

CONTINUOUS IMPROVEMENT – An Update

Barrick Gold

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November 15, 2002

GENERAL OVERVIEW OF CONTINUOUS IMPROVEMENT

•Phase 1

- Diagnose opportunity/
set goals

- Identify key performance indicators (KPIs)
- Agree on stretch targets
- Select KPI to focus on

Set the targets

•Phase 2

- Generate and evaluate ideas

- Brainstorm
- Prioritize ideas
- Action “Go-do” ideas
- Prepare “case” for ideas requiring approval

Identify Initiatives

•Phase 3

- Plan implementation

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Make it happen

Continuous Improvement In Mine Maintenance

Support Equipment [Pilot]

Shovels

Drills

Lube Trucks / Oil Cleanliness

Mine Maintenance Costs

Continuous Improvement: Shovels

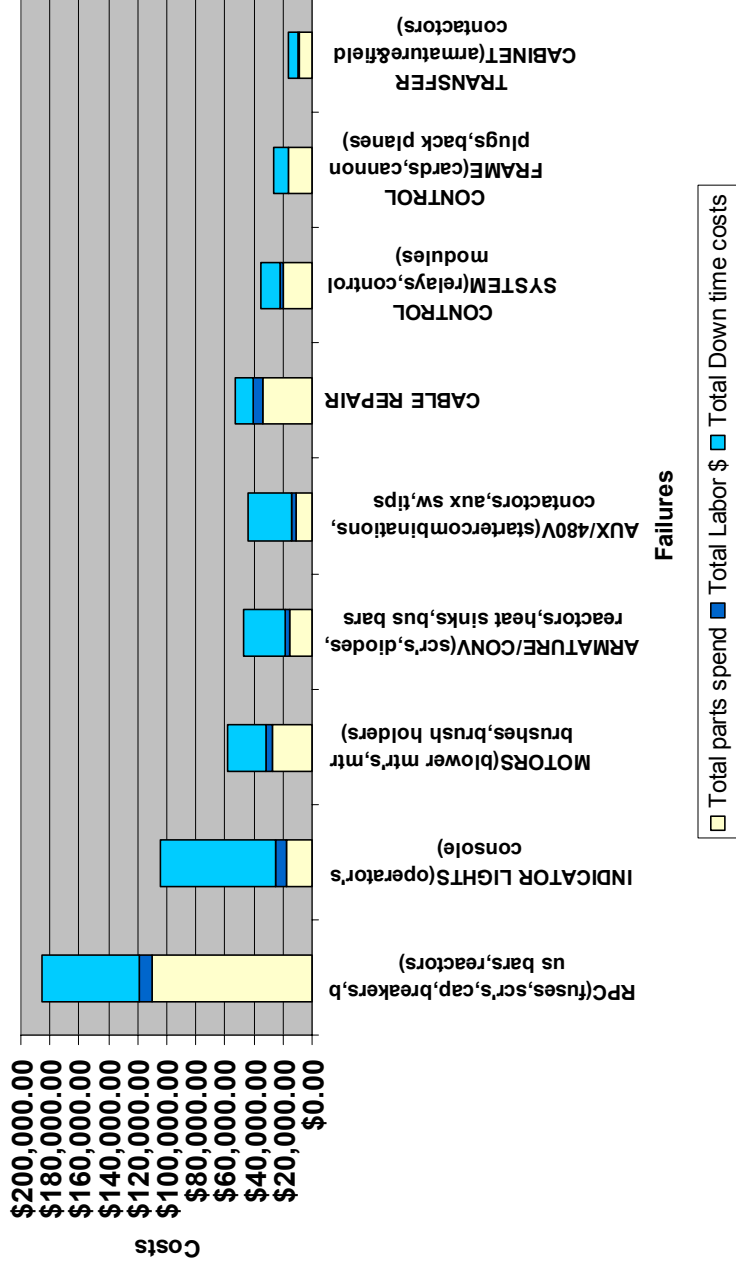
First phase of CI effort,
following pilot program

Primary
focus on P&H
2800's
(fleet of four)



Shovel Costs: Pareto Chart

P&H Electrical Costs



Continuous Improvement:

Shovels

Highest Impact Ideas: P&H 2800's

- **Induction hardened track pins**
- **Delta Drive undercarriage**
- **Redesigned front idler**
- **Test of dutchman inserts**
- **Design changes to swing transmission parts**
- **Alternative mfr hoist ropes**
- **Improved design dipper**

Continuous Improvement: Shovels

BIG WIN!

