



ENGINEERING INNOVATION
WORLDWIDE

TIW[®] FlowBoss

Surge Reduction Tool

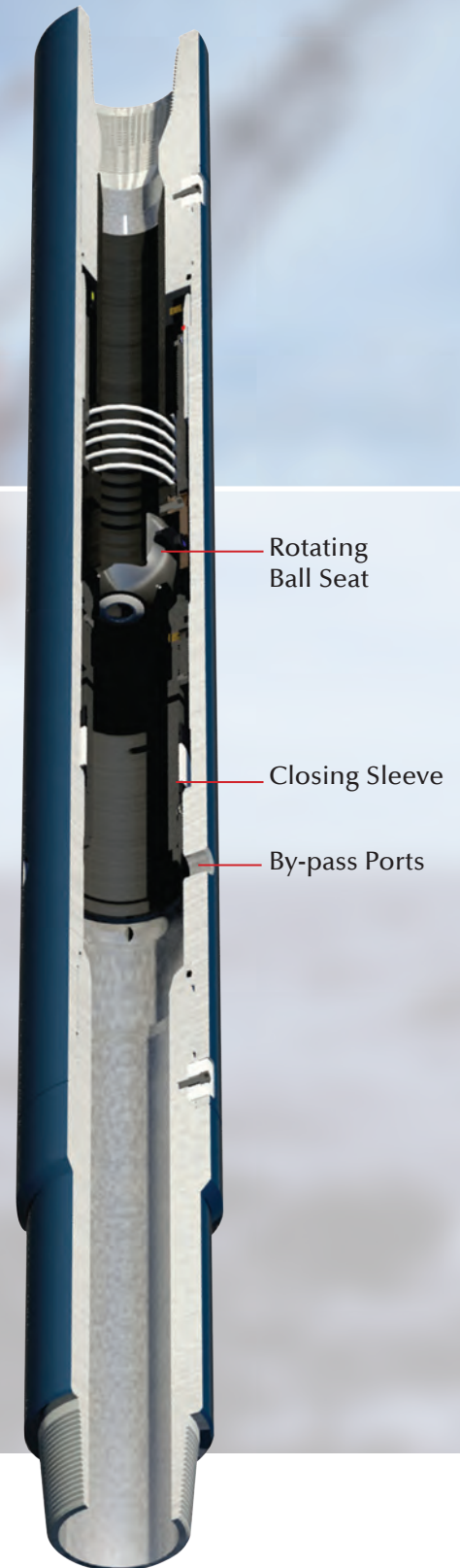
Reduce Your Liner Run Time and Costs

The TIW FlowBoss™ Surge Reduction Tool saves you time and money when running in liner systems. When running conventional float-in-liner systems in wells with weak formations or with running tight tolerance liner strings, the risk of fluid loss through surge pressure presents a challenge for operators. With conventional float-in systems the only option to reduce this risk was to run the liner extremely slowly resulting in long run times.

Auto-fill float equipment has been available for many years, but has limited flow area and carries the risk of premature tripping due to a surge associated with setting down on or coming up off of the slips. Overflow at the surface was also a possibility. The run time with an auto-fill system has proven to be only a slight improvement over conventional float-in systems. High volume auto-fill float equipment still allows large volumes of fluid to move up the inside of the liner string.

TIW's FlowBoss™ Surge Reduction Tool allows the fluid being displaced up the inside of the liner to be diverted back to the annulus above the liner top. The tool design includes a unique rotating ball seat cam that opens after the ports are closed allowing the drop ball to continue down hole. The design provides a smooth bore with no obstructions to damage displacement plugs.

The Verification Tool runs below the FlowBoss tool, providing a means to test the pressure integrity of the ports after closing. It utilizes the same rotational ball seat that rotates after testing thereby releasing the drop ball down hole to activate the float equipment.



