

# Building the supply chain forward

Strategies to mitigate disruption in automotive logistics

Automotive  
LOGISTICS





## Executive summary – The age of supply chain disruption

The automotive supply chain is surrounded by rising uncertainty. Global freight, material and energy networks face significant imbalances and congestion. The industry is struggling with whiplash between shutdowns and pent-up demand in the wake of the Covid-19 pandemic – resulting in constraints in the upstream supply of components, higher logistics costs and production losses, as well as depleting finished vehicle inventory. The rise in logistics and supply costs is hitting margins, while lost production has also meant that automotive OEMs and suppliers are struggling to produce enough vehicles to meet customer demand, threatening the pace of recovery, and putting investments at risk.

OEMs facing such cost and supply headwinds are also likely to apply even more pressure on their suppliers and logistics providers, too.

The supply chain crisis has followed the course of the pandemic – mismatched demand for products like chips and for commodities such as leather and rubber; unprecedented peaks for container shipping post lockdowns; labour shortages in the wake of ongoing infections and restrictions. For the automotive industry, these issues expose the complexity of global supply, as well as the challenges of its lean inventory, capital-intensive business model. The crisis has demonstrated just how critical it is to have buffer inventory, supply and logistics alternatives – however,

it has simultaneously underlined the degree to which 'cash is king' in the supply chain, as manufacturers depend on short lead times to maintain revenue to keep operations and revenue humming.

Automotive manufacturers will face this inventory imperative even after the most significant supply and demand bottlenecks eventually return to a semblance of balance. But the era of disruption has only just begun. Many factors could lead to ongoing constraints upstream and downstream in the automotive supply chain, including increasingly complex trade regulations, requirements for sustainable materials, low carbon energy and transport, as well as new supply considerations for electric vehicles and batteries. The rising frequency of extreme weather events, meanwhile, means that disaster could always be lurking behind the next cloud.

That is why gaining visibility and control of the supply chain is becoming more important than ever, so that manufacturers can make decisions on where to focus extra inventory or expedited freight without overstressing capital. Increasingly, OEMs need consolidated data across departments and partners to prioritise supply and production, as well as an integrated view of freight and logistics networks in as close to real time as possible.

With the right data and tracking, joined-up decision-making, technology innovation as well as strong logistics partnerships, manufacturers can mitigate even the worst of today's disruptions to production or fulfilment.

This report examines the challenges facing automotive supply chains and how manufacturers and logistics providers are working together through the crisis to mitigate shortages, bottlenecks and inflation. It looks at logistics and freight solutions, including data and visibility technology, and innovations in network design that enable flexibility and long-term decision making.

It features examples from OEMs, as well as insight from John Andrew Carmichael, global head of automotive at shipping and logistics giant Maersk both on new approaches for container shipping and on the value of the integrated, end-to-end supply chain solutions that lead logistics providers (LLP) can offer.

# Mitigating disruption: key takeaways



Gain better visibility across supply and freight network, combining technology and data inputs from suppliers, locations and transport assets



Leverage integrated, real-time logistics data and capacity to identify strategic inventory building of critical buffer and alternative transport modes



Establish two-channel logistics distribution, involving planned-for-priority items along with a more stable flow



Maintain mid-channel inventory and storage network strategy for logistics and distribution routes



Build deeper integration between OEMs and logistics providers, especially in supporting sales and operations planning decisions, and long-term decisions on manufacturing and purchasing



Factor logistics and inventory considerations into part and product engineering – for example, lower variability and complexity can reduce inventory and shipping requirements

# Chapter 1

## Rising risk, rising costs

Component shortages and logistics bottlenecks are changing the paradigm of automotive supply chains



The semiconductor shortage has escalated to impact all major OEMs and automotive manufacturing regions. Current estimates indicate that chip shortages could reduce light vehicle production by 10m light vehicles or more in 2021, with hundreds of billions of dollars of revenue at risk. Many industry experts now expect the shortages to persist throughout 2022 and into 2023, leaving little prospect to recover volumes.

