

Automotive Plastic Components Supplier Attacks Severe Microbiological Contamination In Plastic Washers By Using the Adhere Advantage Program

Challenge

One of the biggest challenges facing an East Coast automotive plastic components supplier was microbiological contamination of their pretreatment washer systems. This condition did not just occur overnight, but happened gradually over a period of time and continued to get worse. The bacteria growth had escalated to the point where they were dumping all the stages of the washers and cleaning them on a weekly basis. This was a costly endeavor and a drain on manufacturing and maintenance time.

In addition to the manufacturing concerns, the plant began to investigate the safety and environmental aspects of the bacterial growth. Concerned about the exposure and odor risks, immediate action needed to be taken.

GE Water & Process Technologies was introduced at this point of the process to see if they could help with the growing concern.

The goals of the program were to:

- Meet or exceed safety and environmental objectives
- Eliminate bacterial growth
- Minimize tank dump frequency and costs
- Minimize operator chemical exposures
- Minimize operating expenses for the total plastic pretreatment process

Solution

A GE survey team was assembled to conduct a thorough investigation of the current pretreatment washer systems. There are two pretreatment

systems that serve two paint lines: Line 1 and Line 2. Both pretreatment systems have the same operating configuration. The existing pretreatment configuration consists of an acidic, phosphated cleaner in stage 1, city water rinse in stage 2, a rinse aid in stage 3, recirculated deionized (DI) water in stage 4, and a virgin DI halo as the final rinse.

Severe microbiological concerns were first noted in the rinse stages and ultimately migrated to all the stages. Stage 1 actually ran with the impingement of the water on the parts at nearly zero. Restoring full water flow to the nozzles of all stages will be critical to the process and its improvement.

The survey also revealed the washer on Line 1 used three men to blow water off air bag covers prior to them entering the dry off oven. The proper application of a GE rinse aid will reduce the need for manual or automatic blow off. Attention needs to be given to the rinse aid application here because there is a potential to reduce (or redistribute) manpower in this area.

Line 2 has an array of automatic air knives for blow off instead of a manual system. The air is supplied by compressors, making the cost of the process very high. With the proper use of rinse aids, there is an opportunity to reduce the amount of air used in the automatic air knives, thus reducing the operating cost.

The plant has one significant challenge concerning the water management within the facility. The facility is operating as a zero liquid discharge plant with regard to their industrial water uses. This means no water from the processes is discharged from the plant. Therefore, water recycle and reuse are very important to the entire operation.



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At present, water overflow from stage 4 on both pretreatment lines recycles back to a DI makeup water tank. The DI makeup water tank is used to supply water to the DI system for the final virgin halo. Frequently, overflow from stages 1 and 2 would also end up in the DI makeup water tank, causing higher than normal ion loading for the DI system. The recycling of water in this manner has been the single largest source for the microbiological problem in the system.

The plant has been addressing the microbiological concerns by shutting down the washer, physically cleaning the slime from the stages, rinsing, and re-starting the washer.

Because the rinse water in the washer is recycled back through the DI system, bacteria is present throughout the entire loop. When the washers are the only part of the system that is cleaned, it is inevitable that the bacteria will reenter the washer via the DI water system. Reintroduction of bacteria that have already acclimated themselves to the environment and food source of the washer system will reappear rapidly. Their rapid growth will soon cause the same process problems as experienced before.

Recommendations

Following the survey, the GE Metals Process Group assembled a proposal that included recommendations for improving the cleaning procedures for microbiological growth and a maintenance program for microbiological control utilizing GE pre-treatment chemicals.

The recommendations provided were unique because they utilized a "Total Systems Approach" to the challenges. GE calls the Adhere Advantage a total systems approach. First, a total microbiological cleanup program was recommended for the "entire" water systems. No areas were left untreated. Second, a maintenance program was recommended to improve the overall operation of the washer and minimize the reoccurrence of the microbiological problems. The new Aqua-Shed* rinse aid application was recommended to reduce the manpower and utility requirements of the process.

Results

GE was chosen as the new supplier and immediately launched a start-up team to implement the microbiological cleanup program. The cleanup program consisted of a manual cleaning of the demineralizer, storage systems, piping and the stages of Line 1 and Line 2 washers.

When the cleanup program was completed, the maintenance program was implemented. The new maintenance program was able to help produce a consistent quality process to meet the painting pretreatment requirements. With the new treatment program in place and the cooperative spirit of partnership that the automotive plastics components supplier shares with GE, the following goals have been achieved:

- Eliminated severe bacterial growth
- Safety and environmental concerns have decreased substantially
- Reduced rework, energy, labor, chemical, water, and waste disposal costs
- Reduced the air flow needed for the air knives on washer Line 2
- Reduced manpower for the manual air blow off on washer Line 1
- Reduced frequency of dumping the rinse stages
- Established a long-term partnership

Summary

Often, many users discount the importance of microbiological control in washer systems. It is only when the microbiological growth affects production that attention is given to it. In many cases, the initial resolution is not enough to combat the problem permanently. Usually, downtime and costly cleanings are essential to bring the system back to normal operation. In effect, initiation of an effective, long-standing maintenance program will prevent microbiological growth.