



Rod Lift Field Guide





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How to Use This Guide

This guide is designed to assist operators and engineers in diagnosing and addressing common challenges in rod lift operations. Here's how to make the most of it:

Identify the Issue: Use the “What’s Inside” section to locate the topic related to your well’s performance or anomaly (e.g., overpumping, stuck pumps, gas interference).

Understand the Symptoms: Each section outlines what to look for, including key indicators such as changes in dynamometer cards, pump efficiency, or operational trends.

Apply Remediation Steps: Follow the recommended steps provided in each section to address the identified issue. These steps are practical, actionable, and tailored to restore optimal well performance.

Leverage Ambynt Solutions: Use Ambynt’s advanced tools, such as Autonomous Setpoint Management (ASPM) and anomaly detection, to implement automated and proactive measures for ongoing well optimization.

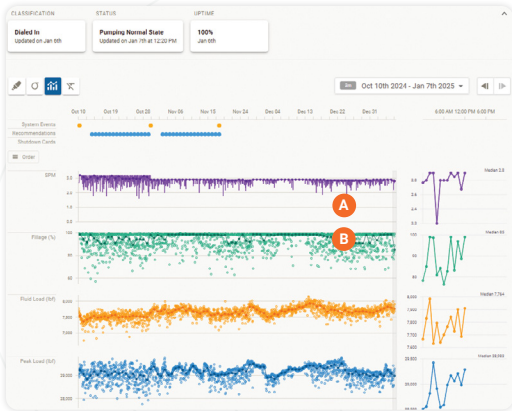
Monitor and Learn: Regularly monitor your wells using the insights and tools outlined in this guide to enhance your operational understanding and prevent future issues.



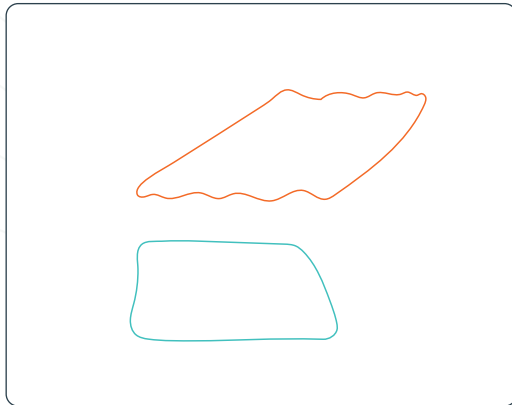
Whether your goal is to optimize production, improve equipment reliability, or troubleshoot specific problems, this guide serves as a comprehensive resource to support your success.



Dialed-In



A B Consistent High Fillage, some light cycling in SPM



DIAMED-IN STATE

What to look for

Primarily full cards with occasional pump-off cards due to routine cycling, demonstrating consistently high fillage.

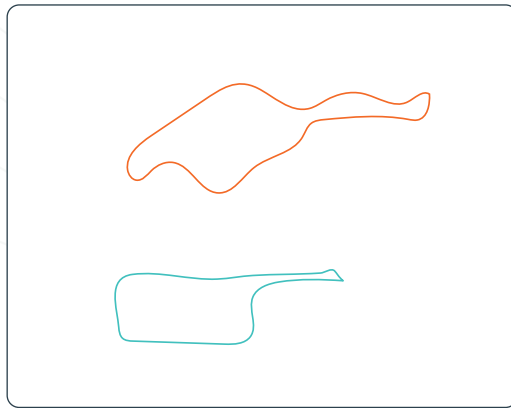
Remediation Steps

None required—your well is already optimized.

Recommended Amblynt Solution

Using Autonomous Setpoint Management (ASPM) to continuously monitor dynamic well conditions.

Overpumping



A B Decrease in pump fillage, more cycling in SPM trend and increased pumpoff cards

What to look for

Majority pumped-off cards with cycling,
& consistently low or sporadic fillage.

Remediation Steps

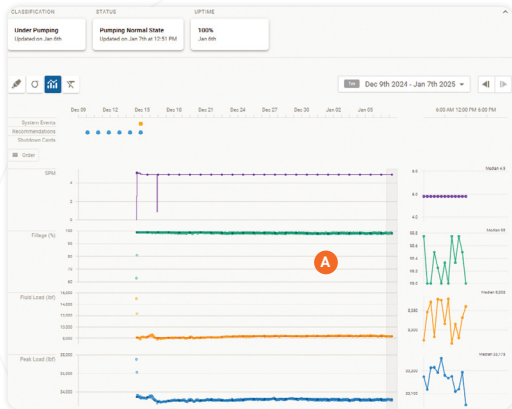
Increase well idle time or adjust the maximum SPM setpoint, and ensure the minimum SPM setpoint aligns with the pumping unit's minimum threshold.

