PUMPS PERFORMANCE ANALYTICS

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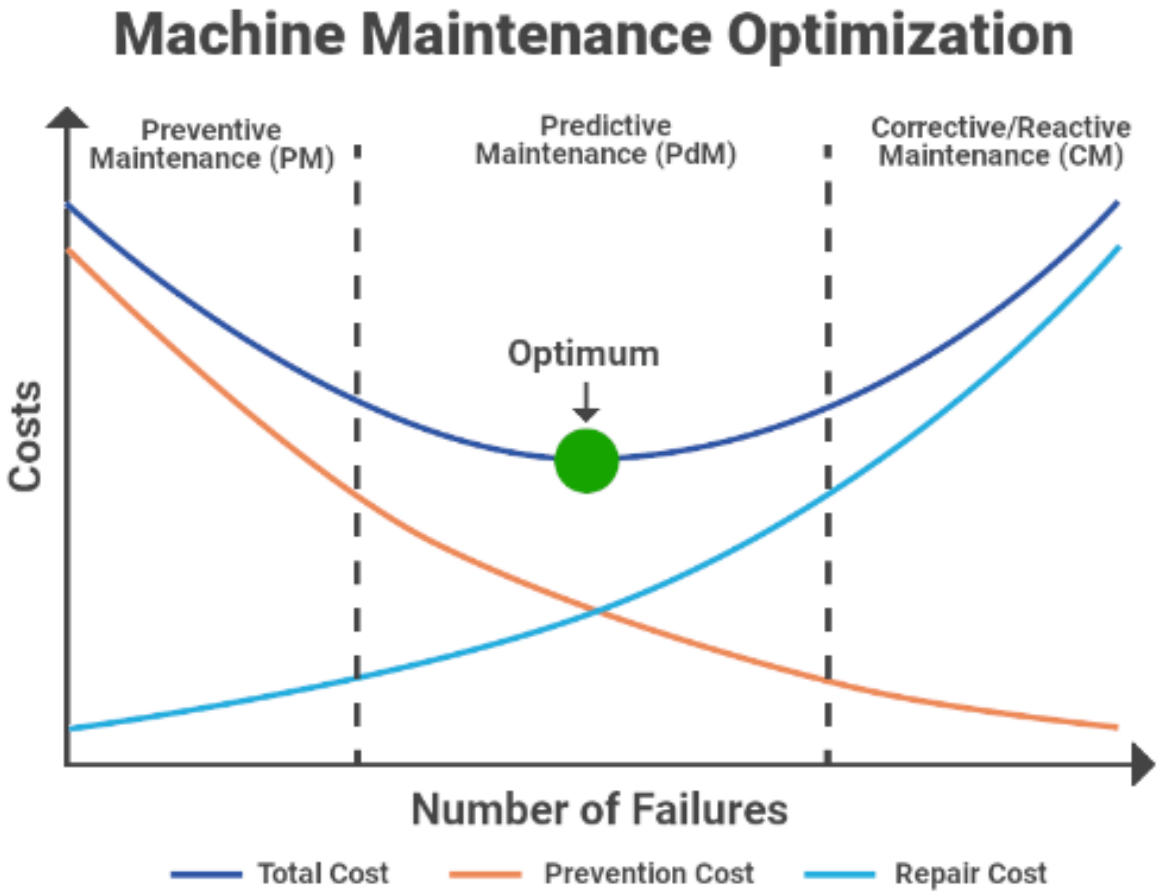
Factories of the Future

Sustainable Business | Connected Operations | Industry 4.0+ Technology

5C DATA TRANSFORMATION



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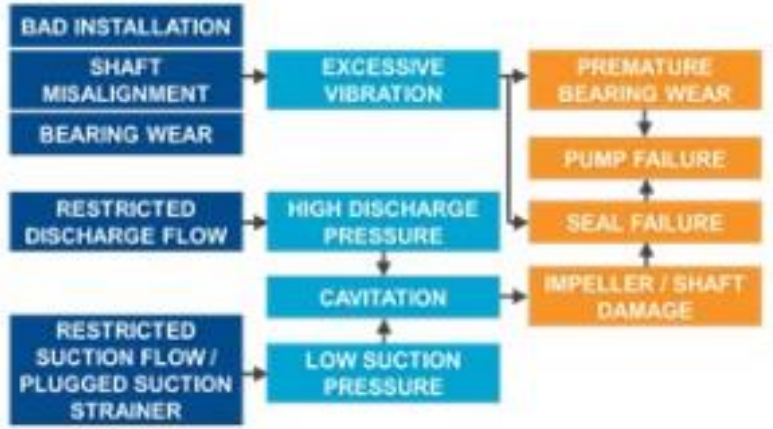
PUMP PERFORMANCE INSIGHTS

