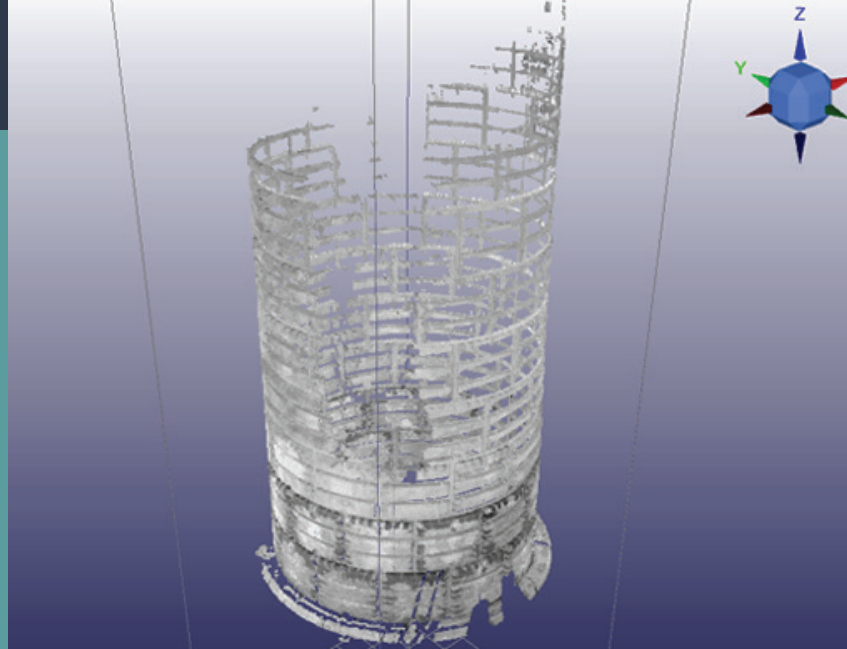




AUGMENTED AND MIXED REALITY (AR/XR) EXTENSION TO SIGHTPOWER MINESHAFT INSPECTION AUTOMATED SYSTEM (MIAS)

Introduction to MIAS

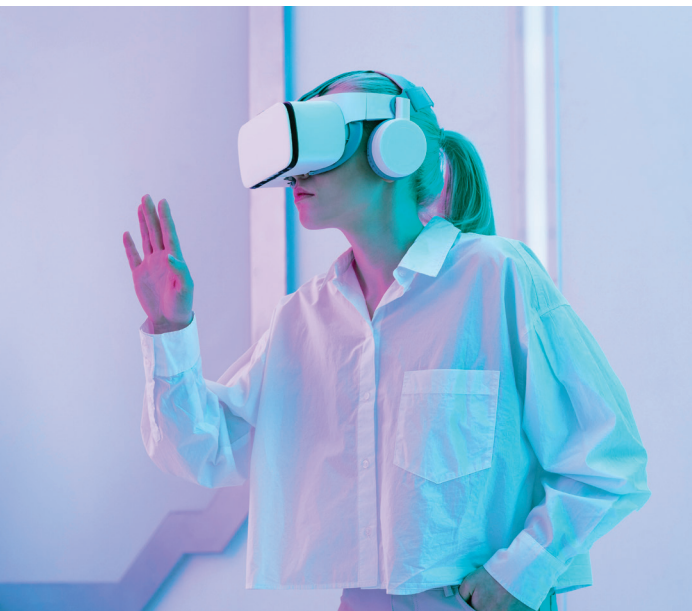
The Mineshaft Inspection Automated System (MIAS) is a hardware-software system designed to automate mineshaft inspections. It replaces traditional, unsafe, and time-consuming visual inspections with a fully automated process using mobile laser scanning, high-resolution panoramic photography, and AI-enhanced software for feature extraction and change detection. MIAS inspection drastically reduces time of hoisting disruption since total time of automated inspection with MIAS takes between half an hour to 1 hour depending on mineshaft depth.



AR/XR Extension

Although MIAS brings obvious benefits to mine owners and stakeholders some existing regulations require having some people-driven visual inspections in place.

