



Portable electronic message signs enable flexible ways for communicating information to drivers.

Developments in road weather monitoring

Recent developments in technology and communications are allowing us to do things in road weather monitoring that we didn't even dream about some years ago. These changes have had a huge impact on road safety and maintenance operations, as well as on the drivers' experiences.

The atmosphere is a chaotic system, producing adverse weather that has a major impact on people's everyday lives. Even if forecasting models and observation equipment are becoming increasingly sophisticated and accurate, there will always remain a level of uncertainty when it comes to weather. Real-time observations are required to make sense of and be prepared for this great unknown.

Intelligent Transportation Systems (ITS), including wireless communications, sophisticated computational technologies and video vehicle detection, are

increasing their popularity around the world. Weather information solutions are becoming an integral part of these systems. Improving the traffic flow and overall safety are key priorities.

People are starting to realize that investment in sophisticated road weather information systems really pays off. Road maintenance authorities can optimize their operations and overcome the guesswork, and drivers feel more secure and better informed. The more information that can be delivered to the driver - either in the vehicle or at the roadside - the better. For example, mobile variable message signs (VMS) enable flexible ways for communicating life-saving information.

Movable sensors increase flexibility

In-situ observation technologies have taken some major leaps forward in recent years. One of them is the development of the non-intrusive sensors, which measure road conditions remotely. For example, the Vaisala sensors can be installed on existing structures, such as lighting poles, traffic signals and buildings, instead of digging up the road and embedding the sensors there. In addition to assessing pavement temperature and state (frost, rain, snow, slush and black ice), these sensors have the unique ability to report road friction and the reduction in grip caused by adverse weather conditions.

When combined with traffic cameras, data management systems and mobile communications systems, such as mobile phones, PDAs or



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paggers, these technologies offer a whole new approach to road weather monitoring and road maintenance operations. Road Weather Information Systems (RWIS) are becoming a key reference point for both ITS and traffic management systems. Relaying current road conditions and weather information to motorists in a timely fashion can help save lives and increase mobility.

Road weather hazards are not restricted to winter conditions. For example, fog, rain, dust storms and wind can significantly deteriorate driving conditions. These challenges can also be addressed with an intelligent combination of in-situ observation systems, such as present weather detectors, wind sensors and weather cameras. For example, warnings on high wind speed enable maintenance operators to take appropriate action, such as implementing reduced speed limits or bridge closures.

The state of Virginia in the US uses movable Vaisala sensors, which

can easily be transferred to any desired location according to requirements. One of the uses in Virginia is to place the sensors on expected hurricane evacuation routes. Being able to pre-position the systems well in advance without major roadside works is a significant benefit and a great improvement in safety.

The extremely busy M25 motorway surrounding Greater London in the UK is using variable speed limits, which are adapted to the prevailing weather conditions. The state of California (US) has introduced an extensive fog detection and warning system alerting drivers on a stretch of highway where challenging fog conditions are frequent.

The list of examples goes on, but the trend is certainly clear: intelligent road weather monitoring systems are gaining popularity around the world.

Authorities can also benefit from relocatable or vehicle mounted weather sensors, which allow observation platforms to be quickly relocated to where they are needed. For example, this enables objective assessments of weather conditions at accident sites, whilst in the past people had to rely on their own interpretation of the weather conditions at the site.

The natural progression from semi mobile vehicle mounted weather sensors is the fully mobile use for collecting information over entire networks. This has been undertaken for a number of decades in the form of IR thermometers, known as Thermal Mapping, however the latest non-invasive technologies are allowing a suite of new parameters to be collected and subsequent applications are only just emerging.

In-car technology complements other information sources

Today's drivers have an increasing amount of information at their disposal to help them reach their destination safely. These include the radio, variable roadside signs and different in-car devices or integrated systems. In-car weather monitoring systems complement roadside measurements and provide a good additional source of information. The in-car data also increases our knowledge of dangerous roads, on which stationary or movable stations can then be placed.

Further information:

www.vaisala.com/weather/applications/traffic.html

Vaisala to launch road weather decision support system technologies

Vaisala is investing in the development of maintenance decision support systems (MDSS) and expanding its portfolio in the surface transportation market by adding a Road Weather Decision Support System (RWDSS).

Leveraging the US Federal Prototype MDSS, which was developed with support from the United States Federal Highway Administration's (FHWA) Road Weather Management Program, Vaisala will develop a larger-scale system for commercial use that expands the FHWA's established proof of concept and addresses the maintenance practitioner's challenges of distilling down large amounts of disparate road weather data and information into well-defined, effective actions.

Some of the road weather technologies that will be included in the RWDSS are proprietary techniques such as thermal mapping and road surface models to reveal the pavement temperature relationships likely to occur across an entire roadway network and to predict the road weather conditions at site-specific locations. Effectively acting as a one-stop shop, the system will not only provide end users with access to critical weather and road condition data, but it will ingest and process all available road weather information to produce succinct, repeatable guidance based upon local resources and practices.

The system will provide comprehensive support for all aspects of weather-related decision making. So far roadway maintenance work has been dominated by preventive measures to control the build up of snow and ice. While this may be directly proportional to the related cost of cleaning up, authorities are now realizing the importance of proactively managing other weather conditions such as fog, blowing dust, lightning and thunderstorms. There is practically no limit to the applicability of a centralized system that automates the procedure of obtaining, synthesizing, and applying road weather data in the decision-making process.

