



AI Powered Predictive Maintenance for Machine Health.





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Our Purpose

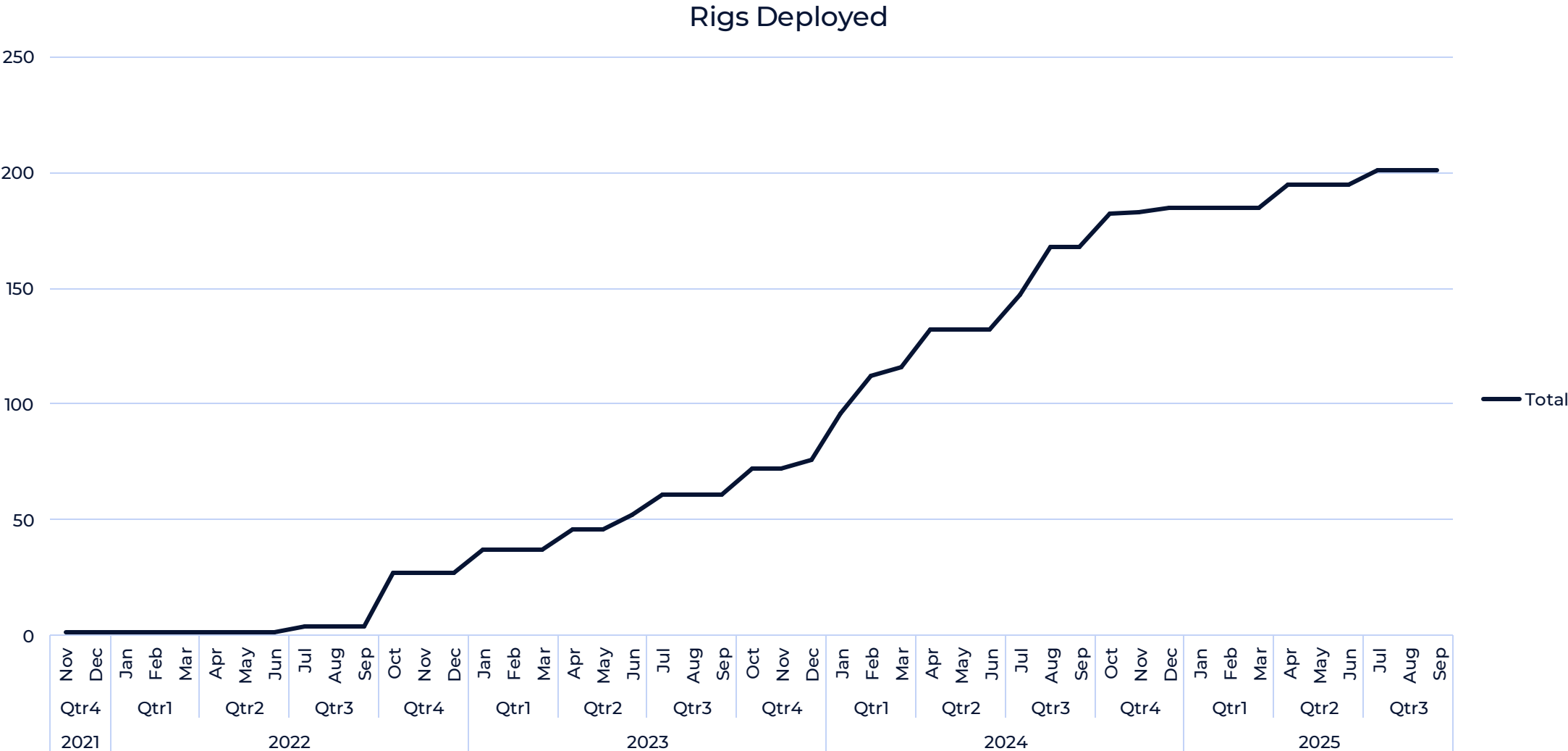
We exist to build technology that elevates people by pioneering comprehensive machine health solutions.

Our mission is to eliminate downtime, enhance safety, and drive sustainable productivity for businesses worldwide.

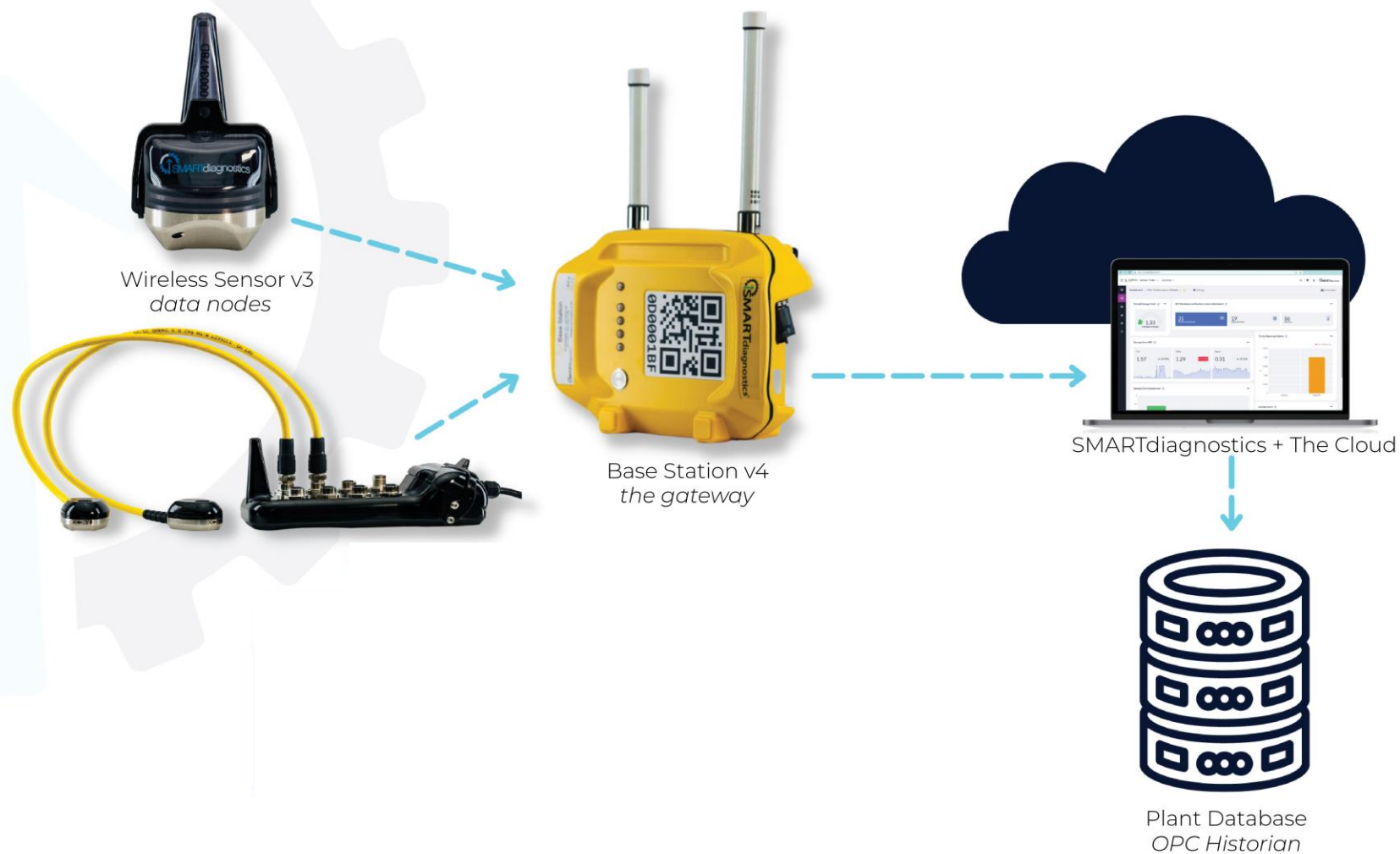
Results

In our **25-year** history, we have partnered with over **700 locations** globally, prevented **85,000+ hours of downtime** on **145,000+ Assets**.

