

Iknow Machinery, Nippon Paper Industries, and NYK Demonstrate World's First

Automatic Wood-Chip Discharging Operation with Actual Cargo

-- Reducing the burden on wood-chip cargo-handling crane operators --

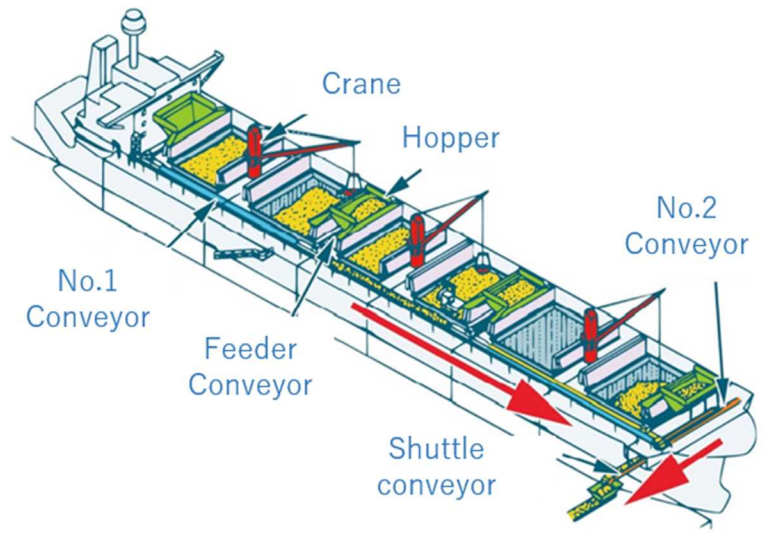
Iknow Machinery Co., Ltd.
Nippon Paper Industries Co., Ltd.
Nippon Yusen Kabushiki Kaisha

Iknow Machinery Co. Ltd. (hereinafter "Iknow Machinery"), Nippon Paper Industries Co. Ltd. (hereinafter "Nippon Paper Industries"), and Nippon Yusen Kabushiki Kaisha (hereinafter "NYK") have conducted a cargo handling trial of the world's first automatic crane operation system, which was developed for wood-chip carriers by Iknow Machinery. The trial was performed at Tomakomai port (Hokkaido Prefecture, Japan) in late August and enabled the three companies to confirm the effect of the system to reduce the burden on wood-chip cargo-handling crane operators.

Background

Wood chips loaded on wood-chip carriers are discharged using a dedicated crane installed on the ship. The discharging work is a repetitive work of capturing the wood chips loaded in the cargo hold of the ship with a special grab that is a part of the onboard crane, pulling the grab up, and throwing it into the hopper (a saucer-shaped stage) installed on the upper deck. Crane operations for discharging work are carried out by professional licensed drivers, not by the ship's crew. Crane operators usually work day and night, and when discharging all cargo at one port, they work continuously for about three days.

