New Treatment Technology Protects Cooling System Assets and Assures Production at a Steel Production Plant in Southern Europe

BACKGROUND
A steel producer in southern Italy uses chlorine dioxide to control microbiology in the cooling water system used on site. Management at the plant are very focused on safety, minimisation of resource use, and overall production cost-efficiency. To assure this, the company expects the best on-site expertise from its supplier partners, innovation in new technologies, and improved sustainability performance through better water, energy, and waste management. As a result of a new initiative to improve operational efficiencies and to reduce overall costs, management were evaluating a range of new initiatives.

CURRENT SITUATION
The company uses sea water in a once-through cooling system with water sourced from a nearby harbour where mussels are raised for food. The raw sea water has an extremely high organic and biological load. Chlorine dioxide had proven to be the best choice to keep microbiological and macro fouling under control. After more than 15 years of operation, using 12 basic sodium chlorite-acid generators to supply a total demand of 25-60 kg/hour, management decided to seek options to improve and upgrade this relatively old system and technology. Specifically, any new option should improve control of microbiological and macro fouling, improve overall system reliability and performance, and reduce the associated capital and operational costs.

ENVIRONMENTAL INDICATORS

<table>
<thead>
<tr>
<th>Environmental Indicators</th>
<th>eROI</th>
<th>Economic Results</th>
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<td>Use of new technology significantly improved operational reliability of microbiological control in the cooling system, with a very high chlorine dioxide conversion rate of 94-98%.</td>
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<td>Overall increase in system efficiency delivered reductions in the Total Cost of Operation (TCO) of over €150k (15%) per year.</td>
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<td>Replacement of existing older treatment equipment with new technology was based upon the replacement of twelve historic generators with a single new unit with reduced footprint and much-increased operational efficiency and output.</td>
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<td>Use of new replacement technology avoided additional CAPEX investment of €250k</td>
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<td>All data verified by the customer</td>
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<td>Over €400k of savings have been delivered through reductions in the Total Cost of Operation (TCO) and CAPEX avoidance through the use of the comprehensive new treatment regime</td>
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Nalco reports eROI values to customers to account for contributions in delivering both environmental performance and financial payback.

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**ACTION PLAN**

The company initiated a thorough evaluation to identify the best technology currently available for producing chlorine dioxide. They first conducted a trial with a 10 kg/hour chlorite-acid generator, identical in concept to their current system, but which offered somewhat more advanced features than the original basic system. However, this trial was terminated early because of poor operational performance and reliability of the generator. Following this, the company conducted a three month trial using an SVP-Pure generator, with a capacity of 30 kg/hour. The SVP-Pure generator was supplied complete with storage tanks for acid and the proprietary chemistry, Purate®, and was very safe and easy to operate. In contrast to the chlorite-acid generator, the SVP-Pure generator provided high operational reliability, production accuracy at any set rate, a high conversion rate (94-98%), and advanced control features.

The company made a capital cost evaluation for the replacement of the existing twelve generators with an upgraded system based either on the chlorite-acid system, or the SVP-Pure technology. The chlorite-acid system had a capacity limitation of 10 kg/hour, so to provide the necessary amount of chlorine dioxide, multiple generators would be required. The SVP-Pure generator on the other hand could efficiently produce up to 80 kg/hour of chlorine dioxide with one single unit. In addition, the model proposed (the Model AD100 DS) could provide automatic distribution of the chlorine dioxide solution from the single generator to multiple treatment points.

**RESULTS**

The company concluded that the SVP-Pure generator, coupled with the Purate technology, represented the best technology available, and also the most cost-efficient option, and placed an order for the system. By choosing a single SVP-Pure AD100 DS model versus multiple chlorite-acid units, the customer saved approximately €250,000 in capital investment (CAPEX). Because of the superior economics of Purate technology, the company was also able to save in excess of €150,000 annually in operational costs. The effectiveness of the new system can be seen in Figures 1 and 2.

**CONCLUSIONS**

As a result of the installation of the new SVP-Pure generator, using the advanced Purate technology, the overall reliability of the system has been assured. The combination of a strong problem-solving approach, on-site expertise, and the application of new innovative technology, delivered improvements in performance and production continuity. The company is now able to monitor and improve the reliability of key strategic assets whilst optimising water use and reducing costs.