



Advancing Sewer Bypass Technology with IoT (Internet of Things)

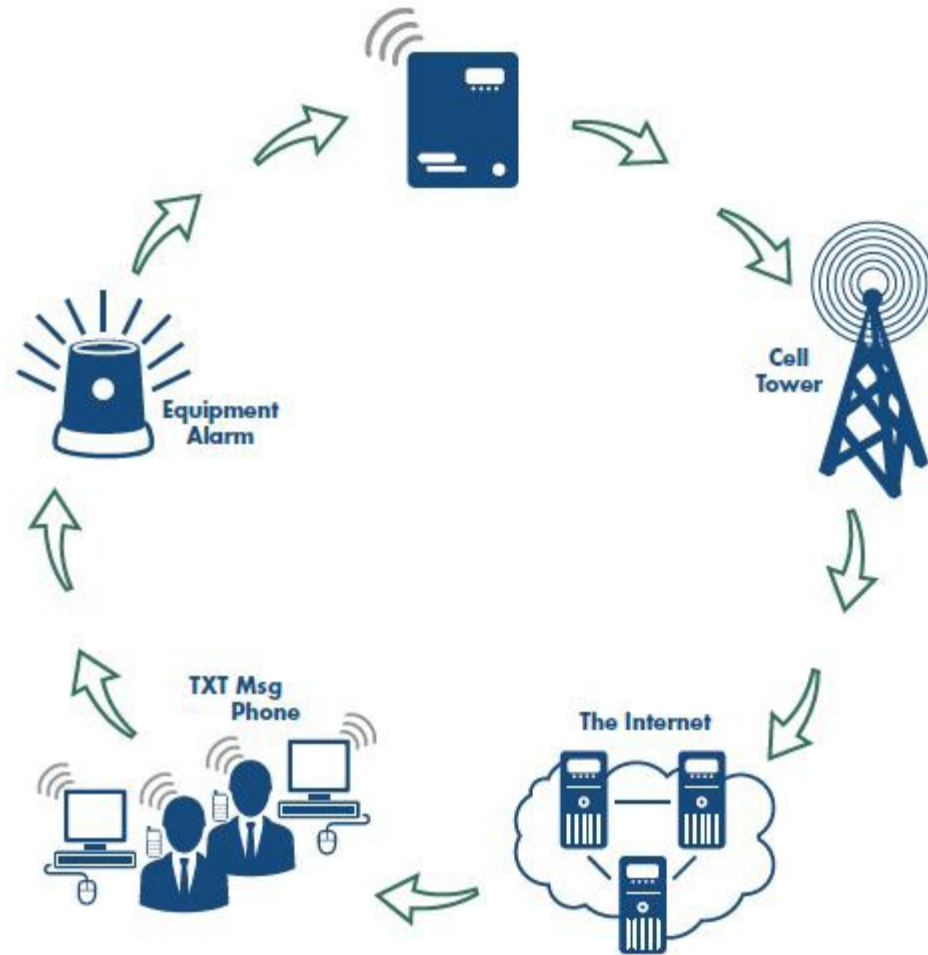
Justin Childers & Shawn Platt
January 26, 2022





Presentation Overview

- Evolution of Pump Telematics
- Next Level of Pump IoT
- Case Studies





Evolution of Pump Telematics

- Pump Watch
- Pump Auto-start
- Standalone Alert Systems
- Remote Sensors
- Engine Telematics





Pump Watch

- There was a time when the only option to monitor pump systems was to have an operator performing Pump Watch.
- This adds cost to projects in the form of Salary, Overtime, & Burden
- There is no precise science to Manually Monitoring a system, only visually seeing what the flow is doing
- No way to precisely diagnose system issues such as priming and cavitation
- Always room for a margin of error

