

Willard Says.....

WINCHES

provide the dredge operator with the “muscle” he needs to maneuver the suction inlet as needed to maintain a satisfactory rate of production.

The winches must be complimented by an efficient digging device to loosen the solids bank and screen out oversized particles. The goal is to create and maintain an ample supply of pumpable solids at the suction inlet.

Digging conditions, mining depth, the type of digger and the arrangement of the dredge are factors to consider when determining which positioning system will be most effective. Winches provide the muscle needed to maneuver the suction inlet and maintain production whether the dredge uses spuds or some arrangement of cables extending to anchors. Good winches enhance production. Poor winches detract from production.

Sand and gravel dredges usually remove solids from the base of the material bank with the intent of causing cave-ins. Cave-ins mix the strata in the deposit so that the stream of solids pumped to discharge has a relatively constant gradation. The cave-in material is loose and available to be taken into the suction inlet.

When suction inlet movement is required to induce a higher vacuum (feed rate) a very small (inches) movement is usually sufficient. Abrupt, jerking movements often result in an excess feed rate or crowd the digger into the bank and cause it to stall. Frequent, small movements are usually found to be the key to high production sand and gravel dredging.

Attempting to use the standard contract-dredge procedure of continuously crowding the rotary cutter sideways into the solids bank when it is positioned at the toe of the material bank seldom results in maximum production.

Consider the suitability of various types of winches for dredge service:

Air-Controlled winches are the pits! The operator has no "feel" as to what will happen when he moves a control lever. Manually operated friction brakes require tiring effort. Air-operated friction brakes release erratically because of lack of “feel.” Often the operator has to operate two levers or a lever and a foot pedal to cause winch movement. Small controlled dredge movements are impossible with air-operated winches.

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Electric winches powered by fixed-speed motors are not suitable for dredge service. They are either fast or under-powered or slow and over-powered. They are bang-bang devices. That is, bang—they run full speed; bang—they stop. Often the brakes wear out and the motor has to be reversed to stop the payout of cable under load. Motor overload indicates that maximum power is being exerted, but the operator has no way to gauge how much linepull was being exerted.

Each electric winch must have enough power to develop the desired line speed and pull as compared to a hydraulic winch equipped dredge that requires only one power source to operate multiple winches. Each electric winch requires a reversing starter; an electric/hydraulic system requires only one non-reversing starter. Taken together, these factors cause fixed speed electric winch systems to combine high cost and poor performance in comparison to a hydraulic-powered system.

Some new electric dredges are fitted with electric winches powered by AC variable frequency motors. These winches can be programmed to respond to very sophisticated electronic controls. Line speed, pull and direction can be closely monitored and controlled which makes them especially useful components of dredge automation packages. There is little not to like about the performance of these winches if you can afford them.

Homemade Friction Hoist winches, mechanically driven directly off the dredge pump drive, used to be a popular idea. Now approaching extinction, the surviving examples of this species of winch are largely confined to dredges located in the Great Plains. These winches are an excellent example of the adage, “You get what you pay for.” They do not cost much and you do not get much in the way of performance.

These winches are inexpensive to install and maintain. They are physically tiring to operate and a tired operator will not make the frequent small adjustments that are necessary to maintain peak production. They are cheap to install but cost a lot in terms of lost production.

Manually Controlled winches are an obsolete winch control system. Those that exist should be retired to museum status. An array of tall levers and foot pedals all lined up at the “leverman’s” station is a sure sign of this type of winch control system that was popular back in the days of steam-powered dredges. It is impractical to expect dredge operators to exert the amount physical effort required to operate one of these dredges in this day of power steering and power-assisted most everything. Precise control is possible but the frequent small movements require a lot of physical effort. As the operator tires, production decreases.

Hand Operated winches are still found on some dredges. Owners of such dredges are not concerned about trifling matters such as efficiency or productivity. These folks should not waste time reading papers such as this.

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Hydraulic winches, wormgear or planetary, are the winches of choice! Productive, efficient dredge operation at modest cost can best be achieved using hydraulic-powered winches. Properly selected hydraulic hoist and positioning winches enable the operator to maneuver the suction inlet with ease. They can be "feathered" to make the small movements required to maintain a uniform flow of solids into the suction inlet. The maximum linepull of these winches can be adjusted to prevent cable breaking. The rate at which oil flows to the winch determines the linespeed. One hydraulic pump can power several winches.

The hydraulic control valves and lines should be kept out of the cab so the operator is not subject to the noise, heat or potential leakage that accompany hydraulic circuits. Use proportional electronic control valves if possible. Manual control valves should be connected by rods to operating levers located on the operator's console in the cab. Winch operating controls must be easy to operate and located convenient to the operator's hand.

DO NOT use flexible push-pull cables to remote control hydraulic valves. Push-pull cables are expensive, sticky, prone to breaking and require operator-tiring effort.

Install a hydraulic winch pressure gauge on the operator's console. Hydraulic pressure indicates how much linepull a winch is developing.

Hydraulic winches increase production, operator comfort and profits!

Planetary winches compared to wormgear winches have:

- Higher efficiency (90 percent vs. 50 percent).
- Superior brakes (oil bath vs. dry).
- Faster linespeed capability (three to five times).
- Larger drums (longer cable life).
- Higher cost (2 to 4 times more).

In addition to being less expensive, wormgear winches have one other feature that some dredge owners find desirable—the drum can be released to free wheel. A jaw clutch connects the wormgear winch cable drum to the drive. Under no-load conditions the clutch can be disengaged so the drum can freewheel to payout cable rapidly such as when moving anchors. A small brake on the drum creates just enough drag to prevent overrunning.

In general, wormgear winches are satisfactory for positioning sand and gravel dredges except for use with a vanging system.

Vanging systems require planetary swing winches. This system refers to a hydraulic swing winch control arrangement that features one-lever cutter swing. For instance, when the left winch is pulling in cable the right winch brake is partially released to allow cable to be pulled off its drum. The speed and linepull of the inhaul winch can be adjusted to suit production goals.

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Planetary winches should always be used for ladder hoist service because they have oil-bathed brakes that give long life under heavy use. Most wormgear winches have dry brakes or wet brakes, neither of which is suited to constant use.

The common knock against hydraulic winches is the concern for environmental damage due to oil leaking or spillage should a line break. Not to worry. We have been furnishing environmentally friendly oil in our new dredges for several years. Tree huggers love this stuff.

Conclusion

Install hydraulic winches on your dredge and prosper. Other winches come up lacking.

Comment, question, criticism, information on products mentioned? Contact willard@willardsays.com