Artificial Lift R&D Council

Wireless Sensor Technology to Monitor Rod Rotator Performance

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Problem Statement

Rod strings in motion produce frictional forces between rods and tubing, resulting in accelerated wear and subsequent failures.

Remedies:

- Limit dogleg severity in initial design
- Rod guides to be sacrificial wear component
- Tubing rotators
- Continuous Rods
- Lined Tubing
- **Rod rotators**

Rod rotators are only valuable if they are working

- About 35% of rotators not working at any given time
- Rod rotators are difficult to monitor
- Failed rotators contribute to rod failures and pulling costs
- Remedies:
  - Visual surveillance is difficult and expensive
    - Resource constraints
  - Wired monitoring with off-the-shelf or home-grown solutions
    - Wiring creates more failure points

Desired Solution for Rotator Monitoring

It should be…

- Wireless
- Long battery life
- Works with any rod rotator
- Works with any Rod Lift Controller
- Simple Installation
- Reliable
- Low cost

Simple Deployment

Sensor Receiver

Agnostic to Exsisting Equipment

Any rotator

Works with any rod rotator, providing an economical retrofit solution using existing equipment in the field

Any RTU

Connects into any RTU that has analog input/output – PLC, POC, VSD

Any SCADA

Ties into any host system for added trending capabilities, data gathering, and graphical analysis

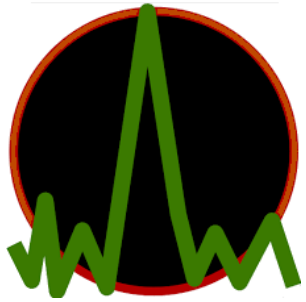
Long-Lasting Wireless Solution

Sensing technology

Leverages sleep/wake proprietary sensing methodology to report health of rotator, including rotation status and comms status

Long battery life

Offers a three-year battery life* for a long-lasting wireless solution



Spectrum Analyzer

Analyzes nearby frequencies and will list the frequency channels not to use, to reduce interference

**Based on calculations from short-term testing with standard 15–30-minute polling intervals; dependent on operator's preferred frequency of data acquisition*

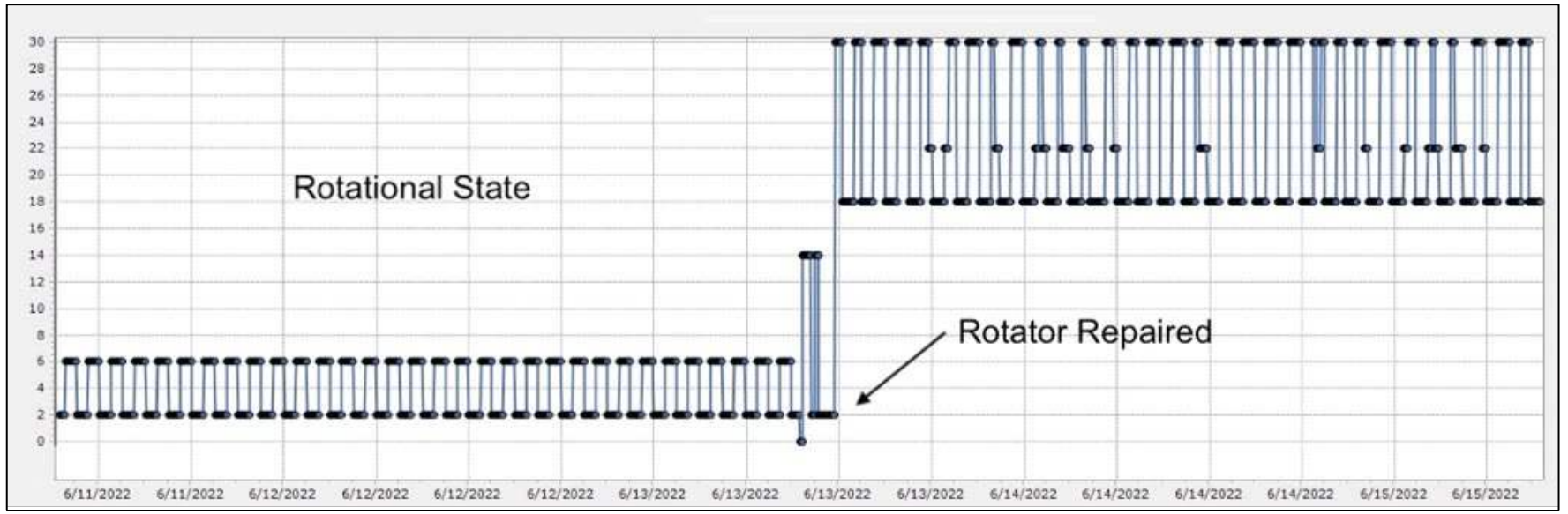
Field Deployment

- Launched to Market in 2022
- 100+ deployed since launch
- Firmware iterations / tuning
- Works on beam (conventional and enhanced geometry) and linear unit

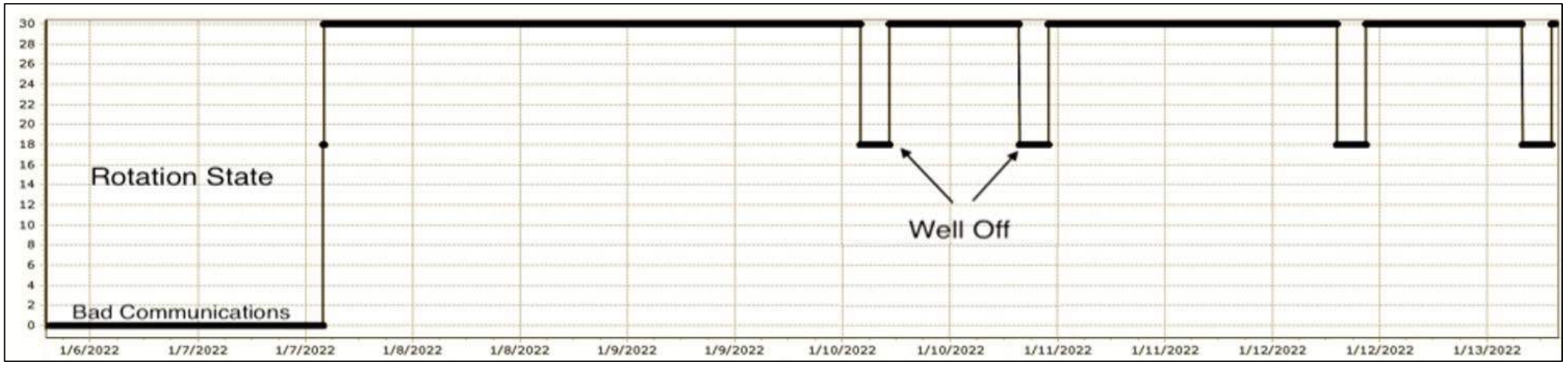
Rod Rotator Status

Sensor value	Rotation state meaning
30	OK, well running, rods rotating
22	OK for now, well running, no rotation noted, but hasn't gone long enough to report it yet
18	OK, well is not running, but was rotating when last running (Any value <16 indicates a problem)
6	PROBLEM, well is running and no rotation is noted (but communications is OK)
2	PROBLEM, well is not running but no rotation was noted when it last ran (but communications is OK)
0	PROBLEM, communications is bad so rotation state is unknown, could be a bad battery or radio malfunction

Rod Rotator State – Repaired Rotator



Rod Rotator State – Bad Communications



Acknowledgements, Thank You & Questions

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