Overcoming Barriers to Accelerate EV Transformation in Asia-Pacific

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Executive Summary

One of the most significant trends in the mobility sector, the electrification of vehicles, is building momentum at pace. In recent years we've seen some of the world's biggest automakers invest their time and resources in creating environmentally-friendly mobility solutions. Why? Because both consumer demand and the government focus on sustainability goals are growing.

Leading Chinese electric vehicle (EV) makers have become significant players in the global EV market. BYD now holds 11% of China's auto-market, overtaking Volkswagen as China's top-selling car brand due to the German brand's lack of electric models.[1] While MG, a car manufacturer recently acquired by the largest Chinese state-owned automotive company, SAIC Motor, pledges to produce only electric vehicles by 2027.[2]

Governments are also putting pressure on both automotive companies and consumers to work together to achieve an all-EV future. Japan is aiming to cut total carbon emissions by 46% by 2030 from 2013 levels but in 2021 EVs represented just 3% of total car sales. With the aim of transitioning to 100% EV sales by 2035 there is expected to be significant expansion in this market in the coming years.[3] Thailand also aims to convert around 30% of its annual production of 2.5 million vehicles into EVs by 2030.[4]

To meet this industry shift head on, EV companies need to transform themselves to become more agile during development and efficient in operations, and do more with less, especially when it comes to resources and waste. This will enable companies to stay ahead of competition to get to market quickly, iron out their operational inefficiencies, customize at scale, and minimize their overall wastage.

This e-book aims to empower you to embrace the shift to electric and to demonstrate how you can overcome challenges to become more innovative, sustainable, and efficient. When EV companies like yours lean into this digital transformation, they'll not only drive future business growth, but also contribute to a cleaner, greener planet.

Regards,

Thomas Heermann
Vice President, Automotive,
Concept Design, XR, Autodesk

[1] China's dominating EV-makers growing at 'scary speed', Financial Review, Sep 2023
[2] Europe's best-selling Chinese EV maker has a surprising name, MIT Technology Review, Sep 2023
[3] Japan's transition to Electric Vehicles, Trade.gov, July 2021
[4] Thailand scales down EV subsidy as sales gain momentum, Reuters, Nov 2023

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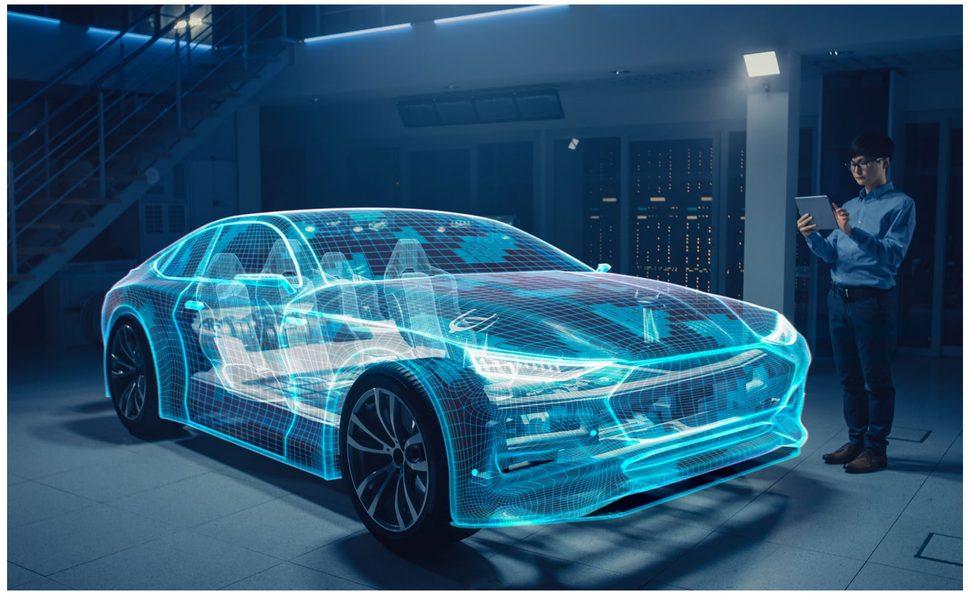


Introduction: State of electric vehicles in APAC

The urgency to combat climate change combined with the advancement in today's infrastructure and technology have propelled electric vehicles (EV) into the spotlight as a leading trend for the future of transportation. Today, electric vehicles sit at 14% of all new car sales globally and showed a 50% increase in sales from 2021 to 2022.[5] In Asia-Pacific (APRC) specifically, the electric vehicle industry is rapidly growing with China currently leading as the world's largest EV market, followed closely by Japan and South Korea.