KCF Growth in Drilling



How It Works



Our Approach

Right Data

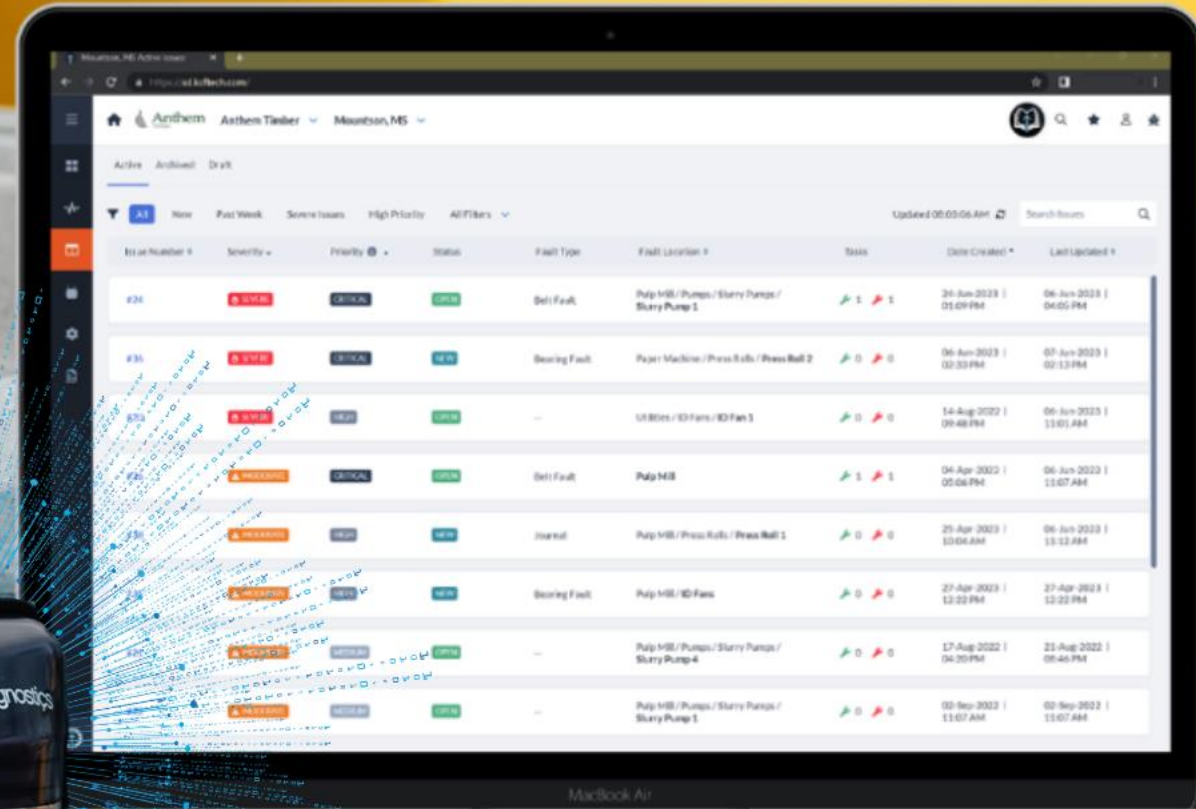
KCF Proprietary Sensors monitor industrial machines 24/7.

Right Analysis

AI and ML diagnose malfunctions, provide alerts, and issue remediation recommendations.

Right Action

From Shop floor to C-Suite, full visibility of facility improvement opportunities as well as enterprise views.



The Solution

Our Platform is **The Definitive Machine Health Solution.**

We deliver a seamless machine health system—eliminating downtime, enhancing safety, and ensuring businesses thrive in a dynamic, modern landscape.

Our platform offers:



Proprietary, enterprise Software-as-a-Service through  **SMARTdiagnostics**



Highly-engineered Industrial Internet of Things (IoT) devices



High-touch engineering services through  **SENTRYsolutions**



How the "Black Magic" Happens

- Desk AI Ticketing
 - Evaluating data across all customers with like assets and compares them to documented past failures.
 - Monitoring for changes in general indicator trends, FFT spectra, and time waveform (raw data) analysis.
- SENTRY Analyst Ticketing
 - KCF Technical Analysts (TA) set static thresholds for rapid alerting. Ideal for mud pumps.
 - EDR data comparison & additional custom indicators to tailor the actionable callouts to your operations.

SMARTsensing Hardware

A machine health optimization program is only as good as the data its built from. Hardware that can withstand the toughest industrial challenges is critical. Discover the KCF equipment enabling you and your team to gather the insights needed to optimize manufacturing performance.



The IoT HUB Monitoring Capabilities Include:

- Ultrasonic Sensing
- Oil Humidity
- Tachometer
- Legacy Vibration*
- Motor Current Signature Analysis
- Pressure Signature
- Voltage
- PLC-Based Trigger
- Current Signature

**Through Integrated Piezoelectric (IPEP)*

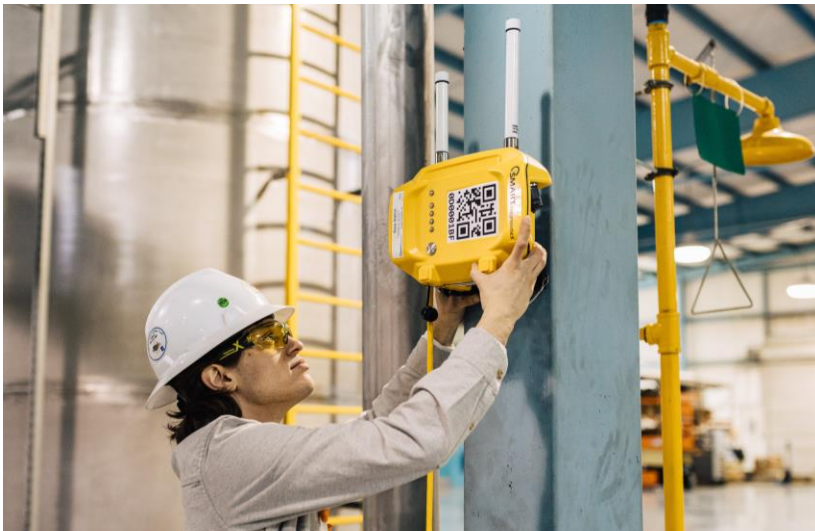
Base Station Gateway

The Base Station is the nerve center of any SMARTdiagnostics® Machine Health Platform installation, allowing effective predictive maintenance for your industrial equipment

