The Schneider Electric industrial software business and AVEVA have merged to trade as AVEVA Group plc, a UK listed company. The Schneider Electric and Life Is On trademarks are owned by Schneider Electric and are being licensed to AVEVA by Schneider Electric.
### Information

Ensure reliability and availability of assets and safety of workforce

Lower cost, time and risk in capital project engineering

Plan and schedule operations to maximize profitability

Monitor and control operations to ensure safety and performance

Ensure safe and profitable operations within operating constraints and regulatory norms

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### Interoperability

Design Asset

Design Operating Process

Build and Commission Asset

Interoperability

### Visualization

Asset Model

Analytics

Analyze Asset Performance

Monitor and Visualize Asset Operation

Control Asset Operation

Planning and Scheduling

### Operations and Optimization

Manage Asset Operation

Optimize Asset Operation

Plan Asset Operation

Schedule Asset Operation

Plan Asset Operation

Asset Efficiency

Asset Performance

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### Asset Lifecycle

Improve Return on Capital

Improve Profitability
Ampla Mining Operations Management Software

Increasing operational efficiency through actionable intelligence

- Ampla is the leading Mining operations management software from Aveva
- MES/MOM – ISA 95 Level 3 solution
- Designed for MMM industries
- Designed to help optimise production and performance of all processes.
  - Better decision making - Knowing the current and past performance of the processes.
  - Reduce manufacturing costs - by understanding the true costs.
  - Better planning – up-to-date information on the current inventory and asset state.

Ampla delivers leading Metals & Mining Companies significant productivity improvements

50% of surveyed Global 500 Metals & Mining customers achieved a greater than 30% or more improvement in productivity using the Ampla software.
Ampla in mining, metals and minerals

Enhance operational performance while driving energy and cost savings

➢ Globally #1 in Downtime for Mining & Metals
➢ Used by 80% of the top global mining companies
➢ In 200+ mining and metals installations
➢ Fastest payback in 6 hours
➢ 92% MMM users say Ampla critical to day to day operations
➢ Current vision: to be the global standard for Production & Inventory Accounting

A Global 500 metals & mining company achieved a greater than 30% improvement in productivity using the Ampla software.
Optimising performance at leading MMM companies globally

If your job is performance optimization or data integrity then Ampla is 100% critical

How critical is Ampla to your organization’s day to day operations?

- Extremely critical: 15%
- Very critical: 54%
- Critical: 31%
Built for mining, metals and minerals
Asset Utilization

Ampla Downtime
What Business Problems are we solving

Asset Utilization

➢ Looking to maximise the Utilisation of Assets (AU)
  ➢ Brings benefit through low cost capacity increases
➢ Standardise the Capture and Classification of Events
  ➢ Understand the Root Cause of Downtime
➢ Provide management visibility to manufacturing performance
  ➢ Standardise the Calculation of Key Performance Indicators (KPI) such as OEE
Ampla Downtime

- Automatic and Manual capture
- Data Capture for Context
- Enabling Consistency – Relationship matrix
- Analysis Capabilities
- Raising Work Notifications
<table>
<thead>
<tr>
<th>Start Time</th>
<th>End Time</th>
<th>Duration</th>
<th>Equipment</th>
<th>Cause</th>
<th>Location</th>
<th>Crew</th>
<th>Last Modified</th>
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**Pareto of top 5 Cause ordered by Duration**

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<th>Duration</th>
<th>Count</th>
<th>Accum. Duration</th>
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<td>0:01:00</td>
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<td>0.45</td>
</tr>
<tr>
<td>0:01:00</td>
<td>2</td>
<td>0.60</td>
</tr>
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</table>

**Causes:**
- Belt Drift, Track Trip
- No code, See comment
- Drive, VWF Trip
- Crash/Stop
- Over, Under Speed Trip
- Other
Unearth the power of real-time OEE

OEE serves as a KPI for how efficiently the assets are being used

➢ Gold standard for improving manufacturing productivity.
➢ Metric for identifying losses
➢ Benchmarking progress
➢ Improve the productivity of manufacturing equipment
➢ Understand the causes of loss by recognizing constraint types and developing strategies to improve, or even remove, the constraint
➢ 78% of surveyed Mining customers have improved OEE by more than 10% since implementing Ampla
➢ 34% of surveyed Mining customers have improved OEE by more than 20% since implementing Ampla

Metals & Mining Customers improve OEE with Ampla Software

Please estimate the improvements you’ve achieved in the following areas using the Ampla software: OEE

- <50%: 12%
- 50-70%: 26%
- 70-90%: 44%
- 90-100%: 20%

Source: TechCircle survey of 13 users of Ampla. Sample comprised of Metals & Mining customers.
Ampla Metrics

Calculating the Key performance Indicators

- Consolidate data from all other modules
- Near Real Time KPI Calculations
- Threshold highlighting
- Configurable time Hierarchy
- Feed for customised digital dashboards
Ampla Asset Utilization benefits
Getting the most out of your Assets

Analyze production loss causes in near real-time

Perform detailed root cause analysis to prioritize maintenance, new equipment and operating procedures

Identify production bottlenecks and inefficiencies and develop ways to resolve them

Empower effective decision making

Benchmarking and gauging the effect of improvement initiatives or operational changes over time
MMG Limited utilizes Ampla Operations Management Software

**Client:**
MMG Limited

**Location:**
Victoria, Australia

**Closing the Loop:**
MMG Limited operates and develops copper, zinc and other base metals projects across Australia, the Democratic Republic of the Congo, Laos and Peru. Schneider Electric helps MMG achieve real-time asset utilization with Ampla operations management software including standardized time usage model (TUM) globally.

