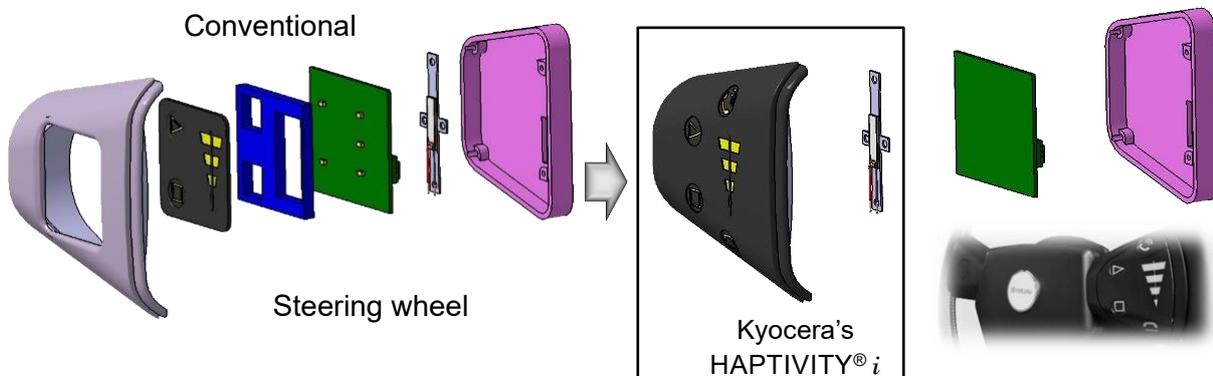


Press Information

Kyocera's New "HAPTIVITY® i" Revolutionizes Human-Machine Interface (HMI)

Patented tactile HMI can be designed into custom 3D shapes; TactoTek's IMSETM technology reduces plastics use, weight up to 80%

Kyoto/London, 13. December 2021. Kyocera unveiled its HAPTIVITY® *i* human-machine interface (HMI) technology — a hybrid innovation combining its patented HAPTIVITY® touch technology with IMSE™, a patented 3D injection-molded structural electronics technology from TactoTek Oy. The result lets designers create HMI solutions in a vast range of 3D shapes, with thinner form factors, fewer components, improved vibration resistance, and significantly reduced weight. Additionally, because they are fully integrated and seamless, HAPTIVITY® *i* solutions offer an interface that is reliable, durable, protected from debris and moisture, and easy to clean.



Kyocera's HAPTIVITY® *i* in comparison

Technology Background

Kyocera's original HAPTIVITY® technology employs piezoelectric elements, a vibration amplification mechanism, a control circuit, and proprietary software to transmit vibration through a panel or display surface when touched and pressed. Biomechanically engineered vibration waveforms can replicate real tactile sensations by stimulating neural mechanoreceptors in the user's fingertip — allowing the user to "feel" physical buttons, for example, and press them, on a panel where no physical buttons exist.



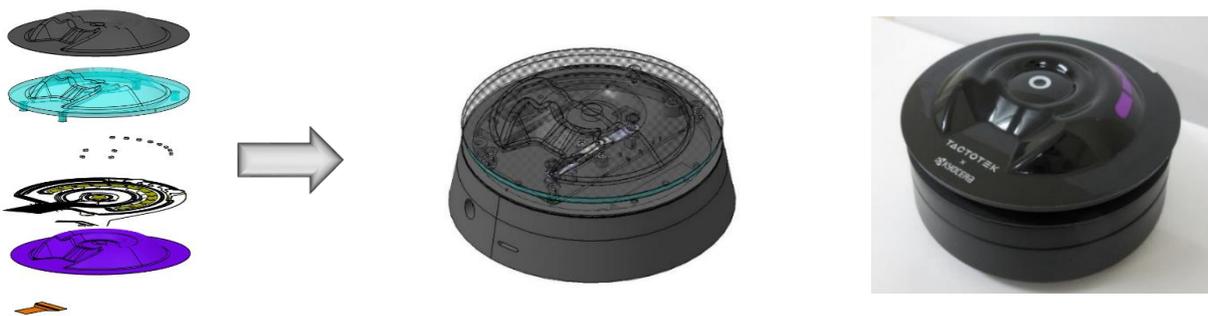
TactoTek's IMSE™ technology integrates printed electronic circuitry and electronic components within 3D injection-molded plastics, providing structure, electronic functions, and cosmetics in one seamless, single-piece, smart surface. Integrated functions commonly include capacitive touch sensing, illumination, and wireless connectivity. Compared to traditional electronics, IMSE™ reduces part-wall thickness up to 95%, diminishing plastics use and component weight up to 80%, and producing 34% less CO₂ emissions “cradle to gate” (from raw material extraction to ready-made products).

The combination promises unprecedented design flexibility and seamless user interfaces. Also, by eliminating wasteful production material and assembly requirements, HAPTIVITY® *i* will help realize eco-friendly HMI solutions for applications demanding high performance, such as vibration-proof structures for automotive controls and easy-to-clean interfaces for consumer products and smart home systems.

HAPTIVITY® *i* Features

1. Thin, seamless 3D design enables new HMI devices

Integrating Kyocera's unique HAPTIVITY® technology into a form factor thinned with IMSE technology creates an alternative to conventional mechanical buttons or a flat touch-panel, resulting in a seamless 3D design that dramatically enhances the user experience.



Jog dial with HAPTIVITY® *i*

2. Combining HAPTIVITY® and IMSE™ reduces components and labor

Conventional HMI technology involves a complex bill of materials that must be procured from multiple suppliers and assembled. In contrast, HAPTIVITY® *i* will offer designers the potential to integrate decorative elements, lighting, touch switches, pressure sensors, tactile actuators and other components into a single module, greatly reducing procurement, assembly and labor requirements.



Kyocera will continue to develop modules equipped with HAPTIVITY® *i*, integrated with a wide range of other Kyocera products and technologies to advance cutting-edge HMI applications. For more information on how HAPTIVITY® *i* technology can support your HMI requirements, please contact Kyocera at webmaster.pressql@kyocera.jp.

For more information on Kyocera: www.kyocera.de

About Kyocera

Headquartered in Kyoto, Japan, KYOCERA Corporation is one of the world's leading manufacturers of fine ceramic components for the technology industry. The strategically important divisions in the KYOCERA Group, which is comprised of 307 subsidiaries (as of March 31, 2021), are information and communications technologies, products which increase quality of life, and environmentally friendly products. The technology group is also one of the most experienced producers of smart energy systems worldwide, with more than 45 years of know-how in the industry. The company is ranked #603 on Forbes magazine's 2021 "Global 2000" listing of the world's largest publicly traded companies.

With a global workforce of over 78,000 employees, Kyocera posted sales revenue of approximately €11,74 billion in fiscal year 2020/2021. The products marketed by the company in Europe include printers, digital copying systems, semiconductor-, fine ceramic-, automotive- and electronic components as well as printing devices and ceramic kitchen products. The KYOCERA Group has two independent companies in the United Kingdom: KYOCERA Fineceramics Ltd. and KYOCERA Document Solutions Ltd.

The company also takes an active interest in cultural affairs. The Kyoto Prize, a prominent international award, is presented each year by the Inamori Foundation — established by Kyocera founder Dr. Kazuo Inamori — to individuals worldwide who have contributed significantly to the scientific, cultural, and spiritual betterment of humankind (approximately €763,000* per prize category).

*Date of Survey: June 18th, 2021

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