The KCF Hardware Advantage:

DART Wireless

Uses Dart Wireless to receive data from Vibration Sensors for a reliable stream of continuous data



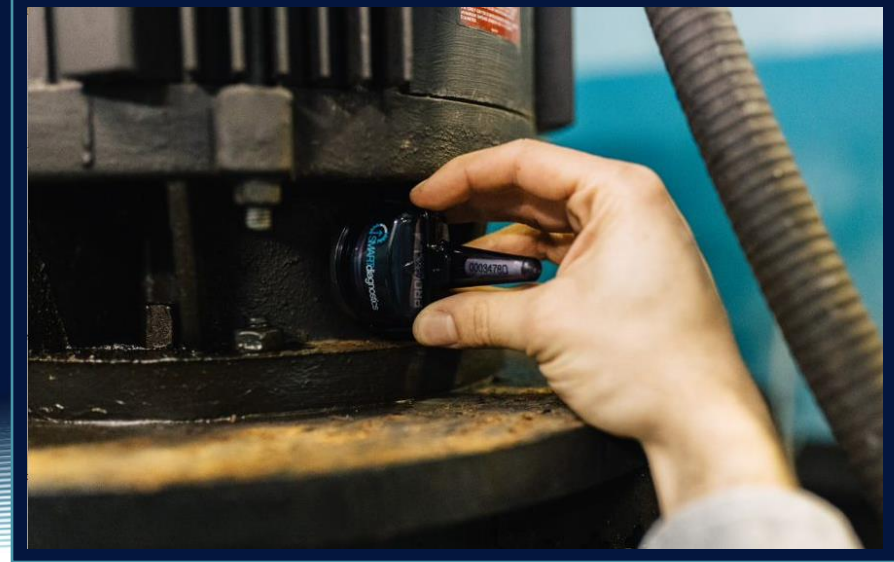
Key Features:

Modular and Scalable: Vibration Sensors dynamically transmit data to the closest Base Station - no intervention needed

Simple Connectivity: Only requires a power outlet and internet connection, mounted with a universal mount

V3-Vibe + Temp Sensor

Industry leading data acquisition in high definition while achieving a **total cost of sustainment 16x less** than the average competitor.



8x more data
per battery

Class 1/Div 2

Stainless
steel

Industry leading
Magnetic Pull

Impact resistant
shell

Mount in 3
Seconds

Replace battery
in 30 Seconds

Actionable data
in 3 Minutes

KCF WIRELESS VIBRATION SENSOR

- ✓ Full spectrum up to minute-by-minute data capture
- ✓ Industrial grade hardware
- ✓ High quality data
- ✓ Hazardous location rated
- ✓ Deploys and generates data in minutes
- ✓ Over the counter, quick change battery
- ✓ Full control over sensor system – move & reassign sensors

Right Data

Achieve **3.6x more asset coverage** with the only comprehensive platform to ingest Oil, MCSA, Pressure, Vibration, Legacy IEPE sensors, and Ultrasound into one software platform.

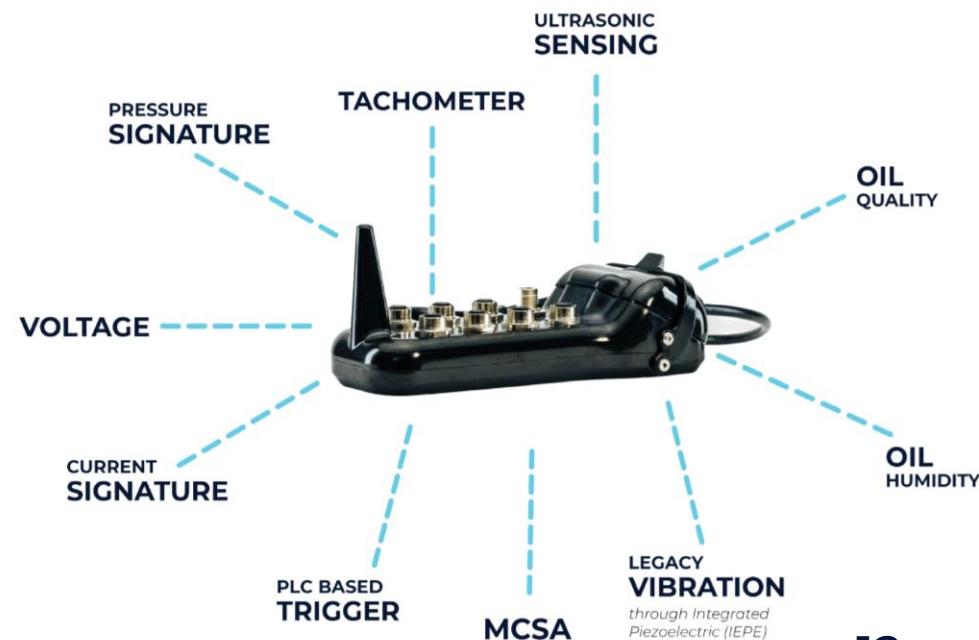


COMPLEX EQUIPMENT READY – IoT HUB

- Triggered data acquisition
- Multi-channel synchronous sampling
- Direct integration to PLCs

WIDE RANGE OF MONITORING CAPABILITIES

- Plug and play integration with 3rd party sensors using 4-20mA , 0-10V
- High fidelity monitoring with new or legacy piezoelectric accelerometers using IEPE



Mud Pump-Power End Failure Mitigation

#29 Moderate Gear Fault

CLOSED Rig 1207 / Mud Pump 2 - 160295 / Power End / Module 1 · Created 13-Nov-2023 | 09:20 PM

Feed Tasks Savings

All Activity ▾

Search Feed



Nov 13, 2023



#29 Moderate Gear Fault issue created

13-Nov-2023 | 09:20 PM

Description

MP2 Gear end vibrations are slightly higher than Mud Pump 1. Rig X49 recently had a failure with vibrations marked on the plot.

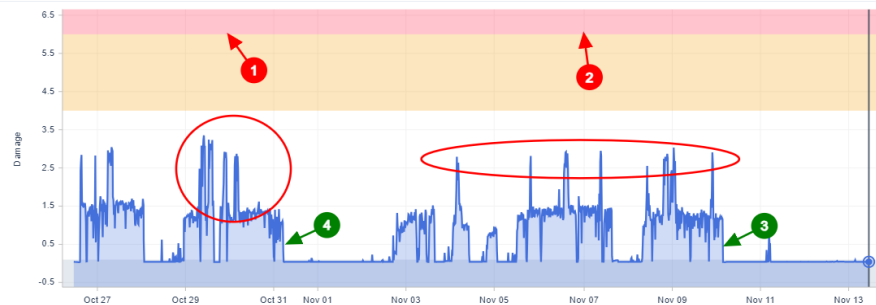
Recommendation

As time allows, inspect Gear End. Check oil samples and act accordingly.

