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A background image showing a long line of yellow mining trucks parked in a row, receding into the distance. The trucks are large, heavy-duty vehicles with high chassis and large tires. The scene is set in an open, possibly mining or construction area, with a light-colored ground.

IIT(BHU) VARANASI

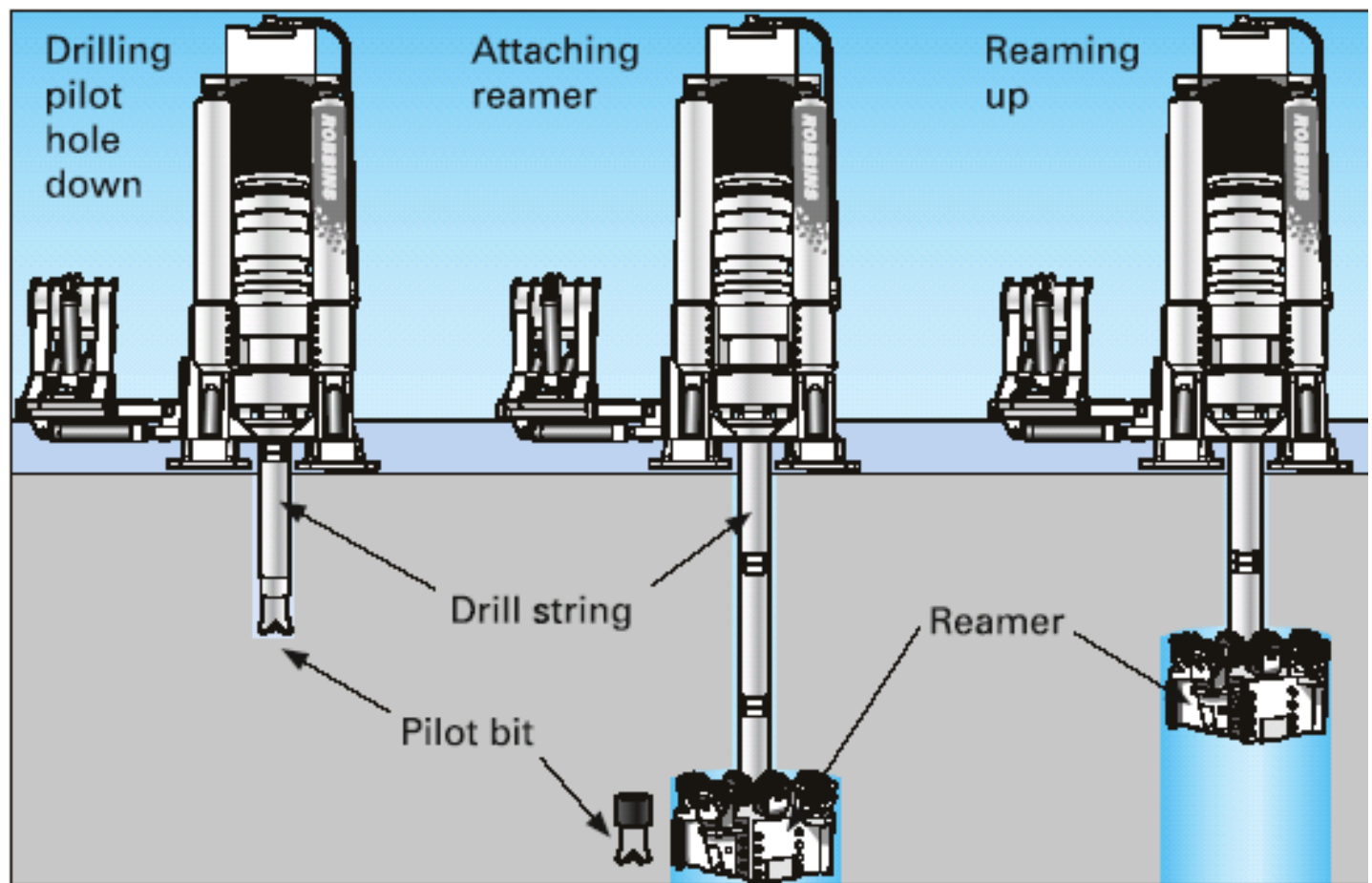
STUDENTS' NOTES

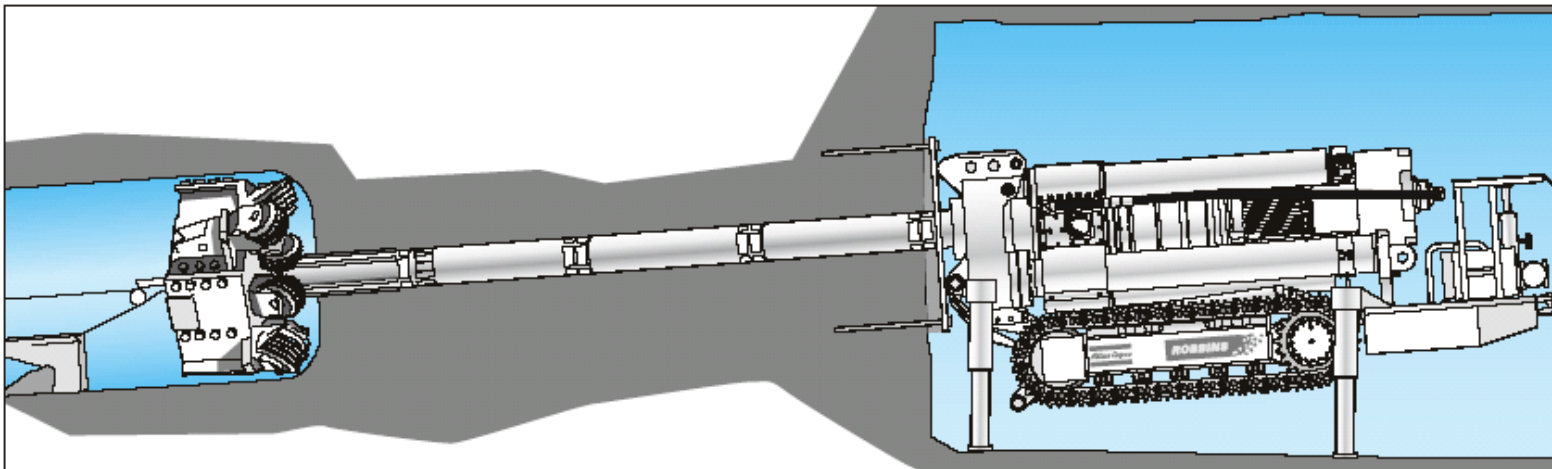
**UNDERGROUND METALLIFEROUS
MINING**

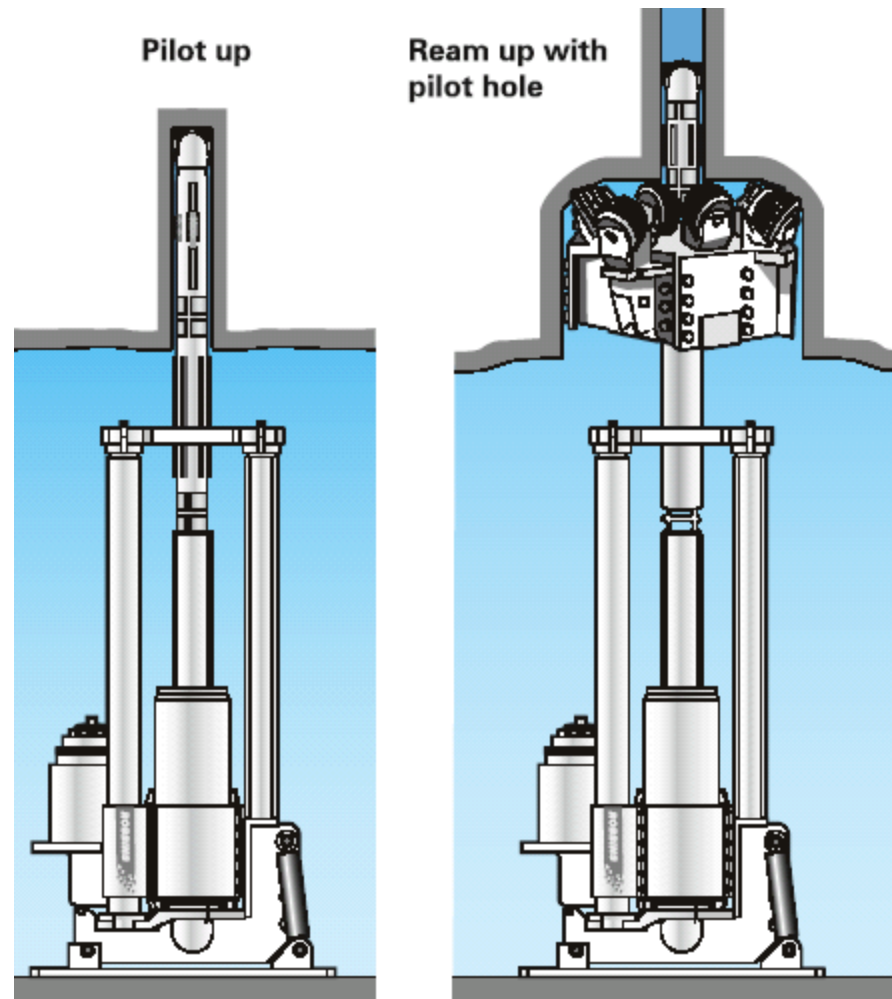
TOPIC-RAISE BORING MACHINE

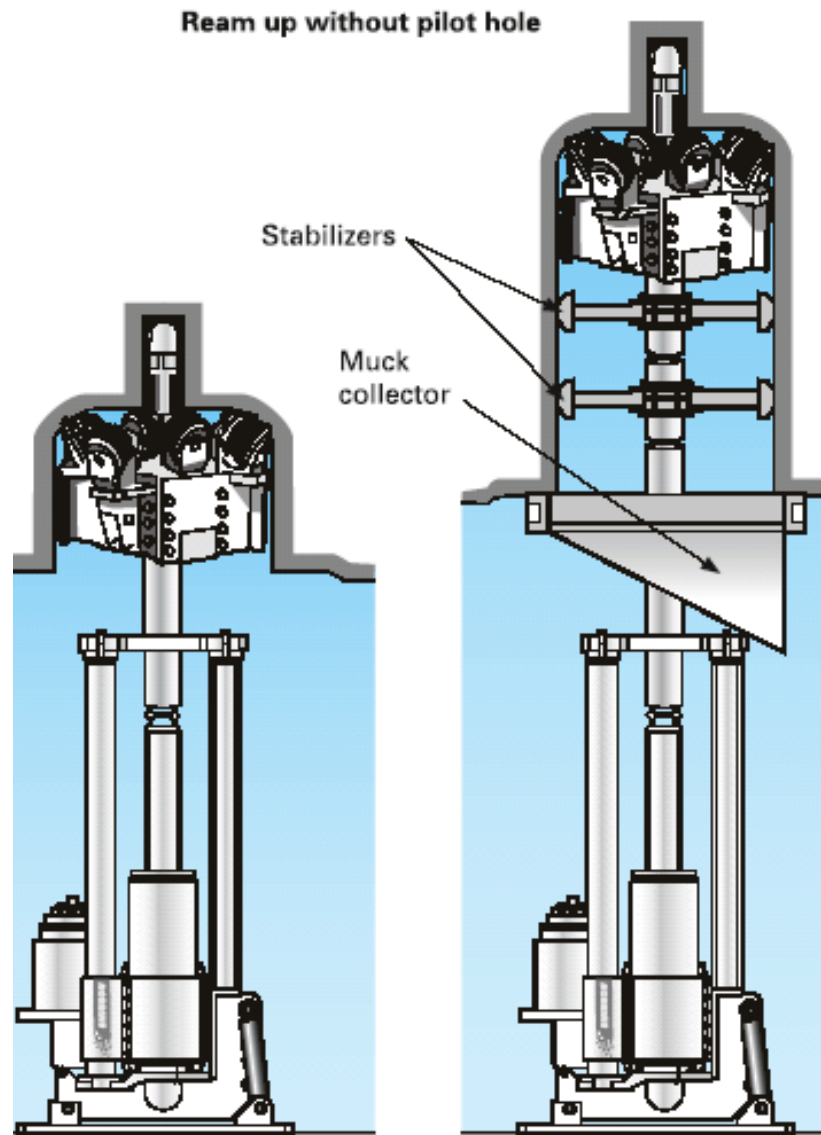
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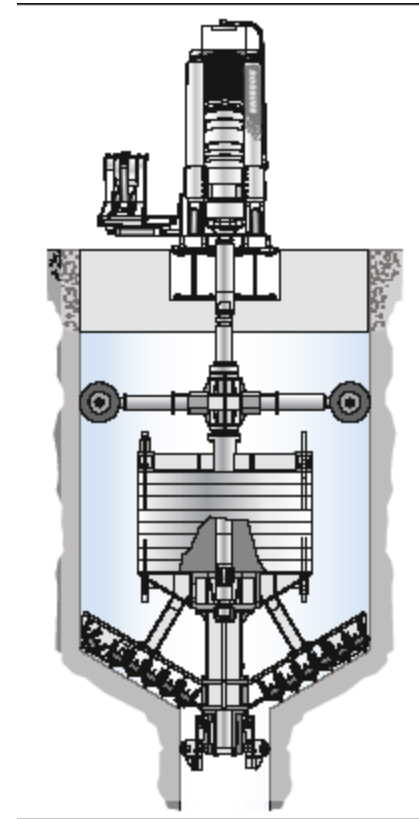
