The Next Industrial Revolution: Creating a Data-Driven, Analytic Advantage

The Teradata Industrial Manufacturing Analytics Framework

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Greater insights into the future of industrial manufacturing

The manufacturing industry has an established track record of continuously evolving to meet the needs of its customers and is at the cusp of a new wave of gains that will dramatically restructure value chains to be closer to demand regardless of costs. This future scenario is being driven by an "intelligent economy" where customers are more informed, talent is at a premium, and the time to react to changes is compressed.

In the face of changing economic and operating conditions, industrial manufacturers need insights that can help them take action to outmaneuver the competition, while seeking innovation, growth and profitability.

Innovation

Leading manufacturers must continuously bring new ideas to market and disrupt the status quo. New products, new ways of thinking, have displaced entire industries. (For example, the iPhone has completely transformed a mobile phone from being just a phone.) In the future, how will autonomous vehicles change mobility behaviors? What new opportunities does the industrial Internet provide to manufacturers? But, it's not just about faster time to market; it's about smarter time to market. And, innovations must not only be external to the company, but also internally applied.

Growth

Competitiveness hinges on agile transformation to respond to market shifts. The industrial Internet provides new opportunities for manufacturers to grow through immediate responsiveness to product performance, improved customer service, dynamic aftermarket services, optimized operations and processes, and increased market share through new revenue streams by creating new products and/or services based on immediate customer feedback.

Financial analytics

No matter what the business environment, businesses must manage the fundamentals of reporting and setting expectations. Companies can afford no missteps in reporting accuracy since shareholders will react briskly to any signs of reduced credibility. Companies struggle to report financial results and forecast future performance with the speed and accuracy demanded

by external stakeholders. Often, they rely on manual manipulation of data views from multiple disparate systems, which is very labor intensive. By providing a comprehensive financial performance analytics capability, companies can reinvent how they launch re-engineering initiatives in supply chain, manufacturing, customer service, quality and finance. Quick return projects could focus on areas like:

1. Yield Improvement Impact: Helps users combine information on manufacturing yield, sales forecast and financial costing data that may be scattered across multiple data marts, so they can quickly analyze it and better prioritize projects designed to increase the percentage of salable product produced by each manufacturing run. This helps management get faster insight into which yield improvement opportunities could deliver the greatest dollar return.
2. Sales and Marketing—Pricing Process Improvement: To maximize customer satisfaction and improve gross margin, companies build a single source of records for pricing data across all geographic regions and hundreds or thousands of products. The analytics from linking pricing policy, sales history, compliance metrics and CRM information provide real-time insight into customers' past purchases and compliance behavior. This insight is used during pricing negotiations to ensure that customers who fulfilled the volume terms of their contracts receive the most generous price discounts. This intelligence is now more readily available for use during both formal and informal negotiations, as procurement users can access it within a few minutes.
3. Consolidation of Financial Data: Profit Center and Cost Center Accounting data as well as bookings, billings and backlog data are available in the Enterprise Data Warehouse (EDW) with user driven functionality that allows for frequent and quick adjustment and synchronization with the Enterprise Resource Planning (ERP) system. The associated tie out for the entire corporation can now be completed in a matter of minutes rather than hours.

Financial Performance analytics is critical to bring the value of manufacturing projects to life. Every project must be designed, measured and modified during its lifecycle. Without integrated, accurate and timely measurement of the financial impact you risk running blind when it comes to the success of any project.

Data is everywhere

Analytic insights from data are needed to help manufacturers complement products with services and create the concepts that sell—all based on the integration of thousands of data points derived from things like business systems, dealers, manufacturing operations, the supply chain, financial management, distribution, after-market service, and social media.

The analysis of and responsiveness to this data, with the right Big Data environment and Business Intelligence technologies, in a timely manner, is what drives that critical competitive edge in today's evolving markets. And, it's by integrating, manipulating and utilizing insights taken directly from the business' data that enables a 360 degree view of operations.

Analytics Enable Global Manufacturing Excellence

- End-to-end supply chain visibility
- Supplier management
- Retail and distributor collaboration
- Track and trace through distribution
- Manufacturing performance analytics, including: quality, cost of scrap and waste, automated/integrated equipment efficiency, inventory analytics, and more

The Analytics Advantage

Teradata helps industrial manufacturing companies unlock the potential of diverse customer and business data, so they can do more of what really matters, better and faster. New, innovative capabilities can impact areas throughout their enterprise. Utilizing our unique and powerful analytics, newfound knowledge can be applied in meaningful ways to deliver significant value for long-term business impact:

- Predictive analytics through telematics & sensor data
- Procurement & global spend analytics

- Quality management analytics
- Supply chain analytics
- Finance and performance management analytics

Integrate. Analyze. Act.

