

A1: Products and Services

Classic Muscle is an automobile manufacturer specializing in cars of the “American muscle” genre (high performance cars primarily from the 1960 -70s; however, all of Classic Muscle’s cars are new. conforming too current safty/air quality regulations).

A2: Size and Locations

Classic Muscle has 2 manufacturing facilities – Kokomo, Indiana and Anderson Indiana with Corporate offices in Elwood Indiana. Classic Muscle has 1200 employees with 900 in manufacturing (evenly divided between the 2 manufacturing sites) and 300 located at the Elwood office (corporate services, design, and engineering). Classic Muscle sells roughly 10000 units yearly and is a pioneer in on-line sales of its products with all sales being contacted via this channel with the exception of Indiana (where orders are placed online but delivered via dealer) where Classic Muscle has 15 dealers. It sells online into Illinois, Michigan and Ohio. And uses a unique “we come to you” methodology for service and repairs.

A3: Organization’s Industry

Classic Muscle is currently a niche player in the sports car market; however, it has decided to transition to performance electric vehicles under a new corporate name – ThunderVolt.

Section B: Research Summary

Because Classic Muscle/ThunderVolt is transitioning to a new product offering this will require extensive retooling. As part of this retooling this is an ideal time to incorporate Industrial Internet of Things (IIoT) into the manufacturing process. The Industrial Internet of Things (IIoT) combines the power of connected devices, sensors, and machines with cloud computing and data analytics to revolutionize industrial processes. By leveraging cloud platforms such as Amazon Web Services (AWS), manufacturers can securely collect, and store massive amounts of data generated by IIoT devices. Through advanced data analytics and machine learning algorithms, manufacturers gain valuable insights from this data, enabling real-time monitoring, predictive maintenance, process optimization, and improved decision-making. The cloud serves as a scalable and flexible infrastructure that supports the storage, processing, and analysis of IIoT data, empowering manufacturers to unlock the full potential of IIoT and drive innovation and efficiency in their operations.

The three primary advantages of implementing IIoT in auto manufacturing are:

1. Enhanced Operational Efficiency:

IIoT enables auto manufacturers to optimize their operational efficiency by connecting various components of the production process and gathering real-time data. With sensors and connected devices embedded in equipment and machinery, manufacturers can monitor performance, track production metrics, and identify inefficiencies or bottlenecks. This data-driven approach allows for continuous process improvement, streamlined operations, and reduced downtime, ultimately leading to improved productivity and cost savings.

2. Predictive Maintenance and Increased Equipment Reliability:

IIoT in auto manufacturing facilitates predictive maintenance, which is a proactive approach to equipment maintenance. By collecting and analyzing data from sensors embedded in machinery, manufacturers can monitor the health and performance of equipment in real-time. This data enables the identification of potential issues or signs of wear and tear before they cause unplanned downtime or catastrophic failures. By scheduling maintenance based on data-driven insights, manufacturers can reduce maintenance costs, increase equipment reliability, and prevent production disruptions.

3. Quality Control and Traceability:

IIoT provides auto manufacturers with enhanced quality control capabilities and traceability throughout the production process. With sensors and data collection devices deployed at various stages, manufacturers can capture critical information about each unit, including quality parameters, production conditions, and potential defects. Real-time data analysis allows for immediate identification of quality issues, enabling quick corrective actions to maintain product quality standards. Furthermore, IIoT enables comprehensive traceability, facilitating the tracking of raw materials, components, and processes used in the production of each vehicle. This traceability aids in recall management, quality assurance, and regulatory compliance.

To summarize. These advantages of IIoT in auto manufacturing contribute to improved productivity, cost savings, increased equipment reliability, and enhanced

product quality, ultimately enabling auto manufacturers to remain competitive in the rapidly evolving automotive industry

B1. Source #1 IIO Industry IoT Consortium, The Industry IoT Consortium is a global not-for-profit partnership of industry, government, and academia.

<https://www.iiconsortium.org/>

This source is the website for the Industry IoT Consortium and provides a repository of case studies and white papers for IIoT. The focus is more on the device level (what is measured per device and how devices are connected within the factory). This source is important because it puts the richness of IIoT on display.

B2. Source #2 iotforall. Iot for all is a website focusing on IOT technologies. This link is specific to the cloud/big data aspects of IIoT (this source uses IIoT and IoT interchangeably). <https://www.iotforall.com/aws-iot-platform-benefits>.

This source focuses on the cloud (where data from factory sites is stored and secured) and the big data aspects of IIoT, how machine learning is used to improve the manufacturing process. IIoT is more than just interconnected devices it also about data being generated in the manufacturing process and how to collect, move, store, secure, and use it. This is the focus of this source.

B3. Source #3 IBM. IBM is a global technology provider. This source is specific to IIoT in auto manufacturing, <https://www.ibm.com/downloads/cas/QXR3DG5O> .

This source is directed towards IIoT in auto manufacturing with an emphasis on cyber security, an area that old-line manufacturing managers may not have considered prior to IIoT adoption. This is a valuable source because it treats with the domain specific aspects of IIoT in abut manufacturing.

paragraph summarizing the main topics of the source and explain why the information in that source is important.

Section C: The White Paper

Introduction:

IIoT is built around using information to transform manufacturing – making it cheaper, safer, provide higher quality of final product and gives a business greater ability to be resilient in the face of risk and to capitalize on new opportunities, as the Industry IoT Consortium expresses “Digital transformation in manufacturing is hard work. It’s a combination of traditional manufacturing processes enhanced with new advancing technologies, working together to drive manufacturing forward and address inefficiencies.” ; however, as Classic Muscle transitions to ThunderVolt as we retool we have the opportunity to incorporate IIoT from the ground up. Some may think of retooling as an expense. A better way to think of it is an opportunity to get it right so that a small player can compete with the giants in our industry.