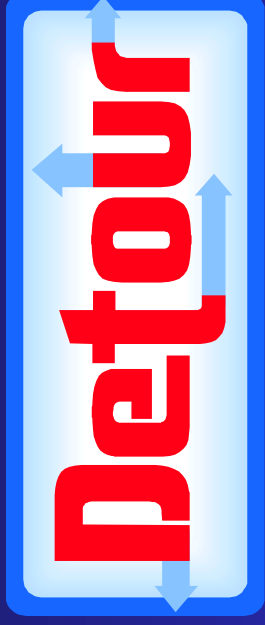
Idea: Install Delta Drive undercarriage system

Effect: Although this system is more costly to purchase, component life is planned to increase by over 50%.

This is a long-term solution.

Continuous Improvement:

Shovels



Idea: Install improved dipper (Optima style) to improve productivity in loading

Effect: Hoist rope life dropped from over 700 down to about 400 hours

Continuous Improvement: Drills

Focus: Increase Reliability

- **Reduce unscheduled downtime**
- **Increase maintenance effectiveness**



Continuous Improvement:

Drills

BIG WIN!

Goal: improve efficiency of
drill P.M. program

Idea: adopt modified P.M.
strategy

Drill PM: "Before"

- 6:20 am Arrive from town– dress out
- 6:30 am Line out (approximately 20 min)
- 6:50 am Walk around truck, make repairs if needed, load tools, check truck supplies (approximately 20 min)
- 7:10 am Go to warehouse get truck supplies, rain gear, gloves, PPE (approximately 20 min)
- 7:30 am Travel to pit & locate drill (approximately 20 min)
- 7:50 am Wash and inspect drill, return to warehouse for needed parts
- 10:00 am Arrive back at drill with parts begin repairs
- 1:15 pm Gather tools and prepare to leave for shot, out of pit by 1:30 (3:15 work done)
- 2:15 pm Shot clears head back to drill
- 2:30 pm Arrive back at drill start afternoon work
- 3:45 pm Gather tools, leave pit, return tools to crib, off load personal tools, clean up, dress down (1:15 work done)
- 4:20 pm Bus leaves for town

Drill PM: "After"

- 6:20 am Arrive from town
- 6:30 am Line out (20 min)
- 6:50 am Walk around service truck, load tools etc. (approximately 20 min)
- 7:10 am Start inspection (**drill washed, in laydown yard**)
- 7:30 am Go to warehouse for parts & supplies (approximately 45 min)
- 8:15 am Return with parts and begin work until lunch with a 15 min break (4:30 work done)
- 1:00 pm Lunch (30 min)
- 1:30 pm Return from lunch, work remainder of shift with 15 min break (2:15 min work done)
- 4:00 pm leave drill return to shop, offload tools, cleanup, dress down
- 4:20 pm bus leaves for town

Continuous Improvement:

Drills

“Before”: 4.5 hrs of
effective wrench time

*Gain in USEABLE time per 10-hr
drill P.M.: 50%!*

“After”: 6.75 hrs
of effective
wrench time

Continuous Improvement: Lube Trucks/Oil Cleanliness

**Focus: Cut Operating Cost/hr by
Extending Component Life**

**Per Noria: For hydraulic systems,
improving from ISO 21/18 to ISO 18/15
can extend component life by 2X.**

**For power train systems, the same
level of improvement can extend
component life by 1.4X.**

Continuous Improvement: Lube Trucks/Oil Cleanliness

- **Cross-cutting Improvements**
 - **Filters**
 - **Breathers**
 - **Quick-connect fittings**
 - **Particle Monitoring tools**
- **Success Measured Long-term**

