

Cognizant

# Beyond the Vision: Realizing the Promise of Industry 4.0

How seven manufacturers are laying the foundation to lower costs, boost revenues and enable market agility in the intelligent, connected era.



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# Foreword

## From Envisioning to Executing for the Next Industrial Era

With its vision of seamless connections, insights and workflows from the factory floor to product delivery and beyond, the promise of Industry 4.0 is compelling: to unlock hidden business value through the merging of the digital and physical worlds.

But for many traditional manufacturers, the reality is less than ideal. With little integration between operational equipment, IT systems and business units, there's little chance for intelligent insights to emerge, even when investments are made in key Industry 4.0 technologies, such as Internet of Things (IoT), machine learning and intelligent automation.

The fact is, the full promise of a smart, connected industrial enterprise cannot be realized with disconnected, dysfunctional processes – no matter how much technology is thrown at it. Manufacturers

that can compete in the new industrial era will be those that do the foundational work of unifying, aligning and integrating operational technologies on the factory floor with IT systems, business processes and organizational models.

That's when the benefits of lower costs, higher revenues and greater agility emerge, through new capabilities like:

- Increased visibility into workflows and supply chains.
- Better communication flows between the plant floor and the business to act on new business, efficiency or quality opportunities.
- Reduced equipment downtime with preventive/predictive maintenance.
- Next-generation after-market services, based on real-time data signals.

The following pages illustrate examples of manufacturers that are navigating the shift to Industry 4.0. We worked with these businesses to:

- Examine their challenges.
- Assess their process and digital maturity.
- Chart a strategy to create opportunities and close gaps.
- Provide talent with deep domain knowledge and technology expertise.

Each business is well on its way to not only envisioning but creating smart, connected solutions that will enable them to compete far into the next industrial era.





# The Right Tools. The Right Connections.

Leading toolmaker integrates global operations using digital twins and an integrated operations framework.

## The Challenge

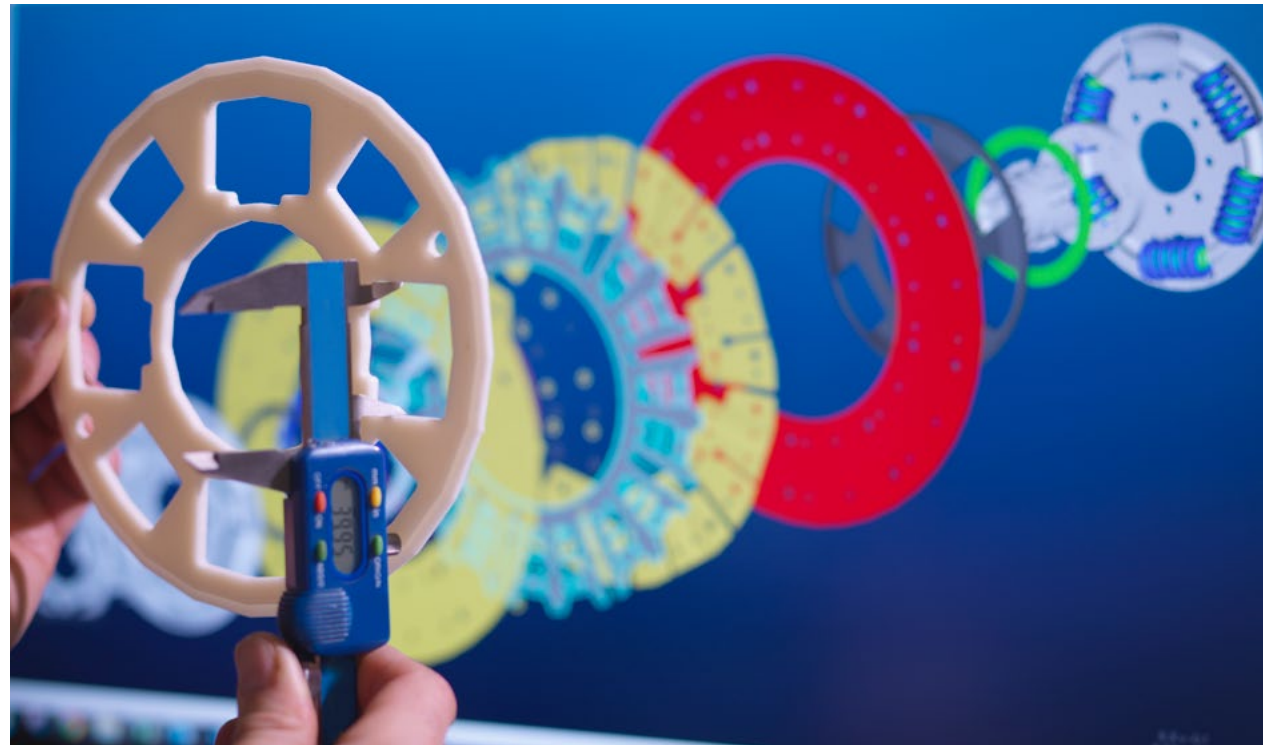
A leading U.S. tool manufacturer with more than 100 factories worldwide lacked visibility into its production metrics and overall equipment effectiveness (OEE). The company sought to revamp its facilities, which had limited coordination, aging assembly lines and equipment, and complex, asset-intensive production operations.

