

Materiality: Creation of New Customer Values



Construction investments have been steadily growing, while the industry urgently needs to address labor shortages and workstyle reforms, which signals that plants' need for automation and remote operation will just keep growing. Nikko is committed to creating new customer values by delivering operation support, including advanced automatic control of asphalt plants and ready-mixed concrete plants and remote operation.

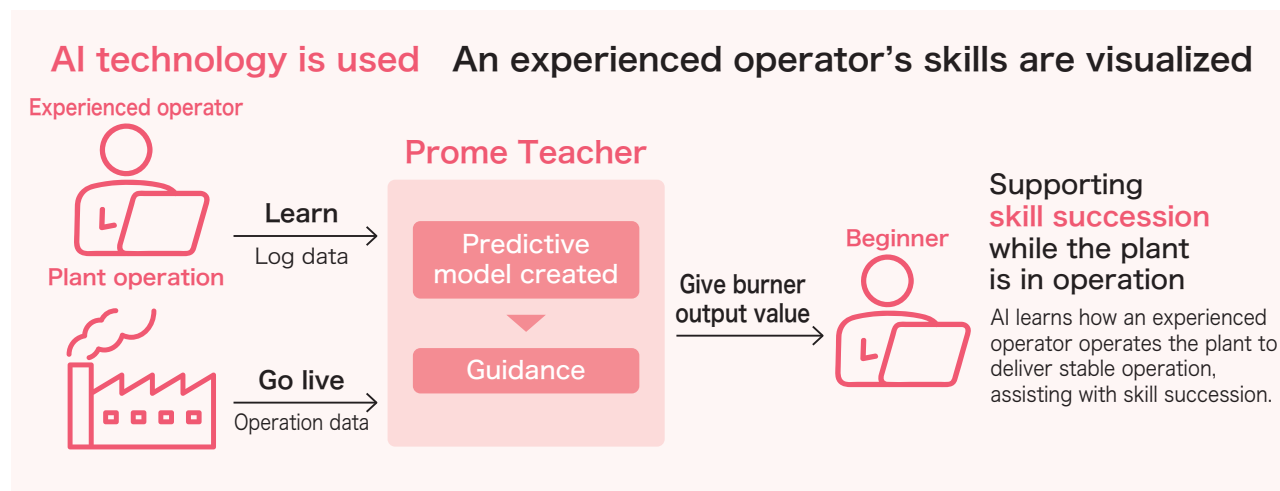
Automatic plant operation by an AI-driven operation support system

Nikko actively pursues the development of AI technology-driven automated products geared to address issues facing customers in order to become "a business partner that supports customers through operation and maintenance services," the 2030 Vision it has set out. The means of optimum burner control to keep aggregate at a certain temperature, which is used in the processes of heating and drying asphalt mixtures, varies according to the conditions of aggregate. Hence, the issue in the control that remained unresolved for a long time was that the length of temperature control, fuel consumption, and the quality of each mixture considerably varied depending on operators' skills. In addition, skillful maneuvers by experienced operators are supported by know-how and

implicit knowledge that words cannot describe, which makes the transfer of the skills challenging. For this reason, new operator training required massive time and effort.

Given this challenge, Nikko developed Prome Teacher for Burner, an AI-driven operation support system designed to assist with skill succession while a plant is in operation. At the demonstration experiment in June 2024 conducted in a customer's mixture plant, it was verified that the system operates as accurately as an experienced operator. This achievement marks a key milestone on the road toward the full automatic operation of an asphalt plant. We will continue to make improvements to the system to make it fit for practical use.

Sketch of Prome Teacher for Burner



CO₂ emissions from asphalt plants make up about 0.1% (approx. 1.15 million tons) of the total annual CO₂ emissions in Japan. Cutting these emissions is an urgent task. As part of energy conversion, ammonia fuel that does not produce CO₂ are expected to become widely available also for industrial use from 2030 or thereafter. With this prospect in view, we will be creating new customer values through the development of combustion technology.

Development of hydrogen burners for asphalt plants using ammonia-derived hydrogen

We have begun the development of the world's first* asphalt plant designed for use with hydrogen burners that is fueled by hydrogen converted from ammonia onsite. This development aims to put the next-generation fuel to practical use at asphalt plants by converting ammonia, which has issues in its combustion properties, into a mixture of hydrogen and nitrogen on the ground to be used as fuel for the burners. Ammonia is highly storable and transportable, while hydrogen has clean combustion properties. Hence, the development is to add a new option to the choice of sustainable fuels used at asphalt plants by combining these features of the two gases. During the initial phase of the development in FY2023, we conducted an in-house combustion test using a mixture of hydrogen and nitrogen generated from ammonia. As a result, we confirmed that operation using a 500 kW hydrogen-fired burner is possible. We also confirmed that NO_x concentration in exhaust gas produced by combustion is well below the regulatory values imposed on plants, indicating we have taken a crucial step towards practical use. In FY2024 (February 2025), we conducted a joint demonstration experiment with a customer as part of the process of turning the technology to practical use. We examined the practicality and operational effects of the system from multiple angles, secured the quality of asphalt mixtures equal to the quality of products produced by conventional plants, and confirmed that the system enables operation that produces zero CO₂ emissions, and various exhaust gases under regulatory values. Based on these outcomes, we plan to bring the system into full operation at asphalt plants by 2027. With the launch and installation of the system across the industry in view, we aim to actualize sustainable next-generation plant operation.

*According to research by Nikko