Time Series Plot

View Plot Details

View Trend



Go to latest ↓



Add a comment

Submit

\$160k cost avoidance

Power end would have failed, lubrication system not working

Feed Tasks Savings

All Activity ▾

Search Feed



LH

Larry Heighington

28-Nov-2023 | 01:49 PM

@Cameron Walsh From email chain yesterday - Upon checking out Mud pump 2 we were checking oilers and filters pressures ect. I noticed that the mud pump external oiler was running with correct pressures but was not discharging oil over the front crossheads and pony rods. Removed back sight glass to see if we could see any signs of back end getting lubricated. Because of limited space you could see some movement in lower corner of pump. We assumed oilers were plugged up on front end attempted to blow air through and poke wire but no success. We then decided to pull off back clam shell and remove all guards off to investigate further. We had to suck all oil out of mud pump and it was discovered that the external gear oiler was plumbed into a open port (essentially only filtering oil)and not tied in with the internal oiler pump lines.

The internal gear oiler only lubricates when over 40 strokes per minute.

The external oiler and internal oiler are essentially the back up for each other in case one fails the pump is always being lubricated.

The day prior to all this i changed oil and filters as per work order on a bad oil sample. I did notice internal screen for oiler was gunked up pretty good.

Mechanic did a visual check on mud pump did not see any noticeable bearing shavings and nothing other than normal wear and tear on cross heads.

Oilers are plumbed in correctly now . I believe this pump came from the repair shop or factory as this is something that would never be moved by rig personnel.

Please go ahead and monitor pump and see how it looks

Mud Pump-Bearing Failure Mitigation (1/2)

#97 Severe Bearing Fault

CLOSED Rig X49 / Mud Pump 1 - 1694467 · Created 22-Jan-2024 | 01:31 AM

Feed Tasks Savings

All Activity ▾

Search Feed



Jan 22, 2024



#97 Severe Bearing Fault issue created

22-Jan-2024 | 01:31 AM

Description

Power End / Module 3 / Y / Damage Accumulation Acceleration

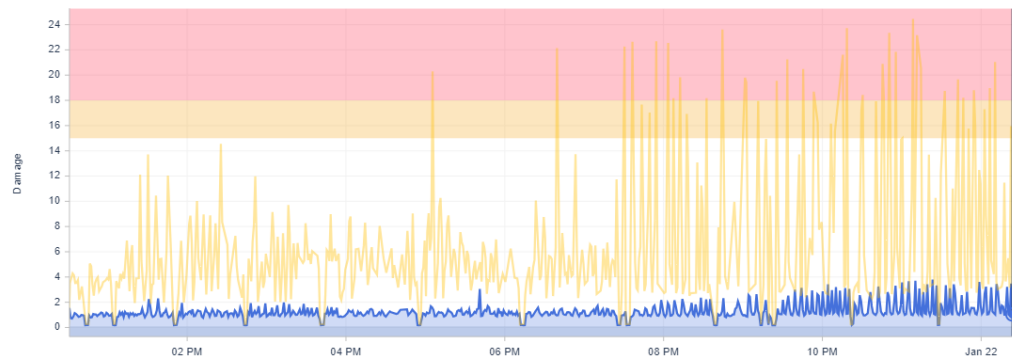
Recommendation

Check Mud pump and Lube oil for obvious issues. If possible shut down MP and perform inspection

Time Series Plot

View Plot Details ↗

View Trend ↗



Jay Castle

22-Jan-2024 | 02:00 AM ↻

RM called back stating the Lube oil was a little low, as soon as they can thaw out air lines they will add oil



Larry Heighington

22-Jan-2024 | 11:21 AM ↻

@Cameron Walsh Is this looking better now? What action should the rig take? They are running it right now.