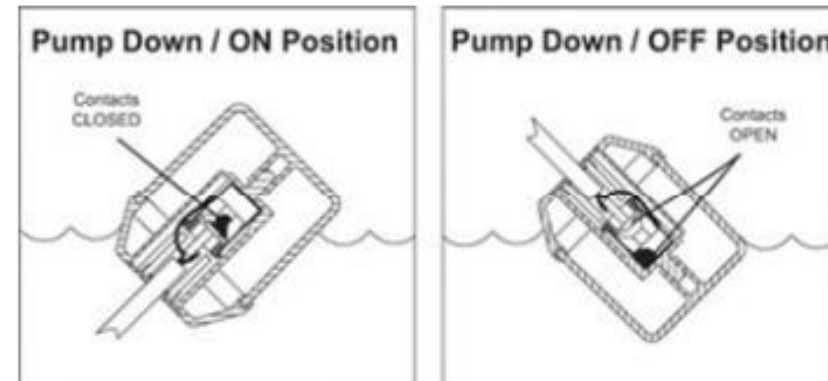
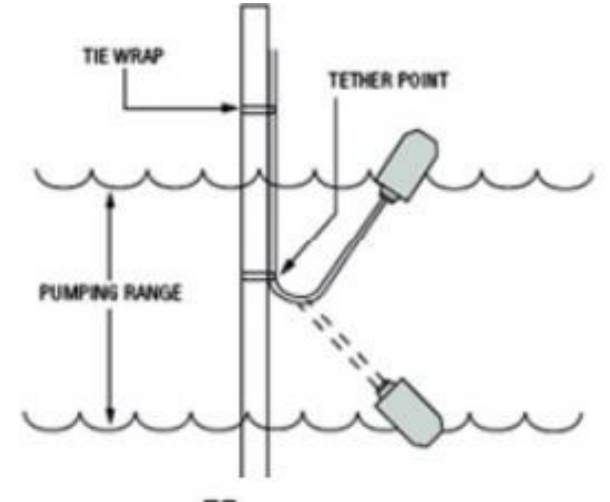


Benefits: Reduces the chances of Mechanical Failure.



Pump Auto-Start

- Allowed for on/off capabilities
- Can be connected to secondary pumps to turn on during Peak/High Flow Events
- Floats are not without issues; They are known to malfunction without proper maintenance
- Floats have the risk of pulling into suction tubes/hoses if not installed or anchored properly



Benefits: Fuel Savings and allows for Redundant Pump operation.



Standalone Alert Systems

- Cellular Box allows for advance monitoring of active pump systems
- Can be connected powered via the pump battery
- Provides notification (although with little detail) of when a pump turns on or off
- When paired with a float switch or Transducer, can provide high water alarms



Benefits: Basic Alert functionality for Faster Response.



Remote Sensors

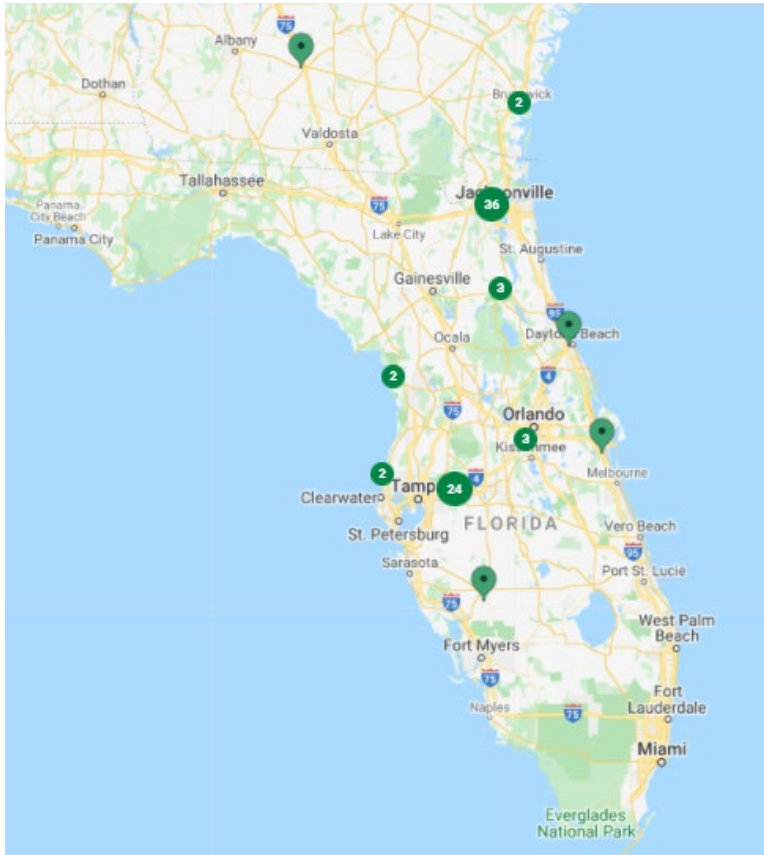
- A level transducer can be used with any electric driven unit, (with a VFD panel), and any diesel driven pump that has a throttle that is controlled electronically
- Can monitor and provide high water alarm data for cellular box notification
- Provides control of RPMs on the pump as flow fluctuates through the day adding fuel cost savings
- Will maintain water levels within suction location to a matter of inches
- Needs to have both the Pump and Standalone System for full functionality
- Pressure Transducer can be introduced to monitor discharge performance and Force Main applications