Performance Insights

- First Principles Based (e.g., Thermodynamic laws)
- Rules Based (e.g., FMEA)
- Data Driven (e.g., AI/ML/DL)

$$eff_p = \frac{(P_2 - P_1) \times Q}{2{,}298 \times kW \times eff_m}$$



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PUMP PERFORMANCE ANALYTICS

1. PUMP FAILURE PREDICTION
2. PUMP DIAGNOSIS INSIGHTS
3. PUMP PERFORMANCE ANALYSIS

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PUMP DATA MODEL (e.g., Electrical Submersible Pump)

Pump Data Model

- - CURRENT(Amperes)
  - PRESS_DESC: Discharge Pressure (Psi)
  - FREQUENCY(Hz)
  - PRES_INT: Intake Pressure (Psi)
  - TEMP_INT: Intake Temperature (°F)
  - TEMP_MOT: Engine temperature (°F)
  - OUT_VOLT: Output Voltage (V)
  - PRES_INTK: Intake Pressure (Psi)
  - TEMP_INTK: Intake Temperature (°F)
  - Vibration: Normal Range Values lie between 0 - 0.8

Production Data Model

- - BFPD: Barrels of Fluid per Day
  - BOPD: Barrels of Oil per Day
  - BWPD: Barrels of Water per Day
  - MSCF: Million of Standard Cubic Feet
  - BSW: Basic sediment and water (%)
  - GOR(MSFC/BPPD): Gas-oil Relation
  - GLR(SCF/BFPD): Gas-liquid Relation
  - API: Oil API Gravity
  - FREC(Hz): Frequency
  - PIP(PSI): Pump intake pressure
  - PROF_INTAKE(ft): Intake Depth
  - AMPERAGE: Current
  - PUMP: Pump name
  - PSI_CAB: Wellhead Pressure

