

Automotive World MAGAZINE

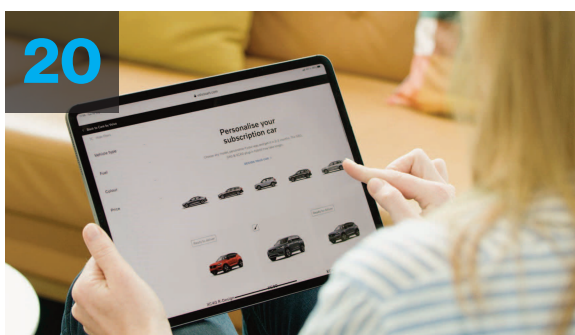
Issue 22 | October 2021



The cost of
future mobility:
ZF CEO weighs in
on key challenges

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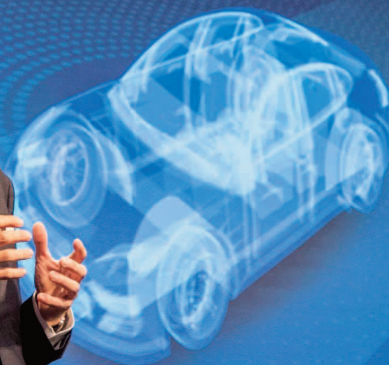
Anmol Mothy

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Cover image courtesy of ZF

ZF Modular eDrive Kit

Up to **50%** reduction of
development times for new e-drives



Next
Generation
Mobility
NOW

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The cost of future mobility: ZF CEO weighs in on key challenges

Megan Lampinen catches up with Wolf-Henning Scheider at IAA Mobility 2021

Today's mobility companies are investing heavily in technology that will enable an ecosystem of connected, autonomous, shared and electric (CASE) transport. Many of these visions are currently on display at IAA Mobility 2021, which promotes itself as the new face of European auto shows. ZF is just one of many incumbents exhibiting at the event and betting heavily on a CASE future.

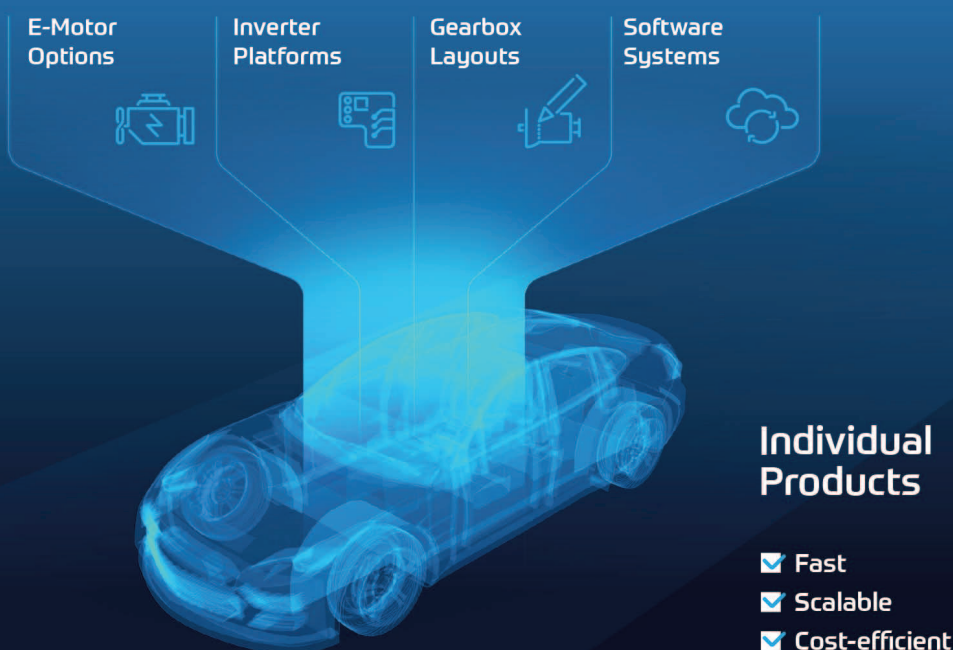
Pay to play

But that doesn't come cheap. Back at CES 2019, ZF said it would invest €12bn (US\$14.2bn) over the coming five years in electromobility and autonomy. Speaking at a media event on the sidelines of IAA,

Chief Executive Wolf-Henning Scheider confirms that "a big portion of that has been invested already." Hefty financial outlays like this are simply the ticket to play in the quest for future mobility, and they may not pay off for some time. AlixPartners has described the coming period as a 'profit desert' as companies enter a lower return environment. ZF is also feeling the pinch.

"It's a stretch," Scheider tells *Automotive World*. "A few years ago we disclosed the huge number of additional investments we would be rolling out and we are now in the midst of that. Our R&D figures are at their highest levels ever. That obviously is a stress on our balance sheet bottom line." R&D expenditure in absolute figures for the first half of

ZF Modular eDrive Kit



© ZF



IAA reflects the industry's new focus on mobility innovation as opposed to strictly product line-up

2021 rose 21% year-on-year to nearly €1.5bn. In terms of R&D as a percentage of sales, however, that slipped from 9% in H1 2020 to 7.6% this year.

Uncertainties

On the whole, Scheider believes that ZF is “managing quite well” financially and is “on the road” towards a “challenging but exciting” future. At the moment, this is also an uncertain future. In addition to disruptive mobility trends like electrification and automation,

companies now have to contend with such global challenges as the COVID-19 pandemic and the climate crisis. “The biggest concern now is in the number of uncertainties we face,” Scheider tells *Automotive World*. “We haven’t seen this sort of accumulation of uncertainties in the three decades that I’ve been in the industry.”

In addition to the issues mentioned above, he points specifically to Europe’s tightening CO2 regulations. “In Europe, we have some of the toughest CO2 regulations in the world. As you can clearly see here at

the show, the industry is in the middle of the transformation into e-mobility,” says Scheider. There is a long list of electric model debuts at this year’s show, including Audi’s Grandsphere concept, an electric concept of the Mercedes-Benz G-Class, the new Limo electric sedan from Renault Group’s Mobilize unit, the UrbanRebel from SEAT’s Cupra and a near-production version of VW’s ID.5 GTX. From ZF there is the Modular eDrive Kit, which brings together the expertise of its e-mobility team into systems solutions,

exhibitors at IAA have been keen to present how they intend to meet or exceed the aims of the Paris Climate Agreement. ZF bundles these under its Green Power Roadmap, which targets climate neutrality by 2040. Interim targets include an 80% CO2 reduction at all ZF locations by 2030, compared to a 2019 baseline. With a look at the wider supply chain and the use phase of its products, ZF is targeting a 40% cut in Scope 3 emissions by 2030. Scope 3 refers to indirect emissions that occur in a company’s value chain, outside of

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We haven’t seen this sort of accumulation of uncertainties in the three decades that I’ve been in the industry

components and software control in a flexible platform. Notably, all new e-drives of the Kit promise improvements in power density, weight, and efficiency. On top of that, ZF claims to slash development times for new e-drives by up to 50%.

But not all eco-projects are battery related. There is a strong industry-wide push to clean up manufacturing operations, and most of the

what it produces directly from controlled sources and the generation of heating, cooling, electricity, etc.

Supply chain

Established supply chain management and strategy has come under the spotlight in the wake of the global semiconductor shortage.

ZF is investing heavily in technology that will enable an ecosystem of connected, autonomous, shared and electric mobility



GlobalData estimates that the automotive industry has taken a US\$100bn hit so far this year in lost production and revenue due to a lack of necessary chips, while IHS Markit predicts that the shortage will cut 7.1 million vehicles from the production schedule this year. “We have also felt some impact from the global shortage in semiconductors,” says Scheider. “This comes in two forms. There is a minor area where ZF is directly

affected, in that we didn’t receive what we ordered. That hits our electronics products. The other impact is if customers shut down their plants and they do not order any products from ZF.”

He expects the shortage to run through the course of 2021 and possibly into 2022, though next year should not be as severely hit, adding: “2022 is not yet fully secured, but

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Our R&D figures are at their highest levels ever. That obviously is a stress on our balance sheet bottom line

perhaps at the end of next year we can expect relief.” Meanwhile, there could be scope for some deeper adjustments in industry supply chain strategy. “The situation we face now has kicked off some critical reviews of the overall supply chain, though it is too early to draw conclusions today,” says Scheider. “This needs a very thorough review with our partners and customers to check how we can best balance that out further, how we can develop measures to prevent such a situation in the coming years.”

Sourcing strategy will also be impacted by geopolitical developments, resulting already in moves to a more regional setup at ZF. “Long-term supply chains with ocean containers will not be the primary way of working in the future,” he predicts. “It will not disappear but more regional supply chains are the way we are headed. This makes us more independent of any obstacles like COVID, flooding, or what happened with the blockage of the Suez Canal. It also allows us to be more agile in response to customer demand.”

Full steam ahead

As concepts of mobility evolve, the way in which automakers and suppliers work together is also evolving. Traditional definitions like Tier 1 no longer fit for some, and many are referring to themselves as a Tier 0.5 supplier, reflecting the closer development relationship with the automaker. “Looking ahead, we see our role remaining stable as a Tier 1 or Tier 0.5 supplier, providing customers with the technical pieces they need for future mobility,” Scheider says. That covers everything from passenger cars and heavy trucks to e-bikes and autonomous shuttles. “This role as tech enabler is one that we know best and where we have a good, unique selling point,” he reiterates.

From this base, Scheider is braced for the possibility of “extremely challenging” times, but the message is that corporate growth will remain ahead of the industry average. The CEO expresses confidence that ZF will “lead in e-mobility and automated driving, full steam ahead.”

Could tokenisation open up opportunities in MaaS?

The blockchain technology could create incentives for users to adopt greener habits, argues one start-up. By Xavier Boucherat



By now, automakers will be familiar with cryptocurrency and coins, such as bitcoin. However, recent years have seen the rise of a second blockchain-derived digital asset. 'Tokens' are sometimes used interchangeably with coins, but there are key differences. Coins are native to their own blockchain—for example, Ether exists on the Ethereum blockchain—and are generally used in the same way that fiat currencies such as the US dollar are.



By contrast, tokens can be created on any compatible network with relatively little expertise required, and are primarily for use within decentralised applications (dApps). For example, tokens may make certain features or rewards available on an app. Free tokens are typically available to those users who agree things which the app is trying to incentivise: for example, watching an advert.

Now one company believes the same power to incentivise behaviours can be used to help clean up mobility. MobiFi is a blockchain-powered

mobility as a service (MaaS) provider which hopes to encourage people to ditch their private vehicles through use of more sustainable transport modes. The company's system proposes two tokens which could help tackle a number of challenges in the MaaS market.

Points mean prizes

First is sustainability. The challenges of road traffic, safety, urbanisation and pollution are common to many cities and transport authorities, and MaaS has the potential to improve

these through shared transport. But convincing commuters and other city denizens to leave their cars at home is proving a phenomenally difficult task, particularly in areas where public transport is not reliable.

Token incentives could help turn the tide. MobiFi's platform gives each user a wallet that can be filled using a regular currency. Funds can then be converted into SMile tokens, which can be used to book and pay for mobility services. However, users can earn free tokens by adopting eco-friendly travel modes and habits. What's more, these tokens can be exchanged for a second type of token: MoFi tokens.

Jores Merlo is Business Development, MobiFi. As he explains, SMile tokens are backed by real currencies such that they are not affected by the volatile cryptocurrency market. By contrast, MoFi tokens can be used to invest in cryptocurrencies and other decentralised finance (DeFi) services, allowing them to earn interest: another incentive, this one geared towards the burgeoning crypto-enthusiast crowd.

"The difference between paying with a token and with paying with a debit or credit card is that with tokenisation, we can incentivise people to behave in specific ways, such as booking an e-scooter," he says. Another benefit is that with people's personal information much less likely to be compromised on a blockchain network.

Meanwhile, compared with traditional travel cards, tokens can offer users more flexibility. "Consider Oyster Cards used by Transport for London (TfL): when people top up their Oyster, they cannot turn that



Tokens and cryptocurrency incentives could encourage people to choose sustainable options in a MaaS ecosystem

back into money. They have to spend it within the TfL network, and this can be an issue for occasional travellers. There are billions of dollars locked up in these cards around the world. With tokens, people will be able to top up their wallet and avoid having their money locked up, as they can use it on a variety of services including e-bikes, ride-hailing and more, whilst MoFi users can turn to DeFi services."

Put it in neutral

But along with sustainability, another issue which tokens could help tackle is that of neutrality in the MaaS segment. As Merlo explains, a problem with today's MaaS ecosystem is that companies cannot safely join it without risking the loss of private customer data to competitors. The many different mobility services are therefore effectively siloed.

"To solve this issue," he says, "MobiFi introduces blockchain's Distributed Ledger Technology (DLT) to foster trust between actors, permitting data-

sharing and access. This will allow people to travel from point A to B using the likes of Uber, Dott or TfL, from one single place: in this case, our platform.”

