tubes.

1- Their function is to supply the desired weight on bit

2- allow the lighter drill pipe to remain in tension.

3- The spiral grooves helps the drilling fluid to flow up the annulus in case of tight hole.



Drilling String Components

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4- Drill Bits:

Drilling String Components

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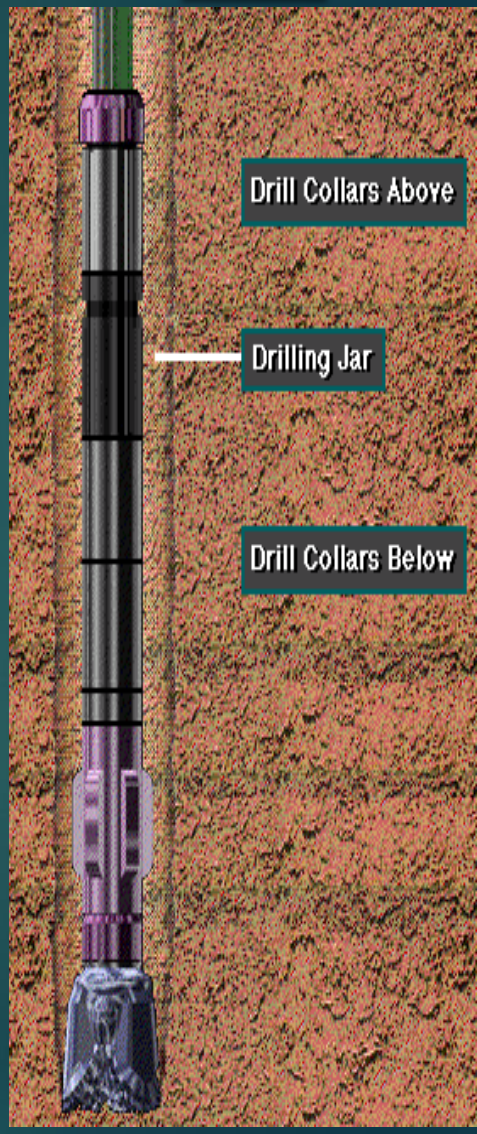
Jars: If the drill string becoming stuck. They provide upward or downward jarring blows help freeing the string.

Monel: This is a non-magnetic drill collar used to contain the magnetic survey tools

Stabilizers:

Of a blade type construction. Drilling fluid can pass freely between the blades while the outer edge of the blades contacts the wall of the hole and holds the drill collars firmly centered in the hole. They do exactly as their name implies, they provide stability to the bit and collars.



Drilling String Components

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Subs : A sub refers to any short Length of pipe, collar or casing used to perform a specific job The most common types of subs are :

a. Crossover Sub: Had different threaded ends for changes between different sizes and types of drill pipe or collars

b. Bit Sub: used to save the thread of the bit from excessive break out such as to change nozzles or BHA .

Rig Personnel

-Company Man: The operator representative usually a drilling engineer employed by the oil company engaged in drilling
-Tool Pusher: A drilling foreman or rig superintendent.

-As-Driller : Charge of the "brake" responsible for making hole .
sistant Driller: Assists driller in "making hole" and general jobs around the rig.

-Derrick Man: Responsible for stacking pipe in derrick during trips, Assist mud engineer to mix mud.
-Roughnecks/ Floor hands: Workers under supervision of the driller.

-Rig Mechanic : Controls maintenance of rig.
-Motorman Rig Electrician Rig Welder: Keep the motors running.

-Mud Engineer: Controls properties of drilling fluid .
-Mud Loggers : Produce mud log of the well. Responsible for detecting changes in volume of surface mud, changes of drilling parameters and the presence of hydrocarbons.

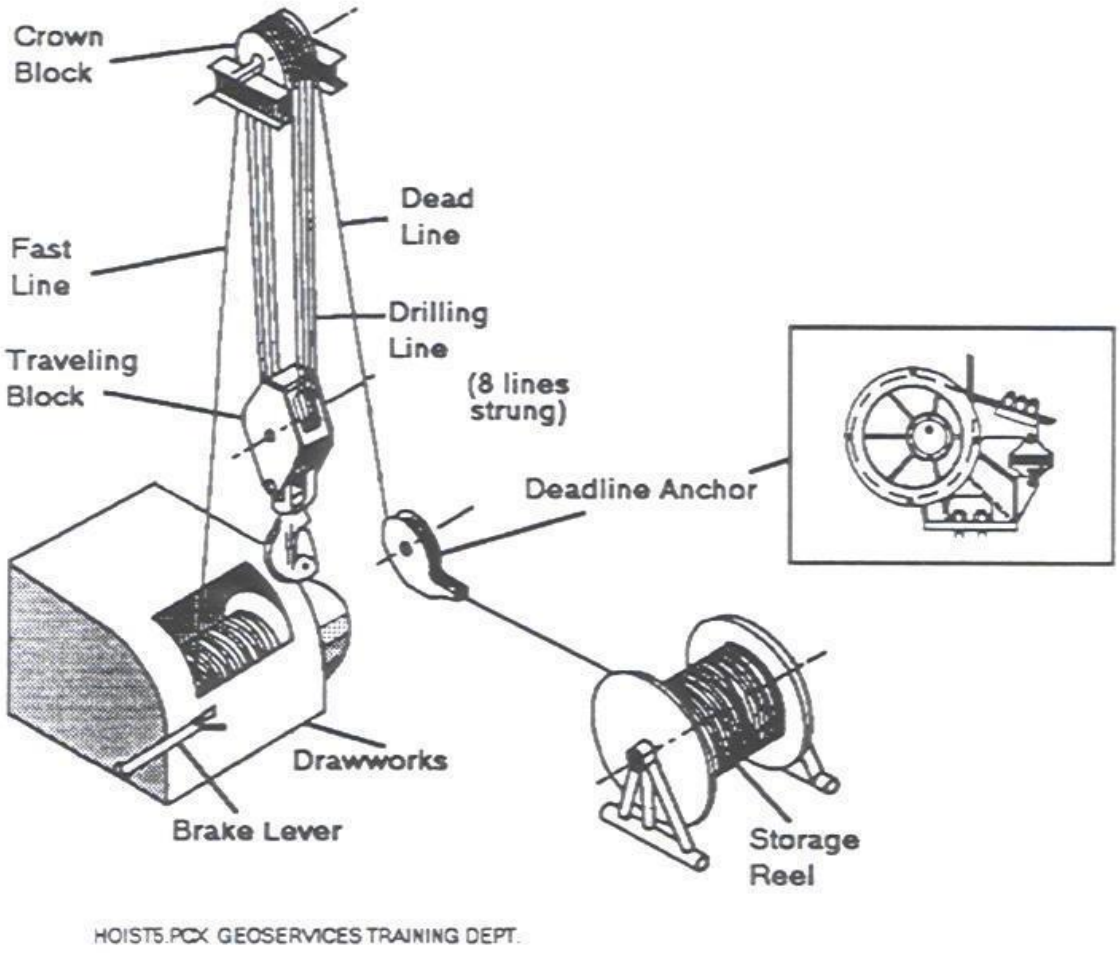

Figure III-15 Hoisting Equipment Used on Rotary Drilling Rigs

Circulation System

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