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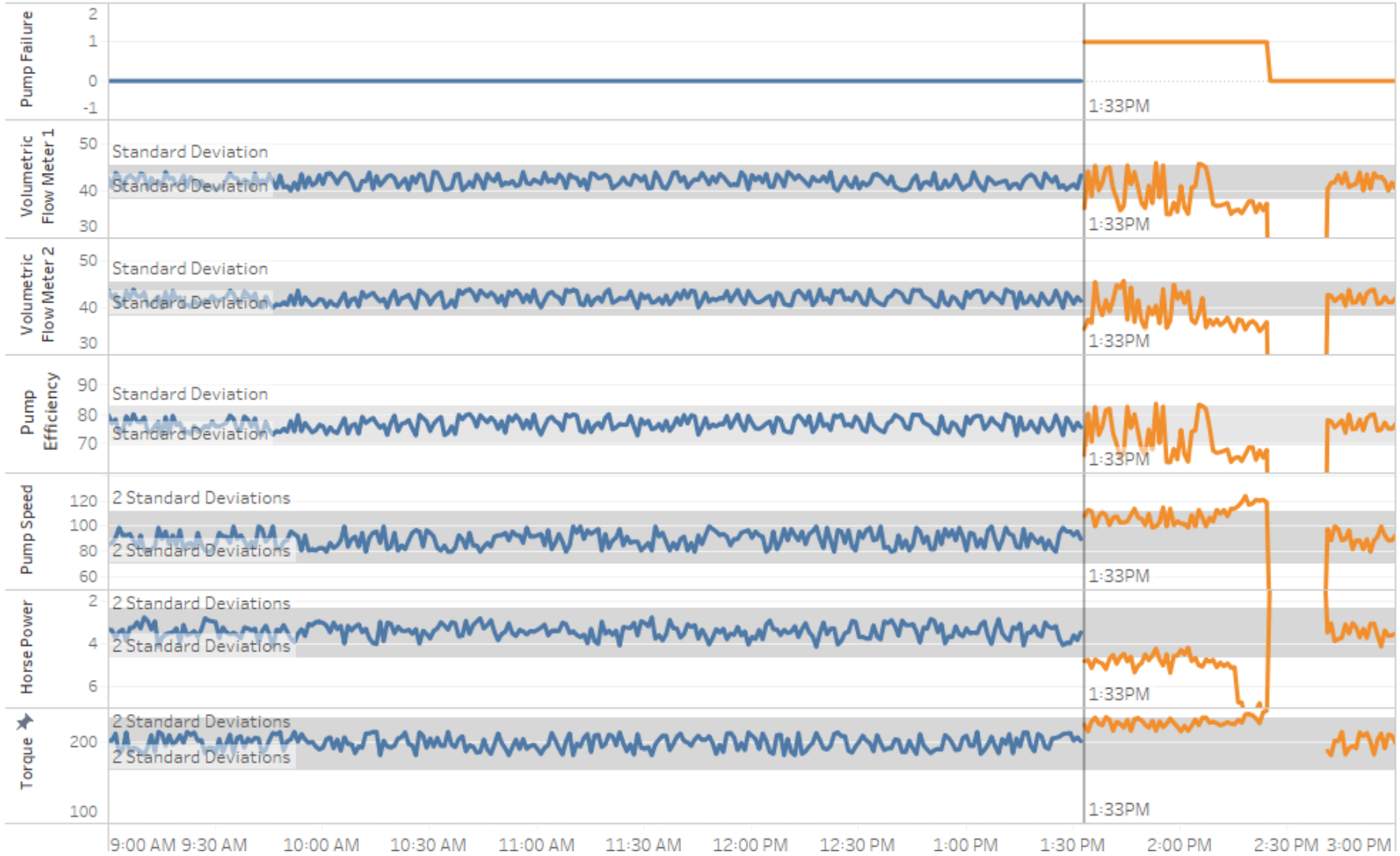
METRICS FOR PUMP FAILURE 1



Post Failure Pre Failure

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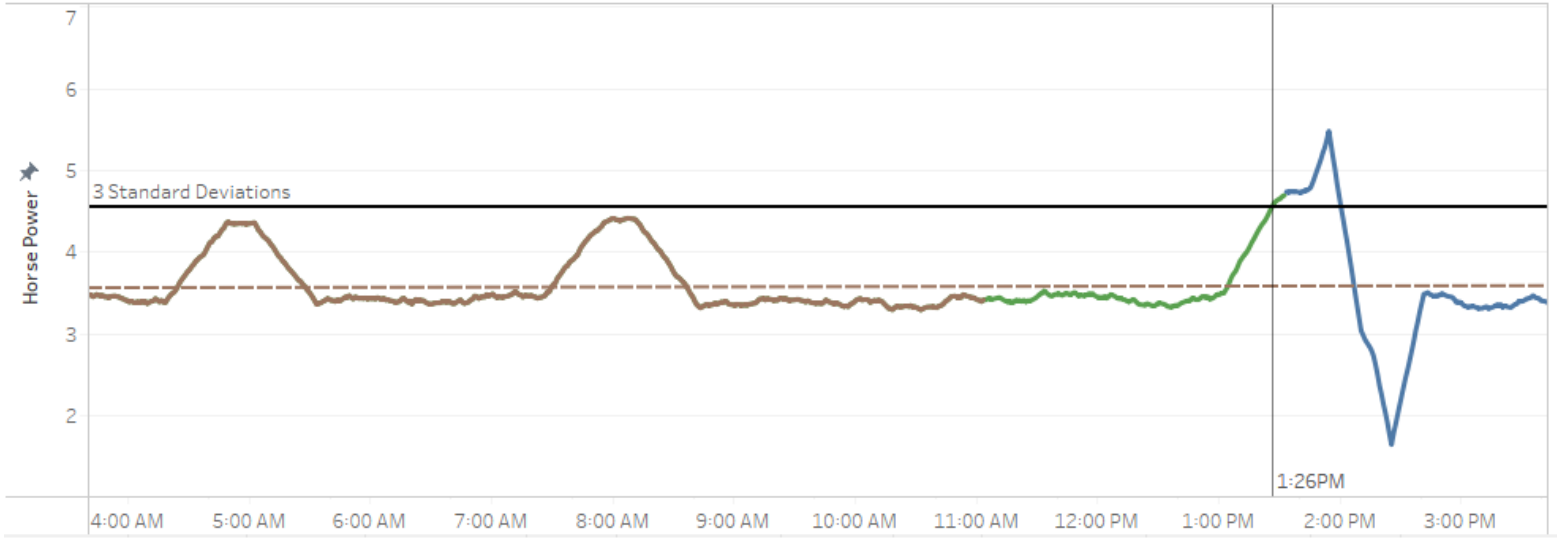
FORECASTING PUMP FAILURES 1



