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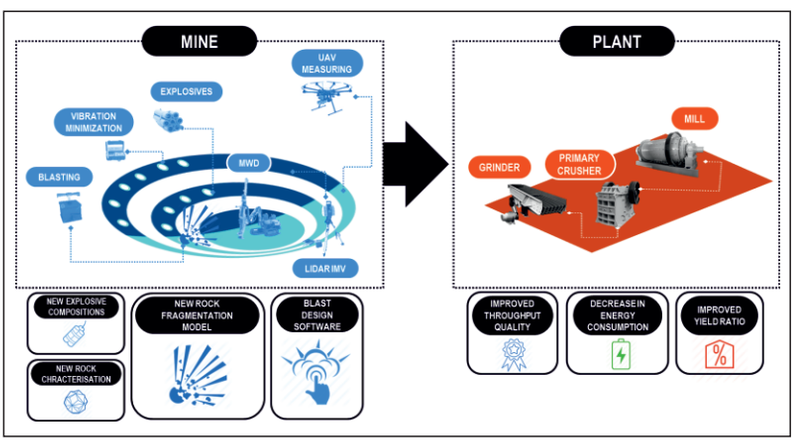
H2020 SLIM: Effects of blast optimization on KPIs of a mine

Evaluate the effects of vibration optimized blasting patterns on production KPIs like loadability and energy consumption

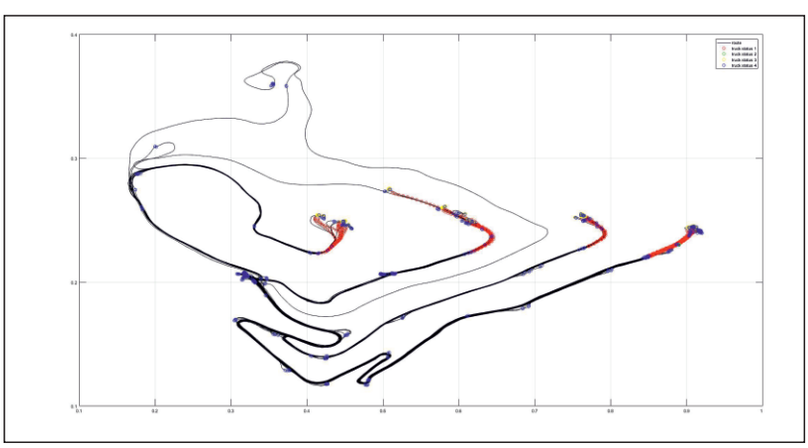
Vibrations play an essential role in the public perception of a mine site with its neighbors. SLIM aims at reducing the level of blast induced vibrations at certain spots by optimizing the blast patterns. Geophysical models are used to predict the influence of different blast patterns on the vibrations introduced in the mine and its vicinity.



These forward-models will provide recommendations and suggestions of how altering the blasting procedure and blasting pattern in this respect.

The goal of the verification tests is to determine the influence of these vibration optimized blasting patterns on the production performance of the mine site.

The results will be compared with standard blast patterns at Erzberg. By doing this, also the blast fragmentation prediction methodology which is developed in other workpackages of SLIM, including measurement while drilling (MWD) and photogrammetric evaluation of the rock mass structure / joint factor, shall be tested. The results will involve detailed geological mapping, MWD characterization of the rock mass, photogrammetry to measure jointing, blast vibration measurements, muckpile characterization and fragmentation characterization, muckpile digging, loading and hauling times, as well as crushing energy and plant throughput.



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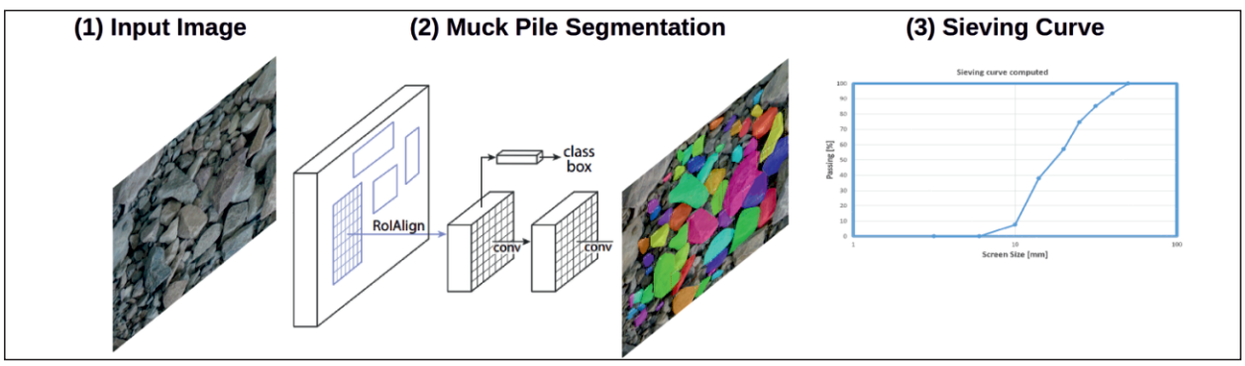
H2020 SLIM: COMPUTATIONAL MUCK PILE CHARACTERIZATION

