

Special Feature Article

## **Rapidly Expanding** Next-Generation Cockpit Development

~**Multifunctional "integrated cockpits" are the trend**~

Car electronics manufacturers and interior component manufacturers are working to develop cockpits for adoption in next-generation vehicles. This is because the rapid development of electrification, automated driving, sharing, and MaaS (mobility as a service) has shifted the automobile interior from a space for transportation to a space as comfortable as a living space. In addition to the functions required by vehicle occupants, it is also essential to consider the user interface (UI), user experience (UX), and power savings. Advanced elemental technologies from hardware to software are also necessary, and there are many examples of companies working together.

**Leveraging the strengths of individual companies, aiming for winning opportunities in collaboration as well.**

In the development of an "integrated cockpit," one of the next-generation cockpits, it is necessary to improve driver safety and convenience by linking multiple human-machine interfaces (HMI) and outputting necessary information with the most appropriate device. Therefore, in addition to the development of hardware, the development and integration of software to control each device is also essential. Component manufacturers with strengths in each elemental technology, such as electronic components, interior components, and displays, are promoting development by complementing each other in areas other than their areas of expertise through collaboration, while also enhancing their capital strength and materials procurement capabilities.

ALPS ALPINE CO., LTD., in collaboration with interior component manufacturer TS TECH CO., LTD. and NIPPON SEIKI CO., LTD., a manufacturer of heads-up displays (HUD) that project speed and other information on the front window, has begun developing the cabin space of next-generation vehicles, including an integrated cockpit.

ALPS ALPINE CO., LTD. and NIPPON SEIKI CO., LTD. have entered into a capital and business alliance centered on the development of integrated cockpit products in January 2021. NIPPON SEIKI CO., LTD.'s strength lies in the development of meters and HUDs, while ALPS ALPINE CO., LTD. has expertise in car navigation systems and software integration. ALPS ALPINE CO., LTD. Chairman Toshihiro Kuriyama, who was President at the time, states, "There is a limit to what we can do in terms of independent development." NIPPON SEIKI CO., LTD. President Representative Director Koichi Sato also recognizes that "Advanced technology and knowledge are necessary, and we cannot accomplish this alone."

In addition to development, they are building a system of joint purchasing and

production outsourcing. Many of the electronic components and resin materials used in their products are common to each other, and by complementing each other at their global production bases, they expect to improve the cost competitiveness of their products. They hope to achieve mass production of integrated cockpit products by the end of 2025.

ALPS ALPINE CO., LTD. and TS TECH CO.,LTD. jointly developed "XR cabin", a next-generation vehicle interior space for the age of autonomous driving, and announced its release in November 2022. XR cabin is a fusion of TS TECH CO.,LTD.'s development and manufacturing technologies for seats and other interior components and ALPS ALPINE CO., LTD.'s HMI technologies. XR cabin allows users to experience various functions, such as seat arrangement according to the scene, using VR (virtual reality) goggles.

Assuming the cabin technologies required in the era of autonomous driving after 2030, and taking into consideration the installation in EVs, they proposed technologies such as high-efficiency, fast-warming air conditioning that reduces power consumption, stealth (hidden) switches that integrate design and function, and zone-specific sound systems.

Masanari Yasuda, President of TS TECH CO.,LTD., said, "First, we will get people interested in the seats, understand how they will be used in the future and what kind of usage will be required, and then incorporate them into actual vehicles," thereby linking this to the next-generation vehicle interior space business.

Toyota-affiliated parts suppliers proposed new vehicle interior spaces, including next-generation cockpits, at the 20th Auto Shanghai 2023 (Shanghai Motor Show) held recently. Denso introduced a cockpit concept model designed to meet the needs of the "Generation Z" born after the mid-1990s. The cockpit concept was created by conducting a questionnaire survey of Generation Z in China and led by a local development team. A component that symbolizes the needs of the younger generation is a large display for enjoying movies and other entertainment. The concept model uses a 35.6-inch wide display. It is also equipped with a function that allows it to slide to the left or right, so that entertainment functions can be enjoyed during EV recharging time, etc. It is also equipped with a camera that detects the face of each passenger, driver and front passenger, to provide comfort functions tailored to the passenger's preferences. To achieve these functions, the SA8295, a high-performance chip manufactured by Qualcomm Technologies, Inc. of the U.S., is used for integrated control.

