

Nippon Koei Co., Ltd.

August 3, 2020

Nippon Koei Jointly Develops Flywheel Energy Storage System Flystab®

The long-life, high-speed charge/discharge energy storage system contributes to achieving a stabilized electric power system

Nippon Koei Co., Ltd. (Headquartered in Chiyoda-ku, Tokyo; Representative Director and President Ryuichi Arimoto. Hereinafter referred to as “Nippon Koei”) has developed Flystab®, a mass-produced flywheel energy storage system, in collaboration with STORNETIC of Germany (Headquartered in Jülich, Germany; Representative Director and President Stefan Kirchhoff), using a business subsidy provided by Fukushima Prefecture to support empirical research on technologies related to renewable energy. Furthermore, we have also developed a hybrid energy storage system that combines Flystab® with other power storage systems such as lithium-ion batteries. To verify the practicality of the system, we conducted a verification test in a simulated microgrid environment working together with the National Institute of Advanced Industrial Science and Technology Fukushima Renewable Energy Laboratory (FREA).

Flywheel energy storage systems are mechanical energy storage systems that store (charge) electric power as kinetic energy by rotating a disk (flywheel) with electric power, and then convert (discharge) the kinetic energy back to electric power when necessary. Flywheel energy storage systems are attracting attention because of their long-lasting and faster charge/discharge performance compared with other energy storage systems that utilize chemical reactions such as lithium-ion batteries and lead-acid batteries. Furthermore, as they store power by mechanical means, they are environmentally friendly. Nippon Koei has been focusing on flywheel energy storage systems and pushing ahead with their development since 2018 in partnership with STORNETIC of Germany, an advanced country in terms of the introduction of renewable energy. This time, we have succeeded in commercializing Flystab®, which is a mass-produced flywheel energy storage system capable of extension to a wide range of applications with small to large capacity.

In Japan as well, when the introduction of renewable energy sources, such as photovoltaic power and wind power, is further promoted in the future and the power supply-demand balance becomes unstable, the need for energy storage systems is expected to increase to stabilize the balance. Currently predominant lithium-ion batteries and lead-acid batteries are relatively inexpensive, but their life is shortened when they are repeatedly charged and discharged. To address this challenge, Nippon Koei has developed a new hybrid energy storage system that combines Flystab®, which has long-life and high-speed charge/discharge features, with a conventional energy storage system. In addition, we have developed in-house an energy management system (EMS) that controls the hybrid energy storage system and conducted an operation test under actual use conditions in a simulated microgrid environment that was built at FREA. Through such test, it was verified that the system can remarkably reduce the charge/discharge current and the number of charge cycles of lithium batteries and lead-acid batteries, since Flystab® absorbs the short-period fluctuation of the frequency fluctuations.

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Tests of energy storage systems that use flywheels for power systems have rarely been conducted in Japan, but they are used in the frequency regulation market and for microgrids in Europe and the United States. Nippon Koei aims to widely publicize the advantages of the hybrid energy storage system that uses Flystab[®] in Japan and in other Asian countries, and to aggressively expand its business to markets where there is a strong need for long-life and high-speed charging/discharging systems.

Nippon Koei will take advantage of its strength as a comprehensive construction consultant and continue contributing to the creation of a low-carbon, recycling-oriented society by actively promoting environmentally-friendly energy businesses.



Appearance of Flystab[□]



Inside of Flystab[®] (The green cylinder is the flywheel)



Verification in a simulated microgrid test room (at FREA)

■Nippon Koei Co., Ltd.

Representative: Ryuichi Arimoto (Representative Director and President)

Established: June 7, 1946

Head office address: Chiyoda-ku, Tokyo, Japan

Business description:

The Nippon Koei Group is the number one civil engineering consultants in Japan, which supports the safety and security of people all over the world. Since being established in 1946, Nippon Koei has been involved in solving social issues via business in the field of social infrastructure maintenance, as the leading company of civil engineering consultants in Japan. The company now provides sustainable business related to the basis of building nations and human resources in over 160 countries and regions around the world.

The Nippon Koei Group implements reforms according to the changing needs of the times, while achieving improved profitability and sustained business expansion.

Website: <https://www.n-koei.co.jp/english/>

■STORNETIC GmbH

Representative: Stefan Kirchhoff

Established: 2013

Location: Jülich, Germany

Business description:

STORNETIC was founded in 2013 as a spin-off of the Rotating Technology Division of ETC (British company), which holds the largest share of the gas centrifuge market. It is a global company that develops and manufactures safe and secure extremely high-speed rotary components and markets them in Germany and other countries throughout Europe. As an innovation driver in the field of energy management, it has been providing dependable and sustainable energy storage devices.

Website: <https://stornetic.com/>