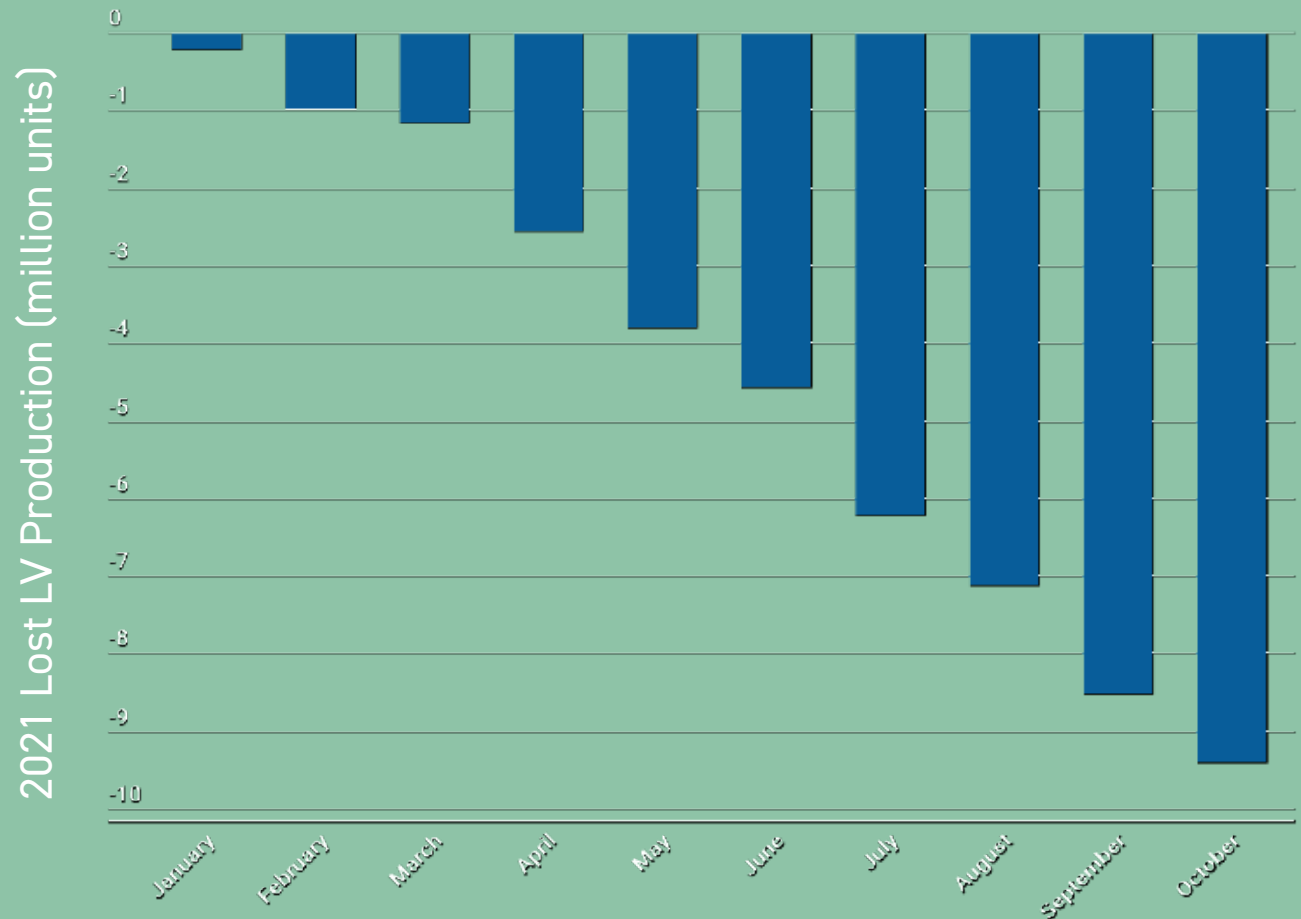
Along with shuttered assembly lines, the uncertainty in production planning is wreaking havoc in the supply chain, with suppliers and logistics providers uncertain of production schedules and supply levels; some have faced plant shutdowns and shift cancellations at very short notice.

Indeed, the escalating scale of the crisis has caught almost all OEMs and suppliers flat footed. Initially the impact on production was thought to be as little as 200,000 units globally for the whole of 2021. However, as the year has progressed, forecasters have consistently downgraded their outlook with the impact now standing around 10m units, according to AutoForecastSolutions – a volume impact comparable to the Covid crisis of 2020.

Production shortfalls and delays in delivery have led dealers and retailers to run down vehicle inventory, with available stocks falling to nearly record low levels in the US and Europe, and Asian markets also feeling the crunch. A lack of vehicle inventory has contributed to year-on-year declines in new vehicle sales in recent months even as underlying demand for personal mobility remains strong.

# Global Light Vehicle 2021 Production Losses from Chip Shortage

(Forecast Updated by Month)



Source: AutoForecastSolutions

# Tracking supply and material price rises

## Material impacts

While the chip shortage is the biggest headline, the industry is facing other upstream supply issues that could persist. There are shortages in commodities from leather and fabrics to steel and rubber, often because production has struggled to recover to pre-pandemic levels. Competing demand from other recovering industry verticals has also hurt automotive supply. Global surges in energy costs could even lead some smaller or niche suppliers to ration production. There are concerns of factory stoppages in China, for example, as the country tries to reduce coal consumption.

Material	Applications	Details	2020 to 2021 Price increase
Steel	Chassis, body panels, powertrain, engine, suspension.	Trade issues, tariffs and pandemic lockdowns have compounded production and impacted prices.	34% - 41% depending on grade of steel
Aluminium	Engine components, gearbox casings, body panels, wheels	Strong demand across various industries leading to rising prices.	62%
Copper	All electrical and electronic components	Strong demand for consumer electronics, computing, networking, and from global shift to electrical power grids and renewable energy	50%
Foam	Seating, sound absorption	Covid production shutdowns, combined with weather disruption at US-based petrochemical plants.	
Rubber	Tyres, hoses, seals	Covid disruption, floods and extreme weather compounded by demand shifting to PPE in the pandemic.	>100%
Leather	Seating, interior panels	Price rises of leather have accelerated the ethical shift away from leather to vegan and synthetic alternatives.	30%
Crude Oil	Lubricants, oils etc. Petrochemicals for paints, rubber, plastics & fabrics	In 2020, demand for crude oil plummeted, but as demand recovered, prices have increased.	70%

