KYZEN
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TECHNICAL BRIEF

Optimizing an Aqueous Cleaning Process

One of the initial steps in the implementation of any successful cleaning program is understanding how to consistently apply the cleaning agent to the soil matrix while maintaining long term control of the manufacturing process. Several factors contribute to the stability and continued success of any aqueous cleaning process. They all begin with the proper set up and adjustment or "Base Lining" of the inline cleaner. This simple often overlooked exercise will go a long way to ensuring long-term success.

At KYZEN our Engineering Services Team is chartered to develop "Wash Bath Conditioning" programs. By that, we mean maintaining chemical concentration of the wash bath and continual removal of soils. Wash bath conditioning will allow you to optimize process performance and maximize tank life. These efforts are essential to any successful operation. We provide proper filtration, auto chemical feed and real time control systems to increase production yields and minimize employee chemical transfers. All installations are factory warranted. Contact your KYZEN professional for more details.

EQUIPMENT COMPATIBILITY:

Prior to implementation of any aqueous cleaning program a few simple guidelines must be established. Firstly, as with all aqueous chemicals used in cleaning today, compatibility with plumbing, pump seals, interior curtains and widow gaskets should be established. KYZEN retains this information on all of our solutions and it can be supplied upon request. Chemical compatible seals should be used in all wash pumps insuring long-term stability. Interior curtains should be reinforced (orange) silicon. KYZEN's Engineering Services Team can supply, install and retrofit existing systems with the correct materials ensuring success.

DRAGOUT:

When operating any cleaning system, care must be taken to minimize cross contamination. Keep the wash chemistry in the wash tank! Drag-out or cross contamination is wasteful and reduces the effectiveness of the rinse stage while putting an unnecessary burden on the rinse water purification systems (if employed). Every machine has a certain amount of drag-out at idle as a result of the conveyor movement, exhaust configuration, etc. In most cleaning equipment, as the wash level drops, water will be automatically added to this stage. Over time these additions dilute the wash tank.

This drop in concentration results in an "out of control" condition. Also any wash solution passing into the rinse stage will effect rinsing performance and operating life of the rinse water purification system. One of the first tasks in determining the fixed drag-out is to measure the movement of fluid within the machine. Wash and rinse fluid often passes in both directions within any piece of cleaning equipment. Understanding and controlling this drag-out is critical to the performance and operational costs of the process.

Fixed drag-out comes from the wash manifolds over-spray and surface area and movement of the conveyor belt. High pressure wash solution is entrapped in the conveyor rails and continually pulled into the rinse sections and vice versa. This is all considered *fixed drag-out* and minor modifications can improve this condition.

First determine the source and rate by applying the following test.

♦ With both the wash and rinse tanks empty, measure the length (L), width (W) of both tanks and record sizes.

Note: Equipment suppliers often provide the total tank capacity, not working volume.

♦ Place the system into an automatic fill mode and fill both tanks of the cleaner with water. After the auto fill mode is completed, operate both wash and rinse pumps for three minutes while remaining in the auto fill mode. (This is done to flood the plumbing and the pump housing.)

♦ Determine the volume in both tanks. Measure the operation height (H) of the liquid in the tanks. Multiply the tank length (L) by the width (W) by height (H) and divide the sum by 231 the resultant is the tank volume in gallons. L x W x H = in3/231 = G gallons

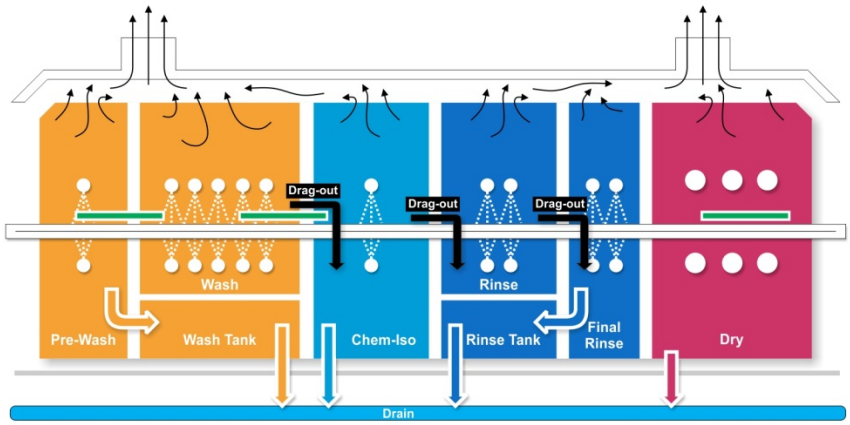
♦ Divide the total gallons (G) of the tank by the height (H) of the solution in the tank. This measurement is the amount of fluid per inch in each tank.

