



**Gulf Coast Center
of Excellence**



Session 12: IIoT for Energy Efficiency

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This session will discuss:

- Smart Manufacturing/Industry4.0
 - Role of IIoT (Industrial Internet of Things)
 - Unlocking Energy Efficiency
- Modern IIoT Tools/Sensors
- Case Studies

History

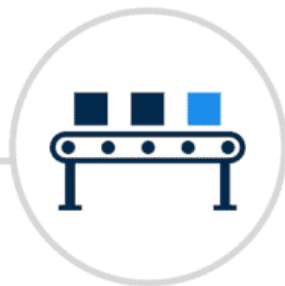
End of 18th
Century



Industry 1.0

Mechanization and the introduction of steam and water power

Start of 20th
Century



Industry 2.0

Mass production assembly lines using electrical power

Start of
1970s



Industry 3.0

Automated production, computers, IT-systems and robotics

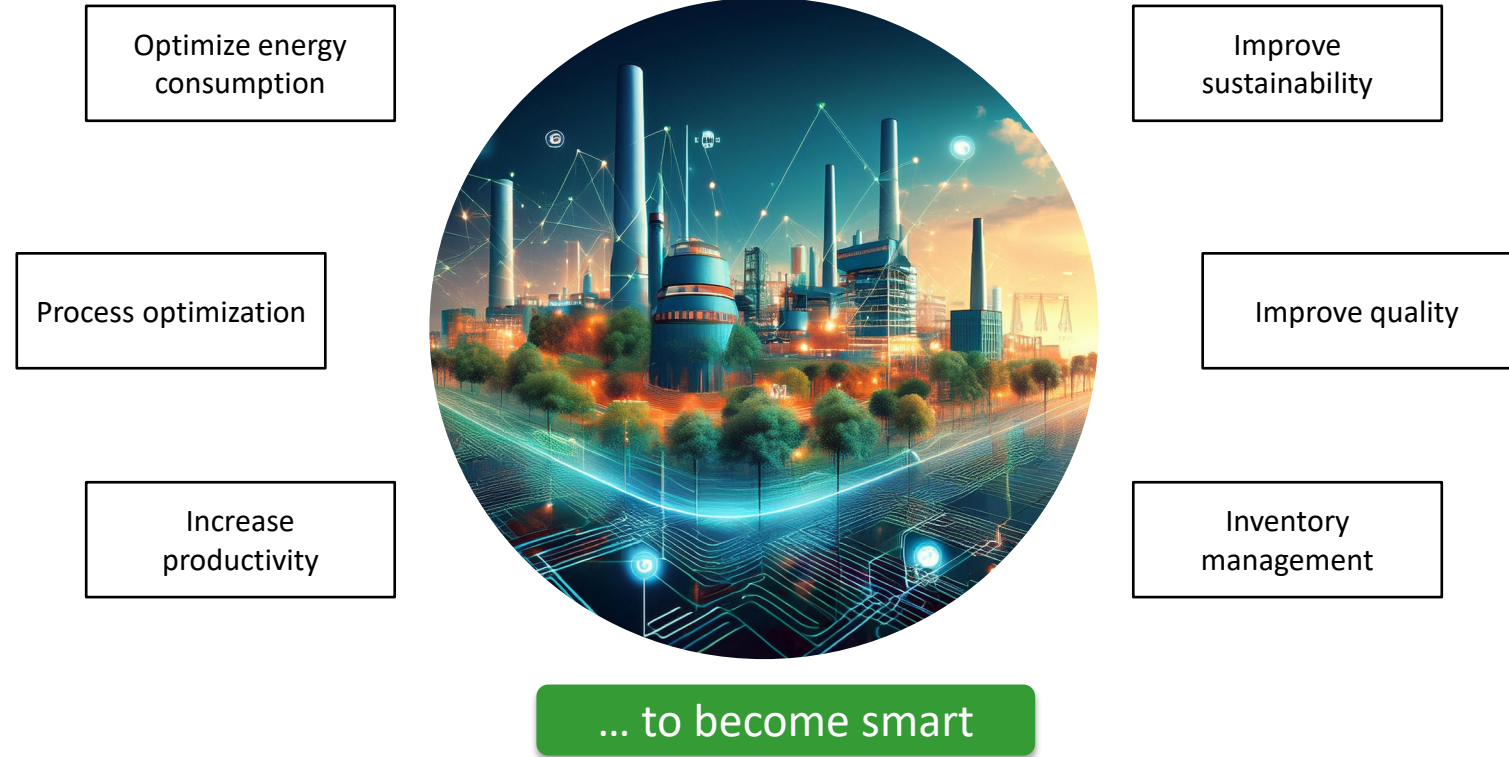
Present



Industry 4.0

The Smart Factory. Autonomous systems, IoT, machine learning

The modern industrial world is reliant on technology



Smart Manufacturing

- According to the Clean Energy Smart Manufacturing Innovation Institute (CESMII), smart manufacturing embodies an **information-driven, event-driven** framework that brings together business, physical, and digital processes efficiently and collaboratively.
- According to NSF, smart manufacturing is about
Data → **Information** → **Knowledge** → **Wisdom**
- According to ACEEE report, it is the **integration** of all facets of manufacturing using **information** and **communication** technologies.