## The Solution

The manufacturer focused on using an industrial IoT platform that would consolidate data captured from its full range of tools and production line equipment. By gathering and analyzing data from its disparate factories, the company could optimize resource allocation across facilities. Using digital replicas of its assets, processes and systems (i.e., digital twins), the company increased its ability to monitor discrete machines to prevent downtime and maintenance. It used the digital twins to assess potential fault notifications and equipment performance to meet its uptime requirements.

## Our Approach

We retrofitted the manufacturer's machinery with IoT sensors to monitor yield, efficiency, uptime and productivity for workers, assets and entire facilities. An "operational nerve center" now provides insights on asset availability, runtime, configuration, customization, scheduling,



throughput, quality output, downtime and maintenance needs. All facilities can now access a robust data model that provides rapid application development, analytics and reporting using digital twins.

After implementing the platform at four plants in 12 weeks, we rolled out the solution globally. The platform ensures secure enterprise-wide connectivity without business disruption, creating a network of plants that respond quickly to changing needs. OEE measures are

now embedded in manufacturing processes, providing managers with details on asset availability and runtime, configuration, customization, scheduling, throughput and quality output, including downtime and maintenance needs. Using real-time notifications and web-based user interfaces, remote experts can now collaborate with shop floor personnel, empowering the company's next generation of workers. Better asset utilization has resulted in efficiency gains and lower energy usage.

## RESULTS

**\$100+ million** in targeted cost savings over five years.

**Improved** order fulfillment accuracy, decreased error rates, reduced energy costs and improved safety.

**More than 100 facilities** connected via the enterprise IoT platform, yielding greater insight and more accurate decision making.

**Improved** overall equipment effectiveness.





# Gearing Up Digital to Ensure Equipment Uptime

Global cement manufacturer adds IoT and analytics to speed detection of critical faults.

## The Challenge

In manufacturing, small things count – like bearings in gearboxes. As small as they are, they’re often the first critical component to fail.

A global construction materials production company was experiencing high failure rates among the bearings on its production lines that used complex grinders and pumps to pulverize and produce cement. Its third-party predictive maintenance solution was ineffective, taking 10 to 20 days to identify anomalies that could lead to failure. Production stoppages were affecting the company’s ability to fill orders, and losses were mounting.

## The Solution

The company implemented an IoT-based system to monitor the condition and performance of its rotary assets, providing real-time insight into the remaining useful life (RUL) of critical bearings. The solution analyzes operational data, including vibration, torque, bearing temperature, speed and grinding pressure, and provides custom measurements to determine bearing health and identify abnormalities such as cracking, spalling, looseness and misalignment.