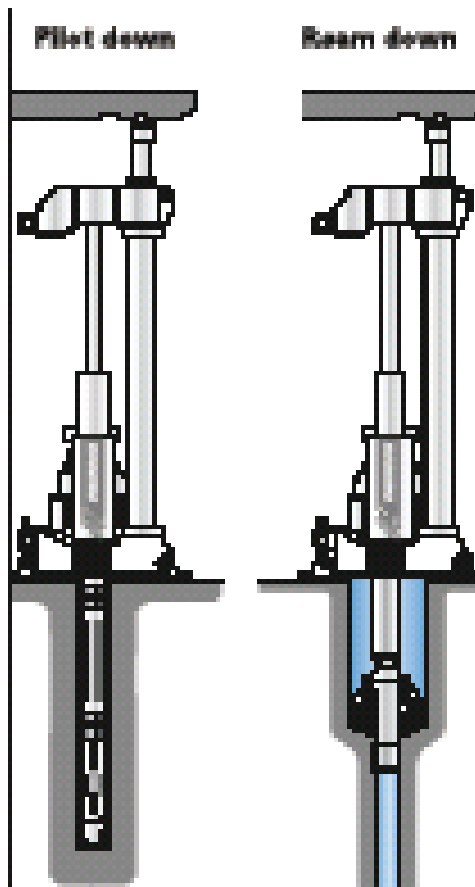


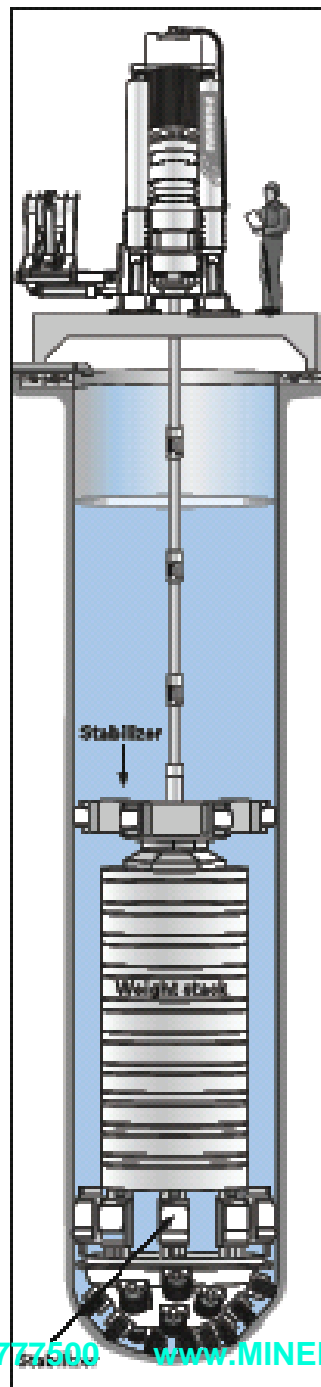














The raiseboring machine

Derrick assembly

The derrick assembly supplies the rotational and thrust forces necessary to turn the pilot bit and reamer as well as to raise and lower the drill string. This assembly consists of several major components. These are:

