



PERFORMANCE-BASED MAINTENANCE FOR SLAG FLOTATION PLANT

KPIs in OH&S, availability and maintenance management through systematic, phased approach with customer's site

Background

During the copper smelting process, it is common for a certain amount of copper to be lost to slag. In order to minimise this loss, the slag is further treated to recover the valuable metal. One treatment method is via froth flotation in a Slag Flotation Plant.

With its smelter operational for many decades, one customer recently replaced its slag flotation plant to further optimise metals recovery. Outotec has already worked closely with the customer over many years, with its smelting, refining, anode casting and process control technologies all used at this particular site.

Slag Flotation Plant

The slag from the customer's smelter furnace is processed at the Slag Flotation Plant (SFP) via various minerals processing technologies. The SFP plays an important role in extracting maximum value from the ore. In 2016, during the early installation phase of the customer's new SFP, Outotec undertook a Maintenance Assessment with the aim of proposing a performance-based maintenance solution.

CHALLENGES

- Short ramp-up to name plate
- Implement new maintenance practices
- Maintainability of newly commissioned plant
- All non-Outotec equipment
- Location with limited resources

SOLUTION

- Systematic, phased approach to performance-based maintenance
- KPIs in OH&S, productivity, maintenance management
- Full maintenance team onsite
- Maintenance of SFP plant including primary crusher, SAG, ball, regrind, floats, thickeners and filters. Also conveyors, pumps & automation.

RESULTS

- Consistently high SFP availability
- KPIs on OH&S achieved, Q1/19 250,000 hrs LTI free
- KPIs on maintenance management achieved
- Maintenance and OH&S practices embedded

Complete maintenance solution

Outotec was subsequently awarded the contract for maintenance of this SFP. Initially a two-year contract, it commenced in November 2016. Equipment scope comprises a primary crusher, SAG mill, ball mill, regrind mill, floats, thickeners and filters, along with conveyors, pumps and automation. All equipment is non-Outotec.

Scope

The scope of the performance-based maintenance agreement reflects the customer's long term commitment to best practice OH&S and plant performance. Outotec's maintenance agreement, for example, includes the disciplines of management and leadership, maintenance, reliability, planning and scheduling, continuous improvement, and health and safety. Central to this agreement are Key Performance Indicators (KPIs) with jointly agreed targets in OH&S, productivity and maintenance management.

Performance-based agreements = shared risk

This performance-based maintenance model at the customer's site uses a fixed monthly price plus a KPI-based bonus/penalty model. Such a model not only gives our customer peace of mind in the budgeting process, but also allows for shared risk in the implementation of necessary actions to achieve performance levels.

This shared-risk service agreement, designed to reduce costs and improve effectiveness of maintenance operations, is a true 'win-win' partnership. Outotec's technical knowledge and maintenance management adds value by enabling customers to focus on their core competencies and maintain their competitive edge.

Customers also have access to business processes and tools for management of the plant, including, for example, continuous improvement methodology and reliability management. The Outotec team continuously measures and evaluates site's practices and performance relative to global best practice standards. This allows the team to identify gaps, pinpoint improvement and propose actions to deliver results.



Outotec team

Maintenance team

The on-site team consists of a site manager, reliability engineer, planners, health and safety representatives as well as skilled personnel in electrical, instrumentation, fitting, welding and an on-site medic. Maintenance of the SFP is 24/7, 365 days a year, with Outotec plant maintenance covering both day and night shifts.

Systematic, phased approach

Our maintenance of the customer's SFP is delivered by a systematic, phased management and maintenance team. It consists of three main phases: pre-planning and systems development, mobilization and start-up, and operation and continuous improvement.

Phase 1 – pre-planning, systems development

During the 1st phase the operational and strategic maintenance plans are created. It is important to have a long term action plan to deliver sustainable success. The CMMS system is configured and populated with items such as maintenance tasks, equipment trees, criticality levels, maintenance plans, standard work instructions and spares/inventory data set-up. From a personnel perspective, suitable local maintenance sub-contractors are identified as well as the necessary preparation for health and safety, staffing, planning and training. Specialists within Maintenance and Reliability, IT, Supply Chain and Human Resources support the preparations.

