





# How innovation is shaping auto sector supply chains

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# How innovation is shaping auto sector supply chains

#### FOREWORD

The automotive industry faces a moment of reckoning. After decades of experience and investment in internal combustion engine vehicles, auto makers face a global imperative to embrace electrification—entailing new skills, processes and supply chains.

The move to EVs is increasingly backed by consumers, with hybrids and fully electric cars becoming more desirable than their gasoline counterparts, influential U.S. magazine Consumer Reports said in February 2024.

However, faltering EV sales growth in 2023 showed how electrification could be an uneven process, forcing OEMs to cut forecasts and scale back expansion plans.

This uncertainty is affecting automotive supply chains, which have historically been at the whim of OEM customers and now face even greater unpredictability given doubts over levels of EV investment. In the long run, what is clear is that many parts of the supply chain will have to adapt to a growing range of drive trains and increasing demands for the more sustainable, intelligent and autonomous driving experience that are part of the EV promise to consumers.

This in turn will demand new skills, which may be a problem since automotive suppliers already face workforce shortages.

Against this backdrop, the automotive supply chain must embrace innovation, using automation and other technology tools to improve worker productivity and operational flexibility. But how is it faring today?

To find out, this report draws on expert views from industrial automation leader Rockwell Automation and major automotive supply chain players including Ascend Elements, Continental, QuantumScape Corp and Ultium Cells, shared during exclusive webinars hosted by Reuters Events.







# How automation can address Tier 1 automotive supplier challenges

Tier 1 automotive suppliers face a challenging 2024 as they seek to balance labor availability and pay issues with growing pressure to cut costs. But workforce problems could be mitigated with investments in technology, says Renee Pieti, global head of Tier 1 automotive at Rockwell Automation.

"Tier 1 suppliers are experiencing pressure to automate and use robotics as much as they can," she says. "The most trying challenge that they have, which is very consistent and is not going to go away, is workforce availability."

The situation is particularly severe in the United States, where Tier 1 suppliers compete for workers who can take their pick of employer. "One supplier park that I visited last week had 5-6 global suppliers on the same street. This creates a very competitive situation for companies trying to retain its workforce." Other factors are compounding the issue. In the U.S., the Biden administration's 2022 Inflation Reduction Act—the country's biggest-ever support package for clean technology—has amped up demand for skilled workers, says Pieti. "the demand for skilled labor in manufacturing is critical." she says.

More widely, Western OEMs and their suppliers face growing competition from vertically integrated Chinese EV makers offering low-cost cars.

The threat is forcing European carmakers to seek cost reductions from suppliers while in the U.S. the Alliance for American Manufacturing has called for a halt to low-cost Chinese autos and parts being imported from Mexico.

### Auto supplier margins took a pandemic hit



The pandemic hit EBITDA margins for suppliers, but boosted them for automakers



These pressures are creating another issue for Tier 1 suppliers: at the same time as they struggle to find qualified workers, they are also less and less able to guarantee long-term, stable employment.

In February 2024, French supplier Forvia announced plans to cut up to 10,000 jobs in Europe over five years. In the U.S., meanwhile, the 2023 United Auto Workers strike forced some Tier 1 facilities to shut down, says Pieti. "The supply chain crisis and UAW strike created uncertainty in the tier suppliers production schedules. This instability made it even more difficult to retain its workforce." she says.

#### A GROWING ARRAY OF TECHNOLOGY TOOLS

The workforce challenges facing Tier 1 suppliers should prompt continued interest and investment in technology tools for automation and operational efficiency, says Pieti.

Given spending constraints and a need to achieve a payback on technology investments within a year, "It's important we look at things we can automate quickly, that will give a return on investment quickly," she adds.

One example is the use of autonomous mobile robotics to move materials around manufacturing plants. Pieti says the use of autonomous forklifts in plants can not only improve efficiency but also enhance safety by reducing the need for workers on the shop floor.

Other technologies potentially of value to Tier 1 suppliers include artificial intelligence (AI)-based systems for quality checking and virtual or augmented reality for use in training situations.

Underlying such technologies, manufacturers will likely benefit from a manufacturing execution system (MES), which Rockwell Automation defines as: "the foundational layer that oversees the production process for transforming raw materials into a finished product, ensuring it's done right."

