Reducing Downtime in an Automotive Metal Stamping Plant

Gerry Roston
CEO, Civionics, Inc
High value, long life assets
Operating 20 of 21 shifts per week
Downtime extraordinarily costly
Legacy equipment
Unplanned maintenance

Goal: Reduce likelihood of unplanned downtime

Approach: Look for changes in long-term behavior
- Plant-wide deployment – thousands of sensing channels
- Wireless / battery-powered strongly preferred
- Cloud access via 3G (for initial deployment)
- Actionable information; not searchable, voluminous data

Customer Desires

**Big Data**

**Smart Data**
- Match sampling rate to customer need
- Push smarts to the sensors – statistical oversampling
Reducing Downtime in an Automotive Metal Stamping Plant

Wireless Sensing Hardware:
- Modular
- Self-configurable
- Embedded intelligence

Cloud-Based Services:
- Analytics / alerting
- Scalable architecture
- Actionable information
Factory hardened IP67 rated enclosure
USB and/or battery powered (up to 10-yr life)
Stream Processing Engine (SPE) for embedded analysis
Modular hardware interface for 20+ transducer channels
Transducer types include:
  • Temperature, current, pressure, humidity
  • Vibration, strain, acceleration/shock
Cloud communications
  • SSL-secured
  • 3G: fast to deploy, no plant IT cooperation needed
  • WiFi: lower cost, better performance
Reducing Downtime in an Automotive Metal Stamping Plant
Informative Alerting

- Assigned per channel
- Sent to selected people/groups
  - Can be schedule driven
- Directed to email and/or SMS
- Can include remediation steps
  - Off-shift staff can handle issues
  - Speeds recovery time
Certain matters of interest require multiple sensors
- Temperature above ambient
- One motor not operating when another is

Certain matters require mathematical manipulation
- Measuring acceleration, derive fundamental vibrational frequency
- Measuring current, derive power and/or energy

Approach
- Provide simple means for customer to derive virtual channel
  - Algorithmic formula, i.e., computer equations
  - Include channels, logic functions, math functions, etc.
  - Push data-intense computations to the edge
- Treat virtual channels just like any other channel
### History
- Lines 19 and 20
  - Deployed late Jan-Feb 2016
  - Fully operational late Feb 2016
- Lines 11 and 15
  - Deployed Jan-Feb 2017
  - Fully operational late Feb 2017

### Scope
- 90 nodes, 240+ transducers
- 15+M data points gathered to date
Three down-time incidents avoided in first nine months
  • Potential losses averted: greater than $500,000

Requested deployment expansions
  • All remaining stamping lines
  • Additional sensing capabilities
  • Various ancillary systems (waste conveyors, overhead cranes, etc.)

Discussions for switching to plant WiFi initiated

Discussions regarding using the system to monitor plant overall energy consumption started
Key Lessons

- KISS! (Keep it simple s***d)
- Listen to your customer
- Factory environment is very harsh – hardware robustness key
- Focus on modularity – minimize need to reinvent
- Customers want insights, not data
  - Create value by building novel ways to gain insights
Gerry Roston, CEO
Gerry@Civionics.com
o: 734-335-4386 x13
c: 734-516-6715

3775 Varsity Dr, Ann Arbor, MI