

AUTOMATIC ANTI-ICING SPRAYING SYSTEM ON THE WEST HIGH SPEED DIAMETER IN SAINT-PETERSBURG

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The highway West High Speed Diameter (WSHD) is a complicated engineering object comprising flyovers, bridges and tunnels over more than its half-length. It consists of low and high sections and stretches over 46 km under the influence of different local climate conditions. Road surface temperature and conditions are influenced by a wide range of meteorological, geographical and road construction parameters.

The Automatic Anti-Icing Spraying System (AAISS) has been installed on the WSHD and put into operational use since 2017 to facilitate the highway capacity and safety. Installation sites are seven sections of the highway with a small radius of curvature and high-elevated bridges. The AAISS is comprised of a storage tank, a pump and delivery system. The number of spray nozzles varies from 50 to 200 depending on the length of the section. Each section has RWS, which controls air temperature and humidity, wind parameters, rainfall intensity, temperatures of road surface and at a depth of 10 cm, surface conditions including grip. The RWIS MeteoTrassa (1) collects data from RWSs and manages of the AAISS starting on the basis of algorithms with precipitation and road icing nowcasts taken into account. Doppler weather radar data enables to nowcast precipitation for two hours ahead in terms of onset and cessation of rainfall, precipitation phase, intensity, amount of rainfall for separate sections of the highway. The MeteoTrassa provides nowcasts road surface temperature and icing for each section based on a local atmospheric boundary layer numerical model. When predetermined threshold values are met, the MeteoTrassa initiates spray program automatically. Operator is also able to start spraying in manual mode. Conventional treatment strategies (e.g., plowing and salting) supplement the AAISS if slush or snow accumulates on the road.

For a year of operation the system has proved to be an effective mean of emergency slip prevention in difficult weather conditions.

References:

1. T. Bazlova, N. Bocharnikov, M. Vinogradov, A. Solonin. Road weather forecasting for a ring highway. In: Proceedings of SIRWEC 16th Inter-national Road Weather Conference, Helsinki, Finland, 23-25 May 2012.