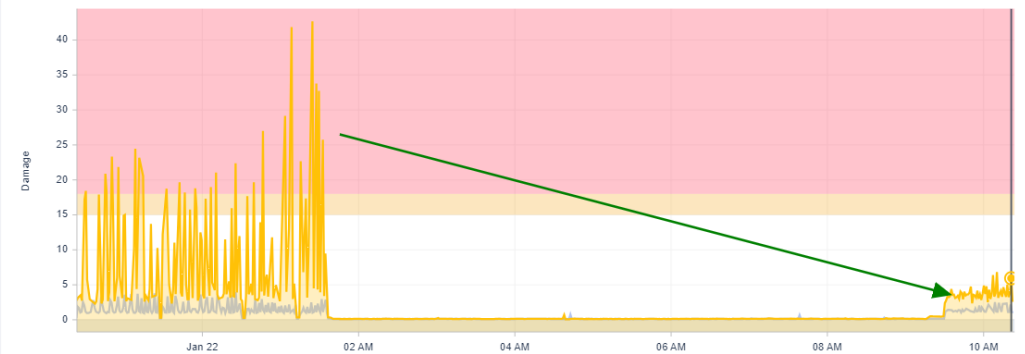
Plot added by Cameron Walsh

22-Jan-2024 | 11:24 AM

Last 12 hours

View Plot Details ↗

View Trend ↗



Cameron Walsh

22-Jan-2024 | 11:25 AM ↻

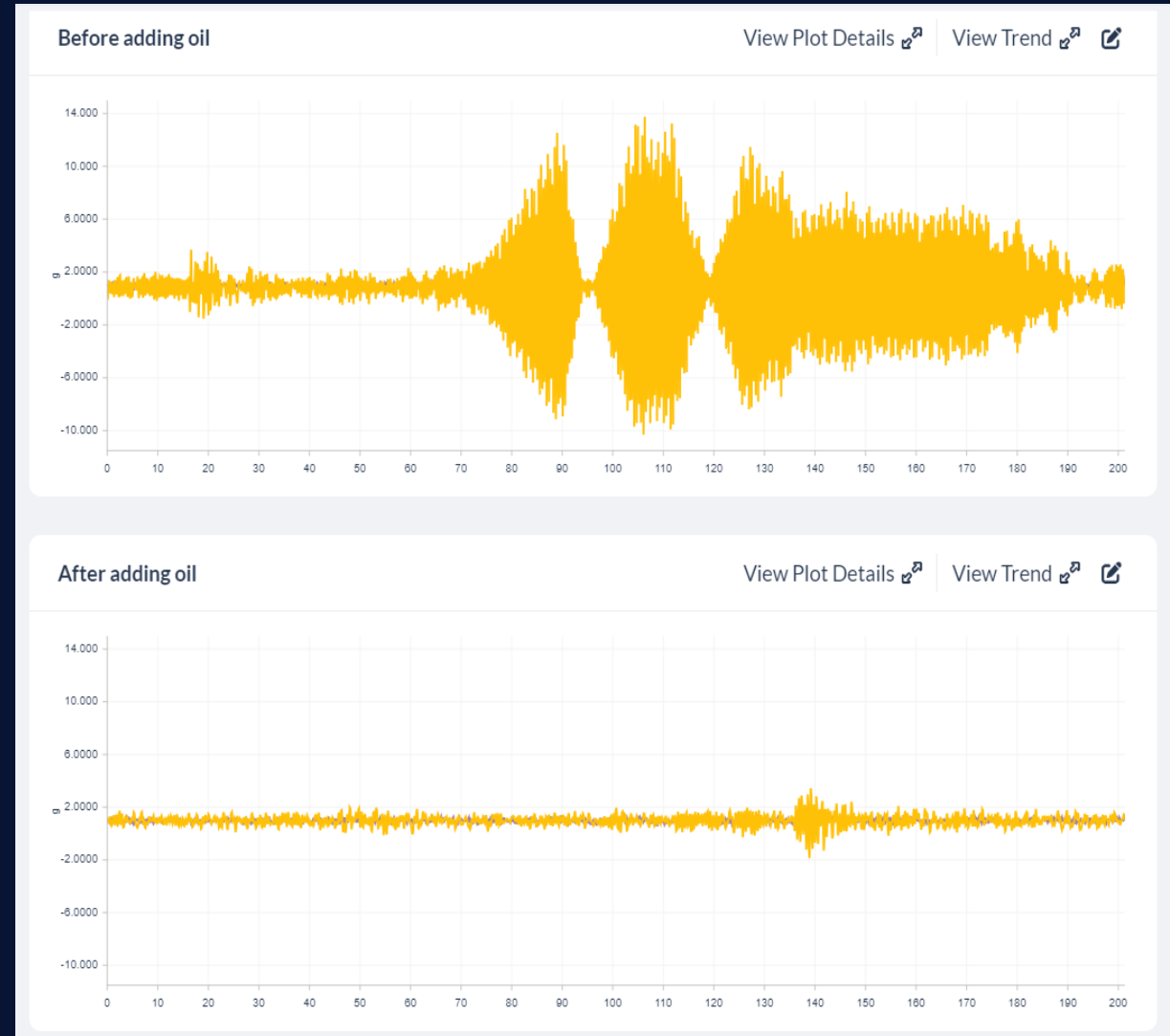
@Larry Heighington, much better! Still some lube fault signature left in the burst samples, but very minor by comparison. I think once the oil circulates a little more, then we'll see those signatures disappear. For now though, I think we can close this one out.

Mud Pump-Bearing Failure Mitigation (2/2)



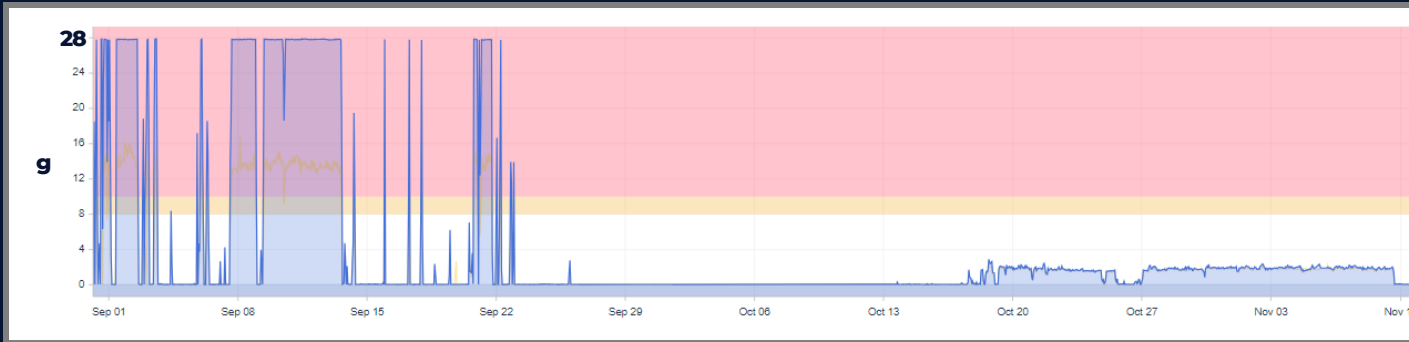
\$160k cost avoidance –

Power end would have failed due to lubrication problem on bearing. Improved lubrication significantly reduced impacting and allowed rig to continue operations.

