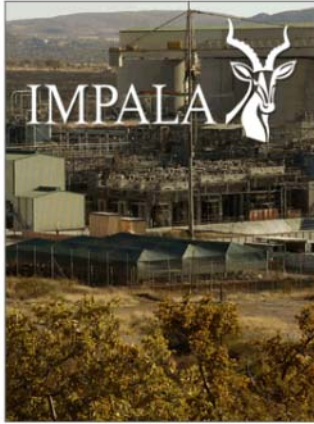


New Technology - Technical Review



Les Jagger

1 Dec 2004

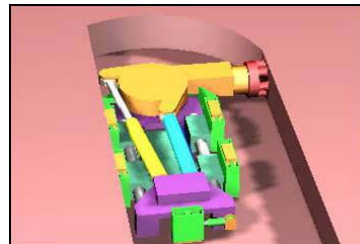


New technology - ARM 1100



• 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

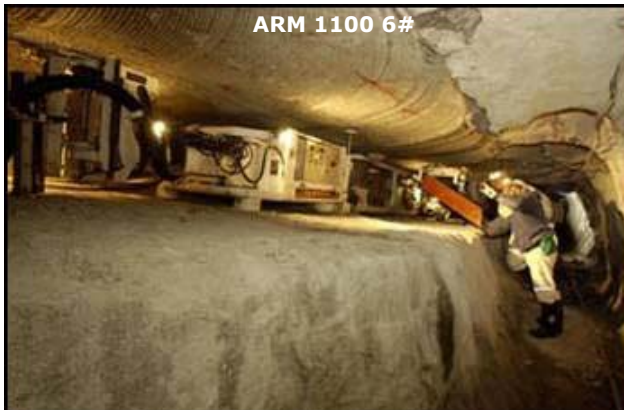


New technology - ARM 1100



- 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



New technology - ARM 1100



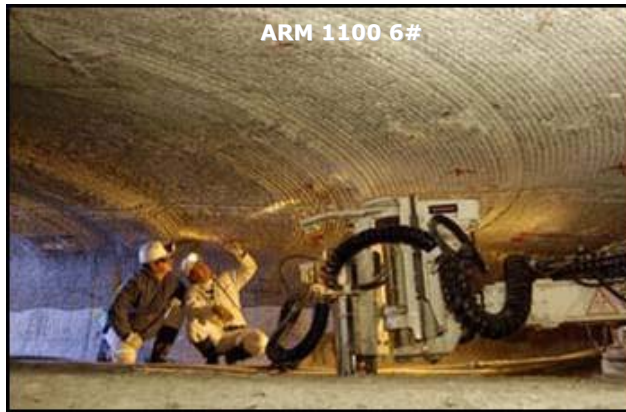
- Machine specifications
 - Main dimensions
 - length 17m
 - width 4.3m
 - height 100cm
 - weight 32tonne
 - Cutting dimensions
 - cutting profile 1.1m
 - cutting width 4.33m
 - cross section 4.6m²

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

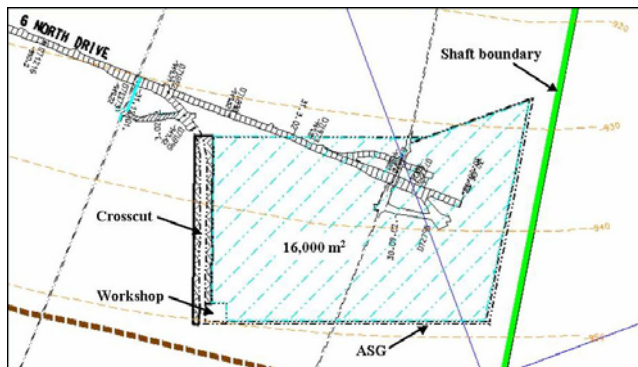


New technology - ARM 1100



- 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



New technology - XLP trial



- 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



New technology - XLP trial

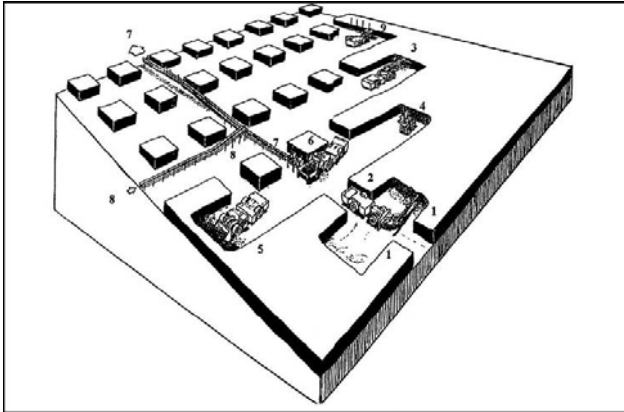


- Mining layout
 - Bord-and-pillar mining
 - 6 x 12m bords ideal for this equipment and fit perfectly with the mining cycle
 - Cycle
 - drill 2/Clean 2/Support 2 bords per shift
 - Production
 - target – 1 890 ca/month double shift
 - achieved – 700 ca/month 1st double shift
 - currently in use at 12#