Continuous Improvement: Mine Maintenance Costs

Examine Total
Spend
and
Identify
Opportunities
for Cost
Savings



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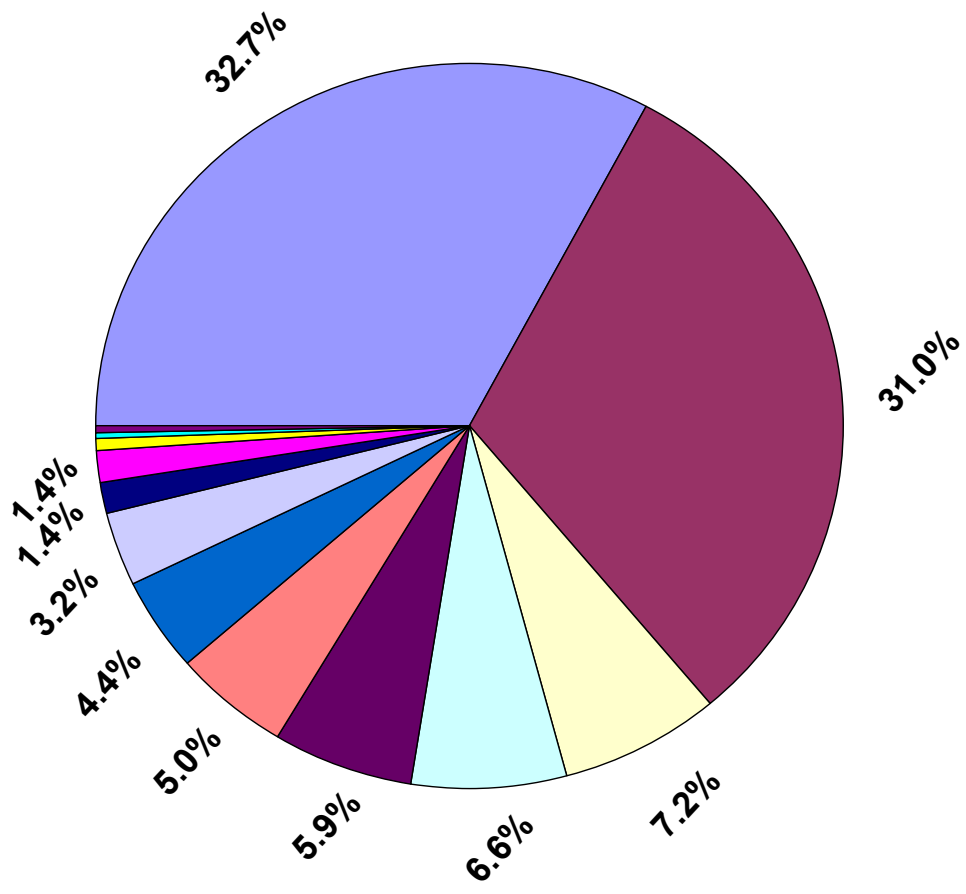
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**Key Performance Indicators:
Measurable and Meaningful and Controllable**

2002 Mine Maintenance Operating Budget

- Labor: W/S/Fr/PrW/B
- Maintenance supplies
- Transmissions
- Undercarriage
- Contractual services
- Pumps & Wet End Components
- Engines
- Other Consumables
- Beds/Buckets/Blades
- Gasoline
- Operating supplies
- Propane
- Administrative



Continuous Improvement: Mine Maintenance Costs



Goal: Analyze functional areas of costs to narrow focus for reduction opportunities

Roadblock: Cost accounting system designed for use by accountants, not maintenance management

930E Availability Tech. Limit

"Preliminary (Oct. 29, 2002)"

Unavoidable Losses



Total Downtime
Engine
P.M.
Tires
Wash
Gen. Mechanical
and others

Avoidable Losses



Total Downtime
Engines
W/Mech.
W/Parts
Accident

Targeted Gap to Close 33%



Theoretical Limits



Technical Limits



Current Performance



Targeted Performance

Continuous Improvement: Lessons Learned

**Get buy-in from everyone
involved**

Listen to the customer

Focus on early wins

The Barrick Goldstrike CI Creed:



An employee-driven
culture change to
maximize work
effectiveness and
efficiency resulting
in reduced cost and
increased mine life

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QUESTIONS?

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