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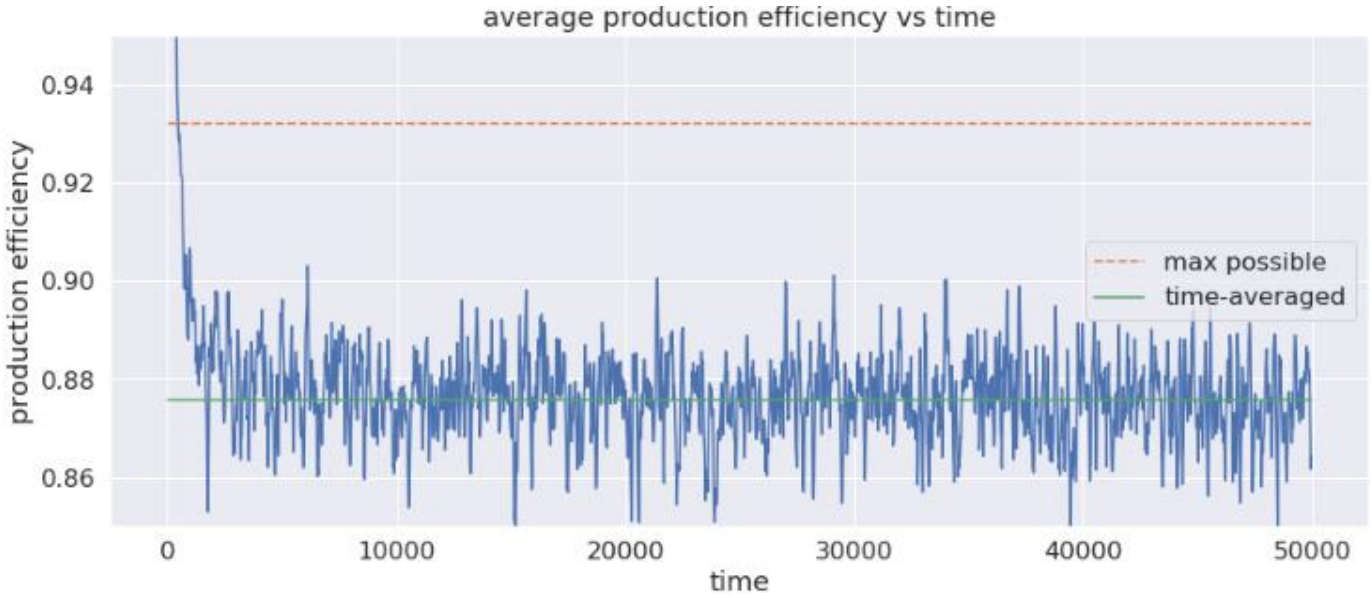
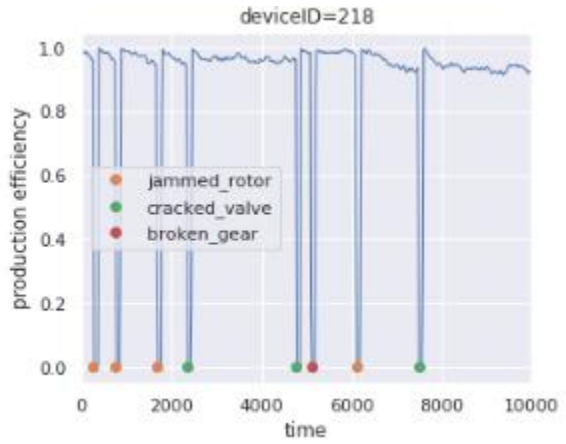
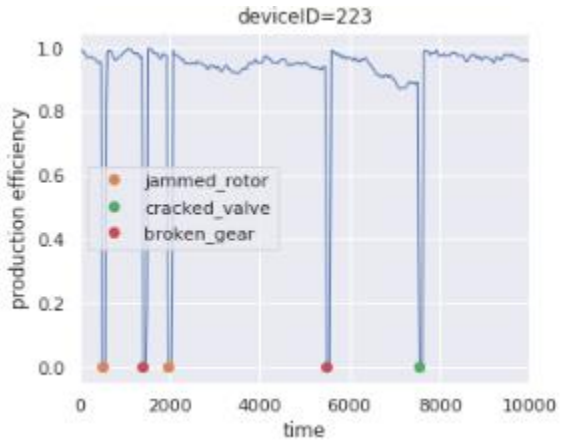
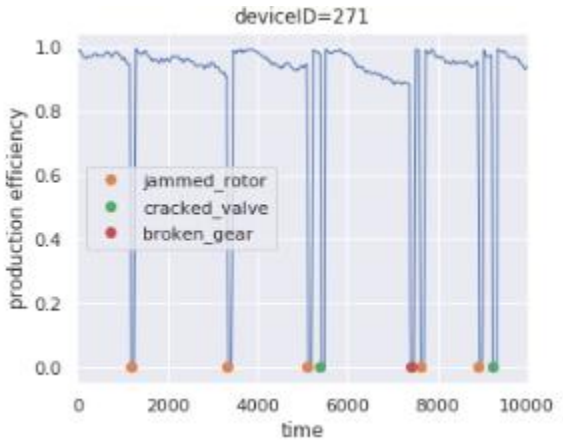
DIAGNOSTICS OF ROD & BOREHOLE PUMPS

