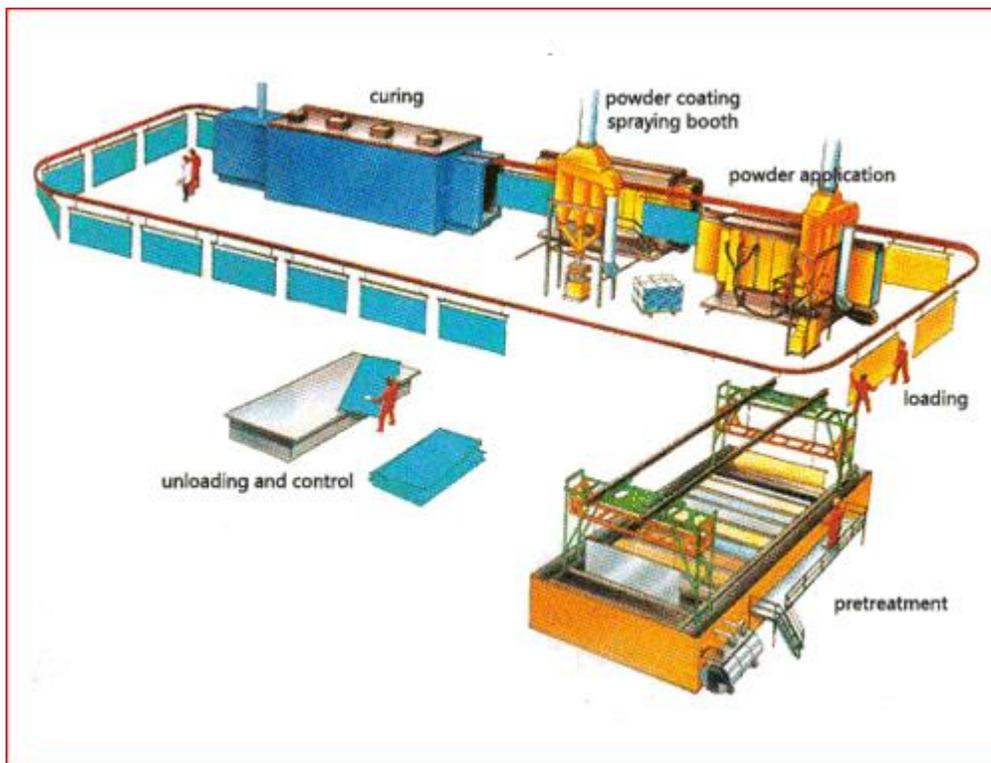


Spray Cleaning for Excellent Pre-Cleaning

Powder coated, electro-coated and painted surfaces that meet and exceed wear resistance and corrosion protection owe their success to adequate surface preparation. Sufficient cleaning before applying a top coating, such as phosphates (iron, manganese, zinc), zirconium and chromates, is critical.

Today, in-line cleaning cycles often involve mechanical devices, such as spray machines, or the typical three- and five-stage automatic lines. Here are some important facts related to optimal spray cleaning.

A complete powder coat automated line. Note the size of the pre-treatment segment of the process, which signifies the importance of this critical step.



Inside a Spray Cleaning & Rinse Line



1. Versatility of Metal

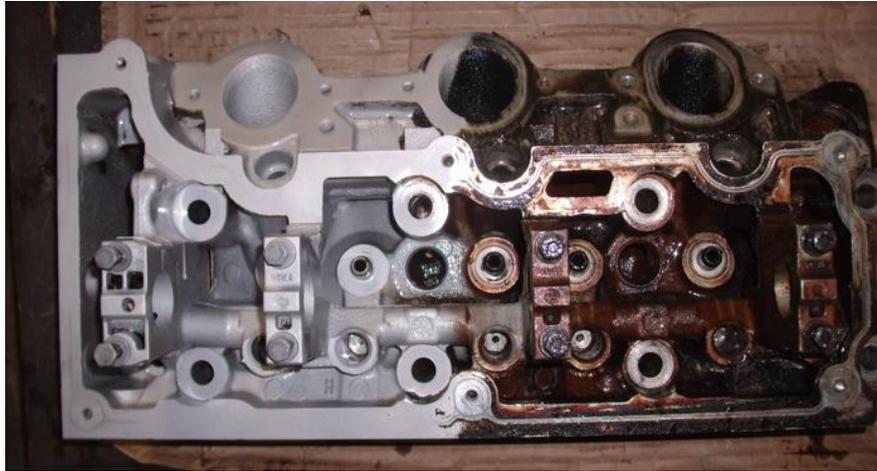
Brutality is a way of life for steel parts, whether they're cold-rolled or hot-rolled.