“Key is to get the right information at right time to right person”

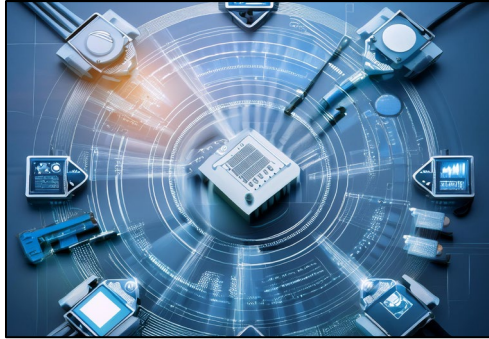
Industrial Internet of Things (IIoT)

IIoT refers to interconnected sensors, instruments, and devices networked together in industrial settings to collect and exchange data.



Components of IIoT

Sensors/Devices



Connectivity



Data Processing

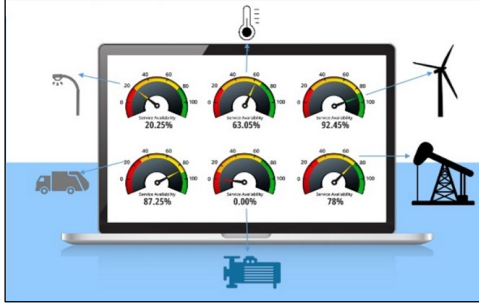


User Interface

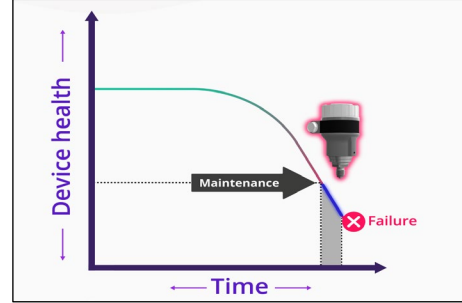


IIoT enables Smart Manufacturing (Industry 4.0)

Real-time Monitoring



Timely Maintenance



Data-driven Decision Making



Improved Energy Efficiency



When Energy meets M³

1

Measure

2

Monitor

3

Manage



"Visibility is the first step toward optimization. You cannot manage what you do not measure."

IIoT is a powerful enabler for energy management

It provides the tools and insights needed to monitor, control, and optimize energy use, leading to greater efficiency, cost savings, and sustainability in industrial operations.

ACEEE study shows...

20% reduction
in energy
consumption

\$15B in electricity
cost savings by
2035

Future

- Traditional energy audits are "snapshots in time"
- **The Shift:** Moving from "Energy as an Overhead" to "Energy as a Variable Cost"
 - Energy required per unit produced
- **IIoT Promise:** Moving from reactive monitoring to proactive, automated optimization

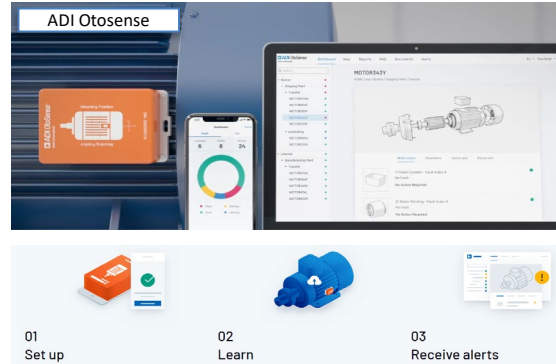


How to Start?

Start small...

- Barrier to entry has significantly reduced
- Don't instrument the whole plant. Focus on the "Significant Energy Users" (SEUs) first.
- Start by integrating one device at a time
- Gradually build your ecosystem of IIoT solutions