2









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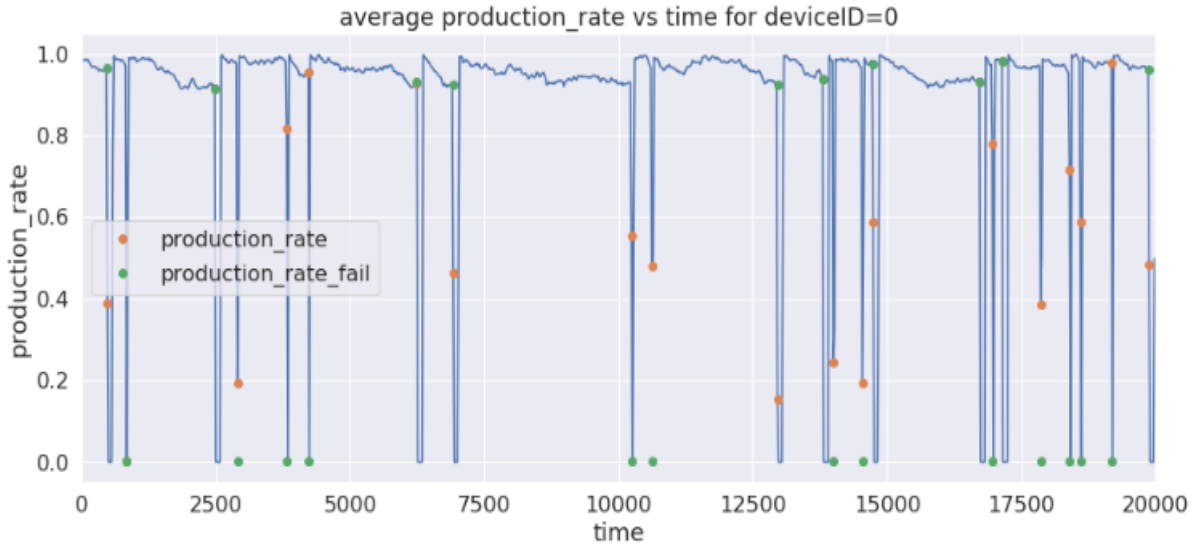
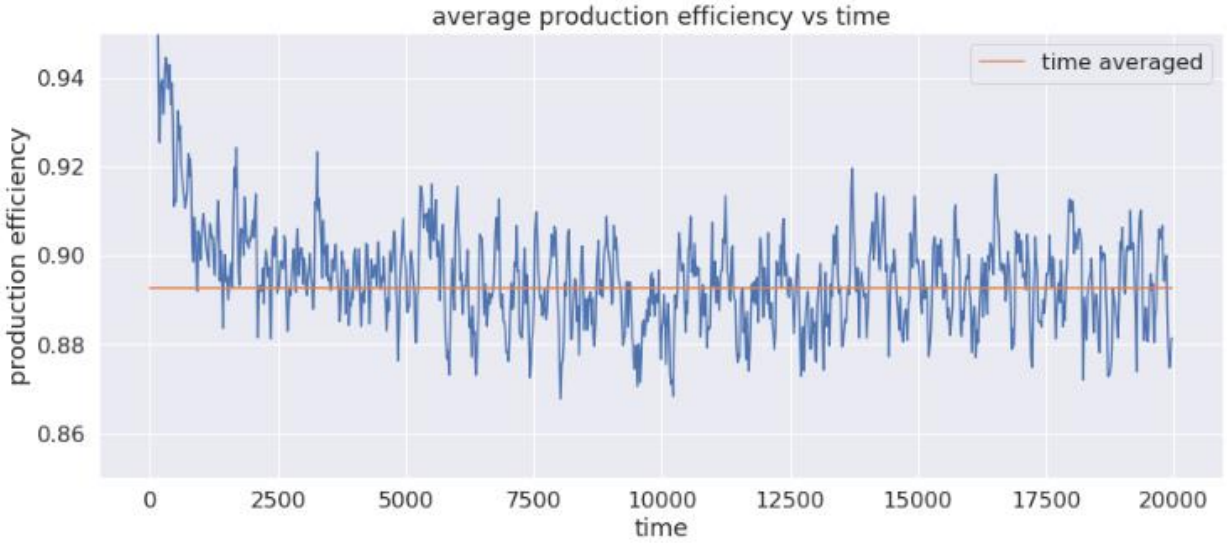
DIAGNOSTICS OF ROD & BOREHOLE PUMPS