Source: Automotive from Ultima Media

## Frightful freight scenario

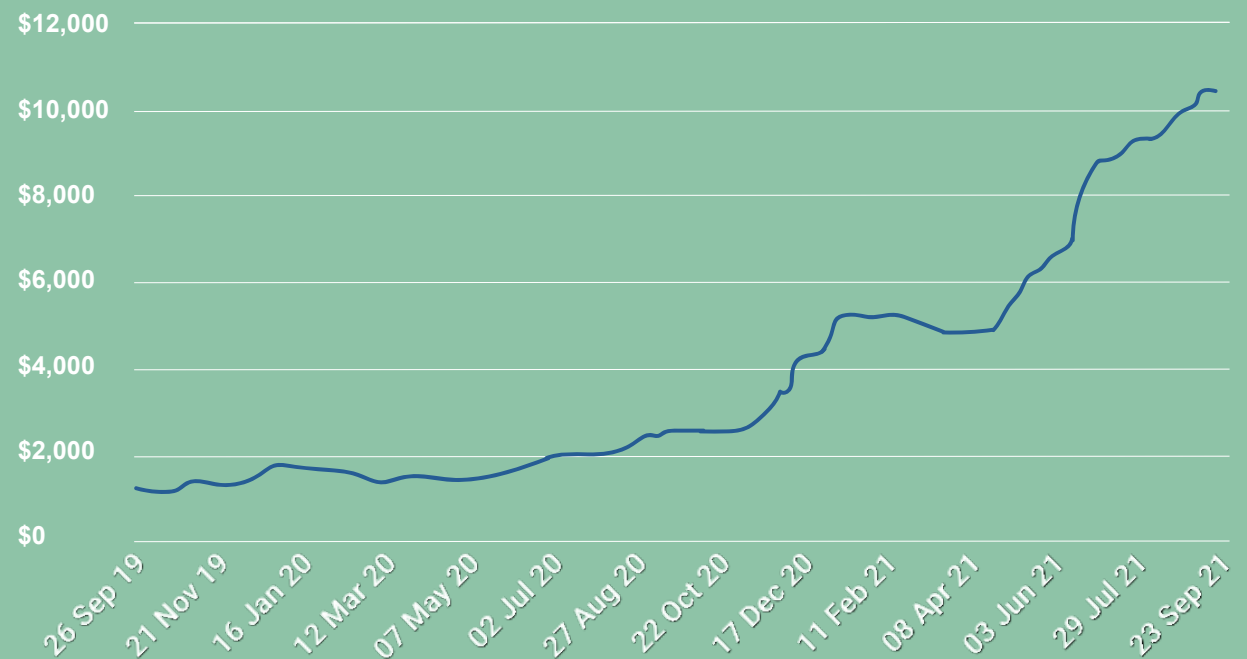
Logistics and freight services are facing significant capacity and cost issues, too. The pandemic and its aftermath resulted in a chaotic displacement of containers, while rebounding demand has strained shipping capacity, schedules and port operations. Covid-related shutdowns in ports, such as China's Shanghai and Ningbo, along with the logjam of vessels in the Suez Canal caused by the Evergreen container vessel *MV Ever Given*, compounded the headwinds in global container shipping.

Anchored container vessels have filled the coastal waters off the coasts of China and the west coast of the US. In autumn, for example, there were at times 70 or more container ships queued outside the port of Long Beach. Spot rates are as much as ten times higher than pre-pandemic, while on-time sailing performance has fallen to as low as 30%.

Other logistics and freight labour issues persist too, from a lack of warehouse and terminal staff to a critical shortage of truck drivers in many regions. In the UK, for example, the driver shortage has become so acute that some fuel stations have had to close because there are not enough drivers to deliver supplies.

# Drewry World container index September 2019 - September 2021 (\$ per 40ft container)

World Container Index -  
Assessed by Drewry \$ per 40ft Container



Source: Drewry

# 10m

Potential units lost in 2021 from chip crisis, similar to impacts from Covid lockdowns

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# 400%

Rise in container shipping price index year-on-year in September 2021

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# 5% → 20%

Rise in share of vehicle value for logistics costs in some cases

## Higher stakes in supply chain

The cost, lead time and revenue implications of these supply chain disruptions are stark, if not yet totally transparent. What is clear, however, is that logistics and supply chain costs have risen significantly as a share of overall product costs for many sectors, including automotive. According to Jean-François Salles, global vice-president of supply chain at Renault Group, international parts logistics costs have risen from less than 5% to as much as 20% of overall value in some cases. That will have lasting effects on purchasing, manufacturing and distribution decisions and is part of why Salles expects so much change.

“Supply chain activities are experiencing a revolution, getting to the heart of businesses as companies understand what is really at stake,” he told *Automotive Logistics*.

OEMs such as Renault have reacted by prioritising manufacturing locations or vehicles as well as to seek alternative sourcing. Manufacturers and logistics providers are furthermore updating IT systems and integrating cloud networks to capture and analyse price data, lead time, capacity, inventory and risks to give them flexibility to adjust logistics flows or transport modes quickly with partners, as well as to support long-term supplier, manufacturing and logistics decisions.

“Supply chain activities are experiencing a revolution, getting to the heart of businesses as companies understand what is really at stake”

**Jean-François Salles,**  
Renault Group



# Chapter 2

## Supply chain priorities

Automotive manufacturers are improving visibility to make quick changes in production and logistics



In the aftermath of component and logistics shortages, manufacturers have made quick adjustments in supply and production. To keep assembly lines running, carmakers dedicated factory and storage lots to unfinished vehicles waiting for delayed microchip subcomponents. In other cases, OEMs have removed digital features that required specific chips altogether. Nissan has made vehicles without navigation systems, for example, and Stellantis stopped offering the intelligent rear-view mirror monitor on the Ram 1500 and switched to analogue instrument dials on the Peugeot 308; several other OEMs eliminated stop-start features.

With stoppages to production a necessity, most carmakers have taken measures to produce the highest margin vehicles first, with GM, Ford and Stellantis prioritising SUVs and pickup trucks in the US over sedans, or Volkswagen and Renault focusing first on higher value vehicles and strategic electrified models.

# How OEMs are mitigating the chip crisis



## Prioritisation of higher-margin vehicles

OEMs are responding to chip shortages by focusing on value not volumes, prioritising higher margin SUVs, pickups and other premium vehicles.