**Time usage model for 5 sites**
Globally ensures standardized reporting

**Increased global capacity 10-20%**
Due to improved visibility into asset utilization

**Resulting in 29,422 tonnes**
Additional copper produced

**Results:**
We’re Closing the Loop to help MMG Limited achieve:

- Significant improvements to productivity
- Visibility into the Process Constraints (bottlenecks) and also Efficiency Gains
- Clear root cause analysis (native drill down capability)
- Clarity on how to achieve optimum productivity
- Improvement to assets, resources and processes utilization

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Material Tracking

Inventory Management
Inventory Management and Material Tracking

Outside of its People, Inventory is the most important asset of any mining company.

Ampla now provides users with a complete work-in-progress (WIP) inventory solution for continuous process industries.

**STATUS QUO**

Plethora of spreadsheets and other manual practices

- Inaccurate information
- Significant lag in reporting

**THE FUTURE... IS HERE NOW!**

Calculate inventory with real-time data from production

- Automated Movement Capture
- Near Real time calculation of Inventory's
  - Material
  - Location
  - Quantity and Quality
- Full History of Inventory
- Error correction and reprocessing
Ampla Inventory

Inventory with genealogy

- Complete View of inventory levels in near real-time
- **Automatic** and **Manual** capture on movements
- Enter **Adjustments/Survey results** to work centers, lots and lot groups
- **Filter & view** any inventory and movements
- **Track Genealogy** from “Blast Block” to Port

Quality Sample Data linked to Inventory Lots

- **Consolidated** view of Inventory with Quality (obtain metal tones)
- **Calculated inventory** for stocks as well as material flows
- **Lot Groups** allow dynamic **segmentation** of materials in work centers and **WAG** calculations
**Inventory Concepts**

- **Materials** - are the things that Ampla tracks the balances of (Products, Waste, WIP)

- **Work Centers** - are locations within the Equipment Model that Ampla tracks the balance of Materials (Process Plant, Crusher, Stock Pad)

- **Material Movements** - represent the business rules of “what” and “when” Material should be moved between Work Centers (Pit to Crusher, Fleet, Ship Load)
Lots

- **Lot** - is an “allotment of material” that can be assumed has the same “grade”

- **Lot Group** - Dynamic grouping of lots. Also has associated functionality such as WAG and survey results (stockpiles, trains, ships)

- **Lot Behaviour** - Defines how Lot processing in a Work Center/Lot Group will be handled (FIFO, LIFO, Mixed, Selective, WAM)

- Relationships between lots is retained and is the biases of genealogy
Material Quality

- Analyze, report, and manage quality throughout the process. Captures key process-related data that impacts quality into a single repository to measure and compare against set targets and specifications. Flexible charting makes for easy analysis.

- LIMS System, Assay version Tracking Online Analyzers, Manual. Any number of Quality Parameters. Linked to Inventory lots for Calculated Inventory.
<table>
<thead>
<tr>
<th>Sample Date</th>
<th>Location</th>
<th>Material Class</th>
<th>Lot Group</th>
<th>Balance</th>
<th>FE</th>
<th>AL2O3</th>
<th>DEN</th>
<th>P</th>
<th>SIO2</th>
<th>Units</th>
<th>Product</th>
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<tr>
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<td>Stockpiles</td>
<td>WIP</td>
<td>ROM_HGA</td>
<td>300376</td>
<td>59.7%</td>
<td>4.21%</td>
<td>1.47612019</td>
<td>0.033%</td>
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<tr>
<td>02/06/2010</td>
<td>Stockpiles</td>
<td>WIP</td>
<td>ROM_BENEC</td>
<td>350406</td>
<td>61.7%</td>
<td>3.70%</td>
<td>1.60527780</td>
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<td>53.3%</td>
<td>8.02%</td>
<td>1.03205133</td>
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<td>ROM_BENEC</td>
<td>502682</td>
<td>52.3%</td>
<td>9.51%</td>
<td>0.026%</td>
<td>11.01%</td>
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<td>1</td>
<td></td>
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<td>20/05/2011</td>
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<td>6.51%</td>
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<td>13.65%</td>
<td>BENE</td>
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**Summary Chart: Balance grouped by Lot Group**

- **Balance [<mulp]**
- **Balance [ROM]**

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*Note: The image includes a navigation pane with various options such as 'Item', 'Site', 'Input', 'Output', 'Pre Crush Stockpiles', 'Survey Results', 'Crushing', 'Primary Crushing', 'Cost Stockpiles', 'Process Plant', 'Process Plant', 'Stacking', 'Product Stockpiles', 'Survey Results', 'Waste Dump', 'Dump Locations', 'Rail', 'In and Out', 'Port', 'Product Stockyard', 'Stockpiles', 'Ship Load', 'Vessels'.*
Ampla Inventory Accounting benefits

