



## Do You Think You Know Electric Vehicles (EVs)?

Back in 2020, Tesla's global sales and stock price reached a historic new high and hit the headlines. The EV maker announced its first model in 2005, and by 2019 it already had installed 12 thousand superchargers across the globe. This kick-started practical use of EVs in every way but at the same time sent an alarm to component suppliers. Many countries have set a timer for the end of gasoline-powered vehicles. The Taiwanese government set a goal for full implementation and localized production of electric buses in a policy which is expected to make a business scale of NTD 170 billion (USD 6 billion).

Seeing that a death sentence on a large portion of gasoline-powered vehicles is to come about in a few decades and that EV sales are kicking into high gear, Taiwanese automotive fastener companies have begun to worry if they have enough technology and capacity to catch the wave when EVs become the mainstream consumer products. Over the years, Fastener World Magazine heard the calls of Taiwanese automotive fastener companies that the government must be quick to help with the transition from gasoline-vehicle fastener to EV fastener development, which requires monumental funds as well as formation of Taiwanese multi-corporate coalition and supply chains to open up the future EV fastener market.

More importantly, here is a question to those in the fastener industry— Do you think you have a fundamental knowledge of the history, potential and development trend of EVs? Forbes reports that as many as 70% of the Americans do not think they know much about EVs up to this date, let alone the Taiwanese people. Compared to gasoline-powered vehicles already on the market for over a century, EVs have not had stepped up development until 2003 and therefore EVs are shrouded in some kind of mystery to the eyes of the world.

# A Book Review on Future EVs That Could Inspire Taiwan Fastener Industry

by Dean Tseng, Fastener World

That is why the Japanese writer Yoshihisa Murasawa published his Japanese book on the future of EVs (Later sold on Taiwanese bookshelves. See the book cover above). The book provides illustrated explanation of the humongous business opportunities in the transition from gasoline engines to electric motors. Note that Japan has the world-renowned Toyota Motor as the dominator of the gasoline-powered vehicle market, but Toyota was caught off guard by the advent of Tesla EVs. The Japanese began to realize their automotive market was being challenged and started to talk about why the Japanese government and carmakers did not react in time, which lays the background for the writing of this book. Now we are going to delve into the book for the gems that are worth the attention of the fastener industry.

## The Approaching Last Day for Gasoline-powered Vehicles; a Brighter Outlook for EVs

If you'd like to know the number of days left for gasoline-powered vehicles, Norway is the earliest country to mandate full transition to EVs by 2025. For India, it is by 2030, and for UK and France, it is 2040. Furthermore, an increasing number of countries even regulate that



future hybrid electric vehicles will not be regarded as EVs, which means only “pure EVs” will be legitimate to be rolled out on the market.

In 2019, China demanded that carmakers ought to manufacture a certain portion of new-energy vehicles. Hence, lots of new-energy carmakers appeared in China over the past few years, including Nio, Li Auto, XPeng Motors, Leapmotor, and Qiantu Motor. These along with BYD Auto which made its debut in 2003 make China the biggest EV manufacturing country in the world.

Up to 2016, the world saw the sales of 750 thousand EVs, of which China accounted for 44% (330 thousand EVs). China is looking to lift the capacity to 15 million EVs by 2030. The U.S. took the second place at around 160 thousand EVs. Japan at the 6th place saw a merely 30 thousand sales, from which we can sense the anxiety of the Japanese. The remaining 200 thousand EVs were sold in Europe.

The world’s EV production is to escalate to 3.57 million vehicles in two years i.e., by 2023. After full transition to EV, the automotive component market will scale up from 700 billion euros in 2005 to 850 billion euros in 2025. The author wrote down a line which is the linchpin of the issue: **“The empire of gasoline-powered vehicles will be replaced by that of EVs’ within 30 years.”** If reading this line does not give you a sense of the encroaching EVs, it is better for you to have a lookout.

## The People and Things to be Bygone in the Era of EVs

The writer quotes a survey by Bloomberg New Energy Finance that indicates EVs will be cheaper than gasoline-powered vehicles by 2025. Gee, the price lowering of EVs is too fast to fathom! In 2020, the distance of travel by EV batteries was almost as long as that by the engines of gasoline-powered vehicles. EVs are 3 to 4 times more energy-saving than gasoline-powered vehicles. Driving on electricity is more money-saving than on fuel. These phenomena signify gasoline-powered vehicles will be replaced in our generation.

“The future EVs will enter Level Five of unmanned driving capability. Taxi drivers will be out of their jobs. EVs will pick you up at your front door and drive itself back to the parking space after completing the transport,” said founder Eli Liu of Green E2, Inc., the first EV service provider in Taiwan.