base plates

Mainframe

Columns

Headframe

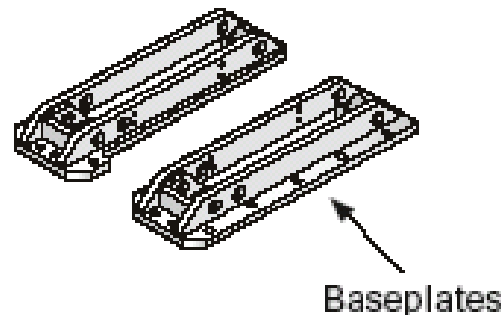
hydraulic cylinders

Drive train assembly

Base plates

The base plates, left-hand and righthand, provide the structure for supporting the weight of the derrick assembly as well as for positively transferring the forces required for raiseboring into the derrick mounting system.

The base plates are normally set on a level concrete foundation pad and anchored by rock bolts passing through the pad into the rock formation below. In some instances, the base plates are mounted to a steel beam system, which in turn is secured to concrete foundation pads and the rock formation.

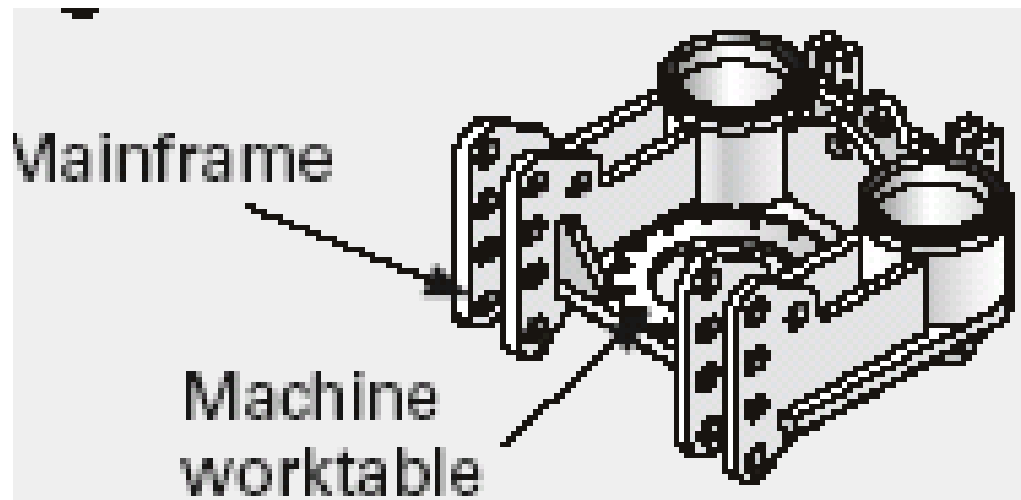
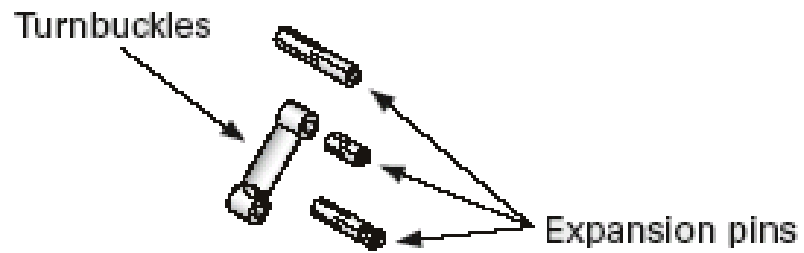


Mainframe

The mainframe is the major load bearing structure of the derrick assembly.

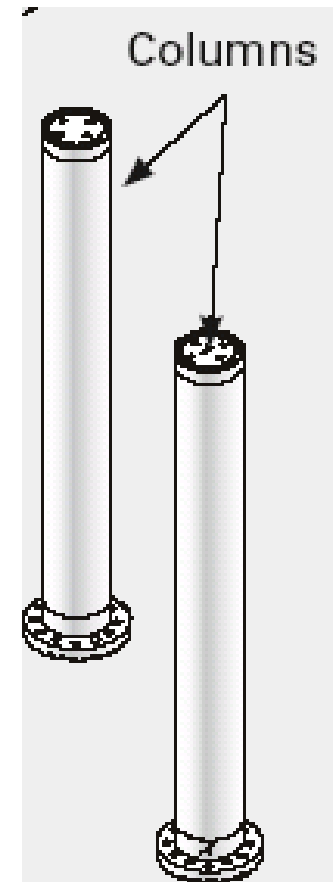
The mainframe is equipped with a worktable. This is designed with a hollow centre to allow passage of drill string components from the drive train assembly into the pilot hole.

The plane of the worktable top surface remains perpendicular to the axis of the drill string at all dip angles.