Condition Monitoring of Motors

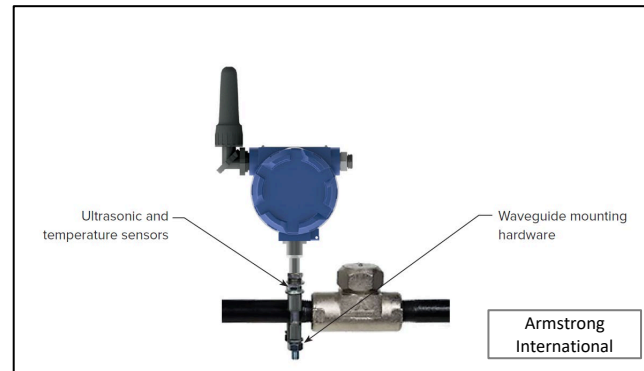
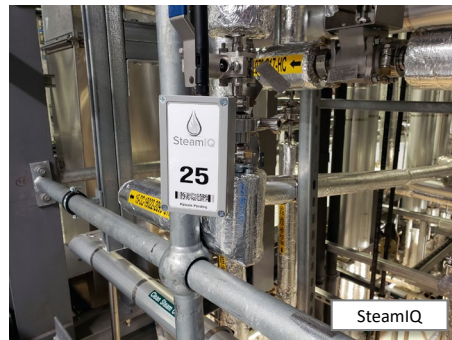


SIMOTICS CONNECT 400 & SIDRIVE IQ Fleet
- Architecture principle



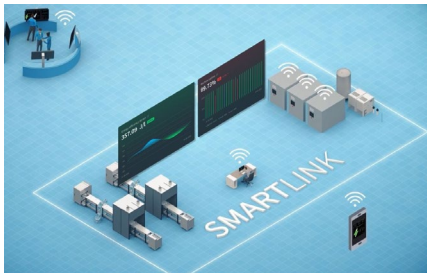
- Monitors: On/Off State, Vibrations, Efficiency, Alignment, Temperature, etc.
- Features: No wires and gateway required, Mobile app support and dashboard access, Long battery life

Detect steam trap failures smartly



- Non-intrusive, 24/7 surveying, Plug-n-pay installation, Ultrasonic + Temperature detection, Cloud integration with analytics
- Detect open and closed failures
- Estimate annual savings, steam loss, etc.

Monitoring of Air Compressor



Atlas Copco SmartLink



Ingersoll Rand Helix



Quincy Intelligent
Connectivity System (ICONS)



Airmatics AIR-TAG

- Leverage IIoT capabilities to achieve increase uptime, improve machine health, higher energy efficiency
- It is not brand agnostic
- Only available on newer models

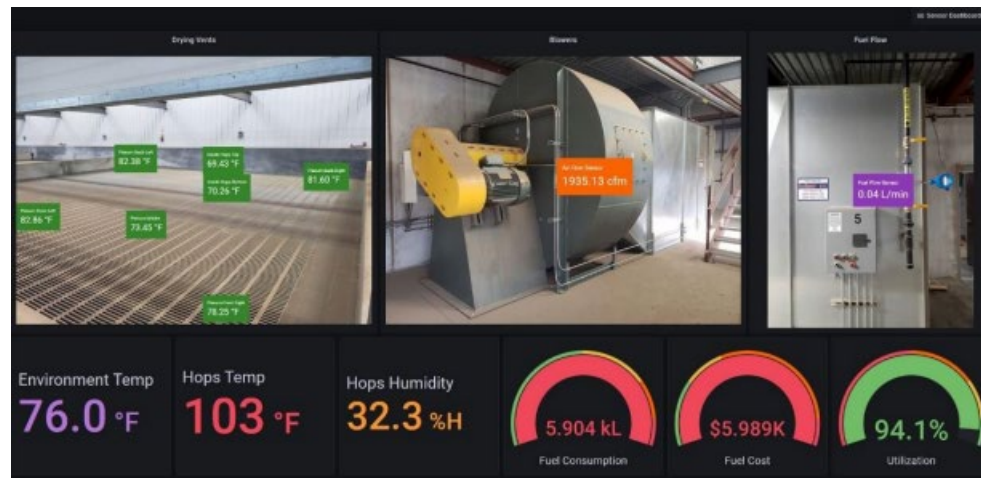
- Performance monitoring device
- Standalone module with cloud connectivity
- It is brand agnostic
- Need your own set of sensors



Case Studies

Hop Drying Plant

- Crop drying is an energy intensive that requires careful control to maximize product quality and prevent spoilage
- Process instrumented to measure humidity and temperature for real time monitoring
- Project focused on improving the efficiency of agricultural drying processes through data-driven protocols and sensor-based monitoring



14% Reduction in
Process Time

10% Reduction in
Energy Consumption

Source: CESMII – The Smart Manufacturing Institute

Food Processing Plant

- Access to real-time production data enables process control decisions in the context of material flows and operations
- Implemented the sensing and tracking platform
- Quality dashboard displays current performance, target performance, and historical average performance for key parameters
- Improved operational efficiencies and waste reduction



**\$60k in Annual Savings
on Energy Costs**



“The cheapest kilowatt is the one you never use”

Questions?