Realize unsurpassed **visibility** of **inventory** levels across your entire value chain

Understand your work-in-progress and **visualize** your **stock** levels in terms of **quantity** and **quality**

Manage and **track** your inventory and material movements

Incorporate survey results and drive **conformance to plan**

View **genealogy** of shipped product from resource to market, and across time

Streamline and audit Inventory **reporting** and **reconciliation** activities
Reducing the cost of processing

Mining challenges in reducing consumable costs

- Reduce energy consumption at the same time as increasing production
- Engage operations teams to take ownership of energy management
- Adopt best practices and reduce energy waste
- Load shift to off-peak times as much as possible (depending on energy supply conditions)
Energy Management

What Business Problems are we solving

➢ Reduce energy consumption at the same time as increasing production
  ➢ Looking accurate picture of production
  ➢ Understand Energy / Consumable Consumption
➢ Know the Real $ Cost of Energy
➢ Load shift to off-peak times as much as possible
➢ Know when and why we are Over consuming energy vs target
Understanding energy in context

Energy Information – no context

Energy Information – with context

profile of track

Travel direction

Height

Distance

Energy Efficiency
15L per 100 km

Energy Efficiency
15L per 100 km

Energy Efficiency
15L per 100 km

Energy Efficiency
15L per 100 km
Ampla Production

Capturing Production in Context

- Automatically logs all inputs and outputs e.g. materials, consumables, energy, waste, emissions and product output

- Native Tariff configuration for real cost of energy usage

- Drill into reports/charts to see the underlying data. The drill-in functionality automatically applies a filter to your data
Ampla Energy

Understand the root causes of energy over-consumption and take action to minimize them

➢ Capture over-consumption
➢ Report amount of wasted energy
➢ Capture information for root cause analysis

➢ Use Ampla Energy to:
  • Reduce power costs and peak consumption
  • Baseline power for different phases
  • Identify energy used during idle time
  • Identify wasteful startup and shutdown sequences
  • Increase accountability of operations team

Can be applied to Water, Air, Gas, Energy and Steam (WAGES). Reduce Costs on all your primary inputs.
Ampla Energy Management Benefits

Automatically capture energy events

Automate the routine collection of production and consumption data

Perform root cause analysis of over-consumption

Stabilize your existing energy usage and improve operating procedures

Understand the true cost of your WAGES energy sources

Drive energy efficiency initiatives throughout your organization
Ampla: benefits realization in mining

**Mining/Crushing**
- BHP Iron Ore (Pit)
- BHP OD (U/G)
- Illawarra Coal (U/G)
- RTCA Kestrel (U/G)
- RTCA Clermont (IPCC)
- BMA Crinum (U/G)

**Concentrators**
- BHP Olympic Dam
- BHP Cannington
- BHP Nickel West (All)
- MMG (3 sites)
- Rio Tinto ERA
- Kennecott Copper

**Refine/Logistics**
- BHP OD Refinery
- BHP Nickel West KNR
- BHP Iron Ore Rail
- Xstrata NCA Pit-to-Port
- RTCA Hall Creek Rail
- RT Alcan Gove Ship

**Coal Operations**
- 8 wash plants and 1 port
- Targeted production rate loss
- 5% production improvement
- $200M increased revenues

**Cement Plant**
- 2 Cement Kilns
- 50% reduction in stoppages
- 12% production improvement
- $1.6M increased revenues

**Manganese Mine**
- Primary crusher to final product
- Targeted production rate loss
- 20% production improvement
- 600Ktpa increased production

**Olympic Dam Mine**
- De-bottlenecking underground rail
- Increased availability by 3 hrs/day
- 18.7% production improvement
- 1.7Mtpa increased production

**Zinc & Lead Filter Plant**
- 5 filter presses (4 Zn, 1 Pb/Zn)
- Increased utilization 78% to 94%
- 20.5% production improvement
- 100Ktpa increased production

**Alumina Refinery**
- Ship (Bauxite) unloading
- Increased by 1 ship a year
- 0.45% production improvement
- $6.6M increased revenues

**RTCA Hail Creek Operations**
- Train Loadout (TLO)
- 2 Coal Handling Preparation Plants (CHPP)
- 44% Reduction in duration of delays within CHPP
- 48% Decrease in delay occurrences in CHPP
- 25% Increase achieving Train Freight Incentive Scheme

Disclaimer:
- Names of some operations were withheld as the information was supplied to Schneider Electric only and not available in the public domain
- Numbers provided for unnamed case studies were rounded (approximated) based on “best guess” commodity prices and annual production levels.

Ampla users include:

- Rio Tinto
- BHP Billiton
- Xstrata
- MMG
- PanAust
- BMA
- Vale
- Anglo American
- Chinese Copper
- Implats
- ERA
- Kennecott Copper
- Rio Tinto
- BHP Billiton

Ampla users include facilities throughout Australia and globally.
Questions?