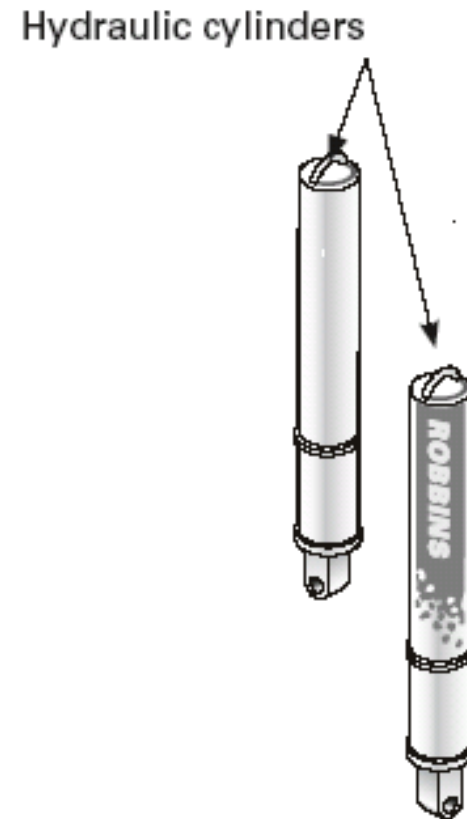
Columns

Chrome plated cylindrical columns provide torque transfer from the drive train assembly into the mainframe. These columns are connected at their bottom to the mainframe, and at their top to the headframe.



hydraulic cylinders

The hydraulic cylinders supply the thrust required for raising and lowering the drill string in relation to the raise boring machine. These same cylinders also supply the thrust necessary for both pilot hole drilling and raise reaming. Extra thrust capacity is often provided in the design of these cylinders to deal with special circumstances.



Drive train assembly

The drive train assembly supplies to the drill string and cutting components the rotational power necessary for raise boring. General descriptions of the three major components making up the drive train assembly are given below. These are:

- crosshead
- main drive motor
- gearbox

hydraulic system assembly

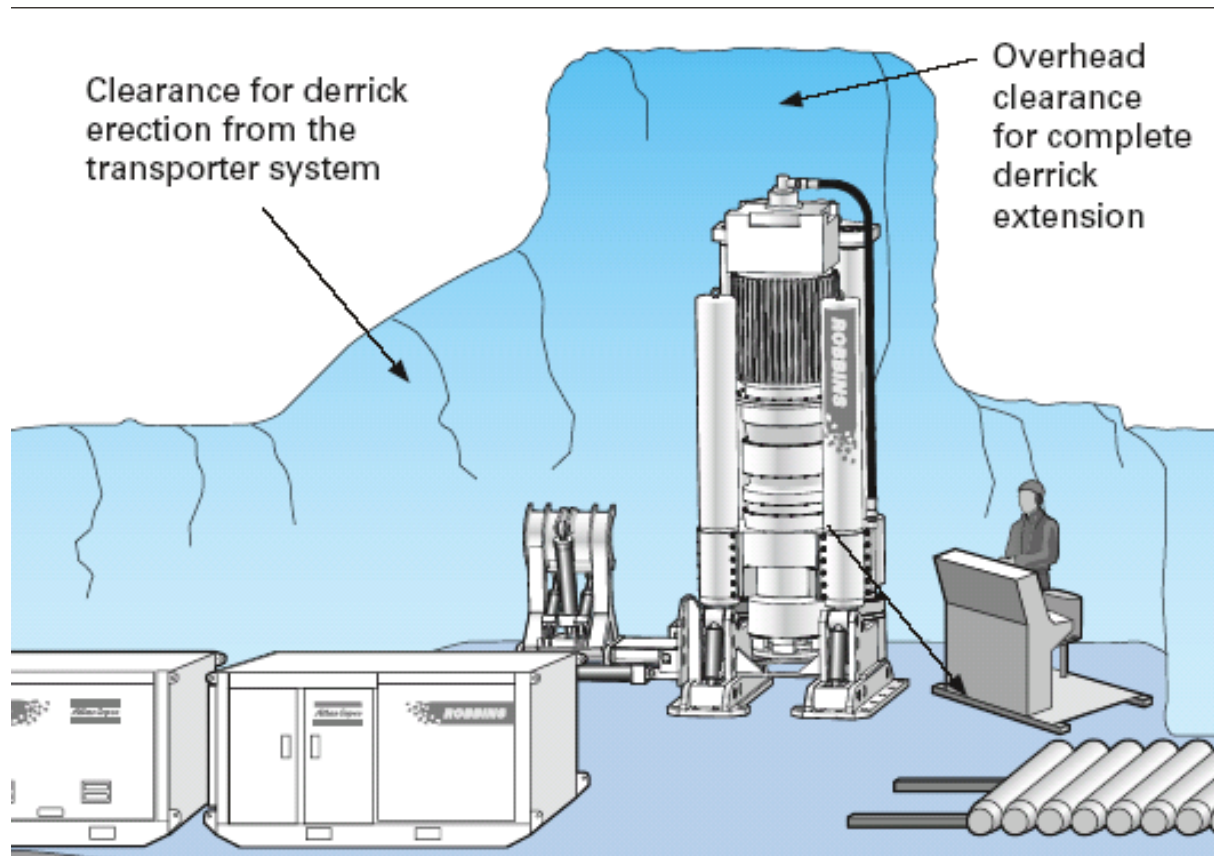
- The hydraulic system supplies hydraulic power for raiseboring. This assembly comprises the hydraulic power unit and all interconnecting hose assemblies.


The hydraulic power unit is on a skid-mounted structure containing a hydraulic reservoir. These are used as mounting platforms for the majority of the components making up the hydraulic system.





Site preparation



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- Correct site preparation eliminates major delays and adds noticeable efficiencies to the raiseboring operation.
 - The site planner needs to know the geology and layout of the hole so that a correct design can be evolved for the areas at both top and bottom.
 - It is necessary to have good access to both positions, and sufficient manoeuvring room for tube changing at the top and clearing away muck at the bottom.
 - Consideration also has to be given to the routes along which all of the equipment will pass. A well thought-out site will be of benefit to the operators, both in time and money.

