



Presentation to the SAIMM 4th August 2017 Building a Robust Mining Industry



DRA GROUP

Leaders in **engineering design,**
project management,
construction and **contract**
operations

for the minerals, metals, mining and
energy industries



OUR COMPANY



A South African Company
Founded in 1984 with skills across
a wide range of commodities in the
Minerals & Metals Mining Industry

A leading multi-disciplinary
engineering and project management
company

Global Reach over **5 continents**

Main engineering & design centre in
Johannesburg, South Africa

Private Company
354 Employee Shareholders



Mineral Processing Plants & Engineering

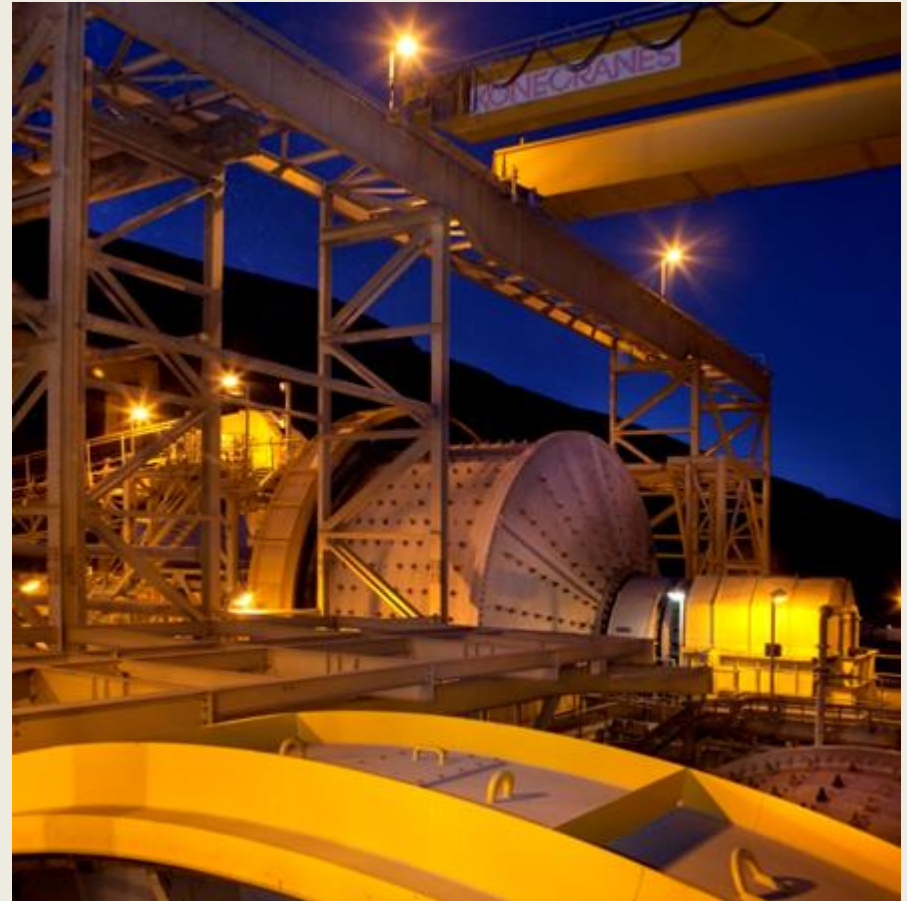
Mine Design, Engineering & Equipping

Infrastructure Engineering

Project & Study Management

Construction Management

Contract Operations



Safety

Engineering Excellence

Client Success





Steven Sasson invented the first digital camera at Eastman Kodak in 1975. It weighed 8 pounds (3.6 kg) and had only 0.01 megapixels. The image was recorded onto a cassette tape and this process took 23 seconds.

DRA - Mine Operating Management System



DRA have developed an Operations Management Information System, called **MOMS**.

- MOMS 1.0 conforms to ISA 95 standard, to a high degree

MOMS can collect all relevant data into one central data model

- Across **multiple production sites**,
- Or a **single production site**,
- From any enterprise data source, such as :-
 - **SCADAs**, **PLCs**, Laboratory Information Management Systems (**LIMS**),
 - Condition Monitoring Maintenance Systems (**CMMS**),
 - Enterprise Resources Planning (**ERP**) and Enterprise Asset Management (**EAM**) systems,
 - **Manually captured data** via desktop software like **Microsoft Excel**. etc.

