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| Getting to Know Your Mud System

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BY TREVOR YOUNG AND TERRY FLYNN ON OCTOBER 20, 2016 | [DIRECTIONAL DRILLING](#), [FEATURES](#), [HORIZONTAL DIRECTIONAL DRILLING](#)

Mud cleaning systems are critical in the drilling process, as they protect the system components by lowering the solids/sand content in the drilling fluid. Cleaner fluid means much longer expendable life in the entire mud cleaning and pumping system. Lower sand content also allows the drilling fluid to carry cuttings from the bore more efficiently, making for a better bore hole and a higher rate of penetration. In addition to helping alleviate environmental mud disposal concerns, reclaiming and recycling also allows for substantial mud cost savings.

There are three main types of systems — integral trailer, skid-mounted and trailer-mounted. Skid mounted allows for transporting through very swampy and difficult terrain, as you could drag it behind a dozer or excavator to your needed work area. Integral trailer designs allows for a more compact, intended design for maximum efficiency and ease of transport.

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Any properly designed and sized mud system that is operated and maintained according to the manufacturers recommended procedures and maintenance schedules, should keep your sand content at or below ¼ of 1 percent. If you are not able to keep your sand content at or below ¼ of 1 percent, expendable life will greatly diminish along with the life span of system components and other items such as mud motors.

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When sizing a mud system to a particular job, a good rule of thumb to use is that the maximum cleaning volume should be approximately 20 to 50 percent more than your continuous rated pumping needs. This will ensure that you have a good clean drilling fluid. Ground conditions will dictate whether you should be closer to the 20 or 50 percent rule. Removing sugar sand is much tougher than removing rock. In sugar sand, you would want to be closer to the 50 percent rule.

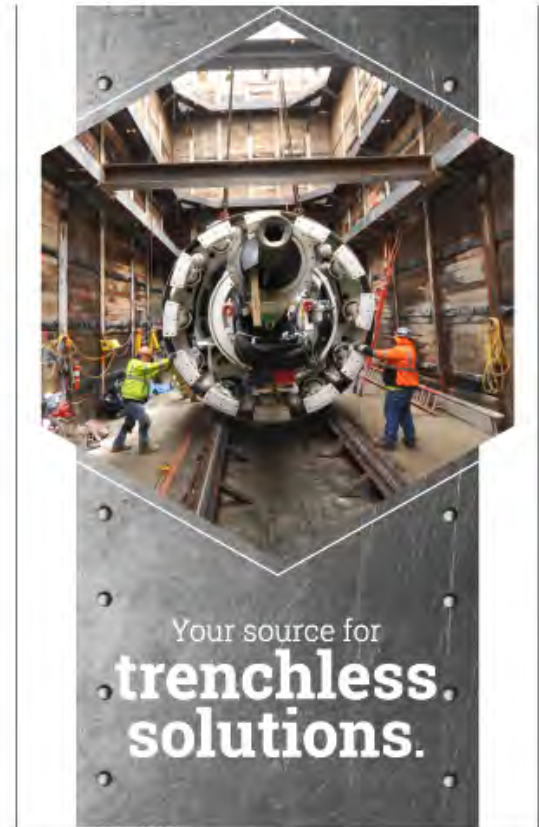
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There are five primary mud recycling system components to consider when either shopping for a system or maintaining your existing system. We will describe each component's importance to the mud system.

1. Shakers

There are three main types of shaker motion available. Linear, orbital, and elliptical Linear motion shakers utilize a pair of eccentrically



weighted, counter rotating vibrating motors. To date the linear motion shaker design is far superior, as it allows for a positive deck angle, which is the angle of adjustment of the shaker deck. Linear motion allows screened solids to travel uphill to the discharge end of the shaker bed. This allows you to keep liquids on the screens for a longer period while allowing a dryer cutting discharge. Both elliptical and orbital motion shakers do not allow for positive deck angles, and therefore require coarser screens to process fluids.



Shakers:
Linear motion shaker

2. Screens

Screen type and mesh selection are crucial to fine tuning your mud system and allows for effective screening and longer screen life. Most manufacturers include a standard set of screens that are good for an all-around starting point. Keeping a good selection of assorted mesh screens is advised, as different soil conditions dictate different mesh. You want to run the finest mesh possible, without “blinding” the screens (plugging the screen openings with solids). Screens should be maintained during operations by rinsing periodically, and handled with care. They may be easily torn by rough or careless handling, or by having items dropped or set on them.



Screens: *Pre-tensioned shaker screen*

3. Fluids Tank

Most systems on the market have two or three compartment tanks, depending upon the number of cleaning stages. Proper tank design should allow fluid to overflow back to the previous cleaning stage tank in case of suspended out-flow from the system. Tank volume size should be properly matched to the systems overall



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cleaning volume capacities.

4. Hydrocyclones

Hydrocyclones are simple devices with no moving parts. Dirty fluid enters the cone from the side, and centrifugal force causes the heavier solids to move to the outside wall and drop out the bottom of the cone, and the lighter fluids move up the center of the cone and discharge out the top of the cone.

Ideally, the applicable mud system will utilize 5-in. desilter cones, which separate solids 15 to 25 microns in size, and 10-in. desander cones, which separate solids 40 to 50 microns in size. The size and quantity of cones needed on a system depend upon the overall rated volume of the mud system. The 5-in. cones can process 80 gpm each, and 10-in. cones can process 500 gpm each. There are other sizes of cones on the market, but we feel this gives us the best volume and micron size separation.

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Over time, the friction caused by the centrifugal action of the cuttings and fluids inside the cone has the tendency to scour or “wash out” the inside of the cone. Once washing out occurs, the cones ability to effectively remove cuttings significantly diminishes. At that point, the damaged portion of the cone should be replaced.

Foreign matter introduced into the tank, usually from the top deck area or a hole in a scalping shaker screen, can plug the cones, as well. It's advised to ensure your operators always clean their boots before walking on the tank deck, and take care to not accidentally drop items directly into the tanks. Key indicators of this problem are when mud pours out of the end of one of the cones, or there is no cone discharge at all and it is vibrating.



Fluids Tank: Tank interior



5 inch hydrocyclones

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In these cases, remove and disassemble the cone for cleaning.

5. Electric motors/centrifugal pumps

Centrifugal pumps that are driven by electric motors are responsible for moving the drilling fluids to various areas of the system within the cleaning process. Pumps and motors should both be sized correctly to adequately handle the systems volume needs. The centrifugal pumps may feature either mechanical seals or rope packing, depending upon the pump type. Mechanical seals are relatively maintenance free, but rope packing requires proper attention. Rope style packing allows some fluid “leakage” from the packing area. Do not tighten the packing housing down to stop the leaking completely, or seal and shaft damage will occur. You should always maintain a slow drip when using rope type packing.



*Electric motors/centrifugal pumps:
Electric motors and centrifugal pumps with mechanical seals*

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Whether your mud system features an on-board triplex mud pump, or you are using a stand-alone mud pump, care should be taken to ensure your systems charge pump adequately feeds the pressure pump, or cavitation will occur within the triplex causing costly damage.

One final thought: Beware of unnecessary gimmicks that could cause costly downtime in the field. In regards to this type of equipment, simple, easy-to-operate and easy-to-field service systems are your best bet.

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