MESs are widely used across manufacturing but can be challenging for Tier 1 suppliers to implement because skilled IT and engineering workers are needed to carry out the installation, integration and maintenance of the systems, Rockwell Automation says.

For this reason, many Tier 1 supply companies still rely on manual, labor-intensive processes and tools such as spreadsheets for tasks including inventory taking, order tracking and quality management.

Recent years, however, have seen the advent of MESs such as Rockwell Automation's Plex Smart Manufacturing platform, which can be implemented on a software-as-a-service basis without the need for in-house IT or engineering support.

#### THE BENEFITS TO TIER 1 SUPPLIERS

G&W Products, a Fairfield, Ohio-based metal stamping and coating company serving the transportation sector, was able to increase its on-time delivery rate from 80% to 98% following the implementation of Plex, while reducing inventory by 25%.

The company also reduced its defect rate to a better-than-world-class 176 per million and increased its profitability 12%. Another Tier 1 supplier, Thai Summit America, saved \$9 million a year after starting to use Plex.

More generally, Rockwell Automation claims MESs can reduce lead times by 50%, raise on-time delivery rates to 96% and result in stocks spending 38 days less in inventory.

Besides improving key performance indicators such as





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on-time delivery rates, automation technology can help Tier 1 automotive suppliers enhance efficiency through novel applications.

One of the most exciting of these is virtual commissioning, which allows engineers to start up a production line without having to be physically on site. "Typically, engineering teams would have to be on site for long amounts of time for a machine start-up," says Pieti. "It could be in Europe, it could be in Mexico, wherever."

Working far from home for months at a time is an important source of burnout among Tier 1 control engineers, who are "really hard to find," says Pieti. "Virtual commissioning allows them to do this remotely, where [before] they had to be in person."

As well as improving employee satisfaction and retention, virtual commissioning reduces travel costs and makes it possible to get production lines running sooner by allowing bugs to be dealt with remotely, says Pieti.

"Virtual commissioning is something that automakers are pushing on their supply base, and we're seeing traction," she adds.

#### **TIER 1 SUPPLIER TYPES**

The automation technology use cases and benefits that Tier 1 suppliers could see will vary depending on the nature of the company. Thus, one body and trim supplier used simulation software to identify bottlenecks that would have reduced capacity by 25% in a final-finish system design.

The system was re-engineered, and the company ultimately saved an estimated \$4 million through equipment efficiencies. Body and trim suppliers can use MES software to automate data collection and improve operational decision making, Rockwell Automation says.

They can also use motion control systems to create more flexible lines, using software-configured move profiles for fast and easy changeovers. And engineers can use augmented reality in combination with digital twins—software-based renditions of real-life plants—to help solve faults.

Seating and interiors manufacturers, meanwhile, can connect stations in the assembly process to a common network, accessing real-time data and machine learning to manage issues before they occur. Furthermore, "Operators can use digitized work instructions and real-time performance data in an augmented reality experience to improve first-time pass rates and rework efficiency," says Rockwell Automation.

Seating and interiors manufacturers can also automate end-of-line testing to reduce labor requirements and costs.

Finally, EV drivetrain suppliers can create integrated design environments allowing workers to collaborate across time zones and improve rates of innovation, for example by writing code simultaneously while comparing and merging changes.

Simulation software can add physical attributes to three-dimensional computer-aided design models that can then be demonstrated to customers in a virtual reality environment, without needing to order materials or make products.

"Design changes don't involve ordering parts and building prototypes," says Rockwell Automation. "They happen with a few clicks. A machine's digital twin can also be used for virtual operator training, bringing operators up to speed before machines are bolted on the floor."

#### SIEZING THE OPPORTUNITY

Tier 1 workforce issues look set to stay, with 46% of manufacturers claiming that they lacked the skilled workforce needed to outperform their competitors in 2022—up from 35% in 2021, and ahead of any other competitive differentiator.

"However, Tier 1 automotive suppliers have yet to fully embrace automation technologies because of scant access to capital and a sense of urgency approach to decision making," Pieti says. This means they may be missing out on important innovations, she says.

One example is independent cart technology, which improves on traditional conveyor belt systems by doing away with chains, reducing fault rates and maintenance requirements. This in turn eases the need for maintenance personnel.

