

In-Line Cleaning for Cold Heading Operations

Cold heading is one of the most competitively cost driven metal forming industries. Large volumes of parts are produced against paper-thin margins, causing cold headers to re-evaluate their methods of processing parts constantly, always looking for cheaper and faster alternatives.

The parts cleaning system is one of the commonly evaluated areas of production. This system is charged with removing the large amounts of soil residue left over from the forming process. Companies are on the look out for the most efficient way to remove this residue and dry the part.

The most effective cleaning method for cold heading operations is to use a hermetically sealed solvent cleaning system. This system will remove all oils and chips from even the tightest deep threads, then will dry the part completely in a single batch cycle. This style system must be done in large batches though in order to contain the solvent vapors within the system.

For those manufacturers looking to clean their product in single piece or continuous flow as part of a multi operation manufacturing line, there are alternatives. Three of the common cleaning processes are cylinder loaded baskets for agitated dip tanks, rotary baskets, and baskets on a standard belt conveyor.

Hand-Loaded Agitation Tanks

With this system, a basket of parts are cylinder push loaded from an indexing conveyor onto a grated shelf. The shelf lowers in a steel tank. A pump or ultrasonic transducer agitates the tank, and the action of the chemistry's surfactant combined with the multiple mechanical actions of the pump/ultrasonic waves or the lifting and lowering into the solution breaks the surface tension of the soil on the parts.

There are few benefits and several disadvantages to this system. The dual mechanical action may be effective in removing soil. However, the parts have to be raised through the tank to be removed from the system, which exposes them to the contamination that was just removed.

Water does not break the surface tension of the soil as well as a solvent does so cleaning is not as effective. Part layering in the basket shields the middle layers of parts from the beneficial mechanical cleaning action. In addition, the parts exit the machine wet instead of dry.

Rotating Basket System

This system is similar to the agitated dip tank in function, but with an additional mechanical action of turning the basket over. Rotating systems are relatively simple operations. They send fluid from different tanks to a single process area and then dry the parts in the same area. They can be large systems, using a series of multiple dip tanks and complex material handling designs that transfer the parts.

Benefits of this system are more numerous than the agitated dip tank. The multiple mechanical actions (spinning, pump spray, and ultrasonic) in conjunction with an aggressive chemical surfactant package remove the soil. When a sophisticated, automated material-handling system is included in the design production rates are

increased. The automation also decreases labor time for the operators. The addition of a drying stage obviously creates drier parts than the agitated dip tanks.

There are negatives with the rotating basket system. The transfer system used to transport the baskets is sensitive to wear. All the parts in the system rely upon each other, meaning weakness or variation in one component will generate problems for the rest and impede the cleaning process. In addition, the parts travel out of the baths in a manner similar to the agitated dip tanks, opening up the possibility of re-contamination.

Baskets on Standard Belt Conveyor

This process employs a standard multiple stage belt washer. Parts are loaded into baskets, and transferred to the washer via hand, gravity roller, powered roller, or a pick and place gantry. The pump sprays the part in a 360-degree fashion. The major advantage of this method is that the parts are not brought up through a soil layer, eliminating the threat of recontamination.

However, parts are still placed in baskets on top of each other. The inside of the stack is not guaranteed a consistent impingement of fluid spray

Examining these options demonstrates the limited capabilities of a washer. It must automatically and continuously transfer parts to, in, and from the washer. It needs multiple mechanical action and cleaner to lift soil. The operation must not drag parts back through the soil. Every part must be exposed to the cleaning, and they must be dry when complete. Also, the inventory of dirty parts must be limited. The longer they sit, the harder they are to clean.

Rotary Auger Drum

The Rotary Auger Drum System can achieve each of these goals better than the three previous systems. This style forgoes the basket, and provides a continuous flow of parts through each stage. An auger style fin rotates with the drum to drive parts one at a time through the various cleaning stages.

The main advantage of this system is the ability to clean parts at the speed they are introduced to the system, limiting dirty inventory. The parts are not re-contaminated at any point in the system. There is less labor involved, because the system has little or no operator interface. The footprint of the machine is small as well, since it only needs to wash one small collection of parts at a time. The entire part is exposed continuously and consistently to the cleaning process, unlike in basket systems, and then is able to dry once clean.

Through the use of “in-process” fluid treatment, the amount of soil in the washer can be controlled via in line particulate filtration and oil removal devices. This is a necessary addition to the machine or else it will become saturated and inefficient.

The best way to control the wash process is by continuously washing a few parts at once, using multiple actions and clean water. The rotary auger drum is the best option for this, and will help a company maintain their high output and quality.