

Essential Expertise and Advanced APEX Technology for Paint Detackification Improves Sustainability Performance and Delivers Reductions in the Total Cost of Operation at an Automobile Plant in Southern Europe



BACKGROUND

A leading automobile manufacturer operates production facilities around the world, and is one of the leading producers in Europe. The company markets 10 brands, including small economy passenger cars, through to luxury class vehicles. In the commercial vehicle sector, the company offers pick-up trucks, to buses, and heavy trucks.

The company operates in 18 European countries, with further facilities located in eight other countries across the Americas, Asia and Africa. Each day, over 500,000 employees worldwide produce over 34,500 vehicles, are involved in vehicle-related services, or other related activities.

It is the policy of the company to offer attractive, safe and environmentally friendly vehicles which are competitive in an increasingly diverse and challenging market, and which set World Class standards in each of their respective classes.

CUSTOMER IMPACT	eROI™	ECONOMIC RESULTS
Increased sludge dry solids from 22% to 40% (80% improvement), eliminating >520 tonnes (45%) of sludge for disposal per year		Reduced annual sludge treatment and disposal costs by over €70,000 (49%) per year
Reduced wastewater discharged by >50%, and eliminated all Volatile Organic Carbon (VOC) emissions previously associated with chemical treatment of the water		Reduced cost allocation per vehicle produced by >49%
Reduced cleaning frequency and extraordinary unplanned maintenance by up to 30% per year		Reduced overall maintenance and operational costs by up to 30% per year
Reduced overall paint detackification costs, and the volume of treatment consumables		All data verified by the customer
Increased safety for plant personnel by eliminating water overflow and maintaining a clean and nonslip area. Elimination of sludge buildup and associated odours		No Lost Time or other Accidents

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

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Superior value, social responsibility and a practical commitment to sustainability are hallmarks of corporate culture. The company takes a far-sighted approach to the key issues of the future, including global warming and climate change. It pursues a broad range of research and development activities to generate the pioneering technology that the mobility of future generations demands. The company expects the same degree of commitment from its many supply partners, and is always seeking new innovative ways to improve production cost-efficiency and overall sustainability performance.

CURRENT SITUATION

The company operates a manufacturing plant in southern Europe where recent annual production of 360,000 passenger vehicles has been achieved. The plant operates two production lines each with advanced paint application technology. Each line starts with the application of a water-based paint; this is in part because the company wants to reduce emissions of Volatile Organic Carbon (VOC) solvent compounds. This is followed by the application of a catalysed clear coat. As with any similar painting process, 10 to 30% of the paint applied in a spray booth does not reach the car body. This so called ‘over-spray’ is extracted from the spray booth by air suction, in order to allow vehicles on the production line to receive the correct application. The air containing paint over-spray is ‘washed’ using water in a scrubber. This allows the scrubbed air to be released to the atmosphere with no paint particles.

The ‘dirty’ water, containing the captured overspray paint, is treated in a lagoon. This removes paint residue (or ‘sludge’), and allows the cleaned water to be recycled to the scrubber. To ensure that the residue does not return with the clean water and contaminate the surfaces of the system, the residue must be floated as a composite sludge on the surface of the lagoon. The cleaned water is pumped from the bottom of the lagoon and recycled back to the scrubber. This process is often called ‘paint detackification’, or simply ‘paint detack’.

The management at the plant was looking to improve the cost-efficiency and overall performance of the scrubber system. Specific problems had been identified with system operations as a result of the production of sludge with a very high water content, subsequent contamination of the scrubber by paint residue in the recycled water, unacceptably high cleaning, maintenance and downtime costs, hazardous work conditions due to water overflow and foaming, and unpleasant odours from the build-up of sludge.

In order to maintain adequate operation of the spray booth, the scrubbers had to be cleaned every three months due to the poor efficacy of the paint removal programme currently provided by a major competitor in the market. The lead time in responding to problems, many of which occurred unexpectedly requiring an emergency response, their correction, and restoration of stable system operations required significant time, effort and cost. In addition, the cost of disposing of the high volumes of wet sludge, and contaminated lagoon water, were unacceptably high, and also prejudiced the overall environmental performance of the plant. Regular cleaning of lagoon overflow and foam was necessary, but represented an extremely difficult and hazardous environment for staff due to the slippery surfaces around the treatment area.

SPECIFIC AREAS OF FOCUS

The company’s stated goals for the efficient operation of the system included:

- Operate safely
- Improve sustainability performance
- Reduce VOC emissions especially those originating from current treatment chemistries
- Operate an effective and robust paint process
- Reduce water replacement and cost of waste water
- Reduce the cost of disposal of paint sludge
- Reduce cost of cleaning (lagoon, scrubber)
- Reduce cost of maintenance
- Eliminate or reduce odours
- Improve safety and cleanliness of the working area



ACTION PLAN

Nalco Water was asked to complete a survey of the entire system and to propose a solution to assure proper control over the treatment operation, maximise productivity, optimise water use, and lower the overall Total Cost of Operation (TCO). A team from Nalco Water conducted a Mechanical, Operational, Chemical, and Sustainability (MOCS) survey of the entire system. On the basis of this, Nalco Water proposed the use of the new APEX paint detackification programme. This programme is used by car and component manufacturers around the world. It is a sustainable programme which includes environmentally friendly non-hazardous materials with no Volatile Organic Compounds (VOC), no formaldehyde, reliable application equipment, optimised treatment preparation and efficacy, and industry-leading on-site service and expertise. The key component of the APEX programme is based on plant extracts and mineral salts.

The company agreed to the Nalco Water proposal, and the APEX programme was quickly installed. In addition, several mechanical changes were also made in line with the recommendations from Nalco Water. These included a review of treatment injection points, changes to the operation and design of the flotation unit to make it more effective. New digital dosing pumps were installed to replace pneumatic ones and increase reliability, and the control of system water levels was improved. In addition, full training was provided for all of the operators involved, and a series of regular site visits was agreed with the goal of maintaining the gains made and continuously evaluating system operation for future improvement opportunities.

RESULTS

As a result of using the new APEX technology, and implementing the various recommendations made by Nalco Water together with the on-site team, this new Nalco Water customer was able to identify and quantify the many benefits delivered. The paint booths are now operating consistently without requiring unexpected emergency cleaning; the recycled scrubber water in the lagoon is much clearer, requiring replacement only every six months instead of every three months in the past (50% reduction). The joint continuous improvement plan now includes replacement of water after one year. Cleaning of the lagoon is now required only once per year (50% reduction). Sludge dryness has increased from 22% to 40%, eliminating over 520 tonnes of sludge per year for disposal, and reducing these and other costs by >€70,000 per year. Overall maintenance and cleaning activities on the ESKA equipment have been reduced, contributing to better paint booth performance, a safer working environment has been provided with no water and foam overflow and the associated risk of slipping, the APEX treatment does not contain any VOC, the use of hazardous chemistries has been removed, odours have been eliminated, and a full Operation & Maintenance (O&M) manual, instructions and training have been provided.

CONCLUSION

The savings in water use, the reduction in wastewater and sludge volumes, and improved staff safety, have all contributed to improved sustainability performance for the plant as a whole. The Nalco Water APEX programme, on-site expertise, application knowledge, and superior cooperation and support from the customer’s team, delivered the significant improvements required by the customer. Nalco Water staff continue to work with the customer to maintain the value created and to seek further opportunities to improve performance and cost efficiency.