Benefits: Reduces Fuel Consumption, and Pump Cavitation.



Engine Telematics



- Basic Engine Data: Fuel levels, Engine Temperature, RPMs, Hours
- Allow the user to efficiently schedule periodic Maintenance
- Track Pump Location and Data log location history
- Data log Runtime

Benefits: Basic Engine Data and Provides Real Time Location.



Next Level of IoT

PumpSentry

PumpSentry truly brings us into the next evolution of Pump Technology. This is a cloud-based platform that can provide real-time bypass flow readings, system pressures, manhole surcharge levels, basically all the pertinent pumping system information could be accessed and logged in real time . . . Remotely!





PumpSentry

- Remote Auto Dialer Call boxes have become industry standard, however their interface was limited to only a few features
- Reduces the need to inspect a pump station or system in person, it allows for a fully IOT integrated Pumping System
- Standalone device that can fully integrate into your pumping system
- Allows for continuous real time pumping system information to be sent to a cloud-based platform for data logging the pumping system operation parameters
- Can be viewed on an app or via web access

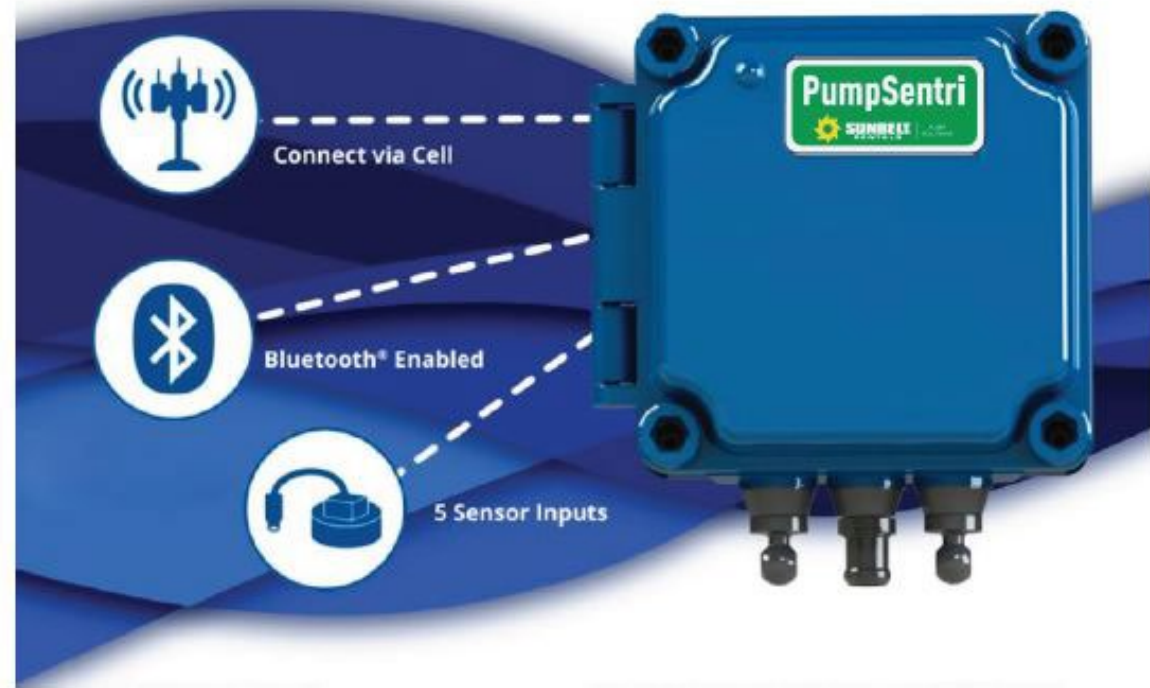




PumpSentry

ALERTS

- Ability to interface with additional sensors: Liquid level transducers and Flow meters
- Customized Alerts: Engine data, Low Fuel Levels, High or Low Water Levels, Pressure, Temperature, Pump Vibration
- Downloadable reports and Data log information on any parameter designated by the user