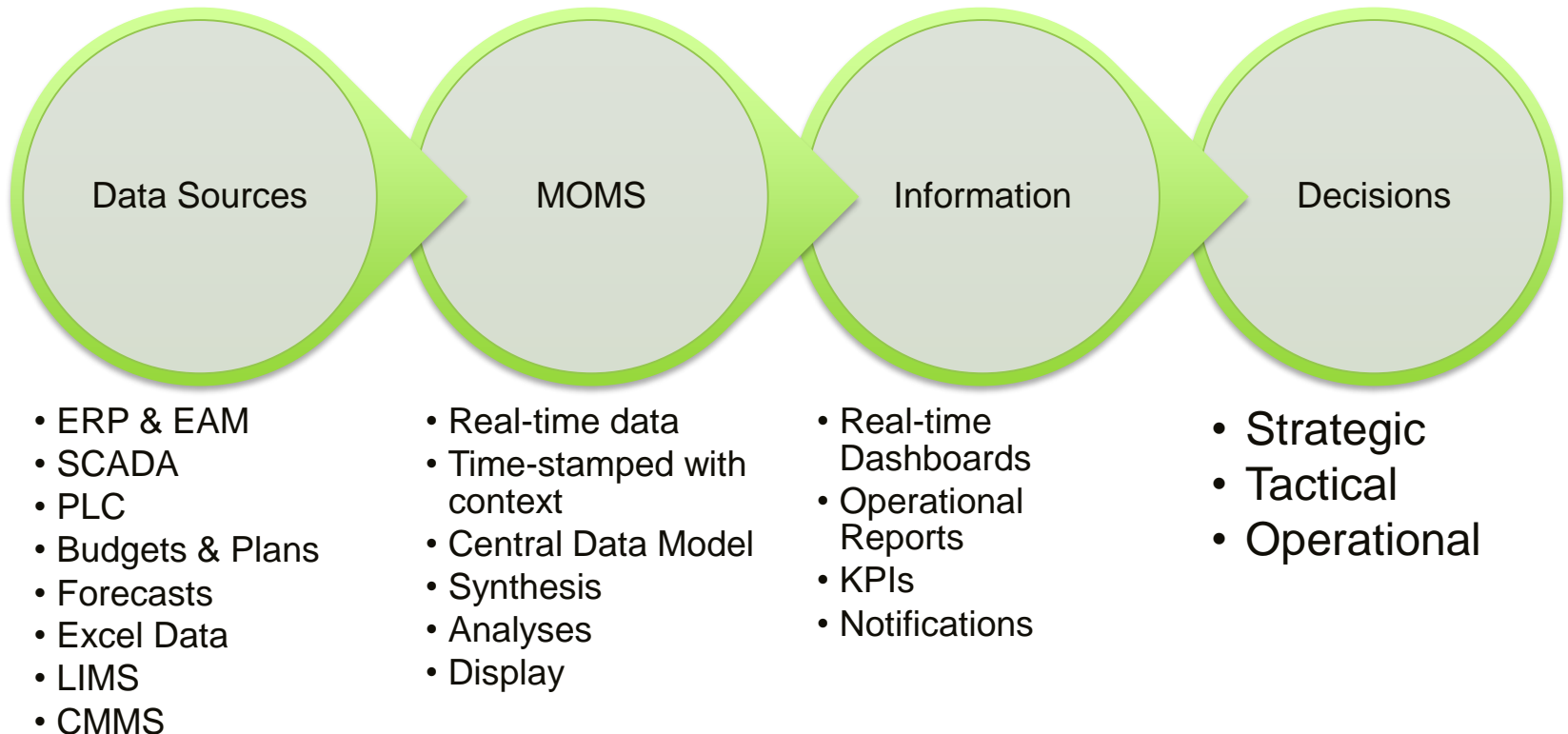
These data are logically structured, time stamped, and archived in a dedicated process historian.

Such data can be processed and displayed

- in **real time** or **historic**
- in **several possible layouts**
- through **dashboards, interactive reports, and notifications**
- **to any specified user** on either his PC / Laptop / smartphone, or a smart device using HMTL.

