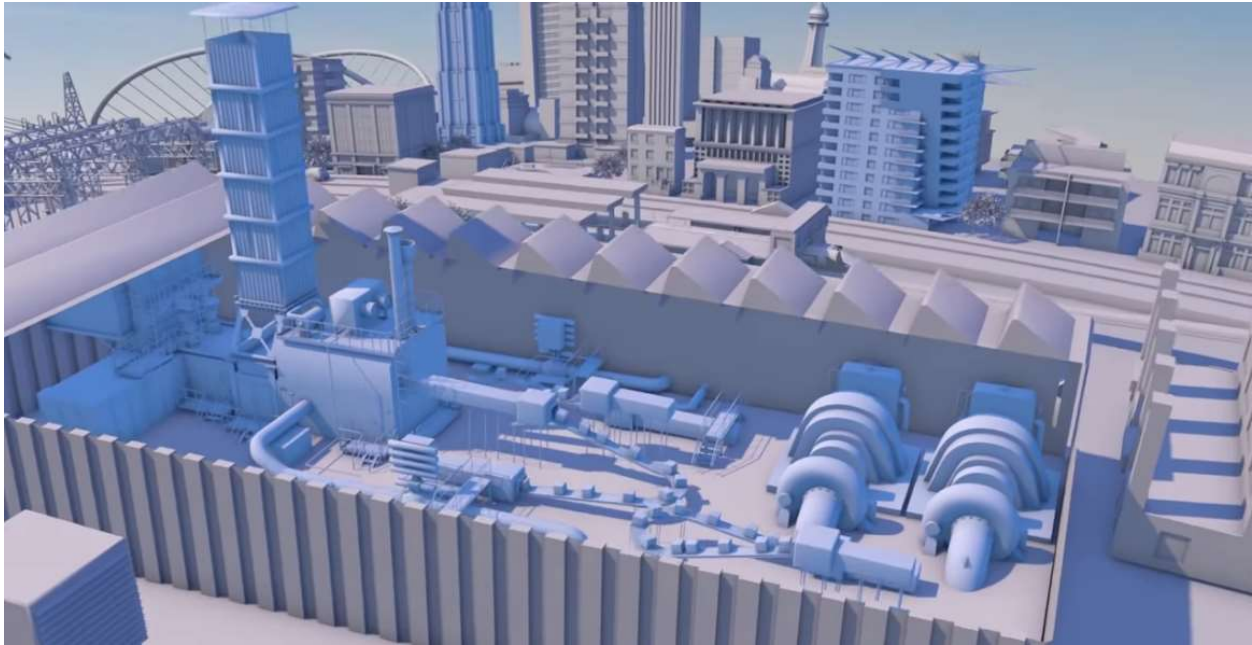


How Cloud ERP Turns IIoT into a Critical Success Strategy for Manufacturing



The Internet of Things is revolutionizing manufacturing. Cloud ERP and IIoT provides the foundation for intelligent factories that scales from factory floor to datacenter, comprehensive security, API management and pre-integrated hardware and software solutions. These technologies enable vital new capabilities, such as predictive maintenance, improved yields, higher quality and remote manageability. From factory floor to datacenter, today's smart factories are being equipped with IIoT.

AT A GLANCE

- Manufacturers miss out on shop floor efficiency gains when they don't have a full view of production.
- Data that lives in disconnected manufacturing siloes make it tough to analyze insights that can be used in everyday business.
- The industrial Internet of things (IIoT) is a network of always-connected "things" and systems that produce data to drive efficiency.
- Maximize IIoT using cloud ERP systems as the hub for connecting and sharing important, value-added business insights across the business.