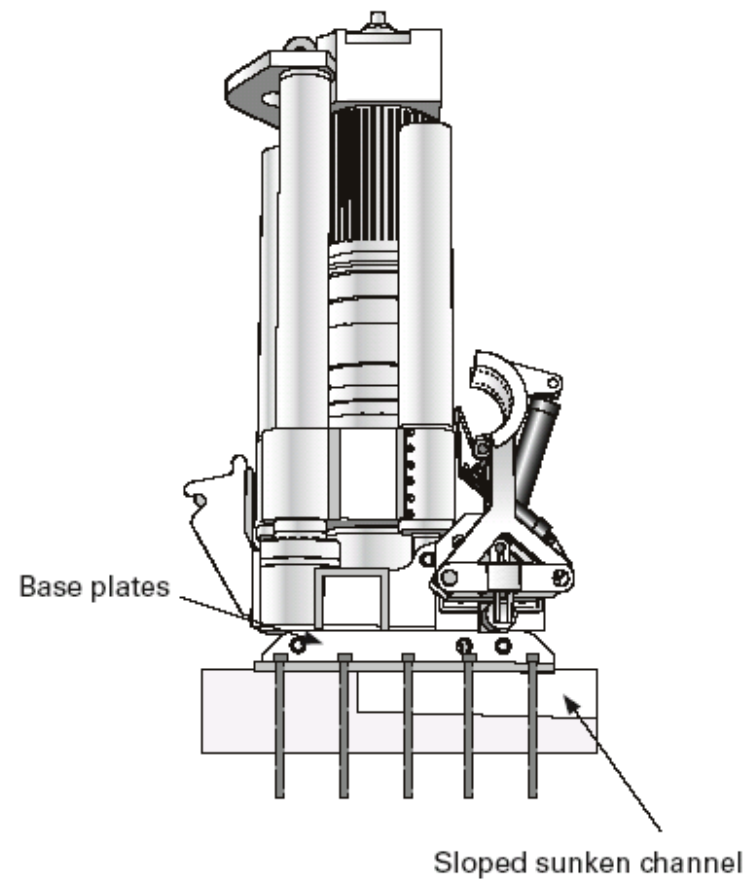
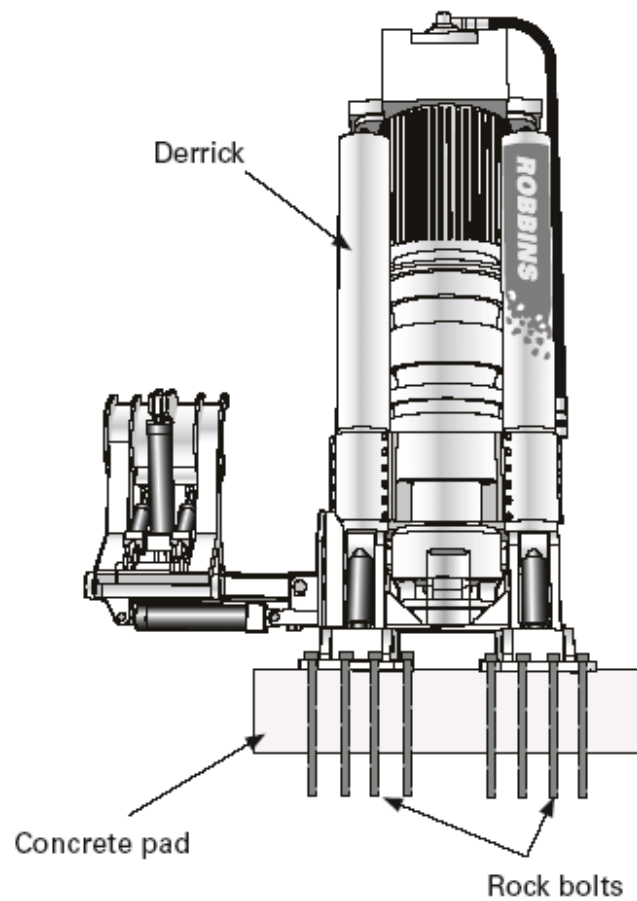


Site planning considerations include:

- derrick mounting systems
- fluid selection
- fluid and cuttings discharge
- storage and positioning of drill string components
- overhead clearances
- floor space and equipment positioning
- compressed air
- water
- electrical power
- lighting
- telephones
- ventilation