Independent cart technology also uses around 20% less energy than traditional conveyor belts, helping to cut operating costs and meet OEM calls for supply chain decarbonization. "This technology can help tier suppliers achieve a quick reduction in energy costs and hit sustainability milestones," Pieti says. "



# Battery production: how the EV supply chain is planning for capacity

Electric vehicles are cornering an expanding share of the new car market, with November 2023 data from research firm Rho Motion showing 20% year-on-year growth. But a key factor in maintaining this trend will be the availability of batteries, which itself is governed by materials supplies.

Concerns over the cost and availability of EV batteries are linked to China's dominance in the battery supply chain. The country makes three quarters of all the lithium-ion battery cells used in EVs.

In response, western carmakers are eying a range of strategies to meet the battery supply challenges that will come with mounting EV demand, according to a panel of experts convened by Reuters Events and Rockwell Automation to speak about boosting battery production outside of China.

#### **SECURING MATERIALS**

Materials supplies are an obvious prerequisite for building robust battery supply chains. Yet volatility around key minerals is hampering EV price reductions, says Srinivas Kompella, director of purchasing and supply chain at Ultium Cells, a joint venture of General Motors and LG Energy Solution.

"The price of an electric vehicle is still way higher than that of a gasoline vehicle," he says. "The majority of the cost of the vehicle is driven by the battery pack. And the cost of the battery cell in the pack needs to come down."

The prices of metals such as nickel and cobalt have already seen drastic declines in the last year.

But "there is not the kind of stability that we need in the metal prices," says Kompella, "to the extent where we can feel comfortable of a supply that is going to sustain the needs of the greater adoption of the vehicles."

Reductions in materials pricing are good for battery manufacturers but could perversely curtail the incentive for investment in new sources of supply.

However, the need for a more sustainable supplies in the long term means new mineral extraction and recycling operations are "still a good long-term strategy and investment," Kompella says. "Any marketplace is going to see supply and demand issues and price fluctuations."



Most vehicle OEMs have committed to electrification, he says, so "this transition is not going to go away. It's only going to go faster if we are able to bring the prices down."

#### **SMART GIGAFACTORIES**

Assuming materials supplies can be scaled up, battery manufacturers could also look to reduce costs through efficient production processes.

"One of the things that we hear a lot is starting with a connected factory," says Stephanie Van Kirk, market development manager for EV batteries at Rockwell Automation, a U.S. provider of industrial automation and digital transformation technologies.





"You need to make sure that all the manufacturing steps are talking to each other," she says. "Depending on the process and specification, there may be some AI assisting with production to reduce scrap and improve operational efficiency."

Battery manufacturers are embracing manufacturing execution and quality management systems to ensure traceability of materials, says Van Kirk. Technologies such as digital twins are also being used to enhance plant performance, she says.

#### LIFECYCLES AND RECYCLING

Another factor affecting the availability of materials is how long the batteries last when in use, and whether they can be recycled afterwards. There is still uncertainty over these points.

Based on conversations with engineers, Kompella estimates the average lifetime of an EV battery could be more than 10 years. Furthermore, he says, "General Motors is putting in a robust program with the dealer network for recycling used batteries."

The exact lifespan of a battery will depend on usage, adds Roger Lin, vice president of global marketing and government relations at recycling firm Ascend Elements. Lifespans are being extended, he says, thanks to improved battery management systems.

"As far as recycling goes, it's going to be a combination," Lin says.

"Responsible OEMs like GM are putting programs in place where their customers can return batteries to them for proper disposal, recycling or reclamation of elements, but there will be a network of your standard auto scrap yards that are starting to look into this with great interest."

The materials used in EV batteries are more valuable than those in traditional auto components, says Lin, which could in theory lead to competition for recycling capacity. But "it's not settled yet, by any stretch," he says.

#### **RECYCLING REGULATIONS**

In the European Union, battery recycling is covered by regulation that was updated in July 2023. In the U.S., however, "I don't see a recycled content mandate for batteries," says Lin. "I would see more incentives, or carrots, as a way of motivating certain behaviors."

In 2022 the Biden administration introduced lavish support for national battery manufacturing as part of the Inflation Reduction Act, the country's biggest ever support package for clean technology.

This "does require some amount of either domestic or free-trade-friendly-country materials provided in new batteries," says Rockwell's Van Kirk.

The Act aims to scale up local extraction and processing of minerals such as lithium and has sparked interest from companies including the oil giant Exxon. But in 2022 the U.S. accounted for just 1% of global lithium production, leaving a major gap to be filled in the short term.