With increasing numbers of urban traffic congestion and environmental awareness, electric bikes (e-bikes) and motorbikes are fast becoming the new favored mode of transport for many urban residents. Between 2022 and 2030 the electric motorbike market is projected to have a compound annual growth rate of 10.2%,[6] with significant investment by EV companies within this area of the automotive industry globally.

While government incentives—like tax credits, exemptions from road taxes, and subsidies to both consumers and automotive companies—and growing environmental concerns are major factors behind the rapid adoption of EV in Asia-Pacific, advanced technology is also helping accelerate the transformation and growth of automakers. Today's EV companies are combatting concerns around market share, design efficiency, manufacturing flexibility, time to market, and green manufacturing.

EV companies are now turning to digitalization to overcome some of their biggest roadblocks and achieve their key business goals:

1. Rising above competition in the EV market
2. Meeting customer demands through scalable customization
3. Reducing waste and meeting government regulations.

Key regional developments

60%
of all new electric car registrations worldwide in 2022 were from China.[7]

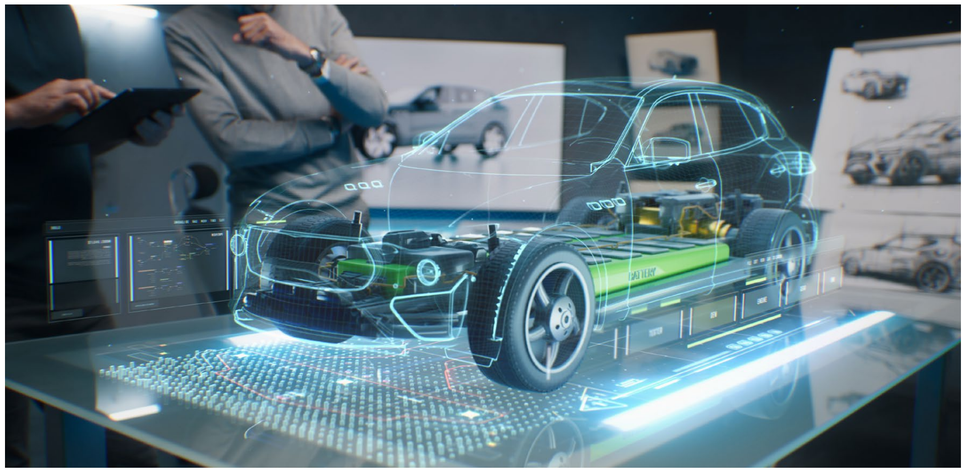
100%
of all cars sold in Japan will aim to be environmentally friendly by 2035.[8]

20 million
EVs to be developed in South Korea to reach their 2050 net-zero goal.[9]

79%
of EVs sold in Southeast Asia in the first quarter of 2023 were sold in Thailand.[10]

12.71%
expected CAGR of electric two-wheeler market in ASEAN between 2023 and 2028.[11]

[5] Electric vehicles 14 per cent of global new car sales, but less than 4 per cent in Australia: IEA, ABC News, Apr 2023
[6] Projected global electric motorcycle market size, Statista, Nov 2023
[7] Tracking Electric Vehicles, iea, 2023
[8] Japan Transition To Electric Vehicles, International Trade Administration, Jul 2021
[9] Electric car plans for 2050 'net-zero' goal, iea, Feb 2022
[10] Chinese automakers sold 75% of EVs in Southeast Asia in first quarter, study says, Reuters, Jul 2023
[11] ASEAN Electric Two-Wheeler Market Predictions, TechSci Research, Nov 2022



Rising above competition in the EV market

Asia-Pacific's EV market is becoming increasingly competitive, with both traditional automotive companies and new entrants trying to dominate the industry and pave the way for a clean mobility future. To rise above competition and increase market share, manufacturers need to continuously invest in electric vehicle technology to deliver stunning car designs, superior vehicle performance, longer driving range, and more accessible charging infrastructure.