Recommended Ambyint Solution

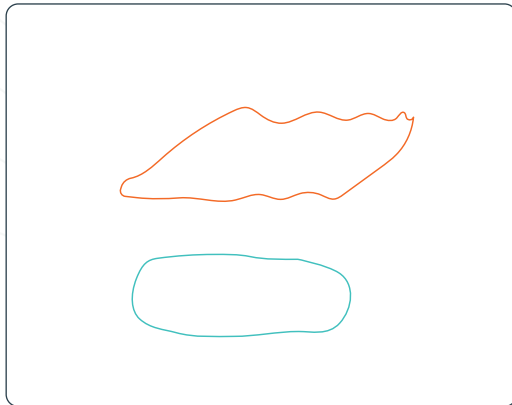
ASPM. This solution enables autonomous control of the well to slow down the well as necessary to meet well inflow.



Underpumping



A High pump fillage, typically 95%+, well is not cycling with speed. Typically at its max value of VFD set speed.



What to look for

Full cards with no cycling, high fillage, and accompanied by a high calculated fluid level and PIP.

Remediation Steps

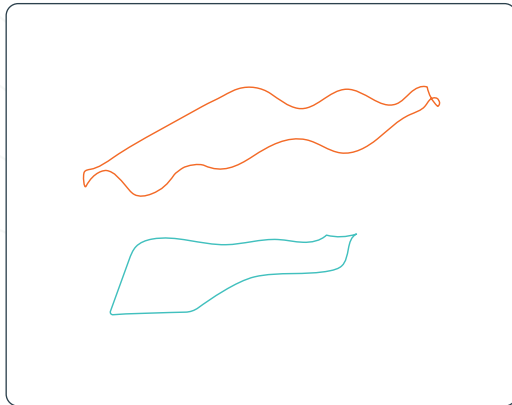
Increase uptime or adjust the maximum SPM setpoint.

Recommended Ambyint Solution

ASPM. This solution will speed the well up every 2-3 days to match current reservoir inflow and aim to transition the well into a "dialed in" state.



Gas Interference



What to look for

Gas interference in a rod lift well occurs when gas enters the pump barrel, disrupting its ability to efficiently lift fluids to the surface.

Remediation Steps

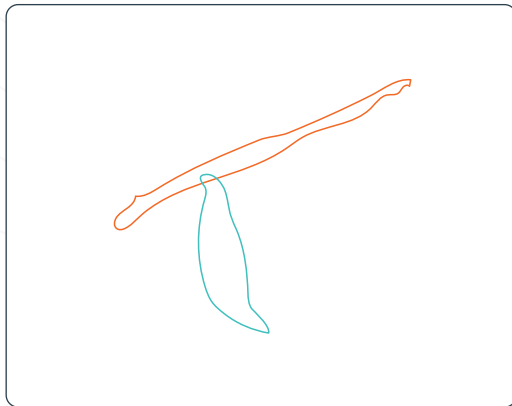
When well has a known high fluid level, increase max spm to attempt to “work through” gas interference. Check tbq / csg pressures, ensuring good pressure differential between.

Recommended Ambyint Solution

ASPM. Ambyint will attempt to speed the well up first while monitoring production impacts.



Stuck Pump



What to look for

Irregular or diagonal surface dynamometer cards with a shortened downhole card, minimal or no pump movement.

Remediation Steps

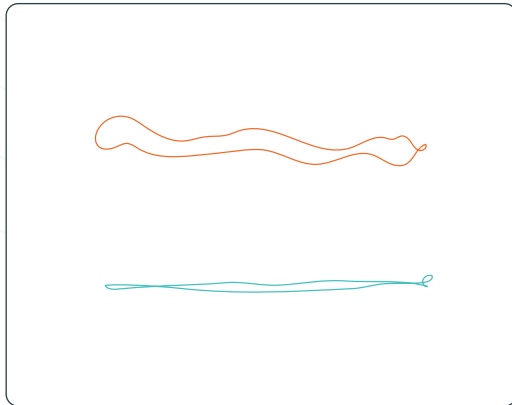
Perform a flush, optimize operating parameters after flush to prevent recurrence.

Recommended Ambynt Solution

Use ASPM and Ambynt anomaly detection to identify and provide a proactive approach prior to well failure.



