

The payback period for the investment was just over one year, and the customer has validated the data associated with the improvements which have been delivered by Nalco Water. All chemistry delivered to site as part of the Nalco Water programme is delivered using the Nalco Water hands-free PORTA-FEED® system, further improving upon staff safety.

CONCLUSIONS

By using a total systems approach, Nalco Water was able to deliver upon the needs of the customer, assuring process continuity and cost-efficiency. The unique capabilities of 3D TRASAR to measure system variability, and to control conditions accordingly. The comprehensive Nalco Water programme has provided improvements in terms of the control of fouling. This has ultimately resulted in improved sustainability performance by conserving renewable resources. Automation has improved the efficiency of staff utilisation on site, and has further reduced operational costs, meeting the customer's KPIs for process improvement with no technical risk.

3D TRASAR™ Technology for Membranes Reduces Maintenance Costs at a Major Glass Manufacturing Plant in Northern Europe

NALCO Water
An Ecolab Company

CASE STUDY - MANUFACTURING

CH-1535E

INTRODUCTION

A global leader in the production of speciality glass, with a 300-year history in materials design and manufacture, operates market-leading businesses in more than 46 countries worldwide. The company makes sustainable development a strategic focus for the development of its business, operating glass recycling programmes, increasing energy use efficiency, reducing CO₂ emissions, optimising water consumption, and evaluating new renewable energy sources including syngas and biogas technologies. The company also makes a very high level and public commitment to the sustainability of its global operations, being signatory to the United Nations Global Compact and CEO Water Mandate, the Caring for Climate initiative, and placing sustainability at the centre of its operational business strategy.

The company regularly publishes information on its sustainability goals and their achievement, in particular for optimised resource use and the minimisation of emissions. The company also has targets in place covering a wide range of safety, health and environmental indicators.

BACKGROUND

The company operates a major manufacturing plant in northern Europe, and management were looking for new ways to improve the efficiency of their Reverse Osmosis (RO) plant, and at the same time to reduce the Total Cost of Operation (TCO) associated with the pre-treatment of all process waters used in glass production on site. In particular, there was a strong focus upon the quality and

ENVIRONMENTAL INDICATORS

Use of New 3D TRASAR Technology for Membranes significantly improved operational reliability, eliminating the replacement of filter units and membranes for the Reverse Osmosis plant

Reverse Osmosis operational yield increased by 92%, from 65.8% to 75%, and demand for fresh water reduced by 5,840 m³ per year

All data verified by the customer

eROI™

ECONOMIC RESULTS



Overall increase in system efficiency delivered reductions in the Total Cost of Operation (TCO) of over €110,000 per year



Borehole source water demand reduced, protecting precious groundwater reserves, and pumping costs reduced by over €1,000 per year

Payback on the initial investment with Nalco Water in just over 1 year

Nalco Water, an Ecolab Company

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eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.

performance of the filtration system upstream of the RO unit. The pre-treatment was based on base-exchange softening, followed by a staged filtration process involving a magnetic filter, sand filter, 25µ, 10µ, 1µ, filtration steps, followed by a Granulated Activated Carbon (GAC) unit, and finally treatment by the Reverse Osmosis unit.

The raw water source was a borehole on site, and historically dissolved organics were found to be present in ground water. This often led to blockage of the filters, increased pressure loss between 2-7 bar, and a high risks of RO failure due to low pressure in the system. As a result, the customer had to change the system filters each week, regenerate the sand filter each day, and every few months replace membranes in the RO unit. Conductivity was a major factor governing the integrity of the closed loop process, and out-of-specification water was being generated by the RO unit on a regular basis. The treatment of the system, including the RO unit, was being provided by the original supplier, a local company, although no measures were in place to monitor RO performance and the pressure loss associated with the fouling of the system.

Management realised that the combination of all the elements in the water preparation process, together with the ongoing fouling, were causing a pressure drop of over 6 bar across the system, and the associated maintenance costs for filter and membrane replacement were running at over €110,000 per year. Despite this costly remedial work, and the additional manpower needed, the yield of the RO was still only around 65%, and this meant that the demand for water by on site sometimes had to be supplemented with a softened water supply.