Reducing time to market is also essential to succeed in the current EV market. Despite the high investments and lengthy processes required for research, development and retooling, EV makers need to quickly adapt to always-advancing technologies and consumer preferences. The ability to launch new EV models and innovations faster and more efficiently than competition would be crucial to drive future business growth in the industry.

Improve design agility and efficiency

The nature of EV components—such as batteries and powertrains—lends itself to design inefficiency. The intricate design and therefore prolonged design cycles needed for optimal performance, safety, and efficiency make it difficult for EV companies to be agile when it comes to product creation. With this comes the risk of taking too long to get to market and creating outdated products before they even reach consumers.

The key to increasing design agility and efficiency is to improve cross-functional collaboration on rapid production of digital concept models and high-quality reviews of visualization models. These technologies reduce the dependence on the physical model and enable rapid design iterations with a high level of digital realism. This helps to achieve a faster and more cost-efficient digital design workflow, and bring a product to market at the intended time.

Get to market faster with product simulation and prototyping

Accelerate time to market with the ability to analyze various aspects of EV design, performance, and functionality faster and without depending extensively on physical prototypes. Not only can manufacturers streamline the design process and expand existing product lines, leveraging immersed reality and simulation tools can also help you create new and innovative products that increase market share.

Meeting customer demands through scalable customization

When purchasing an electric vehicle, consumers—especially eco-conscious millennials and Gen Z—are looking for something exciting, innovative, reliable, and suits their lifestyle and personality. EV manufacturers, therefore, need to not only address concerns about driving range, charging time and pricing, but also create more personalized and flexible experiences that cater to consumer needs and expectations.

Some aspects of electric vehicles might be simpler to produce than a traditional combustion engine automotive vehicle, but if production processes are disjointed and manufacturing is inflexible, diverse customization options will prove to be difficult. With the EV market being primarily driven by global climate change mitigation efforts and with more younger generations opting to purchase EV models, there is an increased need and expectation for personalization in designs and services.

To efficiently adapt to various design configurations, integrate advanced technology for top-quality functionality, and maintain a high-quality standard that meets individual preferences, EV companies must lean into flexible manufacturing processes and invest in operations that not only drive efficiency but allow for customization at scale.

Improve the EV production process to customize and personalize at scale

To enable customization and personalization at scale, EV manufacturers need to look at every aspect of the manufacturing process from raw material through to finished goods. Starting with supply chain management, it's important for automakers to review sources of production materials, especially for critical components like batteries, and develop ways to mitigate risks. Any instability or disruption in the supply chain can significantly impact production and customer delivery timelines.

EV manufacturing facilities also have to meet different product requirements, components, and configurations on the same production line. Leverage the power of flexible manufacturing by generating digital representations of production facilities and equipment before investing in the real thing. This will allow production teams to collaborate, design, validate, and build in an always-up-to-date model.

Meeting consumer demand, however, doesn't just involve improving production facilities or supply chain. The inadequacy of charging infrastructure is a major concern for most EV buyers. They want easily accessible and fast charging infrastructure all around urban and even rural driving routes. This is requiring electrical vehicle manufacturers to work closely with government agencies and other relevant parties to plan, fund and build more charging stations.

Boost efficiency to drive product personalization

Faster, more efficient processes go hand in hand with the ability to cater to individual preferences without meeting mass production inefficiency. For instance, the battery is a critical component of every electric vehicle, and remains relatively expensive, which pushes up production costs and EV pricing. Manufacturers must constantly search for new and innovative ways to reduce battery costs, increase battery energy density and lengthen battery life to improve electric vehicle performance and competitiveness.

EV companies can also push the boundaries of customization, and save costs through modular design strategies and effective methods like generative design. Just as you can replicate physical production equipment with digital factories, EV companies can empower sales, partners, and customers to configure complex products and offerings with efficiency and accuracy.

Reducing waste and meeting government regulations

Reducing environmental impact and embracing sustainable, green business practices would allow EV makers to align with sustainability goals and meet government carbon neutrality regulations, while positioning themselves as a forward-thinking industry leader. With regulations varying across countries and regions, EV manufacturers have the unenviable challenge of needing to adapt to local environmental requirements, and work with specific government or public agencies to help enable widespread adoption of electric vehicles.