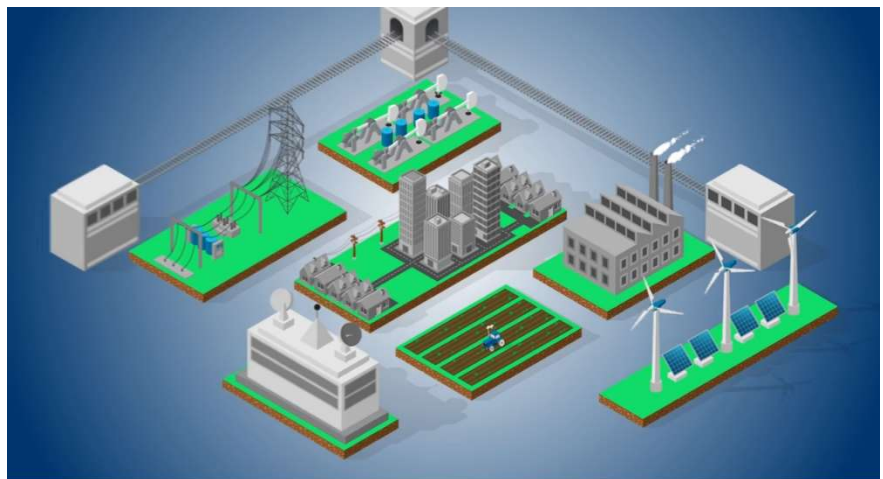
DISCONNECTED MANUFACTURING LEAVES OPPORTUNITIES STUCK IN SILOS

Manufacturers can build or boost their competitive advantage by streamlining their operations but disconnected processes, systems, and data often present roadblocks. Many companies manage an already complex environment with an equally complex web of systems for financials, CRM, manufacturing execution, supply chain planning, and more. In addition, when decision-makers lack visibility into shop floor operations, planning and execution become a guessing game. The problem intensifies when demand fluctuates, or supply chain disruptions occur—especially for businesses with multiple locations.

Manual or disconnected shop floor processes often create problems like:

- **Lax reporting.** When reports on material usage, machine efficiency, and manpower are incomplete or too late to be useful, they prevent decision-makers from optimizing production.
- **Poor reaction time.** Many manufacturers take days to respond to challenges or new business opportunities because they lack easy access to information on inventory levels, production schedules, and raw materials constraints.
- **Insufficient real-time data.** Many manufacturers also lack adequate inventory traceability and tracking so they procure more stock than they need to account for uncertainty.
- **Manual data entry.** Manufacturers that want to incorporate production data into their overall enterprise data (such as financials, order management, and customer data) often must re-enter this data manually.
- **Scrap.** Defective parts and unplanned equipment downtime can eat up a staggering amount of time and budget.

Hoping to solve this problem, many manufacturers have built sophisticated integrations between point solutions, only to run into the challenges of maintaining ever-changing systems and never-ending upgrades. One common workaround is to dump data from each point solution into spreadsheets—but this approach wastes time, gathers data that is already outdated, and doesn't scale well for a



growing business. Not to mention the manual, potentially error-prone work involved collecting data, and the reality that much of this data still ends up unused.

To gain the visibility, control, and agility that will enable them to stay competitive, manufacturers should focus on not only optimizing production but also connecting critical information across their enterprise.

THE RISE OF THE INTERNET OF THINGS

While manufacturers wrestle with these challenges, a massive technology evolution continues. Machines, tools, and computers are being built with embedded hardware or software that enables them to talk to each other with limited need for human intervention. It's known as the Internet of Things (IoT)— and it shows no sign of slowing down.

According to Gartner, there were 4.9 billion connected things as of 2015 that grows to 25 billion by 2020.¹ In an early 2015 Tata Consultancy Services survey of more than 3,000 executives around the globe, 79 percent reported that they already had IoT initiatives in place.²

Who's leading the charge to IoT? According to Tata, it's the industrial manufacturing sector:

- Compared to 12 other major global industries, industrial manufacturers reported the largest average revenue increase from their IoT initiatives in 2014, at 29 percent.³
- When asked to project how much their IoT initiatives would boost revenue (if at all) by 2018 over 2015, industrial manufacturers provided the boldest response: an average 27 percent revenue increase.⁴
- Some 40 percent of industrial manufacturers are already using sensors and other digital technologies to monitor the products they sell to customers. In addition, 23 percent are using this technology to track product and service operations along their supply chain.⁴

Gartner Research estimates that there will be 25 billion connected “things” by 2020.

