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Automotive Manufacturing in Industry 4.0

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Introduction

Both incumbents and upstart entrants compete for business in the automotive industry today. Differentiation based on quality, new features, and customization will force supply chain manufacturers to do more with less now more than ever. Manufacturing insights obtained from empirical and simulated data would be needed to obtain a deeper understanding of the manufacturing process. Maintaining a competitive advantage would involve a manufacturing strategy that uses enterprise processes to drive increased value from productivity, increased power, and lower costs.

New automotive manufacturing problems necessitate a paradigm change in order to investigate technologies that were not available in previous generations. Adaptability can be supported by agile production for batch jobs using collaborative machinery. To pinpoint failure problems, supply chain quality metric tracking will be critical.

Advanced equipment can be used to simulate processes and an entire organization for productivity gains in a digital model. The new Industry 4.0 generation's industrial internet of things will leverage data using a variety of modeling techniques. Predictive analytics for machine actions can be used to compare predicted factory operations. With the right data algorithm software, maintenance, effective operating models, and root cause failure detection can all be enhanced. Let's take a closer look at these problems and their solutions.

Automotive Industry Today

Today's and tomorrow's factories must be adaptable to various agile workflows. Batch jobs that make one part today and a different part tomorrow need equipment versatility. The setup and teardown of each event must be seamless. The widget produced this week in one batch must be similar to the widget produced last week in a different batch configuration. Multi-purpose machines and multi-purpose robots are needed for this process.

A single production line can no longer remain stationary and manufacture a fixed product 24 hours a day. Automakers' nimble agility is a key competitive differentiator. This, however, introduces new problems that must be managed. Quality, performance, and dependability must not be harmed as a result of this versatility. Despite rapid changes in the methods used and parts made, these core tenets must be preserved.

Collaborative robots are also used in many car factories. These "Cobots" are robots that operate alongside humans to maximize production quality. However, as factories become more automated, harnessing repetitive machine predictability becomes more valuable. Sensors and vision systems, together with IoT data analytics for real-time output tracking, will make this happen.

Value For Capital

With a global end-market and a rising global supply chain, the automotive supply chain must sustain its emphasis on world-class quality. Consistent supply chain quality standards are crucial to providing an end product that meets consumers' ever-increasing needs.

The approach of the past was batch sampling inspection for consistency metrics. The industrial internet of things (IIoT), in combination with deep data analytics algorithms, can now detect and identify defects in real-time. Data signatures may be used to identify prescriptive corrective behavior. The final quality of an automobile is determined by the processes and specifications developed by the supply chain's vendors.

New Objectives

Automotive suppliers' manufacturing equipment is improving, allowing them to tackle new capabilities in shorter time frames and with better efficiency. This advanced equipment necessitates more technical repair skills than previous manufacturing generations' equipment. It also can't be tracked, managed, or restored using the same techniques as before.

Expert training and ownership are required for today's equipment. This can be combined with the presumption that the devices can provide information about their own health and upkeep. More complex machinery has more complex parts, which means there are more chances for wear, breakage, and problems. Fortunately, the output of this equipment can be tracked in real-time.

Process optimization is important for streamlining an automotive supply chain operation in order to minimize unnecessary material, time, and money. There is a constant need to improve manufacturing productivity by eliminating waste motion from production processes.

What Do We Know About Industry 4.0?

Over the course of decades, humans have encountered three previous waves of the manufacturing industry. The first generation resulted from the use of pressurized steam and water to generate mechanical motion. Electricity was used in the second era to power factories with mechanical equipment for traditional assembly lines and mass manufacturing facilities.