## Our Approach

Analyzed correctly, data anomalies can be strikingly effective in identifying faults. However,



anomalies need to be filtered. We applied advanced mathematical models and statistical filters to incoming data to eliminate non-essential variables and determine the RUL of the bearings. The solution combines low-frequency condition

and time-domain indicators such as root-mean-square (RMS) kurtosis, peak-to-peak and crest factors along with high-frequency spectrum analysis to diagnose and flag potential faults.

## RESULTS

**5% reduction** in production downtime.

**Greater than 99%** availability of critical pumps.

**Reduced elapsed time** for anomaly detection.

**Lowered** equipment, labor and service costs.

**Improved** operational safety.

**Increased production throughput**, with a 10% increase in service revenue.



# Fulfilling a Manufacturer’s Dream: Cutting Costs and Sending Orders to Factories Anywhere in the World

Global manufacturer boosts flexibility, lowers costs with custom-built MES.

## The Challenge

A Fortune 500 U.S. manufacturing giant with six divisions and more than 800 plants across the planet was keen to reach new heights of efficiency and flexibility with its internal operations. However, each plant had its own manufacturing execution system (MES), which were all incompatible with each other. This made it difficult to gain a unified view of plant operations or transfer production from one plant to another. Things came to a head when the company wanted to embark on a widespread SAP upgrade and found that it couldn’t because of the MESs.

## The Solution

The manufacturer needed a single advanced MES design that could work across all its product lines and manufacturing environments. We worked with the company to implement an integrated operational framework to unify and align its shop floor operations, and we custom-built an MES that would work across all of its operations.

Management now has the contextual intelligence it needs to make strategic and tactical business decisions. SAP can be fully updated, without any systems or business disruption. The highly scalable solution can be deployed at multiple sites, and the company is on track to seamlessly roll out more than 60,000



products globally, once the system is fully deployed.

## Our Approach

After analyzing the manufacturer’s landscape spanning more than 800 systems, our team created an implementation architecture by categorizing sites based on complexity, such as the number of workflows and interfaces and degree of automation.

We applied our consulting, blueprinting, design, development, deployment and business process knowledge to create the robust manager-of-managers architecture needed to harmonize operations and enhance real-time visibility across plants.

The custom-built MES — unique in both its geographical reach and operational scope — is now being rolled out across an initial two business divisions.

## RESULTS

**Global visibility** of shop floors in real time across the enterprise.

**Reduced readiness period** needed for a new ERP system rollout from five to three years.

**Minimized disruption** to plant operations thanks to an incremental feature development approach.

**80% reduction** in support costs with the retirement of four legacy platforms.





# Priming the Pump for an Intelligent Water Management Ecosystem

With real-time insights into field data, pump manufacturer lowers energy consumption, ensures faster decision-making and enables continuous improvement of product design.

## The Challenge

A global leader in pump manufacturing wanted to develop an intelligent water management system that could prevent, predict and react to various operational issues, with the goal of improving disaster relief, sanitation and global energy consumption. To do that, it needed to improve visibility into the conditions, operations and productivity of its field equipment and garner insights directly from the field in real-time.

The company wanted a scalable, deployable and adaptable IoT platform that could help it design new products and react to situations dynamically, in real-time, while uncovering opportunities to create new revenue models.

## The Solution

We helped the company migrate to a customer-centric platform and software-as-a-service model based on Microsoft Azure. The cloud platform enables field data to be shared with the design and manufacturing teams, enabling the company to improvise on product design, as well as commission, register, monitor, control and maintain its pumps. The IoT platform gathers structured and unstructured data from the pumps in a secure manner and enables analytics at the edge and data sharing through the cloud. The company is exploring how to realize new revenue by providing critical data to its customers as a service.