The Industrial Internet of Things (IoT): Telematics & Sensor Data

Billions of sensors in a variety of locations are now creating and collecting vast amounts of data. Every major piece of remote or mobile equipment and capital asset is embedded with increasing numbers of a wide array of sensors that deliver raw data or computed measures that are used to provide analytic insight for faster, smarter decisions. The information ranges from the obvious—like diagnostic codes and hours of use—to the more esoteric, including tilt, force, strain or vibration.

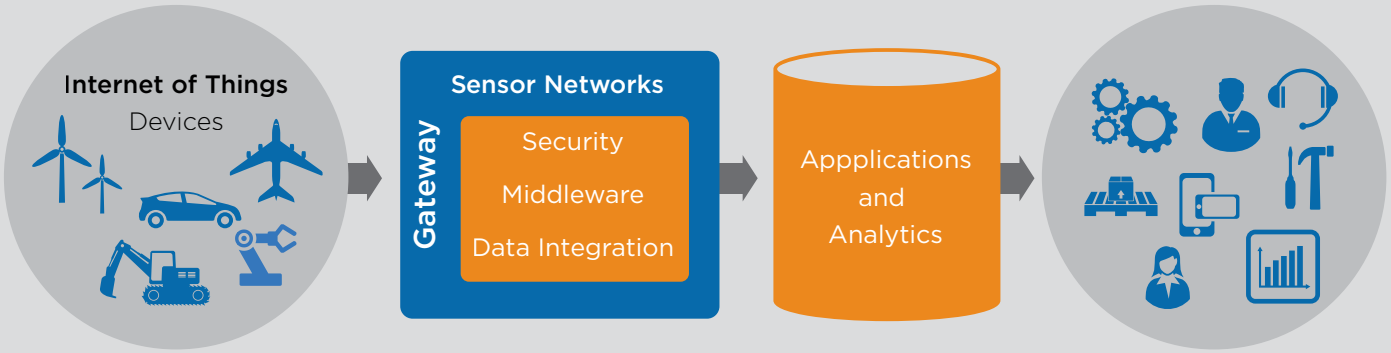
Telematics is the transmission of this data from the devices and sensors to a database where it can be integrated with other enterprise data and analyzed, in some cases, in real time. In many applications, an alert is triggered if the data falls outside established parameters (too hot, too cold, spinning too much, etc.).

Manufacturers must realize that how they use and exploit data is key to their ability to innovate. To win going forward, they must create new business capabilities faster—or miss out.

Telematics data can be leveraged to address a wide variety of ongoing business challenges, particularly for distributed, remote or mobile equipment. When integrated with other enterprise data, telematics data provides insight into such critical functions as quality and warranty issues, inventory management, aftermarket sales and operations, customer service, marketing, maintenance, and product life cycle management (PLM). A key insight using sensor data analytics is the ability to develop product behavior patterns and use these patterns to predict sub-peak performance and even identify failure patterns before they occur resulting in significantly reduced product down time, increased productivity, utilization and ultimately customer satisfaction.

Obviously, adding additional IoT data (web page traffic, streaming weather data, news and world events data, geopolitical data) can have added value when analyzing a products performance, when analyzing risks to supply chain performance and real time customer behavior only enhances the analytics available to the manufacturer. These analytics allow manufacturers to react quickly and decisively to customers, suppliers and the competition.

Operationalizing Telematics for Business Value



Sensors capture data

Sensor data is transmitted, collected and distilled.

Data is captured, integrated, analyzed and retained.

Value maximization

Beyond ERP Reporting: Procurement & Global Spend

Moving any product from supply chain through manufacturing, shipping and sales can offer countless opportunities for margins to erode. Having the ability to track why and where profits are leaking can help you make strategic and operational decisions with timely, data-driven insights into whether or not those decisions will keep you in the black.