The Industrial Internet of Things (IIoT), as it applies to manufacturing, delivers increased efficiency with the disappearance of repetitive, non-value-added tasks such as manual inventory counts and manual production tracking. Companies are also connecting new tools and equipment to their networks and allowing these tools to communicate in real time. These tools include tablets and smartphones that replace outdated clipboards, static workstations, and stacks of paper.

THE INDUSTRIAL INTERNET OF THINGS AND DIGITAL TRANSFORMATION

You might hear related terms like Industry 4.0, Smart Manufacturing, Factory of the Future. All center around the digital transformation taking place in manufacturing that includes the growing intelligence and communication capabilities in industrial systems—and it is accomplishing far more than simply automating existing processes and reducing paperwork. Digital transformation is key to supporting IIoT.

IIoT began on the shop floor. It is the network of physical objects—devices, sensors, machines, tools, vehicles, buildings, and products—that collects, measures, receives, transmits, acts, and exchanges data in an industrial application. This proliferation of always-connected “things” and

systems work together to leverage data collected from one part of the business to enhance the other parts of the business.

The list includes:

Machine2Machine. Equipment sensors and communication capabilities on capital equipment enable machines to communicate and react to each other—even making autonomous decisions --creating an ecosystem of connected products, devices, and machines.

Machine2People. The ability for people to respond to communications sent from machines—and vice-versa—extends connectivity to customers, suppliers, and partners.

Machine2System. When applications connect to systems, manufacturers can form a unified, consistent, trustworthy view of the business.

Connected tools. The list includes connected calipers, torque wrenches, augmented-reality vision systems, and apps that receive and share information in real time with manufacturing systems.

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At the same time, we're also seeing the advent of human-readable visualizations of data sets that would otherwise be too complex for understanding:

- **Dashboards.** By aggregating data from multiple sources onto a single screen, manufacturers can visualize complex data sets and monitor key areas such as production quality through a single pane of glass.
- **Augmented reality.** Specialized wearable devices enable production workers to see real objects and virtual reality at the same time, enhancing the amount of information they have available as they examine products or machinery.

As Industry Week explains:

- “Instead of trying to guess what’s wrong with a particular part, you can have the part actually show you whether it’s within tolerance and whether it’s working correctly using a combination of the Internet of Things and augmented reality...The device or item will not only tell you something is wrong, but will also show you what is happening (or will happen) if it isn’t repaired or replaced, making it easier for technicians to do their jobs.”⁵
- **Vision systems.** Vision systems are essentially computers with eyes that measure materials, provide guidance in positioning machines, inspect materials or products for quality control purposes, and count items in packaging. They can be combined with robots to increase automation and accuracy on the production line.

You'll continue to hear about these technologies because they're key to delivering results for manufacturers. According to McKinsey Digital:

*"The disruptive technologies of Industry 4.0, such as IT-enabled manufacturing and increased computing capacity, hold the promise of smart factories that are highly efficient and increasingly data integrated. Data is the core driver: leaders across industries are leveraging data and analytics to achieve a step change in value creation. A big data/advanced analytics approach can result in a 20 to 25 percent increase in production volume and up to a 45 percent reduction in downtime."*⁶

