Cost efficiency in artificial oil lifting
Everything counts

Power and productivity
for a better world™

Efficiency, uptime, reliability. Everything counts.

When your oil well does not have enough pressure to lift a sufficient quantity of oil, the question is how much energy must be used to achieve profitable production. Here variable speed drives (VSD) can help you, along with advanced control and supervision capabilities.

Achieve real savings with artificial lifting

The uptime of the lifting system is an important factor affecting your system efficiency. A maintenance break or a stoppage to allow the well to fill up to the permitted production parameters reduces system efficiency. A low fluid level results in inefficient production and can damage equipment. Also, stopping and starting causes extra stress and risk of failure to the equipment.

The energy consumption of the artificial lifting system powered by electric motor is a large part of the lifetime cost. So energy saved on the operation has a big effect on the lifetime investment cost of your system.

All these issues can be tackled with a VSD. In addition to excellent control on your artificial lifting process, VSDs can deliver energy savings up to 30% compared to a direct on-line motor.

Pump jack

A big challenge with pump jacks is fluid pound, and that combined with high sand content or low bottom-hole pressure is a really critical problem. If you keep pumping at the same speed, you end up breaking the rod string. If you stop the pump, sand will settle and may jam the pump, or the well will not fill properly without the suction of the pump. You can change the speed of a pump jack by changing the sheaves but doing that frequently is time consuming and expensive. A VSD can adjust the speed stroke-by-stroke if required.

When pumping heavy crude, the rod will start floating on the down stroke. This must be compensated by slowing down the pump jack. Otherwise the pump will not fill up properly and efficiency will be poor. The VSD can detect rod float and will slow the pump down and then accelerate as the pump starts to sink. This can have a significant improvement on productivity.

Progressing cavity pump

Progressing cavity pumps (PCP) provide you a very efficient and economical artificial lift system. However, PCP has certain issues that have to be taken into account in use. Otherwise your artificial lifting system can end up being a high maintenance and low profit investment.

The rod string in a PCP system is under heavy stress, especially in start and stop situations. The start torque must be handled accurately to avoid unnecessarily high loads on the rod string. Our direct torque control (DTC) can accurately control acceleration, speed and torque without any additional devices.

The rod connecting the motor to the pump has rotational tension while it is operating. When the motor is stopped this tension will unwind rapidly. This rapid release of energy must be controlled to avoid damage to the rod. The backspin control can control this situation and prevent damage to the system.

The stator of a PCP pump is sensitive to wear if the pump is run dry or partially dry. ABB's fluid level control function uses input from the PID controller in the pump to maintain an optimal fluid level in the pump. The speed of the pump is adjusted according to the value of actual fluid level, based on data from the pressure or fluid level sensor.

Electric submersible pump

The electric submersible pump (ESP) is an efficient form of artificial lifting. It can also handle a wide range of pump capacity and pump depth. This makes ESP the fastest growing artificial lifting system in the oil and gas industry.