It also solves the issue of the massive transaction costs charged by middlemen used by mobility service companies. “For instance, whenever a traveller makes a payment for an Uber ride, Uber has to pay a fee ranging

growing market of cryptocurrency and token users, says Merlo. Smaller mobility companies can also gain additional exposure from the platform, and eco-friendly services—such as electromobility and public transport—can foster loyalty with their customers, who are now rewarded for using their services in lieu of less sustainable services, and thus more likely to carry on using them.

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MobiFi introduces blockchain’s Distributed Ledger Technology (DLT) to foster trust between actors, permitting data-sharing and access

from 0.5% to 5% to their payment provider, such as a bank or card company. Uber paid around US\$750m in card processing fees in 2017.” Token payments and DLT could remove the middleman from the payment process, allowing significant savings and improved safety thanks to the blockchain.

As such, there are benefits on offer for service providers too. Others include the opportunity to tap into the

Just how big the opportunity is to engage with cryptocurrency and token users remains to be seen, and there is no doubt that these are early days for the technology within the mobility segment. MobiFi hopes to begin testing two proofs of concept in the Netherlands towards the end of this year, meaning its potential to streamline a highly fragmented market will become clearer in time.

3D printing breakthrough unlocks ‘industrial renaissance’ for solid-state batteries

Sakuu has developed an additive manufacturing platform that could revolutionise battery production for EVs. By Megan Lampinen



Sakuu Corporation has developed a multi-material, multi-process 3D printing platform that could potentially revolutionise the electric vehicle (EV) market. The Sakuu AM Platform allows for the production of completely different materials in a single layer, meaning it could be used for complex devices like solid-state batteries (SSBs) for EVs. Many industry players believe that SSBs could kick-start EV uptake, but these batteries have historically been difficult to make. This is the initial

focus area for the company and the KeraCel SSB is its first product.

“The battery is the most difficult thing to print,” says Sakuu Founder and Chief Executive Robert Bagheri. “If you can print that, you can print anything.” The platform has attracted interest from manufacturers of EVs, electric motors and IoT sensors. “Our vision was to develop an additive manufacturing platform that would enable our customers to build any product that they could dream of,” he tells *Automotive World*.

An industrial renaissance

The platform, which Sakuu describes as ‘an industrial renaissance’, reduces hundreds of production steps to just a couple. It is unique in that it can process metal, ceramic

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The battery is the most difficult thing to print. If you can print that, you can print anything

and polymer all within the same layer with the same tooling. “One of the big challenges in building something active is bringing multiple materials into the machine,” explains Bagheri. “There really isn’t anyone that directly competes with us. Other players might claim to be multi-material but what they mean is multi-materials of a certain metal.”

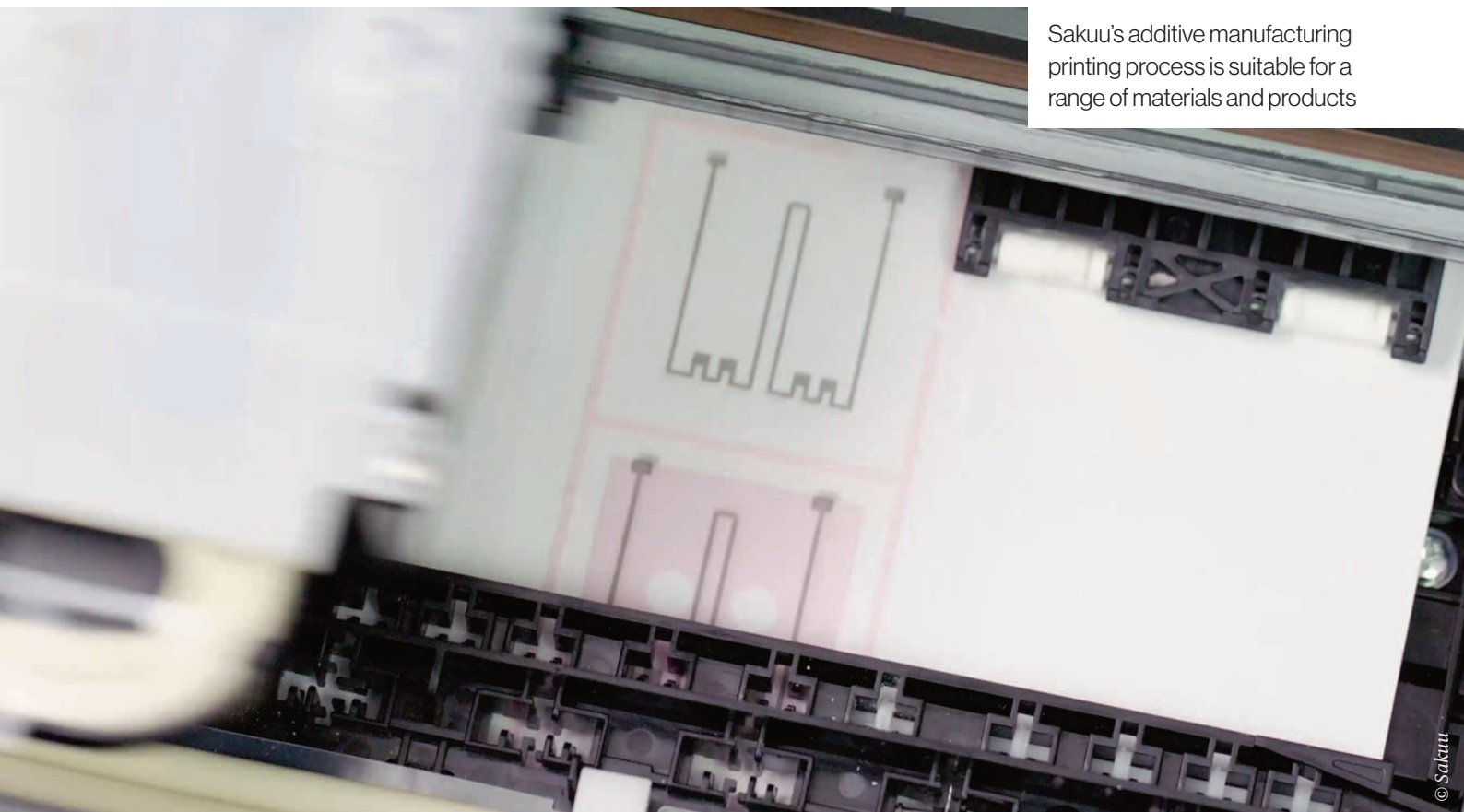
Sakuu claims to have more than 100 trade secrets behind that achievement, one of which is a proprietary material called PoraLyte. Without giving too much away, Bagheri says that PoraLyte is one of the materials used in the printing process. When the product enters the sintering oven, it is subject to very

high temperatures above 1,200 degrees Celsius. During this time PoraLyte evaporates and leaves behind the features, structure and space required for those devices that have internal channels and cavities.

Among other innovations Bagheri flags built-in robotics and intelligence, which allow for in-line quality control to be performed at every layer. Notably, users can bring to the platform whatever method or process they need, such as laser, binder jetting, material jetting or ink jetting. “In most cases you need at least two to three materials or two to three processes to build something active, like a battery, a sensor, an electric motor,” he adds.

Many 3D printing platforms today are designed primarily for prototype work, but Sakuu’s can handle mass production. It is also flexible, and can produce one type of product in the morning before switching to a completely different one in the afternoon.

The approach is much faster than most traditional manufacturing techniques—a Sakuu video shows the printing of a microreactor that takes just a couple of hours as opposed to the usual 14 to 16 weeks. For SSBs, it is about 40% faster than the traditional roll-to-roll manufacturing method. It is also sustainable. “We start everything with powder and eventually it goes back to powder, so it’s very clean technology,” Bagheri explains. “There is no toxic material used that needs to be thrown in the landfill.” Recycling of its SSB is dramatically streamlined, and Sakuu claims it can recycle up to 90% of what goes into the battery at the end of its life.



Sakuu's additive manufacturing printing process is suitable for a range of materials and products

Because Sakuu's platform can produce an entire product as opposed to just a part of it, the supply chain is simplified. "The platform allows our customers to locally procure their raw material and go right to product," he confirms. "They do not have to build a part, a piece of metal and a piece of something else. The assembly and everything is in the platform. That is a major difference from what everybody else is offering."

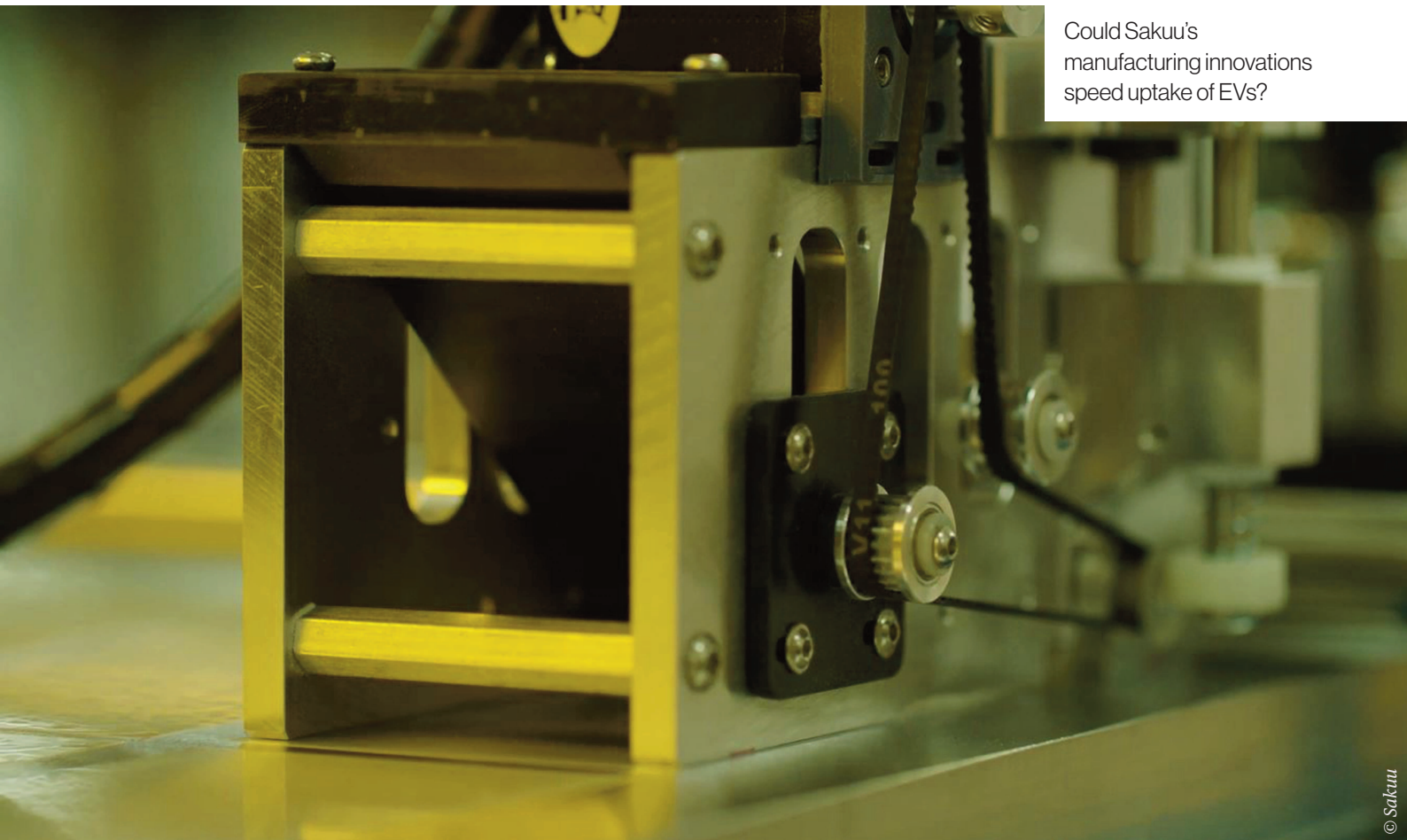
A new take on solid-state

In the case of SSB cells, Sakuu is promising to deliver a battery that is 50% smaller than today's lithium-ion cells but with the same energy density. It is also up to one-third lighter and uses between 30% and 50% fewer materials. "The current batteries, such as the 18650, have to use a lot of metal casing and materials

for packaging. That's for safety reasons and protection," he notes. Sakuu doesn't.

One of the fundamental safety issues stems from the liquid electrolyte or flammable material used as a separator material. Sakuu's SSB doesn't use liquid and is very heat resistant. That helps significantly reduce the protective packaging required. For a two-wheeler EV, the battery pack size can be reduced by nearly 60%. "That is because of the way we construct it," he says. "We can also build it any shape, any size, and you can imagine how efficient the pack would be."

Most SSB developers today use the roll-to-roll method in which layers of material are laminated and hot pressed, but that doesn't work very well for something like a solid electrolyte, or specifically a ceramic electrolyte like Sakuu's. That's



Could Sakuu's manufacturing innovations speed uptake of EVs?