## Longer contracts or paying in advance

OEMs such as Tesla are looking at ways to 'lock in supply' of semiconductors by paying in advance. This notably is a strategy that Apple uses, paying ahead by as much as 13 months for its chips.



## Using fewer semiconductors

OEMs are downgrading specifications or 'de-contenting' by removing non-critical ADAS systems or infotainment systems. Some brands are temporarily putting systems in place that will be retrofitted later.



## More vertical integration

OEMs are likely to exert more influence over the semiconductor value chain by taking more direct control of the contracts to secure supply. Because of the capex required to build a plant, some foundries are sharing build-out costs with customers in exchange for a long-term supply agreement. Tesla has stated that it might even build its own chip factory.

## Strengthening S&OP

To achieve such 'value over volume' decisions, OEMs and their suppliers need to overlay market and demand data with strong visibility of their own parts inventory, supplier pipelines and real-time goods in transit. Carmakers including Renault, Volvo Cars and Stellantis have emphasised increasing the frequency and quality of sales and operations planning (S&OP) forecasts, in which supply chain teams coordinate analysis across departments with a combination of data on capacity constraints, forecasts, cost and availability, including upstream, 'tier-n' suppliers.

Such analysis depends on strong IT and data systems internally at OEMs and across partners, including for logistics service providers to support real-time tracking and delivery updates. OEMs are integrating ERP and inventory management systems with GPS and telematics data for visibility on critical parts and potential disruptions.

Carmakers like Volkswagen, GM, Daimler and BMW are all deepening this connectivity across industrial cloud networks, sharing data across plants and increasingly supplier locations, with opportunities to leverage machine learning and artificial intelligence. Renault, for example, is collaborating in key areas of purchasing and logistics planning, while also working with technology start-ups to capture real-time data, as well as with Google to build a highly integrated data layer in the cloud.

Logistics providers play critical roles in integrating such visibility across the freight network, and thus supporting short-term adjustments and longer-term decisions. Maersk, for example, is providing automatic integration of vessel schedules into transport management, while coordinating mode selection and alternatives. The company's Accelerate product

can pinpoint a customer's material onboard a container ship in transit that may be running late and identify where it can be unloaded for a different transport mode or route at an upcoming port. It also supports diverting containers to alternative ports, such as using entry points in Mexico to serve the US at a time when west coast ports are congested.





# Maersk digital tools for ocean container shipping

There are two key ways to apply digital tools to container shipping, according to Maersk. One involves the management of vessel schedules and the other the organisation of the network. Customers can access active EDI notifications to understand where their freight is in the delivery process, but they can also see what could happen in the future and from where potential disruptions may arise. That is the focus of several key technology platforms from the global logistics giant.

Maersk's **NeoNav** platform combines a data with machine learning and artificial intelligence covering the full supply chain. Maersk has data connections to this platform that provide predictive analytics and tries to manage logistics on an exception-led basis.

Maersk also offers **Accelerate**, an on-vessel block storage strategy for quick discharge at port onto alternative modes, including by air, if a vessel is running late. It provides alternatives to having to duplicate missing inventory by speeding up what is already in transport, helping customers to avoid reordering new stock despite initial delays.

Maersk **TradeLens** is a digital platform set up with IBM in 2017. It uses blockchain technology and secure APIs with any customer system to provide secure exchange of shipping data across different parties in the logistics chain, making transport and delivery milestone visibility clearer. Maersk estimates that the value of global containerised freight is approximately \$12 trillion but manual document handling is slowing logistics and facilitation, reducing the potential by up to 15%. TradeLens can help to grow this revenue by digitalising that paper-based management.



**MAERSK**

# Chapter 3

## The case for building more stable supply chains

Lean inventory is a must to maintain cash flow, but automotive supply chains have room for strategic buffers



The semiconductor issue has brought to the fore questions about lean inventory management and just-in-time supply chains, both of which are critical features of automotive production and logistics. There have been calls for a wider shift from 'just-in-time' to 'just-in-case' inventory strategies. Toyota, renowned as the exemplar of lean and JIT, had fared better earlier in the crisis thanks in part to a more balanced approach to semiconductor planning – the carmaker didn't drastically cut orders last year and could better maintain supplies in the first half of 2021. Other factors played a role, too, especially the strength of the Japanese supply chain for chips and electronics.

However, the importance of free cash flow and capital requirements in the automotive industry means that inventory management strategies must be highly nuanced. Keeping high inventory

levels and emergency stocks would be unviable for all components because of the impact on the cashflow of the business of carrying unsold stock, as well as added costs of warehousing. However, there are examples of where it makes sense to build up extra stock.

In the case of semiconductors, there is currently limited scope to expand inventory buffers to address the issue. Chip orders for the automotive industry have order-to-delivery lead times of four to six months, many of which are now stretching even longer.