MOMS supports quicker, more informed decisions, to improve the mine site performance.

MOMS Information Flow



MOMS Modules



Financial System Interface		Maintenance Management Interface	Warehouse Management Interface
Core Module	Production Performance Module	Production Inventory Tracking Module	Downtime Analysis Module
	Product Quality Validation Module	Documentation Module	SHE Monitoring Module
	Production Planning & Scheduling Module	Custom Modules	Vehicle & Personnel Tracking Module
SCADA Interface		PLC Interface	

Product Architecture

Modular design promotes:

- Structured approach
- Flexible deployment
- Faster time to market
- Increased robustness
- Adding future modules
- Industrial analytics

Core Module



ICT Hardware

- Servers
- Firewall
- Network Switches

Software

- OSIsoft PI System
- Microsoft SQL Engine & Analysis Services
- Microsoft Excel

Asset Framework

- Basic tree structure

Data Interface

- Intermediate tables
- Data connection providers

Tracks production performance in terms of KPI's

- Equipment Utilization
- Equipment Availability
- Product Quality Yield
- Overall Equipment Effectiveness (OEE)
- 1% gain in OEE => 4-8% gain in profit – [Henderson et.al.]

Trends

- Throughput
- Scheduled Throughput

Production performance dashboards and reports

- Aggregates KPI's and other essential measures
- Interactive

MOMS Example - Production Report



Production Report

10 July 2017		04-Jul	05-Jul	06-Jul	07-Jul	08-Jul	09-Jul	10-Jul	WTD	MTD
ROM Tons	Actual	0	0	0	0	0	0	0	0	0
	Budget	5536	5536	5536	5536	5536	5536	5536	38753	83042
	% Var	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%

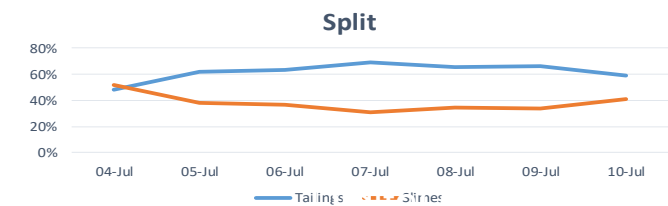
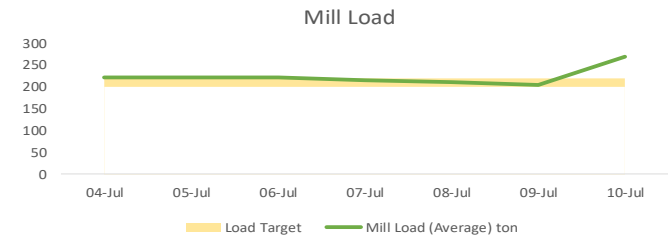
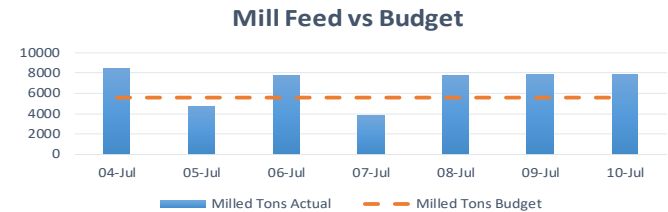
Milled Tons	Actual	8440	4722	7824	3855	7713	7892	7944	48391	94507
	Budget	5536	5536	5536	5536	5536	5536	5536	38753	83042
	% Var	52%	-15%	41%	-30%	39%	43%	43%	25%	14%

