

Smart Speed Logic[™] Feature Sheet



Overview

SSi's built-in Advanced POC helps *prevent fluid pounding and rod buckling* by increasing the downhole pump fillage. Contrary to traditional POCs, this feature can gradually adjust the speed of the unit based on the dynamometer card readings. These changes can be made based on either the pump fillage calculated from the downhole card or the shape of the surface card. In both methods, the speed of the unit is adjusted to match the fluid flow entering the downhole pump. The result?

- Reduced downtime
- Increased pumping efficiency
- Increased production

When setting up the Auto Optimization, the operator is able to set the lower and upper limits of the SPM, the rate at which the speed is changed, and the number of strokes the unit has to complete before the speed change is implemented.

It is also noteworthy that SSi is an industry leader in calculating downhole cards considering the deviation surveys of the well. Our wave equation can produce downhole cards for vertical and deviated wells. In the case of having a deviated well, a deviation survey is requested to accurately calculate the downhole card.

Examples:

When running Auto Optimization in the **Pump Fillage Method** (based on the downhole card), the operator sets the desired pump fillage as the pump fillage target.

If the current pump fillage is *below* the pump fillage target, the unit *slows down* and allows more fluid to enter the downhole pump.

If the current pump fillage is *above* the pump fillage target, the unit *speeds up* and avoids losing production.





When running Auto Optimization in the **Position-Load Method** (based on the surface card), the operator sets a position and load range where the unit determines the shape of the card. The following example shows how the unit changes speeds based on this rectangular reference area.

1) If the card *crosses* the defined rectangular area, the pump fillage is inside the desired range and the speed of the *unit doesn't change*.



2) If the card travels *above* the rectangular area, the pump fillage is below the desired window and the *unit slows down*.



3) If the card travels *below* the rectangular area, the pump fillage is above the desired window and the *unit speeds up.*



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Turn Around Load Control / Rod Stretch Control – Pause Function at the end of Down Stroke

During normal operation, maximum stress on the rod occurs at the bottom of the stroke when the unit changes the direction of movement from downward to upward. The SSi unit can pause at the bottom of the stroke to let the rods relax before starting the up stroke.

This reduces the stress on the rod and increases the lifetime of the rod.

The duration of the pause can be anywhere from 0.1 seconds to a few seconds.



Advanced Rod Hang Up and Carrier Bar Separation Control

This advanced feature lets the unit detect when there is rod hang up or carrier bar separation during the downstroke and gradually slows the unit down without having to drop to the minimum speed. This allows the rods to fall without having a large negative impact in the overall SPM of the unit. The unit is then smart enough to speed back up once the condition is cleared.

Stuck Pump and Sand Build-Up Control

This feature detects any abnormal increase in rod load and compares it with the operator's defined set point. During upstroke, if there's a case where due to downhole problems the rod load rises above the set point, the unit turns around immediately but continues pumping in the range where the load is still below the set point. This technology *protects the downhole equipment* and prevents shutting down the unit, which means not losing production and preventing possible sand buildup.



A Field Example Showing Production Improvement

Here is an example of an operator showing the Dynacards *before* and *after* Smart Speed Logic[™] was installed. All SSi Units can be upgraded in the field in only about *one hour* by our Service Technicians.



Major International Oil Company - Model 400-125-288

Cards Before Smart Speed	d L	.ogic 2
Peak Polished Road Load	=	26050 Lbs.
Minimum Load	=	5000 Lbs.
Strokes per Minute	=	3.7
Stroke Length	=	264 Inches

Cards After Smart Speed	Lo	gic 2
Peak Polished Road Load	=	24550 Lbs.
Minimum Load	=	5860 Lbs.
Strokes per Minute	=	3.1
Stroke Length	=	264 Inches

The Results

After the new logic was installed, the benefits to the operator included:

- *More production* despite the lower SPM due to the higher pump fillage.
- *Eliminated the fluid pounding* shown in the card from before the new logic was installed.
- Extending the life of the downhole equipment.