Assessing the EV lifecycle is key

Determining overall product impact is critical. Inadequate EVs—ones that produce excessive product emissions during the manufacturing process—can fall short of energy and emission standards, undermining the environmental benefits associated with electric vehicles. This not only affects alignment with sustainability objectives but also exposes EV companies to regulatory non-compliance risks due to factors like overprocessing.

Quantifying the environmental impact of a product and rightsizing for intended use by assessing the EV lifecycle can help manufacturers develop alternative powertrains and reduce material waste. Once quantified, EV companies can then enable sustainable design optimization and build greener products by leveraging key capabilities to support with lightweighting as an example.

Measure sustainability more simply with product and factory simulation

A transparent supply chain is critical for tracking the environmental and social impacts of factors like raw material extraction, manufacturing processes, and transportation logistics. Without visibility into the entire supply chain, you may find it difficult to ensure ethical sourcing, reduce carbon footprints, and meet both government and consumer sustainability expectations.

To tackle that challenge, EV leaders need to embrace change and lead with data-centered mindset toward digital transformation of the physical process. Organizations can gain insights into sustainability bottlenecks, identify environmental inefficiencies, and reduce waste by simulating the production and manufacturing processes and ensuring a transparent supply chain.

Success Story

RIVIAN

Changing how we see utility vehicles

US electric vehicle manufacturer, Rivian Automotive Inc., was founded in 2009 with a mission to protect our planet and the cultures that inhabit it for generations to come. By utilizing hundreds of millions of years of accumulated plant and animal-based carbon, the company produces electric sport utility vehicles and pickup trucks that are more environmentally friendly.

Challenge

With a keen focus on sustainability, Rivian wanted to manufacture vehicles with a faster and more efficient process. The traditional clay modeling would have been a lengthy and costly approach to design and build electric cars. So, Rivian needed to evaluate their design concepts, streamline cross-team collaboration, and speed up their validation process without creating any real models.

Approach

By taking the vehicle from a 2D sketch and visualizing it in 3D form, the team at Rivian could quickly iterate by easily evaluating surfaces, dragging and dropping parts of the vehicle, and putting together a full story using the power of subdivision surface modeling.

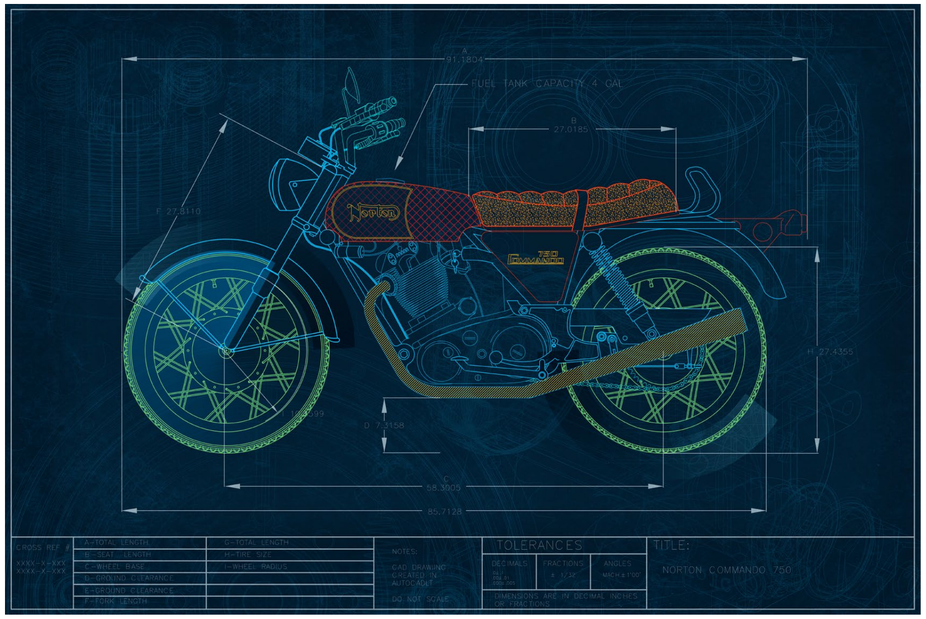
They then applied physical materials directly to the digital model by leveraging their material scanner, allowing them to seamlessly use large amounts of data to quickly view many different iterations of the vehicle and evaluate design more accurately and in more detail than they could using a physical model.

