3 Ways To Make Your Factory Smarter With IIoT

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Omron Microscan
To the machine, give the work. To people, give the thrill of creation.

Kazuma Tateisi, Founder
Defining “IoT”

“If we had computers that knew everything there was to know about things—using data they gathered without any help from us—we would be able to track and count everything, and greatly reduce waste, loss and cost. We would know when things needed replacing, repairing or recalling, and whether they were fresh or past their best.”
Industrial IoT

Additional considerations for...
- Production Environment
- Legacy Assets
- Data Privacy & Security
- Maintainability
- Device Variety
- Operations Criticality

Commercial IoT
Industrial Automation Mega-Trends

1. Integrated
   - High-Speed/High-Precision
   - Reduced Engineering Time
   - Easier Troubleshooting

2. Flexible & Modular Machines
   - Automated Changeover
   - Real-time Adjustments

3. Intelligent
   - Zero Downtime Equipment
   - Predictive Maintenance

4. Factory Intelligence
   - Collect, Store & Process Data
   - Analytics & Improvement

5. Interactive
   - Flexible Production Lines
   - Conveyor-less
   - Mobile Robots

6. Collaborative Production
   - Cobotics & Safety

Collaborative Production
- Cobotics & Safety
Finding Value in IIoT

1) Productivity Improvement
2) Quality Improvement
3) Cost Reduction
Poll: What is Your primary IIoT Goal?

1. Cost Reduction
2. Quality Improvement
3. Productivity Improvement
4. Not sure [yet]
5. <N/A>
3 Main Approaches

- Programming Software
- Runtime Software
- Line Optimization

Proactive Maintenance

- Predictive Maintenance
Case 1: Proactive Maintenance

Data storage

Data processing

Cloud

Apps

Challenges:
No capital budget
Limited IT support

Machines

Sensors

IPC

PLC

Manufacturing systems
IO-Link

- Smart Sensors
- Point2Point
- Serial, Bi-directional
- Signal & Energy
- Fast, Reliable
- Automatic Device Configuration
- Plug&Play (Field Replacement)
- IIoT Ready: Connectivity all through ERP
Case 1 Solution: Smart Sensors

- Know when a sensor needs maintenance
- Automated parameter setting
- Simplified Installation

Productivity+  Cost-
Case 2: Predictive Maintenance

Challenges:
No additional HW
Limited IT support
MTBF - Mean Time Between Failure

- Prediction
- Field Reliability
Case 2 Solution: Integrated Automation

Predict when components may fail

Productivity+ Cost-
Case 1.5: Plastic Molding Machine

Reduce downtime: -40%
Tool wear reduction: -20%

Machining sensing + control system
Force data
Feeding speed command
Proactive
Predictive

Quality+
Productivity+
Cost−
Case 3: Line Optimization

SMT Line

Solder printing machine
High-speed mounter
Multi-function mounter
Reflow oven
Vision inspection

Improve quality
Reduce cost

Challenges:
Many different machines
Unknown correlations
High mix, low volume

Kusatsu
Case 3: Line Optimization

- Solder printing machine
- High-speed munter
- Multi-function munter
- Reflow oven
- Vision inspection

PLC → Server

Machine & Traceability Data
Visualization at Shanghai

Assembly cell

Surface mounting line

Data collected by Sysmac NJ
Visualization

**Process** (solder printing, high-speed mounter, multi-function mounter, reflow oven)

- Movement of a single PCB

**Case 1 “Productivity improvement”**

PCB mounting line at Visualization
Changeover Optimization

Visualization of improvement points in assembly process

Changeover time: 8 min

Changeover time: 11 min
Global Line Optimization

Kusatsu Factory

Current SMT line in Kusatsu

Surface Network Segment

Production Control N/W Segment

MES

Firewall

WAN Access

VPN Access

3G/LTE Access

DMZ

Surface mounting line

Cloud

Visualizatio
n

Shanghai Factory

Assembly cell line

Surface mounting line

Netherlands Factory

Surface mounting line

Visualizatio
n

Global Line Optimization
Production line

1. Traceability

2. Quantities communicated to local networked devices

3. MES creates order in ERP for low stock

4. Orders placed, production data communicated to outside parties

5. Buyer trends communicated to factory, production rates updated

Automate - Control Internal Processes - Predict Opportunities
## Challenges: Expectations vs. Reality

<table>
<thead>
<tr>
<th>Expectations</th>
<th>Reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate results</td>
<td>Iterative process</td>
</tr>
<tr>
<td>100% accuracy</td>
<td>Improving models</td>
</tr>
<tr>
<td>Out-of-the-box</td>
<td>Application specific</td>
</tr>
<tr>
<td>Leverage current staff</td>
<td>New talent required</td>
</tr>
<tr>
<td>Use current infrastructure</td>
<td>Need additional investments</td>
</tr>
<tr>
<td>Full implementation</td>
<td>Start small and grow</td>
</tr>
</tbody>
</table>
Next Steps

1) Decide your IIoT Value
2) Determine what to focus on
3) Investigate what data is available now
4) Consider Technologies / Staff to get & process data
5) Change Management
Questions

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