Any changes needed to improve upon the current system would have to be implemented with no technical risk, with reliance placed upon a water treatment partner able to deliver the necessary on-site expertise and support.

GOALS

The company established clear Key Performance Indicators (KPIs) for the plant, and in particular for the production of process water needed for the glass production area:

- Reduction in the Total Cost of Operation, in particular for fresh water costs
- Reduced operator involvement in manual tasks
- Automation and improved reliability of the system treatment
- On-site expertise and support from the supplier
- No technical risk from changes to the current cooling water management system
- Production of in-specification water, in particular for conductivity and organics
- Improve membrane lifetime use to three years
- Increase RO yield to a minimum of 75%
- Reduce cost of replacement filters and membranes
- No increase in fresh water consumption

PROGRAMME

Nalco Water was asked by the company to carry out a full Mechanical, Operational, Chemical and Sustainability survey (MOCS) of the water preparation system. Trials were also carried out using various pilot equipment rigs to define the best overall treatment process. To address the customer's KPIs Nalco Water was able to recommend a reconfiguration of the entire filtration/pre-treatment system, to include a new 100 µ autowash filter upstream of the existing softeners; cleaning of the existing softening plant; a new Ultra-Filtration (UF) unit; caustic soda injection; a new pressure booster pump; retention of the 10µ cartridge filter, GAC unit, and 1µ cartridge filter as a protective measure; the two existing 3.4 m³/hour Reverse Osmosis units; and all controlled and monitored by a new Softener Control unit and Nalco Water 3D TRASAR Technology for Membranes, an on-line monitoring and control system. This comprehensive system automatically adjusts treatment levels in response to changes in water quality, predicting the development of adverse conditions and preventing the occurrence of scale formation and other problems.

3D TRASAR TECHNOLOGY

3D TRASAR Technology management programmes deliver on-demand control and optimisation of water chemistry and membrane performance, continuously protecting the membranes from scaling, fouling and degradation.



3D TRASAR control system

- Asset protection avoids premature and costly replacement of non-renewable materials.
 - Scale and fouling control maximises energy efficiency and minimises CO₂ emissions and their global warming impact.
 - Precise control of antiscalant assures optimum consumption: no overfeeding or underfeeding.
 - Better water resource management minimises the demand for costly renewable resources, and safeguards public water supplies.
- 3D TRASAR Technology is used by thousands of corporations around the world to:
- Secure improvements in their environmental and economic performance.
 - Optimise system efficiency.
 - Help them to meet their sustainability goals, specifically in the areas of water and energy use reduction.

3D TRASAR technology control systems take account of the inherent variability in system water conditions, protecting membranes from scale and fouling by prediction of problems, and intervening before they occur. The programme controls system chemistry, dosing on-demand, and minimising the amount of materials added to the system, minimising costs without prejudicing system integrity.

Using a comprehensive approach to improve the sustainability of the entire system, Nalco Water proposed the recycling of RO concentrate for use in the regeneration of the new Ultra-Filtration unit, and was able to confidently re-engineer the system to deliver the desired 75% production efficiency level for the RO plant. In addition comprehensive training would be provided for staff on site, together with an ongoing service plan involving Nalco Water support staff. Based on this proposal, Nalco Water was awarded the business, and the new system was implemented.

RESULTS

The new configuration, controlled by the 3D TRASAR technology, quickly delivered better performance through on-line monitoring and control of key system parameters. This also provided plant management with new automated data management functions not previously available, and released staff time for other duties. Specific benefits from the use of the new system included:

- Eliminated the need to change filters, saving over €100,000 per year
- Eliminated annual membrane replacement, saving over €10,000 per year
- RO yield is at the desired 75 % yield
- Maximum pressure drop across the system is now at an acceptable 2 bar
- Fresh water demand was reduced by over 5,800 m³ per year, saving over €1,000