Mill

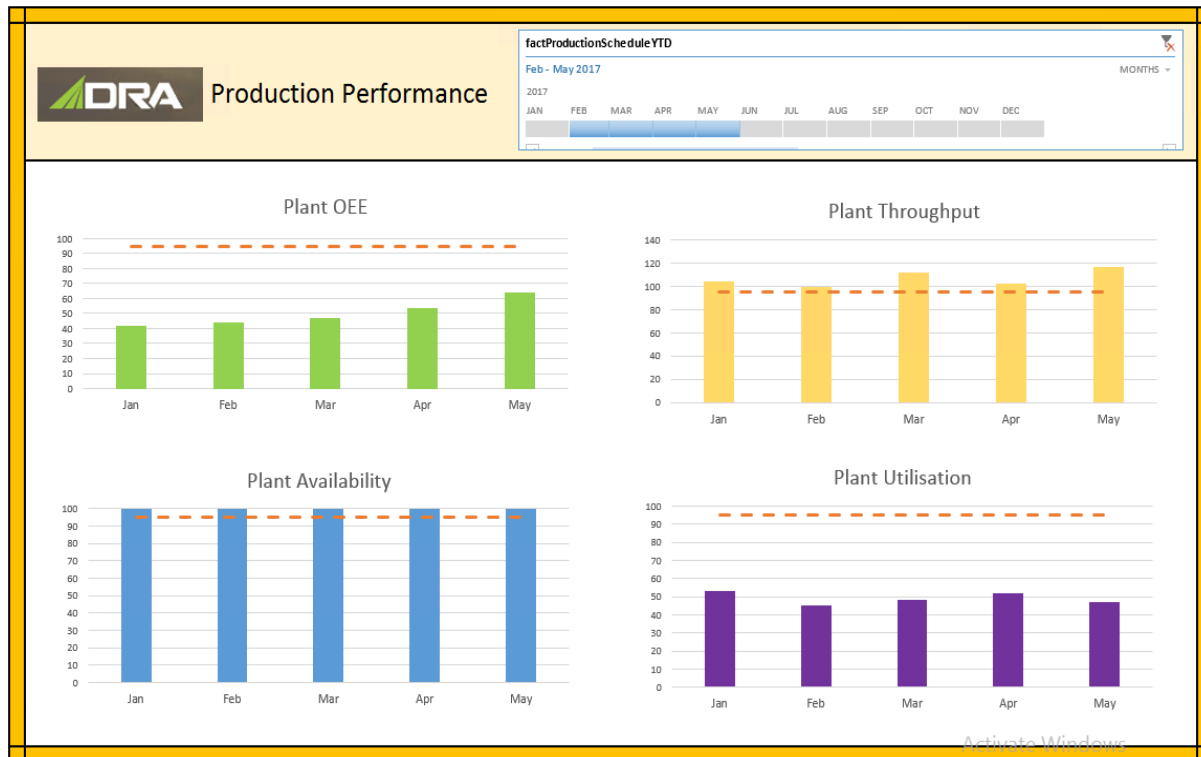
Mill Running Hours	hrs	0	0	0	0	0	0	0	0	0
Mill Availability	%	0	0	0	0	0	0	0	0	0
Mill Load (Average)	ton	223	223	221	216	211	205	270	224	209
Mill MW (Average)	MW	0	0	0	0	0	0	0	0	0