2





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DIAGNOSTICS OF ESPs* 2

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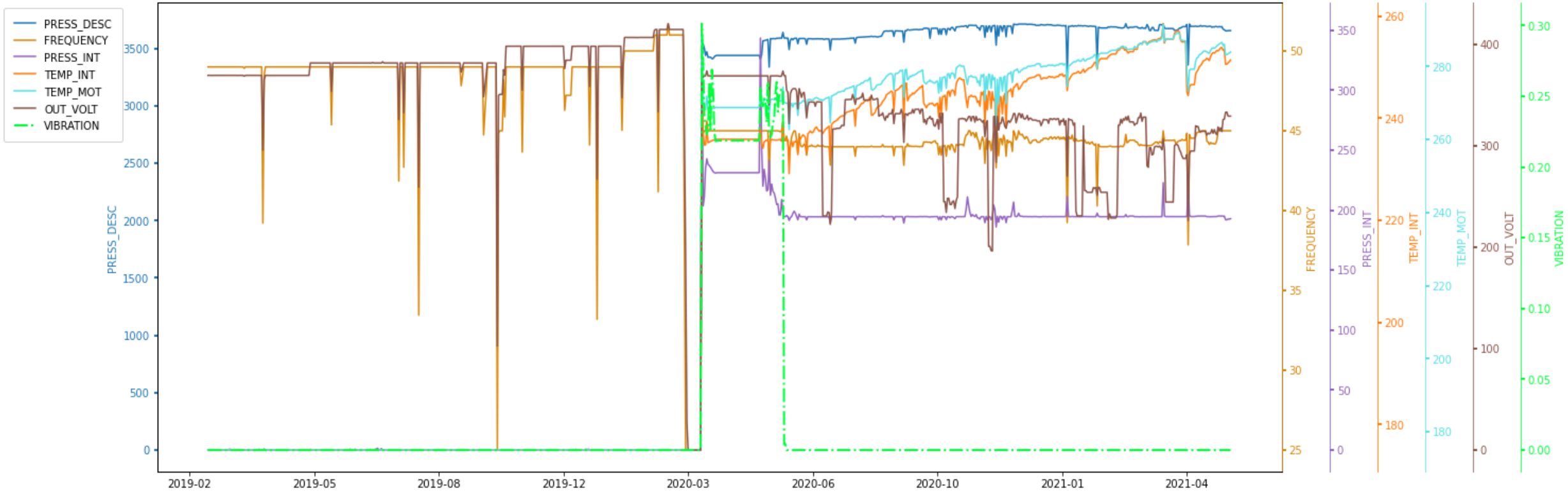
** Electrical Submersible Pumps*



