Self-Healing Asphalt Pavement

A crevice cracks open the buried capsule, causing oil to flow for a repair.

Technology maturity level: Medium
Expectation for 2030: 7.1

A technology that enables asphalt pavement to repair itself when it is cracked is soon to be available for practical use.

Capsules that contain oil and are about 1.5 mm in diameter and steel fibers are mixed into the regular asphalt mixture. If the pavement surface course is cracked, the oil flows out of the capsules. The main roles of the oil are to fill cracks, and to make the aggregates easier to bond together by softening the degraded asphalt.

The technology is expected to reduce repairs of scraping the cracked road surface and covering the road with new pavement, and to contribute to reduced CO2 emissions.

Figure: Self-healing asphalt pavement in the Netherlands is being checked up for the service conditions in five years after it was constructed.

A simple process consisting of placing a special apparatus on the pavement surface and heating enables recovery from degradation.

(Photo by Toshihiro Yamada)

Taisei Rotec and Aizawa Concrete have a joint research project on self-healing asphalt pavement, and are planning to perform trial construction in the fiscal year 2021 in a location where the pavement is assumed to be subjected to the passage of vehicles.

The self-healing asphalt pavement was developed by Professor Erik Schlangen of Delft University of Technology in the Netherlands. In the Netherlands, the construction of self-healing asphalt pavement took place on more than 20 roads, mainly on expressways.

In a certain amount of time after the pavement, a special apparatus is placed on the surface of the pavement for the forced repair. This raises the temperature of the steel fiber mixed into the asphalt, and melts the hardened asphalt, causing the aggregate to be rebonded.

Aizawa Concrete concluded a franchise agreement with Epion, a Dutch start-up firm which had an exclusive license to use this technology in 2018, and proceeded with technology development in collaboration with Taisei Rotec with the aim of putting it into widespread use in Japan.

They performed repeated bending fatigue tests on specimens of dense-graded asphalt mixture with steel fiber added. During testing, a specimen was destroyed, and then heated, and the heated piece was re-tested with a machine. The results showed that about 50% of the original fatigue cracking resistance was recovered.

(By Masahiko Manabe, Nikkei Construction / Nikkei XTech)