Pencil test for pipeline cracks

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It is impossible to see when the "lead" in a pencil cracks within the pencil, but an acoustic sensor can "hear" the change in the way the pencil vibrates. Now, researchers in China have reported in the *International Journal of Sensor Networks* how the same principle can be used to detect cracks in oil pipelines components in remote regions where extreme conditions can lead to corrosion, damage to welds and pipe alike.

Xin-hua Wang and Jie Yang of Wuhan University of Technology, Yu-lin Jiao of Shangqiu Vocational and Technical College, and Yong-chao Niu of Shangqiu Jinpeng Industrial Co., Ltd., explain how cracks in a pencil "lead" or pipeline change the way in which stress waves are carried and this can be detected by an acoustic sensor. The team's tests involved an acoustic sensor and the Nielsen-Hsu pencil break simulation of acoustic emission source in a specific location. The time it takes for an acoustic wave to bounce back to the sensor depends on whether or not a crack is present in the pencil "lead" in the simulation, or the pipework in the real world.

A network of such sensors on a pipeline could allow maintenance crews to quickly pinpoint pipeline damage and schedule a repair. Initial studies show that the acoustic sensors can home in on a crack with an error rate of less than 5%, which could significantly reduce search times for damage over the vast distances traversed by pipelines.

More information: Xin hua Wang et al. The acoustic emission detection and localisation technology of the pipeline crack, *International Journal of Sensor Networks* (2016). DOI: 10.1504/IJSNET.2016.074700

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