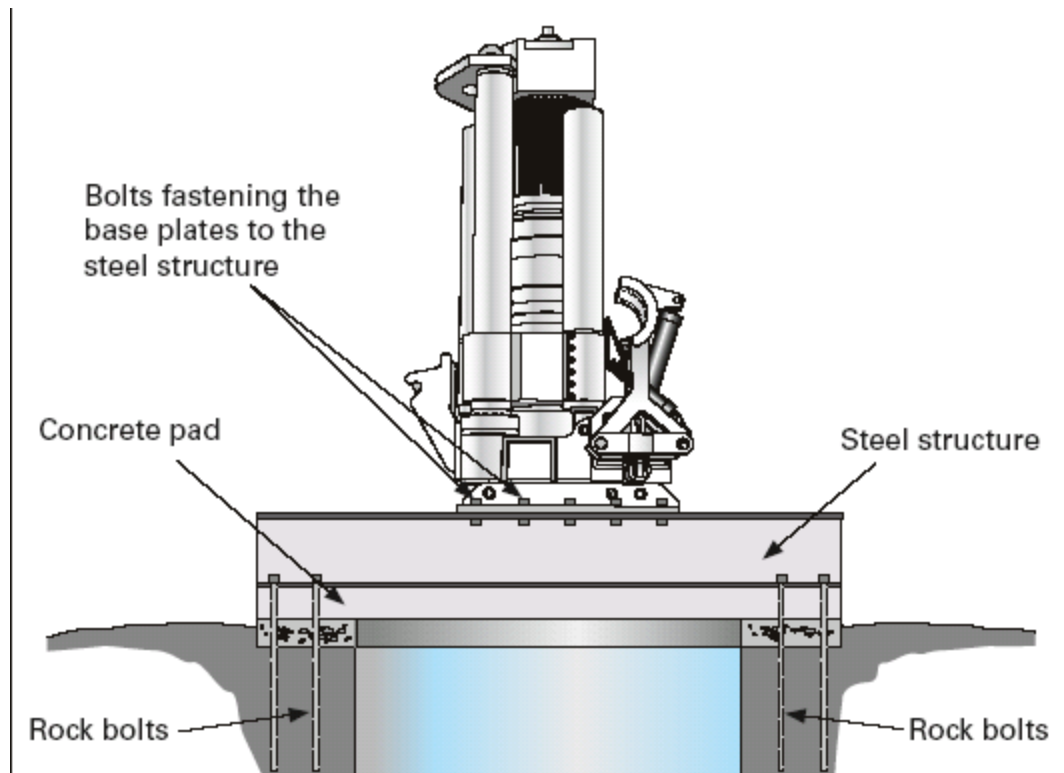
Design considerations for concrete pad mounting systems include

1. The surface area of the concrete pad must be significantly larger than the raise final diameter.
2. It is extremely important that the concrete pad be poured to solid bedrock to ensure the best foundation possible.
3. The concrete pad must be of sufficient quality and thickness to positively react the maximum load transmitted into the pad from the derrick during the raiseboring operation.
4. The horizontal base plate mounting surfaces of the concrete pad must be designed to accommodate the dimensions, spacing, and hole pattern of the base plates.




Steel beam mounting

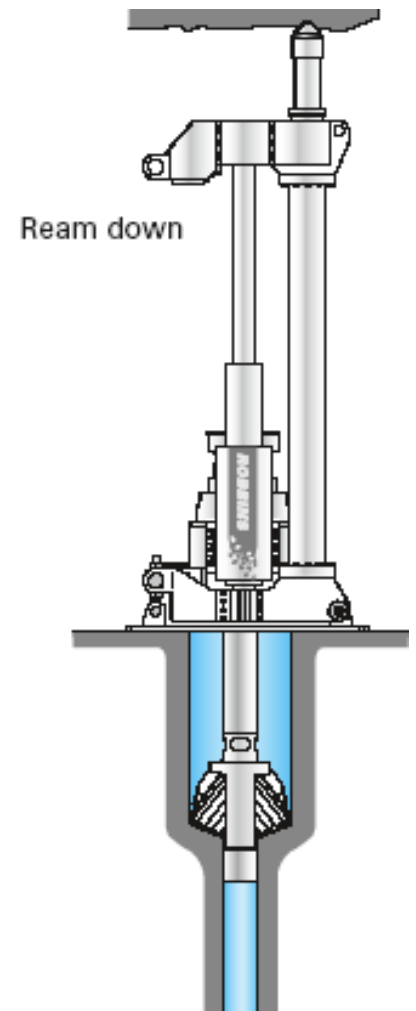
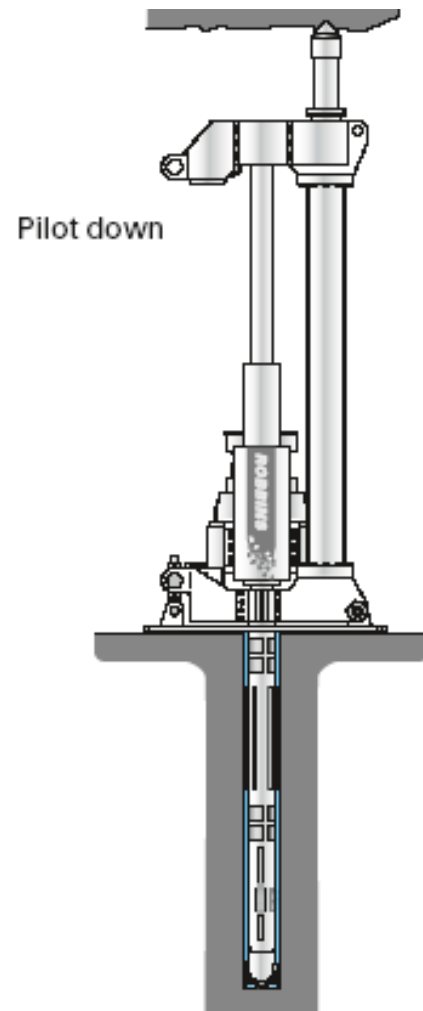
With the steel beam mounting system, the base plates are secured to a steel structure, which can be bolted to a concrete pad or directly to the invert rock, or to reinforced concrete pads at opposite ends of a sunken pit. Advantages of steel beam mounting systems include:

