



Road Pavements & Bridge Deck Health Monitoring / Early Warning Using Advanced Inspection Technologies

The **RPB HealTec** system is aiming to upgrade and optimize the inspection & maintenance of the European roads, reducing costs and increasing traffic safety. This will be achieved by developing a novel automated and integrated NDT (Non Destructive Techniques) system for high speed analysis and evaluation of road pavement/bridge deck condition.



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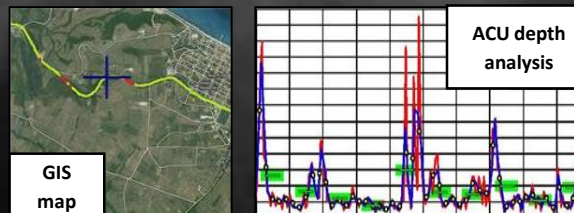
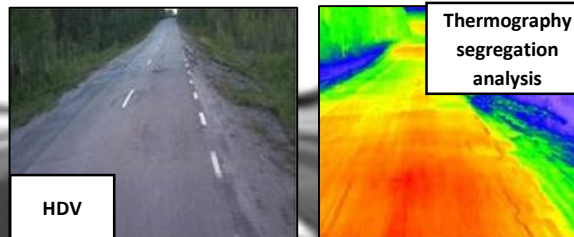
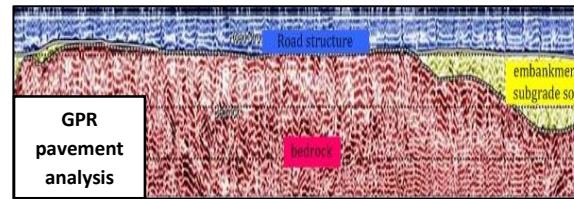


I&T *Nardoni institute*



Integration of Ground Penetrating Radar (GPR), Infrared Thermography (IRT) and Air-Coupled Ultrasound (ACU) NDT techniques will provide multidimensional information on the pavement condition. The measured and processed sensor data will be used in the detection of cracks, subsurface delamination and other defects for assessment of the cause, extent and rate of deterioration.

The RPB HealTec concept will benefit in optimisation of pavement and/or bridge deck maintenance procedures thus increasing road life expectancy. As a consequence it aims for a cost reduction of at least 0.1% on future construction and maintenance in the European road network.



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The main objective of the RPB HealTec project is development of a novel integrated NDT system for damage assessment, diagnosis and monitoring of road pavements and bridge decking.

Objectives:

- To evaluate emerging non-invasive NDT&E technologies for their ability to detect in real-time various types of defects or other life-limiting factors in road pavements and concrete bridge decks with a 30mm lateral resolution and 1m inspection depth.
- To develop an integrated scanner combining advanced GPR, ACU and IRT technologies. The NDT system for inspection of road infrastructure will be able to detect both surface and subsurface defects and deterioration sites, characterize the pavement layer structure of similar materials and provide damage assessment in quantitative terms.
- To develop an advanced ACU system for detection of shallow subsurface delaminations and the identification of pavement surface layer thickness. Operating within the 50-100 kHz range, together with advanced filtering and processing techniques to lower the impact of high impedance mismatch.
- To develop an advanced GPR system specifically designed for HMA and concrete materials, operating with a bandwidth between 100 and 1 GHz with a desired resolution of 30mm and 1m inspection depth.
- To develop an advanced IRT imaging system capable of high precision temperature measurement for continuous road pavement surface surveying and detection of shallow subsurface delaminations.
- To develop an advanced image processing toolbox incorporated in to human machine interface that: (i) will provide pre-processing functionalities that will allow a 20db improvement in the information context of the acquired images and signals (ii) will provide graphical tools for processing, analysis and visualisation, (iii) will combine the inspection capabilities of the three NDT subsystems by employing trend analysis and data fusion and (iv) is capable of detecting different types of defects in the HMA and concrete structures at the maximum depth of 1m.
- To equip the RPB HealTec vehicle with (i) a finely-controlled positioning system (GPS) (ii) a HD video camera for traffic monitoring and validation testing.
- To validate an overall NDT inspection and monitoring methodology (via a NDT validation centre) that will be developed through this project.
- Through completion of the aforementioned objectives, a methodology will be developed, which will be suitable for a wide range of potential applications and would be applicable to end users involved in road construction and maintenance applications. The methodology will be developed and enhanced through practical applications in the laboratory and field testing.