Phase 2 – mobilization, start-up

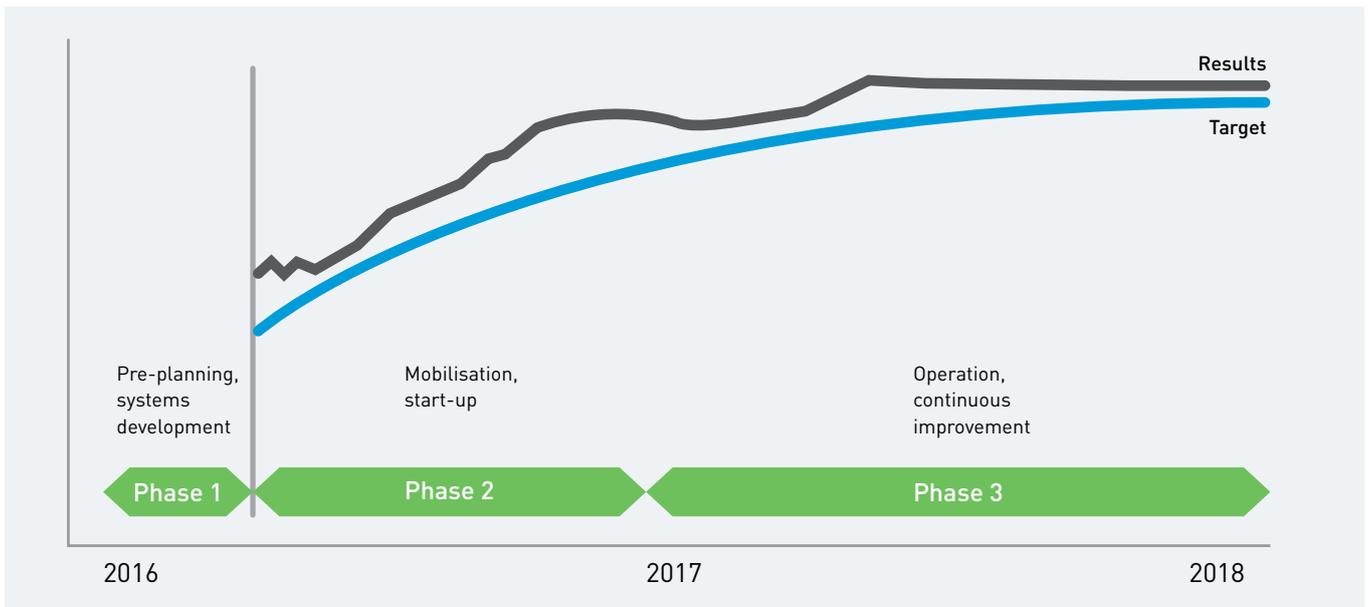
The second phase focuses on the establishment of our team on-site and includes inductions, training in maintenance practices, implementation of key maintenance management processes including communication, reporting, performance management, continuous improvement and Root Cause Analysis (RCA).

Phase 3 – operation, continuous improvement

Following the startup and initial mobilisation phase at site, continuous improvement of site's maintenance activities is now centre stage. With the right approach, systems and people in place, the probability of unexpected downtime is greatly reduced. Early Root Cause Analysis (RCA), Continuous Improvement (CI) and action planning are an ongoing focus of the Outotec maintenance team.

A partnership approach

Central to this maintenance agreement is the partnership approach between the customer and Outotec. This partnership approach was key from the very beginning – from working together on the KPIs in the agreement, to initial start-up, through to operation and continuous measuring of progress.



Outotec Maintenance Agreement at the customer's site

Communicating progress

All progress is regularly reported and tracked through daily, weekly and monthly reports. Outotec's weekly reports, for example, include topics such as safety performance, availability performance to target, work order compliance and downtime losses.

The monthly maintenance reports outline the performance to targets and summarise pro-active actions to correct any deviation to plan. They also outline improvements with a particular emphasis on OH&S, competences, downtime losses, reliability and continuous improvement and the long-term progress in maintenance strategy. For example, one recent monthly report (in 2019) included a review and CI for a reline shutdown, a catalogued ball mill spares review, bearing training and a review of the mill alarm and trip system.

Competence and knowledge sharing

As the customer has limited local resources, it is business critical that Outotec maintains a workforce which competently and expertly delivers the customer's KPIs in the agreement. Central to this is a process that continually develops the skills and talent of the local personnel team and management staff. Through the customer's long term approach and commitment to ongoing training, best practices in maintenance and OH&S are embedded at site. This training benefits not only the Outotec maintenance team but also the customer's other teams at site, such as operations.

Additionally, as part of this knowledge sharing and collaborative partnership, Outotec conducted a two-day technical seminar in 2017 at the customer's site, attended by our global metals and minerals experts to discuss various technologies and latest innovations.

Results

Overall performance is measured using a scorecard approach, broadly consisting of OH&S, Productivity and Maintenance. Each carries a different weighting, with OH&S holding the heaviest weighting, reflecting the importance of OH&S to the customer.

OH&S is measured by MTI (medical treatment injuries), LTI (lost time incident) and TRIFR (total recordable injury frequency rate). In Q1 of 2019 for example, the SFP recorded 250,000 hours LTI free.

Already by the end of November 2016, for example, over 50 improvement actions had been identified across areas such competence management, productivity, maintenance operations, safety and supply chain. And this ongoing process of identifying, targetting and closing out such actions is part of Outotec's continuous improvement approach at the customer's site.

Productivity, measured by availability and reliability, have also shown a marked improvement from post-commissioning which helped to reduce the ramp-up time.

Contract extension

In 2018, Outotec's original two-year maintenance agreement was extended by the customer, further underlining the customer's commitment to sustainable mining. It also reflects the customer's goal for the continuous improvement of OH&S and plant performance, with predictable operational costs exhibited by a long term performance-based approach.

Outotec develops leading technologies and services for the sustainable use of Earth's natural resources. Our 4,000 top experts are driven by each customer's unique challenges across the world. Outotec's comprehensive offering creates the best value for our customers in the mining, metal, energy, and chemical industries. Outotec had sales of approximately EUR 1.3 billion in 2018, and its shares are listed on NASDAQ Helsinki.
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