Rod Part



What to look for

Sudden loss of fluid production, irregular or incomplete dynamometer cards, and abrupt changes in pump fillage. Vibration or noise prior to the failure at surface.

Remediation Steps

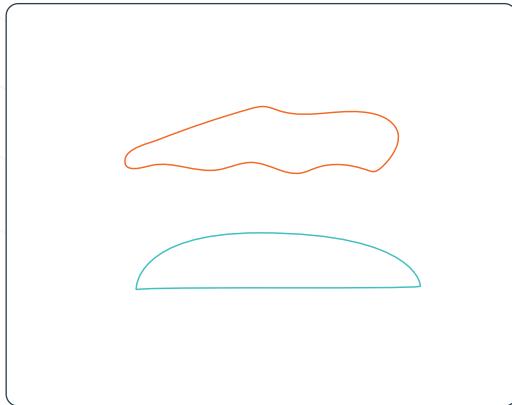
Replace broken or damaged rods and perform necessary repairs. Review rod string design, operating parameters, such as optimizing SPM, load, and stroke length.

Recommended Ambynt Solution

Use ASPM to maintain optimal operating parameters and reduce mechanical stress, prolonging the lifespan of rods and preventing future failures.



Worn Pump



What to look for

Occurs when the pump components, such as valves and/or plungers experience wear over time. This reduces their ability to move fluids effectively.

Remediation Steps

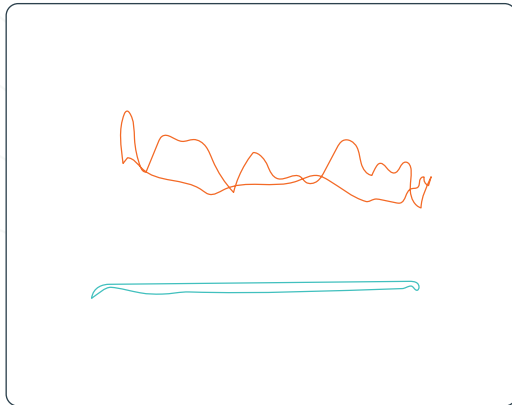
Speed up unit to account for pump "slippage" allowing the pump to stay more full while operating. Treat with chemical if necessary.

Recommended Ambyint Solution

Use ASPM to speed up well to try and get better pump fillage and combat the pump's underperformance while you slot it in your rig line.



Hole in Tubing



What to look for

Occurs when the tubing in an oil well becomes damaged or corroded, allowing fluid to escape before reaching the surface. This results in loss of production, and added strain on the pumping system.

Remediation Steps

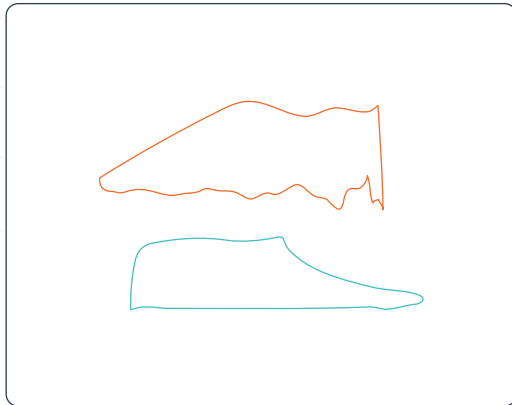
Pressure test tubing to confirm wellbore is compromised.

Recommended Ambiynt Solution

Using anomaly detection, be able to flag well when HIT occurs so that well doesn't continue to run after initial failure causing continued wear on downhole moving parts.



Hole in Barrel



What to look for

A “hole in barrel” occurs when there is a physical breach or wear in the pump barrel where the sucker rods & plunger reciprocate to lift fluid from the well (usually caused by foreign debris).

Remediation Steps

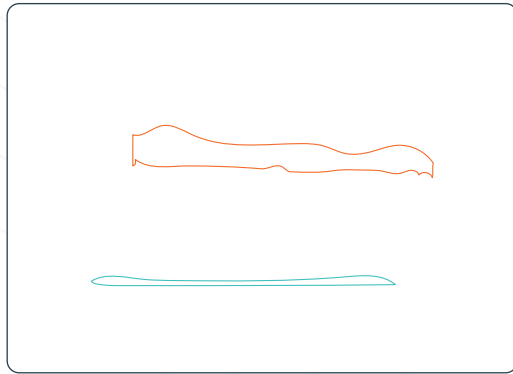
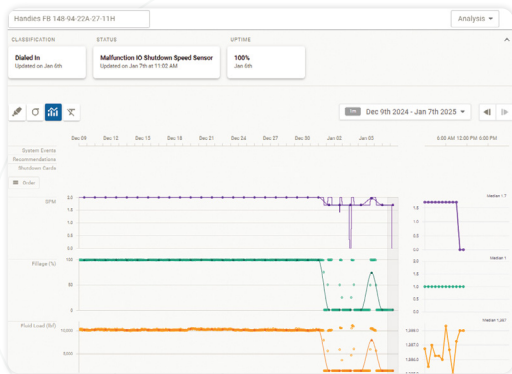
Attempt to speed up well to try and move as much fluid through plunger as possible before putting on rig line.