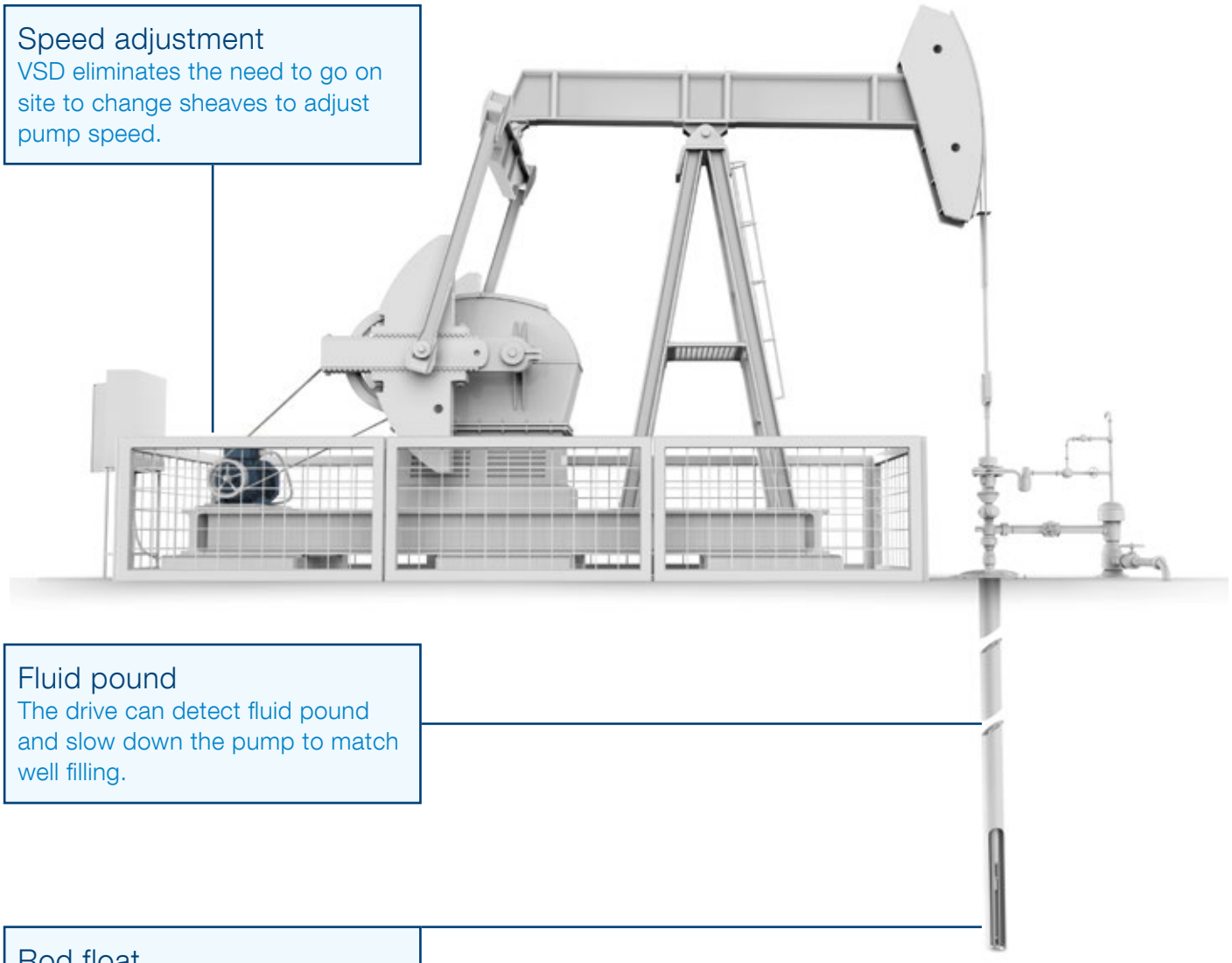
To get optimum efficiency from the ESP it has to be run within the operating range stated by the manufacturer. This is a combination of the brake horsepower curve of the motor and head capacity curve of the pump. These enable you to derive the pump efficiency curve and optimum speed. The DTC can accurately keep the pump within the optimal operarting limits.

Also the ESP will undergo heavy stress in start and stop situations, which causes wear and tear on the equipment. This can shorten the lifetime of the pump and the motor. The DTC can accurately control both speed and torque without any additional devices.

Using the ESP means there is no risk of backspin damaging the equipment, but the reverse rotation must be identified to prevent starting of the motor.

Pump jack
Uninterrupted production

In some cases fluid pound has been practically eliminated with a VSD. Also, the VSD can detect when the pump has excess oil and speed up the pump. With heavy crude, a VSD helps to increase pump-fill. The movement is slowed on the down stroke when rod floating is detected, and speeded up as the rod starts to fall through the high viscosity oil.