Plant Tonnages

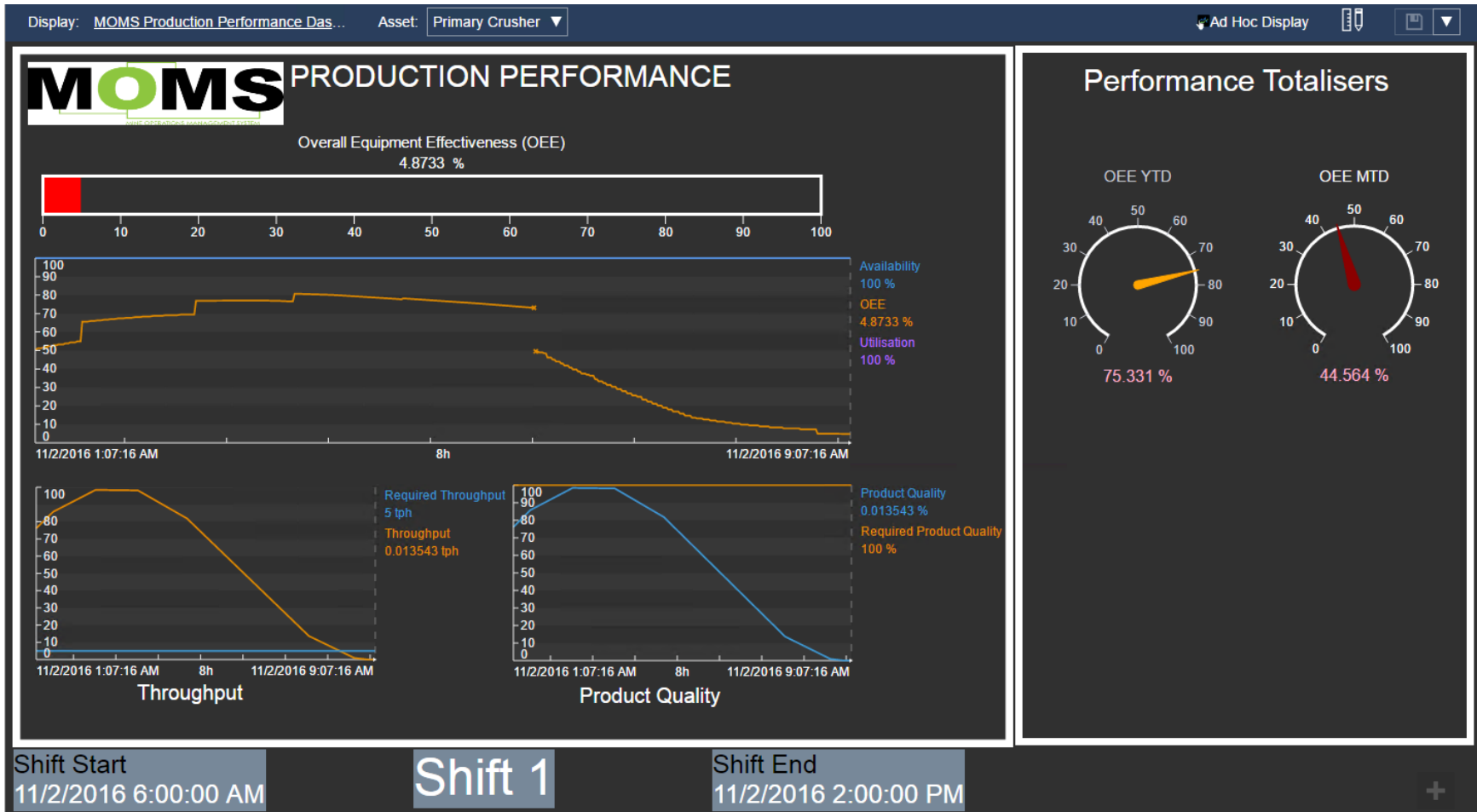
Tertiary Crusher	ton	2172	2297	3034	1735	3631	3408	-28	16249	29138
Pebble Recycle	ton	2877	2010	2512	1441	2473	2900	2670	16882	33608
DMS	ton	1295	929	1649	876	1512	1426	854	8541	16267
Tailings	ton	4066	2914	4953	2656	5074	5223	4693	29580	56984
Tailings		48%	62%	63%	69%	66%	66%	59%	61%	60%
Slimes		52%	38%	37%	31%	34%	34%	41%	39%	40%
XRT Tons	ton	1596	1537	2008	1206	2278	2819	3077	14522	28641



MOMS Example - Production Performance Module



Production Performance Module



Production Performance Module



Dashboard – Real time or historical



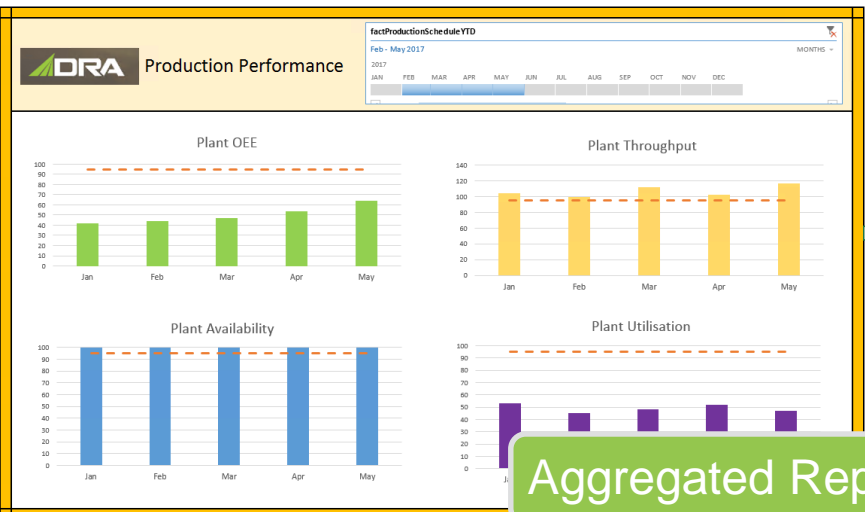
From: DRA MOMS System
Sent: 12:09:00 AM 12/09/2017
To: General Manager
Subject: Plant OEE – Month to Date

