



CASE STUDY

Strategies for Adding Value through Internet of Things, Cloud Computing, and Analytics

Product development and validation testing is critical to the design and launch of competitive products, including support of reliability and durability assessment, as well as evaluating product performance and energy efficiency. For many small companies working to launch new products, including those in the “green products” space, the cost of this testing can be a barrier to preparing products for a successful launch. Center of Excellence in Advanced and Sustainable Manufacturing (COE-ASM) has significant experience in the development and deployment of technologies leveraging the Internet of Things (IoT), cloud computing, and advanced analytics that can be helpful in maximizing the benefits from the investment in product testing and evaluation. We leverage years of experience in core technologies and original innovations, and through these technologies, have developed advanced solutions for remote monitoring of vehicles and industrial equipment (among other applications).

Client Challenge

COE-ASM applied these technologies to collaborative work with a startup manufacturer of wind turbines that sought to test system performance under several different operating conditions and compare results to official certification requirements. In an effort to achieve quality data, the turbines themselves were necessarily placed in remote locations conducive to representative wind exposure. This created a challenge for the systematic collection of product data, particularly in consideration of personnel constraints familiar to many small enterprises. The COE-ASM team was asked to develop a means by which system performance data could be centrally collected, transported, stored, and interpreted for a variety of different operating conditions. The objective was to compare the theoretical “nameplate” generation capacity of the turbine system with the actual amount of produced power under diverse conditions of wind speed and direction, ambient temperature, barometric pressure, and relative humidity. As a small enterprise with limited personnel and a need for independent review, external support for assessment of system efficiency was paramount to the realization of the company’s certification goal.



CLIENT CHALLENGE

- The client sought to test their system performance under several different operating conditions and compare results to official certification requirements.

COE-ASM WORK PERFORMED

- Developed a software system to collect site data on both environmental conditions and wind turbine performance.
- Designed the software to monitor the duration of each test under each set of environmental parameters to determine when testing is complete.
- Computed the maximum theoretical generation capacity.
- Calculated the turbine efficiency rating.

RESULTS

- Leveraged the benefits of Internet of Things.
- Saved both time and money by offsetting both fuel costs and environmental emissions.
- Streamlined system allowed the company to pursue its sustainability goal of renewable energy certification.

COE-ASM Work Performed

The COE-ASM developed a software system that collects site data on both environmental conditions and wind turbine performance, and provides a scalable capability for remote data collection, automatic analysis, and data access. This system computes the generation capacity under each set of conditions specified by an industry standard, and therefrom calculates the product's efficiency rating. As the certification towards which the company was working required that operation in each set of conditions meet a prescribed time duration, the system automatically determines when these conditions are met and therefore when testing is complete. The software provides a web-based interface that allows the company to track historical and real-time performance on a large distributed fleet of wind turbines.

Results

Through the use of distributed sensing and cloud computing, COE-ASM was able to leverage Internet of Things (IoT) technologies to provide connectivity and monitoring of distributed remote equipment. This saves both time and money for the firm, as the need to travel to test sites to collect data was eliminated. In addition, the data storage and analysis architecture allows all data and calculations to be audited for certification purposes. This approach simultaneously provides a means of collecting data for advanced analytics to support further product performance enhancements.

As customer demands for sustainability increasingly influence the manufacturing sector, companies continue to search for opportunities to develop marketable sustainability strategies. In many cases, these strategies depend on data-driven and verifiable performance metrics that highlight energy efficiency, waste reductions, and unique company or product features not matched by competition. While platforms for system integration and data analysis are growing in both popularity and availability, independent review often lends considerable credibility to a sustainable manufacturing strategy. Beyond this, an external assessment creates the opportunity to identify areas of improvement and develop solutions tailored specifically to unique and individual company goals. Whether for the purpose of regulatory compliance, official certification, or the realization of internal objectives, the efficient, reliable collection and meaningful evaluation of performance data is critical to the success of any corporate sustainability strategy.

The Center of Excellence in Advance & Sustainable Manufacturing (COE-ASM)

is a specialized applied research and development center dedicated to helping emerging and existing NYS manufacturers to enhance productivity and become more competitive through innovation and technology in sustainable products and processes. COE-ASM is located at the Golisano Institute for Sustainability and is a New York State Center of Excellence, a NYSTAR partnership.



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