

High Resolution Cigar Gauges Plunger On-Bottom Indicator

- Extremely robust design
- User friendly
- Small footprint, minimally invasive
- Cost effective
- Great for tracking and optimizing production plunger cycles
- Sensitive pressure monitoring easily replaces traditional acoustic methods



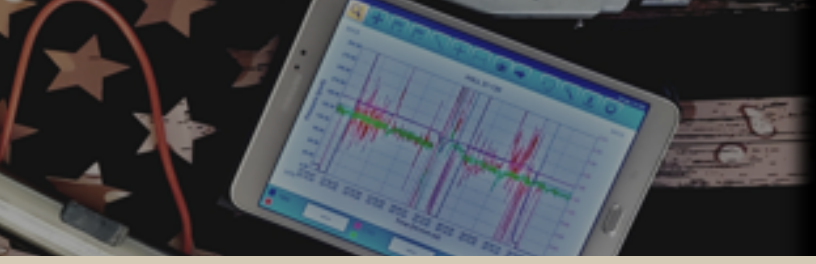
- Proprietary Amplifier calculation capable of detecting plunger reaching bottom of wellbore
- Small shifts in pressure within the tubing and casing occur as plunger contacts bumper spring
- Slight pressure changes are amplified and smoothed for clear recognition
- Unaffected by noisy environment
- Achievable with minimal gear - No downhole gear required



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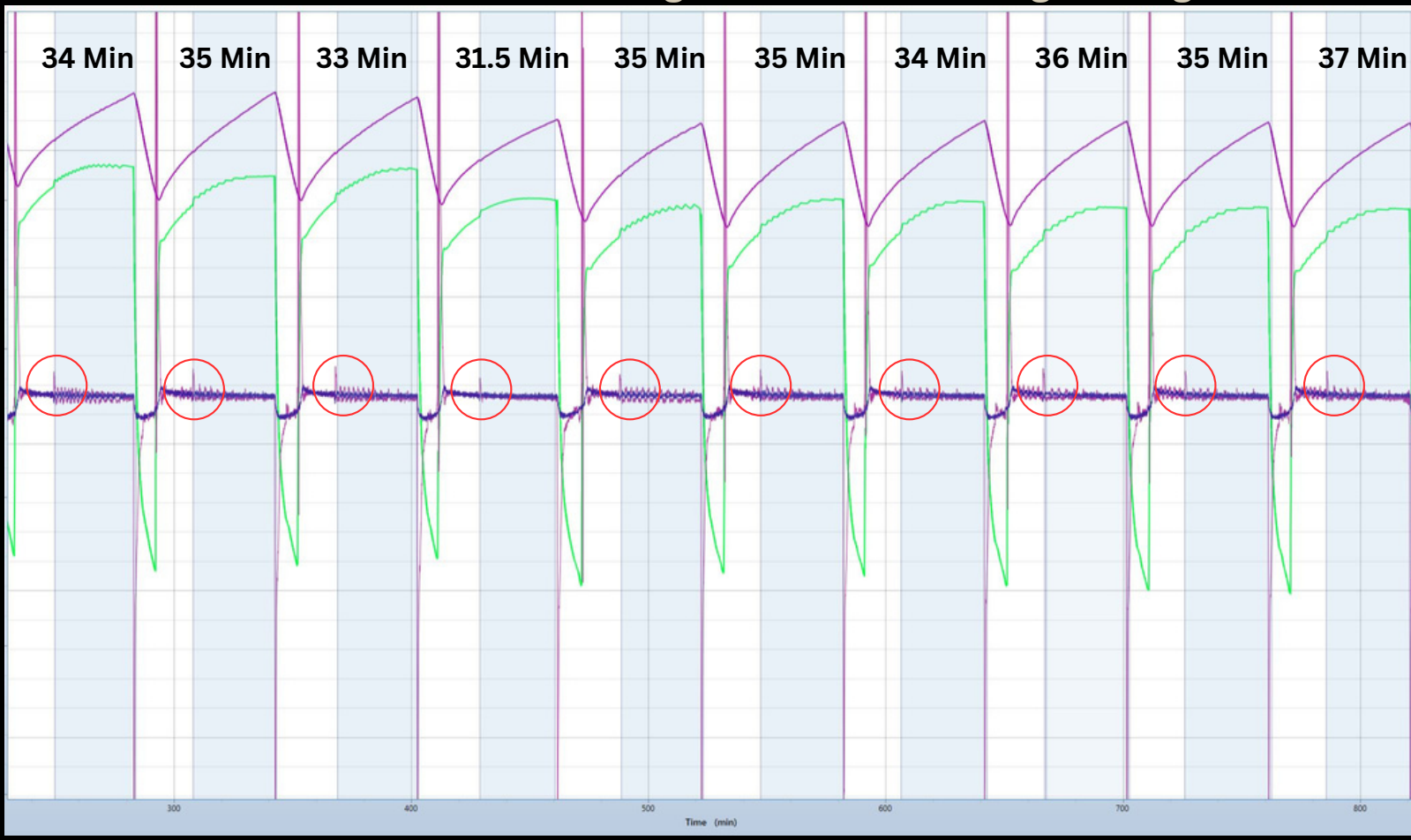


