MAKING INDUSTRIAL IOT SUCCESSFUL IN MANUFACTURING

The use of Internet of Things (IoT)-enabled devices in the smart manufacturing industry, or Industry 4.0, is an area which is presenting massive opportunities. While there are challenges to connecting machines on the shop floor to the top floor, industrial IoT (IIoT) systems offer manufacturing organizations an avenue to create new business. IIoT systems add to the top line by creating next-generation products and services, and also boost the bottom line by improving efficiencies across the manufacturing shop floor. Moreover, these connected systems also allow manufacturing organizations to improve supply chain efficiency by allowing tracking and tracing of all the raw materials, components, and substances coming to the manufacturing shop floor.

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It is a given that IoT systems for Industry 4.0 deliver value to manufacturing organizations, making their processes smarter and more efficient, and the outcomes of a recent study by Greyhound Research, a leading global analyst firm, confirm much the same. According to the findings of the study, 87% of large global manufacturing organizations have either already implemented Industrial IoT systems, are currently running a pilot project, or are holding discussions with management to get started.

FOUR DIMENSIONS OF IOT-LED EFFICIENCIES

We believe there are four dimensions against which industrial IoT systems can help deliver efficiencies on the manufacturing shop floor:

- **Operations efficiency** due to higher availability of floor operations data – to plug gaps faster and better, thereby improving overall shop floor operations
- **Maintenance efficiency** due to real-time availability of equipment health data – to better predict equipment downtime, thereby reducing productivity loss on the manufacturing shop floor
- **Information efficiency** due to better ability to move data from the device to the shop floor – to improve efficiencies across the entire manufacturing operations
- **Energy efficiency** due to better ability to measure, analyze, and improve energy consumption, as well as reduce wastage – to deliver on the agenda of an enterprise that is environmentally sustainable

To help manufacturing organizations achieve the above stated benefits, we partner with manufacturing enterprises to **assess their Industry 4.0** maturity and create **roadmaps for successful IoT implementations**. Infosys brings on board strong capabilities for the manufacturing industry, leveraging core engineering for physical components, embedded engineering for smart components, and networking and cloud technologies for connectivity components. In addition, we use features such as rich user experience, social media integration, cloud-based solutions, and product intelligence to help our clients **generate new revenue streams** and **improve people's lives.**

Infosys stepped in to help a leading **automotive manufacturer** explore the use of industrial IoT systems to help p**redict the usability of spindle machines and maintenance** needs, and gain a scalable architecture for rolling out more machines, different protocols, and controllers with minimal changes.

PREDICTING EQUIPMENT MAINTENANCE AND ENERGY REQUIREMENTS

We helped champion two use cases - one, predictive maintenance of 10 CNC, or computer-controlled machines at an engine manufacturing plant and two, **energy demand forecasting** for floor shops and the overall plant to plan future energy requirements.

For this engagement, we **brought together a diverse team** consisting of Industry 4.0 consultants, industrial automation experts, data scientists, and cloud and big data professionals. The solution was implemented in **five phases:**

1. Defining engagement expectations through a week-long workshop with all the stakeholders. The group carried out a FMEA (Failure mode and effects analysis) of the equipment for predictive maintenance - spindle machines. This helped the team identify the key reasons for spindle failure, which included fatigue wear, and overloading.

2. Designing edge architecture by deciding the array of sensors, actuators, and devices which would enable complex computation and analysis to run on-site. The group brainstormed and created detailed panel and wiring designs to connect sensors and gateway through discussions with hardware vendors, plant network and production engineering teams.

3. Identifying platform requirements for the IoT platform, keeping in mind parameters like scalability, access to ML tool, security, maximized usage of existing infrastructure, etc. A high-level architecture was designed and technology and platform options evaluated for it.

4. Prototyping to identify issues and get early feedback from business. To ensure this, the team put together rapid prototypes on the development environment and UAT instance of data ingestion, visualization, and analytics.

5. Deploying for production on the production server after implementing the UAT instance.

For the energy consumption use case, we helped forecast the plant's power needs by measuring three input parameters, namely weather, active power, and production volume, and using these, along with future planned production volume. We automated data collection, and the collected data was sent to the IoT platform which analysed the data using machine learning analytics, and sent the forecast results to the client's platform.

For the predictive maintenance use case, the solution was planned for 25 machines. If implemented in the client's plants across Europe, the solution can predict the remaining life of spindles in 90 machines, leading to **potential savings of up to 3 million euros in five years**, including the cost of spindle replacement and production stoppage. Gathering data over a period of time, engineering analytics can **predict the life of spindle machines with 95% accuracy**.

As for energy demand forecasting, the client had previously been able to do so only on a yearly basis for the entire plant. With our solution, the client can **forecast energy demand on a monthly, weekly, and daily basis for each shop** in the plant. Also, with energy demand forecasts available at a more granular level, the client can shift from buying expensive energy contracts on a yearly basis to buying quarterly contracts.

MAKING INDUSTRIAL IOT SUCCESSFUL IN MANUFACTURING - THE FIVE KEY TAKEAWAYS

1. **Define** expected outcomes from the engagement through consultations with stakeholders
2. **Plan** for a data model that evolves with the growing sources and complexities of data and systems
3. **Conduct** a Proof of Concept to better understand the impact and scope of Industrial IoT on your organization
4. **Use** AI and ML technologies to better predict the impact of IoT on production and maintenance of systems
5. **Train** employees on IoT and related edge architecture to ensure efficient utilization and hence minimal downtime

BIG LEARNING:

While it's a no-brainer that most organizations, particularly in the manufacturing sector, expect benefits from IoT implementations, the fact is, most projects are currently in the POC stage and outcomes from those already implemented are months, if not years, away. Organizations that will benefit from such projects will be those that solve some of their long-standing business problems and inefficiencies in existing physical systems and processes by way of integrating the machines on the shop floor to the top floor. With our extensive work on this topic, we believe that before using industrial IoT solutions it is important to ensure that technology considerations are in tandem with the overall enterprise IT architecture and its needs.

WE DID THIS FOR THEM. WE CAN DO IT FOR YOU.

To learn more about how IoT solutions can benefit your organization, reach out to us at askus@infosys.com

For more information, contact askus@infosys.com

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