

## Ma'aden Gold & Base Metals Co.

Jeddah, Saudi Arabia



Ma'aden Gold & Base Metals Co. is the largest subsidiary company of Maaden, active in gold, silver and base metals mining. Ma'aden was originally a department under Petromin operating Mahd Al-Dahab Gold Mine, and another company called Saudi Precious Metals Company. A merger in 1997 between Saudi Precious Metals Company and Petromin Gold's mining department, created the Saudi Arabian Mining Company, aka Ma'aden). As Ma'aden grew, the Ma'aden Gold Company was established as a subsidiary of Ma'aden.

Ma'aden engages in the exploration and development of mineral resource properties, primarily gold and bauxite, in Saudi Arabia. Besides a \$10.8 billion integrated aluminium project and \$5.6 billion phosphate mine, Ma'aden has five gold mines producing over 150,000 ounces per annum, with 11 million ounces of resource. Ma'aden Gold operates through four gold mines, Mahd Ad Dahab – a mine which has been in existence for 4000 years, Sukhaybarat, Bulghah, Al Amar and the recently re-opened Al Hajar mine.

### ANALYSIS

The key objective of the Analysis was to determine the financial and operational scope of opportunity available to Ma'aden Gold at three of the larger mining sites; Mahd Ad Dahab, Sukhaybarat, and Bulghah. The main deliverables were to:

- Determine the current throughput and productivity levels;
- Assess the productivity-related processes, procedures, systems and behaviours;
- Determine the areas of improvement;
- Determine the bottom-line effect of the identified improvement potential; and
- Develop the implementation approach of realizing the improvements and build the business case.

The detailed analysis revealed:

**Operational** inefficiencies could be significantly reduced through:

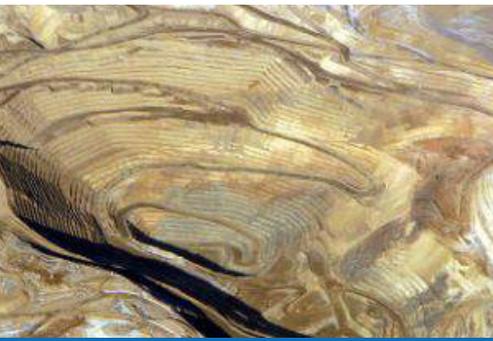
- Increased compliance to shift schedule
- Improved active supervision
- Enhanced interfaces between departments to improve mining effectiveness
- Tighter management of the mining cycle
- Increased adherence to maintenance scheduling, thus greater mining equipment availability
- Defined and communicated targets, positive reinforcement, and variance control
- Improved planning, controlling and reporting systems

### Key Results

Overall, the project resulted in a significant uplift in throughput of all three mines, with improvements of 40% against targets of 17%. It has created a 'can-do' attitude amongst the mine personnel that will continue to push for even higher results in the future.

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**Maintenance** effectiveness could be significantly enhanced through:

- Increased accountability for maintenance to equipment operators through job request processes
- Improved compliance to planned vehicle and equipment maintenance by implementing full maintenance needs backlog
- Enhanced assessment process for prioritization, resources, and parts requirements
- Improved performance-driven supervision by charge hands and foremen
- Improved interfaces and collaboration between Operations and other departments

Moreover, the assessment also highlighted the need to:

- Set up the right key performance indicators dashboard for management
- Implement the key daily, weekly and monthly meetings with the right attendees to systematically review past performance versus plan, analyze any deviations and take corrective actions
- Increased clarity in the accountabilities and responsibilities
- Improved management skills, across the organization, to further drive continuous improvements, safely

### PROJECT APPROACH

The Productivity & Maintenance Excellence initiative was a 40 calendar week project designed to deliver a 17% increase in throughput across three sites measured against the previous year's performance.

The project consisted of a dedicated Renoir Project Team along with a Ma'aden Task Force of four people, allocated full time to the project. A monthly Steering Committee, chaired by the President of Ma'aden Gold, consisted of the Operations Director, Industrial Relations Director, QMS Manager, and the Mine Managers. This committee ensured that the project remained on track and achieved the stated objectives in accordance with the detailed project plan published at the outset. All system element development involved the committee members to ensure a high level of ownership and sustainability that led to a controlled culture change.

On a weekly basis, Management Action Teams (MATs), which were created and chaired by the Mine Manager, focused on identification of opportunities for observed problems, evaluating these ideas for suitability and sustainability, and driving the installation of the approved ideas. Both the Taskforce and the MAT members received extensive training and continuous development throughout the project, to prepare them to become key change agents for the organisation.

During the first weeks of the project, the teams re-visited the areas identified for improvement during the analysis. This ensured buy-in and ownership of the improvements. New ideas were also generated and examined by each MAT.

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## Operations

Renoir focused its attention on the key potential areas for operational improvement; specifically, the throughput of the underground and open pit mining operations and the maintenance of the plant and machinery to support that. Significant time was invested in training all supervisory levels to ensure the understanding of the new tools and techniques and to illustrate the most appropriate management behaviour for the mining site environment. All elements were installed with detailed follow-up was carried out to ensure not only quick results, but also long term measurable sustainability.

The project team designed and developed a new Management Control System that would drive productivity through clear, accurate and achievable plans. This would then be controlled on site, through short interval control mechanisms and then reported. The reporting would create a corrective action culture at the daily, weekly and monthly levels depending upon the severity of the issue. Through the project governance structure, Renoir was able to change long-entrenched behaviours that had developed over decades. As a result, tremendous behavioural improvements were realized, specifically in areas such as shift management, intra- and inter-departmental communication and coordination, operator handling of equipment, accurate target-setting and positive reinforcement, and most importantly the creation of a corrective action environment.

## Maintenance

Maintenance had been one the key bottlenecks to productivity, resulting in significant downtime, and production losses. Bulghah mine was particularly affected by this with its crushing operation operating under less than optimum conditions. The other mines also suffered from production losses due to vehicle and equipment availability, primarily through a practice of run-to-failure and minimal preventive maintenance. Through a systematic approach to planning vehicle and equipment maintenance, and increasing the adherence to preventative maintenance practices, equipment availability increased by over 40%.

A best-practice maintenance management system was implemented in all three sites, starting with driving accountability for equipment condition to the source, namely the operator, through the early identification of maintenance needs. This enabled improved visibility to the real maintenance needs of the mines. A systematic process of early assessment was also implemented, which helped maintenance planners plan the acquisition of required parts; ensuring that downtime of equipment was kept to a minimum. Significant time was invested in training all supervisory levels to ensure the understanding of the new tools and techniques and also to instil a different approach to managing people, through constructive feedback. As a result, the project over achieved its original targets.

## THE RENOIR GROUP

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