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Optimize Plunger Settings

Recorded Data with I-Plunger and CSG/TBG Cigar Gauges



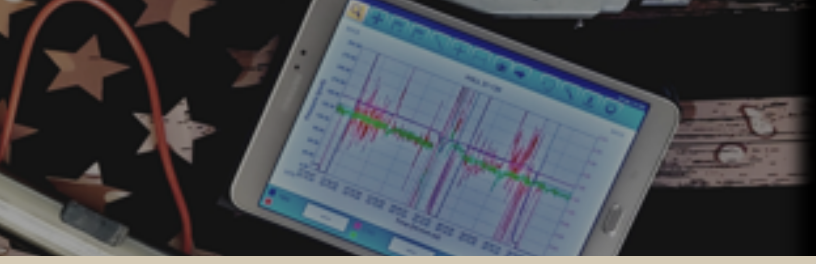
- Longer stretches of data give optimizers a better fall time average
- Current Production Settings:
 - Total off-time is 50 min
 - Total cycle time is 60 min
- The plunger is consistently making it to bottom within 15 min....could save 35 min of off time!
- Reducing the off-time by 33 minutes could result in the well tripping every 27 minutes, effectively doubling the number of runs within a 24-hour period. This increase in operational frequency would lead to reduced bottom hole pressure (BHP) and higher production output



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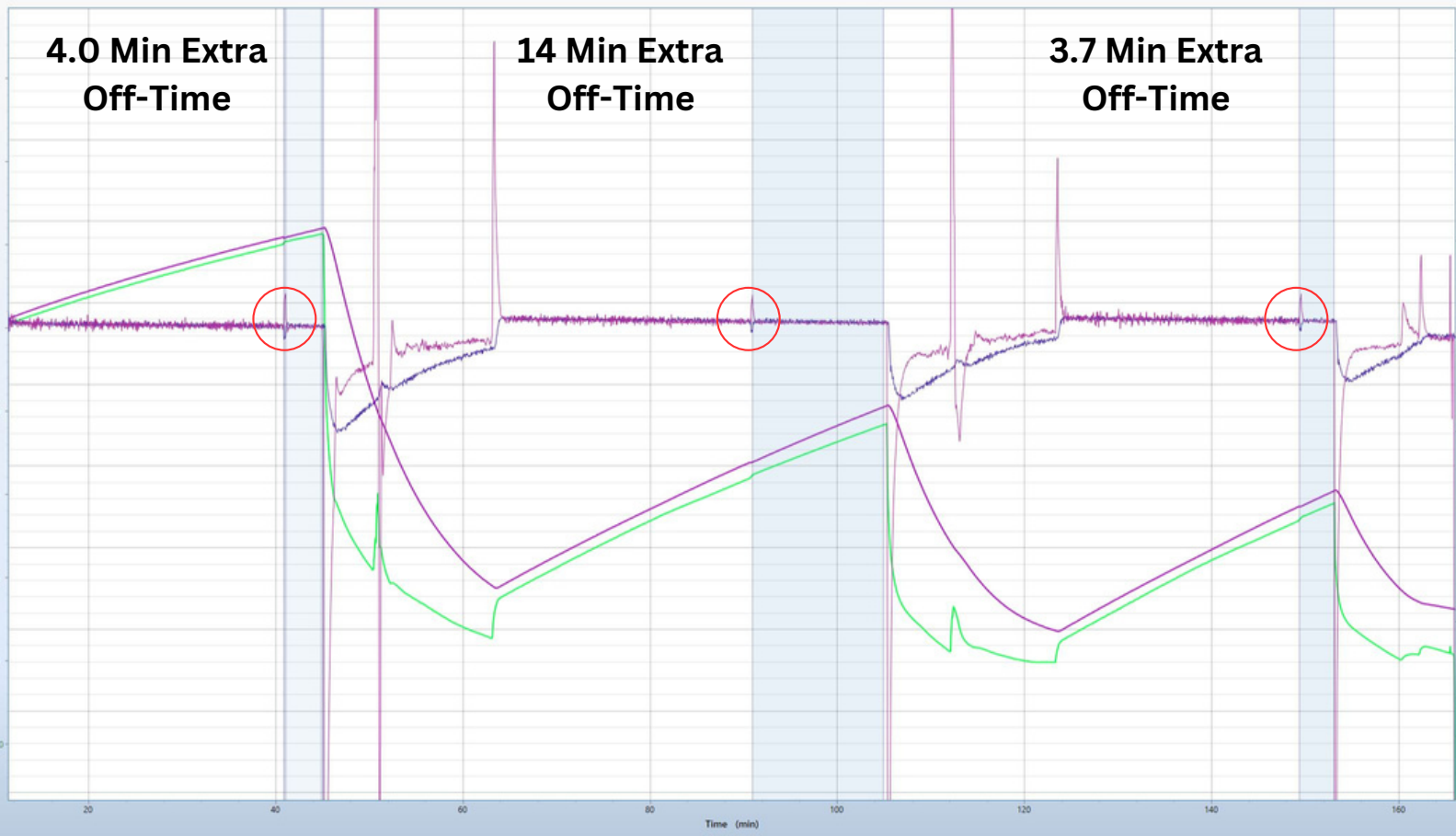