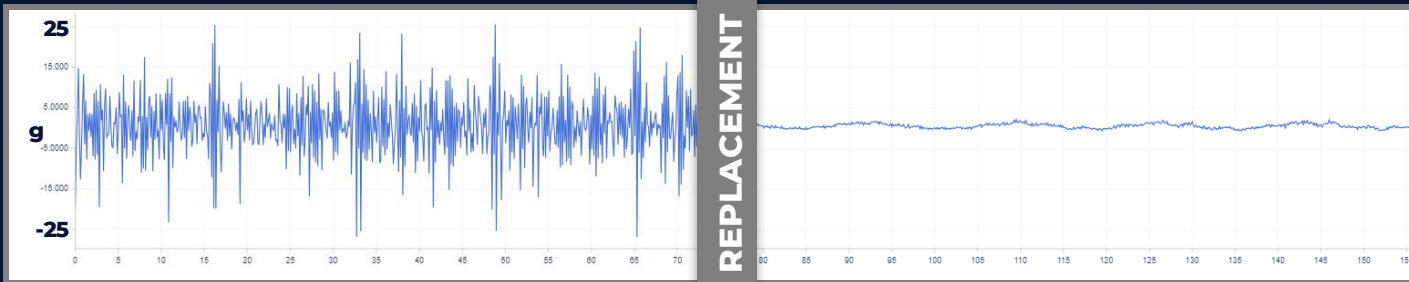


Top Drive-Blower Motor

VIBRATION
TREND



BEFORE
& AFTER

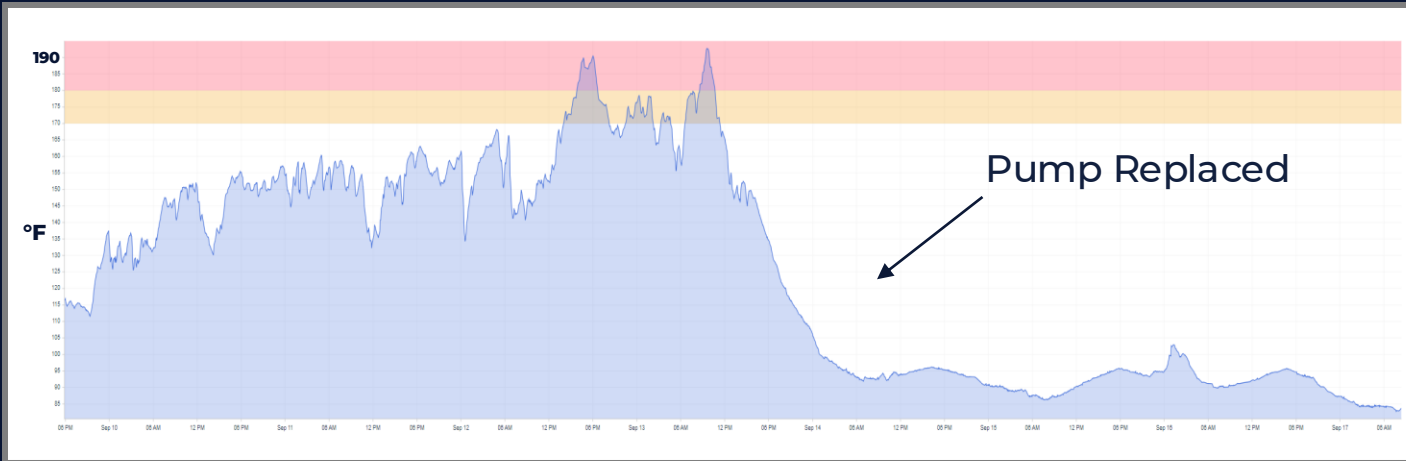


Upon deployment of the KCF SMARTdiagnostics technology on this drilling rig, the data immediately indicated the top drive blower motor was in critical condition. KCF's analysts were able to compare this motor with other top drive blower motors across the industry and make an immediate recommendation for the rig crew to take action. If this blower motor were to fail during drilling, it is very likely that the traction motor would overheat and shut down the operation. This would create significant NPT for the driller and result in significant costs incurred for a Top Drive replacement.

With the integration of advanced vibration monitoring and AI-driven predictive maintenance technologies in KCF Technologies' SMARTdiagnostics™, Drilling Rigs are enhancing operational efficiency, reduce equipment downtime, and extend asset life.

Top Drive-Gearbox Lube Pump

TEMPERATURE
TREND

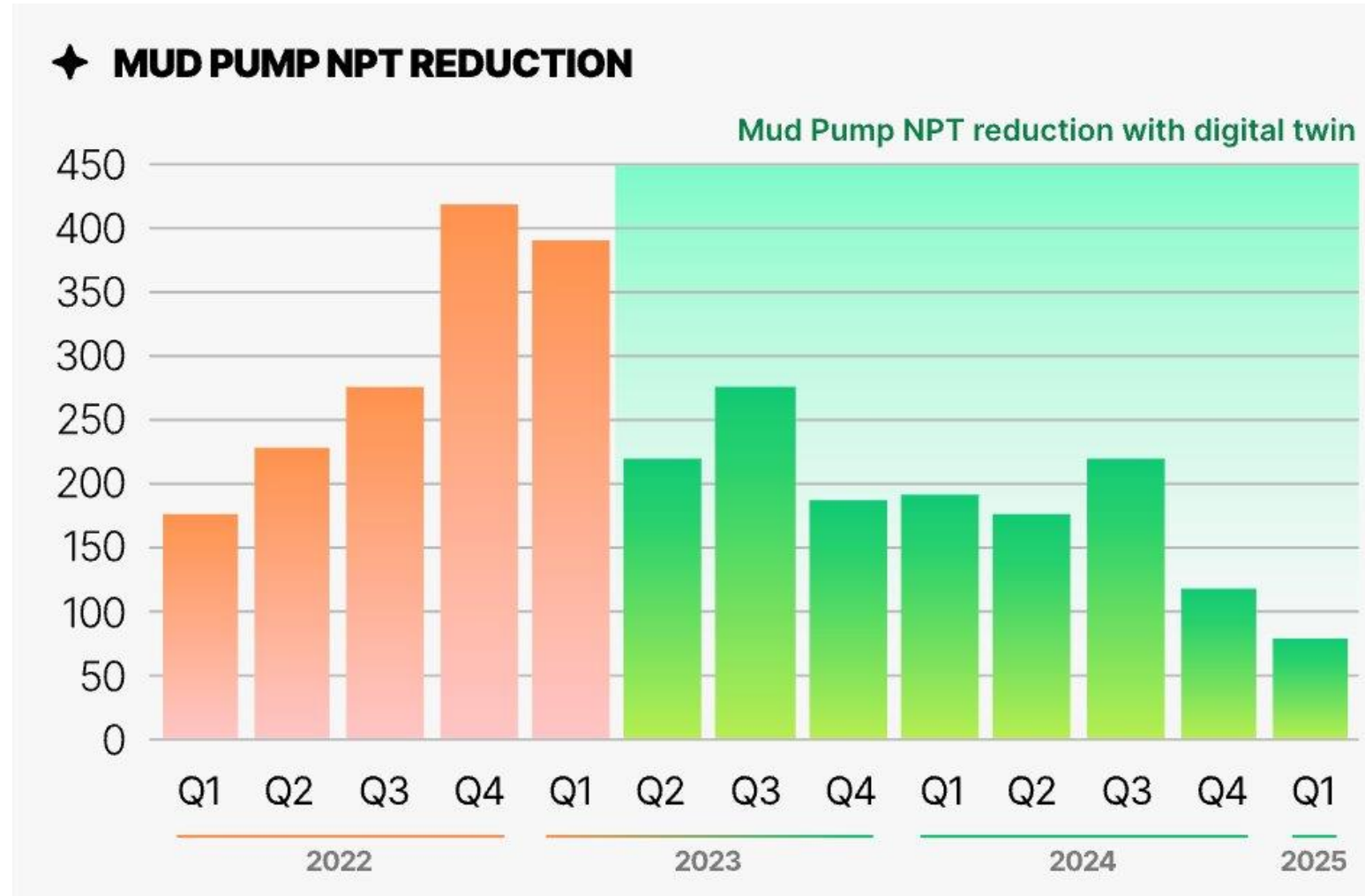


TOP DRIVE COVERAGE

- Bearing Faults
- Rotor bar faults
- Stator Windings
- Overheating
- Imbalance
- Looseness
- Misalignment
- Cracked Gear Teeth
- Gear Wear
- Gear Backlash
- Gear Misalignment
- Gear Loose Fit
- Gear Assembly Phase Problems

Upon deployment of the KCF SMARTdiagnostics technology on this drilling rig, the data indicated an increasing temperature trend on the top drive. The temperatures exceeded OEM recommended max ambient levels and rig inspection resulted in finding a poorly running lube pump. After changing the pump, pressures returned to optimal levels and operating temperatures dropped by 70F on average. Had the lubrication pump not been changed out, continued heating of the oil would have continued and could have resulted in the smoke point being reached – increasing the risk of a major fire on the top drive.