Toyoda Gosei Co., Ltd. also prepared a concept model for the Shanghai Motor Show. It proposes an advanced interior space that utilizes "wrap airbags," which are airbags built into the seatbelt.

### Differentiation through proposals that are conscious of living space

Panasonic Automotive Systems Co., Ltd. (PAS), which is engaged in development utilizing the technologies of group companies, will propose next-generation cockpits and vehicle interior spaces optimized for each client group, such as families, seniors, and young

people. PAS will also incorporate the Group's own technologies, such as lighting and sterilization, into its proposals, aiming to win orders from automobile manufacturers and other customers.

For example, in the development of family-oriented vehicle interior spaces, in response to the growing need for anti-virus measures arising from COVID-19 infection, a function to sanitize the vehicle interior with a mist of hypochlorous acid and ultraviolet rays when passengers get off the vehicle has been installed. The hypochlorous acid mist uses the Panasonic Group's patented "Silky Fine Mist" technology. The advantage of this technology is that it evaporates quickly and there is no risk of wetting the seats.

Functions to enhance communication among family members are also proposed. Ceiling lighting changes color to match the scenery outside the vehicle. There is also a function that allows the camera to capture the moment when the occupants are excited by conversation and share it with the in-vehicle display and smart phones.

In addition, the cabin space for seniors incorporates driving assistance functions because "physical functions decline rapidly from the age of 70," according to the person in charge. The HUD mounted in the cockpit reduces the driver's eye movement and makes driving easier.

A sound system that makes it easier to hear sounds from outside the vehicle, such as sirens of emergency vehicles, is also installed. Four directional microphones mounted in the side mirrors pick up outside sounds and play them through speakers built into the headrests. A mascot appears on the dashboard to give advice on safe driving.

PAS is also working on the meter business to realize the integrated cockpit. The person in charge of development says, "The meter business is indispensable (for an integrated cockpit)." In 2010, PAS began studying the possibility of entering the meter business and embarked on development. Mazda Motor Corporation's new SUV, CX-60, is already equipped with a full-display meter for the first time. PAS is making the most of its expertise in car navigation systems and its experience in developing efficient graphical user interfaces.

In addition to hardware, PAS is also working on development in the software domain. They have launched a new brand of cybersecurity technology and services for connected cars, "Versaeus," and has begun global development. A virtualized security solution for next-generation cockpit systems will be developed and applied to the next-generation cockpit systems they are working on.

### Acceleration of technology development related to power saving and miniaturization

Changes in the cockpit have also led to the development of new components. Displays, one of the component parts, are required to support larger screens, odd-shaped designs, and power saving. In particular, the need for power saving is high among automobile manufacturers due to the growing popularity of EVs. In response to this demand, Japan Display Inc. (JDI) has developed a new OLED "eLEAP." JDI expects to use this new OLED

in displays for integrated cockpits and other applications in the future.

HUDs are prominent in next-generation cockpits. NICHIA CORPORATION (President: Hiroyoshi Ogawa, Anan City, Tokushima Prefecture) is applying its Micro Plasma Lighting System (PLS), which uses LED technology, to light sources for HUDs, leading to the miniaturization of HUDs. The Micro PLS can drive 16,384 micro LEDs individually, using micro LED technology with an in-house developed chip and Infineon's built-in LED driver IC. By incorporating the Micro-PLS into HUDs, it is expected to lead to miniaturization and greater design flexibility.

In particular, the new HUD unit is smaller than the 5 to 20 liters of LCD HUDs built into dashboards, which are 1 to 1.5 liters when using the developed product. They say, "With the unit size significantly reduced, we can consider installing it on the ceiling." It can also be flexibly adapted to the diversifying interior designs of next-generation cockpits.

### Digital cockpit market to exceed \$37.6 billion by 2026

The market for automotive cockpits is expected to continue to grow. According to the "Global Market for Automotive Digital Cockpits," by market research firm Global Information, Inc., the digital cockpit market size is expected to increase from \$20.94 billion in 2021 to \$37.65 billion by 2026. The market is expected to grow at a CAGR of 13.2% during the forecast period of 2022-2026. In order to capture the demand for next-generation cockpits, manufacturers are rushing to develop and commercialize next-generation cockpits that incorporate new technologies.