Digital Transformation with Internet of Things

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November 5, 2018
NETPIE – Network Platform for Internet of Everything
What NETPIE Offers

- Instant-MESSAGE Communication
- Local Data Storage
- Data Visualization
- Control Dashboard
- Connection Security
- Local Communication
- Access Control
Developing IoT application

Connect devices to the IoT cloud with http REST or MQTT protocol for monitoring and control.
Monitor production flow in real-time to eliminate wasted time and reduce in-process inventory.

Manage equipment remotely using sensors and limits to conserve energy and reduce costs.

Automated Inspection

Implement condition-based maintenance alerts to reduce downtime and increase throughput.

Aggregate product and process data, analyze, identify constraints and improvement areas.

RFID sensors identify product and materials.

Production line triggers autonomous material handling vehicles.

Source: @MicrosoftIoT in Manufacturing infographic, 2015
Digital Transformation: Measure & Improve

• OEE (Overall Equipment Effectiveness) = function {
  Availability (run time/planned time),
  Performance (actual/expected speed),
  Quality (good units/total units) }

• Maintenance: MTTR for maintainability,
  MTBF for reliability

• Process: delay, cost, efficiency

• Factory environment: temperature, energy saving.
Case study: Low-cost automation

Nidec Shibaura Electronics (Thailand) Co., Ltd. develops IoT solutions for

- **Productivity Management**: speed
- **Quality Management**: NG count, accuracy, traceability with barcode/RFID
- **Energy Management**: consumption
- **Maintenance**: machine status -> from preventive to preventive maintenance
- **Smart warehouse system**: speed, accuracy
Example: monitor, control, and visualize
Smart Energy Management:

- Temperature Humidity Sensor
- Relay Switch
- Light Sensor
- Motion Sensor

Smart Air-Cond.

Smart Light

Temperature Control Monitor

Check Sheet

MDB (RS485)

Smart MDB

Overview Energy Consumption Monitor

Mobile App.
Smart Machines:

Lubricant Temperature Sensor
Cooling Water Flow Rate Sensor
Pressures Sensor

Smart TPSM of Machine

Omron PLC

SMART MACHINE

Location | Machine | Temperature | Flow Rate | Total Power | Status
---|---|---|---|---|---
Stirring A | STM1 | 25 | 14 L/min | 120 kwh | RUN
Stirring A | STM2 | 28 | 16 L/min | 200 kwh | RUN
Stirring B | STM3 | 25 | 14 L/min | 184 kwh | RUN
Stirring B | STM4 | 223 kwh | 15 L/min | 223 kwh | RUN

Maintenance Real Time Monitor

Smart Machine Condition

Injection Machine Condition Control Monitor
From Real-time Monitoring to Visualization

Productivity can be improved.

Credit: Nidec Shibaura Electronics (Thailand)
Case study: PIONEER MOTOR PUBLIC COMPANY LIMITED

Productivity Improvement
Machine and Environment Monitoring
Industrial Automation Pyramid

- Sensor, Actuator, Input/Output signal (Device level)
- PLC (Control level)
- SCADA (Process management level)
- MES (Plant Management level)
- ERP (Enterprise level)