Dear Customer,

The Plant OEE has dropped below 40% for the Month

Start Time: 18:09:00 AM 01/09/2017

Notifications



Aggregated Reporting



Production Inventory Tracking Module



Tracks product-in-process from ore

- ROM Ore
- Concentrate
- Tailings

Tracks production materials and energy consumption

- Reagents
- Process Water
- Grid Power

Product mass balance (Metal Accounting)

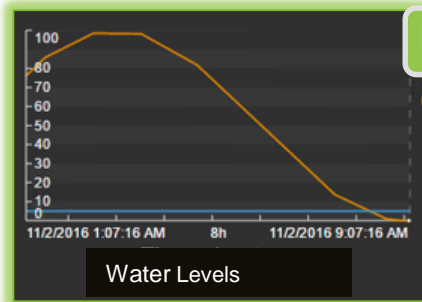
Data exchange with ERP System

- Inventory financials
- Reorder prediction

Materials & Energy Consumption Report

- Aggregates KPI's
- Interactive

MOMS Example - Production Inventory Tracking

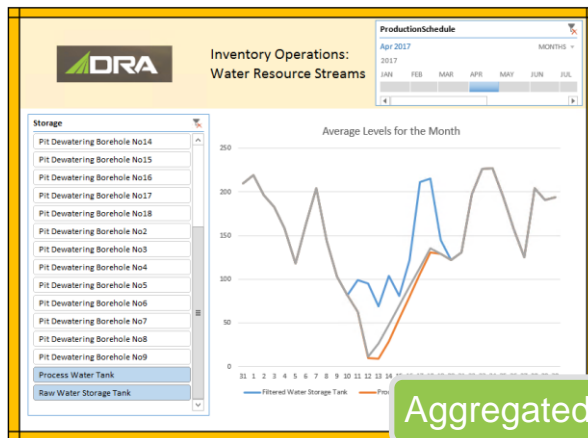


Dashboard – Real time or historical

From: DRA MOMS System
Sent: 12:09:00 AM 12/09/2017
To: General Manager
Subject: Water Storage Levels CRITICAL

Dear Customer,
The Water Storage Level has dropped below 20%.
Start Time: 18:09:00 AM 01/11/2017

Notifications



Aggregated Reporting

Downtime Analysis Module



Tracks asset downtime

Categorises failure events on immediate cause:

- Production
- Maintenance
- Quality
- Inventory
- Safety

Calculates KPI's:

- Mean Time Between Failures (MTBF),
- Mean Time Between Repair (MTBR),
- Mean Time Between Failure Growth (MTBF Growth)

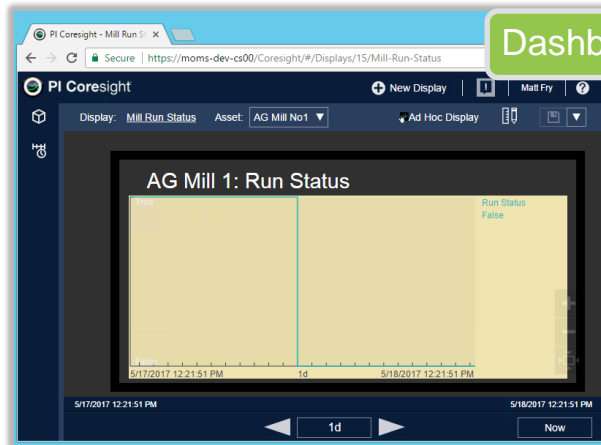
Sends running hours & availability to ERP

- Maintenance Management

Production Downtime Report

- Failure Downtime
- Reported Downtime
- Aggregate KPI's

MOMS Example - Downtime Analysis Module



Dashboard – Real time or historical



From: DRA MOMS System
Sent: 12:09:00 AM 12/09/2017
To: General Manager
Subject: Mill 01 Trip

