

# COD-11-2021 “Processing and reportability of Geomechanical Information in Underground Mine”

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## General aspects

In underground mining it is required to maintain safe operational conditions, for which the physical displacement of the walls of the tunnels and galleries that make up the mining infrastructure is monitored, identifying early on potential risks to people and equipment.

In the field of geomechanics, the process of measuring the displacement of the walls of an excavation is called convergence monitoring, a common practice in mining and is used to qualify the state of the fortification/infrastructure and trigger maintenance actions if necessary.

Currently, LiDAR Slam instrumentation is used to generate a large amount of data (point clouds), which are processed manually through stages of cleaning, recording and measuring displacement of tunnel walls (convergence measurement), which represent a high demand of time and human resources, delaying decision-making in a timely manner.

## Objective and scope

Identify technological solutions to facilitate the processing, analysis and reporting of convergence measurements in underground mining for opportune decision making.

## Solution requirements

The proposed technological solution should consider the following requirements:

-Platform (software) for point clouds processing (one billion points generated daily) corresponding to topographic information generated with LiDAR equipment. The processing must include the cleaning of topographic data from other objects or bodies (equipment, vehicles and people) captured with the LiDAR.

-Maximum quality and efficiency in the processing of large volumes of data. It is desirable to identify differences in millimeters between reported surfaces (quality) and to process a high volume of daily data (billion points per day) with low labor consumption (efficiency).

-Compare point clouds (daily data versus previous measurement), align and register surfaces.

-Quantify distances between surfaces generated by each point cloud.

-Visualization of results.

-Ability to integrate information from other sources (CAD, georeferenced instrumentation data and images), in order to consolidate geomechanical information data in just one place.

-Web reporting (viewable in the Integrated Operations Center room).

-A lightweight, integrated and agnostic solution for geomechanical monitoring systems is desirable.

-Comply with Codelco's security and communications standards.

## Excluded solutions

The following will not be considered in the background evaluation process:

- Advisories, consultancies or engineering studies.
- Proposals that only consider the survey of topographic information.

## Current Problem

### Challenge

Manual processing of clouds of millions of points surveyed by LiDAR instrumentation makes it difficult to make timely decisions for the maintenance of safe conditions in underground galleries.

### Consequences

- Safety risks due to late decision making for fortification/infrastructure maintenance in subway mines.
- High demand of human resources for data processing.

### When does the problem occur?

On a permanent basis.

### How is it currently resolved?

For the convergence measurement, one billion points per day (approx. 25 GB of data) are captured with LiDAR Slam in the field (approx. 3 hours), followed by manual processing, cleaning, registration and measurement of tunnel wall displacements (approx. 10 hours).

### Tested technologies

No technologies have been identified for what is required to generate a significant improvement in the KPIs presented.



# Expande Program

The Open Innovation in Mining Program, Expande, is a public-private initiative designed and carried out by Fundación Chile. The purpose is to drive innovation and make possible a better future for global mining, promoting the mining ecosystem in Chile along with building a collaborative model that enables the best solutions for the high complexity challenges of mining today and tomorrow.

## Confidentiality

The delivery of personal information to register in the database, such as details related to technological solutions to apply for Expande's open innovation processes is strictly confidential; as is the information contained in the contact forms with information of these processes subsequent stages.

## Milestones



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### Link

<https://fch.brightidea.com/COD112021/ProcesamientoyReporteInfoGeomecanicaMina>

## Required documents

Upload slide presentation or files (pdf, images, etc) with the information below:

- Relevant skills of the team members who will solve the challenge.
- Technical background of the proposed solution: description of the technology used, technical characteristics and details of the system or mode of application.
- Degree of maturity of the proposed solution (according to the Technology Readiness Levels, TRL classification) Make reference to success stories or antecedents that support the degree of maturity.
- Proposed Business Model: sale, service, licensing or other.
- Representative in Chile (for foreign suppliers)