- Mechanical forming drives oil and metallic shavings into the surface.
- Heat-treating bakes and burns oils and grease into surface pores.
- Oxide scales form, with a severity based on the treatment atmosphere.
- If the parts have been mass finished, media residue or chemical compounds may be left on the surface or driven into it.
- Parts may have been treated with a rust preventative.
- Storage based on humidity and time may result in or accelerate rusting.

Examples of Heat Treated Parts



Engine Block Segment Before & After Spray Cleaning



2. Effective one multiple metal substrates

- It is all too common to have a mix of products or variety of parts. Aluminum, brass, copper alloys and zinc parts may be run in the same line, at different production loads, or interchangeably. Often, parts may be fabricated using mixed metals or alloys. Variables like these and others affect the chemistry of the cleaner, along with cleaning demands and requirements.
- The simplest scenario is where all the parts are of the same base metal coated with the same process oils. Choices for spray cleaning may address any of the parts in a single process line using a single cleaner or require offline pre-cleaning of some parts in advance.

3. How spray cleaning works

Spray cleaners combine chemical and mechanical action to remove soils from the substrate. The cleaning action must be rapid, as contact times in most spray machines typically range from 30-60 seconds, at temperatures below traditional soak cleaners.

Some of the benefits

- Low foaming action
- Displacement of soils, rather than emulsification
- Lower temperature ranges, reducing energy use contributing to cost savings



Series of Spray Nozzles for Cleaning Parts



Spray cleaner installations typically include a side overflow tank where oils and grease separate, floating to the surface for removal using an automatic skimming device (such as a belt or disk skimmer). The side tank promotes cleaner solution cooling, which speeds up separation of the accumulated soils.

Picture of a Side Over Flow Tank



Spray cleaners may range in pH from near neutral to above 13. A variety of formulations permits the finisher to use a cleaner more adapted to a range of different metal surfaces. These would typically range from non-ferrous, light metals to steel and stainless steel. Displacement cleaning is preferred to remove oils and grease.

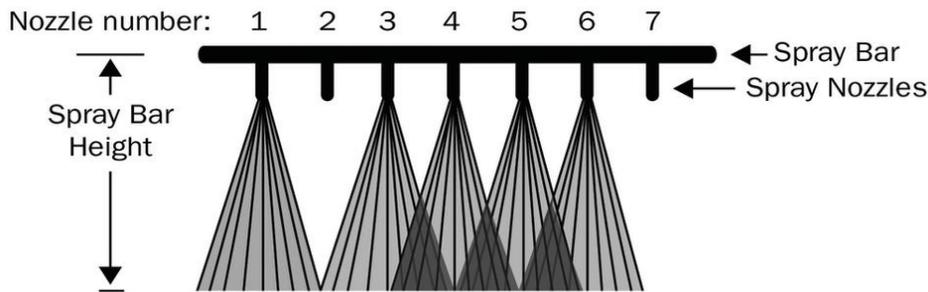
The sprayed cleaner is re-circulated through a side tank or sump. Oils and grease float to the surface and are removed by application of a suitable belt or wheel, or by use of membrane

filtration. Removal of the soils prevents their re-deposition on the parts and minimizes their loading in the cleaner. Then the solution is pumped into the spray station, to once again repeat the cleaning cycle.

