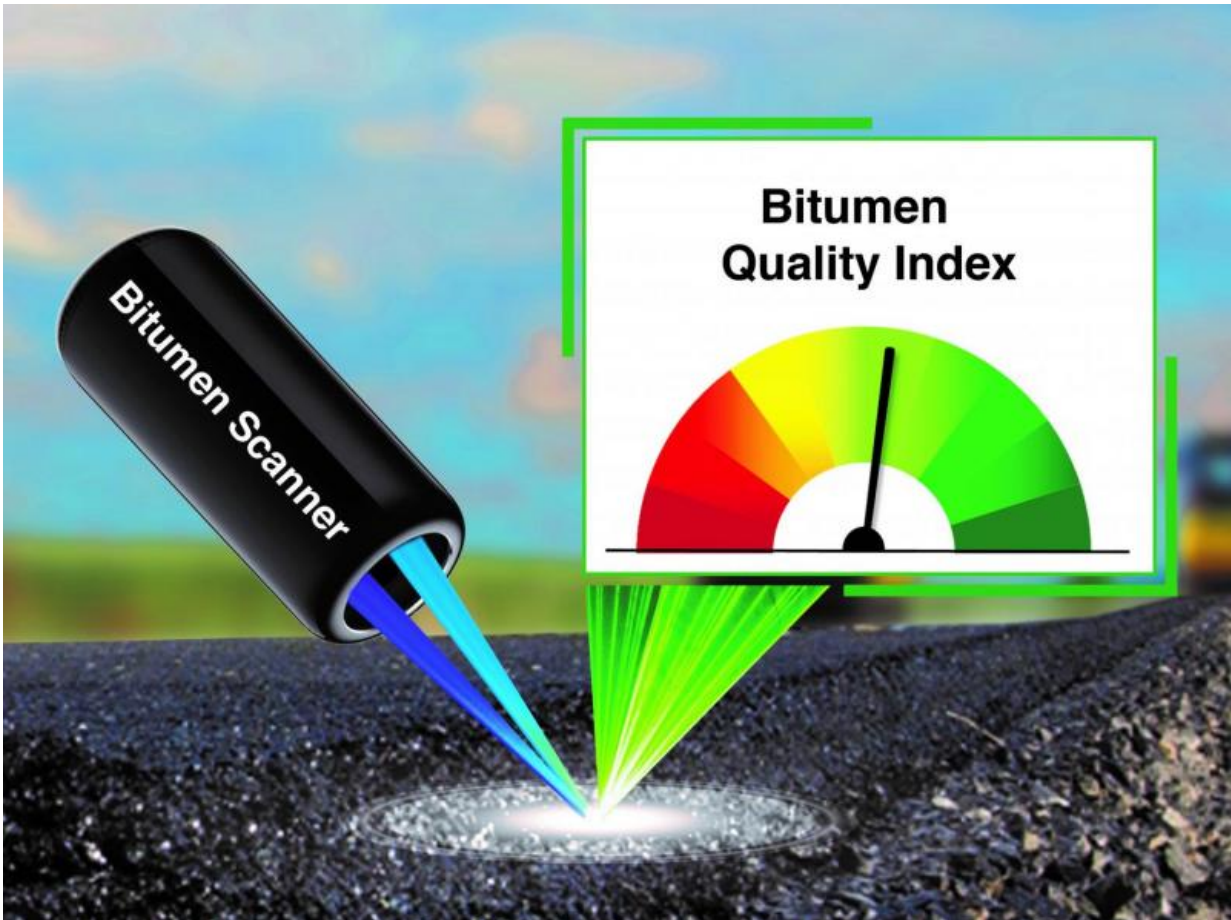


Hand scanner measures bitumen quality

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Measuring the quality of bitumen by means of light rays at the push of a button.
Credit: Vienna University of Technology

TU Wien presents several technological innovations at the Hannover Messe: With a simple hand scanner, the quality of the bitumen, which

holds the asphalt together, can be measured directly on-site.

Asphalt does not last forever. At some point, it ages and starts to crumble. This has to do with the bitumen, the sticky binding agent, which holds and keeps the rock content in the asphalt. Bitumen is a petroleum product consisting of several organic components, which undergo a chemical change over time. Until now, the condition of bitumen could only be approximately measured in a laboratory. At the Vienna University of Technology, a much easier and more accurate method has now been developed: By means of a fluorescence analysis, this small, mobile hand [scanner](#) can measure the bitumen's quality in a quick and simple way.

Aged bitumen loses its useful properties

"Several causes can have a negative impact on the bitumen's quality", explains chemist Prof. Hinrich Grothe from the TU Wien. Together with the team of Prof. Bernhard Hofko, traffic scientist at the TU Wien, he conducted an in-depth study of bitumen. "Environmental influences or manufacturing faults can lead to the aging of bitumen - it loses its elasticity and becomes brittle and fragile", explains Grothe. "The aging of bitumen is a serious problem for road construction, but also for the waterproofing of buildings."

Until now, bitumen has mostly been explored by means of mechanic measuring methods. There are more than 100 different, standardized procedures for the quality measurement of bitumen, but these procedures can only be carried out by trained staff in a laboratory. "There must be an easier way to do this", thought the staff at the TU Wien - and developed a measuring tool based on a fundamentally new principle.

The hand scanner functions with LEDs, which stimulate the bitumen's

fluorescence. "Due to the aging of bitumen, its composition changes, particularly the proportions of important components such as alkanes, aromatics, resins, and asphaltenes", explains Hinrich Grothe. "The fluorescence measurements reflect the shifts of these proportions."

As it shows, new bitumen can be clearly differentiated from aged bitumen in terms of its fluorescence. "We have identified three wavelengths that are particularly suitable for quality control", says Grothe. "Thus, it is no longer necessary to measure a full spectrum - instead, it is fully sufficient to conduct three individual measurements with blue, violet and ultraviolet light."

Handy fluorescence scanner

Based on these insights, a portable, handy scanner was developed, by means of which a reliable measurement can be performed within seconds. Thus, complete quality control of bitumen becomes possible. In order to use this method in the future not only for analysing new bitumen, but also for recycled bitumen consisting of existing asphalt pavements, data is being collected at the moment. In the future, the bitumen's reusability will thus be assessable at the push of a button. It is already possible to measure whether a certain bitumen has changed its [quality](#) between refinery and paving. The bitumen scanner can be used in the fields of production, storage, and processing, as well as for the multifaceted application of [bitumen](#) in [road construction](#), the sealing of buildings, or, for corrosion protection of technical components.

Provided by Vienna University of Technology

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