Result

Rivian was able to successfully speed up the design and validation process by streamlining cross-team collaboration among the data, design, and VR teams—a previous pain point for them. The company also succeeded in reducing material costs and increasing sustainability by moving away from traditional clay modeling and digitizing its design studio. The result? Getting to market with a product it was proud of in record time.

> “With digitization, we saved over 32 tons of clay and over $1 million over the life of the project.”
>
> **Trevor Greene**
> Surface Design & Visualization Lead, Rivian

Success Story



ATHER

Designing the vehicles that drive the future

Indian two-wheeler electric manufacturer, Ather Energy, brings passion and purpose to the roads with smart electric scooters that are revolutionizing the commute experience. The Ather 450X has become a frontrunner in the EV market for their enhanced connectivity, superior customer experience, and new-age functionalities.

Challenge

The aim of the automotive design process is to develop a real-scale prototype. Traditionally—and often using clay modeling—this would be a time consuming and costly process. With the immense success of the Ather 450X scooter, Ather Energy wanted to release a second smart scooter: the Ather 450S.

With the EV market at a tipping point of transformation, Ather Energy's newest smart electric scooter needed to give the company a distinct identity and create an aspirational pull. Here, design aesthetics were deemed crucial.

Approach

Ather Energy aimed to increase the speed of their automotive design process, focusing heavily on functionality details, aesthetics, and the ability to scale prototypes.

The company built realistic 3D models from product sketches using fast concept modeling and high-quality precision surfacing functionalities. This sped up the design process significantly which eliminated the need to depend on other CAD visualization tools. Ather Energy was also able to quickly create 3D prototypes that provided flexibility to its design process alongside high-quality rendering capabilities.

Result

Ather Energy was able to make faster decisions, reduce the costs associated with creating physical prototypes, and get the brand-new Ather 450S to market faster.

> “[Autodesk] just streamlines our process in a more efficient way. In terms of exploration too, like the colors, materials, etc. There is no dependence on the physical prototypes now, because these can be done digitally, and further reduces time and improves the decision-making in the design process."
>
> **Swagath Rath**
> Design Manager, Ather Energy

Conclusion: The future of EV manufacturing is seamless, scalable, and sustainable

As the EV experiences rapid growth, technological innovation and a focus on environmental concerns continue to revolutionize the market in Asia-Pacific. Now more than ever, EV companies need to focus on accelerating digital transformation or risk falling by the wayside.

While challenges of agility, time to market, inefficient processes, and meeting sustainability goals continue to appear, it is the responsibility of enterprises to break through these roadblocks in order to not only survive, but thrive in this new tech-led era.

Traditional production processes and manufacturing methods need to evolve. EV companies must be digitalizing operations in order to reduce costs, iterate quickly, improve sustainability, and decrease time to market.

Key takeaways for EV leaders

Improve the collaboration on digital design and VR visualization, and minimize the production of physical models, which can significantly improve design efficiency, save costs, and accelerate time to market.

Flexible manufacturing is paramount to increasing operational efficiency and enabling the customization and personalization of vehicles at scale.

Pay close attention to EV consumers' needs and the great influence of marketing on design. Differentiation is key to enabling you to stand out from the crowd.

Focus on the experience design in the whole design process as consumer expectations will gradually shift from vehicle performance and styling to in-vehicle experience and human-machine interaction in the future.

As society shifts to a cleaner, eco-friendly world, reducing waste and building green business is critical to meeting government regulations of carbon neutrality and exceeding evolving consumer expectations.

Autodesk is a strategic partner to major mobility businesses across the globe and brings advanced technology capabilities to those wishing to digitalize their operations and get to market faster.

We enable mobility businesses like yours throughout the world to accelerate their e-mobility transformation by enhancing sustainability, enabling customization at scale, and increasing operational efficiency.

Visit our content hub for more information or **get in touch with one of our experts** to discuss how we can help support your business ambitions.

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