The cleaner formulation consists of low-foaming biodegradable surfactants and wetting agents, SARA Title III exempt solvents, alkali builders and hard-water conditioners. Water softening is critical to prevent plugging spray nozzles with otherwise harmful soap sludge and water hardness scales.

Here is an example of how plugged nozzles compromise cleaning:

Poor Coverage - clogged nozzles



Liquid and powder spray cleaners operate similarly as the following table shows:

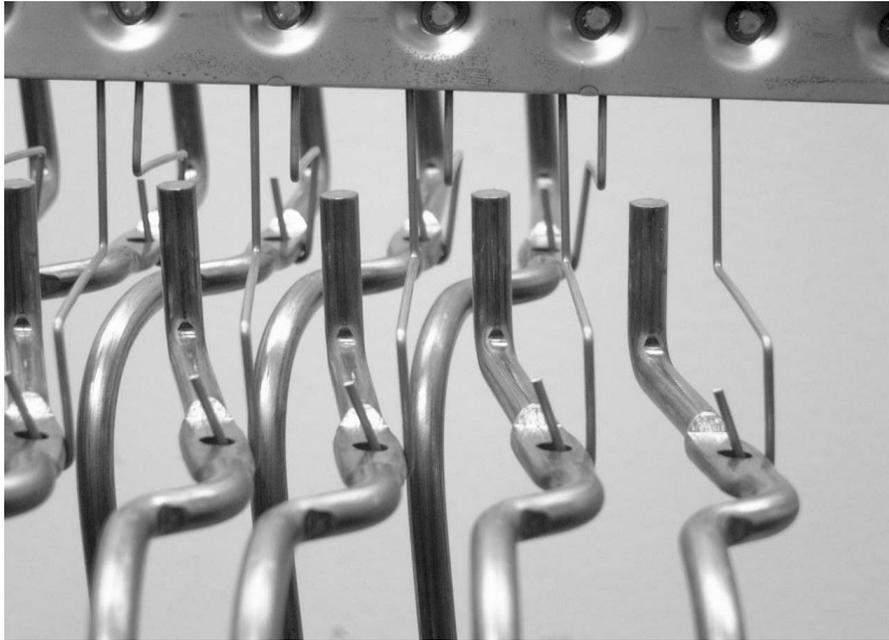
<i>Cleaner Type</i>	<i>Conc. Range</i>	<i>Deg F</i>	<i>Deg C</i>	<i>Time</i>	<i>Pressure</i>
Powder	2-5% v/v	100-160	38-71	0.5-3 min.	15-35 psi
Liquid	3-6 oz/gal	100-160	38-71	0.5-3 min.	15-35 psi

4. The rules of racking

- a. Parts are exposed to the mechanical spray of the cleaner.
- b. Racking of parts should be firm.
- c. Positioning of parts should expose maximum surface area, allowing for enhanced draining of cleaning solution and rinses.

It is important to note that spray cleaners are not typically blended with the concentrated formulation, as with a traditional immersion soak cleaner. A good deal of the cleaning action is generated by the mechanical spray, which enhances the activity of the cleaner components.

Properly Racked Parts to be Spray Cleaned



5. Trouble shooting

The most common barriers between you and satisfactory spray cleaning come down to “tweaking” the operating parameters - time, temperature, and concentration.

- If the cleaner is under-concentrated, adjust as required.
- If the cleaner temperature out of range, adjust accordingly.
- Check for and modify the contact time. Confirm whether different oils now being used in manufacturing, stamping, cutting, forming, etc....
- Test for use of appropriate cleaner chemistry. Change as required.
- Spray nozzles may be plugged, damaged, or not providing optimum spray pattern. Check for proper positioning of spray nozzles.
- If soils are re-depositing on parts, maintain oil removal equipment. Cleaner may have exceeded its service life and needs to be replaced with fresh make-up.

Our people. Your problem solvers.





For questions or comments on this information please call us at

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