

TOP TIPS

Address 8 Production Challenges with Integrated Data Analytics

How to enable near real-time decision-making and trend analysis across your production processes to increase speed, agility, flexibility, competitive advantage and cost savings.

Data drives business decision-making at every level of manufacturing, from production operation to strategic planning. The difference today is that manufacturers are using cloud-based Internet of Things (IoT) platforms to automate data collection and analysis, allowing business leaders and operators to make faster, more accurate decisions.

The benefits that such integrated data analytics capabilities confer across an entire business value stream—that is, how manufacturers can exploit data analytics for strategic competitive advantage—are too numerous to cite. So here, we zero in specifically on how production facilities can leverage the technologies today.



Throughout production, data analytics transforms critical elements of the workflow processes by supporting quick decision-making at two levels:

1. It delivers data to operators overseeing production, enabling near real-time action.
2. It compiles and makes available datasets that are vital for trend and root-cause analysis.

By connecting plant assets and then continuously collecting and analyzing the generated data, manufacturers can discover new efficiencies across the production process and reduce costs.

It's important to note that a cloud-based IoT platform, such as MindSphere, is critical to success. The cloud enables easier connectivity across legacy and new manufacturing applications and makes available the massive storage and computing resources needed for effective analytics of data-intensive production processes.

With a cloud-based IoT platform, manufacturers can use integrated data analytics to accelerate decisions that help manufacturers achieve the following:

1. Enhance asset transparency.

With data analytics, operators can routinely gather and compare the near real-time performance of every machine and process against defined control ranges to identify anomalies. Data about particular parameters, such as vibration, temperature and pressure, are automatically collected and communicated to operators. The applications monitor processes in near real time and alert operators when they are out of spec. This automated approach enables early identification of events or incidents, such as a suspected defect or process abnormality, which allows operators and maintenance technicians to take action to reduce unplanned downtime, guarantee product quality and maintain throughput.

2. Enable predictive maintenance.

Data analytics powered by a cloud-based IoT platform identifies issues and uncovers trends faster and more effectively than previously possible. By analyzing trending operational data, including machine cycles, load, pressure and temperature, operators gain insights that enable preventive maintenance or, better, predictive maintenance. With these insights, plants can conduct maintenance at the optimum time, rather than use the inefficient run-to-failure or time-based approaches. This method keeps machines operating at maximum efficiency, ensures asset availability and increases productivity. It also reduces costs because it allows replacement part inventory levels to be kept at a minimum.

3. Optimize uptime.

Accurate failure prediction and predictive maintenance increase asset uptime and availability, which helps manufacturers better coordinate production schedules. Using the analysis of data from sensors within equipment, plant managers can automate the actual operation of the machines. Essentially, the manufacturer can determine when machines may need to be brought online or shut off to prevent an issue. With knowledge about which machines run most optimally, they can maximize the use of those machines. With advanced information about when maintenance will need to be done, they can schedule it to make the least impact on machine uptime.

4. Reduce waste.

Integrating data analytics into your plant accelerates the identification and elimination of most wastes that afflict the production process. With access to customer order data, plant managers can eliminate overproduction and excess inventory, perfecting just-in-time delivery to customers. Keeping machines optimally maintained reduces scrap and rework, as does early detection of product or process defects. Also, trend data identifies bottlenecks that impact productivity and overall equipment efficiency.



5. Improve quality.

Integrating data analytics throughout production increases quality and reduces defects of both products and processes. The data enable manufacturers to increase first-pass yield and throughput, which not only reduces costs but improves on-time delivery—and, ultimately, customer satisfaction.

Using trending data, manufacturers can identify the parameters that affect quality variations and optimize them. Manufacturers also will gain greater visibility into supplier quality and delivery accuracy, enabling better decisions about which suppliers to use for specific orders based on customer requirements.

6. Optimize scheduling.

IoT platforms allow manufacturers to connect enterprise resource planning (ERP), customer relationship management (CRM) and e-commerce systems. By integrating customer, scheduling and maintenance data, manufacturers can uncover hidden patterns that may lead to identifying additional operational efficiencies. Manufacturers will be able to optimize production schedules based on supplier time-to-delivery, customer demand, machine availability and cost constraints.

7. Streamline ordering.

A slightly different look into customer, scheduling and maintenance data will enable manufacturers to improve accuracy of order lead times, materials purchasing, work in progress (WIP) decisions and the timely reordering of replacement parts for preventive maintenance.

8. Increase energy efficiency.

Integrated data analytics can help manufacturers unlock energy efficiencies, which reduces costs and increases energy productivity. Trending data offered by applications such as MindSphere, for example, can help operators identify high-value opportunities for saving energy by allowing them to schedule resource-heavy machines to be operated during off-peak hours or to reschedule production onto more resource-efficient machines.



When the entire production process is connected, and datasets are available at the right place at the right time, operators are free to perform higher-value tasks focused on optimizing, not just running, the process. Likewise, plant managers have access to automatically collected datasets from across the extended enterprise that, along with advanced analytics, can help them raise plant productivity by increasing efficiency and improving product quality.

The benefits of integrating data analytics into your plant translates into gaining speed, agility and flexibility even as you dramatically reduce production costs. Advanced IoT platforms, such as MindSphere, make smarter, real-time decision-making an affordable business reality. Consider the results achieved by the Siemens Amberg facility with a project focused on energy analytics. While operating on a 24-hour production schedule, the plant faced volatile energy costs, creating difficulty fulfilling sustainability demands and complying with regulatory requirements. Using direct MindSphere connectivity, which enabled automatic data collection that aggregated performance data across all lines, machines and devices, the plant achieved €20,000 (\$22,000) in electrical energy savings in two weeks. It also increased savings in nitrogen and compressed air, serving the environment, and achieved cost-effective data transparency with traceable results.

This content was developed together with Siemens PLM Software, Inc.