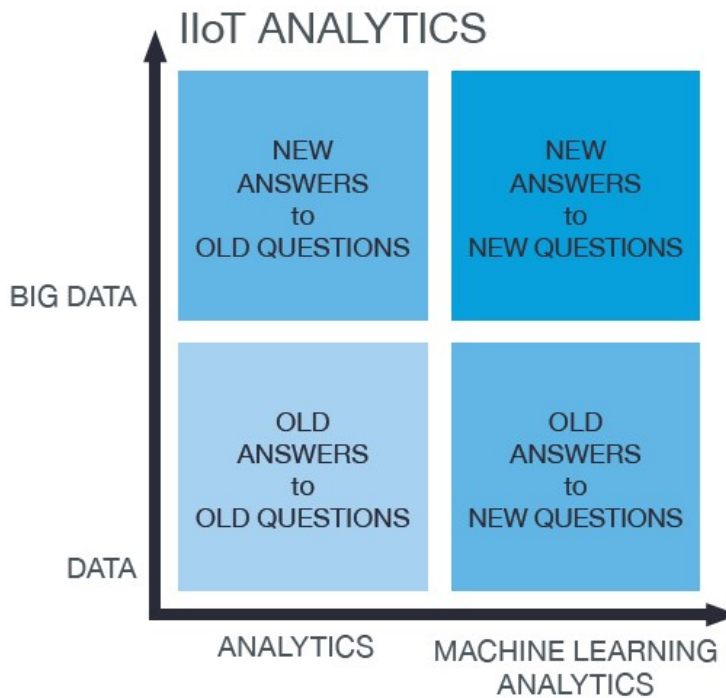
It's no wonder, then, that IIoT is spurring a global trend for smart factories. Programs include Industry 4.0 in Germany, Smart Manufacturing in the U.S., and Manufacturing 2025 in China.

Whether they're participating in a national program or taking their own initiative, forward-thinking manufacturers don't view IIoT as merely a set of products or technologies—they see it as a business shift. Rather than evaluating a new piece of technology and then considering how they might find a use for it in their business, they identify a business problem and then consider how IIoT technology can help solve it. From among the complementary group of IIoT tools and capabilities, manufacturers can select the specific technologies that address their challenges and bring them closer to meeting their goals.

WHY MANUFACTURERS NEED TO EMBRACE IIOT

As the pace and complexity of manufacturing increases, the ability to make more informed decisions about the supply chain and how customer demand affects overall production will not simply be an imperative—it will be how manufacturers operate to sustain a viable business. IIoT fosters a data-driven approach to running a manufacturing business. Always-connected machines, tools, and systems generate unparalleled amounts of data. Digitizing nearly all aspects of their operations enables manufacturers to gather more business and manufacturing intelligence that increases their awareness of the health of their business and helps them identify opportunities to differentiate themselves.

Having this volume of data on hand empowers manufacturers to make better-informed decisions. It enables machines to make autonomous decisions. Perhaps best of all, when manufacturers discover new facts and trends about their businesses, they're better able to offer differentiated products and services to customers. They gain the wisdom to know what customers need before they ask for it and can design products that anticipate the expectations of their market.



For example, seeing opportunities for better quality and reduced waste—an area of priority for virtually all manufacturers. A 2016 survey of Oracle customers asked, “What is the one thing you most want to improve about your organization in 2016?” 32 percent of participants responded, “Product Quality.” This concern ranked ahead of Process Automation (27 percent) and Order Performance (18 percent).

IIoT is even driving change in the way manufacturers deploy personnel. With so much more data at their fingertips, high-value database administrators can now become even higher-value data scientists and business analysts who decide on behalf of the company which data is most important to collect and how best to use it.

Today’s massive data stores present modern manufacturers with a huge opportunity. Forward-thinking manufacturers are finding ways to exploit this opportunity by mining, analyzing, and acting on these huge volumes of data generated by IIoT technology. But they can only do this if they’ve simplified their operations to one platform: the cloud.

THE CLOUD IS THE FOUNDATION FOR IIOT

Leading manufacturers are pursuing a competitive advantage by embracing IIoT but first they need to break down the barriers to data. The only way to do that is in the cloud. The cloud offers unlimited storage and computing power. The cloud also makes it easy for manufacturers to integrate new devices and machines into a fully communicating ecosystem. And it’s the most essential technology for managing a diverse set of data points and communications

A cloud ERP system acts as a hub for all your production systems and represents a single source of truth. Oracle Manufacturing Cloud ERP is designed to help you make decisions with confidence and speed. It gives you one source of data from which you can translate structured data into actionable insight. This enables you to deliver the right information to the right person, to empower your executives to make strategic decisions, to drive production efficiencies. You can view and act on this data from anywhere in the enterprise or remotely over any mobile device with role-specific capabilities, creating the most complete, unified, comprehensive manufacturing infrastructure in the cloud.