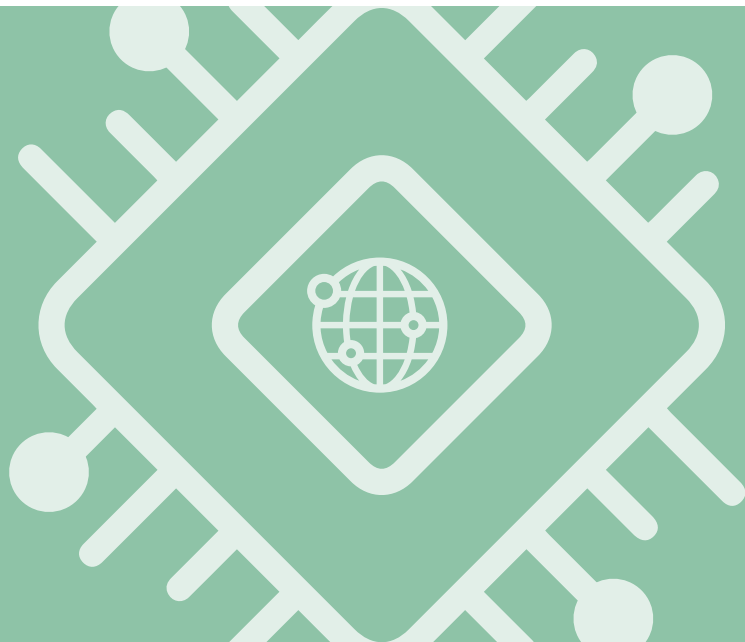
Orders themselves are also no guarantee. A lack of visibility amongst OEMs of the supply chain beyond tier one and two suppliers often means that even those who have had strong chip pipelines could still face issues upstream. OEMs that had more buffer earlier in the crisis –

including Toyota, Honda and Hyundai-Kia – have all since had to make drastic production cuts as well, not least after an issue at a Malaysian supplier impacted global chip output further.

Around 63% of global chip production is also based in Taiwan, and an even larger majority concentrated across Asia, which makes the world overly reliant on few locations.

All these factors point to reasons why, in future, OEMs are likely to take a different approach to inventory and buffer stock for such components. The first key step is knowing more about the risks lurking in each segment of their supply chains.

There is no one-size-fits-all solution to inventory management – but there are more options than many companies are using.



# 63%

## Taiwanese share of global chip production

## Multi-stream supply chains

According to Maersk's John Andrew Carmichael, the automotive industry could follow supply chain patterns more common in the fast-fashion industry, which often see logistics providers running two-stream delivery channels. In such a scenario, OEMs could run one supply chain for the delivery of standard parts, which follows lean inventory and just-in-time priorities, but another independent 'just-in-case' supply chain for the more dynamic next-day delivery of parts that make or break the assembly of the final product, such as semiconductors.

"Carmakers need to keep a stable supply chain going – one that is usually not subject to parts surges and is flowing continually – allowing focus on mitigating the more dynamic parts, such as microchips, and getting them out as fast as possible to recover production," he said.

This approach can work for parts that are small and low cost, and which can be easily stored and stockpiled to facilitate a much more efficient, dynamic and responsive supply chain resilient to supply shocks. Semiconductors, for example, are small and relatively low value (around 1% of the vehicle's value). Next-day deliveries can be reactions to an emergency, but they can also be a planned distribution flow for certain components.



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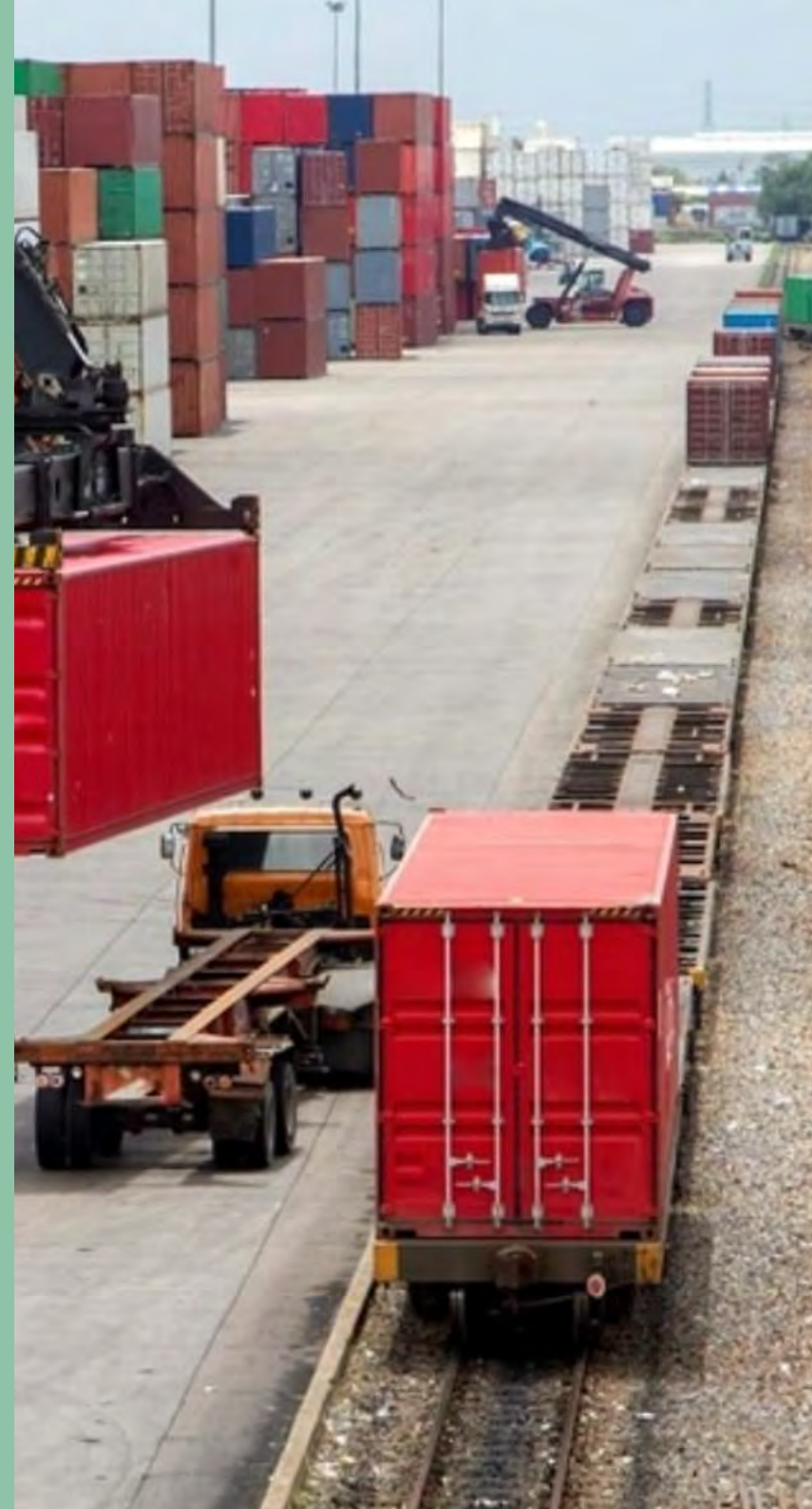
**John Andrew Carmichael, Maersk**