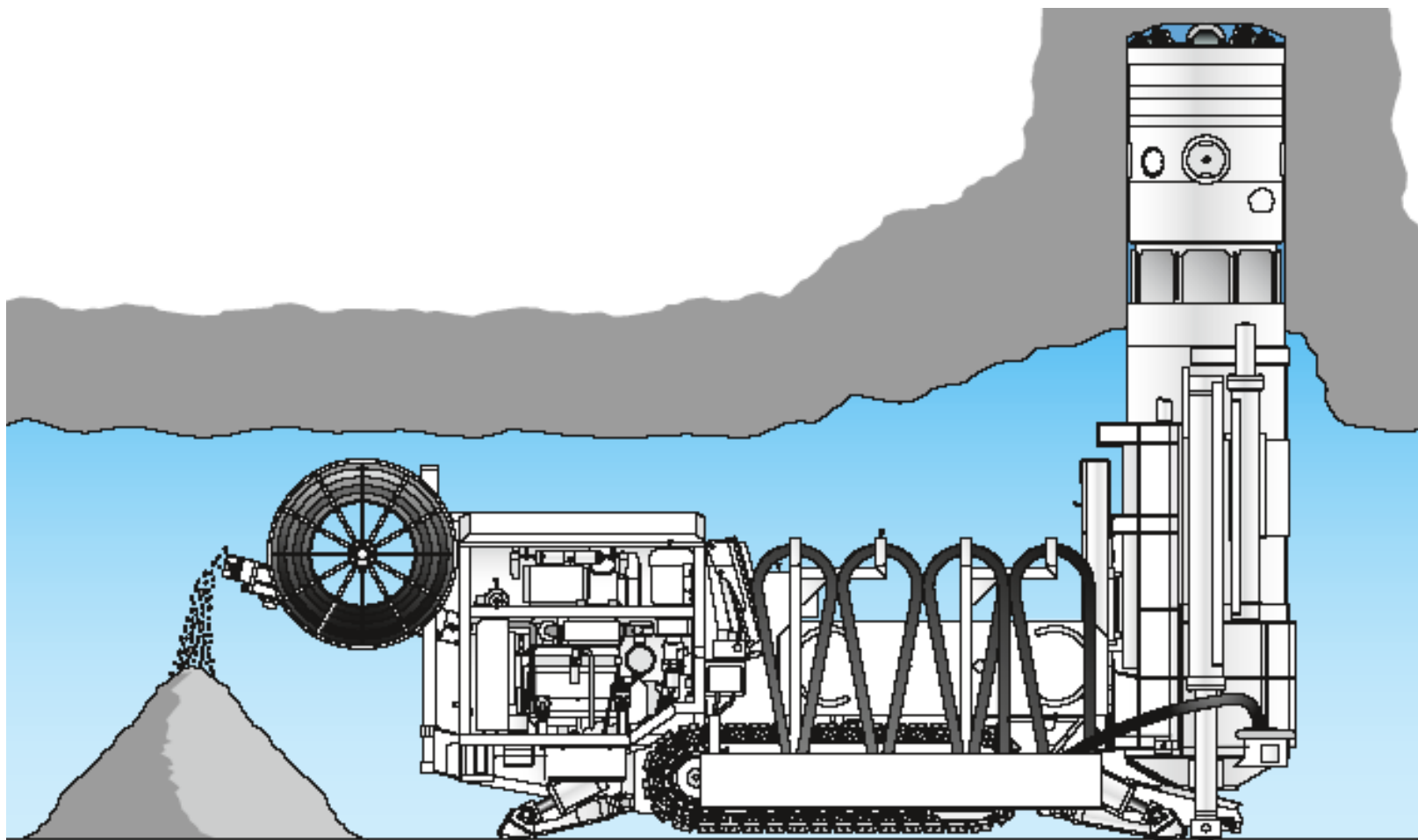


Down reaming

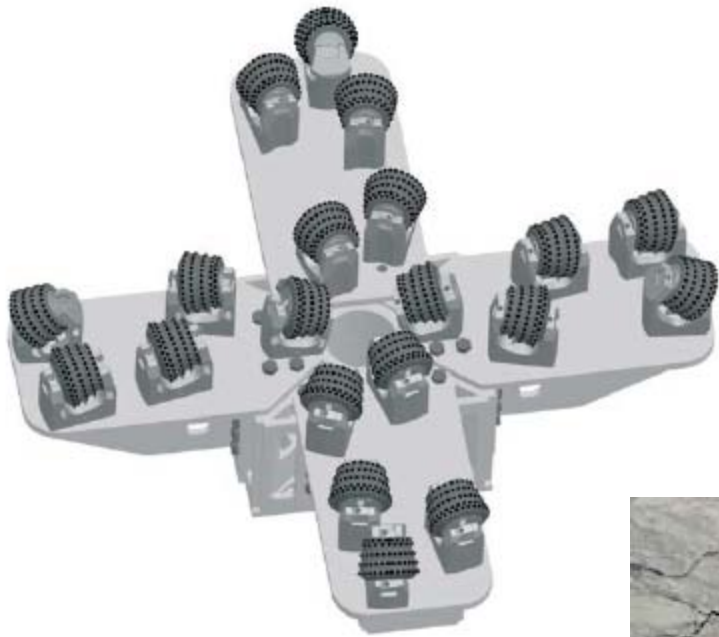
- Down reaming is a type of raise boring where a pilot hole is reamed from the machine to a lower level. This can be done in one or several steps to final diameter.
- The cuttings are transported through the pilot hole to a lower level. This method is mainly used for small diameter slot-raises and backfill drifts.

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- Down reaming is mainly used when the lower level is unsafe or if access to the lower level is financially not viable.
 - One advantage for the down reaming method is that all work is done at machine level further increasing safety over competing methods.











Assignments

- Different make of raise boring machine and its specifications
- Compare between conventional and Alimak raise boring methods
- Applicability conditions for Alimak and long hole drop raising method
- Limitation and problems with raise boring machine. Why is it not use frequently for raise boring.