

## Application of UAV photogrammetry for quarry monitoring and assessment

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**Abstract:** In quarry production, survey work is necessary to monitor the height of stockpile and the quarry's walls to comply with the rules and regulation stated by the authority. Conventional method of surveying uses ground-based surveying at these sites to measure the X, Y and Z data. Nevertheless, these approaches are very time consuming and dangerous for the staff. Advancement in remote sensing specifically unmanned aerial vehicle (UAV) have become an alternative for surveying work. The use of drone for survey that is remotely piloted enables replacement of traditional method of surveying in quarries. This paper describes the application of drone mapping for quarry monitoring and management mainly stockpile and slope assessment. Quadcopter was used to acquire the

aerial images for stockpile and both aerial and side images for slope assessment. Image captured were processed using a photogrammetry software, Agisoft Photoscan to produce the final output that consists of orthophoto, digital surface model, 3D dense point cloud and 3D model. Based on the output, volume, height and area of stockpile computational were made in the photogrammetry software. The slope stability assessment computation was made using facet extraction to identify the major discontinuity sets for rock slope stability analysis. UAV photogrammetry grants precise approach, provides fast data recovery and is time saving for mapping a large area of quarry.

**Keywords:** UAV, photogrammetry, quarry, rock slope