First-generation robotic manufacturing was pushed into the third industrial generation by computing power and basic automation. The fourth generation, which is currently in development, is largely powered by data. As we collect mass data to harvest new insights that were not possible in the previous three decades, the term "data is the new oil" was coined. Machine learning algorithms can now intelligently model massive quantities of data in order to provide automated machinery and real-time factory process improvements. Data could be now considered as new oil as it is gaining worth day by day.
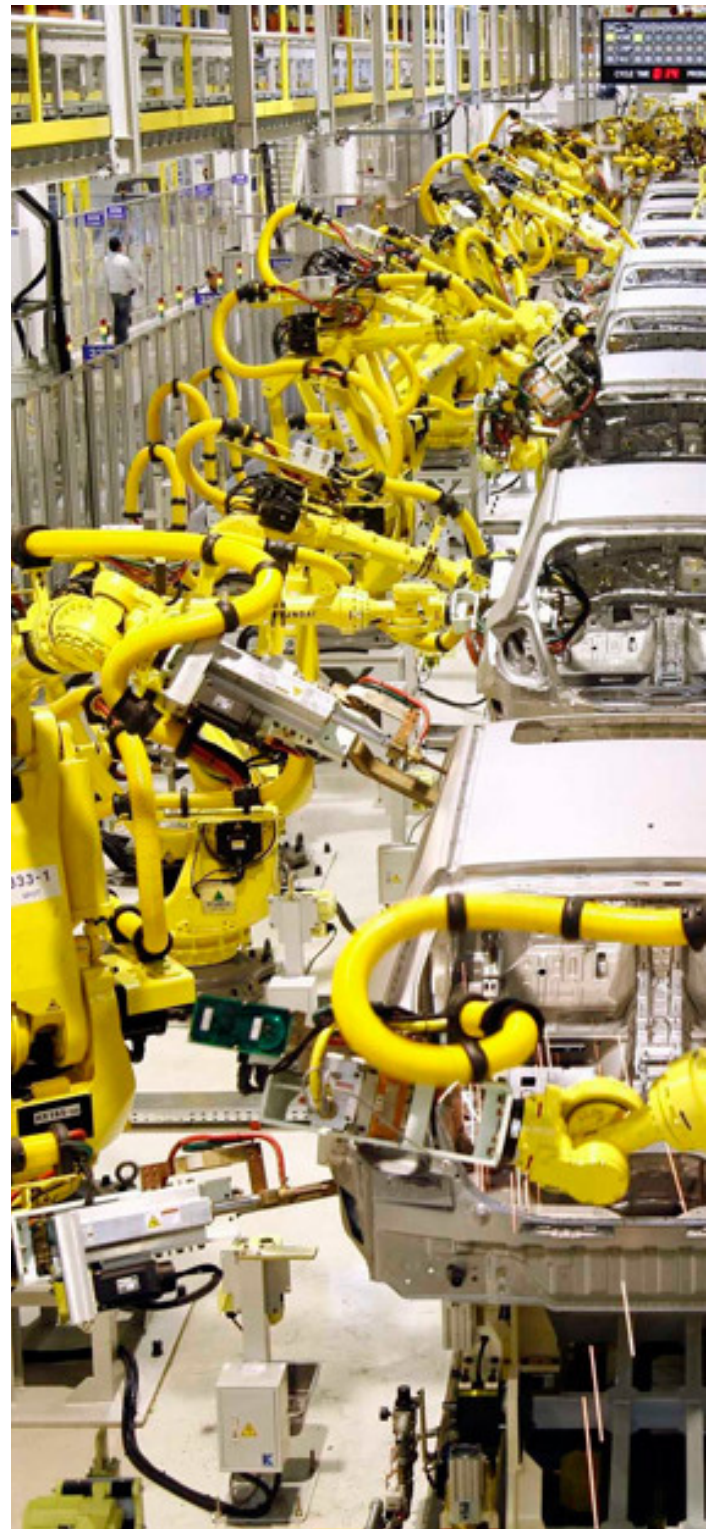
Industrial IoT

The Internet of Things (IoT) is a general concept that applies to all connected devices in homes, vehicles, and businesses. The industrial internet of things (IIoT) refers to applications that provide deep market insight to commercial segments like automotive manufacturing, transportation, and healthcare.

The most important feature of the IIoT - data - is captured by these complete systems, which include both hardware and software. They also have advanced data processing analytics algorithms that are focused not only on edge servers but also on the cloud's vast farm of computing resources. It is the data intelligence from these sensor nodes that can be used within cloud analytics applications to identify valuable insights. Powerful analytical models can be used on a large set of data to enable smart factories for improved business operations of an enterprise.

Cloud analytics applications may use the data intelligence from these sensor nodes to find useful insights. Smart factories can be allowed for better business operations by using powerful analytical models on a wide collection of data.

What Happens on the Background?

A single sensor's data can only provide point-in-time knowledge about a single observable feature of a system at a specific location. Multiple sensors of the same kind in different locations may reveal new layers of information about a single aspect of data across a region.

When multiple types of sensors (temperature, vibration, illumination, air composition, flow speeds, and so on) are placed in the same area, however, condition monitoring takes on a new dimension. A complete analysis may be overlaid over other sensors of similar and different data types using the background of each sensor's data.

Industry 4.0 is the latest generation and is part of the long-running industrial revolution. The IIoT is the technical framework that enables Industry 4.0 to become a reality. A Smart Factory is a particular IIoT manufacturing implementation that allows a company to participate in Industry 4.0.

What to Expect From IoT in Automotive Manufacturing?

While today's automotive manufacturers face numerous challenges, they also have numerous opportunities for increased growth and development. There's no denying that manufacturers are under - pressure to innovate, boost consumer loyalty, and increase profitability. Only a handful will succeed, and it all depends on how well they execute digital transformation.

If You Don't Use IoT in Car Manufacturing, You'll be Left Behind.

Automakers' technology investments will eventually determine whether or not they will stay ahead of the competition. Even today's best-in-class market success will be obsolete in a matter of years, rather than decades.

According to IDC's IoT and Digital Transformation: <u>A Tale of Four Industries</u> whitepaper, at least one-third of each industry's top 20 companies will fail to meet digital benchmarks in the next few years, and 33 percent of all industry leaders will struggle against their already-digitally-enabled rivals.

True IoT Implementation Improves Design and Ideation in the Manufacturing Industry.

Any carmaker today must introduce smart manufacturing and Industry 4.0. The main advantages are various, frequently having a significant effect on how a company works while often providing a fantastic opportunity to accomplish many key objectives.