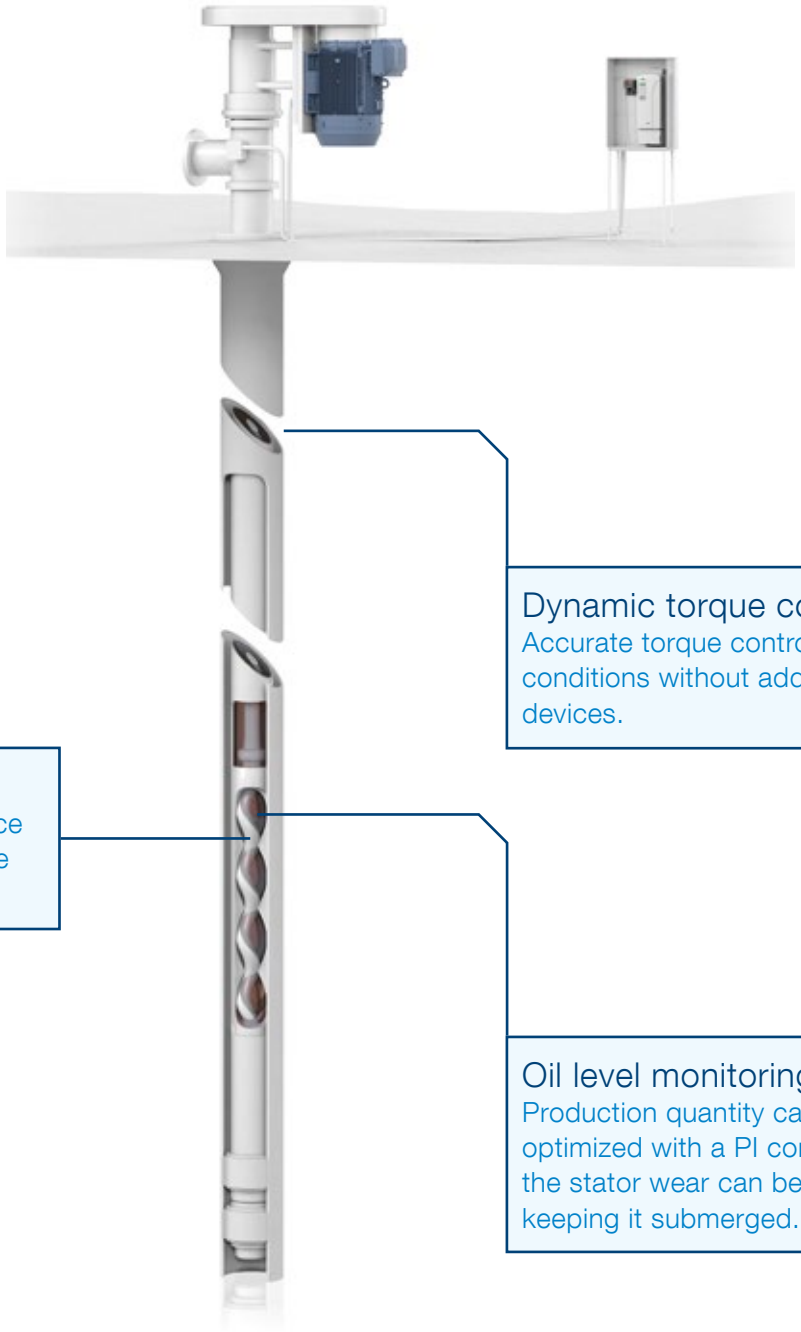
Speed adjustment
VSD eliminates the need to go on site to change sheaves to adjust pump speed.

Fluid pound
The drive can detect fluid pound and slow down the pump to match well filling.

Rod float
Movement can be slowed down and speeded up as the rod starts to fall through high viscosity oil.

Progressive cavity pump
For challenging conditions

With oil wells that have a high sand content, ABB LV drives are able to clean the pump of sand in start up situations.
The start up stresses the pump and the rod even without sand.
By using an acceleration ramp (linear, s-shape) or setting the pump to accelerate in two stages you can minimize the stress.



