

OPTIMIZING SURFACE CONDITION MANAGEMENT

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The Boschung Group has a rich history of more than 70 years of activity in the field of mobile and stationary surface condition management. Electronic developments led, in the 70's, to the establishment of Boschung Mecatronic with the installation of the first ice early warning system and fixed automated thawing system.

Indeed, Boschung was the first company to design active pavement sensors to detect the freezing point temperature on the road surface. This is nowadays still the only approach that can detect the freezing temperature, in anticipation and with high precision, in order to take preventive action against the formation of ice layers (see [1]).



Fig. 1. IT-ARCTIS (left) and IT-Sens (right) pavement sensors.

The combination of several pavement probes and atmospheric sensors are offered as ice early warning stations GFS3000 and RCM500-NT. Latest developments in this field are the following: the RCD system, the multi-sensor r-weather and the non-invasive sensor r-condition.

The RCD system (Runway Contaminant Depth) is an arrangement of pavement sensors that allows the air traffic management to determine the type of contaminant and the thickness of the film on runway airport, in order to eliminate friction tests that are traditionally done by vehicles.

The r-weather is a compact atmospheric sensor combining the measuring functionalities for the most important weather parameters in one unique enclosure. It provides precipitation type, precipitation intensity, precipitation quantity, visibility, air temperature, relative humidity, barometric pressure, dew point, wind speed, wind direction. Making use of optical backscattered technologies, the instrument provides very accurate measurements.

The r-weather moreover has a unique design that reduces maintenance needs and guarantees for long-term reliability. By use of pressurized air, the optical parts can be automatically cleaned to make sure that insects, spider webs, dust, water or snowflakes are kept off the optics. For winter environments, a heating system is available, which avoids the creation of ice and moisture on the lenses.



Fig. 2. r-weather (left) and r-condition (right).

The r-condition is a sensor designed to monitor, remotely from the pavement, the road condition, the pavement temperature and detects the appearance of water, snow and ice formation. Thanks to a near infrared laser system, backscattered signals are analysed in real-time. Easily installed on a mast or an existing structure, it does not require any installation in the pavement.

Boschung Mecatronic's comprehensive solution portfolio for surface condition management is completed with Fixed Automated Spray Technology (FAST) systems, the universal vehicle control unit vpad and the management software BORRMA-web.

FAST systems are proven systems for increasing road safety and improving the flow of traffic in critical areas. They are automatically controlled by ice early warning systems. Before ice can form, they spray the road surface with de-icing chemicals in a uniform manner, using spray nozzles at the side of the road, spray discs in the road surface or by means of the innovative Micro-FAST technology. This guarantees the efficient, cost-effective and ecological spreading of the de-icing agent and reduces the risk of ice-related accidents.

The vpad (vehicle pad) is the control unit for the operation and monitoring of spreader, communal engineering systems as well as vehicle equipment. It enables the optimization of spreading interventions with the capability to setup the spreading patterns as well as to prepare the route with a navigation module. All information is recorded and transferred automatically to the data collection software BORRMA-web.

The software BORRMA-web (BOSchung Road and Runway MANAGEMENT system) collects different data from ice early warning systems, FAST systems and vehicles with vpad on a central database. The different data are shown in real-time on an interactive map, by use of a web browser or in the smartphone-based RWIS App, the latter being a necessity to ensure the mobility of the winter service operators [2].

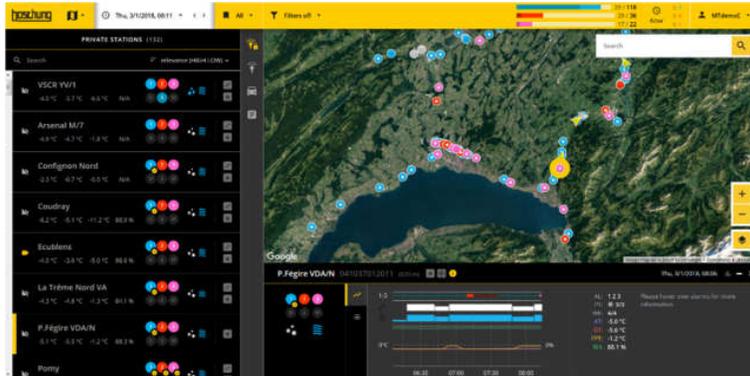


Fig. 3. BORRMA-vision.

References:

1. Donau, P., **2000**, Water Film Thickness Measurement on Road Surfaces by Means of an Early Warning Sensor, *Proc. of the 10th SIRWEC Conference*, Davos, Switzerland.
2. Cypra, T., **2016**, Winter Maintenance Management System Goes Mobile, *Proc. of the 18th SIRWEC Conference*, Ft. Collins, CO, USA.