Main Point 1

IIoT-enabled manufacturing in the automotive industry revolutionizes traditional processes by leveraging connectivity, real-time data analytics, and proactive maintenance. In non-IIoT manufacturing, limited connectivity and manual data collection hinder operational efficiency in automotive production. Reactive maintenance practices lead to unexpected vehicle downtime and increased costs. In contrast, IIoT manufacturing ensures seamless connectivity and automated data collection, enabling real-time monitoring, control, and analysis of production processes in the automotive sector. Predictive maintenance based on data analytics and machine learning algorithms minimizes vehicle failures, optimizes maintenance schedules, and maximizes vehicle uptime. Real-time visibility and analytics empower automotive manufacturers to identify bottlenecks, optimize assembly lines, and make data-driven decisions to enhance productivity and quality control. IIoT manufacturing in the automotive industry offers improved efficiency, reduced vehicle downtime, enhanced product quality, and cost-effectiveness. By embracing IIoT, automotive manufacturers transform their operations, achieve higher productivity, and drive innovation in the dynamic automotive sector.

IIoT-enabled manufacturing in the automotive industry not only revolutionizes processes but also prioritizes data security. With the increased connectivity and data exchange in IIoT, robust data security measures are essential to protect sensitive information in the automotive sector. As IBM in the white paper cited above noted “Security for connected and autonomous vehicles gets all the attention. But companies need to focus on fundamentals – the industrial systems used for manufacturing automobiles and their increasingly high-tech components. Bringing “intelligent industrial things” online without effective cybersecurity puts an entire company at risk.” IIoT manufacturing solutions incorporate advanced encryption, access controls, and

authentication mechanisms to safeguard data integrity and confidentiality. Secure data transmission protocols ensure that critical vehicle and manufacturing data remain protected throughout the ecosystem. Additionally, cloud-based platforms like AWS offer comprehensive security features, including identity and access management, data encryption, and threat detection, to ensure a secure environment for IIoT data. By implementing strong data security measures, automotive manufacturers can mitigate the risk of cyber threats, unauthorized access, and data breaches, ensuring the protection of valuable intellectual property, customer information, and sensitive manufacturing data in the IIoT-driven automotive landscape. The automotive industry stands at the brink of a transformative era, and the adoption of IIoT is crucial for manufacturers aiming to stay competitive and drive innovation. IIoT enables seamless connectivity, real-time data analytics, and predictive maintenance, leading to enhanced operational efficiency, improved productivity, and reduced costs. By integrating sensors, devices, and connectivity throughout the production process, manufacturers gain unprecedented insights and control over their operations. Real-time monitoring and data analytics enable efficient resource allocation, optimized workflows, and proactive issue identification, resulting in minimized downtime and increased productivity.

Additionally, IIoT empowers manufacturers with predictive maintenance capabilities, allowing them to monitor equipment health, detect potential failures, and schedule maintenance before costly breakdowns occur. This approach maximizes equipment uptime, reduces maintenance costs, and enhances overall production efficiency. The availability of granular data and operational visibility provided by IIoT facilitates data-driven decision-making, enabling manufacturers to identify bottlenecks, optimize processes, and improve product quality.

Moreover, IIoT enables manufacturers to adapt to changing market demands and customer expectations more effectively. The scalability and flexibility offered by IIoT systems ensure that manufacturers can quickly and efficiently adjust production volumes, introduce product variations, and respond to dynamic market conditions. By embracing IIoT, old-line auto manufacturers can embark on a transformative journey that revolutionizes their operations, fosters innovation, and positions them at the forefront of the industry. The transition to IIoT auto manufacturing represents a significant

opportunity to optimize processes, increase efficiency, reduce costs, and create a competitive advantage in an increasingly interconnected and data-driven automotive landscape. The automotive industry stands at the brink of a transformative era, and the adoption of IIoT is crucial for manufacturers aiming to stay competitive and drive innovation. IIoT enables seamless connectivity, real-time data analytics, and predictive maintenance, leading to enhanced operational efficiency, improved productivity, and reduced costs. By integrating sensors, devices, and connectivity throughout the production process, manufacturers gain unprecedented insights and control over their operations. Real-time monitoring and data analytics enable efficient resource allocation, optimized workflows, and proactive issue identification, resulting in minimized downtime and increased productivity.

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By embracing IIoT, Classic Muscle can embark on a transformative journey that revolutionizes our operations as we move to ThunderVolt, this fosters innovation, and positions us at the forefront of the industry. The transition to IIoT auto manufacturing represents a significant opportunity to optimize processes, enhance security increase efficiency, reduce costs, and create a competitive advantage in an increasingly interconnected and data-driven automotive landscape.

Section D: Explanation of Diction

This white paper was written for an executive committee that is successful in old-line manufacturing operation but new to IIoT.

Section E: Sources

Primary

<https://www.ibm.com/downloads/cas/QXR3DG5O>

[https://www.iotforall.com/aws-iot-platform-benefits.](https://www.iotforall.com/aws-iot-platform-benefits)

<https://www.iiconsortium.org/>

Secondary

<https://docs.aws.amazon.com/whitepapers/latest/aws-overview/internet-of-things-services.html>

https://en.wikipedia.org/wiki/Industrial_internet_of_things

<https://www.sciencedirect.com/science/article/pii/S0166361517307285?via%3Dihub>