CONTROL YOUR SHOP FLOOR

The Oracle Manufacturing Cloud helps you control your shop floor. It includes a manufacturing execution system (MES) with communications from your IIoT-enabled machines and automation to give you a comprehensive, real-time view of what's happening in production at the "manufacturing moment." Oracle's control panel also gives your operators a single source of the truth regarding manufacturing operations.

As a result, you get:

- **Real-time production control.** You gain the insight to maximize the uptime and effectiveness of your equipment with operator controls that increase yields, minimize errors, and boost overall productivity.
- **High-resolution traceability.** Rather than guessing about quality issues or production problems, you can pinpoint the causes by tracking all materials from the moment they enter your system.
- **Connected data-driven quality.** Quality control plans are produced within Oracle and control the material, processes, and automatically present checksheets to ensure that quality processes follow the plan.

Companies accelerate new product introductions and time to market with automated flow of Printed Circuit Board/Printed Circuit Board Assembly (PCB/ PCBA) engineering designs into machine programs. Automating the flow of such documentation helps companies meet globally standardized processes and respond faster to changing market or competitor actions.

CONNECT YOUR BUSINESS TO EVERYTHING

Increasing the efficiency of your shop floor operations is about more than simply preventing waste or boosting productivity. It's also about leveraging data about your operations to gain the insights you need to optimize your entire manufacturing business, not just production. That's why the Oracle Manufacturing Cloud connects your business to everything to ensure that data communication will continue, from the top floor to the shop floor and from customers to suppliers, even while you sleep.

The Oracle Manufacturing Cloud enables you to:

- **Connect your people.** Everyone can see how their job relates to the health of your business—and can work smarter as a result. Executives can bring in data from the shop floor to make decisions based on information at the manufacturing moment. Line workers

can more easily share information through tablets, smartphones, and wearables—information that helps reduce errors and minimize redundant data entry.

- **Connect your equipment.** With a cloud ERP system as your hub, it's easy to collect data from anywhere and make it instantly available for the business to leverage from a single source of truth. There is no more collection of production data on paper forms only to be re-entered into a different system at the end of the shift – too late to react to issues.
- **Extend to other software.** Use Oracle in tandem with the point solutions you've always trusted—through direct API data connections—maximizing your ROI from all your software. You can form the truly connected manufacturing environment that's essential for you to get the most out of IIoT.

UNLOCK YOU PEOPLE POTENTIAL

Every manufacturer understands at the end of the day the goal is to get the most out of your finite resources to deliver on customer demand. The Oracle Manufacturing Cloud helps manufacturers do this because it is designed to help you unlock your people potential.

With Oracle you can:

Re-focus high value employees. According to the 2016 Enterprise Solutions Study by Mint Jutras, 93 percent of Oracle Systems' customers have been able to redirect technical resources to more strategic tasks when they moved to the cloud.⁷ But most manufacturers have untapped value in their current workforces. With a cloud ERP in place, your brightest employees can spend less time managing technology and more time improving processes and finding the most valuable insights hidden in your massive data volumes.

Manage data about costs, quality, and efficiency as you grow. Oracle's digital transformation approach turns your manual, paper-based processes into paperless data-driven operations. As a result, your valuable people resources can spend their time improving processes with the data instead of writing it down themselves—naturally increasing your output per employee.

Scale to changing needs. You'll find it easier to sustain profitable growth when your business system scales seamlessly to support your people, minimizing unnecessary software and hardware upgrades for always on access to the latest tools and functionality simply by opening a browser.

Three Manufacturing Companies the IIOT Journey Today

For most companies, any new technology must have operational meaning, purpose, and application. Those who have begun their IIoT journey have done so to achieve realistic, incremental enhancements to support their business strategies. This approach will not only set the foundation for long-term improvements, but also provide justification for investments in IIoT and cloud ERP technology.

Oracle customers are doing just that.

