Using Static and Mobile Laser Scanners to Measure and Manage Open Pit Mines

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Case Studies

1. Gold Mine
   Planner – Polaris TLS750

2. Gold Mine
   Slope Automatic Monitoring – ILRIS ER

3. Coal Mine
   Canyon survey – Maverick MMS

4. Platinum Mine
   Change detection – Lynx Dynamic Scanner

5. Underground mine
   Mine design – Cavity Monitoring System
1. Gold Mine
   Static Scan Polaris TLS750

- Mines with extension from 300m to 1km
- Survey from different positions – on fixed locations (pillars or GCP)
- Each set-up locations, 5-10 minutes
- Data Processing using ATALScan Software
- Classification of lidar ground data by generating a DTM surface and removing all points above or below this surface
1. Gold Mine *South America*

Static Scan Polaris TLS750

**ATLAScan Planner**

- Plan the survey with the Planner (at the office)
- Set the Scanner on known location (Pillars or GCP)
- Perform the survey
- Retrieve the data
- Automatic processing in ATLAScan software
1. Gold Mine *South America*

Static Scan Polaris TLS750

**ATLAScan Planner**
1. **Gold Mine** *South America*

Static Scan Polaris TLS750

**ATLAScan Planner**
1. **Gold Mine** *South America*

Static Scan Polaris TLS750

**ATLAScan Planner**
The aim of this survey was:

- Analyze a landslide that occurred after a blasting inside the quarry
- Calculate the volume of dropped material
Polaris TLS 750 - Gold Mine

Pre-Blast

Post-Blast
Comparison to calculate the volume
Report layout and data export: Volumes – PDF file

- Mine name
- Date
- Surveyor information
- Processing operator
- Elevation plane
- Volume calculated
- Screenshot
- Previous volumes calculated
2. Gold Mine
ATLAScan Monitoring Solution
Polaris TLS1600

- Automatic monitoring of fault areas
- System mounted in a permanent enclosure
- 3 to 10 minutes scan
- Data automatically processed ATLAScan Monitoring Solution
- Automatic error map and text file with the movements
- Exports a jpeg and text report for each area of interest
A gold mining operation was looking for a real time, slope monitoring system because of two dangerous rock fall areas above a current production areas
Note the personnel and equipment below the danger area
Danger Area
A permanent mounted Polaris on a concrete pillar in a unique enclosure

Computer in pit
Running the Monitoring application (optional)

Computer in office area (connected through the internet)
ATLAScan Monitoring Solution

- Web-Base application
- Run on a local computer or through the internet
- Preset: the parameters
- Preset the baseline
- Preset the thresholds
- Automatic processing
ATLAScan Monitoring Solution
ATLAScan Monitoring Solution
ATLAScan Monitoring Solution

- On-the-fly analysis
ATLAScan Monitoring Solution

- On-the-fly analysis
- Review stats and graphs

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<th>Class Range (m)</th>
<th>N. of Points</th>
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<td>0.7 - 1</td>
<td>5</td>
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<td>1 - 3</td>
<td>65</td>
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Target Statistics:
- Total N. of points: 2391429
- Valid points: 2166949 (90.71%)
- Invalid points: 224480 (9.29%)
- Max displacement: 2.558 m
- Min displacement: 0.321 m
- Average displacement: 0.001 m
- Standard deviation: 0.041 m
3. Gold Mine

Maverick Mobile Mapper System

- Long canyons with a width of about 100 or open mines
- Survey at a speed of 20 km/h surveying in about 2 hours
- Extremely easy set-up (10 minutes)
- Automatic calibration of the sensors
- Automatic data Processing using Distillery
- Generation of a DTM of the entire area, contour lines, cross section and Volume calculation of the stock piles
3. Gold Mine
Maverick
Mobile Mapper System
3. Gold Mine
Maverick
Mobile Mapper System

The aim of this surveys:
- Survey the entire canyon for the DTM generation
- Re-assess the entire mine with updated contour lines and cross section, Stockpiles Vol Cal
Volume Calculation and Analysis
4. Platinum Mine
Lynx SG

- Mine extension of about 1 km by 3 km
- Survey monthly at a speed of 20 km/h, surveying in about 3/4 hours
- Extracted volume: 1.8 – 2 million cubic meters every month
- Data Processing using TerraScan and Model Maker
- Generation of a DTM of the entire mine, compare the survey performed every month, generating contour lines and volume calculation
Survey preformed with the Lynx

Lynx – Platinum Mine
Data completed with the ILRIS TLS
Final point cloud with Lynx trajectory
Contour lines extraction
Platinum Mine Surveys

May
June
July
August
September
Platinum Mine Surveys

May

June

July

August

September
Platinum Mine Surveys

May
June
July
August
September
Platinum Mine Surveys

May
June
July
August
September
Lynx – Platinum Mine

Platinum Mine Surveys

May
June
July
August

September
Underground Mining
Cavity Monitoring System

The survey area is located at 2.7km below the ground
The cavities are connected together with 30 km of tunnels network
Survey of the main cavities
Data extracted with the SysCAD software
Create the triangulated model of the entire tunnels network and cavities
Underground applications

- Caving Method
- Vertical Method
- Stope Method

Courtesy of Harmony Mine
Underground Survey

Courtesy of Harmony Mine
Thank-you

Please come to visit us at the booth 34/35