# Chapter 4

## Letting logistics take the lead

Working with LLPs can help OEMs and suppliers to better plan logistics networks and simplify supply chains, including by collaborating during the engineering of parts and vehicles



According to a McKinsey report, better integration across OEMs and suppliers could create up to €65 billion in value per year. Logistic providers can play a major role in achieving such value, notably in helping OEMs and suppliers to adjust to changing freight and logistics requirements, including strategic network and even product design.

Such integration with logistics providers is seldom found in the automotive industry. According to John Andrew Carmichael at Maersk, manufacturers in sectors like fast fashion and pharmaceutical tend to work more closely with logistics providers when developing products and planning distribution, while OEMs work more closely with suppliers.

“Within the automotive industry there has been very close collaboration between OEMs and tier ones on the manufacturing side, including co-creation and co-engineering of parts. But when we talk about logistics, I feel very little integration from that perspective,” he said.

There are opportunities to strengthen those links with logistics providers’ intelligence and data to develop a more accurate view of complete supply chain and logistics services.

Using a lead logistics provider (LLP) in supply chain design can help to leverage synergies across common suppliers and customers. For example, Maersk has common customers

across the battery supply chain, including cell maker CATL, which supplies Maersk customers Tesla and BMW. The logistics company has the opportunity to organise and combine common cargo and routes across this supply chain.

Integrating LLPs into the S&OP process would also keep stakeholders better informed about production and supply planning, while logistics experts could further influence shipping needs. For example, depending on part engineering and manufacturing processes, requirements for inventory levels, packaging and transport vary. If manufacturers worked together with logistics providers earlier in the process, it would help them to understand and plan such operations.

At Renault, Jean-François Salles suggests supply chain visibility can help influence where to reduce product complexity and lead time from the supply chain. “The less complexity and diversity in a product, the more confidence we can have to supply without having high stock of parts in our flows,” Salles told *Automotive Logistics*.

There are further opportunities for automotive manufacturers and suppliers to turn to logistics provider for more managed supply chain service, for example through an LLP that helps coordinate with suppliers and carriers across multimodal transport networks. In this approach, providers increasingly take on more of a strategic role in supply chain management.

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**Jean-François Salles,**  
Renault Group

Maersk has established an **Integrator Strategy**, in which it uses its multimodal assets to provide end-to-end logistics services with flexible multimodal shipment options for customers. In doing so, Maersk can mitigate disruption by:

- **Switching between alternative logistics modes to offer quicker transit times and greater predictability**
- **Dividing larger shipments of critical components into smaller loads across a variety of transport modes to increase the chance that at least some will get through if there is widespread disruption**
- **Taking on more responsibility around contingency planning and executing contingency services by being closer to OEM and supplier logistics planning**
- **Supporting supply chain synergies across OEMs and their different suppliers, i.e. optimising logistics between battery cell suppliers and different carmakers**
- **Establishing longer-term partnerships and commercial agreements to reflect the needs of delivering cargo on time at a predictable cost**

# Chapter 5

## Zero emission disruption

Manufacturers need to prepare logistics for changes in EV, battery and sustainable supply chains



The current disruption in the automotive sector is extreme and hard to predict. The semiconductor shortage has repercussions across goods and commodities, from high tech to metal prices. However, the situation is likely to ease, eventually. Volatile markets also mean that high commodity prices could also reverse – even suddenly. The chaos in container shipping, meanwhile, should see some correction over the next year.

However, an increasingly complex supply chain means that disruptions are likely to be the only constant. The rise in vehicle electrification, and the huge growth and investment in battery production and supply chains, meanwhile, already point to potential bottlenecks and supply issues.

EV production is set to ramp up in volume by around 20% per year over the next 10-15 years. With most of today's lithium-ion battery supply chain concentrated in Asia, manufacturers are investing heavily to build regional gigafactories and develop suppliers for lithium-ion battery production, the core component of EV manufacturing.

There is risk that supply will fail to keep up. That could range from shortages in key ingredients, such as lithium or manganese, to challenges in the transport and storage of batteries. Specialised warehousing for lithium-ion battery storage represents a significant investment, for example, and is currently in short supply. Recycling facilities for batteries and materials are also underdeveloped in Europe and the US.

A failure to keep up with demand could see more production shortages. Germany's Centre for Automotive Research (CAR) estimates that potential battery cell shortages could result in manufacturing 'losses' of 18.7m EVs over the 2022-2029 timeframe.

