New Technology - Technical Review

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New technology - ARM 1100

- Objectives
  - develop and prove a cutter for the Merensky reef type
  - develop an effective, efficient method of cleaning the cutter path
  - develop an effective secondary ore pick up system
  - train operating and maintenance personnel
New technology - ARM 1100

- Current performance
  - cutter life and costs – still very high, and receiving priority
  - new cutter design to arrive January 2005
  - dust-cutter generates copious amounts of dust
  - new scrubber design completed, installed and operating satisfactorily
  - cutter journal bearings have been upgraded due to previous failure(s)
  - reliability – no major mechanical failures to date
New technology - ARM 1100

- **Machine specifications**
  - **Main dimensions**
    - length 17m
    - width 4.3m
    - height 100cm
    - weight 32tonne
  - **Cutting dimensions**
    - cutting profile 1.1m
    - cutting width 4.33m
    - cross section 4.6m²

New technology - ARM 1100

- **Cutting rates**
  - phase1 – 11.59t/hr@ 50mm
  - phase2 – 12.43t/hr@ 55mm
  - phase3 – 13.92t/hr@ 65mm
New technology - ARM 1100

- Mining layout at 6#
  - Workshop - completed
  - Services
    - power - completed
    - water - completed
    - air - completed
    - ventilation - cutting causes dust problems, scrubber installed
    - telemetry - 80% completed
- Mining
  - pre-dev - completed
  - ledging - completed
New technology - ARM 1100

- Objectives
  - research and development project on extra-low profile trackless equipment to test and further develop the technology of mining trackless at sub-1.3m heights
  - firm up the inputs used in the business model for trackless mining at 1.3m
  - identify the requirements for personnel to operate and maintain such machines

New technology - XLP trial

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New technology - XLP trial

- Mining layout
  - Bord-and-pillar mining
    - 6 x 12m bords ideal for this equipment and fit perfectly with the mining cycle
  - Cycle
    - drill 2/Clean 2/Support 2 bords per shift
  - Production
    - target – 1 890 ca/month double shift
    - achieved – 700 ca/month 1st double shift
    - currently in use at 12#
New technology - XLP trial

Mining layout

• Machine specifications
  • EJC 88 LHD
  • Main dimensions:
    • length 7.7m
    • width 2.48m
    • height 90cm
    • t/circle 5.91m
  • Capacities
    • tramming capacity: 4 000 kg
    • bucket volume: 1.5m
New technology - XLP trial

- Machine specifications
  - Axera Drill-Rig
    - Main dimensions
      - length  4,2m
      - width   2,2m
      - height  97cm
      - t/circle 4,5m
    - Capacities
      - drifters X 2 hydraulic
      - drill steel 2,0m eff. depth
      - power X 2 30kW e/motors, radio remote
New technology - XLP trial

Axera Drill-Rig 1#

New technology - new investigations

- New investigations - loco drill-rig
  - developing business case - potential for 52 metres/month
    Impala currently averages 23 metres/month
  - initial site identified as the new 12# to 20# second outlet tunnel
  - Lonmin – 42 metres/month – have ordered 13
New technology - new investigations

Loco Dril-Rig

SANDVIK
TAMROCK

New technology - new investigations

Trackless sweeping machine
- Developing business case
  - 4.2 tonnes/hr or 34 tonne/shift

Electric driven fan unit
Cyclone
Suction pipe attached to hammer
Remote Control unit
Screw conveyor

+/- 700 kg
New technology - new investigations

- Explosives
  - Chrysalis Propellants developed in-house with Impala technologies to look into the potential for continuous underground mining and also sensitive surface blasting as with the GIFT system

New technology - new investigations

Van Ryn Pit
New technology - new investigations

- 20 GIFT cartridges 1000t Quartzite

New technology - new investigations

- Drop raising
  - invert drop raiser using hydropower down-the-hole drilling technology
  - potentially twice as fast as Impala’s average for travelling way, ore pass development
  - site establishment currently underway at 7#
New technology - new investigations

• Drilling technology
  • Premfit Rocket Drill:
    • now standard equipment on all roof bolters
  • Sulzer Oil-Less Drill:
    • pre-production trials completed and over 2 000 metres drilled with no breakdowns or visible wear to the components
New technology - new investigations

- DDT Development Rig Prototype:
  - ready to begin trials at 7A#

Premfit Rocket Drill

- 300 Premfit Rocket Drills now in operation at Impala
- Benefits of using this equipment:-
  - shorter stroke higher revving machine which is ideal for drilling vertical roof bolt holes for support
  - reduced overall drilling times due to faster penetration
  - reduced noise and vibration exposure to operators
  - locally manufactured
  - developing shorter machine for sub 1m bolting
# Benefits of the Oil-less Drill

| Cost effective  | - No oil costs or consumables  
|                 | - Impala spends R4.4m annually on rock drill oil |
| Price           | - R6 500 each but will be less with bulk orders  
|                 | - Current drill cost R3 800 |
| Health and safety | - Lower noise levels  
|                 | - No oil vapour inhalation  
|                 | - Cooler, cleaner working environment |
| Performance     | - Faster rate of penetration  
|                 | - Better reliability |
Thank You

Any questions?