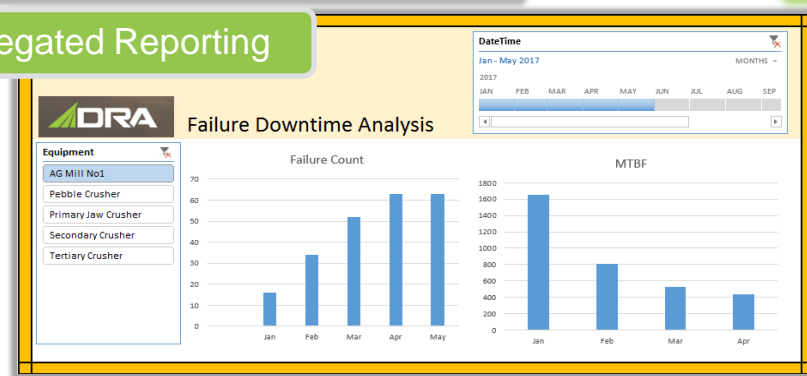
Dear Customer,

The AG Mill 01 has tripped.

Start Time: 12:09:00 AM 12/09/2017

Notifications

Aggregated Reporting



Product Quality Validation Module



Tracks the actual product quality vs required quality

- Set of metrics as defined by process stream
- Compares reserve expectation to quality as received at plant.

Interfaces with Laboratory Information Management System (LIMS)

Interfaces with intelligent instruments

- Online or visual analyzers

KPI's

- Actual Product Quality / Required Product Quality

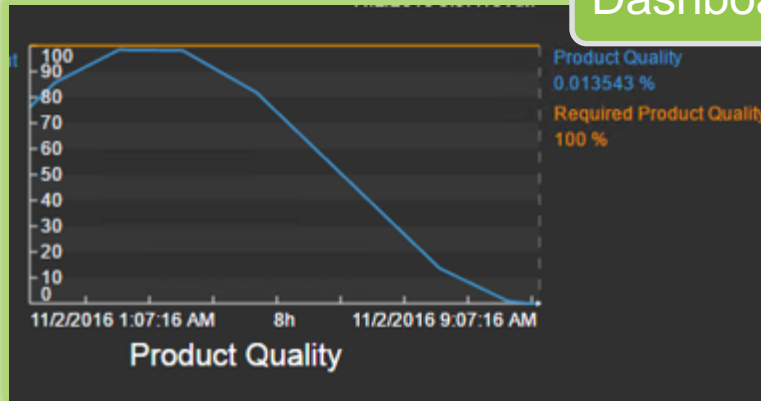
Product Quality Report

- Aggregate KPI's
- Interactive

Product Quality Validation Module



Dashboard – Real time or historical



From: DRA MOMS System
Sent: 12:09:00 AM 12/09/2017
To: General Manager
Subject: Crusher Product Size out of spec

Dear Customer,

The product size of the primary crusher has moved out of spec.

Start Time: 12:09:00 AM 12/09/2017

Notifications



MOMS Product Quality Report

Nov 2016

Region: Duran Duran Mine

Site: No1 Plant

Sampling Station: 0050 0051 Primary Crusher PSA

Property	Required Value	Quality Rating	Quality Property MTD	Quality Property YTD
Product PSD 200	50,53	80	53,41	50,13
Product PSD 300	50,51	80	53,41	50,12
0050 0051 Primary Crusher PSA Total	50,52	80	53,41	50,12
Product Grade	3,43	4	84,33	3,52
0850 0060 Elution #1 Pregnant Solution Sampler Total	3,43	4	84,33	3,52

Aggregated Reporting

Documentation

- Operation Manuals,
- Maintenance Manuals,
- Critical Spares, Datasheets,
- Process Design Criteria, PFD's PID's
- Mechanical Equipment Lists

Documentation Control (Management System)