"One of the ways to approach that would be with materials recycled here in the U.S.," Van Kirk says.

#### **IMPROVING RECYCLABILITY**

The approach could provide major sustainability gains for the automotive industry, with cleantech thought leader Michael Liebreich claiming a 95% recycling rate and a 10-year lifespan could allow 50% of today's battery materials to still be in use 130 years from now.

However, today's battery technology still has some way to go in improving recyclability. "The incoming feedstock is very variable," says Lin. "It depends on the battery type, size, shape [and] applications, whether it's EV, electronics or stationery."

Different types of batteries "can vary wildly from each other," he says. "What the recycling industry would like to see is more consideration of end-of-life dismantling and disassembly, to make it easier to manage the end-of-life streams. That would obviously reduce the cost of processing the materials."

#### SAFETY CONSIDERATIONS

Another consideration for battery recycling is the safety of plant operators. Lithium-ion batteries have already attracted attention as potential fire hazards. "Obviously, Libatteries do have a voltage," says Lin. "They have energy inside. They also contain liquids that can in many cases be flammable."

The biggest threat to workers is that EV batteries hold voltages many times in excess of those typically found in most consumer devices. EV charging infrastructure is moving to 800 volts as standard, a level that Lin says is "very, very dangerous."



Because of this, "There has to be specific training on how these battery packs can be handled at end of life," Lin says. "It's a primary hazard. We all know about the volatility of a lithium-ion battery if you do not handle it correctly, in terms of not just shock hazard but fire hazard."

However, he adds: "These hazards can be managed with appropriate training and awareness and education. We deal with hazards every single day. The design for safety is there in gas stations and every day most people pump gas—it can be done through safety measures and fail-safes."

#### MANUFACTURING INNOVATION

Safety is evolving in line with constant improvements to other aspects of battery technology. Yet the rapidly developing nature of batteries could pose a further hurdle for manufacturing and recycling plants, forcing operators to adapt to regularly changing chemistries and formats.

This is something they may simply have to deal with. "The change in manufacturing process and the change in technology is a constant. It's not unique to the EV space," says Kompella at Ultium.

"If you look at where the vehicles were five, 10 years back and where they are today, the kind of processes the OEMs have adopted to decrease the cost or increase the reliability of the vehicles—all of those things are in constant change."

EV battery technology is especially likely to show rapid evolution as carmakers seek to improve the performance and reliability of their products, he says. "I don't see the process change or the technology change going away any time soon," he adds.

This should be seen as a welcome sign, says Lin at Ascend. "It's all in pursuit of marching down that cost curve to make batteries more affordable for the various applications and EVs that we drive right now," he says. "I think that's going to continue."

#### SOLID STATE

One hotly anticipated development is the advent of solid-state lithium-ion batteries, which are still at a pre-commercial stage today but are expected to yield significant performance gains as the technology is perfected.

It is already "pretty viable," says Asim Hussain, chief marketing officer at U.S. solid-state battery maker QuantumScape Corp.

A major benefit of the technology will be to enable faster charging. "With our lithium-metal anode-free design, we can do a 10 to 80% charge in 15 minutes, approximately," says Hussain.

Solid-state batteries are also tipped to have higher energy densities than today's lithium-ion products, he says.

This means EVs equipped with solid-state technology could either achieve current ranges with a smaller battery, thus cutting cost and weight, or travel farther on similar sized batteries to today's.

"Just like any technology, you're going to be more expensive at the beginning, as you're coming down the cost curve, as you scale, as you get your processes right," says Hussain. "However, there are some inherent advantages when you for example eliminate the anode."

With anode-less technology, he says, "You eliminate the supply chain constraint on graphite, which is sourced from basically only one area in the world, to a large extent. You're relieving some of the bottlenecks in the supply chain as well as simplifying the manufacturing process."

#### **FUTURE PRIORITIES**

Likely advances in technology underscore the vast opportunities as well as major challenges ahead for battery manufacturing in the U.S. and other western economies.

Over the next couple of years, says Ultium's Kompella, "From an OEM perspective, the biggest thing is how do you bring the vehicle costs down so that you can ensure people are adopting this new technology, as well as providing the infrastructure for them to charge their vehicles."

Standardization of charging technology is "going to help with adoption, opening up the network for people," he says. "A lot more work needs to be happening in that space. That's a big focus area for a lot of OEMs."