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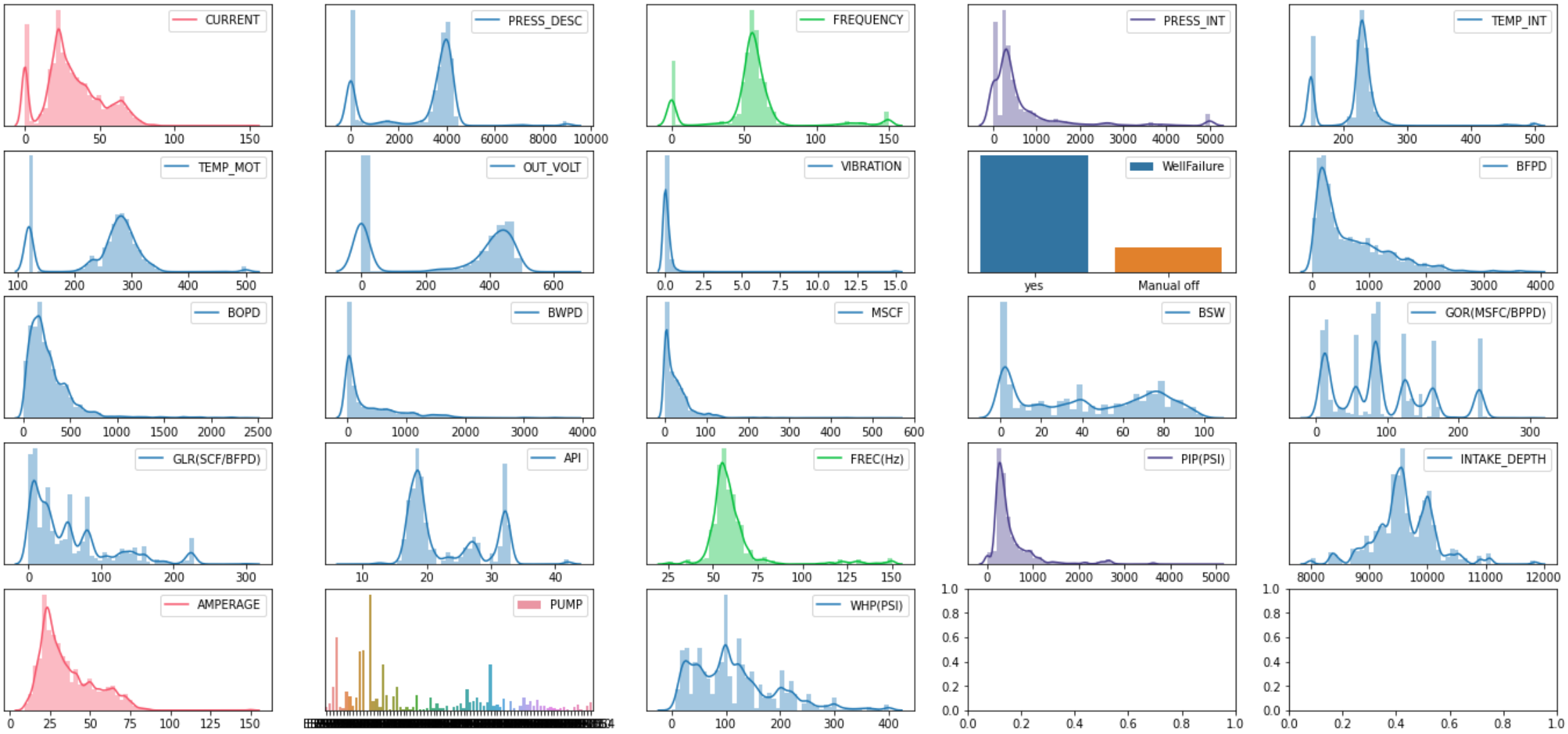
PERFORMANCE - ESPs KPIs 3