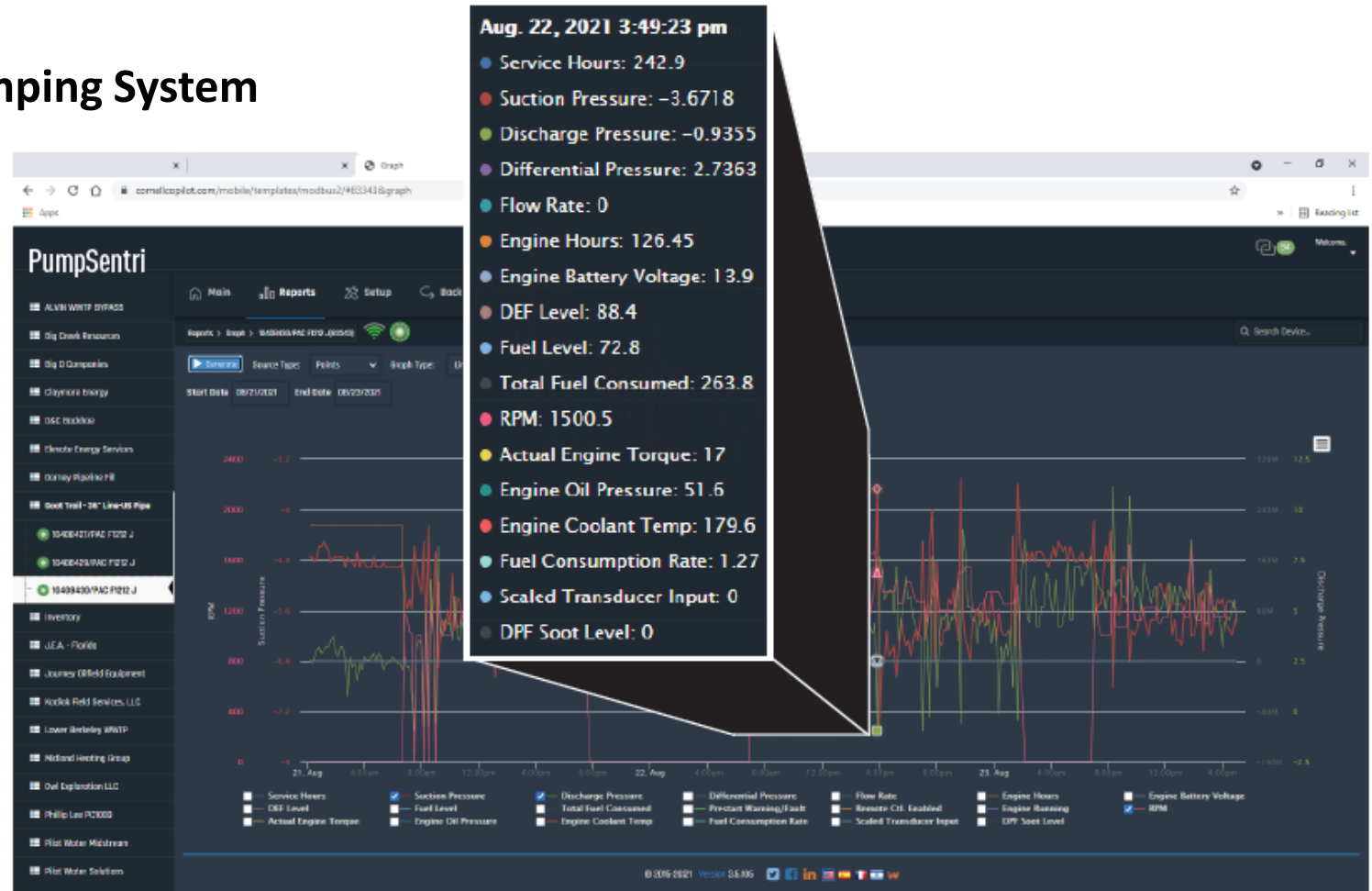




PumpSentry

Single Platform for 360 view of the Pumping System

- Engine Data: Fuel levels, RPM, Engine Temperature, Hours
- Allow the user to efficiently schedule Maintenance
- Pump Temperature and Vibration
- Real Time Pump System Operation interface with Vacuum and Discharge Pressures
- Track Pump Location and Data log location history
- Data log Runtime



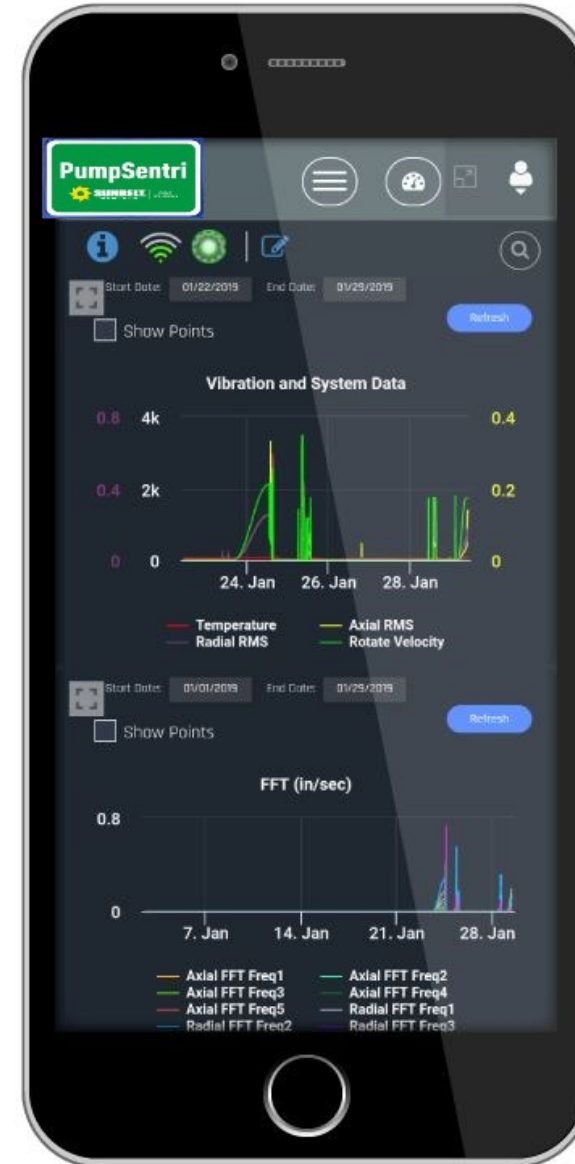


PumpSentry

Remote 360 view of the Pumping System

CONTROLS

- Ability to remotely operate the pump
- Start / Stop Remotely
- Adjust Engine Speed





Case Study | 100 MGD Standby Sewer Bypass

Challenge

90-Inch Parallel Sewer Line that required open cut 730 feet of 90-inch sewer pipe and 700 feet of the 90-inch cured-in-place-pipe (CIPP). Flow could be diverted to the parallel line, but a 100MGD standby bypass pumping system was required in the occurrence of a wet weather event.

Solution

Installation of PumpSentry telemetry on (6) of the primary pumps that were also set in automation mode for double redundancy. This entailed the use of liquid level transducers to accurately monitor the surcharge level in the sewer. The automation mode safeguarded the project since the pumps would activate in the event the water flow reached full pipe capacity.