Simply put, EVs are installed with electricity-driven motors in replacement of fuel-driven engines. The rest of their structure remains the same as that of gasoline-powered vehicles. In replacement of engines motivating on piston motion, motors motivate on rotary motion and therefore are quiet and vibration free. A more critical change is that the transmissions installed on gasoline-powered vehicles will not appear on EVs. Additionally, the same goes with the brake pedal, while the accelerator remains untouched. Hit the accelerator to speed up and release it to auto-decelerate (break). The author points out other automotive components that will disappear, including “radiator, cooling fan, intercooler, oil cooler, ignition coil, magneto, distributor, electrical sensor, spark plug, and fuel injection device”. The author quotes an estimate by VDA that replacing car engines will affect 600 thousand jobs in Germany.

Think about this— Does the disappearance of gasoline-powered vehicle components mean the same for the fasteners that fasten them? **A gasoline-powered vehicle uses nearly 30 thousand components, 3,500 of which are fasteners (taking up 10%). Switching to EVs will reduce the number of components by 30%, mainly those that are used to provide drive power. How many of the 3,500 fasteners will be cut from the switch to EVs?**

Perhaps you may find this hard to believe, but the author goes as far as to point out that future EVs could be like tramway. Roads will have embedded electric wires or be enabled with wireless power supply. EVs will have power collectors installed on the bottom to fetch electrical power from the roads as their driving force to move forward, like the European tramway. Such EVs won’t even need batteries. Does that foretell the fasteners for fastening the batteries will disappear?

## Three Core Elements of EVs: Motor, Electricity, Control Device

Let’s not frighten ourselves yet. Perhaps we won’t see wireless-power roads and tramway-like EVs coming this fast. Is there any perspective the fastener industry can look at in response to the oncoming tide of EVs?

The 3 core elements of EVs are the motor replacing the engine, electricity replacing fuel, and the device which controls power output. Take Japan for instance, Toyota is at the top of the supply chain of gasoline-powered vehicles. The upmost tier below Toyota are manufacturers of primary components, and further down at the lower tier are contractors consisting of small companies, altogether forming Toyota’s empire of gasoline-powered vehicles. However, EVs disrupted Toyota’s pyramid. In the EV era, a group of EV start-up like the Chinese BYD Motor, Nio, and Li Auto will be the center which the component suppliers (including battery, motor and car body manufacturers) will supply directly. The supply chain will no longer be a triple-tier but a double tier-structure.

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In other words, if Taiwanese fastener companies are adequately capable of supplying EV fasteners, they can take on the challenges and contact EV start-ups, or take a step backwards and make contact with battery, motor, control device, car body manufacturers for a chance to supply, so as to form a supply chain centered on EV start-ups.

We don't have to be concerned that EV start-ups may disappear into thin air, because a new start-up will keep coming up after another and there is only going to be more. As EV motors feature a simpler structure than gasoline engines, they have lower thresholds in manufacturing. More and more countries gradually have the ability to manufacture EVs. Even the emerging small and medium companies can manufacture at lower prices. The most essential question is still this— Exactly how much capability do we have to convert ourselves into EV fastener suppliers?

## A Few Other Examples to Look at

To see if we measure up to the task, let's look at other fastener companies already in the EV field to see what they saw as critical in the development of EV fasteners.

Kevin Peacock from Stanley Engineered Fastening said fasteners could result in power loss on battery packs on EVs. Traditional fasteners are difficult to maintain conductivity. The car's vibration and heat cycles will make the fasteners loosen and lose half the clamp load and affect connectivity with EV and battery terminals. It means EV fastener development requires attention to conductivity and clamp load.

LISI Automotive rolled out an insulating fastener for EVs that satisfies the demand for both fastening and insulation. To

save space, some EV models are installed with a 12V circuit and a 48V BSG (Belt-Driven Starter Generator) on the same spot. LISI's insulating fastener can insulate the circuit from the BSG to prevent danger caused by different voltages, and therefore, can fasten two components of different voltages.

The French Desoutter Tools provides EVs with a series of Norms IEC 60664-1:2007 and IEC 60900:2012 compliant insulated installation tools to prevent operators from an electric shock when they install high-voltage components and connect wires. It means hand tool companies can also supply insulating tools for EVs.

The renowned Sundram Fasteners from India has also begun supplying parts to global major EV makers, and expressed an interest in acquiring EV companies.

Moreover, there are other fastener products on the market that are supplied to EVs, including Flowform®, STRUX®, RIVTEX®, PIAS®, RIVTEX®, Powertite®, Eco-Sert®, and customized fasteners for car body assembly. However, one product also came in as a strong competitor— LOCTITE® adhesives. It is a type of structural adhesives specifically engineered to application in batteries to ensure firm connection between batteries, as well as between batteries and modules, so as to safely fasten and seal the outer cases of battery packs, preventing dust, liquid and moisture intrusion. This is where adhesives can replace fasteners.

These examples tell that fasteners' entry into the EV industry is already an ongoing thing. We must delve into the development trend of EV to acquire the know-how, and try to take the first step to contact related companies and discuss fastener design so that we can discover the next step of the way in fastener development. This is to be accompanied by the industry's call for the support of the government and corresponding policies to put together a Taiwanese EV supply chain. ■



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