What benefit does the Internet of Things add to the automotive manufacturing industry in terms of design and ideation? Let's look at it more closely.

Shorter Cycles

Consider the importance of IoT from the perspective of the engineering cycle. This is a huge opportunity for added value. It is possible to move the product engineering cycle forward at a faster pace by linking knowledge between products back to the design and development team. Finally, this has the main advantage of allowing innovative products – which today's buyer has an insatiable appetite for – to reach the market faster.

Increased Customer Satisfaction

Customer loyalty is another important factor. Though car manufacturers knew that any new product that reached the market would be met with excitement 50 years ago, that is no longer the case today. With emerging technologies and innovations in place, consumers have a wide range of vehicles to choose from.

Domestic and foreign options are readily accessible – and often at fair rates. In short, customer satisfaction is essential and even required, but it is difficult.

There is an opportunity to enhance customer experience by integrating IoT during the design and ideation process. That is, items produced by the manufacturer are better suited to the needs of the customer. They address the needs of the customers. And, most significantly, they help the customer right away. The manufacturer is able to generate instant satisfaction, develop the brand, and increase the company's long-term potential to continue building brand loyalty by addressing real performance requirements and needs.

Lowered Overhead Expenses

Cost-cutting is a challenge for any producer. The cost of labor is increasingly increasing. Compliance remains a persistent source of concern. The cost of advertisement is higher. Simply removing what isn't working and no longer useful from the design and ideation process of the automotive manufacturing sector is one way to minimize costs.

It is possible to eliminate all non-value components by providing a continuous stream of information from consumers and other value points flowing into the automobile manufacturer. This streamlines operations and allows the organization to focus on what will generate the most profit.

Although all of this sounds fantastic, many of today's automakers don't have the resources in place to capture, coordinate, and use IoT data to generate such significant benefits. The advantages, on the other hand, make going in this direction not only desirable but also necessary. In any automotive manufacturing sector, developing a framework and starting to implement these solutions is a crucial first step. However, it is not an easy mission.

IoT for Design and Ideation

Present teams may be restructured to include these types of data and information. It's important to concentrate first on the places that are most likely to result in the biggest win. Pulling in IoT data to use for creating new products may be more straightforward in this case, but it can later be just as successful as changing existing products.

To begin, companies must align their business goals with the most possible disruption: the Internet of Things. Following that, it's important to assess the organization's digital readiness before embarking on the digital transformation journey with a reputable IoT solutions provider.

What Can Thread In Motion do in Automotive Manufacturing?

In the automotive industry every millisecond matters. Enhancing processes might be costly for an industry like automotive yet smart gloves are easily applicable with low-cost preferences.

Smart gloves are totally capable of being easily integrated with current operating systems of your supply chain; Kanban systems, quality control operations, in-house logistics operations. Thread In Motion's solutions are ready to increase process quality and decrease operational duration with the ergonomics level of your workers.

What Did Thread In Motion Do for Mercedes-Benz?

As usual, every Kanban system in production sites works with a small equipment car which is called a Tannenbaum tree. This system helps workers to maintain internal logistics operations. With the help of equipment charts, the worker is able to check equipment's and car's bar code as if they match.

They can also check if equipment boxes are filled or not, they detect low stock equipment and can supply it from the warehouse. This system provides equipment continuity and the perfect supply chain.

For the internal logistics processes, TIM realized every shelf and car can be labeled automatically with the printed barcodes. Workers now scan the barcode of the related low stock shelf and then the software system instantly sends orders to the warehouse worker. This also gave them the opportunity to maintain operational continuity. Therefore, when a warehouse worker supplies the material, the system automatically decreases the stocks.

It is now possible to save and review records of the materials used during the process. Thanks to the process route automation, with the created heatmap, it is possible to determine which worker was carrying out the process and optimize the location of the cars. End to end traceability of workers and materials is provided. Without any need for traditional methods, smart gloves take care of everything.

Which Device is Used to Do So?

IWOS, a device designed especially for assembly operations, is one of the most in-demand products of Thread In Motion. Let's take a closer look at the features;

> ### Exceed usual speed limits with better process quality.

Focuses on performing faster and more accurate assembly operations. Complete assembly tasks with zero defect discipline.

> ### Trigger point, placed on point.

To complete your assembly operations successfully, your assistant had to be the most ergonomic wearable. IWOS has a flexible textile structure and trigger button placed on the side of your finger to maintain ergonomic standards all day.

> ### Leave no room for mistakes. IWOS warns you instantly to prevent human-centered errors.

Haptic, acoustic and optic feedback system, prevents human-centered errors instantly.

> ### Display what you need to see.

A functional screen allows you to receive instant feedback right on your hand. When you focus on your quality control operations, a protective sled will take care of the rest.

Thread In Motion's solutions designed just for the needs of the automotive industry differentiates it from the rest. With the help of smart gloves, it is possible to take a step into the digitalized world of Industry 4.0 without eliminating the human workforce but eliminating the errors made by humans.

If you are interested in or have questions about one of our solutions in automotive manufacturing, contact us now.

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