The alarm should alert the operator whenever one of these parameters exceeds normal operating limits. Thus notified, the dredge operator can call for help to access the problem and continue pumping long enough to flush solids out of the pipeline. The alarm should not trigger booster shutdown!

Pipeline plugging is a real danger whenever full-production pumping stops abruptly. It is your choice of course, but I believe the chances of plugging the pipeline and the penalty too great to incorporate an automatic shutdown feature in any dredge or booster control system.

The thought behind automatic shutdown is to prevent damage to some mechanical component. Seldom does that prove to be the right thing to do. Usually, clear water pumping can continue for another two or three minutes to insure that the pipeline does not plug. During that period maintenance people can ascertain the extent of the problem or if one actually exists.

Nuisance alarms are a real hazard for automatic shutdown systems. Each stoppage is an opportunity for the pipeline to plug.

Adjustable-speed drives.

Adjustable speed booster pumps, diesel or electric should have automatic controls that adjust booster pump speed as required to maintain a selected suction inlet pressure.

Electronic controls are available to control the speed of AC variable frequency or DC drives. The BIPCON (Booster Inlet Pressure CONtrol) system provides automatic speed control for diesel booster pump drives.

If flow to a booster pump equipped with a auto speed control slows down, the pump speed slows. If incoming flow ceases, booster pump speed slows to idling speed, its inlet pressure changes to a vacuum and air enters the booster pump case through the whistlepipe to prevent cavitation. The booster pump can run indefinitely in this condition without harm.

When flow from the dredge resumes, the air bubble trapped in the booster pump housing cushions the collision between the stationary slurry in the booster-to-discharge pipeline and incoming flow from the dredge pump. The air cushion prevents a high-pressure spike.

Increasing flow from the dredge causes the booster pump inlet pressure to rise to the speed control setpoint. As dredge output increases to the normal rate, the booster speed increases to maintain the setpoint pressure and normal operation resumes automatically without incident.

Booster inlet pressure speed controls match the pump speed to the load requirement and reduces pump wear and energy consumption.

The location of a speed-controlled booster pump in the discharge pipeline is not as critical as it is with fixed speed boosters. As long as the dredge is capable of delivering flow and maintaining a positive pressure at its inlet, a speed-controlled booster pump can vary its energy contribution to the dredge system from zero at idle to full power when necessary.

The combination of automatic speed control and whistlepipe makes booster operation nearly invisible. The dredge operator can do his job with little concern for what the booster is doing.

Fixed-speed Drives

Numerous fixed-speed boosters successfully follow the same procedure outlined above for variable speed pumps, however, the location of these boosters in the line is much more critical.

Whether speed-controlled or fixed-speed, boosters must always be located close enough to the pump which supplies them to maintain a positive inlet pressure during normal operation. That distance depends on the booster pump's speed. Pump speed determines the ability of a booster to reduce the pressure in its inlet and speed determines how much energy it can supply to the dredge system.

If booster speed is too high, it may develop a vacuum in its inlet in normal operation in which case it must either be moved nearer to its supply pump or run at a slower speed. If booster speed is too slow, the amount of power it can contribution to the operation of the dredge system will be less than it could be were it to be run faster.

The critical element is to have a whistlepipe installed on the fixed-speed booster pump inlet. It is much more likely that these units will "pull" a vacuum and cavitate than speed-controlled boosters. The presence of an air bubble in the booster pump case to prevent cavitation and cushion colliding slurry flows is critical to prevent pressure spikes. With air in their gut, fixed speed pumps can also run indefinitely without harm in the absence of flow from the dredge pump even though they run at somewhat higher speeds.

Booster pump operation can be invisible.

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