- Revision control
- Search functions

Documentation Archive

- Links provided in the framework structure

Reporting Audience



Executive Team Reporting

- CEO, COO, CFO

Mine Management Team Reporting

- GM, HOD's

Operational Team Reporting

- Engineers, Operators, Foremen, Supervisors



Owners' Benefits



Improved control and management of your process plants

Track **asset performance** for delivering maximum efficiencies

Right information at the **right time** to the **right audience**

Real-time reporting

Event-based reporting

Simplify complex data capturing

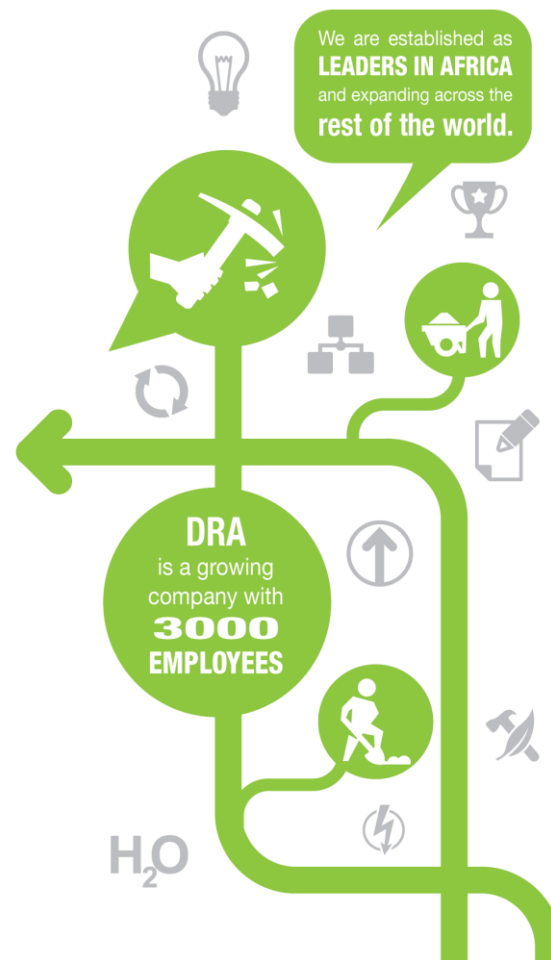
Improve communication between management and staff

Pro-active **decision** making

Selecting of "**Golden Shifts**"

Mobile platform visualization

Reduction in **operating costs**



MOMS Reference Sites



2017 - Zimbabwe, Zimplats SMC & Ngezi

2017 - Botswana, Minopex Karowe

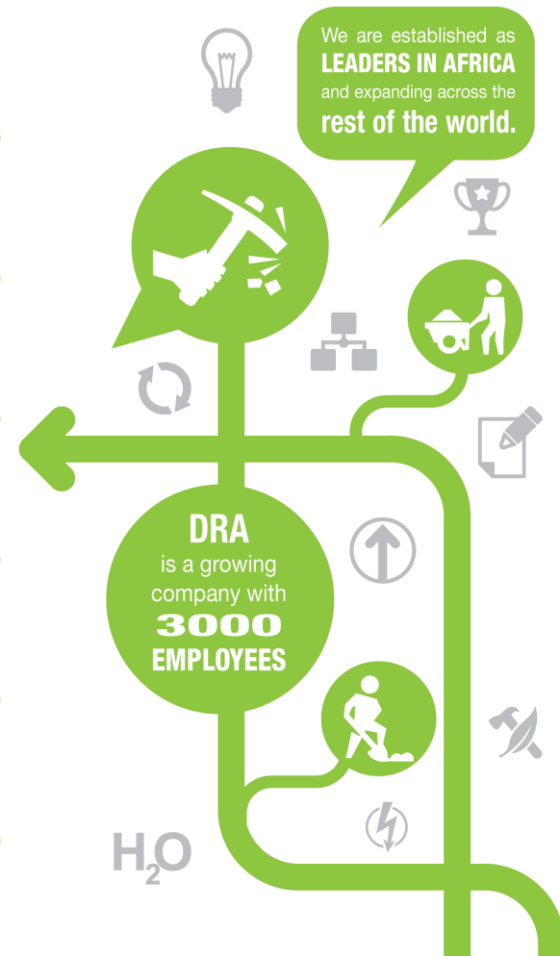
2017 - Lesotho, Firestone Diamonds Lqhobong

2016 - Mauritania, Kinross Gold – Tasiast

2016 - Pennsylvania, DRA Energy Operations

2015 - Liberia, Aureus Mining New Liberty Gold

2013/4 - DRC, Randgold Kibali





QUESTIONS & THANK YOU