The AR/XR extension of MIAS allows off-site, immersive visual inspections using AR/XR glasses. Engineers can virtually “enter” the mineshaft, seeing the results of newly taken mineshaft data. They can move through it and collaborate in real time—without disrupting operations or exposing personnel to risk. This extension enhances safety, ensures compliance with regulatory visual inspection requirements, reduces downtime, and increases operational efficiency.



Value Proposition

The AR/XR extension of MIAS offers several key benefits:

- Enhances safety by eliminating the need for physical presence in hazardous environments.
- Ensures compliance with regulatory requirements for visual inspections.
- Reduces downtime and inspection time, increasing shaft availability.
- Provides a scalable, innovative solution for global mining operations.



TECHNICAL DETAILS

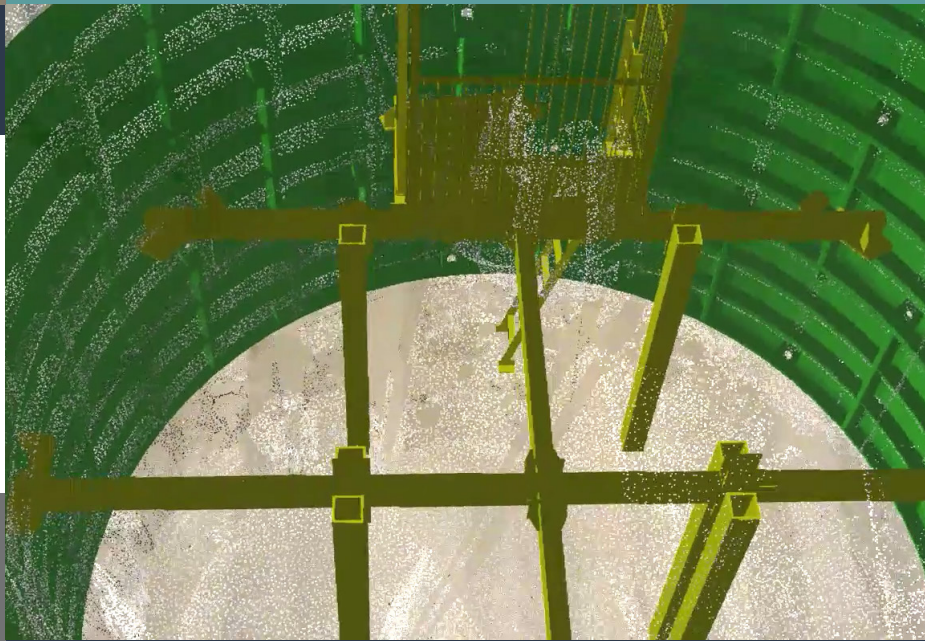
MIAS combines hardware (laser, IMU, cameras) with intelligent software. The AR/XR instruments allow engineers to conduct visual inspections sometimes required by regulators remotely in an immersive environment with additional instruments for making notes, putting labels etc. The system offers automated reporting and maintenance recommendations.

The initial Digital Twin of a mine shaft is compiled from original CAD drawings and/or ad-hoc MIAS shaft scanning. Density of the scan and stitching precision determines the accuracy of the model and the results of the analysis.

Built-in AI and ML-powered algorithms enhance stitching accuracy and error compensation during scanning. Analysis is based on the comparison with a mine shaft Digital Twin, which includes 3D models of key linear elements, tubing, or concrete lining of the mine shaft. The Digital Twin gradually changes over time during the mine's life, absorbing deformation of elements. A model at any required date can be exported into standard CAD formats (DWG, STEP).

USE CASES

MIAS has a proven track record with mining clients in Canada, South Africa, and Europe. The system along with its AR/XR extension is also applicable beyond mining, for any vertical shafts such as skyscraper shafts, subway shafts, military shafts, and hazardous waste burial shafts.



TARGET AUDIENCE

The target audience for the AR/XR extension of MIAS includes:

- Mining companies with underground operations.
- Service providers to the mining sector.
- Educational and research institutions in mining technology.



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