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One of the big challenges in building something active is bringing multiple materials into the machine

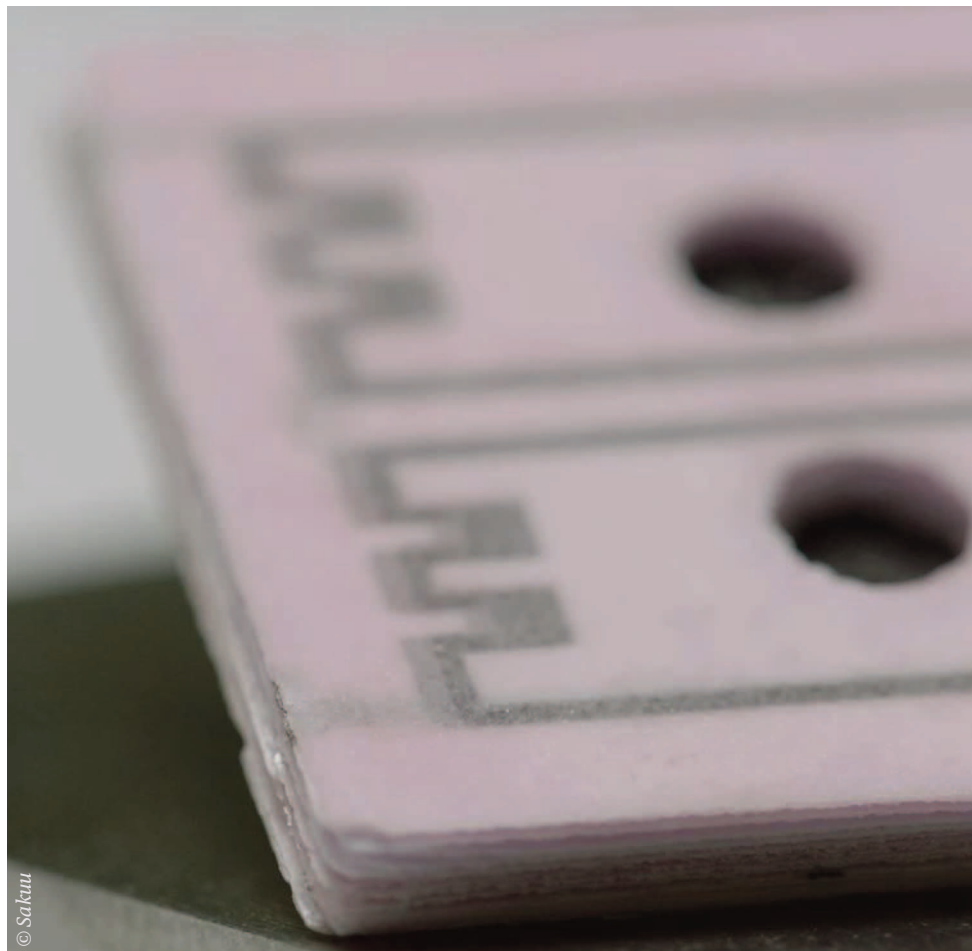
because these must be made very thin to get the right performance. “If you make it thin, it will be brittle and break. You get very low energy and not very good contact. Yield is very low. Many people have tried for more than a decade to build SSB in this method. It doesn’t work,” Bagheri says.

The biggest challenge in perfecting its proprietary method has been the material set. Sakuu is the only company that has built a solid electrolyte with a separator measuring under 30 microns thick. QuantumScape, generally regarded as an SSB front-runner, recently showed off a 50 micron separator. Sakuu believes, based on its analysis, that this simply isn’t thin enough to achieve energy density greater than 1,000 watt-hours/litre.

“We spent the first two years of the company just developing the material set for the battery. The biggest difficulty is the LLZO material itself,” he says. “You can get the best performance out of LLZO if you can make it work, but it’s very difficult to work with. Traditional methods are not suitable.” Exactly how Sakuu finally solved this remains a trade secret. Sakuu is also claiming significant cost advantages. Bagheri says a 1-gigawatt hour per year factory has an estimated 30% battery cost reduction if using the Sakuu Platform, while a 10-gigawatt hour per year factory offers a 40% cost reduction.

Accelerating electromobility

Sakuu believes that SSBs are the Holy Grail of EV propulsion and that its method of producing them will usher in the electromobility era. On the EV side it has already secured its first customer: Japanese automotive and motorcycle parts supplier Musashi Seimitsu. Under a US\$1bn letter of intent Sakuu will provide SSBs for 2.5 million motorcycles over the next seven years. “That’s a very reachable goal. We’re not talking about going to Mars to achieve that,” notes Bagheri. Sakuu has also been approached by players in other industries and has letters of intent with firms in biotech, wireless infrastructure, military and aerospace. “We have a big funnel of customers in all technology and market segments, and everybody has come to us, it’s not us going to them.”

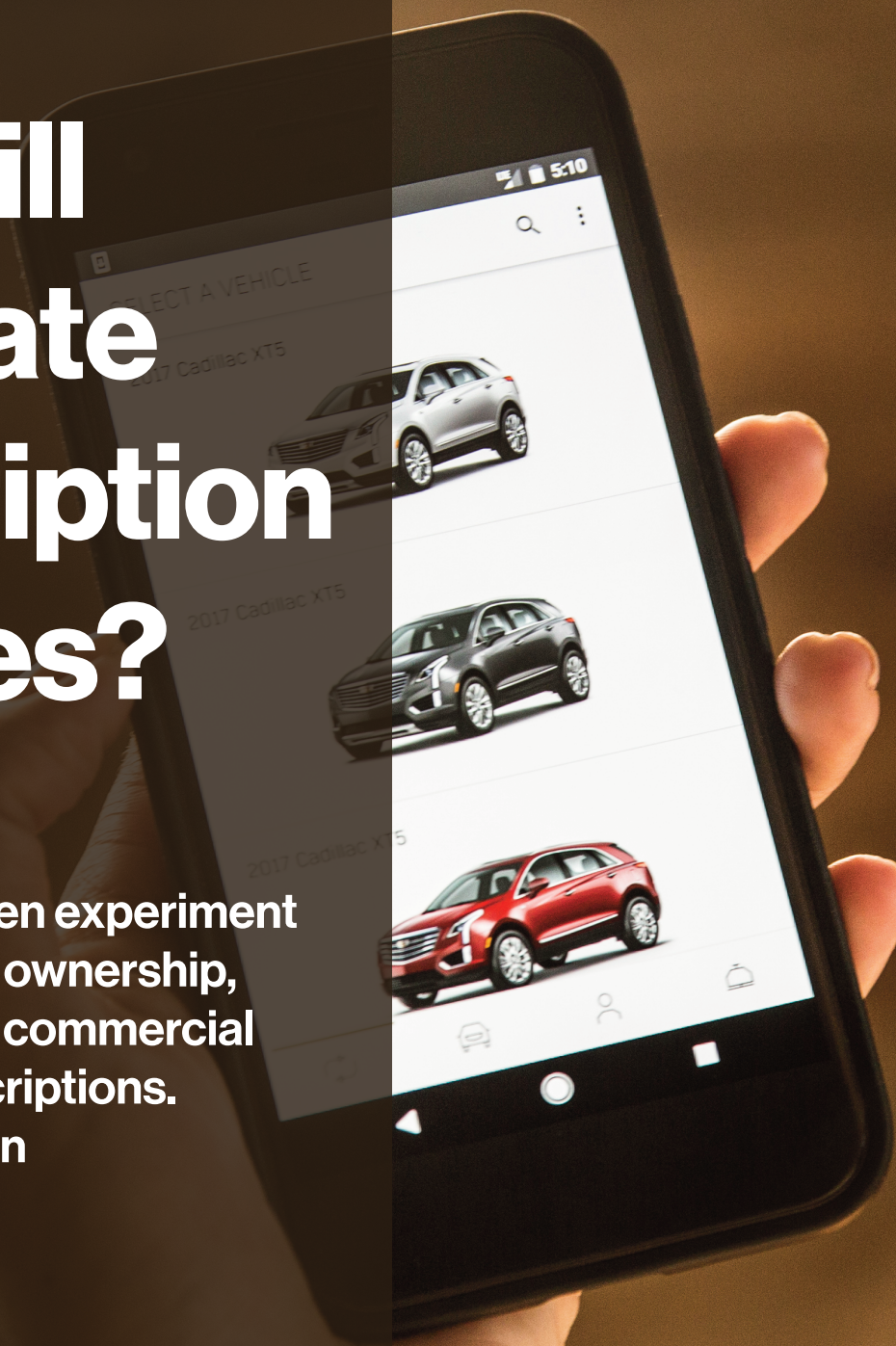


In February 2021 it marked a milestone with the delivery of a 300 watt-hour/litre battery for customer trials. At the end of this year it will start Sample A production for EV customers, with an 800 watt-hour/L version by the middle of next year. Development will then focus on a 1,200 watt-hour/L version and eventually 2,400 watt-hours/L.

“All the other SSB companies are promising production in 2025, ‘26, ‘27. We’re looking at 2022 production,” says Bagheri. “We are going to have a big influence by coming out with this method of manufacturing. It will unlock many new applications in the electrified world—not just EVs, but anything that needs to be electrified and removed from fossil fuel.”

Who will dominate subscription services?

Automakers are keen experiment with alternatives to ownership, but few have found commercial success with subscriptions.
By Megan Lampinen



As concepts of ownership evolve and consumers look increasingly to usage versus purchase, automakers are scrambling to offer new services. The end game is still to match consumers with vehicles, but that may not take the form of a traditional sale. Leasing, rental, car-sharing and most recently subscriptions have been gaining ground as interest in Mobility as a Service (MaaS) accelerates.

“The ‘disownership’ trend has changed the preferences of customers who have gone from wanting to own an asset to simply using it in a flexible way and free from any worries,” says Paolo Manfreddi, Chief Executive of Leasys Rent. Leasys is the Stellantis brand specialising in short-term usage. In 2019, Leasys Rent began offering mobility services based on the subscription model, starting with Leasys CarCloud. This allows clients to pick up and drop off vehicles in different cities and choose the vehicle that best suits their needs. The service is renewable monthly, with no cancellation penalties. Like most other subscription services it covers a set mileage per month, in this case 1,500km, along with insurance, theft coverage, and maintenance.

Success and failure

This is just one of many automaker-run subscription offerings. Others include Mercedes-Benz’s Collection, Audi Select, Book by Cadillac, Access by BMW, Care by Volvo, Lexus Complete Subscription and Porsche Drive (formerly Porsche Passport). However, few of these have thrived; Ford sold Canvas in 2019 after just two years of ownership. Book by Cadillac was

halted in 2019, initially with plans to return in 2020 but this has yet to happen. Mercedes never grew the Collection service beyond its initial pilot markets in Atlanta, Philadelphia, and Nashville. After just two years it was wound down in July 2020 due to disappointing customer response. Audi Select was dropped early this year.

“For many of the OEMs that have attempted to dabble in subscriptions, the cost proved a significant barrier,” says Ivan Drury, Edmunds’ Senior Manager of Insights. Compared to the cost of financing or leasing, subscriptions carry a hefty price premium. “In some instances you could lease two vehicles from the same automaker and the price would be similar to the cost of subscription,” he tells *Automotive World*. One solution could be to lower the price of subscriptions, and many brands took this route. But there is only so far they can pursue it, due to the costs of running the programme.

Not all of these programmes have resulted in disappointment. “For those automakers that have seen a high utilisation rate such as Volvo, the subscription cost is closer to a traditional lease and does not allow for as much flexibility as the higher cost subscription models that allow for swapping vehicles,” Drury adds. Care by Volvo is currently one of the more successful programmes, if one of the less flexible, as it doesn’t offer the option to switch cars. However, there seem to be enough happy customers. Its first year of operation in the UK, for instance, “exceeded all expectations,” according to the company. Since its launch on 2 September 2020 it has delivered more than 2,500 cars to customers.



© Volvo Cars

“Customer feedback has been overwhelmingly positive so far,” says Conor Horne, Volvo Car UK’s Head of Online Sales. Examples of direct feedback on the scheme include, ‘Certainly the easiest way to ‘buy’ a car that I’ve had’ and ‘Makes the total cost of ownership worthwhile for me’. The only negative comment received about Care by Volvo is that delivery times are too long for cars that are not in stock, but as Horne points out that is not specific to Care by Volvo and impacts most of the industry today.

For Drury, Volvo’s comparative lack of flexibility could be key to its success. “There were programmes promising customers the ability to change vehicles through the push of a button, which requires having excess levels of inventory and keeping these vehicles on hand at all times. That’s very

costly.” He also notes that brands must also have a vehicle line-up that is diverse enough to justify the desire by consumers to drive more than just one or two models. Then there is the additional manpower required to then facilitate vehicle pick up and drop off. “You truly would require a dedicated staff that monitors inventory, customer needs and support for any issues like learning curve of vehicle features and functionality, app/tech based issues, mechanical breakdowns, etc,” he observes.

For whom and by whom?

