INTELLIGENT DRILLING TOOLS

The Ultimate Hole Cleaning System While Drilling
AVOS - Annular Velocity Optimisation System

SplitFlow Hydraulics
- Maximise Annular Velocity and Increase Hole Cleaning efficiency
- Divert excess flow into the Annulus above the BHA using the AVS tool
- Engineer AVS and BHA hydraulics using IDT's SplitFlow software

AVS and AVT Electronic Multi Position Circulating Valves
- Downlink from surface to command
- Throughbore
- Splitflow position with Variable Dispersion Nozzle system
- Full Bypass position with 4in² TFA
- Fullbore closure if pumping LCM
- No balls, darts or surface intervention
- TANDEM downlink command protocol to control AVS and AVT when run together for rapid wellbore clean up

AVD Electronic Intelligent BHA Disconnect
- An AVS tool with an integrated BHA disconnect module
- Operator can decide to disconnect from BHA in a stuck pipe situation
- AVD uses its onboard sensors to establish it is stuck
- Process Logic safeguards have to be met before the AVD is ready to disconnect
- Final command given from surface

Get off that stuck BHA fast and reliably

AVD – Electronic Programmable Circulating and Disconnect Module

The AVD combines all the features and benefits of the AVS multi position circulating valve combined with an integrated BHA disconnect module. This uses the same Electronics and Power Module with the addition of additional electric control motors which activate the full strength mechanical clutch.
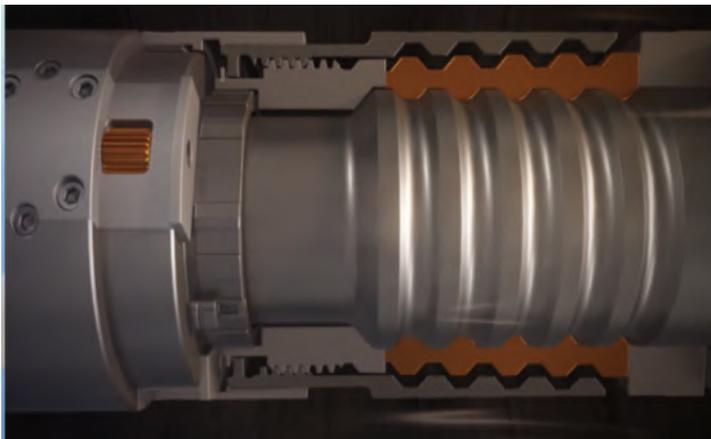
The AVD can be run in the BHA below the Jars. It is as strong as the drillpipe and no surface intervention is required to activate i.e. no balls or darts. If the BHA becomes stuck, the Operator can achieve a disconnect in a matter of hours depending on how the AVD has been programmed.

INTELLIGENT
DRILLING TOOLS

Confirm disconnect with Drillstring
Dynamic signal from surface
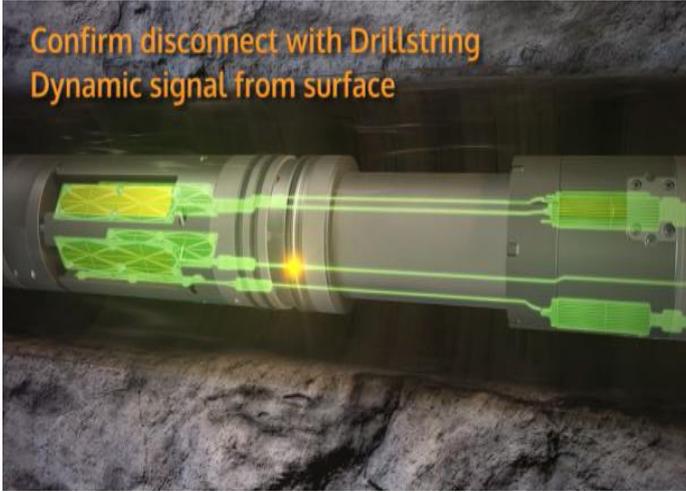
The AVD senses it may be stuck by monitoring its sensors; accelerometers, MEMS Gyro and flow sensors. The tool has 4 modes: "Active" – when all is normal, "Listening" – when it senses it may be stuck and starts to listen for the countdown confirmation, "Countdown" – when it is confirmed that the tool is stuck and the countdown begins, "Disconnect" – when the countdown has finished and the tool is awaiting the final confirmation to disconnect from surface. The AVD has a small telescoping joint with a proximity sensor. This is used to send confirmation signals and the final signal to disconnect, however, the tool has to be in Disconnect mode before it will activate.

Hook load
Hook position
RPM
Flow

AVD 3 Axis Accelerometers and MEMS Gyro, detecting full scale deflection in X, Y and Z plain through rotation, upward, downward and lateral movement. Proximity sensor activating when picking up and down. AVD is in Active Mode.

AVD 3 Axis Accelerometers detecting partial or zero deflection in X, Y and Z plain. Gyro reading zero RPM. Proximity sensor cycling corresponding to jarring actions. AVD concludes it may be stuck and moves into Listening Mode looking for the signal to go into Countdown. Any FSD on XYZ will cancel Listening Mode and AVD will revert to Active Mode.

AVD is in Listening Mode. No deflection from X Y or Z Acc. Gyro static. Proximity sensor reads continuous closed signal for 15 mins. AVD enters Countdown Mode.

AVD is in Countdown Mode. Continuous steady reading from proximity sensor and zero deflection from X Y and Z Acc and Gyro, for 2 hrs will move the AVD into Disconnect Mode.

AVD is in Disconnect mode waiting to receive the final confirmation to disconnect. Proximity sensor reads from closed to open 3 cycles within 20 minutes by lifting the string into tension and slacking into compression. This is the final signal to activate the electro mechanical disconnect mechanism.

AVD dual electric motors activated and collet latch released. Electronics and sensor packages recovered leaving a slick mandrel for external catch with Overshot or with IDT catch tool.

Backreaming out the hole. Almost packed off, very limited flow but still able to rotate and move the pipe up and down with large overpull and resistance.

Pipe stuck with no movement up or down, no rotation other than winding up to maximum torque. Pipe packed off. Commence working the string. Add a work single to give room to jar down. Rotating string weight prior to stuck pipe was approx 180k. Jarring up with 150k overpull.

Driller slacks off brake and puts string into maximum compression. No String movements for 15 mins. This action signals the AVD to commence countdown. The string is not moved for 2 hrs. Any string movement will cancel the countdown.

The Driller picks up to max hookload and sets back down to previous hookload, 3 times within a prescribed period e.g 20 mins. AVD triggers and the BHA is released. Full circulation and rotation and movement are now obtained. Hookload returns to free weight.

TIME