A new approach to asset management

Road markings and studs are able to improve visibility for drivers through retroreflectivity. No matter what type of road, these are considered some of the basic and most important road safety devices. Indeed, it is also important that both elements are coordinated; for example, road markings can guarantee a proper performance during dry conditions and road studs can help to maintain a minimum level of visibility during wet and rainy conditions

The collection of accurate highway asset records and performance results has become a key maintenance challenge for road authorities due to the extensive population of markings and studs on the road network. This is accomplished nowadays by assuring certain minimum levels of pavement marking retroreflectivity. This is the reason why the ability to survey the performance at road network level using these parameters can not only provide useful information to maintain road safety, but can also optimise the costs of pavement markings and road studs maintenance.

The measurements of the above parameters however, need to be repetitive and accurate enough so any road agency can rely on its results in order to develop their maintenance programmes.

A-one+ have been working collaboratively with the Highways Agency and their wider supply chain to develop a new asset management approach that will offer more sustainable value to the Highways Agency and its customers.

The new model moves away from the annualised approach to maintenance where long-term needs are predicted based on deterioration modelling. The approach avoids scheme identification based on reaction to defects with a short term horizon to a more cost effective model that uses asset management plans (AMPs) to model deterioration over 30 years, and therefore identify future needs and long term budget requirements.

Put simply, the asset management approach applies the implementation of lean techniques across the entire portfolio of the Highways Agency's assets to remove waste. The asset management approach intervenes at the optimum time to ensure a safe, sustainable network. It will also give the Agency a better view of the network condition and what condition levels can be achieved for the appropriate funding.
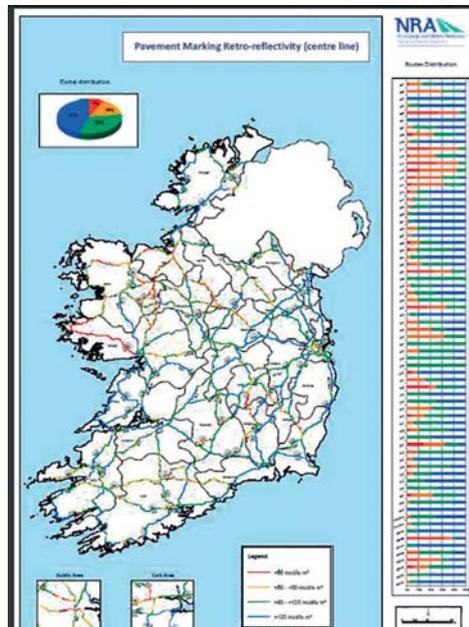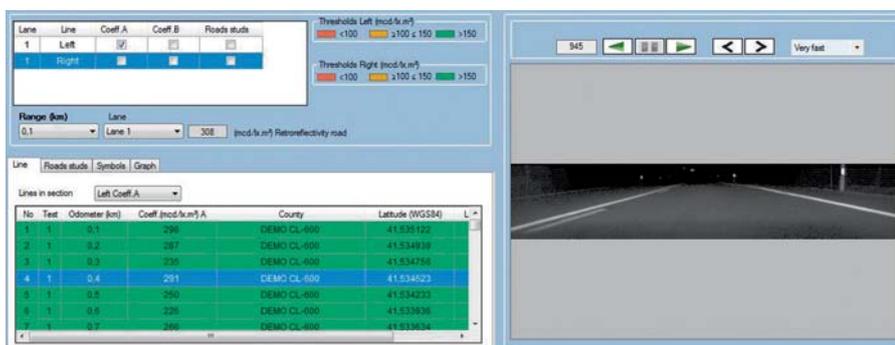
Monitoring conditions

In order to drive the new AMPs, reliable asset condition indicators are required for each asset to monitor condition and estimate remaining life. A-one+ alongside the Agency has developed and subsequently tested a series of asset measures where no suitable cost effective measures previously existed. The project team took the opportunity when possible to identify and develop new technology and techniques that make the network wide collection of the measurements safer and more cost effective. The aim for each measure is:

➔ To find new technologies able to limit working on live carriageways, protecting road workers and road users
➔ To identify ways to get better data, faster and cheaper
➔ To reduce occupancy of the carriageway during surveys to support the economy.

To this end A-one+ employed and collaborated with DBi Services, an American infrastructure maintenance company, along with its partner, Cidaut of Spain, to undertake a survey of the Area 7 network using Advanced Mobile Asset Collection system (AMAC).

The objective of the contract was to dynamically evaluate the visibility of all traffic signs, road markings and road studs through the measurement of their retroreflectivity. All lines, symbols and studs were included in the main carriageways and slip roads.

The main aim was to obtain relevant information to optimise maintenance of traffic signs, pavement markings and road studs so that they can be carried out under technical criteria based on their behaviour in service.

Until now the common method of testing traffic signs and carriageway markings is by the use of handheld reflectometers which is a challenge for the Agency and service providers due to the extensive population of signs installed on the network and the requirement to biannually survey them.

Example reports produced

AMAC is a mobile and highly accurate automated system which measures traffic sign retroreflectivity as well as creating a comprehensive traffic sign inventory that can be used to identify signs failing to meet standards of retroreflectivity for maintenance or replacement.

Although the market already has other approaches to record this information, this development focuses on two main objectives:

➔ Increase the level of repeatability and accuracy of pavement marking dynamic retroreflectivity measurements, according to the geometry of EN 1436 standard

➔ Increase its efficiency by gathering more information on every road pass in a relatively safe environment.

At its core, the AMAC system measures the visibility of traffic signs, pavement markings and road studs from a mobile platform. A multidisciplinary team of engineers, physicists, psychologists and statisticians have developed an innovative system able to measure retro-reflectivity, which:

➔ Assess whether traffic signs, pavement markings and road studs provide the minimum performance levels required

➔ Optimises their operation

➔ Decreases their maintenance costs. Integrating advanced lighting and

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artificial vision techniques in an instrumented vehicle; AMAC assesses the present performance and usefulness of pavement markings and road studs.

AMAC is composed of three subsystems:

➔ Mobile system for data and images acquisition

➔ Detection, performance analysis and positioning software

➔ Management and analysis software.

The survey also measures the condition of road markings and studs during the same traffic speed pass over the network. Even double lines are measured independently to provide a full inventory of signs and markings.

The inventory of signs and road markings, including data like the retroreflectivity, size and absolute position, provides a tool for cost effective planning of traffic signs, road markings and road stud maintenance, and will be used to predict intervention within future asset management plans. The survey makes it possible to select only those signs, markings and studs needing to be replaced in the short term and

also brings the possibility to estimate replacement resources necessary on a mid to long term basis when the survey is repeated to indicate deterioration.

This survey has already allowed A-one+ in Area 7 to avoid expensive and disruptive carriageway/lane closures and site visits to measure sign sizes, assess condition, etc, prior to replacement, saving traffic management costs and the cost of disruption.

A review of asset management approaches from around the world has confirmed that this new approach will help the Highways Agency reach the leading edge in the application of highways asset management internationally and will contribute to the Agency's aim to become the world's leading road operator.

The safety of road users is paramount for all road operators, and the AMAC system enables them to use technology to safely capture highway data. With interest garnering in other Agency areas, AMAC is fast becoming the road operators tool for cost effective asset management of traffic signs, road markings and road studs. ⬤