To address procurement issues, a leading manufacturer did something few companies can do: created a decision support environment to support strategic sourcing at the global level. As a result, the company gained the ability to negotiate more effectively, leverage volume purchases, and identify new sourcing opportunities and vendors. This translated into initial cost savings estimated at $3.5 to $5.5 million and cash flow benefit of $4 million—and that is just the beginning. For many manufacturers, sourcing and procurement struggle to keep up with engineering changes affecting supplier selection, long term pricing agreements, stepped pricing and performance agreements, product cost and negotiation leverage. Analyzing these changes as they occur and understanding the impact on price, quality and delivery during the evaluation process can save millions annually.

Quick Response Using Quality Management

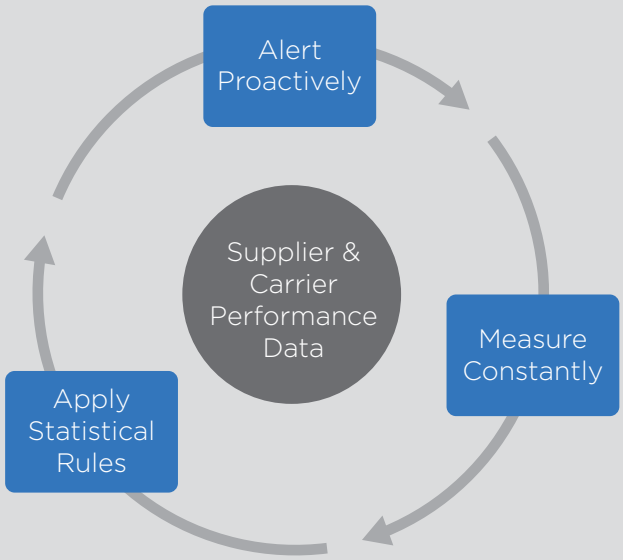
Manufacturers face many challenges around the management of product quality. A Quality Information System (QIS) working with Teradata's Manufacturing Analytic Platform provides a scalable solution that integrates and synchronizes quality data, processes and monitors quality performance metrics to provide visibility across globally dispersed operations and manufacturing processes. The ability to analyze detailed quality data enables the workforce to rapidly detect, resolve and successfully deploy permanent corrective actions for quality issues, understand the root cause of poor quality goods, rework and scrap and the impact on manufacturing performance.

Quality is more than the final approval of the product at the end of the manufacturing process. Being able to measure and monitor in near real time work center, equipment, yield, labor and supplier performances through every operation can reduce costs and ensure higher quality products.

Greater Visibility and Transparency: Supply Chain Analytics

Lack of transparency along the supply chain can cause insufficient process stability and high supply chain costs. Manual and disconnected systems and queries can cause latency issues in responding to logistical problems and no fact-based assessments of suppliers/carriers regarding quality and logistics performance. However, integration and aggregation of data throughout the global supply chain allows total visibility via one, centralized information platform. This view can provide an early warning system of alerts for variances and scoring to track suppliers and carriers, and take action to minimize or eliminate impacts on the business. It can also enable operational reporting and forecasting for organizational management and experts from the overall process down to a unique part number.

Dynamic Supplier Performance Analytics



A simple example is when a supply chain analyst needs to understand the impact of a late delivery from a supplier on a final assembled product. This may seem very basic, but for manufacturers that have multiple plants and multiple outsourced services (like coating or plating operations) where a part goes in as one part number and comes out as another then gets transferred to another plant running a different ERP system, then outsourced to a supplier for another service and returned to a different plant for final assembly—obviously, this is a complicated situation. Oftentimes, it takes the integration of many different data sets from several different ERP systems throughout the entire supply and demand chain network to evaluate complex supply risks on the fly.

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Teradata has supported several different supply chain risk operations centers evaluating supply risk of all kinds, taking input and data feeds on a 24/7/365 basis to help identify, predict, react and minimize the impact of supply chain performance issues on the commitments the manufacturers have made to their customers.

Build a Manufacturing Data Management Model

You would never consider building a manufacturing plant without a blueprint, as you wouldn't know if you had sufficient production space, ample storage room or if inventory could flow easily in and out of your production lines. So, why build a data warehouse without first knowing the details of exactly where data will be stored?

Seeing a coherent map of critical information is a challenge when your data is stored across disparate systems. Utilizing a master data management system gives industrial manufacturers a single view of master and reference data, whether it describes customers, products, suppliers, locations, or any other important attributes.

