

## Special Feature Article

### **Parts Suppliers taking on the challenge of new technologies -Responding to the electrification and intelligence of vehicles-**

Automobile manufacturers are developing new models based on vehicle electrification and intelligence, while at the same time further promoting carbon neutral (CN) compliance. In order to respond quickly to these developments by car manufacturers, parts suppliers are also taking on the challenge of developing new technologies and initiatives to reduce environmental impact, with flexible thinking that is not bound by existing ideas and values.

#### **Established manufacturers develop new e-axle-related technologies**

Evolving in electrification-related areas are the drivetrain components of EVs, with new technologies and developments from various suppliers, particularly with regard to e-axles.

NSK Ltd. has developed a 'centrifugal disconnect module' for use in e-axles. The module functions to reduce losses by disconnecting the e-axle from the driveshaft in situations where driving force is not required, and will first be proposed for the Chinese market. However, in order to win orders in the Chinese market, the speed of development and mass production needs to be accelerated more than ever. Their representative says: 'When we make proposals to Chinese customers, they sometimes ask for mass production in a shorter period than before, such as one year or one and a half years. We would like to make proposals that will enable us to respond to these requests without any problems'.

NTN Corporation is also strengthening its line-up of bearings in order to respond to the evolving e-axle. Bearings for e-axles, which operate on electricity, need to be insulated or energised, as electric corrosion occurs when an electric current passes through them, causing sparks and damaging the metal structure. To address this, NTN Corporation has developed a line-up of 'Resin Mold Insulated Bearing' with an injection-molded resin bearing outer ring for the current circulating in the motor (circulating current), and 'conductive bearings' with conductive rubber seals for the electric poles flowing in the motor shaft (EDM current). With these, NTN Corporation says it is able to respond to all currents for which measures are required for e-axle bearings.

Moves to respond to electric commercial vehicles are also active: IJTT Co., Ltd. has developed an e-axle for rear-wheel drive for medium and small vehicles; TBK Co., Ltd. is researching large EV vehicles and is conducting a series of test runs of trucks equipped with the e-axle at the Tokachi Test Track (Hokkaido). PRESS KOGYO CO., LTD. also intends to work on electrification in Japan, the US, Europe and Thailand in its medium-term management plan that ends in FY2028. They will develop and propose electrification products to meet the needs of each region, including special axles, axle tubes for EVs and frame components for electrified vehicles.

Furthermore, there are examples of e-axles being developed for use not only in electric vehicles, but also in golf carts and other small mobility devices. UNIVANCE CORPORATION has developed 'Type SS' e-axle with two motors and a gearshift mechanism, which, despite having two motors, is tall to fit into an A4-size, and features highly efficient and powerful drive by transmitting power to each motor via gears with different gear ratios depending on the driving conditions. In addition to Japanese manufacturers, sales will be expanded to ASEAN (Association of Southeast Asian Nations).

### **The ability to respond to the recent focus on SDV is also required**

As well as electrification, there is also a need to respond to the 'intelligence of vehicles'. One of these is software-defined vehicles (SDVs), which are defined by software that can be updated to add functions and improve performance. Most recently, Nissan Motor Co., Ltd. and Honda Motor Co., Ltd. announced the signing of a joint research agreement on SDV elemental technologies. As the status of SDVs is expected to increase among auto manufacturers, parts suppliers are also beginning to strengthen their SDV-related research and development systems.

Hitachi Astemo, Ltd. is opening a development base for advanced technology in Shibuya, Tokyo, to further promote the development of advanced technology and SDV-compliant software. Shibuya and its surroundings are home to a concentration of IT companies of various sizes, including US tech giant Google LLC, Japanese IT giants GMO Media, Inc. and DeNA Co., Ltd., and internet-related start-ups. By establishing a base in Shibuya, Hitachi Astemo, Ltd. aims to secure engineers and creators with a variety of technical backgrounds and to speed up the development of SDV-compliant software.

ALPS ALPINE CO., LTD. is rushing to develop products for SDVs in China. In

order to increase the speed of development, they are strengthening its cooperation with Neusoft Reach Automotive Technology Co., Ltd., a joint venture established with China's Neusoft Group. They are discussing specific measures such as selling products to local manufacturers via Neusoft Reach Automotive Technology Co., Ltd.,.

Services to support SDV-related developments have also emerged. The support services by PwC Consulting will provide a wide range of support, including the establishment of systems and mechanisms for software updates required for SDV, hardware R&D work, software business research, and the establishment of cybersecurity systems. They have also launched the SDV Initiative, a specialized organization comprising about 40 people. The organization will be expanded to about 120 people over the next three years in anticipation of increased demand in the future.

