TECHNICAL NOTES

Energy Monitoring

Energy Management Challenges and Intell-i-Watch Monitoring

Managing energy within your facility or department with Intell-i-Watch can be a major yet often underutilized cost savings opportunity for companies looking to reduce waste cost, enhance sustainability, and meet regulatory requirements. To attain your energy goals there are numerous challenges to overcome. Although the following list of points could be expanded to vast amounts of minutiae, this may spark you into developing an action list of your own.

Energy Usage vs. Reduction

In order to reduce overall energy usage within a facility each area or section of energy usage needs to be identified, analyzed for subsystems, machinery, devices and components that consume energy then groups or individuals are to be isolated and monitored to establish baseline consumption of each individually. To achieve this a high-density data capture system is required, this is the power of the Intell-i-Watch monitoring platform.

High density data accumulation: The required high-density monitoring is facilitated by Intell-i-Watch due to the large input and data storage capacity of the Watch systems. In the input vs. cost arena our Watch systems reduce your installed data capture costs greatly compared to the typical, alternative low density, high I/O cost systems.

Routine Maintenance of Systems

The routine maintenance of energy systems leads to increased efficiencies, fewer equipment failures, lower consumption rates and proactive benefits.

Points of interest for improvements:

- **Automation of maintenance notification items:** Use the software and applications in your computers, phones and Intell-i-Watch monitoring system to alert your operators to scheduled events reminders.
- **Create Schedules for Preventive Maintenance:** Create proactive scheduling of maintenance items and stick to the plan that include regular inspections and servicing of energy-related equipment. Proaction can identify potential issues before they become problems.
- **Predictive Maintenance Technology:** Employ advanced monitoring tools that analyze and integrate equipment performance data to predict sensor performance degradation and failures to anticipate interventions, sensor replacement and minimizing system and process downtime. Use the same tactics for motor condition monitoring.

Real-Time Data

Waiting for occasional equipment and energy condition inspection reports can delay identification of inefficiencies or system failures. Real-time data helps develop immediate insights, enabling timely corrective actions and continuous optimization of energy usage. Improved data integration and accessibility, data volume, storage, retrieval planning will make using the data easier.

Points of interest for improvements:

- **Analyze all devices in your facility makeup:** Identify which systems will quickly allow implementation of monitoring and feedback and perform those upgrades on one or two such systems to demonstrate how data collection and analysis can be successfully implemented across all devices.
- **Invest in Advanced Energy Monitoring Systems:** Implement Intell-i-Watch systems for real-time data on energy consumption, demand patterns, and system performance. These systems can facilitate prompt responses to anomalies and lead to informed decision-making.
- **Implement Analytics:** Leveraging analytics tools to process real-time data, uncover trends, and predict future energy needs, enhancing energy oversight strategies.
- **Data Infrastructure:** Create a data storage, handling, tools and manipulation process to simplify and streamline data use and consumption.

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Energy Saving Measurement

Without clear, measurable objectives, energy management initiatives may lack direction and effectiveness. Creating achievable specific goals allows your organization to monitor and assess progress and success of implemented measures.

Points of interest for improvements:

- **Outline Goals:** Set specific objectives that are measurable, achievable, relevant with time. For example, aim to reduce energy consumption by 10% within the next fiscal year.
- **Baseline Comparison:** Collect current baseline energy usage via Intell-i-Watch data collection and compare the current and historical energy consumption against real-time and near future reduction data after you implement energy reduction plans and actions to identify areas of improvement and set realistic targets to accelerate near term improvements.

Engage Employees in Energy-Saving Initiatives

Employees play a vital role in the success of energy management programs. Lack of awareness or involvement can undermine efforts to reduce energy consumption.

Points of interest for improvements:

- **Conduct Training and Awareness Programs:** Educate employees about the organization's energy goals and the importance of their participation. Provide practical tips on energy-saving behaviors relevant to their roles.
- **Establish Incentive Programs:** Recognize and reward departments or individuals who contribute significantly to energy-saving initiatives, fostering a culture of sustainability.

Outdated and Inefficient Equipment

Operating obsolete and/or inefficient equipment can lead to excessive energy consumption and increased operational costs. Modern, energy-efficient technologies offer improved performance and lower energy usage.

Points of interest for improvements:

- **Conduct Energy Audits:** Regularly assess equipment to identify inefficiencies and prioritize upgrades or replacements. Energy audits can reveal significant savings opportunities.
- **Leverage Incentive Programs:** Explore government or utility-sponsored programs that offer rebates or incentives for adopting energy-efficient technologies, offsetting initial investment costs.

Simplify Energy Management Systems

Complex energy management systems can deter effective use and hinder the achievement of energy-saving goals. Simplicity and user-friendliness are key to successful implementation.

Points of interest for improvements:

- **Select User-Friendly Systems:** Choose energy management solutions that are intuitive and require minimal training, ensuring ease of use for all operators.
- **Provide Comprehensive Training:** Offer training sessions to familiarize staff with the system's features and functionalities, empowering them to utilize the tools effectively.

Monitor and Adjust Strategies Over Time

Energy management is an ongoing process. Neglecting to monitor performance and adjust strategies can result in missed opportunities for improvement and diminished returns on energy-saving investments.

Points of interest for improvements:

- **Create Regular Monitoring:** Frequently and per scheduling review energy consumption data to assess the effectiveness of implemented measures and identify new areas for improvement.
- **Adopt Advancements:** Stay informed about emerging technologies and best practices in energy management and be prepared to integrate them into existing strategies to enhance performance.

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Intell-i-Watch Scope of Application

There are three electrical classes driven by NEC, NFPA, and UL.

Low Voltage:	Under 1000 Volts
Medium Voltage:	1KV to the 69KV
High Voltage:	69KV up to 225KV

The Watch systems can be used in low voltage systems up to 600V.

What we can provide is simple measurements of:
- Voltage
- Current
- Wattage
- Time of usage.
- Identifying excessive power consumption
- Others dependent on sensor type(s)

Additionally, when monitoring VFD's we can use the inverter's parameter outputs to monitor and log those parameters for devices such as motors, gear motors, pumps and mixers. As there are many parameters, there can be some customization here where you can decide which parameters are important to you.

The parameters might include:
- Motor fault
- Motor overload
- Relay contact output(s) for a variety of parameter setups dependent on parameter
- Motor torque as % of motor rated torque
- Current
- Run time

Motor starters

Newer electronic motor starters from all of the major control manufacturers offer an expanded range of parameter access to detect conditions prior to becoming a problem.

Smart motors

Newer motor designs are providing integrated sensors for:
- Temperature
- Vibration
- Phase balance
- Power factor monitoring

Any of these factors can indicate a change in performance that when sensed can result in corrective action to reduce unwanted downtime.

Communications

When deciding to connect multiple devices to the Intell-i-Watch you would typically use the terminal inputs for your sensors. However, the Ethernet connection can allow use of Modbus RTU. For Ethernet and Modbus more review of your application, components, channel programming requirements would need to be performed to determine the cost of implementing this method of device/sensor interface.

Additional Thoughts

Awareness of these common challenges is essential for effective energy management. By maintaining systems, leveraging real-time data, setting clear goals, engaging employees, upgrading equipment, simplifying systems, and continuously monitoring progress, organizations can optimize energy usage and achieve long-term sustainability. Implementing these strategies will not only reduce operational costs but also contribute to environmental conservation and regulatory compliance.

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