Applications

- Weak formations
- Liner strings with tight tolerance

Benefits

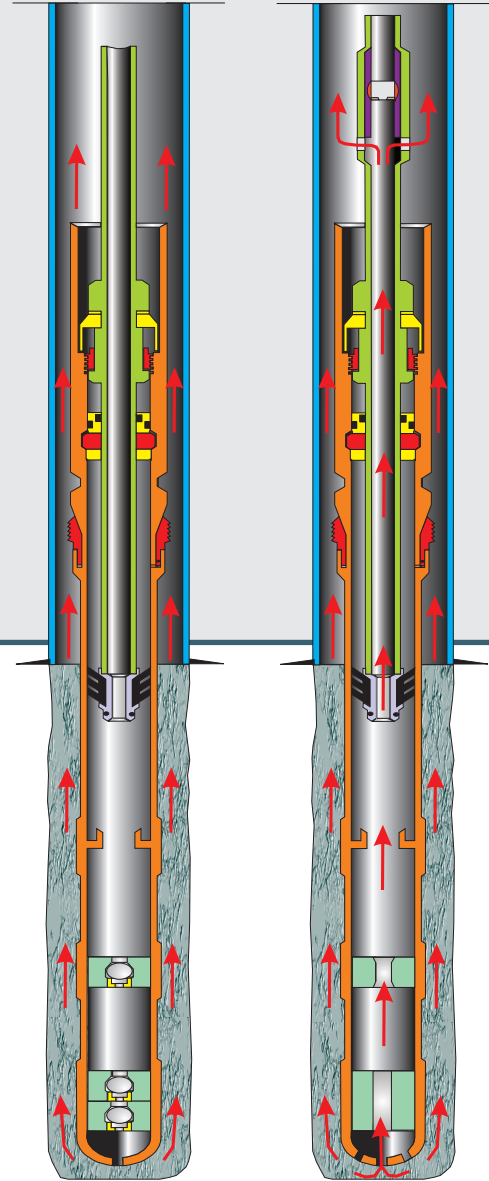
- Helps reduce fluid overflow at surface
- Smooth bore with no obstructions to damage plugs

FlowBoss Surge Reduction Tool Details

- Bypass ports divert fluid to the annulus above the liner top
- Drop ball seats in the rotating ball seat and shifts the closing sleeve to seal off the bypass ports
- Bonded rubber seals on the closing sleeve provide pressure integrity to 10,000 PSI
- Tool strength exceeds the drill pipe in Torque and Tensile
- Drop ball sizes vary for use with ball activated liner equipment
- Dual pressure indications for closing ports and opening bore
- Emergency seat to evacuate drill string in problem situation

Conventional Float in System

Surge Protection System



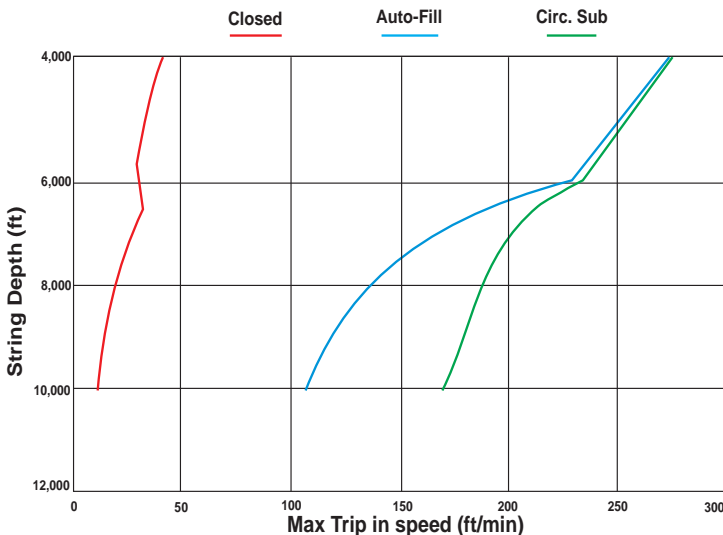
FlowBoss Tool Specifications

| DP CONNECTION | OD (in) | ID (in) | TENSILE (lbs) | TORQUE (ft-lbs) | PORT AREA (sq-in) |
|---------------|---------|---------|---------------|-----------------|-------------------|
| 3-1/2 IF | 5.50 | 2.13 | .59M* | 18,300* | 3.98 |
| 4-1/2 IF | 7.50 | 2.88 | .94M* | 37,500* | 7.36 |
| 6-5/8 FH | 9.00 | 4.00 | 1.48M* | 73,700* | 9.82 |
| 6-5/8 FH | 9.50 | 4.00 | 2.20M* | 119,400* | 9.82 |

*Ratings based on tool joint connections

SurgeMOD Surge Protection Software

Max Trip in speed vs String Depth for weak zone @ 10,000 ft



SurgeMOD software predicts the EMW effect of running the liner in a variety of configurations. This powerful hydraulics modeling program allows the operator to have an understanding of how the well will react during the run in and the opportunity to plan for the most efficient liner running operations.

- Effects of different pipe end conditions
- Surge/Swab pressure for given pipe speed
- Optimal trip speed at different depths
- Pipe movement animation