

# Value Creation Story

Hitachi offers a host of solutions to the problems society faces. To develop these solutions, we maximize our strengths, OT, IT, products we have accumulated over the years, along with the technological capabilities, knowledge and know-how we have amassed through projects. Here, we introduce a global co-creation project in which Hitachi reduces CO<sub>2</sub> emissions and helps resolve the issues customers face.

## “AI Captain” to Curtail Fuel Costs and Optimize Travel Routes

### Co-Creation with Stena Line, One of Europe's Leading Shipping Lines, to Optimize Fuel Efficiency and Voyage Planning

Here, we introduce a flagship project that demonstrates how Hitachi is cultivating social innovation. For this project, Hitachi has partnered with ferry operator Stena Line to reduce ships' fuel consumption costs and minimize environmental impact by introducing artificial intelligence (AI) technology.

#### Integrating Digital Technologies and Hitachi's Products

Hitachi has created value by capitalizing on its three core competencies: operating technologies (OT), which the Company has built up over more than a century of manufacturing; cutting-edge information technologies (IT), which have a solid track record dating back more than half a century; and products, which the Company has developed and manufactured since the time of establishment based on its own technologies.

On top of these value sources, Hitachi has developed the Lumada IoT platform as a system for deriving value from data. Making use of its cutting-edge AI technology, the Company is providing various solutions even in new fields and industries where it does not play a direct role.

In June 2018, Hitachi partnered with Stena Line, one of Europe's largest ferry operators, to introduce AI and machine-learning in shipping.

In this project, although Hitachi does not manufacture the vessels themselves, it is developing an effective solution for Stena Line based on its solid understanding of IT requirements (such as edge-processing capabilities), its AI and machine-learning capabilities, and operating technologies developed and accumulated through the manufacture of other Hitachi products.

#### Delivering Global Solutions through Collaboration with Customers

Stena Line, which transports 7.6 million passengers, 1.7 million cars and 2 million cargo units each year, has taken on the huge challenge of becoming the world's leading cognitive shipping company by 2021. To this end, optimizing fuel and voyage

planning are two of the highest priorities. While shepherding ships from a voyage's start to finish, crews are tasked with minimizing fuel consumption and respecting the expected time of arrival (ETA).

Fuel represents a major cost for shipping companies, so controlling consumption is a vital concern. Also, less fuel used means lower emissions. Stena Line is at the forefront of the shipping industry's efforts to reduce its environmental footprint. Accordingly, pursuing fuel efficiency and optimized shipping serves the dual purpose of improving financial performance and environmental impact. This is well in line with Stena Line's vision of “Connecting Europe for a Sustainable Future”.

In 2017, Hitachi and Stena Line started discussing ways to improve operational performance through advances in artificial intelligence and machine learning. This collaborative project involved three Hitachi entities. The Social Innovation Business Unit, which has data scientists experienced in marine analytics, initiated discussion with the customer. Hitachi Consulting acted as a project management partner, providing data scientists with experience in data analytics and visualization. The Center for Social Innovation Europe's Automotive and Industry Lab developed the core AI model for the project based on its vast experience in AI, deep/machine learning and general data analytics.

To develop a practical, feasible solution, Hitachi's team has conducted multiple rounds of workshops to better understand the customer, potential problem areas and the operating environment. The team accessed historical shipping data, applying machine learning algorithms to generate insights on how to reduce fuel consumption. In these ways, the team



sought to identify common characteristics of fuel-efficient operations and extrapolate these findings across the fleet.

The team discovered that weather conditions and the action of captains were major contributors to fuel consumption. Collaborating closely with Stena Line, Hitachi inspired Stena Line to create an AI-based technology that learns captains' practices, such as operating parameters corresponding to low fuel consumption, and then recommends fuel-efficient operating parameters for upcoming trips.

With the help of AI, Stena Line's captains can simultaneously consider several variables, such as currents, weather conditions, shallow water, and speed through water, all of which would be impossible to do manually. Once installed in a vessel, the crew monitors the ship and AI system, intervening only when necessary—such as reducing vessel speed due to traffic. The technology, dubbed AI Captain recommends fuel-efficient voyage plans in terms of propulsion power and speed for given weather and environmental conditions (such as winds, sea current, waves and sea depth), as well as vessel characteristics (such as loading conditions and hull roughness). Initial trials of the AI-based model have been very successful and Stena Line's current goal is to roll out AI across the entire fleet by 2021.

### Values Hitachi Delivers

Modern-day society faces major changes and a host of challenges, from energy and environmental issues to water scarcity, rapid urbanization, an aging society, insufficient infrastructure and security needs. Amid these circumstances, Hitachi is committed to providing value to stakeholders by improving quality of life (QoL) and realizing a sustainable environment.

With the Stena Line Project, Hitachi has inspired Stena Line to create a cross-functional team that combines seamanship, mathematics and technology and to deliver social, environmental and economic value through AI and machine-learning.

Optimizing shipping reduces fuel consumption, lowering emissions of CO<sub>2</sub>, NO<sub>x</sub>, and SO<sub>x</sub>. Rather than replacing the captain and crew, the AI technologies aimed at extending their expertise to allow for better decision-making and execution.

In addition to social and environmental value, considering the success of AI Captain, Hitachi is developing a core solution that can be scaled across the industry, which could drive revenues and profit for Hitachi. The solution could also help Hitachi gain market recognition in a new business segment and to develop cutting-edge AI technology.

Going forward, Hitachi will keep providing innovative solutions and creating social, environmental and economic value.

# Value Creation Story

## Ride a Train or a Bus, Using Only Your Smartphone

Hitachi Rail STA Starts Proof of Concept of a Digital Ticketing Solution for a Public Transportation Operator in Italy



In May 2019, Hitachi Rail STA S.p.A, a Hitachi subsidiary operating in the railway systems business, entered an agreement with Trentino Trasporti S.p.A to carry out proof of concept (PoC) of a new digital ticketing solution for the public transportation operated by Trentino Trasporti, including Trento-Malé-Mezzana Railway and buses in the vicinity of Trento, Italy. The digital ticketing, which uses smartphones as tickets, leverages the Hitachi Group's experience in ticketing and digital technology.

With this solution, passengers install an app on their smartphones that allows position information to be read by vehicles (such as train cars and buses) and at waypoints (train stations and buses). The ticketing solution then determines when a person is using public transportation, automatically calculates the fare, and charges that fare to the passenger in a cashless transaction.

The solution allows passengers to ride multiple types of public transportation without the need for paper tickets or IC cards, making movement seamless and more convenient. For operators of public transportation systems, the system reduces the need for ticket machines, ticket wickets and other equipment, lowering equipment investment and maintenance costs. With this proof of concept, we are making travel more convenient for passengers by allowing them to seamlessly take multiple modes of public transportation in comfort.

Once the digital ticketing solution is approved by Trentino Trasporti and the service launches officially, Hitachi Rail STA will start selling tickets for the public transportation system, receiving a share of the revenues from ticket sales.