Subscription customers come in all shapes and forms, but they do share certain characteristics. “Users are a heterogeneous mix in terms of mobility needs and age,” Leasys Rent’s

Manfredi tells *Automotive World*. “Our subscriptions range from city cars such as the hybrid Fiat 500 to Maserati and Alfa Romeo Quadrifoglio, passing through the rest of the wide range of the Stellantis Group. What makes them homogeneous is the search for flexible services, without economic barriers to entry and with all services included. They are smart customers accustomed to the use of new technologies.”

Ford and Volvo may have found subscriptions a useful means to attract new customers, but perhaps automakers are not the best placed to run these services. The leading rental giants, including Sixt and Hertz, as well as motoring organisations like AAA, have been diversifying into subscriptions as well. “Automaker subscriptions have a long way to go as we’ve seen little to no success in those that had plans for expansion and

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The end game is still to match consumers with vehicles, but that may not take the form of a traditional sale

At Volvo, the typical user in the UK today is a 45-year-old man with a young family, but the brand insists it appeals to a wide variety of people. Before Ford sold Canvas, it had praised the service’s ability to attract customers new to the brand. In 2019, 81% of Canvas users were new to Ford, offering a useful means for brand exposure. Volvo has seen a similar trend, with 91% of Care by Volvo customers new to the brand.

access to their entire model line-up at any time,” Drury points out. “The upper hand is certainly with rental agencies as this is very similar to their existing business model. The next best chance for success would be the dealership groups that had access to multiple brands and vehicle segments and were stocking their fleet with used vehicles that had already taken the initial one to two year heavy depreciation.”



Is US climate policy positioned for an electric future?

EV policy expert Ellen Hughes-Cromwick takes a deep dive into the sort of investment needed to expand America's charging infrastructure.
By Megan Lampinen

Governments around the world are pushing electric vehicles (EVs) as a means of tackling environmental concerns and climate change commitments. Most recently, the US outlined targets for EVs to account for half of all new car sales by 2030. Similarly, the country's Bipartisan Infrastructure Framework, which represents the largest long-term investment in infrastructure in nearly a century, could provide pivotal support to EV charging infrastructure.

EV policy expert Ellen Hughes-Cromwick argues that charging stations are the backbone of the transition to EVs. She believes that investment is especially critical to support public charging stations for those drivers who cannot install private charging units at home. Hughes-Cromwick has been helping to shape US policy on his front for years. She currently serves as a Senior Resident Fellow for Third Way's Climate and Energy Program, and has been engaging with the Biden Administration and Democratic members of Congress on EV policy. She previously served as Chief Economist of the US Department of Commerce during the Obama Administration and spent more than 18 years as Ford's Chief Economist. She is

also one of the authors on the recent Third Way report, *Beyond BID: Getting EV Charging Plugged Into Reconciliation*, which explores the federal policies and investments needed to rapidly expand US charging infrastructure.

The US may have a grand vision for an electric future, but just how much work will it take to get there, and are the current policies the best way to go about it? Hughes-Cromwick shares her take on this endeavour with *Automotive World*.

How does the US rank globally in terms of EV preparation, interest, and investment?

The US is well behind China and many European countries. To start, the US EV sales share was 3.5% in the first half of 2021, while Europe was 12% and China was 9.4%. Both Europe and China have recognised that electrified transportation is the technology of the future and government policy has provided an important stimulus for both customer purchases as well as manufacturing production.

China has already set up nearly one million charging stations to support its ambitious EV targets. What is the current state of the US charging network?

The Department of Energy's National Renewable Energy Laboratory keeps tabs on chargers and stations. Its latest data indicate that there are about 96,000 public chargers. Now bear in mind that technically speaking, Tesla chargers are 'public' since they are publicly accessible. However, only Teslas can charge there.



What sort of investment is needed to support President Biden's announced target of 50% EV sales share by 2030?

For that the US will need over one million charging plugs. It is true that about 80% of people with cars only travel about 30 miles a day. As a result, many of these people can charge from a regular power outlet at their homes. But EVs and charging needs to be accessible to all, not just those with single family homes. Charging plugs in apartment buildings, at workplaces, and in downtown areas as well as rural communities are critical. Thankfully,

Tesla's network of Superchargers is considered public but is limited to Tesla owners



the Bipartisan Infrastructure package includes US\$5bn of funding for charging plugs installations. More than that will be needed to get to over one million plugs by 2030.

How would you describe today's charging experience?

There are pros and cons. To start with, it is very easy to use apps to find stations. In most EVs, the apps will ensure that you reach a charging station well in advance of when the battery charge is depleted, eliminating some of the stress and strain of owning an EV. It is a new technology, so customers will adapt and adopt with time. Everyone will find, as I did, that once you drive an EV, there is no

going back to gas stations and the high cost of ownership that comes with gasoline powered cars.

What's currently in place when it comes to US EV policy? What's coming and what would you still like to see come forward?

There are three legs to the stool of EV legislation in the US: consumer incentives to purchase an EV, federal funding for more chargers, and financial support for automakers and suppliers to retool and grow the EV manufacturing base. The Bipartisan Infrastructure package tackles support for charging stations and for batteries, but more is needed in the budget reconciliation.

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EVs and a cleaner grid is a one-two punch against the tide of climate change



Specifically, the 30C tax credit can be expanded to accommodate more charger installations. The 48C tax credit and ATVM loan facilities can both provide support for retooling and growing the domestic EV manufacturing base with good paying jobs. Finally, the 30D tax credit that could make EVs affordable for middle class buyers is the third key provision needed. It would provide an upfront US\$7,500 tax credit for the purchase of an EV. That will help fill up the plants more quickly and get us on our way to 50% EVs by 2030.

In your view, is the future of transport electric?

Absolutely—the technology is better than the gasoline powered engine and it offers more safety content as the EV takes advantage of more digital capabilities. I would certainly worry less about my teenagers driving an EV. Maintenance costs are far less, and we can reap the benefits of reduced pollution and CO2 emissions as we clean up the electric grid. EVs and a cleaner grid is a one-two punch against the tide of climate change.



How does Waymo design for the driverless experience?

The robotaxi pioneer relies on its app and passenger interface to serve as a proxy for a human driver.

By Megan Lampinen

Self-driving taxis promise to bring safety, environmental and societal benefits once they are deployed in large numbers. Several players are trialling pilots at different stages of maturity, and the race is on to secure a leadership position in what could be a lucrative segment. ResearchAndMarkets estimates it will grow from 617 units in 2021 to 1,445,822 units by the end of the decade at a CAGR of 136.8%, but there's a big uncertainty in that forecast: consumer acceptance.

No matter how good the self-driving technology, robtaxi will never take off if travellers are reluctant to ride in them. Removing the driver from the equation suddenly leaves riders with new uncertainties and nobody on hand to reassure them. A good proxy for communication could be the key to cracking consumer concerns.

Tackling apprehension through design

For the past two years Waymo has been offering fully driverless ride-hailing services via the Waymo One

programme in Phoenix, Arizona. Anyone who wants to can try it out simply by downloading the app and hailing a car. For most of these riders, this is their first exposure to autonomous driving. "As with anything new, there could be some apprehension," says Waymo's Ryan Powell, Head of UX Research & Design.

Some of the most common questions first-time users have include, What can the car see? How does it make decisions? How will it manoeuvre in a particular situation? Designing the user experience in a way that sheds light on these areas could go far in building confidence. "What we're going for in these early days is trust between our riders and our technology," he explains. For design, that translates into transparency. Users can be reassured if they understand the car's intent: why it is behaving the way it is. At the same time, designers are prioritising freedom—a big part of the value proposition in a robotaxi is taking away the hassle of driving but without bombarding the rider with unwanted alerts or intrusions. "We want to make sure that we're designing for more of



The Waymo One offers a driverless experience

a ‘lean back’ experience,” says Powell. “We do not want to be intruding into that time and space that riders can use however they would like.”

may require a bit of a walk to the final destination; if so, the app will alert the user. “In our experience, the role of the app is to really make sure that

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The interface in the back is designed to communicate what the car sees and what its intent is, especially in cases where the vehicle may act differently than we might as humans

Powell’s team also prioritises consistency across touchpoints. “At all of the touchpoints it should feel uniquely like a Waymo experience,” he adds.

An average ride in Phoenix

Every autonomous journey starts with a ride request on the app, which asks customers where they are and where they are headed. It can then estimate journey cost and arrival time. The fleet uses SAE Level 4 autonomous technology, which means the cars can safely pull over most places in the roughly 50 miles of designated ‘rider only’ operating territory, but not necessarily everywhere. In some instances, the safest drop-off location

we’re setting up users for success and that there are no surprises ahead of them,” explains Powell. “We really lean on the app to set those expectations. It serves as a proxy for some of those interactions that happen today between a human driver and a rider.”

Once the car has made its way to the designated pickup spot, the user enters the vehicle. Inside, in the back seat, is a passenger screen. Deliberately kept simple, the screen initially projects the user’s name and destination—providing reassurance that the car is indeed for them—alongside a big blue start button to initiate the ride. During the ride, this screen will convey a map of the environment outside and the car’s path along the road,



including information about what the car sees and why it is taking the actions it does.

“With this interface in the back, we think a lot about the communication that happens between riders and a human driver,” adds Powell.

Essentially, that interface is replacing the human driver when it comes to communication. For example, in a human-driven taxi a rider can simply ask the driver why he has chosen a certain route or why he is slowing down. Here, the screen needs to show that. “The car icon is in the centre of the screen, and a green trajectory shows the route that it is taking,” he

says. Laser points are used to render the cyclists and pedestrians that are around the car, showing details down to arm and leg movement. “We are trying to make this match what a rider would see outside the window,” Powell points out.

Waymo has even added symbols to reflect construction zones, for instance, showing a range of orange traffic cones. “We saw early on from our research that riders had concerns about the system performance around a construction zone. By using these traffic cone depictions on the screen we reinforce that Waymo actually understands that level of detail. This

is one of the things on which we receive the most feedback, with users appreciating the reassurance that the car understands what can be a complex situation.”

Even the best of design plans, though, can run into trouble. In May this year, an incident in which a Waymo One vehicle became confused by traffic cones made international news and attracted considerable attention on

passenger cannot see. Again, the screen can be used to highlight that, such as a pedestrian taking their time crossing the street and hence preventing the taxi from moving on when the light turns green. “The interface in the back is designed to communicate what the car sees and what its intent is, especially in cases where the vehicle may act differently than we might as humans,” he adds.

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What we’re going for in these early days is trust between our riders and our technology

social media. The passenger who recorded the episode remains a decided backer of the technology, later tweeting: “How can I prove the technology is great, if I hide it when the occasional mistake happens?”

In many cases, the car’s sensor suite can provide much more insight into the environment than is visible for a passenger in the car. After all, it can see 360 degrees around the vehicle and up to a few US football fields away. That means it can see, and act on, events or objects that the

Designers have also taken care to address confusion over the end of the ride. A passenger may see that their destination, for instance a busy shopping centre, is ahead. The robotaxi may be navigating through a crowded parking lot, occasionally stopping as it yields to other road activity. As a rider, it may not be clear if they need to exit now or if the car will carry on to another parking spot. “For this, we use the area on the bottom of the screen to let a rider know the car is still looking for a spot to pull over. Once we’ve actually

The Trusted Tester programme will invite San Franciscans to share their input into robotaxi development



found that spot, the system conveys it,” he says. “Having something on the screen is helpful, but we also want to augment that with either sound or voice, just to give a heads up about a minute out that you’re almost to your destination. We know from our research that people are more likely to look up at the screen then. We choose those moments carefully because we want to make sure that we’re creating that lean back experience, not so much lean forward experience.”

Up next

Waymo’s approach to human machine interfaces and the user experience has been shaped by feedback from Waymo One participants in Phoenix, and will

be further refined by riders in San Francisco. While the Phoenix ride-hailing pilot runs a fleet of autonomous Chrysler Pacificas, in California the Trusted Tester fleet will consist of Jaguar I-Pace’s fitted out with Waymo self-driving technology. These vehicles will also include a specialist in the driver’s seat to monitor the car. “This is the same trajectory that we took when we were in Phoenix, where we had people take rides in cars that had autonomy specialist up front,” he noted.

Riders are quizzed on their expectations before the ride and then again on their experience after the ride. “This is a great way for us to really understand people’s needs in the context of a fully autonomous experience,” says Powell.



Incumbents likely to dominate electric pick-up segment

The electric pick-up will soon become a reality. Some hopeful start-ups have fallen by the wayside, whilst big automakers look set to rule the roost. By Xavier Boucherat

In recent years, many automakers—both incumbents and aspiring new-comers—have promised the arrival of the electric pick-up truck. It has been said that successful mass electrification will depend on automakers offering customers vehicles that excite them, and in North America, enthusiasm for the pick-up segment remains relentless. For 44 years, the Ford F-Series range of pick-ups—including the F-150, the heavier 250 and 350 models and other variants—has been the US's best-selling vehicle of any kind. The disruption and economic uncertainty of COVID-19 saw a year-on-year drop in sales of 12% in 2020, yet the manufacturer still recorded sales of 787,422 units.

