Asset-Centric Applications
High Fidelity Fiber Sensing and Asset Performance Management

Digital Mine
GE Transportation, a Wabtec Company
Hifi Competencies to support technology development

- Proven solution used in Pipeline & Slope Monitoring
- Monitors **thermal, acoustic, and kinetic energy (strain and vibration)** to alarm on multiple types of events, including:
  - Abnormal temperatures
  - Pipeline strain and movement
  - Hillside erosion and other geotechnical event detection including active or residual earthquakes
  - Security Intrusions detected via acoustics
  - Leaks
Asset Performance Management
Enabling a continuous improvement work process

1. Strategy
   - Criticality
   - Failure Modes
   - Damage Mechanisms

2. Risk
   - Re-evaluate Risk
   - Optimize Plan

3. Analytics + Action
   - Drive Work (repair)

4. Operations & Maintenance
   - Connect / Collect
     - Sensor Data / Alerts / Events
     - Inspection Data / Alerts / History Events
APM Work Process

Continuous improvement loop

RISK/STRATEGY

- Identify critical assets
- Identify asset risks and actions
- Update asset strategy
- Criticality analysis
- Strategy manager

Asset strategy
- Spare parts
- Plant rounds
- Compliance actions
- Lubrication management
- Condition monitoring
- Operational procedures and tasks
- Engineering modifications
- Strategy manager

OPERATE/MAINTAIN

- Execute strategy
- Compile asset health data
- Respond to asset health deviations

- Rounds
- Inspection mgmt./Mobile inspection
- Calibration mgmt.
- Proof tests
- EAM integration (e.g. SAP/Maximo)
- Other plant execution systems

ANALYTICS/ACTION

- Performance Recommendations

- Production loss analysis (downtime, reason codes, etc.)
- Inspection reports/NDT results
- EAM work history
- Calibration data
- Historian data (OPC connectors)
- Rounds readings
- Predictive diagnostics
- Policy designer

- KPI
- Reliability Analysis
- Root Cause Analysis
Toward Operational Excellence
Summarized

- Matured Integrated edge to cloud maintenance and operational applications
- Single Pane of Glass
  - Analytical insights driven by integrated information
  - Value driver tree visualization
- Curation and deployment of analytics
- Alerts Framework, Case Management and Knowledge Base
- Full Digitally Enabled Monitoring Services
Conveyor Belt Solution Map

Belt Integrity and Operation
Real time belt integrity/rip monitoring and belt alignment detection. PSA and volumetric measurement.
- Reduce damage on belt
- Reduction in safety risks
- Proactively detect potential belt failures

HiFi High-Fidelity Dynamic Sensing (HDS) Fiber Optic
Idler temperature and vibration profile monitoring
Fiber Optic Sensing measuring temperature and vibration of idlers along the length of the belt
- Real time visibility on idler health
- Alarm location along length of belt
- Reduce engineering cost in troubleshooting
- Prevent unplanned downtime

Predictive Analytics
Pre-emptive detection of eminent failures on the drive and gearbox using digital twins
- Reduce unplanned downtime
- Remote monitoring augmenting engineering team

Asset Centric Application
Unified analytics and visibility of operational performance and how the conveyor system relates to the up- & downstream operation with Value Stream Mapping, KPI Driver Trees and Bottleneck Identification
- Continuous improvement on production capability
- Operational performance improvement
BEST IN CLASS SENSING FOR ASSETS

CONTINUOUS - EVERY CENTIMETER is sensitive with high DYNAMIC RANGE

0.001°C DELTA TEMPERATURE
SONIC & ULTRASONIC ACOUSTICS
VIBRATION
STRAIN

Multiple Measurements = High Confidence

LEAK!
LEAK!
NO LEAK

100% COVERAGE  24/7/365  COST EFFECTIVE