Technologies for Mining



NCL NIGAHI MINE

Mining Products



Slope Stability Monitoring RADAR 3D Laser Scanner

Gyromat

Mine Management System

Slope Stability Radar



- Reutech Radar System
- Mining Slope Stability Failure.
- Working together since 2010
- Prospect in open pit mine
- Product with global presence

Slope stability dangers

• Slope failures are a

reality and results in:

- loss of life
- damage to expensive equipment



- decreased productivity

Conventional monitoring techniques

- Requires access to slopes (visual inspection, reflectors etc.)
- Uses optical path (affected by rain, dust, mist etc.)
- Localised measurements (only specific points)
- Has accuracy constraints
- Has low frequency of measurements
- Results in early evacuation that reduces mine productivity

Movement and Surveying Radar (MSR200)



Why radar ?

- High-speed accurate scanning capabilities
- Sub-millimeter slope movement detection
- 100% slope coverage
- No need for reflectors and no need to access to the slope
- Not affected by dust, mist or rain
- All weather DAY and NIGHT operation



How it works

- System deployed within 30 minutes
- Standoff distance to the mine slope of up to 1 200m
- Automatic scanning after initial setup
- Automatic slope movement alarms based on user defined thresholds
- Fully autonomous
- Data fully geo-referenced
- Full remote operation



MSR 200 measurement principle



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Synthetic map



DTM



Identification of structures



Case study # 1: Chile

• 23 Jan 08 -

Deployed in Sur Sur open pit (Codelco Andina division)



Case study # 1: Chile



Case study # 1: Chile

- Failure detected:
 - 20m x 15m
 - 20 000 ton failure (onto haul

road)

- Stand-off distance: 576m



3D Laser Scanner



- Non Contact Measurement
- Time of Flight LIDAR
- Large Data Sets
- Approx 15 nos are installed
- Technical advantages
- Increasing Interest
- Key customer : CIL, Private customers

3D Laser Scanner



- Ideal for Volume of Ore Dumps/Coal
- Technically superior
- Less Failure
 - Price could be a factor
 - User Acceptance

Gyro Station



- For Underground Mines
- High Accuracy
- Mostly Automated
- When you can't use GPS/conventional

Mine Management System / TDS



One Company, One Integrated Solution







Dozer 2000 Dozer Monitor & Guidance

FMS Complete Fleet Management

Mine Telemetry (Data & RTK) 450Mhz UHF 900Mhz, 2.4Ghz SS 2.4Ghz 802.11

Integrated to LAN AN ,VPN, e-mail for Reporting, Pit Management and Analysis.

Office Software Control, Scheduling, Reporting & Configuration

9000 Series 3 Dragline Monitor & Navigation

5.0

ShovelPro Shovel Monitor & Navigation

DrillNav Plus Drill Monitor & Navigation

Leica's Mining Product Draglines



A dragline stands 22 stories high, is 400 feet long, and weighs 5700 tons. Its bucket takes bites the size of a four-car garage.



Geosystems

- 86km / 53.5miles Strike Length
- Over 100 Machines working at any one time
- 24 hours 7 days
- Site moves



- when it has to be **right**





- Maps developed in the Engineers office
- •Maps sent out to each machine to navigate and guide each operator over radio network





- •Operational Controller can see in real time the position of each machine
- Machines can automatically move into working or delays states depending on position
- Material movements tracked from load location to dump location
- Machines can be tracked and alerted when off assigned route for optimization



- when it has to be **right**





 Spatial information is stored in open databases allowing engineers to update the mine plan with the latest plan updates

Machines can automatically move into working or delays states depending on position



Jigsaw Rugged Field Systems

- > X86 based hardware
- Fully compatible with 802.11b/g, and other IP based networks such as Motorola's Mesh Networks
- > Advanced GPS navigation and vehicle health alarm capabilities
- Offers 4 serial, 1 Ethernet and 1 USB port (all external)



Geosystems



Modular Interchangeable Mobile Solutions

- Assured compatibility with future wireless technologies
- Active connection to mine-layout GPS display
- Accurate location detection of other vehicles in close proximity
- Primary and secondary equipment full-cycle automation operator input is not required
- Continuous operation even without communications with the central computer



Leica Mining Product Overview

CIL Project....

- Projects Mine-wise: 7 large highly Mechanised open pit mines in Northern Coalfields and Mahanadi coalfields area of M/s CIL with contract value of Rs115Crs.
- Mines are-

1) Lingaraj OCP-	MCL
2) Balaram OCP-	MCL
3) Bharatpur OCP-	MCL
4) Amlohri OCP-	NCL
5) Nigahi OCP-	NCL
6) Khadia OCP-	NCL
7) Dudhichua OCP-	NCL



Project Milestones as per CIL Contract



- 29 - when it has to be **right**



Thank You



- 30 - when it has to be **right**