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Exploring the Potential of Cost-Effective Mobile Laser Scanning and Photogrammetry in Mine Shaft Sinking Processes

This presentation highlights the application and benefits of cost-effective mobile laser scanning and photogrammetry in enhancing the efficiency, safety and precision of mine shaft sinking operations. Through a series of trials conducted over recent years, 3D models generated using these technologies were employed to achieve significant outcomes in various mining projects. Key applications included the accurate measurement of concrete volume in the GG-1 mine shaft, monitoring convergence in the rock salt interval, and assessing arch-lining displacement in the SW-4 mine shaft. Beyond these engineering applications, the data derived from these methods also contributed to improving geological documentation, offering new insights into subsurface conditions. To provide a comprehensive understanding of the mining environment, this presentation will showcase key elements of the technologies and project implementations by PeBeKa S.A., a leading organization in mine construction. The validation of both photogrammetric and laser scanning methodologies will be discussed, supported by comparative analyses of previously measured objects. These results underscore the value of integrating modern, cost-effective spatial imaging technologies into the traditionally challenging and resource-intensive process of mine shaft development.

Keywords: urban mine, critical minerals, e-waste, circular economy

Biography

I am a PhD student at the AGH University of Science and Technology in Kraków, specializing in Geo-Data Science, Geodesy, and Environmental Engineering. I also work as a mining foreman in the shaft sinking department of PeBeKa S.A., part of the KGHM Polish Copper Group. My research focuses on improving safety in shaft sinking through advanced remote sensing techniques, such as photogrammetry and laser scanning. The goal of my PhD project is to develop an automated system for photogrammetric measurements, combining innovative research with practical solutions for the mining industry

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