WITH THE USE OF UAV, COMBINED WITH MACHINE LEARNING AND PHOTOGRAMMETRIC COMPUTER VISION MUCK PILE PROPERTIES SHOULD BE DETERMINED.



The fragmentation and the shape of the muck pile are the two major outcomes of open cast mine and quarry blasts. These outcomes of the first stage of the comminution chain heavily influence the downstream operation like loading, hauling, crushing and milling. Fast information about the muck pile properties will help to improve the production scheduling of loading and hauling as well as further processing steps. Image based determination of fragment size distribution is a central ambition in research for many years (2D image classification as well as 3D stereo photogrammetry with single particle delineation). The biggest problems concerning present technologies are perspective shadowing, due to ground based acquisition platforms, and safety reasons. The main task of SLIM WP 5.1 is to determine muck pile properties like shape, presence of boulders and fragmentation in open cut blasting sites by using a camera carrying UAV (unmanned aerial vehicle) combined with modern machine learning and photogrammetric computer vision systems. Based on real scale and model investigations new algorithms for interpreting visual and geometric data from muck piles are developed. They should allow for identifying (i) the fragment size distribution, (ii) the presence and location of boulders, (iii) the identification of partially covered fragments, and (iv) fine material below image resolution. The developments so far show promising results and the first software prototype is already being evaluated.

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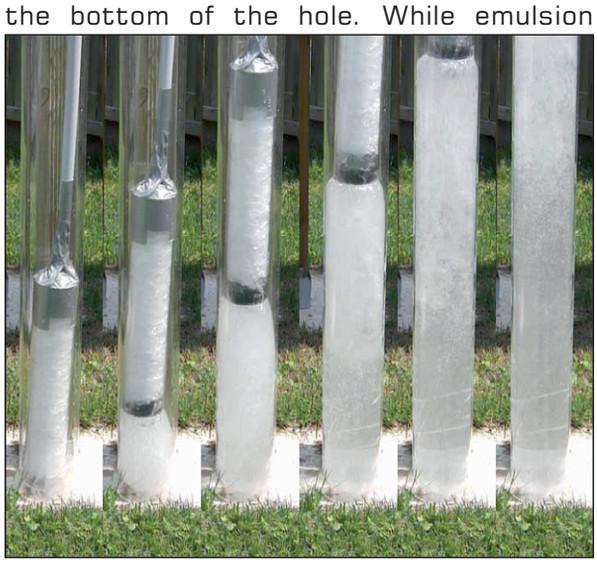
H2020 SLIM: Design of a Charging-system

Design of a system for lining of blast holes while charging with bulk emulsion explosives

Site sensitized emulsion explosives offer several advantages over cartridged explosives regarding safety, working conditions, storage and transport. Faults and voids connected to the borehole also fill with explosives, creating an inhomogeneous charge column. This increases the risk of flyrock, vibration and noise emissions. Undetonated amounts of explosives remaining in the muck pile may lead to nitrate emissions. As part of the EU Horizon 2020 project "Sustainable Low Impact Mining – SLIM", a method for lining blast holes while charging them with bulk emulsions based on the ContBlast system should be developed. A unit containing a folded plastic hose is attached to the charging hose and lowered to the bottom of the hole. While emulsion



explosives are pumped in, the hose unfolds and the unit is pushed up towards the top of the hole. Tests in a defined environment proved the principal function of the system. When testing the system in an open pit mine, problems involving the container getting jammed in the drill hole arose on occasions. Future tests therefore should focus on practical handling of the system and dealing with the risk of getting jammed.

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