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Plunger On-Bottom Indicator

Recorded Data with I-Plunger and CSG/TBG Cigar Gauges



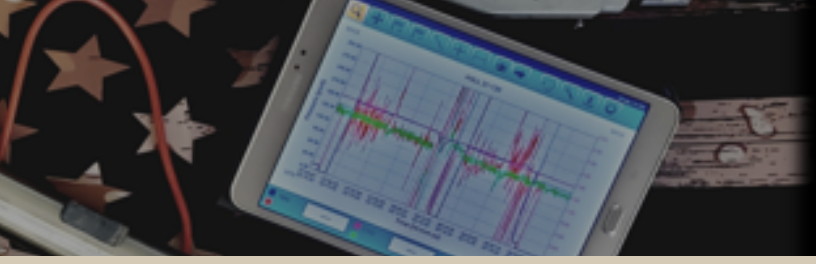
- Optimize off-times more accurately
- Determine fluid levels based off casing and tubing differentials
- Record longer stretches of data to fine tune most effective production cycle times



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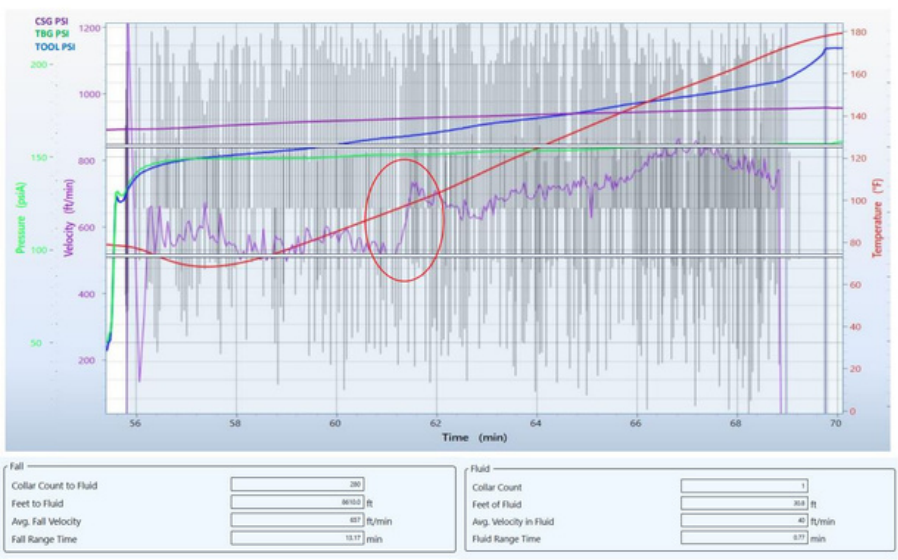
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Diagnose Tubing Issues