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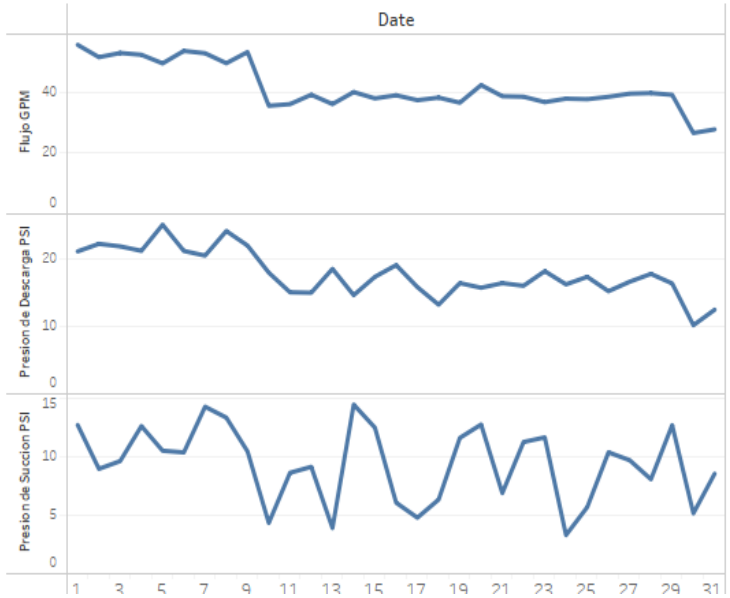
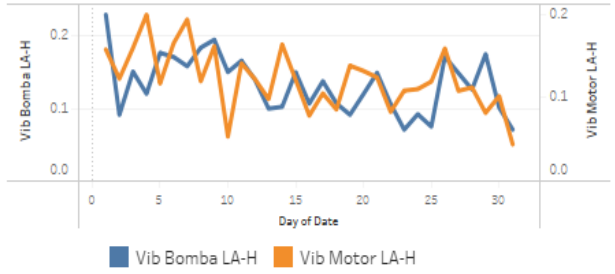
PERFORMANCE - VIBRATION ANALYSIS

3

Process Var Trend



Vibration Trend

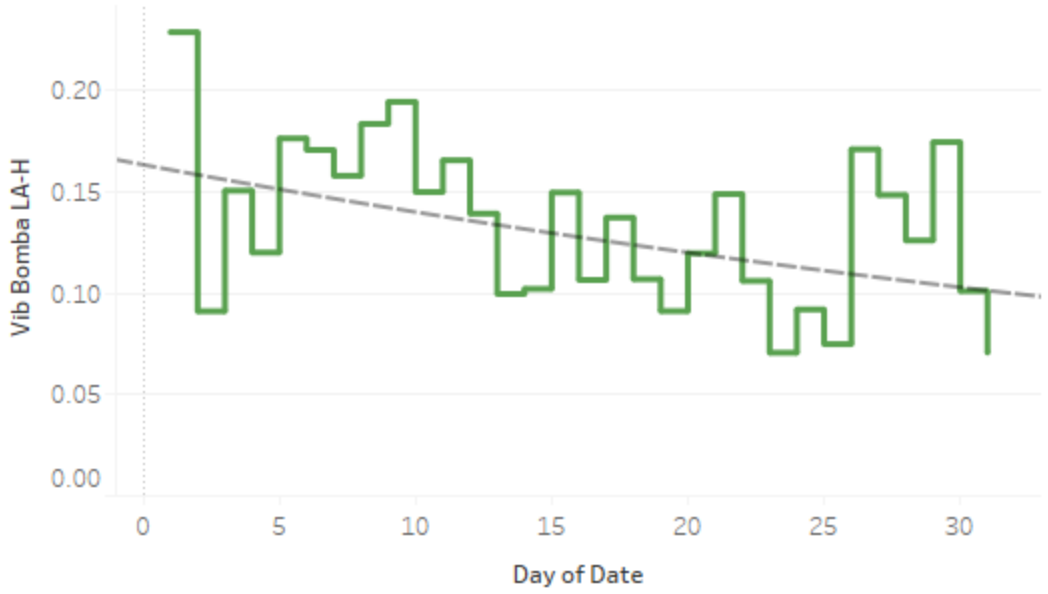


Vib Bomba LA-H Vib Motor LA-H

Failure Type

Tipo Electrica Mecanica

Vibration Forecats



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THANK YOU

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