Industrial Internet of Things: A Path to Predictive Analytics

Presented by:
Conveyors and Sortation Systems Industry Group of MHI
**Mission:** To promote the market growth and effective use of conveyor and sortation systems in manufacturing, warehousing, distribution and other key markets.

**Vision:** To be the recognized independent authority for end users and suppliers on market trends, technology developments, and applications through:

- Education the market on key features, advantages, and benefits of conveyor and sortation systems
- Identifying key issues affecting our marketplace through user outreach
- Development and distribution of educational materials
- Collaboration of manufacturers and technology providers on trends affecting the industry
- Promotion of career opportunities within the CSS industry
Presenters

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Director of Business Development - Siemens

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Principal Product Marketing Manager - Honeywell Intelligrated
Objectives

• The existing and foreseeable innovations due to internet of things

• Types of data that can be gathered and used to collect predictive analytics

• Steps that every company can take to unleash the power of internet of things
What Do All These Images Have in Common?

Internet of Things
The interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data.

Oxford Dictionaries, 2018
Industrial Internet of Things: A Path to Predictive Analytics

Data gathering
- Machine-level sensors and controls provide asset visibility and information.

Asset Insights
- Powerful analytics detect trends and predict failure.

Real-time dashboard
- Move calendar-based maintenance plan to a real-time, asset condition-based approach.

Remote incident alerts
- Stay informed of critical issues and take corrective action.

Maximum uptime, reliability and reduced cost
- Reduce unplanned downtime while cutting maintenance expenses.
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- **40.2%** of all IoT devices are used in business & manufacturing processes.

- By 2020, the number of devices connected globally is forecasted to grow to **30.7bn** (2015: 15.4bn)

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[FutureScope Co, 2018]

[Statista, 2018]
Hey, the Sales World job first!

Please blend:
Chocolate and Caramel Cookies

I need 5

I just need 2

Oops, we have to reject poor quality Products!

4.0
Industry 4.0 and the Internet of Things

How do they relate?

Some say...

Industry 4.0
- Is based on a German initiative and represents that country’s vision for the future of manufacturing
- Is “the comprehensive transformation of the whole sphere of industrial production through the merging of digital technology and the internet with conventional industry” (A. Merkel)
- Other terms: Industrial Internet, Advanced Manufacturing (US), etc.

Internet of Things
- Are smart objects (in a network → CPS)
- Is the intelligent connectivity of smart devices by which objects can sense one another and communicate, thus changing how, where and by whom decisions about our physical world are made

...and some...

...at least it is...

Their relationship
- Industrial IoT is a basis for, and will result in, the fourth industrial revolution
- IoT is not only about manufacturing… it goes far beyond that
- Industry 4.0 is a collective term for technologies and concepts of value chain organization which draws together Cyber-Physical Systems, the Internet of Things and the Internet of Services
Material Handling - Application Areas

- Conveyance
- Storage - ASRS
- Sortation
- AGV
- Palletizing
- Robotics
- Picking and putting systems
Industry 4.0 Automated Device Examples

- Smart Sensors
- Controllers
- Readers/Scanners
- Motor Control
- Safety Systems
- Smart Metering
- Frequency Drives
- Smart UPS
- Cameras
- Circuit Protection
Iiot Analytic Levels

**Descriptive**
- What happened?
  - Motor failure

**Diagnostic**
- Why did it happen?
  - Motor overloaded

**Predictive**
- What will happen?
  - Rising current will cause motor overload failure

**Prescriptive**
- What should I do?
  - Reduce load on motor

**Decision Support**

**Decision Automation**

**Feedback**

**Human Input**

**Action**

Source: Gartner
What is Your and Your Customer’s Time Worth?

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FIND YOUR WOW
Harnessing the Value
Data + INDUSTRY 4.0

• **4.1% cost reduction** (manufacturing efficiencies and improved value chain management)

• **3.0% revenue increase** (driven by customized products, predictive maintenance, and additional services)

• Most assume a **two-year full Return on Investment (ROI)** and enormous long-term gains

Homeland Security Research (www.hsrc.biz)
Data

Connectivity is key
Put That Data to Work
Potential use cases towards predictive analytics

- Asset Management
- Condition Monitoring
- Energy Management
- Fleet Management
- Predictive Maintenance
- Performance Management
- Predictive Scheduling
- Supply Chain Analytics
- Root Cause Analysis
- Advanced Diagnostics
- Throughout Simulation and Optimization
- Product Tracing
Ultimately Most Companies Will Head Towards Machine Learning

Fundamental questions need to be answered:
- What am I trying to achieve? / What am I aiming to learn?
- Who will be using the product/service/outcome?
- Does my organization know how to use the product/service/outcome?
- What are my success criteria?

Getting an organization to machine learning proficiency is a journey with several steps along the way

ML is a journey:
1. Get the right data
2. Transparency
3. Basic analytics
4. Machine Learning

http://www.noeticscience.co.uk/wp-content/uploads/2014/05/google-deepmind-artificial-intelligence.jpg
The Journey: Lay the Foundation

ML is a journey:
1. Get the right data
2. Transparency
3. Basic analytics
4. Machine Learning

The right data:
- Starting with use cases, determine the appropriate data points
- Evaluate bandwidth requirements
- Validate data model

- Energy Consumption
- Motor Temperature
- Motor Vibration
The Journey: Harvest the Low-Hanging Fruit

ML is a journey:
1. Get the right data
2. Transparency
3. Basic analytics
4. Machine Learning

Use Cases:
• On/Off visibility
• Capture energy consumption
• Notifications on machine failure
The Journey: Start Analyzing the Data

ML is a journey:
1. Get the right data
2. Transparency
3. Basic analytics
4. Machine Learning

**Use Cases:**
- Parameter trending
- Predict performance with simple inputs
- Threshold detection
The Journey: Reap the Rewards

ML is a journey:
1. Get the right data
2. Transparency
3. Basic analytics
4. Machine Learning

Use Cases:
- Predictive maintenance
- Anomaly detection
- Root cause analysis
- Institutional knowledge capture
- Optimize machines/processes
- Improved Research & Development
Challenges
• Create a Digital Twin of its Cleaning Systems, Built from Performance Data
• Globally Distributed Industrial Washing Plants – Detergent and Disinfectant
• Timely And Efficient Operations Data Collection and Analysis
• Visibility into Production Line Performance and Preventative Maintenance

Transformation Results
• Centralized Analytics and Visualization Of Cleaning Plants and Products
• Optimize Resource Usage Including Water, Energy, Detergents and Additives
• Performance Management and Predictive Maintenance
• Global Secure Data Access

Value
• 6% Reduction of Chemical Consumption
• Reduced downtime by 10%
Best Practices for Digital Factories

Do...

...Start with the big picture

...Work backwards – from business drivers to data points

...focus on outcomes

...Work towards 2-4 use cases that will support the larger goals

...Conduct rapid prototyping to quickly demonstrate business value

Avoid...

...Getting lost in the technology – business models lead, technology follows

...Trying to solve all challenges in one project – define and protect the scope
For More Information

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