In short, pick-ups are big business: a 2020 report from Bloomberg estimated that the F-Series line alone supports half a million jobs and contributes US\$49bn to US gross domestic product. According to BCG, in 2019, it generated US\$42bn in revenue for the automaker, an estimated 30% of Ford's total reported revenue.

It makes sense that the company's most important product should make the evolutionary leap towards electrification, in the form of its hybrid F-150 and the all-electric F-150 Lightning. The growing societal concern around climate change and internal combustion engine (ICE) restrictions, coupled with electrification's financial incentives, mean that zero-emissions mobility will doubtlessly appeal to some casual F-150 owners, i.e., those who choose a pick-up for leisure purposes.

But can the same be said for those who choose pick-ups for commercial purposes, and who rely on them to make a living?



The all-electric F-150 Lightning can function as a portable power plant

Power plants

“We believe there will be an application for electric pick-ups in work truck fleets, but not for the usual purposes of hauling cargo or pulling trailers, since both of these activities impact range and performance,” says Matt DeLorenzo, Senior Managing Editor, Kelley Blue Book. Whilst improvements in battery technology continue to deliver higher range, Ford is currently targeting in the region of 230 miles (370km) for the Lightning, or 300 with an extended battery pack. For commercial vehicle (CV) drivers making regular long trips, this pales in comparison to the 2020 F-150's 36-litre gas tank which can deliver over 750 miles.

That said, says DeLorenzo, electrified vehicles could play new roles in the CV sector. The F-150 Hybrid and F-150 Lightning function as mobile power

sources at job sites, turning into power generators with outputs as high as 7.2kW: enough to power the average home. This can be used to power everything from site machinery to lighting, using outlets in the truck's cargo bed. Power is drawn from the battery, and the hybrid system can use its ICE to power that battery. Numerous outlets have already reported on owners using the generator for power purposes in the event of blackouts and outages.

"In addition, electric pick-ups can be used for light-duty work in a given area where the vehicle can return for overnight re-charging," adds DeLorenzo. Electrification is already a hot topic among return-to-base

operations, with opportunities to reduce the total cost of ownership (TCO). It is well understood that the reduced number of parts in an electric powertrain makes for better reliability and lower maintenance costs, but there are benefits beyond this. "For example," says DeLorenzo, "fleets will benefit from the lower maintenance costs by not having to perform oil changes, as well as replenishing and flushing radiator coolant. What's more, regenerative braking systems will see brakes last longer, further reducing maintenance and repair costs."

The main contenders

Ford is by no means alone in the emerging electric pick-up segment. The automaker will face competition from its traditional rival Chevrolet, which has announced plans to electrify the Silverado pick-up. GM will use its Ultium battery packs to build the model, giving it a reported 400 miles of range on a single charge. The company has also announced that both retail and fleet versions of the model will be built, although exact details remain hazy with production launch at least a couple of years out.

The electric Silverado will be built in the same factory as the GMC Hummer EV Sports Utility Truck. The newly resurrected Hummer brand will be all-electric, and production is slated to begin this year. Reported ranges stand at 350 miles, but buyers may also be interested in its power: despite being one of the heavier vehicles on the market at over 9,000 lbs, a summer 2021 demonstration saw the vehicle go from zero to 60 mph in just three seconds, and GMC claims a torque of 11,500 lb-ft at the wheels.

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Some, like Rivian, may be successful, and others, like Lordstown Motors, are having a much more difficult time. I think where the start-ups underestimate the established players is the complexity involved in building the vehicle itself



Electric pick-ups can be used for light-duty work in a given area where the vehicle can return for overnight re-charging

A number of start-up manufacturers are also working on electric pick-ups, with names including Rivian, Lordstown, Bollinger and more. Among these, fortunes are proving mixed. Rivian is by far the most promising. The Amazon-backed, California-based manufacturer has secured billions in investment to date, buoyed by large orders for its electric van from the e-commerce giant. But the company says deliveries of its electric, 300-mile range pick-up will begin this year. A previous target to begin deliveries in July 2021 was waylaid by COVID-19. The company filed an IPO at the end of August 2021.

Things do not look as rosy for Lordstown Motors, named for the former GM plant purchased by the start-up where it had plans to build the electric Endurance pick-up. Then-President Trump unveiled the hub-motor-driven vehicle at the Whitehouse in 2020. However, in June 2021 the company warned there was “substantial doubt” over its ability to stay in business, with a 2021 filing declaring just US\$259.7m in cash on hand as of 31 March and a net loss of US\$125.2m over Q1 2021.

Long-term, it is reasonable to assume that the incumbent manufacturers—and in particular, Ford—will dominate

the space. It is certainly true that new electric vehicle (EV) technology has opened up the traditional manufacturers to outside competition, says DiLorenzo: when it comes to electric powertrains, there is a certain degree of starting from scratch. But this does not guarantee success for everyone, he explains.

“Some, like Rivian, may be successful,” he says, “and others, like Lordstown Motors, are having a much more difficult time. I think where the start-ups underestimate the established players is the complexity involved in building the vehicle itself. Things like axles, suspensions and interiors are where current manufacturers enjoy an advantage... and so whereas a new entry can have a great technology, it may find it comes up short when building a competitive product.”

It takes major investments to get this right, he says, and at the end of the day, automakers need to build vehicles that appeal to their customer base. “This is another area where the existing manufacturers have a huge advantage,” he concludes, “because they’ve been serving fleet clients all this time. It would take a pretty brave company to risk its fleet with an unproven manufacturer.”

Who will take the blame for autonomous vehicle crashes?

Liability frameworks are taking shape to determine who is at fault in the event of a crash. Access to vehicle data will bring further clarity, writes Freddie Holmes

© Ford



Autonomous driving raises difficult questions around who is at fault in the event of a crash: the human driver, or a computer. With various levels of automation in development and on the road, it is a challenging time for the automotive industry, insurers and legislators.

Autonomous vehicles (AVs) will share the road with members of the public, and the risk of a collision is never zero. As such, they cannot feasibly be commercialised outside of trial conditions until there is a framework for liability. The challenge is in

frameworks are also being reshaped to address the fact that control of the vehicle is now shared, and insurers are preparing for a day where drivers become riders.

Self-driving vs driver assistance

The outcome of a collision could vary depending on the level of automation involved. It is unlikely that a passenger in a Level 5 AV would be considered at fault, while a driver that misuses a Level 3 system is almost certain to be held accountable.

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Any system that requires oversight will hold the driver liable, while higher levels of automation will place responsibility on the vehicle manufacturer

understanding whether a particular system was engaged under the right circumstances, whether a crash resulted from a system error or if a myriad of other factors are in play.

To date, investigators have struggled to determine the root cause of an AV crash with absolute certainty, but efforts to make vehicle data more accessible could change things. Legal

“The position for vehicles of Level 3 and below is very straightforward,” says Diane Mullenex, a Partner at law firm Pinsent Masons who is based in the UK. “These vehicles—pursuant to the 1968 Vienna Convention—are driven under the responsibility of their driver.” In the case of a crash, she says, the driver will be liable unless they can prove that someone or something else is to blame. This



The consequences of an AV crash have not always been clear, potentially slowing progress

might be a drunk driver weaving across lanes, for example, or a mechanical failure in the car. “As the ‘assistance’ of the car must be used ‘under the supervision’ of the driver, this can never be considered to be at fault,” Mullenex explains.

But with a vehicle that supports Level 4 autonomous driving and above, responsibility shifts from the driver towards the manufacturer. “As these vehicles do not have a driver, there is a question over who carries the responsibility that would otherwise be the driver’s,” Mullenex continues. “Currently, the position in England

and Wales seems to be leading towards the non-liability of the driver as long as he or she follows the manufacturer’s instructions about when it is appropriate to engage the self-driving function, and the driver has ensured that the vehicle is in a roadworthy condition, such as obtaining an MOT test certificate if applicable and being taxed and insured.”

In essence, any system that requires oversight will hold the driver liable, while higher levels of automation will place responsibility on the vehicle manufacturer.

Seeking clarity

With rising adoption of advanced driver assistance systems (ADAS), the challenge extends to cars already on the road. Partially automated vehicles have been involved in numerous high-profile collisions over the last five years, many of which have been fatal. Tesla's Autopilot function, classed as a Level 2 system, has been linked to numerous cases, from [crashing into barriers](#), [tractor-trailers](#) and [more recently colliding with parked emergency response vehicles](#). Since 2016, more than 30 separate investigations into crashes involving Tesla vehicles have been opened by the US National Highway Traffic Safety Administration (NHTSA).

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The law on this topic is understandably still in a state of flux

“There is careful monitoring of the cases where vehicles have caused fatalities—such as Tesla vehicles driving into other vehicles,” says Mark Concannon, Founder of Concannon Business Consulting. Many systems similar to Autopilot are available from other manufacturers, and all should be used only in defined situations and with constant oversight from the driver. However, crashes raise valid

questions such as: was the system used incorrectly or did it malfunction? Did the driver even have the system engaged in the build up, or was the situation simply unavoidable? It is important that these questions are addressed, as simply assigning blame will fail to bring improvements to these systems.

“On one hand, by removing human error ADAS has huge potential to improve road safety. On the other hand, if drivers misunderstand the limits of these new technologies being rolled out, it may lead to accidents,” says Gerry Ross, Head of Commercial Motor at insurance company Allianz. “These opposing impacts are happening on different timescales, with higher risks in the short term and expected safety benefits in the longer term.”

In the UK, the Automated and Electric Vehicles Act came into force in April 2021 and brings new requirements in terms of insurance and liability. The legislation details that if an AV is insured at the time of a crash in a public place, the liability falls to the insurer. If the vehicle is not insured, it falls to the registered owner. “One exception is if the accident was totally caused by the driver’s negligence in allowing the vehicle to begin driving itself when it was not appropriate to do so,” noted Ross. It also recognises that the policyholder would be liable if vehicle software was altered or if safety-critical software updates were not installed prior to the crash.

“The key agreement is that the insurer of the vehicle will deal with the claim in the first instance, so anyone impacted by the accident doesn’t have to wait for years of legal argument before receiving a payment,” notes David Williams, Managing Director,

ADAS and Level 3 autonomous driving systems require oversight, making the driver liable for any collisions



Underwriting and Technical Services at AXA UK. “Most people think that liability will simply pass to the automaker, but it isn’t as simple as that; many parties could be involved and responsible, infrastructure providers, software designers, vehicle repairers. That’s why it is essential that insurers deal with the claim in the first instance and then once settled, they can pursue potential recoveries.”

Access to data

To better understand the root cause of an AV crash, investigators and insurers must have access to vehicle

data. This will illustrate what went wrong and who is at fault. “When it comes to assigning liability, access to vehicle data will be crucial,” says Allianz’s Ross. “We want this access to be fair, direct and unrestricted, as it will speed up assistance and claims handling.”

Efforts on this front are already being made. In the US, NHTSA recently mandated that crash incident data involving partially and fully automated vehicles should be reported almost immediately. Companies testing AVs already provide monthly disengagement reports in places such as California,

but a general order issued in August will require data to be uploaded to an online portal within 24 hours. It applies to crashes that have taken place on public roads, and where the automated system was engaged at any point in the 30 seconds prior to a crash (which is defined as a collision resulting in vehicle recovery, airbag deployment, a hospital visit or any collision involving a vulnerable road user).

been in the back seat, implying an Autopilot experiment gone wrong. Data logs could help to clarify the matter.

“Access to AV data is fundamental for establishing liability and accurate risk modelling. It’s crucial that the type of data being collected, and how it is used, is transparent,” says AXA’s Williams. A ‘data map’, he says, is being developed to support industry-wide data management.

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Access to AV data is fundamental for establishing liability and accurate risk modelling

Currently, says Ross, it is unclear how insurance companies will gain access to vehicle data, “and yet they will need this to determine whether the vehicle was driving itself or the driver was still in command, and to establish all the circumstances that led to the accident.” He emphasises that automakers must make data freely available to confirm whether the vehicle or the human driver was in control in the lead up to a collision. In April 2021, a Tesla Model S struck a tree in Texas, killing both occupants; neither were found behind the steering wheel following the crash. While a conclusive report has not been issued, it is believed that the driver had

“This will be crucial to identifying who needs access to data,” he continued, “and will enable the industry to discuss frameworks to effective governance and the standard data exchanges required.”

An unavoidable issue

All this begs the question of whether privately-owned AVs can be made available unless the issue of liability is solved. Technology challenges aside, it is one factor that will have slowed the testing and development of Level 4 and 5 systems in recent years.




“Those creating Level 4 and 5 technologies are looking for governments to start putting down laws with clarity of responsibility, and for insurance companies to drive the liability guidelines, before they will take risks outside of very targeted areas that are more ‘AV friendly’ like San Francisco, Las Vegas and Phoenix,” says Concannon.

There is plenty still to do on the AV liability front, he continues. “In short, it is very difficult and there is little precedent for how to proceed,” he observes. “We are seeing Elon Musk criticise his own company’s technology, and this speaks to how it’s going: not well.” In August, the outspoken Tesla founder said in a

tweet that the latest beta version of Tesla’s autonomous driving software was “actually not great.”