- Wood-chip carrier parts



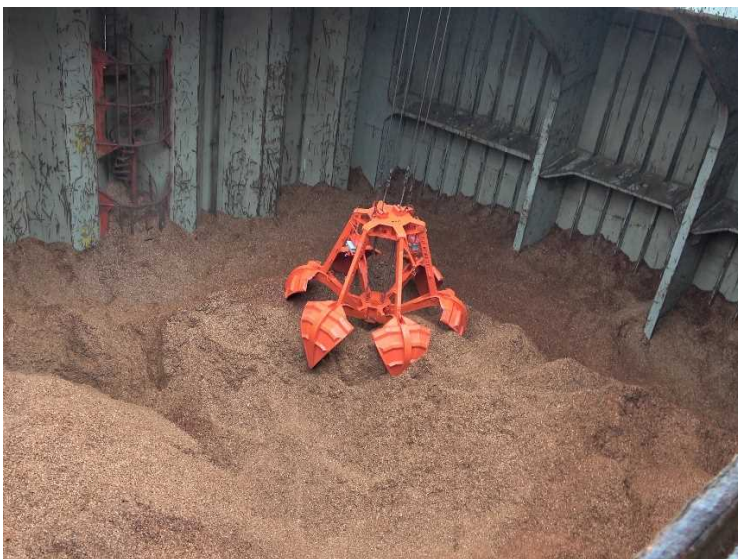
- Crane



- Grab before capturing cargo



- Grab capturing wood chips



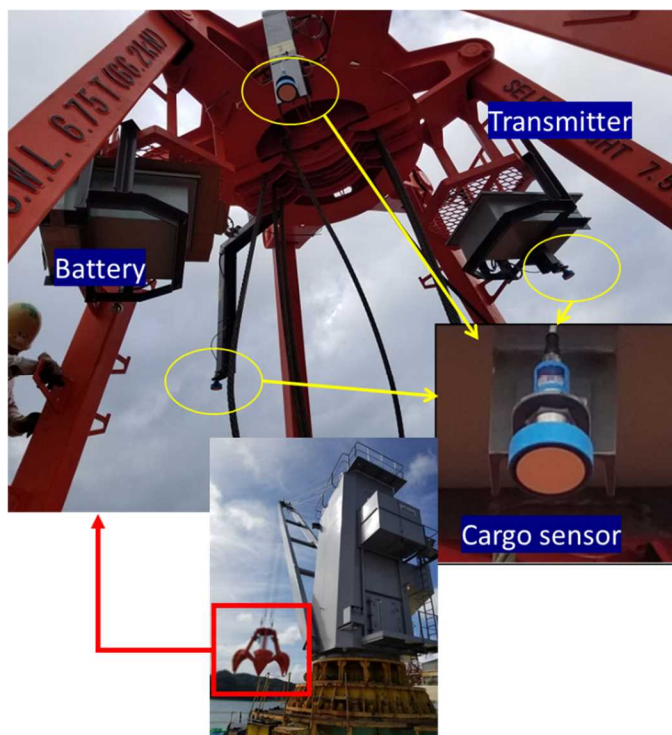
Iknow Machinery, a manufacturer of marine products, including deck machinery such as cranes, has been conducting research and development on automatic crane operation to reduce the work burden of crane operators. This is being done with the support of Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT) for the introduction of cutting-edge vessels. Nippon Paper Industries, which arranges crane operators, has made it an issue to reduce the burden on and improve the work environment of crane operators. NYK has been aiming to share social issues with stakeholders involved in the supply chain and solve them by working from all possible perspectives while promoting ESG management. With this background, and together with the understanding and cooperation of the shipowner,

management company, and other related parties, the three companies conducted this cargo handling trial.