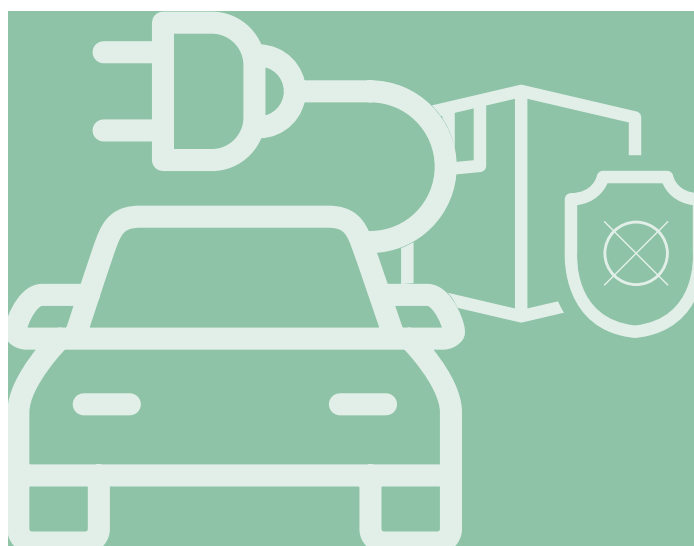
There are other disruptions on the horizon, too. OEMs have ambitions to reduce supply chain and logistics emissions, which will depend not only on efficient networks but on availability of alternative fuels and low-emission technology. Such transitions will require significant capital investment, another factor which could contribute to higher overall logistics and supply chain costs.

As investment in the battery supply chain continues apace, manufacturers will require close coordination with logistics providers. OEMs could address the storage issue with multiuser warehouses, for example, removing the need for each carmaker to build its own facilities (and reducing carbon footprints at the same time).

## Sustainable partnerships

Collaboration will also be required for investment in sustainable logistics. It's unlikely that any one logistics provider can make such transitions alone and will require partnership both with other players on technology as well as with OEMs on integrating new equipment. That is why carmakers such as BMW are already running pilots of full electric trucks for inbound and outbound vehicles, or why Toyota is trialling hydrogen-powered equipment in port terminals.

Supply chain engineering teams need the right intelligence and data on alternative locations for where best to place facilities to avoid disruption and delay; that will also be the case for battery manufacturing. Those companies who work hand-in-glove with logistics firms upfront will have the best opportunity to design supply, storage and transport networks that minimise delays from inefficiency or regulatory hurdles.



**18.7m**  
**Number of EVs at risk from supply issues in 2022-2029**

# Chapter 6

## Building the supply chain forward

Maersk's John Andrew Carmichael thinks that, with the right partnership, LLPs can take a lead in integrating freight, adjusting routes and reducing risk





# John Andrew Carmichael, director and global head of automotive, Maersk

**John Andrew Carmichael has worked at Maersk for more than 14 years, with experience in operations in Central and South America, as well as Europe. For the last three years he has been focused on the automotive vertical at Maersk, becoming director and global head of automotive at the beginning of 2019.**

# Q&A

## **What is Maersk doing to support its automotive customers through a period of critical disruptions?**

At the moment, our key focus is on supporting customers to get the reliability they need, or as close to it, and to fulfil the commitments we have to them to serve their factories on time. This involves finding ways through congested shipping lanes and trying to find alternative capacity but also building visibility around where customer parts are, and where their containers are in the supply chain at any one moment so they can make the best decisions for their supply chain at that point in time.

At the end of the day, we are trying to avoid bottlenecks by using allocation and diverse methods of getting cargo to different parts of the world that can potentially help mitigate some of the disruption we are facing.

## **How do you see the situation developing over the next three years?**

At the beginning of this year there were forecasts that it would ease off in 2021 but there have been a few curve balls thrown at us, including more Covid closures. It has been

a classic combination of the bullwhip effect of supply chains running out of stock and then rushing back to replenish, combined with external factors that are not normal in any other point in time.

We see in China the closures of ports because of just one Covid case. We see congestion in west coast US ports at record levels. It is not decreasing in complexity in the short term.

From a transportation perspective we do expect to have strong demand through 2022 if not longer.

## **With that expectation, what has Maersk put in place to mitigate disruptions to its services and to its automotive customers?**

We have several initiatives at an operational but also at a product level to try and mitigate these challenges. Part of what we want to do at Maersk is combine our controlled asset network with cutting edge technology and our global capabilities to offer solutions that get the most out of our customers' supply chains.

One initiative is fixing the schedule reliability and ensuring the vessels are on time as

frequently as possible. That is one of the core elements that our operations team are constantly working very hard on.

There are constraints to what we can do there, so we go into other solutions. That can include multimodal transportation; Asia into Europe is a good example. By having control of the assets, we can make decision points very close to departure on whether our customers want to use ocean or trans-Siberian rail. Or if they want to combine air and sea modes through the Middle East, for example. That can help mitigate some of the variability that we are seeing in the market today.

The last is trying to find alternate ways of getting cargo to congested areas. We are working with some customers on doing transloads through Mexico to the US Midwest, which allows bypassing some of the congestion we see in the LA/Long Beach area, while still providing some level of reliability.

It is a combination of things from a structural company perspective but also in products and services, tending to new ways of managing the supply chain.



# Q&A

## **Do you see OEMs or tier suppliers more in need of these services?**

We are seeing the relevance across all groups. I think the key difference is that OEMs, especially the larger ones, are still thinking of doing more inhouse and then collaborating on certain parts of the supply chain. With the tier ones we see more interest in cooperation but the smaller suppliers are feeling the pain more because some lack the expertise and may have smaller supply chain teams and are not big enough to handle the disruption we see today. So, tier one and smarter component manufacturers are definitely interested in this.

