

# ScaleSense

In underground mining, the scaling process takes place after blasting. The idea is to remove loose rock hanging from the roof in a controlled manner aimed at creating a safe working environment. The scaling process can be performed by either manual (using a scaling bar) or mechanized (using a scaler) means.

For an effective scaling process, loose rock has to be detected and removed. Till date, this process has not yet been successfully automated. Instead a mine worker taps on the roof with a bar and decides, based on the sound, whether the scaling process has to be performed at the appropriate place or not. Hence this process is highly dependent on human decisions. Further, according to the National Institute for Occupational Safety and Health (NIOSH), manual scaling is very labour intensive while mechanical methods can be too powerful or produce a less stable roof.

In the ScaleSense project, a sensor-based system will be developed for the detection of loose rock during the scaling process and will be integrated into a scaler. The objective of this project is to assist the operator in identifying loose rock to make the scaling process safer and more efficient.

Within the ScaleSense Project, the AMT is responsible for developing the sensor-based system for the detection of loose rock. For this, a combination of Long Wave Infrared Thermography and Acoustic Emission technology will be used. In analogy to an experienced operator loose rocks will be detected by the scalers vibrations using AET. This will lead to a more robust sensor system, in case of failure of one system, with higher reliability and a more complete detection of the loose rock. Hermann Paus Maschinenfabrik GmbH is responsible for integrating the sensor technology into a scaler and also for developing a visualization concept. Since the scaling process is related to the safety aspect of the mine, this system will be highly relevant for the mining industry and will also contribute to digitalization of the scaling process.

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