“The law on this topic is understandably still in a state of flux. This issue must be resolved before vehicles of Level 4 and above are authorised to be put on the roads,” agrees Mullenex. “The alternative would mean that the risk of putting these vehicles on the road would be fully absorbed by society without placing liability on one particular person or entity. This would translate into unacceptably high insurance premiums and, should an insurance company refuse to shoulder this burden, a completely unregulated deployment of AVs which would further delay adoption.”

A photograph of a white car on an assembly line, with a dark blue semi-transparent overlay on the left side containing text. The car is positioned on a conveyor system, and various mechanical components and tools are visible in the background.

How can automotive players mitigate the risk of supply chain shortages?

The global semiconductor shortage could give rise to a surge in supply and resourcing disputes, but these can be avoided. By Michael Stocks and Matthew Padian

The road to recovery was always going to be bumpy. Whilst there are clear signs of a recovery in the car market as society emerges from the pandemic, demand is not being matched by supply. For example, such has been the global demand for semiconductors (the “brain” for every kind of electronic device), that shortages of these parts have slowed vehicle production lines and deliveries to the forecourt.

Any blockage in the supply chain inevitably puts a strain on each party’s obligations to meet contractual commitments. At best, this might cause a short delay in delivery of components. At worst, it could result in deadlines being missed, or the loss of trust between contracting parties leading to disputes. How then can companies mitigate the risk of such disputes arising as the sector attempts to navigate this bumpy road?

Key things to consider

It is important that any company reminds itself of what it has agreed to supply, and by when, by reviewing its customer contract. For example, how is the commitment to supply couched and does it provide any wriggle room? Earlier this year, the much-publicised supply dispute involving the European Commission and Astra Zeneca (see below) had to address what was meant by “best reasonable endeavours” to supply vaccines to the EU, which ultimately gave it scope for

arguing its delivery commitments were somewhat flexible.

Another consideration might be the force majeure clause, which is common in commercial agreements and allows a party to suspend or extinguish obligations due to events out of their control, perhaps due to fire, flood, a natural disaster, war, a strike or, if specifically drafted, epidemic or pandemic.

customer to resort to a legal process to determine the solution. If the parties are unable to resolve the position through dialogue, highly-skilled mediators can be appointed to engage with both sides in search of a commercially acceptable outcome (at a fraction of the cost of a more formal dispute resolution process). Commercial parties would do well to heed guidance issued by the UK government Cabinet Office in

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Any blockage in the supply chain inevitably puts a strain on each party’s obligations to meet contractual commitments

Away from the precise contractual wording, a company might also consider whether to openly address a likely supply issue early on to allow a commercial solution to be found. If there are other issues at play not within the supplier’s control, which need to be wrapped up in a revised contract in which a new delivery scheme can be set out, a contract re-set is a pragmatic way forward.

It is also important to remember that it is not generally in the interests of either supplier or

May 2020 during the pandemic that “parties to contracts should act responsibly and fairly, support the response to COVID-19 and protect jobs and the economy”.

What could auto learn from pharma?

The dispute concerning delivery of vaccines to the EU bloc between the European Commission and Astra Zeneca is an example of how a supply dispute can quickly escalate and

is not one that played out well for either side. There were, of course, politics at play, with the European Commission needing to be seen to be taking steps given the criticism it was facing with its vaccine rollout programme. Yet, the decision of the European Court to order a staged vaccine delivery programme, with the sting of penalties if deadlines were missed, is helpful in showing how courts can adopt a commercial approach to such cases.

In the automotive world, any supplier currently experiencing delivery problems faced with multiple customers should tread carefully if it is inclined to favour one over another. Whilst it can prioritise a customer (perhaps on the basis of a longer standing relationship or confidence of quicker payment), it will still be bound by delivery commitments in its other contracts.

What about the customer?

From the customer's perspective, business failure of a supplier can cause severe distress in any supply chain. Customers can be left out of pocket for goods paid for upfront or unable to meet orders for their own products.

Customers can seek to avoid this scenario. This can include due diligence on suppliers before exchanging contracts; for example, to determine their financial health or over-reliance on any key customers who themselves face solvency issues.



Supply contracts can provide for ownership of goods to pass to customers upon production rather than delivery, so that those goods can be ring-fenced in any insolvency. A customer may spread risk across several suppliers or take out insurance against supplier insolvency.

However, as the last year has illustrated, unforeseen events can turn any successful business into a struggling one without much warning. If a supplier enters insolvency, some customers may want to cut ties and move on. Fortunately, the restrictions that prevent suppliers terminating supply contracts upon a customer's insolvency, as introduced under the Corporate Insolvency and Governance Act 2020, do not work the other way. Therefore, if a contract entitles a customer to terminate upon the supplier's insolvency, the customer should be able to do that.

Depending on the type of insolvency, there are other considerations.

If a supplier enters administration, the statutory moratorium will prevent a customer from taking certain actions (including legal proceedings) against the distressed business without the administrator's consent or court permission. A similar situation arises if a supplier seeks the benefit of a temporary moratorium as is now possible without entering administration. Providing this does not involve any legal proceedings, in each case, the moratorium will not prevent a customer from exercising its contractual rights, such as termination or retention of title rights (although it will fetter the customer's ability physically to repossess the goods).

Administration often results in a sale of all, or part, of the business. If the business continues trading, the buyer may want to fulfil any incomplete orders, and there may be scope for negotiation around future supplies. Where there are no other interested buyers or alternative suppliers, a customer may consider purchasing part of the supplier's business itself to ensure continued supply.

If customers pay for goods in advance and the supplier enters insolvency, the goods are unlikely to be handed over unless title has already passed. The liquidator or administrator will only reimburse deposits if sufficient funds are available.

However, this rarely happens, as customers usually rank as unsecured creditors. Customers

may also remain liable to pay any outstanding invoices, unless they have grounds to dispute those invoices or make any counterclaim. The availability of set-off rights may also enable a customer to set off sums owing to it by the supplier against sums claimed by the insolvency practitioner on the supplier's behalf, thereby reducing the risk that a customer will not recover anything in the supplier's insolvency.

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Unforeseen events can turn any successful business into a struggling one without much warning

An aside: confidentiality

An unusual feature of the Astra Zeneca case was that at the request of the Commission (and with reluctant acceptance by AZ), the terms of the Advance Purchase Agreement were publicised, initially with sensitive material redacted only to be uncovered later by journalists adept at using Adobe Acrobat. That sensitive pricing and other information

was out in the open has raised concern in many quarters, which are now questioning the value of confidentiality clauses in contracts.

There is no fixed rule under English law as to what is confidential information, although usually a contract will define what it covers, and if it doesn't, the court can make such a determination.

Recognising the value of such information in a contract, the courts take a dim view of parties who misuse it and has made a range of remedies available. For example, a party may choose to seek an order from a court preventing the offending party from using or further disclosing the information (known as an injunction), or an order that it be compensated calculated by reference to the royalties/fees the offending party would likely have needed to pay to use the information.

About the author: Michael Stocks and Matthew Padian are Managing Associates at Stevens and Bolton LLP



Battery recycling will be vital for European supply chain

Reusing non-conforming materials from battery production will be ever more important as demand increases. By Jacob Moreton

Demand for lithium-ion batteries is expected to increase enormously in the next few years. With many automakers investing heavily in electric vehicles, demand for batteries will increase by at least 30% a year for the next decade in Europe, according to a European Commission report from 2020. But while electric vehicles might offer a more sustainable alternative to current mobility options, the materials wasted in production can be incredibly damaging to the environment.

JB Straubel, former Chief Technology Officer at Tesla, is one critic of the current state of affairs. “It’s not sustainable at all today, nor is there really an imminent plan—any disruption happening—to make it sustainable,” he told the Financial Times in August 2021.

But some initiatives are seeking to tackle the problem. Fortum, an energy utility based in Finland, recently announced a collaboration with Tier 1 supplier Valmet

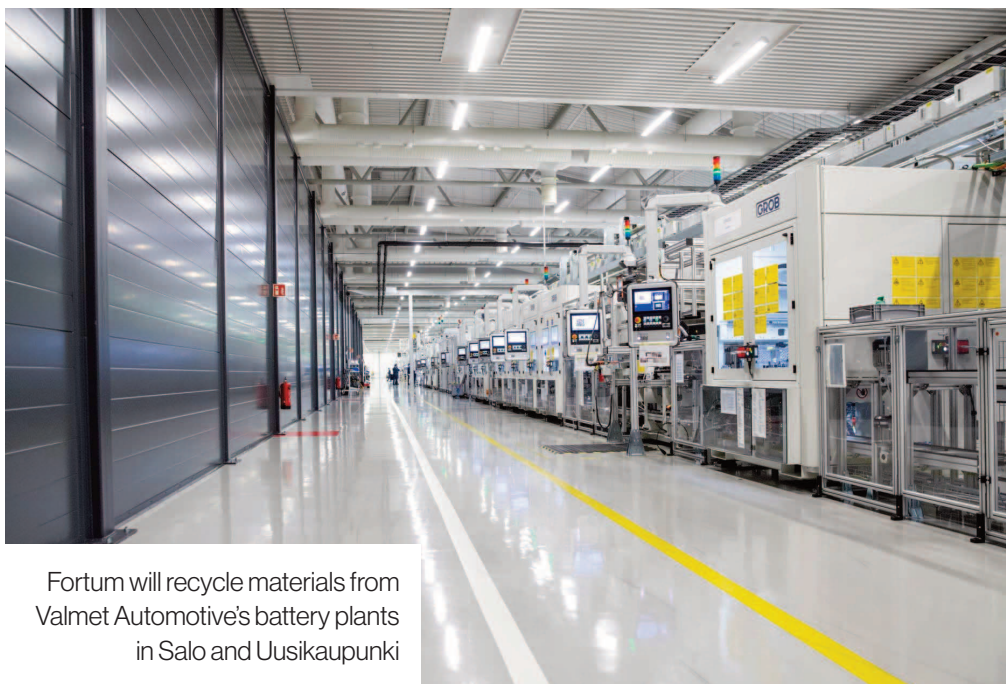
Automotive to recycle non-conforming battery materials at the latter’s plants in Finland.

“When we are recycling those materials,” says Tero Holländer, Head of Business Line Batteries at Fortum, “we are actually producing sustainable recycled raw materials like nickel and cobalt sulphates, which can then be used again for battery manufacturing.”

The recycling process

Almost zero lithium is recovered in Europe currently, but recycling of cobalt, nickel and copper is in a strong position, according to a European Parliament briefing from July 2021. Recycling nickel and cobalt has around 95% efficiency, while copper has 80%, depending on the specific process.

Some of the materials Fortum process are recycled in the traditional way. For example, when Fortum dismantles batteries it will get ‘scrap’ metals like



Fortum will recycle materials from Valmet Automotive's battery plants in Salo and Uusikaupunki

© Valmet Automotive

aluminium coverings, copper cabling, and so on, which will be sent to secondary smelting. These are then recycled back into the production chain—for instance aluminium can be used to make gearboxes.

But there is more to Fortum's recycling process, Holländer explains. The company takes battery cells or modules from companies like Valmet. It breaks these down, releases the 'active' material from battery cells and delivers that material to Fortum's hydrometallurgical plant on the west coast of Finland, where it can extract metal for making new batteries. In addition to the current industrial scale plant, it is also investing in a larger scale hydrometallurgical plant which will begin operations in early 2023.

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What's important is that these batteries do not end up anywhere other than in recycling

This process can be used to recycle batteries from both passenger and commercial vehicles such as buses, trucks, or even forklifts. “What's important,” Holländer argues, “is that

these batteries do not end up anywhere other than in recycling. Not to waste collections or exported outside the European Union to plants that do not provide high-level battery recycling.”

Holländer suggests this method could become increasingly important in the production of new batteries as the sector matures: “The mining sector is the largest provider of battery materials now, in the current growth phase. But at least in Europe, it takes many years to establish new mining and refining capacity. It is also very important for the sake of waste treatment and resource efficiency to recycle the materials back for another use.”

A second life

Material extraction is one method of recycling lithium-ion batteries. Another is to put such batteries to use in new applications after they have reached the end of their useful life in vehicles. “Today, most EV batteries have a life expectancy of 15 to 20 years within the car—and a second life beyond,” says Graeme Cooper, Transport Decarbonisation Director at National Grid. During that “second life” a battery can be used as an energy storage system for homes fitted with renewable sources like solar panels.

Outside of Europe, some automakers are making significant progress in this area. Nissan's Blue Switch project uses Leaf batteries to provide power for tools, homes or stores after natural disasters. Meanwhile hybrid batteries from Toyota Camry vehicles hold electricity from solar panels at Yellowstone National Park, which is used to power buildings at the Lamar Buffalo Ranch campus.



© Volkswagen

But being based in Finland, this form of recycling isn't currently viable for Fortum. "Finland is a rather small country—we are just 5.6 million people—so we aren't able to generate as many end-of-life batteries," Holländer says. "We need to go where the market is, meaning the key areas in Europe."

