Artificial intelligence in operational technology

Sector focus: Automotive

The automotive industry is deploying AI across its business to overhaul the way cars are manufactured, used, and experienced. We look at the most important developments AI is enabling across automotive manufacturing and the supply chain.

The automotive industry faces various economic, geopolitical and technology issues. As car makers transition to making electric vehicles, they need to retool production facilities, find new suppliers and markets for their products in the face of newer, more nimble competitors. They must do this while facing serious supply chain issues with semiconductors and rare earth materials.

Meeting challenges with AI in OT

Technology can help meet these challenges, and AI promises to help solve multiple manufacturing and supply chain issues. Increasing the resilience of production is vital, and AI can help reduce unplanned downtime and mitigate the impact of supply chain disruption. It can also significantly improve production quality and ensure that vehicles meet stringent safety and sustainability standards.

The first step in bringing AI into the OT environment is to integrate IT and OT systems. This is already happening widely. In our manufacturing survey carried out by GlobalData, automotive manufacturers reported some of the highest levels of IT/OT integration, with 92% of respondents having made significant progress with full or partial integration.

Rapid progress in AI/GenAI

Our survey also found that AI/ML is widely deployed in automotive OT environments by 43% of our respondents, with a further 40% reporting pilot projects or plans to deploy the technology within the next 12 months. A similar proportion of automotive manufacturers are adopting GenAI, with only 11% of respondents not having any GenAI plans at all.

This push towards AI in OT is being driven by the automotive C-suite, with two-thirds of executives saying it is either “essential” or “very important”. Like most other sectors, this initiative is being led by the IT department, as part of an IT/OT convergence strategy.

AI in OT benefits

In terms of identified AI benefits, the top three chosen by automotive executives in our survey are improved productivity, improved customer satisfaction and reduced costs. Clearly costs are a priority for the automotive industry as it navigates the uncertain global business environment and transitions production to electric vehicles.

With complex global supply chains and threats of trade disruptions, the automotive industry needs proactive risk management and detailed scenario planning to ensure they can always maintain production.

AI in OT use cases

The automotive industry is deploying various AI and GenAI use cases. The top three identified in our survey were predictive maintenance, supply chain management and traceability. Examples of their use are described below.

Predictive maintenance

Unplanned downtime is extremely costly for the automotive industry. According to research, the cost of an idle production line at a big plant is $695 million a year, which is 50% higher than just five years ago[1]. One of the biggest causes of downtime is unplanned maintenance. Predictive maintenance applications use sensors on a machine to measure factors like temperature, pressure and vibration, along with machine learning to predict when a machine needs maintenance. This extends the life of machines and allows factories to order parts and schedule maintenance without disrupting production. The benefits are significant: Renault, for example, saved $270 million primarily through predictive maintenance deployed as part of its industrial metaverse project[2].

Supply chain management

With modern cars having around 30,000 components, supply chains consisting of thousands of companies play a key role in automotive manufacturing. Ensuring that supply chain disruptions don't impact production is crucial. For example, Nissan has completely overhauled its supply chain strategy to support proactive risk management[3]. By analyzing multiple data sources, it can quickly switch to alternate suppliers if one of them experiences a cyber-attack, for example, while still meeting regulatory rules. Nissan is investing in AI to carry out scenario planning and in-depth supplier risk assessments.

Traceability

Traceability is a vital requirement for the automotive industry, and moving to electric vehicles adds another layer of complexity. For example, car makers must meet strict traceability regulations in Europe with the introduction of battery passports in 2027 under the Ecodesign for Sustainable Products Regulation[4]. This aims to boost circularity, energy performance, and sustainability. However, companies struggle with data challenges, including unclear requirements, inaccessible information, and lack of updates in the product lifecycle. AI can help meet these challenges by replacing paper compliance and reporting. Automated systems powered by AI can generate the documents required with fewer errors and faster processing.

Overcoming AI challenges

Automotive executives have identified several challenges holding back the broader adoption of AI within the OT environment. The top four were a lack of AI skills, concern over accuracy, a lack of appropriate network infrastructure, and uncertainty regarding the impact on employees.

Given the importance of safety in automotive production, it's little surprise that data quality and inaccurate results from AI are at the top of executives' minds. There are continuing concerns around hallucinations in GenAI, for example, and using it safely requires expertise in areas such as retrieval augmented generation (RAG).

However, the general lack of AI skills affects all industries, and many companies are turning to third-party assistance. Establishing responsible AI practices and deploying AI at the edge were the top two areas the automotive industry identified for seeking external help when scaling their AI projects.

Focus on digital infrastructure

Digital infrastructure plays a key role in enabling AI in OT projects, with foundational technologies such as networks, cloud and security helping drive the convergence of IT and OT. Our survey found that 87% of automotive respondents said they had the requisite IT infrastructure fully or partially in place for deploying AI in OT. Concerns over security dominated among those who didn't.

These worries are shared with many other industries. Manufacturers are increasingly the target of cyberattacks, which can shut down operations or steal business-critical information. Downtime is so damaging to business that ensuring resilience is essential. As such, OT security is an investment priority for 72% of our automotive respondents.

Connectivity is vital for the success of AI in OT because the processing of data is largely carried out in the cloud. However, the automotive industry is increasingly looking to edge computing to bring processing closer to the factory, with 70% of respondents either using it or planning to use it within 12 months as part of the IT/OT strategy.

Why Orange Business

Orange Business can help you take advantage of these AI opportunities and support you in your data quality, integration, and infrastructure requirements.

We have a unique skill set as a global integrator, communications operator, and service provider and genuine industrial experience. Our individual approach is designed to make your business outcomes a reality. Our consultants have extensive automotive industry experience and are supported by best-in-class partner ecosystems.

We can answer your transformation challenges at every stage of the data journey using a secure, scalable, flexible approach. With our business approach, methodology, and skills, we will work closely with you to outline business goals, organize efficient and secure data sharing, and accelerate innovation.

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1. https://assets.new.siemens.com/siemens/assets/api/uuid:1b43afb5-2d0747f7-9eb7-893fe7d0bc59/TCOD-2024_original.pdf
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3. https://www.automotivelogistics.media/digitalisation/nissans-supply-chain playbook-for-real-time-resilience/47205.article
4. https://www.capgemini.com/solutions/product-traceability-for-automotive/

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