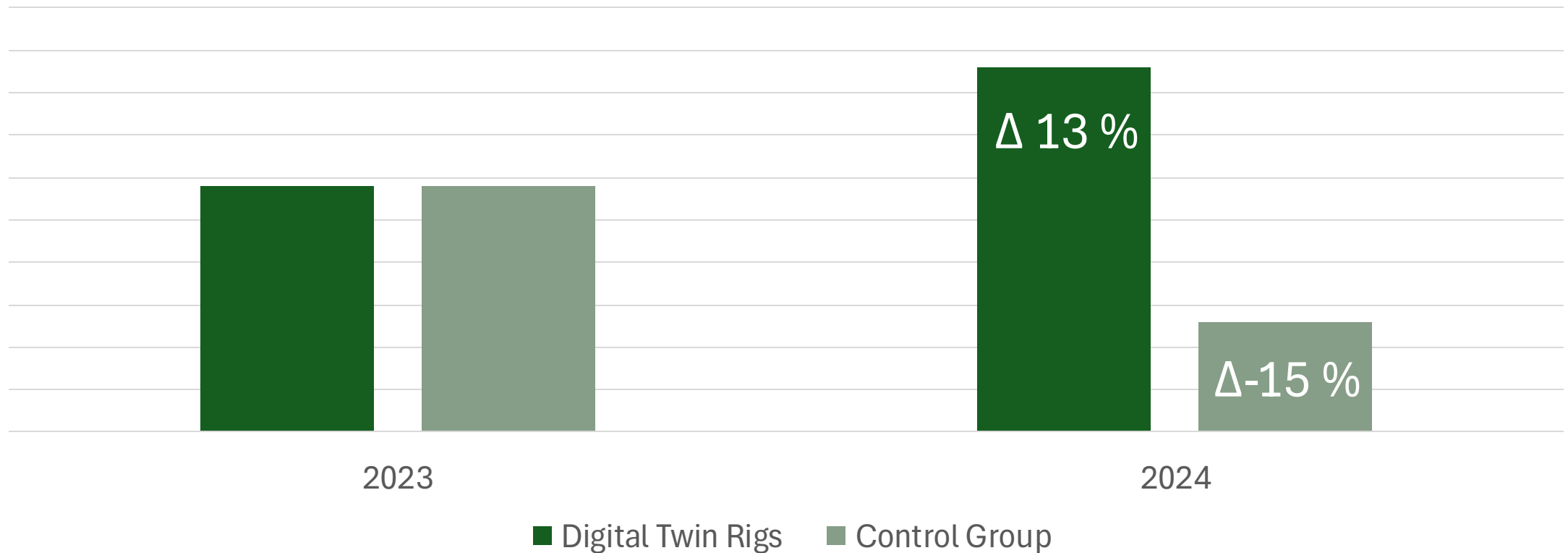
Mud Pump NPT Reduction



Drilling Performance

Drilling performance improved 13% YoY and 28% compared to rigs without the solution

ROP (Ft/hr) Comparison: Digital Twin Rigs vs. Control Group



- Digital Twin Rigs: 27 early adopter rigs selected with full implementation completed before EOY 2023
- Control Group: 10 rigs selected that do not have solution at time of analysis

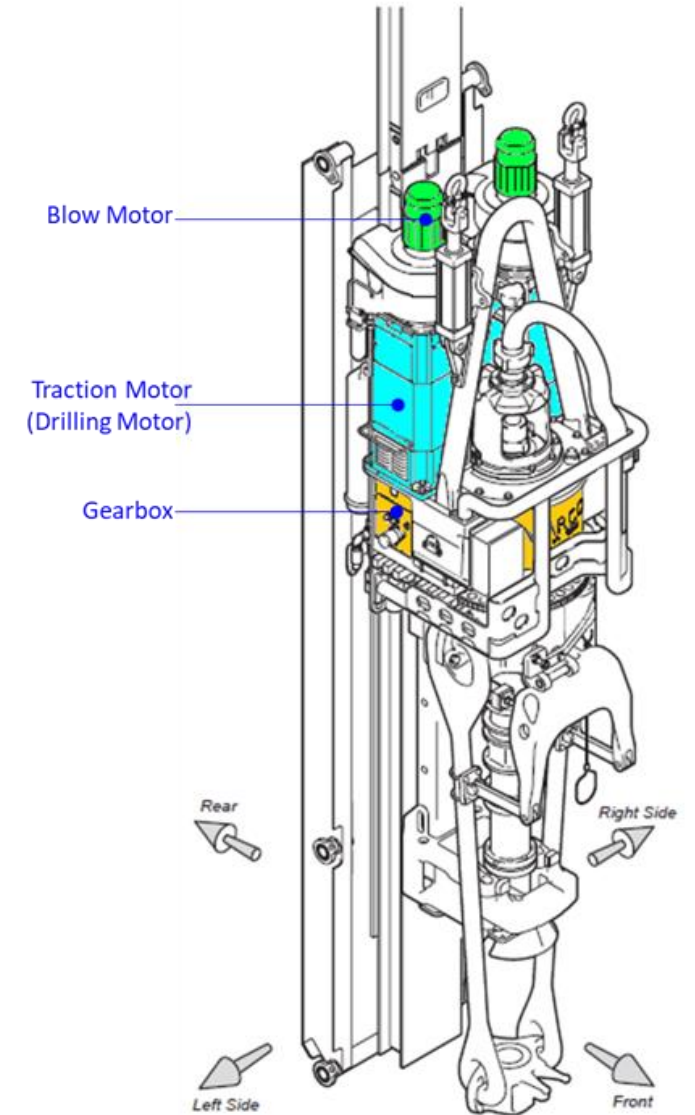
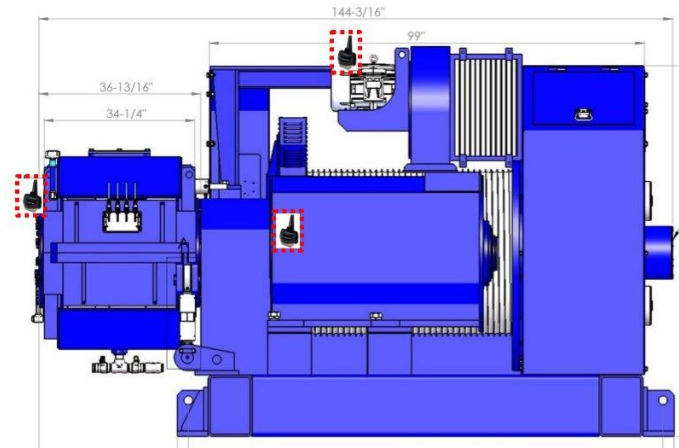
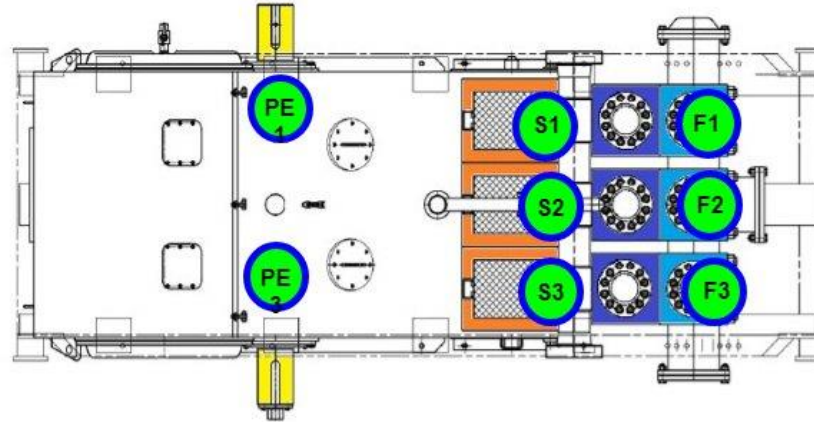
KCF Drilling Rig's