## Our Approach

We worked with the manufacturer to define, steer and execute a roadmap to an intelligent water management platform. The new IoT platform supports remote pump management, including commissioning, registration, monitoring, control and maintenance. The integrated architecture – which uses Microsoft Azure IoT and Cortana for a future-proof,

connected field solution – generates insights for customers on the operational performance of its water pumps worldwide to enable real-time response to changes in the chemical composition of water. Now the company wants to deploy new technologies to improve field visibility, such as during disaster relief operations and for sanitation and energy savings.

## RESULTS

**7% reduction** in energy utilization.

**1% downtime** due to timely preventive maintenance.

**Accelerated** response to disaster recovery through remote management and analytics at the edge.

**Improved** next-generation product design by providing access to data on real-time pump performance.

**Continuous** product improvements based on field behavioral patterns.



# A Digital Remedy to Harmonizing Manufacturing Systems

By streamlining manufacturing operations, pharma lowers costs, increases throughput.

## The Challenge

A major global pharmaceuticals company that grew through acquisition urgently sought to streamline and simplify its many manufacturing production lines. The company needed to replace various proprietary and legacy applications with a unified intelligent operational system across 70 plants to lower operating costs and simplify compliance auditing.

## The Solution

We worked with the company to unify its processes and systems and improve operational efficiencies. We harmonized the pharma's critical manufacturing processes and enhanced its ongoing operational, quality and compliance functions. Using our solution accelerators, the pharma saved more than 4,000 person hours and realized ROI within six months of rolling out the global intelligent operational system. An efficient, evergreen, standardized platform lowered total cost of ownership, allowing the pharma to reinvest much of its savings into its smart-factory strategy.

## Our Approach

Our framework included templates, process documents and best practices for deployment to help the company roll out project deliverables as much as 30% faster than before. We customized



applications and provided a range of accelerator tools to reduce production cycle time, increase yield, introduce paperless systems, and enhance compliance and quality. We also established a

structured training and change management process to help ensure consistency across the many sites.

## RESULTS

**Saved** more than 4,000 person hours.

**Deployed** a unified MES that integrates with the ERP system at 30 of 70 sites.

**30% increase** in deployment speed of production-level solution.





# Increasing Agility and Safety for an Offshore Oilfield Organization

Combining intelligent algorithms with an integrated foundation empowers workers and increases efficiency.

## The Challenge

A European engineering firm that designs and builds offshore oil platforms needed to enhance its product design processes and digital capabilities — namely AI, IoT and machine learning — to maintain its competitive edge. In the current environment, there were many complex workflows and multiple handoff points for the operators and foremen to complete jobs safely, resulting in delays and loss of productivity.

The company’s design and build teams — comprising designers, operators and foremen — required a more streamlined and collaborative approach to constructing and building oil platforms.

## The Solution

We launched a digital platform that enables operators and supervisors to use a mobile application for interactions in the yard, utilizing a server-less environment powered by an IoT cloud platform. Workers now have more transparency and real-time notifications to complete their jobs in a paperless, intuitive and productive manner.

Our roadmap helped the company ramp up quickly to guide specific actions to tackle in its design simulation process, automating complex workflows, while improving workforce collaboration. Workflow automation is expected



to improve efficiencies by 70% to 80% and reduce costs by 30% to 40% through a paperless solution.

## Our Approach

Taking a human-centric approach, we sought to improve the safety and quality of life for oil field and oil-rig construction workers, while also empowering them and increasing their

productivity. Our team studied the daily activities of field workers to understand their culture and challenges first-hand. We built minimally viable products (MVPs) called WeBuild. This mobile application, built on Microsoft Azure and machine learning, helps the foremen and operators track progress on work orders and required materials, better optimizing each work phase.

## RESULTS

**Empowered workers** through an intelligent engineering environment and smartphone app that increases worker efficiency.

**25% reduction** in person-hours needed to erect and tear down scaffolding.

**Helped develop** an algorithm to optimize the design of an oilfield structure and track progress on work orders.

**Increased** speed and seamless data flow across locations, time zones, cultures and toolsets.



# Global Food Processor Gains Real-Time Visibility into Plant Operations

Defining gaps and forging connectivity are the first steps to improving efficiency.

