



## CUSTOMER CASE STUDY

# MMG generates large returns by focusing on continuous improvement

MMG Limited - [www.mmg.com](http://www.mmg.com)  
Industry - Metals, mining and minerals

## Goals

- Implementation of a standardized asset utilization solution across all operational sites globally
- Achieve ongoing measurement, analysis and reporting of production losses due to equipment utilization
- Ability to perform root-cause analysis of “less than perfect” utilization of equipment assets
- Complete integration with other systems to enable “single sign on”
- Defining the maximum sustainable rate for processes, which may differ between sites
- Achieving the appropriate level of automated data capture at the instrumentation and data collection layers

- Standardizing time usage model (TUM), cause codes and classification matrix across all 5 current operating sites globally
- Adoption of the new work practices given the extensive work experience of people within each operation

## Challenges

- The solution needed to be flexible enough to adapt to the local operating conditions of each mine, while also providing a standardized asset utilization data that they could analyze in real-time
- Had to have the capability to drill-down to the root-cause of any equipment asset that was exhibiting less than perfect utilization, in order to drive continuous improvement through the business
- Needed to be readily accepted by global users in a single sign-on environment compatible with existing systems

# AVEVA Solutions

- AVEVA™ Production Management software
- AVEVA consulting services, project design, implementation, training and support

## Results

- Significant improvements to productivity
- Process constraints (bottlenecks) and efficiency gains exposed
- Clear root cause analysis (native drill down capability) provided
- Clarity on how to achieve optimum productivity
- Improvement to assets, resources and processes
- Increased asset utilization by at least 10% across the sites

**VICTORIA, Australia** – MMG Limited (MMG) has a vision to become the world's most respected diversified base metals company.

MMG operates and develops copper, zinc and other base metals projects across Australia, the Democratic Republic of the Congo (DRC), Laos and Peru. It also has significant exploration projects and partnerships across Australia, Africa and the Americas.

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“MMG is committed to improving the productivity of our operations, illustrated by these record movements in ore mined and continuing improvements in asset utilization.”

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**Andres Micheltore**  
Former Chief Executive Officer, MMG Limited

## Project goals

One of the core business drivers for MMG is to generate value through transformation. This strategic intent drives business efficiencies, and led MMG to implement an asset utilization program.

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“We needed a long-term solution that would standardize our asset utilization across our five mines. It had to provide us with a global understanding of OEE (overall equipment effectiveness) so that we could improve our business processes and ultimately improve our mine throughput.”

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**Mark Dwyer**  
Business Technology Manager, MMG Limited

“The solution needed to be flexible enough to adapt to the local operating conditions of each mine, while also providing us with standardized asset utilization data that we could analyze in real-time.”

Dwyer continues “We had to have the capability to drill-down to the root-cause of any equipment asset that was exhibiting less than perfect utilization. The new system and processes had to drive continuous improvement through the business, be readily accepted by users everywhere, and this had to be achieved in a single sign-on environment compatible with our existing systems.”

The project would have the potential to generate large cash returns with little change to MMG's fixed business costs, as the focus of the program was on improving the performance of existing assets.

Asset utilization is a measure of how well a company's capital assets, typically a process plant, are being used. Mathematically, it is the ratio of the product actually made compared to the product that could have been made operating at Maximum Sustainable Production (MSP).

Since a process, when running at peak performance, can only produce as much as its bottleneck (constraint point), each factor in the OEE equation had to be measured and analyzed at the most relevant constraint point.

Asset utilization measures all production losses and all time losses, including loss of sales, against calendar time. The real value of asset utilization, is when the number or KPI is supported with an appropriate Time Usage Model (TUM), and a governing hierarchy that identifies, captures and categorizes opportunities.

This then becomes a powerful analysis tool into the specific opportunities that make up the overall improvement gap, and aligns the improvement focus with the constraint or bottleneck of the process for maximum net effect.

In addition, a new set of business rules needed to be developed that would standardize the TUM, cause codes and a classification matrix for 'less than perfect' activities across the geographically dispersed mines.

The resulting gains and losses could then be analyzed by MMG process, mechanical and electrical engineers to determine where productivity improvements could be made to either the physical or process assets as part of a continuous improvement strategy. This is more reactive and requires an integrated IT/OT solution that has a powerful event capturing system that can automatically or semi-automatically capture those loss or gain events and makes it easy to classify and determine causes.