Rockwell's Van Kirk meanwhile sees three priorities for the industry. One is to educate the public on battery basics, such as how to maintain and dispose of the products. Her second point, echoing Kompella's view, is a need to improve EV affordability.

Finally, she says, the industry must focus on batteries after they have served their purpose in an EV. "What are the logistics and infrastructure to address what we do with that pack?" she says.





# Automating and simplifying tire manufacturing to stay competitive

The humble tire is set for a makeover as the automotive industry transitions to EVs. The move to electric drivetrains is affecting all areas of the automotive sector, including tires, according to Dan Paul, tire industry global business director at Rockwell Automation.

"EVs have had a tremendous impact on the typical tire manufacturer," he says.

Underscoring this impact, in January 2024 Goodyear Tire & Rubber Co appointed former Stellantis executive Mark Stewart as CEO with a brief to streamline its business, including pursuing strategic alternatives for its chemical operations, Dunlop brand and Off-the-Road equipment tire business.

Stewart had previously led Stellantis's EV transformation in North America.

Because of its batteries, a typical EV weighs around 2 tonnes, or about 25% more than an average internal combustion engine vehicle, which creates a need for design

changes such as reducing rolling resistance to increase energy efficiency.

"An EV tire needs to handle complex challenges in tire design," says Paul. "It needs to handle the added weight of the vehicle and the instantaneous torque unique to EVs, while also minimizing noise and optimizing rolling resistance."

For tire makers, the move to EVs also provides an opportunity to address long-standing challenges around issues such as access to talent, according to Paul. "Almost every manufacturer that we talk to is dealing with high turnover of employees," he says.

"They all complain about having great difficulty in finding and retaining qualified workers. There are many different things that technology for digital transformation can do to help us here."







#### **TIRE MANUFACTURING 4.0?**

Such technologies are set to play an important role in helping tire makers stay competitive in a changing environment.

Adapting to EV tire manufacturing while maintaining a steady supply of products for the majority of diesel and petrol cars that will remain on the roads for decades to come will require manufacturers to achieve new levels of productivity and flexibility.

They should be able to rise to the occasion following years of investment in so-called Industry 4.0 technologies, says Gabriel Fehrmann, autonomous mobility business area lead at Germany tire maker Continental.

"We see big benefit in the combination of systems to really capture the end-to-end process, because we've invested a lot connecting the system, standardizing the systems, having lots of pilots [and] applications," he says. "I think we will really have that harvest in the next 10 years." Much of companies' Industry 4.0 investment so far has been in internet of things infrastructure connecting operational technology (OT) to IT systems, allowing greater analysis and control of plant operations.

In addition, Rockwell Automation is already providing technologies to help manufacturers address productivity, for example using machine vision for automated tire inspection and closed-loop optimization to auto-adjust processes carried out automatically.

Going forward, the focus will likely be around using these connected assets to achieve digital transformation, which Rockwell Automation defines as the use of new technologies and advanced analytics to deliver financial, operational and environmental value at scale.

"Industry 4.0 has many differing meanings," Paul says. "It might mean digital twin, augmented reality, artificial intelligence and machine learning, cloud or enterprise-wide software."

Tire manufacturers are looking to digital technology for a range of business outcomes, including lower costs and improved productivity, efficiency and quality, Paul says.

And many are already beginning to see results, with machine learning and artificial intelligence (AI) applications having a payback time of months or even weeks thanks to advancements in technology combined with optimal control theory.

Similarly, says Paul: "A world-class MES [manufacturing execution system] might improve plantwide OEE [overall equipment effectiveness, a measure of productivity] by more than 5%."

#### THE QUEST FOR PRODUCTIVITY

Given the skills shortages facing tire manufacturers, improving productivity is a major issue for the sector.

One class of technologies that could help address this problem are augmented and virtual reality, which could be used to improve and speed up training and assist with maintenance tasks—for example by making it easier to view equipment manuals.

The use of such technologies could also help attract and retain a younger generation of technology-savvy workers, Paul says. "It can make the job more attractive, because now it appears high-tech and it's cool," he remarks. "This can improve job satisfaction and retention."







Similarly, MESs could improve productivity and quality thanks to automated error proofing. "There's many things that Industry 4.0 can help with these human processes," says Paul.