Result

Value of the PumpSentry application is two-fold. It not only provided stakeholders with the peace of mind about the project, but also helped to reduce costs for the owner by alleviating Pump Watch cost and fuel consumption.



PumpSentry telemetry proved beneficial on all levels — and it opens up the opportunity for project owners and contractors to specify this technology to improve efficiencies and costs on future projects.



Case Study | Electric Drive Sewer Bypass



PumpSentry telemetry proved beneficial on all levels — allows the Bypass Provider better intel to support the project.

Challenge

Complete rehabilitation of one the municipalities largest lift stations by replacing pumps and coating the wet well. The lift station was required to be offline for over 5 months and required a bypass design of 5000 GPM at 410' of Total Dynamic Head.

Solution

Installation of PumpSentry telemetry on primary 800hp Electric drive unit, and the (3) 600hp backup diesel units. As a backup for the customer self-performing pump watch.

Bypass Startup Challenges

Significant vibration was noticed on the new 800hp electric drive pump during testing. PumpSentry telemetry on primary 800hp documented the vibration, along with pumping parameters to share with OEM for analysis.

Result

PumpSentry's datalogging capability allowed for the OEM to have a clear picture of the issues and determined OEM defect. The pump end was swapped and is currently running per spec. Additional, PumpSentry Vibration alerts have helped the customer negate pump ragging issues.



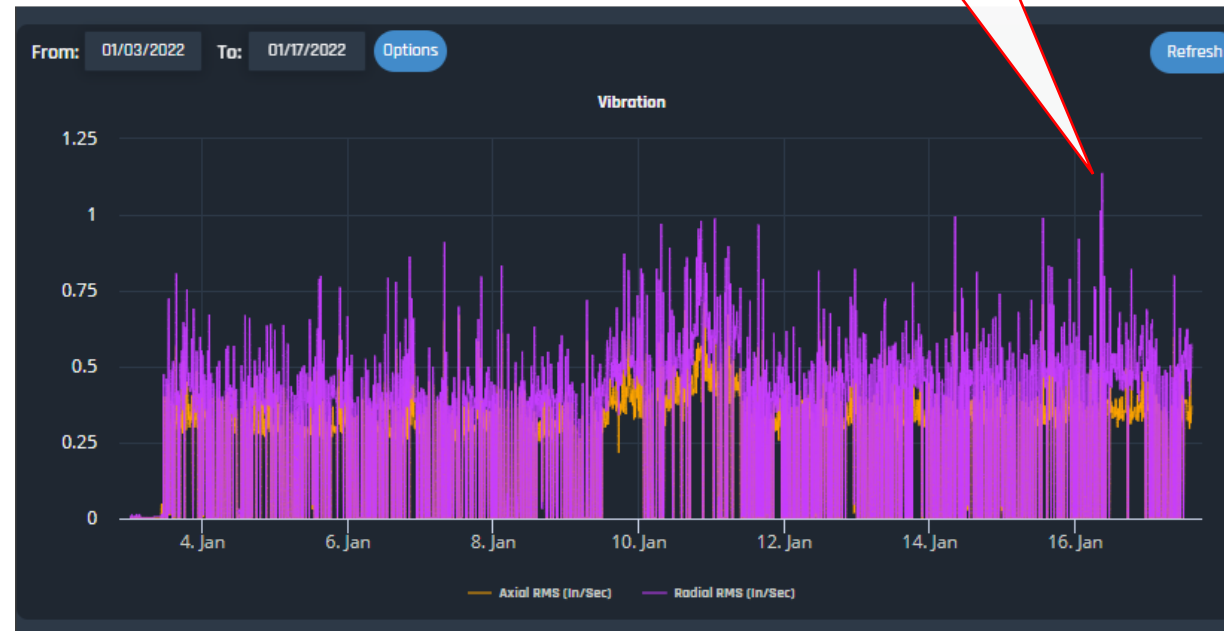
Case Study | Electric Drive Sewer Bypass

Non-Ragging Vibration



12/14/21 - Startup testing with extreme Vibration

Pump Ragging



1/4/22 - Current Operation with vibration spikes only for ragging issues.

Vibration analysis is key to a successful bypass operation.



Questions?