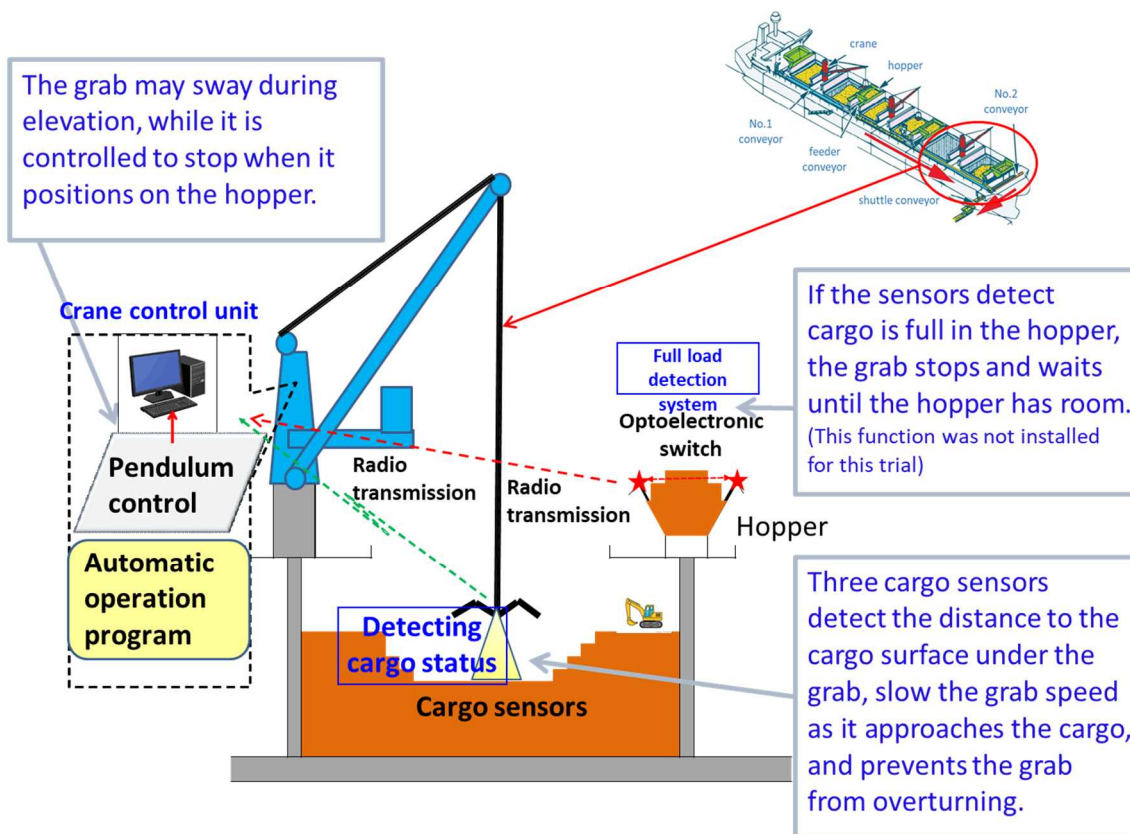
Outline of cargo handling trial

The crane automatic operation system is designed to carry out discharging work once a crane operator uses an operation panel installed in the cab of the onboard crane to select one of the pre-set types of routine movements. Three sensors attached to the grab detect the surface of the cargo loaded in the cargo hold, and they wirelessly transmit a signal to the crane. The grab then rolls down, slows down its speed as it approaches the surface of the cargo, and lands on the cargo. For the sake of safety and efficiency, the system is equipped with a grab fall-prevention function and a hopper full-load detection sensor.

- Cargo detection system built in the grab



- Overall view of the crane automatic operation system



In this cargo handling trial, the automatic crane operation system was retrofitted on the onboard crane of the vessel Growth Ring, a wood-chip carrier engaged in a long-term contract between Nippon Paper Industries and NYK. With the attendance of the crane operator, the crane with the automatic crane operation system carried out discharging work for about four hours. The trial confirmed that this automatic crane operation system enabled the crane to handle about 70% of the cargo, which was the initial target of the trial. The attended crane operators gave comments such as “it was easier to handle this automatic operation system because it works just by buttons being pushed” and “the operation was safe enough.”

Going forward, Iknow Machinery will commercialize this system by taking advantage of the effectiveness of the automatic system confirmed in this trial. Nippon Paper Industries will consider installation of the automatic system on wood-chip carriers, and will further work to reduce the burden on and improve the work environment of crane operators. NYK will further cooperate in the development of technology to reduce the burden on crane operators, and will work to resolve social issues throughout the supply chain as a sustainable solution provider while pursuing safe operation, which is the basis of ESG management.

Overview of each company

- Iknow Machinery Co., Ltd.

Headquarters: Sasebo City, Nagasaki Prefecture

Representative: Shinji Nonaka, Chairman and President

Website: <https://www.iknow-m.jp>

- Nippon Paper Industries Co., Ltd.

Headquarters: Tokyo

Representative: Toru Nozawa, President and CEO

Website: <https://www.nipponpapergroup.com>

- Nippon Yusen Kabushiki Kaisha (NYK)

Headquarters: Tokyo

Representative: Hitoshi Nagasawa, President

Website: <https://www.nyk.com/english/>

Contact for inquiries

- Iknow Machinery Co., Ltd.

Business Department

Tel: +81-956-47-3113 ✉ business@iknow-m.co.jp

- Nippon Paper Industries, Ltd.

TEL: +81-3-6665-1016 ✉ pr@nipponpapergroup.com

- Nippon Yusen Kabushiki Kaisha

Corporate Communication Group, Media Relation Team

Tel: +81-3-3284-5190 ✉ NYKJP.ML.MEDIA@nykgroup.com