# COAL THICKNESS GAUGING USING ELASTIC WAVES

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The ability to determine the thickness of coal layers in a coalmine is essential to the efficiency of harvesting coal while maintaining a safe residual level. As the coal industry is transitioning into automation, the capability to nondestructively determine the amount of residual coal levels is critical to a fully autonomous mining. The benefit of such capability is two folds: (a) saving lives by removing the risk to human operating in an underground mine; and (b) reducing the harvesting cost by automating and accelerate the speed of mining and thus making more mines economical to operate. This reported study addressed the objective of developing a portable device that noninvasively gauges coal layers to determine their thickness. Substantial amount of information is carried by elastic waves that travel through a layered media and such information can be extracted by analysis of the wave dispersive behavior. In this study, the Spectral Analysis of Surface Waves (SASW) was used and its capability was augmented by capabilities that were developed for the the leaky Lamb wave (LLW) technique. Results showed accuracy of inverting coal layers thickness at the level of 10-15 percent for substrates that are either soft soil or hard rock. The experiments were conducted at elastic wave frequencies in the range of 100 Hz to 50-KHz. The technology has a potential spin-off for planetary noninvasive geophysical probing.