Tap Into the Teradata Advantage

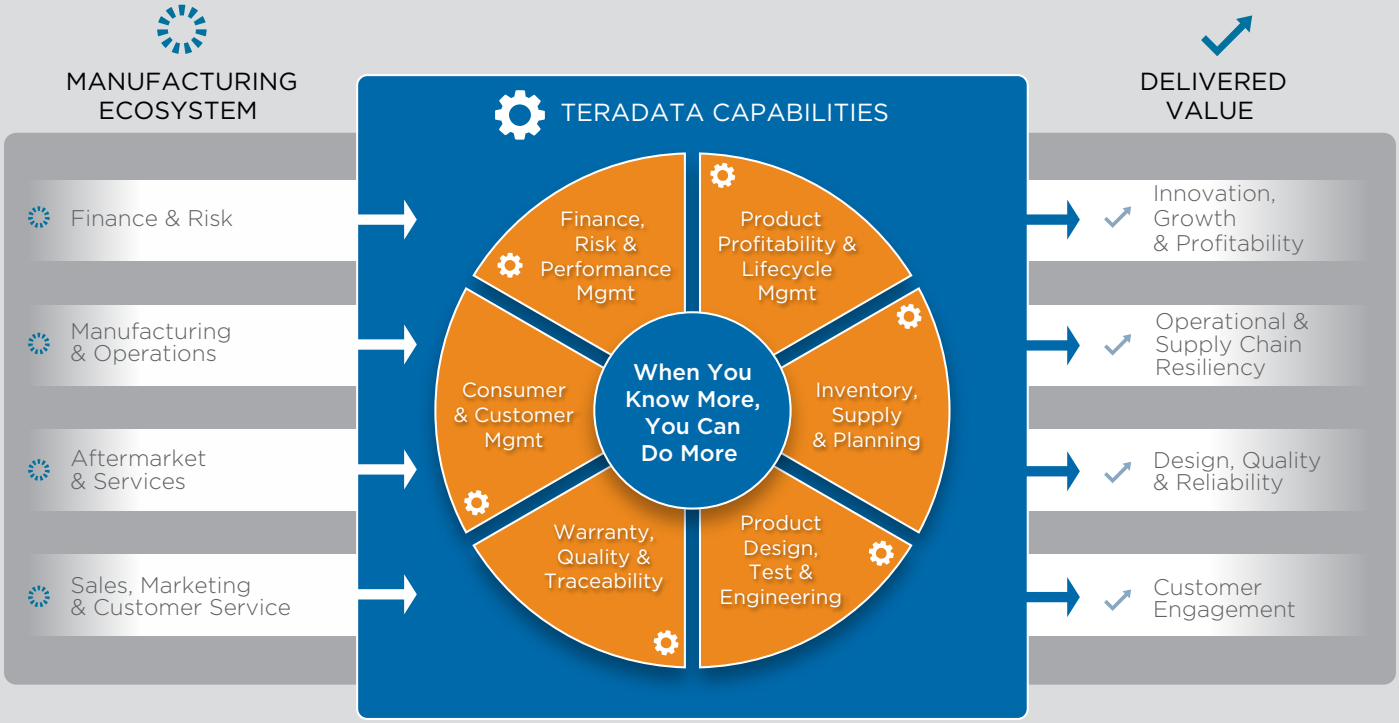
Teradata empowers industrial manufacturers to bring innovation, service and new products to market quickly, collaborate more effectively with partners, dealers, distributors, wholesalers and customers, to help maintain profitable growth, and optimize both manufacturing and the supply chain network.

Teradata's capabilities are built upon the world's leading analytic data platform ecosystem, marketing and analytic applications, and consulting services. Our integrated solutions are engineered to integrate and analyze massive amounts of data, yet designed for everyday use by the broadest constituency of business users.

Do More—Faster, With Expert Guidance

Teradata Services includes best-in-class business analytics consulting, technology and implementation expertise, and customer support services that can be uniquely tailored to your business strategy, initiatives and best practices. Teradata industrial manufacturing industry experts know your business and can help you discover new insights that unlock the hidden value in your data.

Teradata Framework for Creating a Next Generation Analytics Advantage



The only constant in today's Industrial landscape—is change. The enormous volumes of data being generated from the manufacturing environment today will increase exponentially in the future. Organizations that are not prepared to manage and leverage that data with effective and efficient data management and analytical systems will drown in the data and lose their market leverage.

Teradata helps many of the world's most successful industrial manufacturing companies transform data into insights, which leads to amazing outcomes. For more information, visit teradata.com/industrial.

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