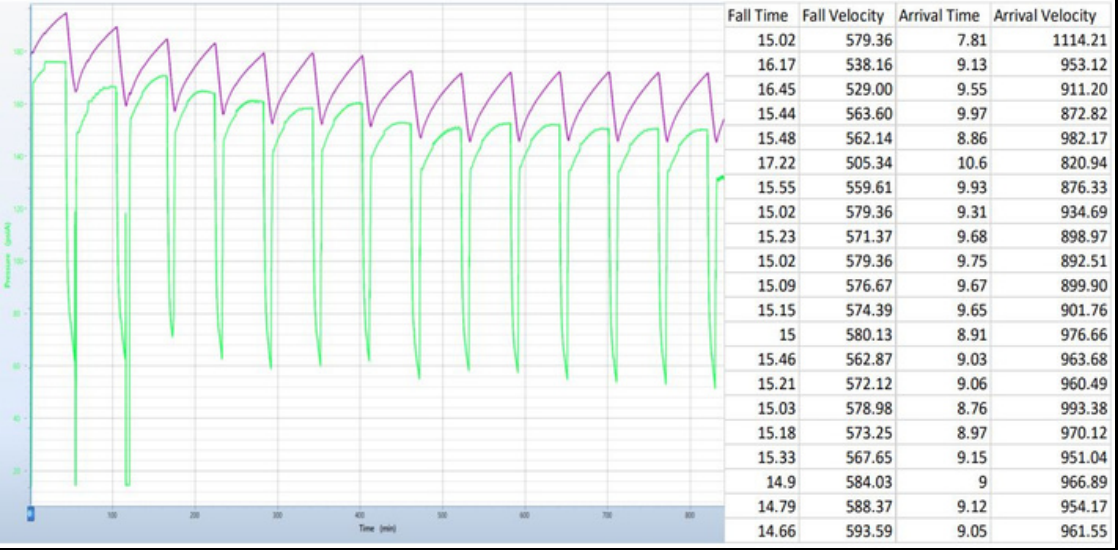
Recorded Data with I-Plunger and CSG/TBG Cigar Gauges

Instrumented Plunger Fall/Fluid Cycle



- These data sets are from the well above.
- By utilizing the I-Plunger and Cigar Gauges we were able to determine the tubing is wore out.
- Surface data allowed operators to determine fall and rise velocities of the production plunger.

24 Hr. Production Plunger Data



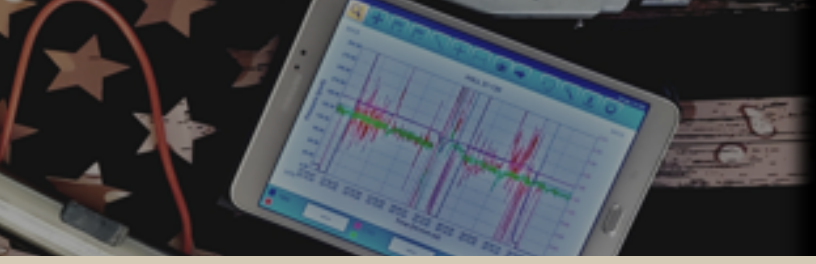
- The plunger being used was a barstock...this well is an ideal candidate for a Dart or Bypass plunger.
- High differential indicates high fluid...also a strong reason for a Dart or Bypass plunger instead of a barstock.



