Petroleum Production Technology
module2: Drilling Operation
Lecture:5

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Controlling System:

- The **Well Control System** or the **Blowout Prevention System** on a drilling rig is the system that prevents the uncontrolled release of high-pressure fluids (oil, gas, or salt water) from subsurface formations.

- These uncontrolled releases of formation fluids are referred to as **Blowouts**. Due to the explosive nature of oil and gas, any spark on the surface can result in the ignition of the fluids and an explosion on the rig.

- An explosive blowout and the failure of the **Well Control System** were the causes of the **Mocondo Well** disaster that killed eleven of the rig crew on the Deep Water Horizon Rig on April 20, 2010 and resulted in 35,000 to 60,000 bbl/day of crude oil to spill into the Gulf of Mexico.

- To prevent such hazardous situation a controiling element known as blowout preventer is used is an oil rig.

- Before blowout the invasion of formation fluid is known as well kick. There are various surface indication of a well kick. If kick is not controlled, it turns into blowout of the well

- The blowout preventers are the principal piece of equipment in the well control system and are operated hydraulically.
- pressurized fluids are used to operate pistons and cylinders to open or close the valves on the BOP.
- The **Accumulators** are used to store pressurized, non-explosive gas and pressurized hydraulic fluid to run the hydraulics systems on the rig.
- The accumulators store enough compressed energy to operate the blowout preventers even if the Power System of the rig is not operating.
- The blowout preventer is a large system of valves each of which is capable of isolating the subsurface of the well from the rig to provide control over the well.
- These valves are typically stacked as shown in the **Fig.**

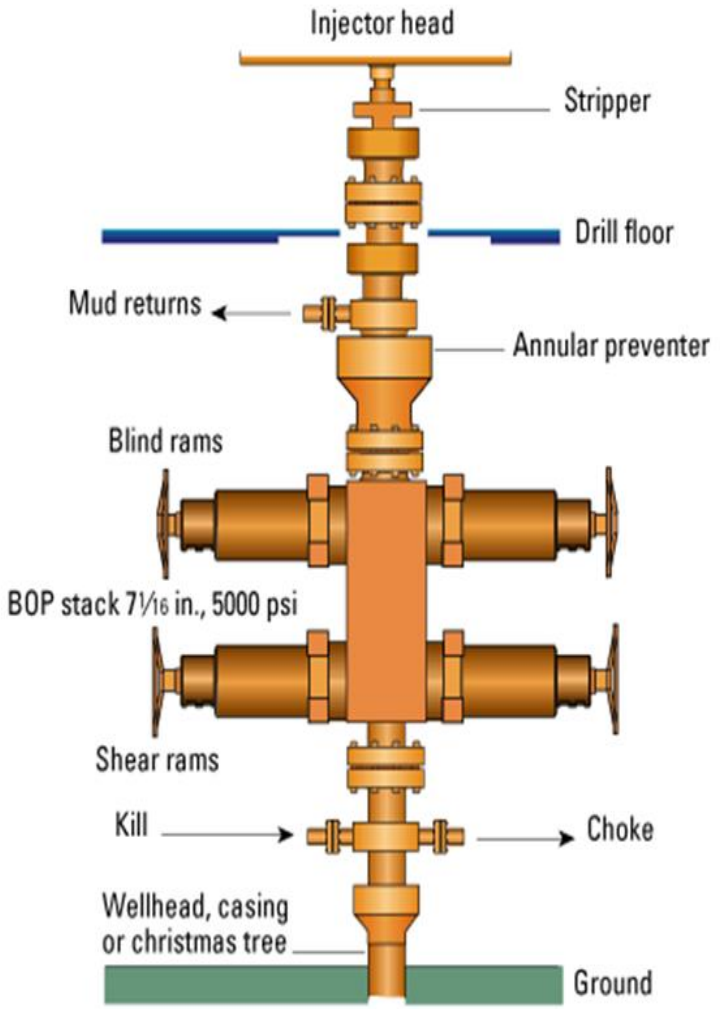

Fig: Blowout Preventer

BOPs are basically of two types:

- Annular preventer
- Ram preventer

Annular Preventer:

- The annular preventer is used to prevent flow through the annular space between the drill string or casing and the annular preventer.

- The annular preventer can also be used for non-cylindrical pipe, such as the kelly, or open hole.