European companies have a significant presence in downstream battery manufacturing and recycling, but upstream production has long been dominated by Asian firms. Some, like LG Energy Solution, CATL and Samsung SDI have even set up plants in Europe. However, more European firms are looking to level up battery production on domestic soil.

For example, Sweden's Northvolt announced in June this year that it had raised a further US\$2.75bn to extend capacity. The company already has a US\$14bn order from Volkswagen to produce batteries and has plans for a partnership with Scania.

"Few industry players realise that in Europe there are countries that already have the raw materials for batteries," says Holländer. As demand for electric batteries increases, so will demand for domestic production of those batteries. In that environment, companies that can sustainably extract valuable materials from existing batteries could play an increasingly important role in Europe's shifting supply chain.



Seeing clearly: how smart systems will keep AV sensors clean

Interest in sensor cleaning continues to grow as autonomous driving heats up, writes Freddie Holmes

Like any other car on the road, an autonomous vehicle (AV) should be kept clean. The issue relates less to aesthetics, and more to safety: blocked sensors could render active safety systems useless, and in a worst-case scenario may even result in a crash.

Today, the effects of a soiled sensor are already becoming apparent. Advanced driver assistance systems (ADAS) rely on vision sensors which scan the road and identify possible threats. The idea is that these systems will engage faster than a driver can react, mitigating or preventing a collision. But if the sensor cannot see, it is useless. Today's cameras can be easily disrupted by everything from snow, rain, dust and even insects. LiDAR, radar and infrared can even be affected by residual moisture.

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We participate in all applications across passenger cars, robotaxis and in the commercial truck area

For this reason, the industry is recognising a need for comprehensive cleaning systems that can keep vehicles operational in any condition in any market around the world. With

the automotive industry more globalised than ever, the same vehicle sold in the heat and dust of South Africa may also need to drive in the depths of a freezing Michigan winter. Suppliers with a global presence and full systems capability could soon be in high demand as automation increases.

Make a complex system simple

Global supplier Kautex Textron specialises in clear vision systems (CVS) and has been closely monitoring developments around ADAS and autonomous driving. [Its CVS unit](#) has gradually bulked out since 2014 to a point where it now provides a full suite of components and systems under the Allegro brand. With a background in other headlamp and windscreen cleaning systems, the company has been able to use scalable parts to avoid costly bespoke solutions.

The Allegro system is designed for ADAS, covering everything from Level 1 systems through to Level 3+. “It is an expandable system that can meet all of today's needs,” explains David Plant, Vice President of the CVS Business Unit at Kautex Textron. “With drivers expecting these systems to work all the time, the risk of dissatisfaction will drive efforts to ensure these functions work in all conditions.”

Kautex's solution is based on a mixture of telescopic and static nozzles, hoses, storage tanks and pumps, which essentially use air and fluid to clean different sensors. This portfolio of components can be mixed and matched to fit virtually every customer application. “As customer

requirements and regulations around autonomous driving continue evolving, a system that is adaptable across different applications will be crucial,” Plant adds.

On the face of it, a sensor cleaning system may sound fairly simple, but with a growing number of sensors on board that are mounted on different areas of the vehicle, a comprehensive CVS can be quite extensive. Some customers might have ten cleaning points, while other more advanced models might have double that. One AV application Kautex is working on currently sports 28 different cleaning points. All this brings added complexity to the build, as well as added weight and cost. “The distribution system needs to be lightweight and offer quick connector capability,” said Plant. “The system must be practical to install when it’s going down that assembly line.”

Automakers will also want to avoid any bumps or protruding nozzles on the exterior of the vehicle for aesthetic reasons. “We want the sensor cleaning system to be invisible,” says Plant. “Customers do not want to hear noise from the pumps, they do not want to see the system and they ultimately want it to be as seamless as possible, particularly with a premium vehicle. We have a very high bar to meet.”

Smart software

The next phase of its system—Allegro Premium—brings intelligence into the mix and can adapt its cleaning strategy based on the conditions at hand. “We can really tailor the function of that system for the environment the vehicle is working

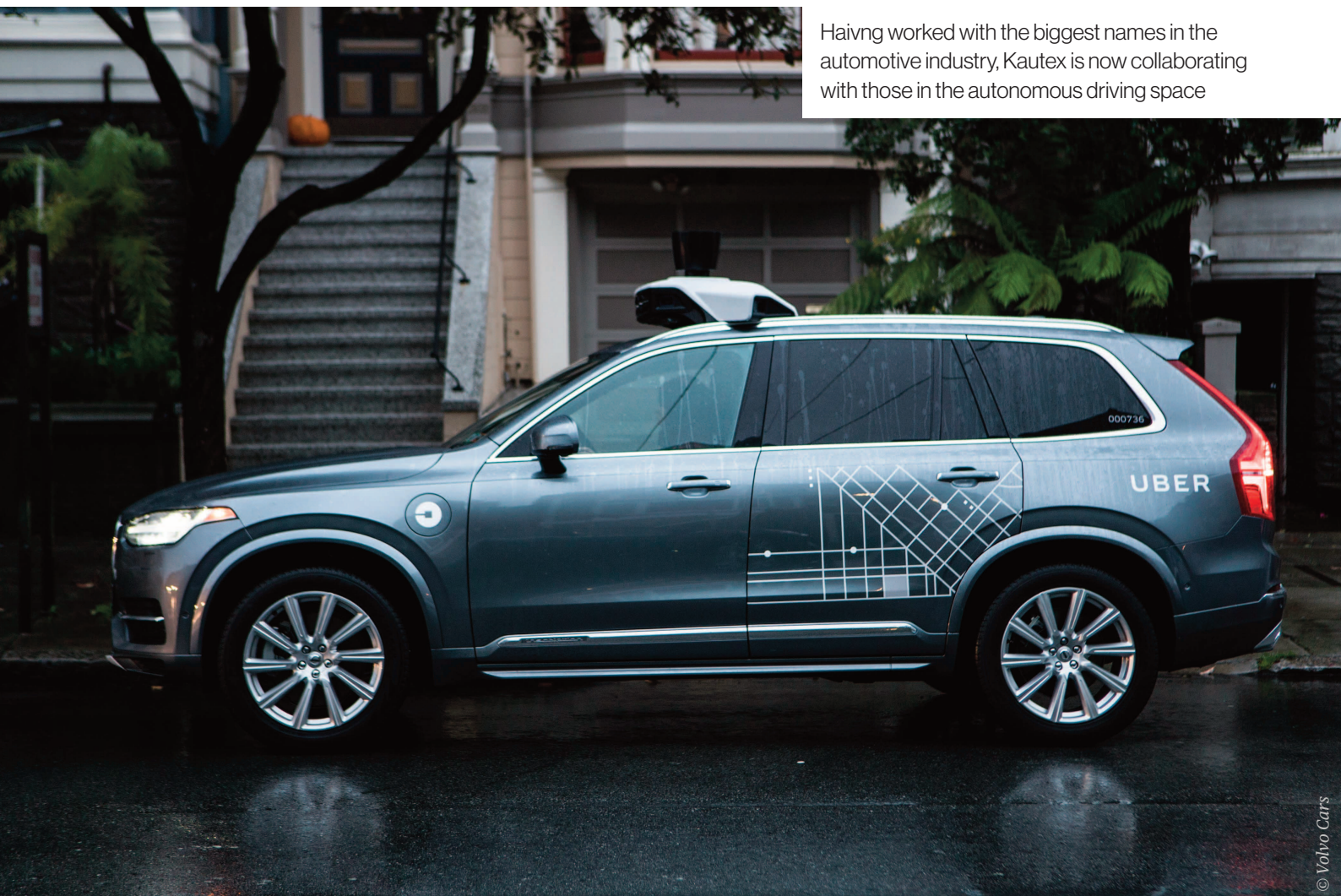
in,” explained Plant. “Cleaning needs can vary, so if it’s a bit of dust or mist, we may just give a puff of air to the camera to clean it without water. It is about making sure we have an optimised system.”

From a dedicated testing facility, Kautex can simulate a variety of different weather and road conditions to see how different solutions perform. This can inform how a system reacts to certain events. “It really depends on the sensor type and the environmental condition. With LiDAR, rain or even just a fine mist affects the way light rays interact with the main LiDAR unit,” explained Plant. “With a camera, anything that might limit its sight must be removed. This could be anything from road salt and snow to insect impacts. In these types of situations, cleaning is absolutely essential.”

In-house tests have shown that over time cleaning systems can become less effective as the surface of the sensor wears. Allegro Premium allows the cleaning system to adapt, ensuring that sensors continue to do what is needed over the vehicle’s lifetime. It can also decide which method of cleaning is required, which prevents overuse of cleaning products. “We do not want to clean something unnecessarily,” Plant explained. “That’s where the smart software control really comes into play.”

A growing market

Kautex has good experience in the AV sector, having been the supplier of choice for the Uber-Volvo collaboration’s [Drive Me programme](#), one of the early public AV experiments which put prototype vehicles on Swedish roads.



Having worked with the biggest names in the automotive industry, Kautex is now collaborating with those in the autonomous driving space

Moving forward, Kautex is set to expand its customer base from not only the industry's incumbent automakers but also new future mobility entrants. "Our Allegro system really allows us to participate in all applications across passenger cars, robotaxis and in the commercial truck area," Plant advised. And although details remain confidential at this stage, he added that Kautex is also the sensor cleaning supplier for "one of the world's first truly purpose-built robotaxis" being built by "a leading Californian company."

With locations around the globe, Plant believes that Kautex is well prepared to meet the needs of the industry moving forward, and particularly as

localisation requirements heighten. In North America, for example, the reconfigured NAFTA agreement—USMCA—will require a growing percentage of components to come from the US, Canada or Mexico. "This means that if you're making parts in North America, you now need to use more local content or your customer may get a penalty," said Plant.

"Looking ahead, we're going to see more and more pressure on the supply base to offer local sourcing," he concluded. "Our full-system strategy and global footprint will be a big benefit for our customers, particularly as the industry's awareness around the need for clean sensors builds."



Kulr claims 'game-changing' Li-ion battery management tech

The company's CellCheck platform can provide detailed, real-time insight on critical battery variables.

By Jack Hunsley

Kulr— pronounced ‘cooler’— is not a name with deep automotive links, but its tech seems an excellent fit for the challenges presented by electrification. As its name implies, the company is an expert in battery safety and specifically thermal management.

In this rapidly growing segment, the company also has a valuable unique selling point: its technology has been deployed not only on the International Space Station but also on NASA’s Mars 2020 Perseverance Rover. “We are proud to say that we beat Tesla to Mars,” Kulr’s Chief Executive, Michael Mo, said during the company’s virtual Battery Solutions Day in September 2021.

CellCheck

Back on Earth’s soil, Kulr has been quietly expanding its reach into four-wheel applications too. Most prominently, this includes a tie-up

with iconic American motorsport brand Andretti in the all-electric Extreme E off-road racing series. Kulr is Andretti’s official thermal management and battery safety provider, a vital role given the series’ range of host locations: so far in 2021 Extreme E has raced on Russell Glacier in Greenland and the desert around the Saudi Arabian city of Al-‘Ula.

Despite these achievements, Kulr is currently focused on its new ‘CellCheck’ battery management platform. Mo describes CellCheck as a hardware and software platform that can provide “data intelligence and new levels of battery safety and stability.” As Keith Cochran, President and Chief Operating Officer, added, this is achieved through a “revolutionary system of hardware, software, sensors, apps, the cloud and AI,” which can “dramatically increase the safety of a battery pack through an instant analysis of its current and historic health.” In comparing CellCheck with existing smart battery



Kulr’s battery thermal management tech is currently being put to the test in the all-electric Extreme E off-road racing series

© Extreme E

technologies, Cochran describes current platforms as being at “kindergarten level” while CellCheck comes in at the level of a “master’s class professor.”

“Today a battery pack provides little to no data about what may have happened to or what’s going on within its cells,” said Cochran. “This is dangerous and can lead to catastrophic events such as fires and loss of equipment.”

data, user interface, data storage, and cloud updates,” said Cochran, adding that current solutions consist mostly of a row of LEDs detailing the state of charge. “The communications processor makes updates in the cloud through Bluetooth NFC or USB connection.”

This raft of data is then fed into the CellCheck app which provides developers with an “intuitive, graphic-rich dashboard” that can help

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Rechargeable batteries are not just powering billions of cell phones and laptops around the world but everything from electric vehicles to entire buildings. It’s already a multi-billion-dollar market and it is projected to grow five times larger in the next ten to 15 years

CellCheck counters these issues by firstly monitoring several variables within the battery pack. This extensive list includes charge cycles, vibration, pressure, swelling, charge and discharge rates, cell imbalance, leakage and more. “The app’s processor monitors the health, sensor

“instantaneously analyse” the pack. This solution gives a detailed rundown of exactly what is and what could be about to occur inside. “Think of it as a pre-flight check, with the whole life history of a battery in view,” said Cochran. “This has simply not been possible before.”