Recommended Ambyint Solution

Using anomaly detection, be able to flag & identify well when hole in barrel occurs.



Standing Valve Stuck Open



What to look for

A **standing valve stuck open** occurs when the valve at the bottom of the downhole pump fails to close properly, allowing fluid to flow back into the well.

Remediation Steps

Can “tag” the pump by lowering the rod string and temporarily “jarring” your pump in an attempt to free up any foreign debris/matter that is keeping your valves from operating properly. May also attempt flushing your well.

Recommended Ambyint Solution

Using anomaly detection, be able to flag & identify well when stuck valve occurs.



Distorted Dynacards

What to look for

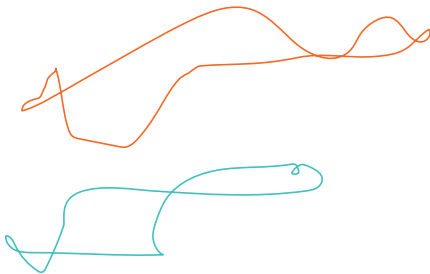
Distorted dynacards provide misleading information about pump performance, making it difficult to accurately diagnose well problems.

Remediation Steps

Adjust friction/damping parameters.

Recommended Ambynt Solution

Check load cell and load cell cable for possible bad connections, broken cables, or moisture in connections. Ensure hall effects (crank and rpm sensors) are aligned and working properly. Make sure rod designs, pump sizes/depths are inputted correctly.



Bad Data

What to look for

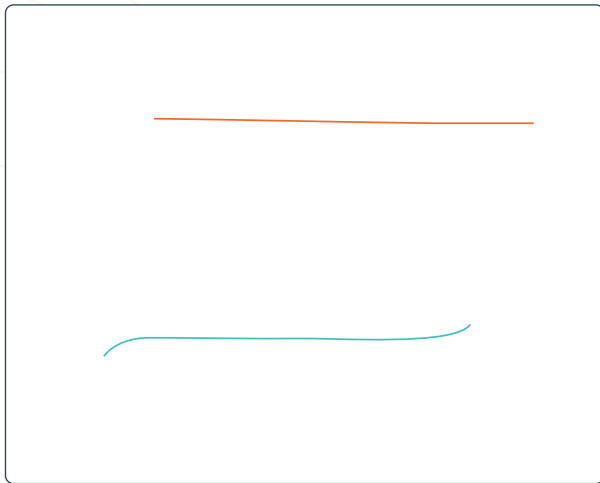
Bad data in oil well operations refers to inaccurate or incomplete information from sensors, gauges, or monitoring systems.

Remediation Steps

Check load cell cable, POC for issues.

Recommended Ambyint Solution

Using Ambyint anomaly detection, be able to flag wells with bad data and address the issue internally or externally.



Delayed Traveling Valve

What to look for

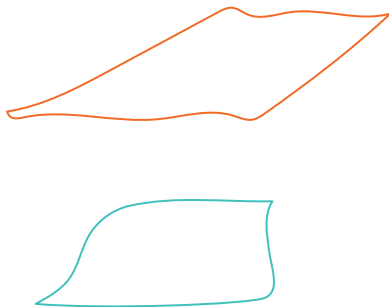
A **Delayed Traveling Valve** occurs when the valve in the downhole pump fails to open and close promptly, often due to mechanical wear or improper seating. This causes inefficient fluid movement, reducing pump capacity and oil production.

Remediation Steps

Reduce the pump speed to allow sufficient time for the traveling valve to open and close properly during the stroke.

Recommended Ambynt Solution

Use ASPM to allow unit to slow down and accommodate for delayed valve travel.