## Solution selection

MMG required a commercial-off-the-shelf (COTS) solution and selected AVEVA Production Management software as a solution to deliver near real-time visibility into global production plus the ability to drilldown to root-cause analysis of 'less than perfect' utilization events.

With its ability to connect to multiple plant and business systems, the software captures relevant data to provide easy to understand real time intelligence for analyzes.

Being a long-term strategic initiative at MMG the asset utilization program also had to deliver a future-proof solution which meets the needs of complex, continually evolving IT systems. Highly configurable, easy to integrate and sustainable to adopt change and continuous improve, AVEVA Production Management software was the obvious choice.

## Solution implementation

MMG chose AVEVA for their asset utilization program as they were looking for a single vendor for this critical turn-key project.

The solution delivered by AVEVA included everything from software, licensing and support, through to business consulting, solution design, implementation services, documentation and user training.

With change management being such an important part of the asset utilization program it was imperative that the project commenced with a business consulting exercise. This discovery services study (DSS) delivered a thorough understanding of the business requirements before any engineering began.

The asset utilization solution implemented at MMG has taken the old OEE lag indicator to a real-time lead indicator. All required data is captured from existing instrumentation and control system, and calculated and presented as easy understandable information to operators. This improved visibility helps operators to optimize the process on the fly, enabling them to run just below the point of failure at the maximum sustainable rate. This has resulted in measurable OEE improvements, a significant increase to production and a reduction in operating costs.

One of the key challenges to the project success was determining the correct positioning of reporting points. Given that a complex process seldom experiences a total loss right across the operation it was important that any stoppage or compromise in production was recognized at the relevant constraint point when calculating the OEE of the overall asset. This meant that it was imperative to achieve the appropriate level of automated data capture at the instrumentation and data collection layers. This challenge was overcome using the results of the DSS.

The project was underpinned with a good change management approach which also included role-based training.

This contributed immensely to the adoption of the technology along with well-defined OEE reports that are distributed daily to operations, supervisors and management.

Underpinning this was the ability for the process engineers, maintenance and asset managers to drill down into the data to determine the root cause of the problems which provided the answers they needed to show management they had action plans and were in control.

## Results

The true power of the resulting asset utilization program has been to deliver real-time OEE. Firstly, it provides operators and production personnel with a real-time target, based on maximum sustainable and achievable rate given the current feed grade and equipment availability.

Operators are able to tweak the process to achieve their production targets – making this rather than a reactive approach to OEE. This means the system behaves more like a control system than just a reporting system; allowing for immediate intervention to help ensure losses are minimized. Secondly, it is now possible to better understand constraints and the causes for losses, so that strategies can be initiated to improve, or even remove, that constraint over time.

Not only does the system capture production losses, it also captures higher than expected performance. All this information becomes invaluable for the metallurgists, process and reliability engineers to diagnose root cause of constraints and also helps recognize the reasons why the process runs above expectations.

Operators are able to proactively chase realistic operation targets in near real-time; reducing both the time to resolve problems and the amount of production loss experienced.

- Operators have a better understanding of their process and learned not to push the process harder than it could handle; minimizing downtime and improving throughput
- Process constraints and bottlenecks were exposed, allowing key operations people to more effectively target their continuous improvement initiatives; resulting in a more collaborative approach to problem resolution between departments
- The native drill down analyses capabilities provided with AVEVA Production Management software allowed to determine root-cause of any “less than perfect” utilization; making it easy to identify the “low hanging fruit” or those issues, that if addressed, would deliver MMG the biggest ROI on their time and investment
- Provided clarity on how to achieve optimum productivity which drives improvement to assets, resources and processes.