♦ Turn off all incoming water sources. Shut down heaters and blowers in the drying stage. If a wet isolation section is employed, operate the drag-out blowers of this section only. Do not operate the wet section of the isolation area unless a re-circulated tank is used. If a re-circulated tank is used, insure that during the test no incoming water is allowed to feed this section.

♦ Operate the wash and rinse pump for exactly one hour of time. Measure the height of the tanks, and calculate the volume of fluid in each tank as described above. Record the increase and decrease of water remaining in both wash and rinse tanks.

♦ The test may be run again with the conveyor and the wash & rinse pumps in the operational mode. The change in volume recorded in this test will be the drag-out attributed to the conveyor.

The change in fluid level in each tank indicates how solutions transfer within the equipment. These figures are used to baseline behavior and operational costs of the equipment. This information will also direct you to the areas in the equipment where improvements are required.



EXHAUST LOSSES:

Exhaust losses within cleaning equipment are also part of the operation. Exhaust systems contain vapors created by the heated solution being atomized within the equipment's cabinet. Exhaust systems create a negative cabinet pressure to offset the positive cabinet pressure created by interior blowers and the atomization of the re-circulating pumps. Exhaust systems in effect pull ambient make-up air into the cabinet and prevent vapors from exiting the cabinet. If the exhaust system is not set up properly, vapors will escape out of the equipment into the workplace environment.

On the other hand too much exhaust can create extensive chemical loss, inconsistent cleaning process and an inability for the wash and rinse tank heaters to maintain operational temperatures. The installation of blast gates and magnaheilics gauges, which read the negative pressures on independent exhaust stacks, are strongly recommended for any chemical cleaning application. A demister installed in the exhaust stack is an excellent way to reduce evaporative and liquid losses in the equipment. KYZEN can supply and install these maximization instruments to any piece of equipment operating KYZEN chemistries. The test described in the fixed drag-out section of this bulletin will need to be repeated with heated tanks.

The only difference is that all the blowers will now be in the “on” position. The blowers are turned on to give a realistic cabinet pressure and a realistic exhaust flow required. As discussed above, the same tests need to be completed to determine the proper exhaust set-up for the equipment.

Where permitted, exhaust flows and blast gate settings should be adjusted to not permit wash vapors entering the rinse section and vice versa. Wash vapors entering the rinse section will create extra loading on the rinse section. Typically, this can be determined visually. These settings are extremely important to effective rinsing and efficient operating costs of an aqueous cleaning program.

PROCESSING LOSSES:

Drag-out rates from the wash stage to the rinse can increase when product is introduced to the process. Due to the high pump pressures and flows applied to the surface of the product to be cleaned, the assembly can create a bridge from the wash to the rinse section. This high water flow creates a massive amount of turbulence on top of the product. The larger the assembly, the more dramatic the result. If the product’s leading edge has exited the wash section and entered the next stage while the trailing edge of the assembly is currently under a spray manifold, the product to be cleaned creates a bridge and massive amounts of wash solution will be pumped into the chemical isolation or rinse section. This phenomenon can also result from products being fed onto the belt without proper spacing in between. There should be at least the length of one product spacing in between. Proper spacing between products on the belt to prevent this effect is critical these are simple tests that should be performed to understand and optimize performance of your inline cleaner. The resources KYZEN has to offer can greatly assist you in successfully creating an efficient cost-effective process. It is not a difficult process to develop however; there are many key dependent variables. The key to any successful process is understanding each of these variables and their interdependences. Contact your KYZEN professional for expert technical assistance.