- US Land
- Canada
- Mexico
- Australia
- Saudi, Oman, Bahrain

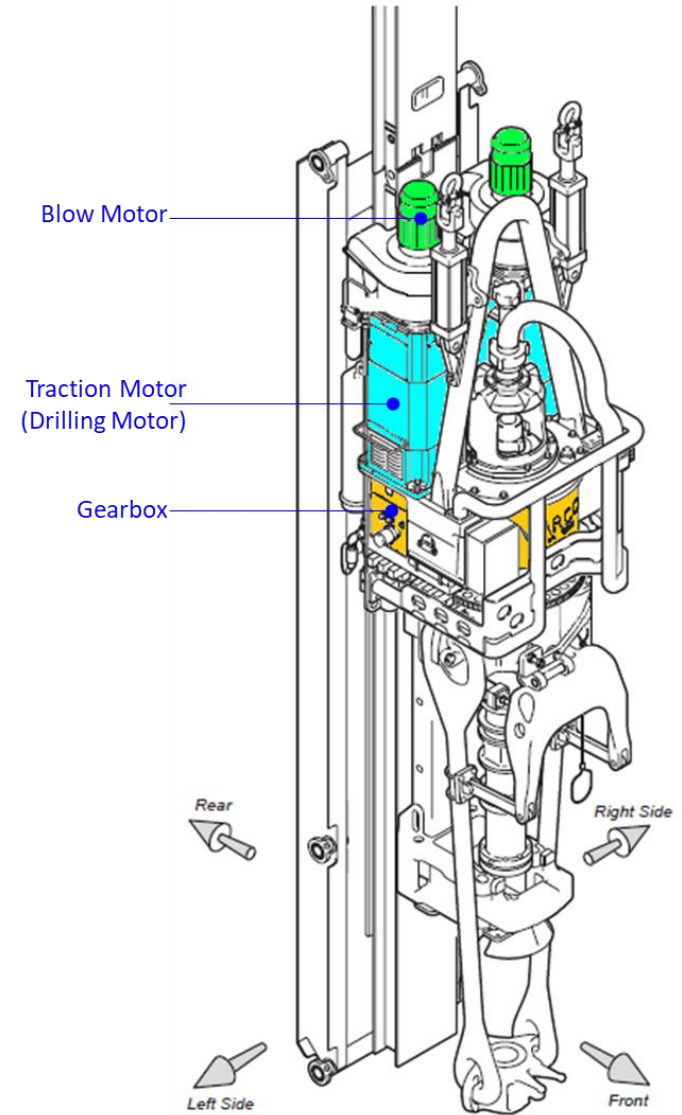
Rig Assets Monitored

- Mud Pumps
- Top Drive
- Drawworks
- Pulsation Dampeners
- Generator Bearings



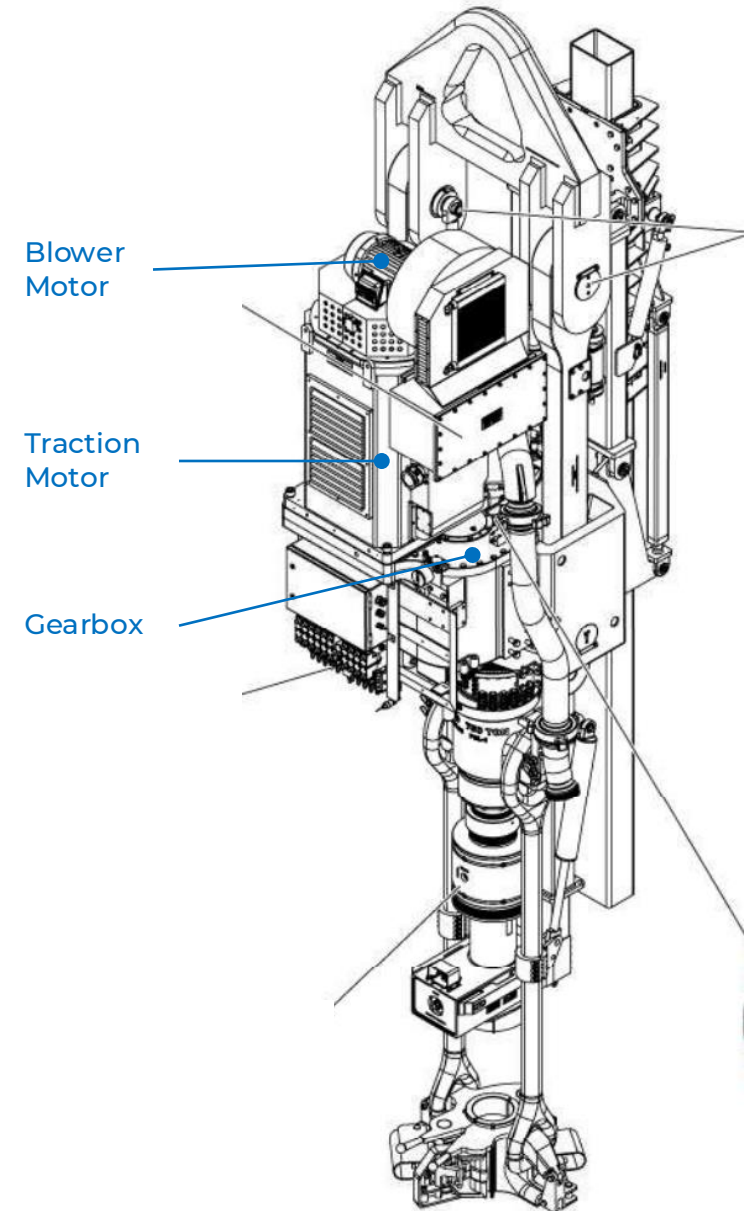
NOV-TDS 11 Overview

- To Date we are monitoring **3 main components** on these Top Drives
 - **Blower Motors**
 - Driller's Side (DS) & Off-Driller's Side (ODS)
 - **Traction Motors**
 - Inboard on both DS & ODS Motors
 - **Gearbox**
 - Sensor on bottom of gearbox



TESCO ESI 1350 Overview

- To Date we are monitoring **3 main components** on these Top Drives
 - **Blower Motor**
 - Motor Inboard (preferred)
 - **Traction Motors**
 - Inboard & Outboard
 - **Gearbox**
 - Top & Bottom



Canrig 1250/75 Series Overview

- Monitoring 3 main components on these Top Drives
 - Blower Motor
 - Motor Inboard
 - Traction Motor
 - Inboard (bottom) & outboard (top) bearings
 - Gearbox
 - Top and bottom to measure pinion & main gears

