CASE STUDY

ENHANCING OPERATIONAL EFFICIENCY AND ASSET RELIABILITY OF SFPUC'S VPSA OXYGEN PLANT

The San Francisco Public Utilities Commission (SFPUC) oversees the delivery of essential water, power, and sewer services to over 2.7 million residents in the Bay Area. A key facility within this infrastructure is the Southeast Treatment Plant, which processes a significant portion of the city's wastewater. In an effort to improve the reliability and efficiency of this plant, SFPUC undertook an improvement project focused on the Vacuum Pressure Swing Adsorption (VPSA) Oxygen Plant, a critical component in the wastewater treatment process.

AMBITIONS: ENHANCE RELIABILITY

The primary objective of this initiative was to enhance the operational reliability of the VPSA Oxygen Plant. The project aimed to transition from reactive to preventive maintenance strategies, thereby reducing downtime and maintenance costs, and extending the lifespan of critical assets. This approach was also intended to ensure compliance with environmental and safety standards, reinforcing SFPUC's commitment to sustainable and reliable service delivery. MaxGrip has been a trusted advisor and partner of SFPUC for almost a decade, making it a logical choice for SFPUC to ask MaxGrip to support this asset reliability improvement project.

APPROACH: RELIABILITY CENTERED MAINTENANCE

To ensure the functionality of the critical VPSA Oxygen Plant within the aeration deck, which is essential for meeting the oxygen supply demands of the plant operations, a structured Reliability Centered Maintenance (RCM) methodology was implemented. The following steps outline the systematic approach undertaken:

Scope Definition

The project began with a rigorous scope definition, examining 155 operational locations and 349 assets. This phase included gathering Original Equipment Manufacturer (OEM) recommendations to inform subsequent analyses.

Risk Assessment

The risk assessment phase involved a Failure Modes, Effects, and Criticality Analysis (FMECA) for essential assets. A workshop engaged team members to evaluate functional failures, their consequences, and appropriate mitigation strategies. The criticality assessment prioritized 218 assets based on a risk matrix evaluating operational impact, safety concerns including public protection, environmental implications, and potential costs.

Risk level	Number of Assets
Catastrophic	4
Severe	26
Moderate	102
Minor	27
Insignificant	59

Figure 1: Risk Assessment

Risk Treatment

Following the risk assessment, maintenance strategies and critical spares were identified and selected. Preventive Maintenance (PM) Job Plans were refined to focus on high-priority assets and to address recurring issues. The project ensured that necessary spare parts were accessible. Additionally, opportunities for enhancing VPSA operations through staff training and intensified inspections of crucial assets were identified.

Strategy Implementation

With strategies in place, the focus shifted to implementation:

- Technical job descriptions were developed to provide clear guidelines for maintenance tasks.
- Preventive maintenance tasks were clustered to level the workload.
- A detailed schedule for PM tasks was created.
- MaxGrip provided RCM training to the SFPUC team to elevate proficiency in maintenance processes.
- At a later time, The SFPUC team will update the EAM system to reflect the new maintenance regime.

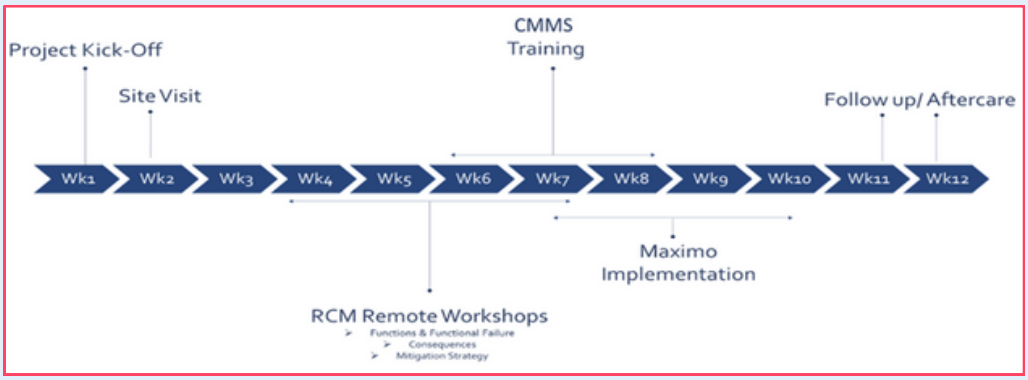

Figure 2: Project Timeline

Collaboration was a key aspect of the project, with SFPUC personnel working closely with external consultants to leverage industry best practices and tailor the maintenance strategies to the plant's specific needs. This included optimizing preventive maintenance job plans, ensuring the availability of critical spare parts, and conducting targeted training sessions for the workforce.

"Partnering with MaxGrip has brought tangible benefits to SFPUC's maintenance operations. They have effectively guided our teams through RCM processes at multiple facilities, leading to cost savings and better asset management. MaxGrip's targeted trainings have significantly upgraded our maintenance planning capabilities. Their deep domain knowledge of I&C, mechanical, and electrical assets has been crucial in improving maintenance for our critical assets and accelerating our RCM initiatives to meet our goals."

Christine Spencer
Maintenance Planning and Reliability Manager SFPUC

RESULTS AND ADDED VALUE

SIGNIFICANT IMPROVEMENTS

With a quick project time of only twelve weeks, the project yielded significant improvements in operational efficiency and asset management. The implementation of optimized preventive maintenance strategies delivered a potential 87 percent reduction in firefighting work orders and contributing to a more streamlined and efficient maintenance process. Additionally, a 44% reduction in operational routes was achieved, enhancing work efficiency and safety.

The project also led to the successful implementation of Key Performance Indicators (KPIs) for ongoing performance monitoring and improvement. Training initiatives and the development of technical job descriptions played a crucial role in empowering SFPUC's workforce and fostering a culture of proactive maintenance and continuous improvement.

The collaboration on the VPSA Oxygen Plant project at SFPUC's Southeast Treatment Plant demonstrated the effectiveness of a strategic, fact-based approach to asset management and maintenance. By focusing on preventative maintenance and risk management, SFPUC was able to achieve substantial improvements in operational reliability and efficiency, underscoring the value of RCM in utility management.