A Metal Forming Manufacturer

A metalforming manufacturer of components used for powertrains in automotive and agriculture, has a primary focus to increase quality and reduce scrap. The company's machine vision inspection system automatically rejects any part that doesn't meet quality specifications. The system will then pull the accumulated value of the scrapped part from the ERP system and multiply it by the number of scrapped units. This allows the operator to see the actual "value" of the scrap, rather than just a pile of parts in a bin.

Because entire enterprise is connected through cloud ERP to a single database, this information and any related reporting is accessible to all users. The company can automatically correlate shop floor machine inspection results to product values to produce an accurate scrap cost. This is just one example of how IIoT enables more visibility. From here, the possibilities are endless.

Fisher Keeps Managers Informed thru Wearables

Fisher & Company, a U.S.-based manufacturer, used cloud ERP software as a means to connect its users to the shop floor through innovative new wearable technologies. Fisher used iBeacons positioned at work centers to communicate status to smart glasses with heads-up displays worn by supervisors. This allowed supervisors to easily scan the floor during their rounds and instantly understand status without interrupting operators. Fisher's material handlers also use hands-free ring scanners to scan barcodes on containers with simple voice commands. This information was then communicated to the cloud instantly, creating real-time inventory and work-in-progress material accuracy. Best of all, the flexibility and simplicity of the cloud enabled Fisher to go from test to production capabilities in a matter of hours!

Aerospace Manufacture Uses Advanced Visualization

Another customer is in the early stages of introducing advanced technology - advanced shop floor visualization in manufacturing operations. These include delivering shop floor details via HoloLens wearers with heads-up display, enabling them to receive and use production information while on the move, hands-free. This allows them to make adjustments as needed based on deep levels of data measurements.

The customer also plans to test overlaying work instructions specific to a role or work center on HoloLens to simplify worker tasks and ensure more efficient on-the-job training. With HoloLens expected to decrease considerably in price once it hits mass availability, the customer expects this to be a new way to use manufacturing data and manage production.

THE CLOUD IS YOUR PATH FORWARD

Yesterday's on-premises ERP systems and siloed databases can't offer the level of connectivity you need to take full advantage of IIoT. Only cloud ERP solutions can.

The convergence of IIoT, digital transformation and the cloud lay the foundation for an unparalleled level of automation, efficiency and collaboration. The potential upside for your

business is nearly endless—in fact, it’s limited only by your creativity in using your own data to enhance your future business strategy. Are you ready? Because the cloud is ready for you.

1 Gartner. *“Gartner Says by 2020, a Quarter Billion Connected Vehicles Will Enable New In-Vehicle Services and Automated Driving Capabilities.”* January 2015.

2 Tata Consultancy Services. *“Internet of Things: The Complete Reimaginative Force.”* TCS Global Trend Study. July 2015.

3 Tata Consultancy Services.

4 Tata Consultancy Services.

5 Sanjiv, K.R. *“How Augmented Reality Can Revolutionize Manufacturing.”* Industry Week. September 29, 2016.

6 McKinsey & Company. *“Industry 4.0: How to navigate digitization of the manufacturing sector.”* McKinsey Digital. 2015.

7 Mint Jutras. *“2016 Enterprise Solutions Study.”* September 2016.

8 McKinsey & Company. *“An executive’s guide to the Internet of Things.”* McKinsey Digital. 2015.

About ERTechnologies as your Cloud Partner?

ERTechnologies is the leading Oracle partner delivering The Oracle Manufacturing Cloud for manufacturers. ERT has pioneered cloud solutions for the shop floor, connecting suppliers, machines, people, systems, and customers with capabilities that are easy to configure, deliver continuous innovation, and reduce IT costs. With insight that starts on the production floor, we help manufacturers see, understand and uncover the value hidden in their Oracle technology investments by capturing unexpected opportunities to fuel growth and profitability in every aspect of their business ecosystems, enabling them to lead in ever-changing markets using Oracle technologies.

Learn more at www.ER-Technologies.com | 949.387.0250