Specifically, the app can generate a life expectancy estimation and a risk assessment. This is based on cloud-AI analysis of factors such as usages patterns, abuse history, extreme physical shock, extreme temperature and vibration. These factors are then denoted with green, yellow and red light notifications to clearly show where possible operating hazards exist. “And it gets better with time,” added Cochran. “As more data is transported to the cloud, the battery lifecycle information is gathered and analysed to improve the safety of all batteries on the ground.”

Profit potential

Kulr says that CellCheck will be the “centrepiece” of its smart battery management platform, and aims to bring it to market in the first half of 2022. The company also foresees huge success for its new platform, with Cochran suggesting that CellCheck will be a “game-changing product for the US\$38bn lithium-ion battery market” in that it will allow developers to take battery management to the next level. “For the first time you’ll be able to manage your entire battery pack,” he said. “You will anticipate failures and eliminate risk such as a catastrophic event. You will also improve performance with the proper tracking and handling of charging.”

As for Kulr’s broader company roadmap, Mo made clear his ambition to carve an even larger slice of the rapidly expanding battery market for his company. “Mobile sustainable energy has gone from the future to the



now,” he said. “Rechargeable batteries are not just powering billions of cell phones and laptops around the world but everything from electric vehicles (EVs) to entire buildings. It’s already a multi-billion-dollar market and it is projected to grow five times larger in the next ten to 15 years.”

With vehicle connectivity on the rise, and the importance of battery thermal management in yielding EV range and efficiency gains, Kulr’s entrance into this space could prove neatly timed.



ADAS demands insurance strategy upgrade

New solutions are helping insurers understand the impact of advanced driver assistance features on the risk profile of specific vehicle variants. By Megan Lampinen

Advanced driver assistance systems (ADAS) are increasingly finding their way into new vehicles, offering a host of convenience and safety benefits for drivers. At the same time, these new technologies pose unprecedented questions and complications for the insurance sector. “Despite the risk of more expensive repairs, [insurance companies] need to weigh the fact that ADAS has been shown to be effective at reducing crashes in the scenarios in which they are designed to work and can reduce the severity of an accident when one does occur,” observes Susanna Gotsch, Senior Director, Industry Analyst, at CCC Intelligent Solutions, a SaaS platform for the insurance economy.

In an upcoming article for *Automotive World*, Gotsch warns that as ADAS content grows, so too will the complexity of repairing vehicles, pricing insurance policies and

processing claims. What is needed, she argues, is more data to help insurance providers make informed decisions. “Insurers and collision repairers need access to data and insights that will help them understand what technology is in a given vehicle to properly insure vehicles; know which ADAS were engaged in the moments leading up to an accident; and provide consistent repairs,” she asserts.

Insurance providers today need to know exactly what systems are installed on the vehicle, what these systems do and when they do it, and what sort of repair work is involved if it goes wrong or is damaged. The key is to make all of this information easily accessible. Easier said than done. In many cases insurers struggle to identify features that have become available and marketed under different product names. In some models, these features act differently, with more or less functionality than in others. To add



Insurance providers need to know what systems are installed on a vehicle, what they do, and when they do it

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Variant Code

Variant Code

the introduction of automated, connected and electric (ACE)

the introduction of automated, connected and electric (ACE)

vehicles since 2015, when the first generation ADAS started to arrive on the market. “It is quite a significant upgrade,” Payne emphasises. While Variant Code has been developed specifically for the UK market, the principle can be easily applied globally.

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This is about giving the insurance industry that information it needs to understand the vehicles that we are all increasingly driving

“It is all about bringing that much needed clarity and granularity to underwriting modern vehicles and balancing that reduction in incident

frequency versus the severity of repair cost,” he adds. “It is about trying to transverse that shift in that insurance liability model, allowing providers to make more informed decisions increasingly about the vehicle rather than yourself as a driver.”

From driver to car

A fundamental shift is taking place with liability as the vehicle assumes more driving functions. Historically, insurers want to know about the driver’s background, how long they have held their licence, whether they have had incidents in the past, etc. “With the advent of ACE technology, the car is becoming increasingly important,” says Payne. “When vehicles become more autonomous, it will be critical to access live or point-of-accident information describing the circumstances in which that collision occurred in some form of common language or format.”

What is offered today may prove just the starting point. “There is never enough information,” says Payne. “Any insurer will always tell you that the more information they can have, the better they can profile the risk environment in which they work. Organisations like Thatcham need to provide much more information about the insured vehicle, and the industry’s ecosystem needs to upgrade to recognise that.”



Truckmakers are looking beyond the vehicle for new revenue

The advent of connectivity has allowed manufacturers to carve new positions as service providers. By Freddie Holmes

In days gone by, a manufacturer would sell its vehicles through a dealership or other third party and be done. The customer interaction would be negligible, and aside from routine maintenance and ad-hoc repairs, the trail of business would end there. With connected trucks, things are changing: manufacturers are now able to extend their reach beyond the vehicle itself to provide ongoing services and digital solutions, all with the aim of helping fleets and drivers go about their work.

There is money to be made with the connected truck. Customer-facing applications are needed to make vehicle data useful, and fleets are willing to pay for it. Embedded telematics systems provide useful insights into how a vehicle is being driven or the state of cargo on board. Data can also suggest better route planning or predict mechanical failures in advance. While the [third-party ecosystem has grown tremendously](#) in recent years, bringing an array of such solutions to market, fleets can now also work directly with the original manufacturer.

For example, MAN offers its own fleet management platform which it describes as “the solution for all your fleet performance, compliance and maintenance needs,” while Scania’s Connected Services cover everything from driver

efficiency analysis to vehicle tracking and asset management. DAF Trucks has a similar solution, DAF Connect, which in June 2021 was expanded to offer a web shop from which monthly and annual subscriptions to DAF Data Packs can be managed. These provide insight into the performance of individual trucks, drivers and processes, with ‘basic’ and ‘advanced’ packs available depending on the fleet’s needs.

Volvo Trucks too has developed its own in-house fleet management platform, which aims to serve as a comprehensive tool to optimise fleet operations. Volvo Connect combines key technologies such as telematics and tracking systems with back office software, which can evaluate all of the data that comes off a fleet of connected trucks. The OEM describes Volvo Connect as “the home for a more profitable transport operation.”



Fleets are willing to pay for predictive maintenance, which can avoid even costlier mechanical issues down the line

What can be monetised?

There are a number of ways to monetise the connected truck. Services that can aid fleet maintenance and improve vehicle utilisation, for example, might be offered through a pre-packaged bundle. Other services might be picked individually from an online marketplace. Whichever way, these services take granular data from single or multiple trucks and produce useful, easy to understand insight for fleet operators or drivers. In effect, truckmakers are not only offering additional functionality, but also convenience.

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Truck connectivity enables us to deliver an increasing number of sophisticated and tailor made services to our customers

“Our Volvo Connect platform gives a real-time overview of the whole fleet, planned servicing, mileage and performance which makes it a tool to improve truck productivity and reduce the total cost of ownership,” a Volvo Trucks spokesperson told

Automotive World. “We are committed to remaining a leader in these fields.”

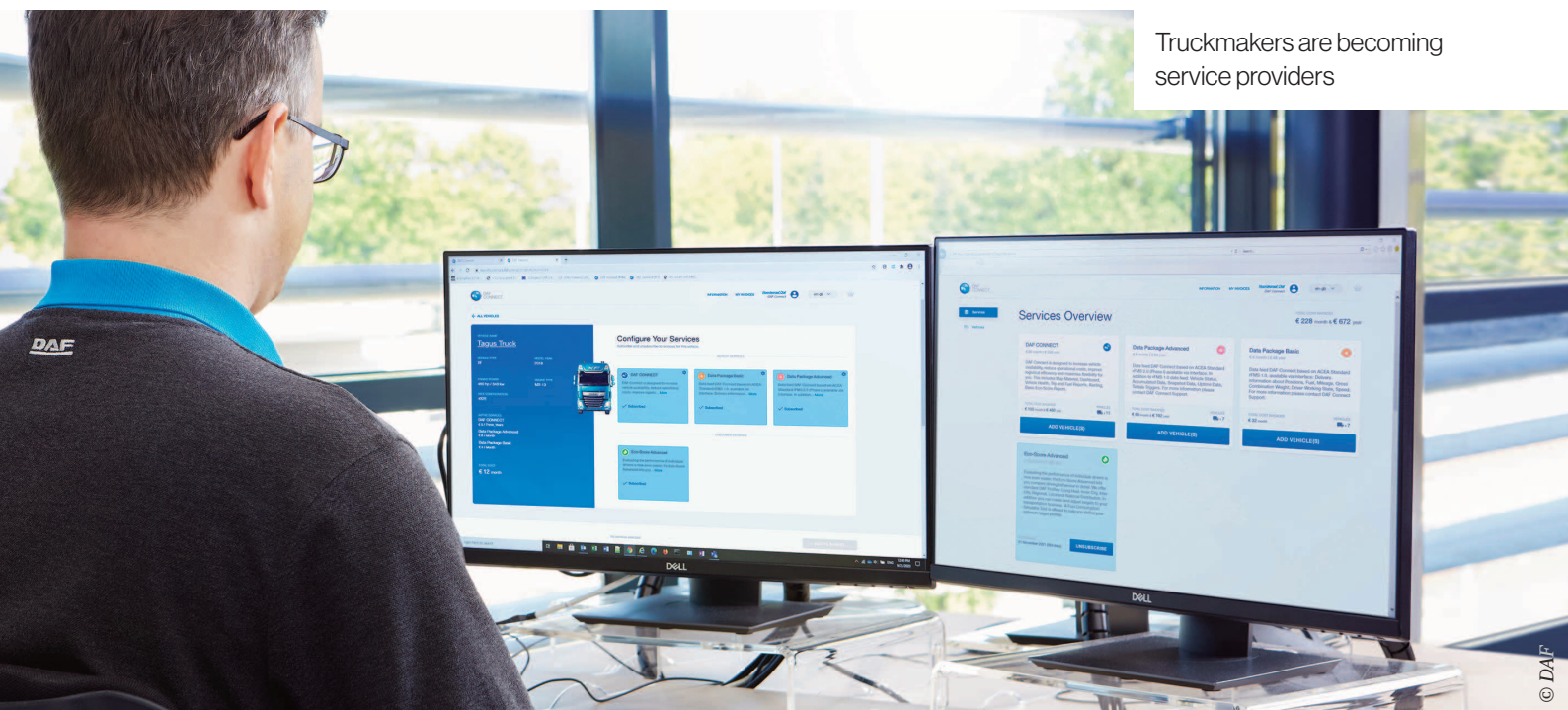
In addition, some fleets with niche requirements—such as refrigeration—may wish to choose what works for them and avoid paying extra for services they might never use or need. “Our connected solutions bring, for example, increased vehicle uptime for haulage operators, better safety for drivers and other road users and lower carbon dioxide emissions,” added the spokesperson. “One well-known example is the way we help the haulier to remotely monitor vehicle health and provide remote diagnostics and software downloads. By that, we can help maximise the utilisation of the vehicle.”

Daniel Davenport, Senior Director of Automotive, Capgemini Americas, adds that data from vehicle-to-vehicle (V2V) communication systems, alerts issued by advanced driver assistance systems and sensors, and engine and service data can all be utilised. Even the status of lights, tire pressure monitoring systems, engine temperature and fuel tank capacity can be monetised, he explains. “With connected trucks, each functional piece of the vehicle provides valuable data that third-parties can leverage,” Davenport told *Automotive World*.

A new money maker

The passenger car sector is scouting opportunities to generate more revenue from the vehicles being produced, and the truck sector is making similar moves.

Having made initial forays into the world of connected services, some of the biggest names now offer



Truckmakers are becoming service providers

complete solutions that monetise data which might otherwise go to waste, or else be leveraged by other players. “Truck connectivity is an enabler for us to deliver an increasing number of sophisticated and tailor-made services to our customers,” said the Volvo spokesperson.

“Truckmakers are looking to provide their own services as add-ons once the truck is sold,” emphasised Davenport. “Especially in the case of autonomous and electric trucks, regulatory requirements and monitoring of the truck will become an interesting playing field to which trucking companies must adhere.” He suggests that add-ons can assist with future regulations around autonomous driving, where a driverless truck might need to be stopped remotely. Connected services, Davenport says, can constantly monitor the health of the vehicle and bring it to a safe stop if the predictive maintenance system calls for it.

Own-brand platforms are helping manufacturers to retain control of the connected truck experience, but fleet management solutions must still be compatible across multiple brands.

Research from Fleet Complete has found that more than 90% of fleets globally have a range of different brands all under one roof, which means a system that works for a Volvo truck must also work with a Daimler, MAN or DAF model. For this reason, third parties will retain a place in the connected truck ecosystem. Through the creation of the rFMS standard, Daimler, MAN Truck & Bus, Scania, DAF Trucks, Iveco, Volvo Trucks and Renault Trucks have all agreed to grant third parties access to truck data. Solutions that are based on the rFMS standard can be used across all trucks.

With customers that are willing to pay for insight that will improve the way their business runs, data monetisation is set to be a significant new source of revenue for truck manufacturers and third parties moving forward.