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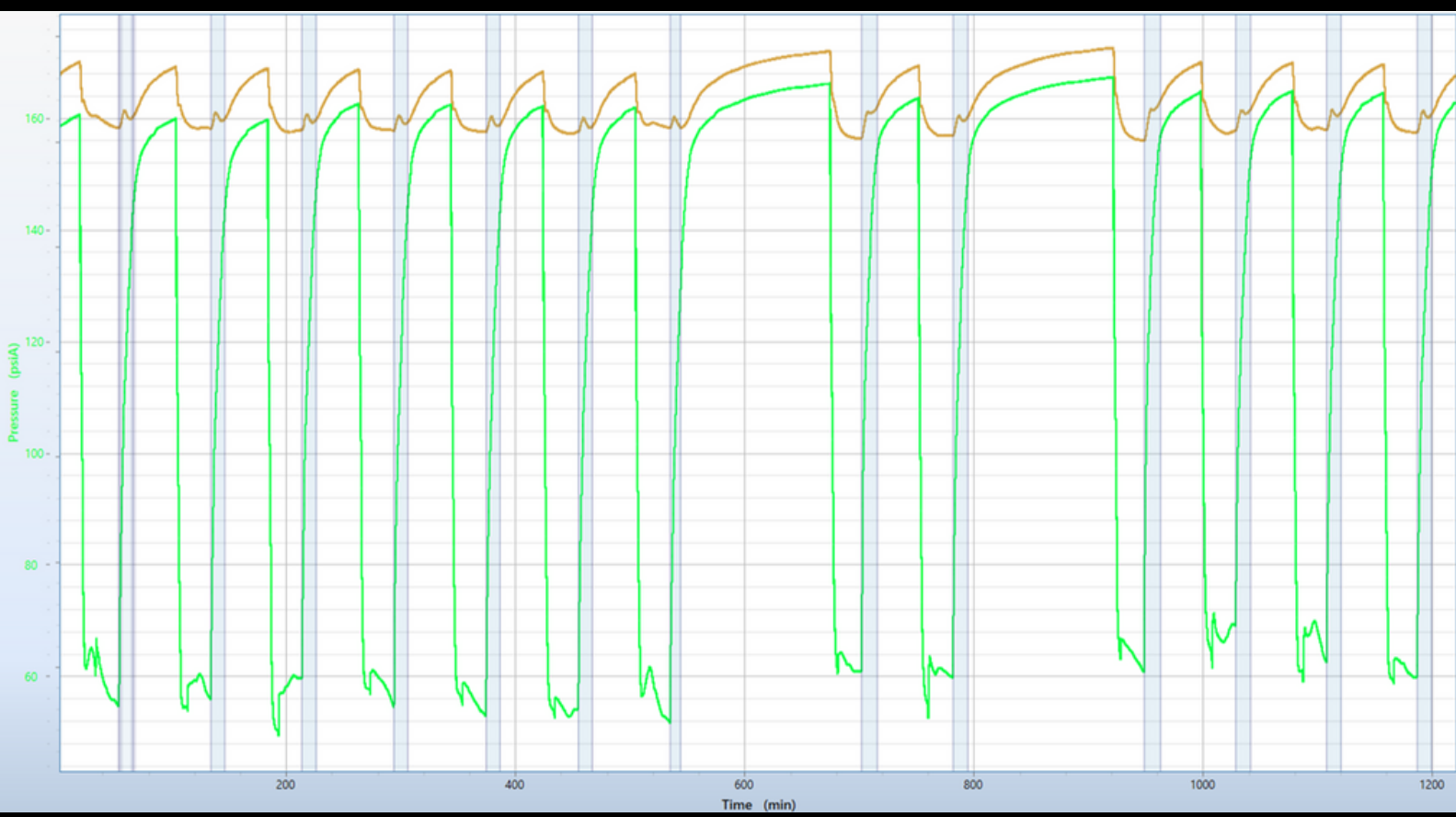


Client Well Analysis / 24 hr. Surface Gauges

Fall time	Fall Velocity	Arrival Time	Arrival Velocity
12.3	512.20	9.97	631.90
12.06	522.39	9.48	664.56
12.35	510.12	10.44	603.45
12.01	524.56	10.51	599.43
11.92	528.52	10.55	597.16
11.95	527.20	N/A (stall)	N/A (stall)
8.98	N/A (stall)	6.87	917.03
13.72	459.18	8.94	704.70
12.39	508.47	6.62	951.66
14.2	443.66	9.87	638.30
12.82	491.42	9.37	672.36
12.49	504.40	9.12	690.79

Cigar Gauges allow for long stretches of data recording with minimal overhead

- In this set we see the plunger stall
- Plunger undetected at surface
- High fall velocities (bar style plunger) may indicate TBG wear, contributing to stalling



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