However, there are still obstacles that tire companies need to overcome before making the most of industrial technology. One sticking point is that many manufacturers have a mix of technologies in their asset portfolios, including legacy systems that might be hard to integrate into Industry 4.0.

This could prevent companies from being able to benefit from the latest advances, says Fehrmann, adding that there needs to be a balance between embracing innovation and deploying systems that are backwards compatible.

Paul says a desire to maximize technology benefits could lead companies to review their existing platforms. "I was on a call with a tire manufacturer and the topic of the day was how are they going to connect to legacy systems," he says. "That's kicking off a whole bunch of other projects."

Investing in upgrades might be easier when Industry 4.0 benefits are considered, he notes. Fehrmann adds that most systems today have high levels of interoperability. "There are technologies which really make it easier than what we knew 10 years ago," he states.

#### **ROBOTS AND HUMANS**

While system integration is important, the big challenge for tire manufacturers will be to ensure Industry 4.0 projects account for the needs of workers. "When you are specifying and designing an MES, you need to bring in all the functional areas," Paul advises. "You're basically writing the operating system for how the plant is going to operate. There are inefficiencies or gaps—the MES can help deal with that. But you also have to change how those functional areas work, how they relate, for it to be successful."

Paul says it is important for Industry 4.0 projects to have buy-in from senior leadership, although incorporating views from the shop floor can be just as useful.

At Continental, for example, an initiative to introduce digital workforce enhancements via smart watches fell flat when it became apparent that the devices interfered with workers' tasks.

The company solved the problem by integrating the application into employee identity badges instead, says Fehrmann. Technology "needs to support the human process, in an accepted way," he says.

Paul adds: "We've done advanced analytics on various processes in a tire plant, and if you don't include operators in how that's designed, guess what they do when something funny happens? They just turn the machine off. They don't trust the system if they are not part of the journey."

Because of this, he says: "You have to include them in the design of these projects, otherwise they'll cut you off and you'll not get the results."

For optimal outcomes, Paul says it is important for manufacturers to work with experienced technology partners.

"The ones that are getting the results, the ones that are seeing the return on investment, in our opinion, seem to be the ones that are partnering with someone who has been there and done this before," he says.



"They know the tricks, they understand the technology, they understand how it applies to certain processes on the plant floor. They also understand the change management aspect of this, because there's a big part of the digital transformation of Industry 4.0 that involves change management."

#### FROM AUTOMATION TO AUTONOMOUS

That change will be increasingly important as tire makers strive for supremacy in a changing, skills-sparse future. With workers at a premium, Paul envisages manufacturers relying on automation for a growing proportion of process workloads.

"Once you understand what machine learning or artificial intelligence can do for you, and once you get results in one process area on one machine, you quickly realize that you can spread that methodology to other processes in your plant," he says.

"You can start connecting the extruder to the tire building machine, to the curing press, and create a feedback loop. That is the beginning of autonomous manufacturing."

Autonomous manufacturing differs from 'lights-out' processes—which can be carried out automatically without human intervention—because it is controlled by AI algorithms that continuously adjust and improve the way tasks are managed, Paul says. "You can get more production out of the same assets, you can lower your costs, you can improve your quality," he says. "There's many different areas where this can lead to improved results."

Fehrmann notes that such a vision can only be achieved "if we rethink processes and many existing principles."

The current trend to process data at the edge of networks, for example, might be good for network traffic management but could lead to a loss of information that could be valuable for a higher-level Al.

"We might not know how this information will be needed for some algorithm or for some decision," Fehrmann says.

It remains to be seen whether tire manufacturers will sacrifice network capacity in pursuit of possible productivity gains—but it is clear those willing to take risks on innovation could have much to gain.

## Outlook and conclusions

A consistent theme throughout this report is the need for the automotive supply chain to adapt to rapidly changing conditions with scant resources, whether in the form of materials for battery manufacturing or workers across most of the top tier suppliers.

The obvious answer to this challenge is to further embrace automation technologies, which auto OEMs already use profusely—and which could yield increased benefits across the supply chain.

Automation today is not just about using a robot to do a task better, faster and longer than a human worker could.

It is also part of a wider move towards a joined-up technology ecosystem where the robots are combined with intelligent algorithms that can analyze and improve industrial processes and provide enhanced safety and support for plant workers.

Automotive suppliers that harness innovation in this way will stand the best chance of overcoming the challenges ahead—and emerging as winners in the auto industry of tomorrow.



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