

Empa, Road Engineering/Sealing Components Laboratory

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Empa, the Swiss Federal Laboratories for Materials Science and Technology, is an interdisciplinary research and service institution that conducts pioneering materials and technology research in the field of nanostructured materials, energy, health and performance, natural resources and pollutants as well as sustainable build environment including road infrastructure. It is part of the domain of the Swiss Federal Institute of Technology ETH under the Federal Department of Economic Affairs, Education and Research EAER. Empa is active in the formation of about 200 PhDs plus 200 master students or interns and employs close to 1000 staff. It consists of 28 research laboratories; one of them is the Road Engineering/Sealing Components laboratory RESC which is specialized in road construction materials, asphaltic bridge deck plug joints and flexible sheets for waterproofing.

RESC focusses on developing and optimizing energy and resource saving techniques with bituminous materials or systems for use and re-use in traffic infrastructure and buildings. This means improving and developing sustainable environmental friendly pavement materials and systems not only with good traffic and weather performance but also with additional multifunctional non-traffic related functions, such as energy harvesting or “self-healing” capabilities. RESC is structured in five main research areas:

- Road Materials and Pavements which includes recycling, low energy pavements, noise reducing materials, static and dynamic interlayer shear properties.
- In-situ Performance Testing, i.e. field sensing and accelerated pavement testing with the Model Mobile Load Simulator MMLS3 and the full-scale prototype Mobile Load Simulator MLS10 that was developed in partnership with University of Stellenbosch, South Africa. RESC also operates 6 test fields for the Swiss Federal Road Office ASTRA.
- Sealing Components in collaboration with industry, focusing on asphaltic bridge deck plug joints with low temperature dynamic systems testing and on new systems of waterproofing sheets
- Innovative and Multifunctional Pavements, aiming at noise reduction, energy harvesting and self-healing capabilities as well as use of new material components
- Multi-Scaling and Microstructure of Road Materials establishing the link between nano- and microstructure of pavement materials with full-scale behavior in order to improve the scientific basis for developing new innovative pavements and for better understanding climatic and mechanical performance (such as effect of moisture on asphalt pavements).

The interdisciplinary work environment at Empa provides synergetic access of the RESC to a unique diversity of expertise and equipment within Empa's five departments. This is particularly true for nanostructured materials and surfaces, functional polymers, photovoltaics, advanced materials processing, structural engineering, building science and technology, acoustics, applied wood materials, concrete, environmental technology and materials for energy. It is also true for synergetic use of high-tech equipment such as X-Ray CT and AFM.

RESC has established a broad, continuously increasing international scientific and technological network with different other institutions and research groups. In this sense, it is active in chairing technical committees within the frame of RILEM and ISAP, in particular RILEM TC 237-SIB Advanced testing and Characterization of Sustainable and Innovative Bituminous Materials and ISAP TC APE Asphalt Pavements & Environment, both of them organizing major symposia and conferences in 2015, i.e. the 8th Symposium SIB2015, 7th-9th October in Ancona (Italy), <http://www.rilem-sib2015.it/>, and the 3rd APE Symposium 16th August in Sun City (South Africa), <http://www.isap2015.co.za/>. On a national scale RESC is leading the standardization committee on road materials and is accredited for bituminous building materials (STS 043) in accordance with ISO/IEC 17025.