## The Challenge

A leading global food-processing conglomerate wanted to increase the efficiency of its plant operations, with real-time visibility of its machines on the factory shop floor. It was hampered, however, by an outdated infrastructure, multiple applications and varying plant devices. The business wanted to design and deploy an edge environment to consolidate and modernize its view of all assets on the factory floor for timely analysis and to drive production agility.

## The Solution

The project began with a detailed workshop to understand the scope of conducting a comprehensive discovery of each facility's requirements and environment. We then helped the business better understand its plant environment gaps and devised a path forward for a unified infrastructure, with a clearly defined roadmap to transform plant floor operations across geographies.

## Our Approach

We collected details of hardware, software and applications across the client's 33 plants in the Asia Pacific region, and delivered a network architecture diagram for each plant to provide clear visibility of connectivity between plant



assets. We also set up a technical offshore expertise center to provide validation and support for onsite field engineers. The close

connection with the business enabled us to provide proactive and immediate resolution of issues to enable next steps.

## RESULTS

**75%** of the technology environment was assessed for effective budget planning, with a view of the refresh cycle of aging assets.

**Identified and mapped** over 1,000 devices and 300 applications across 33 plants supporting 10,000+ users.

**Designed** a foundation for the customer to enable network segmentation to secure the plant assets from cybersecurity threats.



# Get Started: Envision Your Industry 4.0 Journey

We recognize companies are at various stages of maturity in transforming their products, operations or services with digital. One common goal among business leaders is accelerating the pace of innovation by demonstrating proof of value and then scaling proofs of concept to full-scale deployments.

At Cognizant, we help companies assess where their business is on the maturity curve toward Industry 4.0 intelligent automation. We provide critical insights into opportunities and gaps, as well as design and implement a roadmap to guide how and where to drive incremental value with our Connected Factories microservices.

Whether you are just getting started or moving to the next phase of your Industry 4.0 journey, our experienced team can help accelerate delivering the outcomes by leveraging the power of IoT, machine learning and intelligent automation across your entire enterprise.

## About Cognizant Digital Business IoT and Engineering Practice

Cognizant Digital Business helps our clients envision and build human-centric digital solutions — fusing strategy, intelligence, experience and software to drive industry-aligned transformative growth. As emerging technologies like IoT extend across the enterprise, factories, supply chains and beyond — as well as become more pervasive throughout our everyday lives at home, school and work — clients across industries are seeking Cognizant's expertise to advance and implement their IoT strategies. IoT, combined with applied analytics and intelligence, is helping them deliver greater business performance, products and service offerings — all leading to superior customer experiences. To learn more, please visit [www.cognizant.com/iot](http://www.cognizant.com/iot) or join the conversation on [LinkedIn](#).

## About Cognizant

Cognizant (Nasdaq-100: CTSI) is one of the world's leading professional services companies, transforming clients' business, operating and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 193 on the Fortune 500 and is consistently listed among the most admired companies in the world. Learn how Cognizant helps clients lead with digital at [www.cognizant.com](http://www.cognizant.com) or follow us [@Cognizant](#).



### World Headquarters

500 Frank W. Burr Blvd.  
Teaneck, NJ 07666 USA  
Phone: +1 201 801 0233  
Fax: +1 201 801 0243  
Toll Free: +1 888 937 3277

### European Headquarters

1 Kingdom Street  
Paddington Central  
London W2 6BD England  
Phone: +44 (0) 20 7297 7600  
Fax: +44 (0) 20 7121 0102

### India Operations Headquarters

#5/535 Old Mahabalipuram Road  
Okkiyam Pettai, Thoraipakkam  
Chennai, 600 096 India  
Phone: +91 (0) 44 4209 6000  
Fax: +91 (0) 44 4209 6060

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