### **Increased co-operation with IT and software companies**

In addition to SDV, the use of artificial intelligence (AI) is also attracting attention in intelligence. For example, Sony Honda Mobility Inc. is developing a partnership with Microsoft Corporation to introduce generative AI into in-car systems.

PIONEER CORPORATION is also conducting technical verification on improving the user experience (UX) of its products and services with Microsoft Corporation's generative AI service. It is also considering implementing generative AI in in-vehicle devices and using it for API (interface connecting applications) services.

US-based Cerence Inc, a developer of AI-based in-car voice recognition systems, has recently collaborated with Smart Automobile Co. Ltd., an emerging Chinese EV manufacturer on the development of an in-car voice recognition system using generative AI. In addition, Cerence Inc, has developed the basic technology 'Cerence Chat Pro', which enables integration with the generative AI 'Chat GPT', and has been introduced in all models in the Volkswagen AG's European line-up.

OpenAI, Inc., which is developing 'Chat GPT' with a view to increasing the adoption of generated AI in new vehicle development and in-vehicle systems, intends to open 'Tokyo Office', its first subsidiary in Asia, to expand its sales and support structure.

Research and development related to SDV and generative AI, for example,

requires a large amount of funding as well as the availability of personnel with expertise in software. For this reason, companies are not preparing everything on their own, but are also joining forces with IT companies and software companies that have had little involvement with the automotive industry.

### **Examples of initiatives to reduce environmental impact**

In addition to responding to electrification and intelligence, parts suppliers are required to develop components and technologies that contribute to reducing environmental impact, including CN. Regulations to encourage the reduction of environmental impact are also being discussed, for example, the European Commission's draft 'Regulation on the Design and Management of End-of-Life Vehicles' stipulates that at least 25% of the plastic required for the production of new vehicles must be recycled plastic (25% of which must be derived from end-of-life vehicles).

The number of companies complying with these regulations is expected to increase in the future, and each company is involved in research and development to fulfil its social responsibility as a company while keeping an eye on new regulations. TOYOTA AUTO BODY CO.,LTD. is developing products that use wood as part of the materials for automobile parts. Plant fibers are extracted from thinned wood and combined with thermoplastics to form product materials. The optimum amount of compound is adjusted to ensure strength. In addition to being used in fog light brackets and wire harnesses, they have developed prototypes for door mirror covers and other products that are expected to be put into practical use in the future.

Oji Holdings Corporation has developed 'Tuffcell Pellet VF', a cellulose resin composite pallet with low volatile organic compound (VOC) emissions. The use of wood-derived cellulose as a reinforcing fiber contributes to plastic reduction. They claim that acetaldehyde generated during injection molding can also be reduced by up to 40%. According to them, this is the world's first technology for CN.

Parts suppliers involved in seat-related products are also focusing on developing products that contribute to reducing environmental impact. 'Sustainable Seat E3' developed by FORCIA, Inc., a subsidiary of FORVIA, features a cover made from a single PET material, which is easy to recycle. Metal parts are made from 'green materials' smelted using hydrogen as fuel, reducing the amount of carbon steel used. The aim is to provide sheets with

quality and strength comparable to conventional products while reducing CO<sub>2</sub> emissions during production, including materials.

Delta Kogyo Co., Ltd., which mainly produces seats for Mazda Motor Corporation, is developing a next-generation seat that reduces both weight and environmental impact. All the urethane used in the seat is replaced by beads foam products, and 2D net material is used instead of springs and 3D net material is used as a substitute for the slab pad inserted between the skin material and the urethane. It is said to be approximately 20% lighter than conventional products. The skin material uses Toray Industries, Inc.'s 'Ultrasuede', which contains approximately 30% plant-derived material.

TOYOTA BOSHOKU CORPORATION also proposes the 'Recarbon Shell Sheet', which utilizes recycled carbon fibers mixed with natural fibers from the annual plant 'kenaf' to make sheets. The kenaf reduces the amount of carbon fiber used and CO<sub>2</sub> emissions during production, including materials.

MIDORI AUTO LEATHER CO., LTD. has developed a surface material, 'Coir-Le', which uses approximately 30% fibers from discarded coconut shells. The material contributes to the reduction of CO<sub>2</sub> emissions during production, including materials, by reducing methane gas emitted from the disposal of coconuts and by using plant-derived materials. The skin material is expected to be used for car seats as well as interior materials.

The electrification and intelligence of vehicles and the need to respond to environmental considerations are becoming more important than ever for parts suppliers, which also require a different dimension of development speed at the same time. While making use of know-how cultivated over many years in the automotive industry, parts suppliers are developing products that match the needs of next-generation vehicles through collaboration with other companies, including those in other industries, and by making full use of new components and technologies.