- The annular preventer consists of a doughnut shaped bladder that when in the open position allows the drill pipe to rotate but in the closed position seals the annulus.

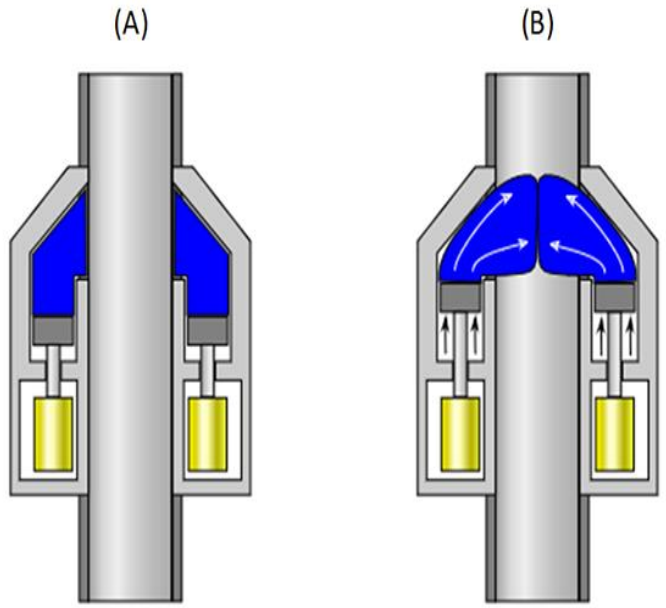

Fig: Annular Preventer; A-opening position B-closing position

Ram Preventer:

- **Blind rams** isolate both the pipe and the annular space by crushing the pipe and it pinching-off when closed.
- **Shear rams** isolate both the pipe and the annular space by shearing-off the pipe when closed.
- **Blind shear rams** isolate both the pipe and the annular space by shearing-off and crushing the pipe when closed.
- **Pipe rams** isolate the annular space by wrapping around the pipe when closed.

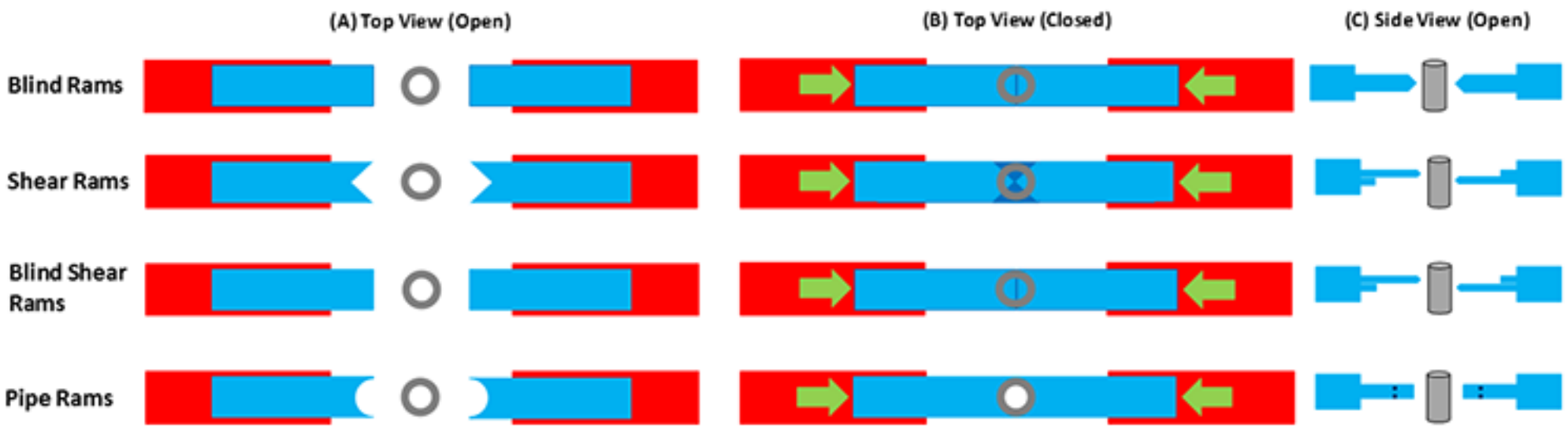

Fig: Different types of ram preventers


Thank
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