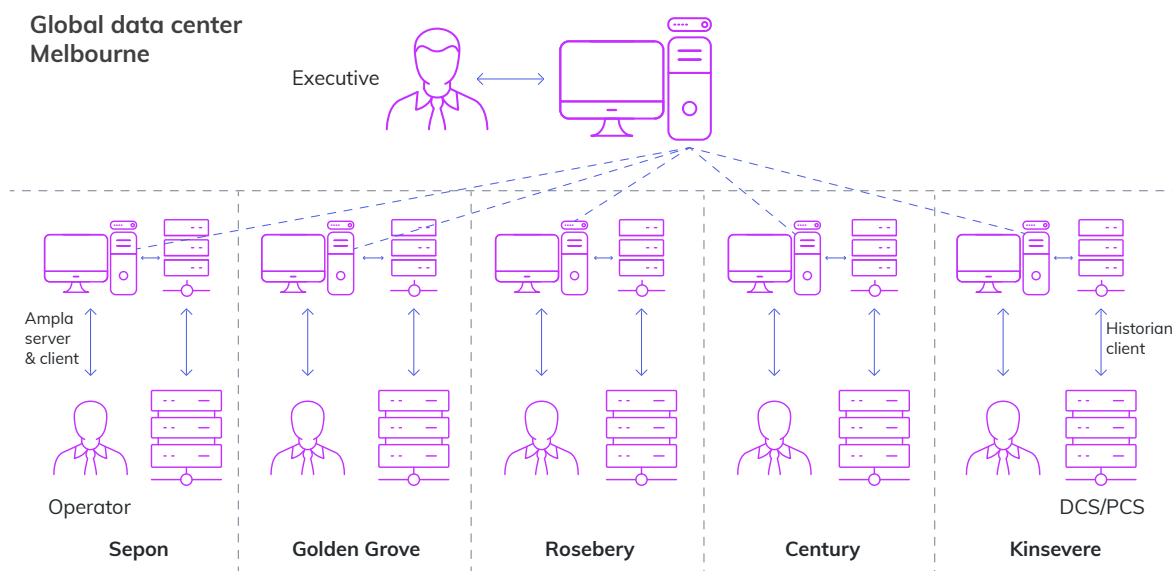


Figure 1: Asset utilization project architecture



“The asset utilization project is already delivering significant results. We have achieved around 10-20% capacity improvement globally. Sepon and Kinsevere continue to operate 12% and 34% above nameplate capacity respectively, contributing a further 29,422 tonnes of copper production in 2015 compared to the year ended 2014.”

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**Dan Curry**  
 Group Manager Processing Operations, MMG Limited

“The asset utilization and productivity improvement programs that commenced in 2012, significantly contributed to this. These initiatives aimed at maximizing throughput, maintaining production volumes and reducing mining and processing input costs – AVEVA Production Management software, and AVEVA were instrumental in us achieving this.” Curry continues.

The asset utilization program, which began as a strategic initiative, is now embedded into MMG’s processes and provides an ongoing return on their initial investment. MMG’s investment in the asset utilization, real-time OEE solution is negligible when compared to the payback in the first year alone and now continues to generate additional annuity year on year.

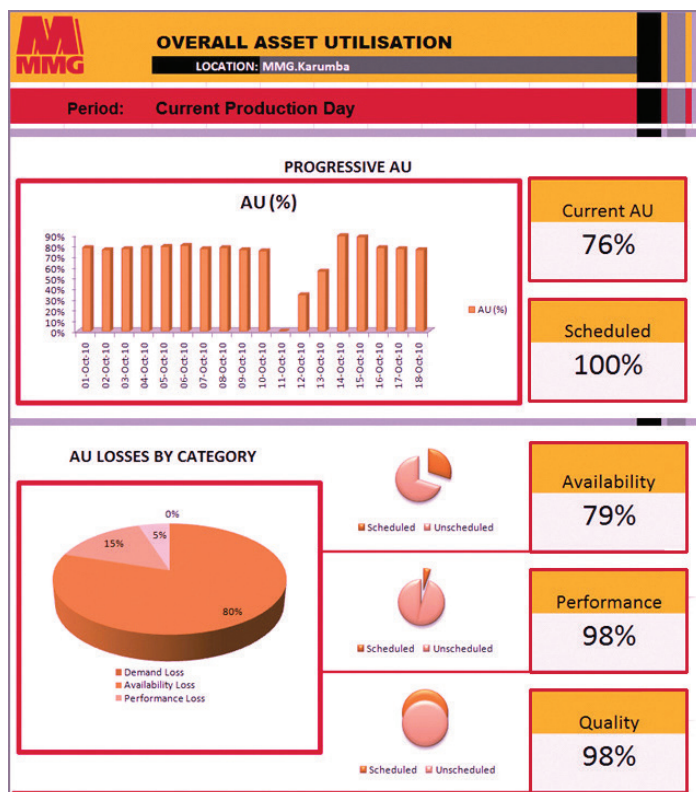


Figure 2: Real-time reporting allows MMG to achieve optimum productivity which drives improvement to assets, resources and processes

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