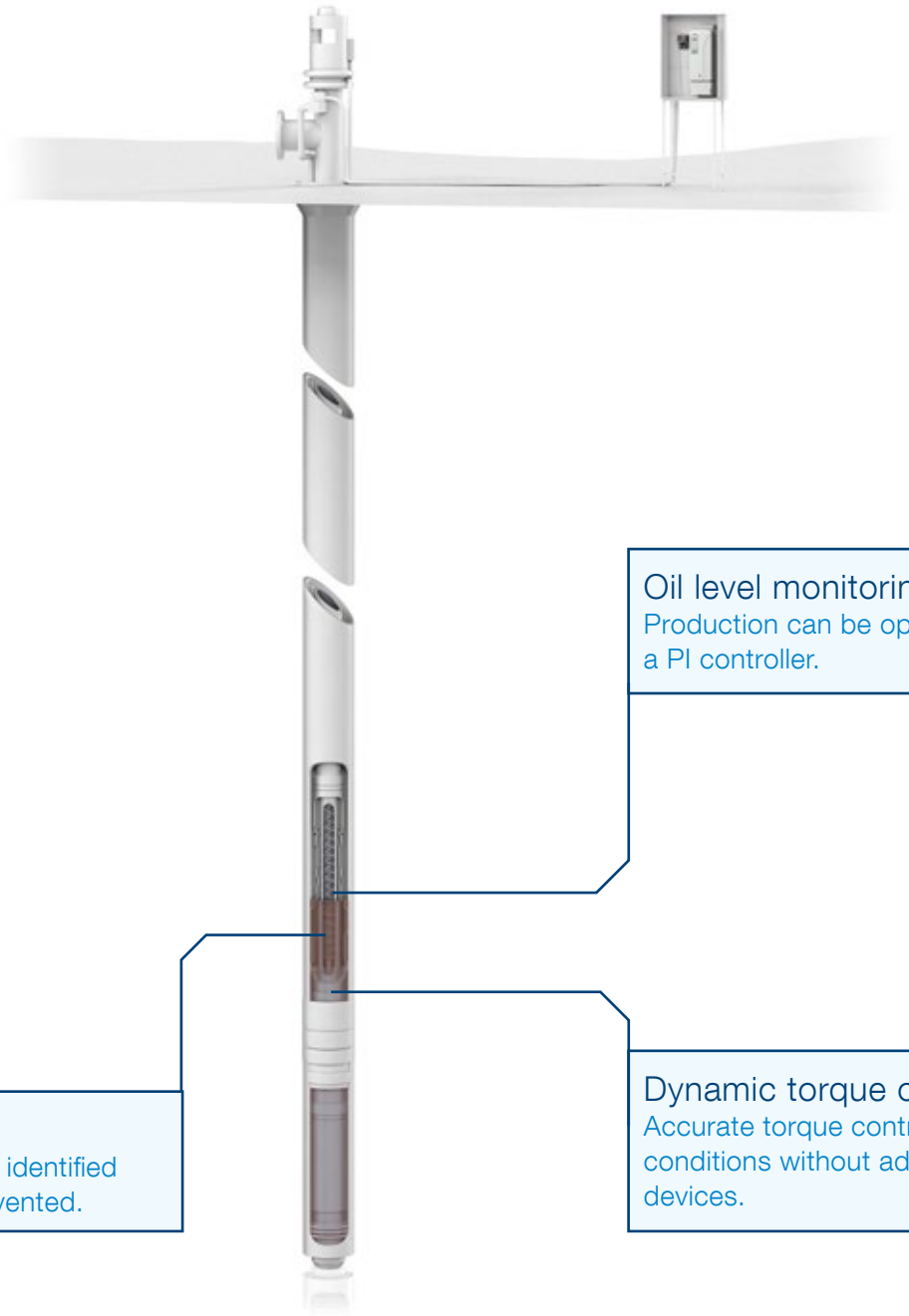
Dynamic torque control
Accurate torque control in all conditions without additional devices.

Backspin control
A specialized shutdown sequence controls rotor backspin when the pump is stopped.

Oil level monitoring
Production quantity can be optimized with a PI controller. Also, the stator wear can be reduced by keeping it submerged.

Electric submersible pump
For harder to reach reserves

ESPs are used in very deep wells. This means that the environment is challenging and can vary unpredictably. Variable speed drives enable you to tune your ESP system so that your production is always optimized. If the downhole pressure rises too high, VSD can automatically stop the pump and restart it when pressure is back within production limits.



Oil level monitoring
Production can be optimized with a PI controller.

Backspin control
The reverse rotation is identified and motor start is prevented.

Dynamic torque control
Accurate torque control in all conditions without additional devices.

Contact us

For more information please contact your local ABB representative or visit:

www.abb.com/drives
www.abb.com/drivespartners

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