## **How will that help deal with the next major disruption and what is that likely to be for the automotive industry?**

If we talk disruption as not just a break in the supply chain but for the industry in general, then the electric vehicle drive and the fact that barriers to entry will decrease over time is the next big disruptor. We are seeing it with the amount of EV start-ups that have come along over the last ten years, with actual credible products to be sold.

The question is how will the changes in the manufacturing of cars change the way supply chains are structured in the long term? Will you really have manufacturing and assembly so spread out globally or will there be more consolidation with CKD/SKD [complete or semi-knockdown kits] being done at the locations? That is another angle for future supply chain design.

## **What do you see as the most important steps to make the automotive supply chain more resilient over the next three years?**

I firmly believe that integration and collaboration are the key things that need to happen between LLPs and the automotive industry in general. Keeping at arms distance is detrimental to the value that can be created. That is where we as a company come in with controlled assets, data and technology, and with capabilities in the organisation to harness that collaboration.

Another important focus is that the logistics cadence is very much linked to the production cadence. As you need it just-in-time, you send the signal to get the parts delivered,

but while schedule reliability is so wild and disruption is high, you need to delink that a bit more. For example, you can build forward locations of inventory that help serve and cover disruption in several places instead of depending on the point of origin and freight from origin to destination because there is no other alternative. The network needs to be redesigned to provide more forward locations and use multimodal service providers who can shift that on the fly.

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**John Andrew Carmichael, Maersk**



## Conclusion: Lessons for the 'never normal'

Whether from extreme weather, trade wars, the Covid-19 pandemic, the current semiconductor shortage, financial worries in China or potential future battery shortages, OEMs can expect supply chains in a nearly constant or potential state of disruption. As Renault's Jean-François Salles terms it, the new normal is becoming the 'never normal'.

In such a situation, manufacturers are working on an almost constant 'war room' footing. Internally, supply chain teams are coordinating information across manufacturing, purchasing, marketing and sales, and integrating it across S&OP systems and processes, to help board members and executives make the best decisions.

The single most powerful tool is supplier and freight visibility – but it does not come from a single source or system. Manufacturers and logistics providers must work across control towers, GPS, telematics, tracking tools, transport management systems, cloud networks and data analytics – and sometimes even text and phone calls, or even more analogue processes – to integrate data in as close to real time as possible. Current disruption is accelerating the pace and priority of such approaches.

With schedule reliability in such a wild state, coordinated visibility can help OEMs transition a small, but critical number of parts from just-in-time delivery to just-in-case, including

the building up of inventory and distribution through multiple channels and locations to help cover flash points of disruption. Instead of depending on the freight from point of origin to destination, parts supply should be organised on a chain of intermediary nodes that are able to store and redirect inventory to plants facing shortages, all of it based on updated and constantly shared data.

Longer term, data analytics and optimisation should further help OEMs to make better decisions on maintaining stable logistics and supply networks. Closer logistics partnership can also help to mitigate capacity issues. The spike in container shipping spot rates, for example, demonstrates the importance

of securing capacity and 'locking in' shipping prices over the longer term to hedge against price volatility. More OEMs from the Renault-Nissan-Mitsubishi Alliance to General Motors are exploring longer-term contracts with shipping companies to mitigate against capacity constraints.

To achieve this level of combined visibility, flexibility and capacity planning, integration with logistics providers is key, as they bring not only transport assets and control towers, but also logistics engineering and data capabilities that can help manufacturers react faster and plan more efficient supply chain networks.

OEMs and logistics providers have little control over the events that disrupt their networks, but by implementing forward-looking supply chain strategies that learn from previous experience and other industries, they can mitigate against the worst effects of those unforeseen events.

# Logistics risk mitigation strategies



## Sales and operations planning

OEMs are using more frequent sales and operations planning (S&OP) to better align volatile production and capacity constraints. Effective S&OP helps manage fluctuating demand characteristics to maximise output given limited components and supply chains constraints.



## Alternative transport mode and routes

OEMs are increasingly exploring having multiple logistics options for distribution, including moving key commodities by alternatives to sea freight – whether via rail from Asia to Europe, air freight, or combining sea with air or rail to avoid congested ports.



## Real-time visibility

OEMs and logistics providers are combining tracking devices, GPS and telematics with control towers and transport management systems to improve visibility. Cloud-based systems can integrate predictive data analytics for freight and supplier inventory management, helping to optimise supply chain efficiency and build resilience.



## Lead logistics providers

Integrated freight and logistics management is helping manufacturers to make changes to supply chains across transport modes, including expediting critical inventory, and engineering more efficient loading and routes.

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## **Automotive Logistics, Ultima Media Ltd**

401 King Street  
Hammersmith  
London, W6 9NJ  
United Kingdom  
[www.automotivelogistics.media](http://www.automotivelogistics.media)  
+44 (0) 20 8987 0900

## **AP Møller-Maersk AS**

Esplanaden 50  
1098 Copenhagen K  
Denmark  
[maersk.com/industry-sectors/automotive](http://maersk.com/industry-sectors/automotive)  
+45 3363 3363

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## **Christopher Ludwig**

Editor-in-Chief, **Ultima Media**  
[christopher.ludwig@ultimamedia.com](mailto:christopher.ludwig@ultimamedia.com)

## **Marcus Williams**

Senior Content Producer, **Ultima Media**  
[marcus.williams@automotivelogistics.media](mailto:marcus.williams@automotivelogistics.media)

## **Daniel Harrison**

Automotive Analyst, **Ultima Media**  
[daniel.harrison@ultimamedia.com](mailto:daniel.harrison@ultimamedia.com)

## **Gemma Wood**

Digital designer, **Ultima Media**  
[gemma.wood@ultimamedia.com](mailto:gemma.wood@ultimamedia.com)

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