New technology - XLP trial



Mining layout



New technology - XLP trial



- 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



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

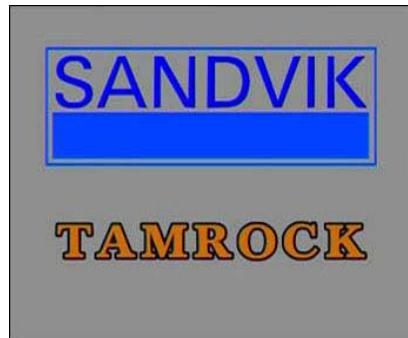


New technology - new investigations



- 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

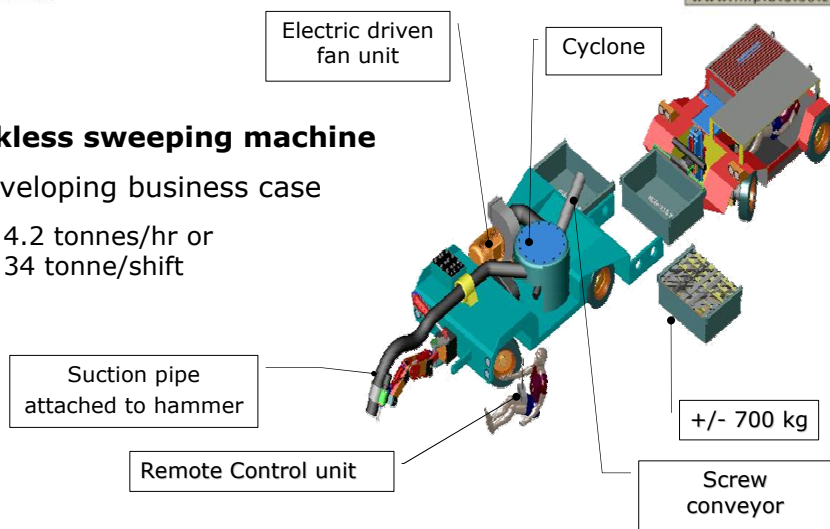


New technology - new investigations



Trackless sweeping machine

- Developing business case
 - > 4.2 tonnes/hr or 34 tonne/shift

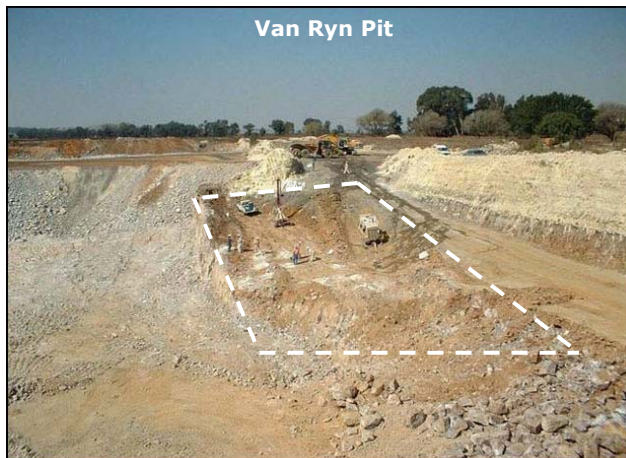


New technology - new investigations



- 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



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



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

SULZER Oil-less Drill



SULZER

SULZER
Hydromining Division




Aya Duma Duma

Benefits of the Oil-less Drill



Cost effective	<ul style="list-style-type: none">No oil costs or consumablesImpala spends R4.4m annually on rock drill oil
Price	<ul style="list-style-type: none">R6 500 each but will be less with bulk ordersCurrent drill cost R3 800
Health and safety	<ul style="list-style-type: none">Lower noise levelsNo oil vapour inhalationCooler, cleaner working environment
Performance	<ul style="list-style-type: none">Faster rate of penetrationBetter reliability

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Thank You

Any questions?