Stuffing Box Friction

What to look for

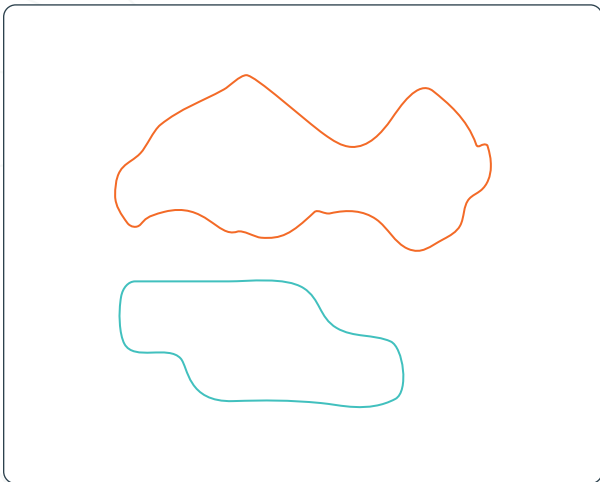
The **Stuffing Box Friction** anomaly indicates increased mechanical resistance at the surface, typically caused by worn packing, poor lubrication, or misalignment. You may notice higher polished rod loads near the top of the stroke, irregular surface card shapes, or elevated power usage.

Remediation Steps

Inspect the stuffing box for excessive heat, dry or worn packing, and lubrication issues. Repack or lubricate the stuffing box as needed, verify rod alignment, and monitor subsequent cards to ensure the load profile returns to normal.

Recommended Ambyint Solution

Ambyint's solution will flag wells that exhibit characteristics of friction at the stuffing box.



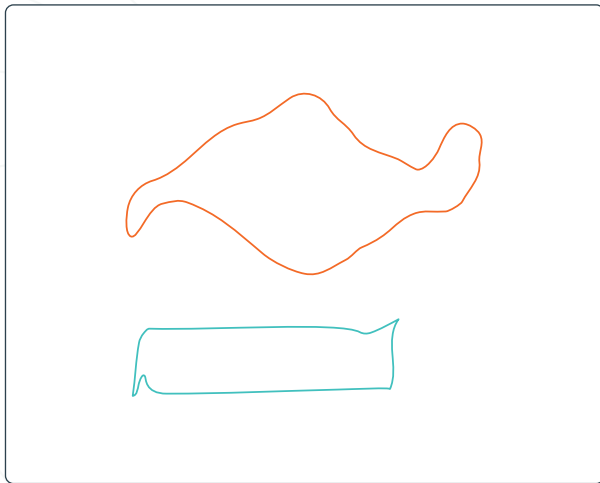
Tagging

What to look for

Tagging in an oil well occurs when the plunger or rod string hits the bottom of the wellbore or pump. This contact when unaddressed can cause mechanical damage, equipment wear, and inefficient pumping.

Remediation Steps

Space out pump properly by raising rod string off of tag. Know recommended spacing parameters for steel and fiber rods on initial install.



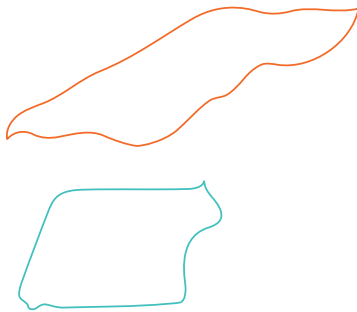
Plunger Undertravel

What to look for

Plunger Undertravel occurs when the plunger in a rod lift system does not complete its full stroke, often due to insufficient fluid levels or mechanical issues. This limits the pump's capacity to lift fluids.

Remediation Steps

Adjust pump spacing. Lower the pump to maximize fluid intake and ensure the plunger operates fully within the pump barrel. Adjust surface stroke length or pumping unit geometry to match plungers stroke capability.



Ambyint Autonomous Setpoint Management

Our physics-informed AI classifies well optimization states and determines optimal setpoints.

THIS FEATURE INCLUDES



Physics-informed
AI calculations



Daily
classifications of
wells that define
optimization
strategy



Optimal controller
setpoint
recommendations
for review



Remote or
autonomous setpoint
updates



User-defined
boundaries to ensure
the well is always
operating within
expected limits



Idle time or speed
changes to ensure
pump efficiency and
reliability





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ABOUT AMBYINT

Ambyint is dedicated to supporting upstream oil and gas companies through our proven AI-powered production optimization platform. Our focus on expanding capacities across personnel and production, while improving safety and sustainability reflects our commitment to addressing critical industry challenges.

By prioritizing operational issues and enabling autonomous well control, we help lean production teams to optimize every well, every day. With nearly 200,000 BOE/D managed on our platform, companies consistently achieve production gains, cost savings, and emissions reductions. Our team in Houston and Calgary stands ready to assist producers across North America with harnessing the power of AI to advance the energy industry's progress toward a more sustainable future.



