

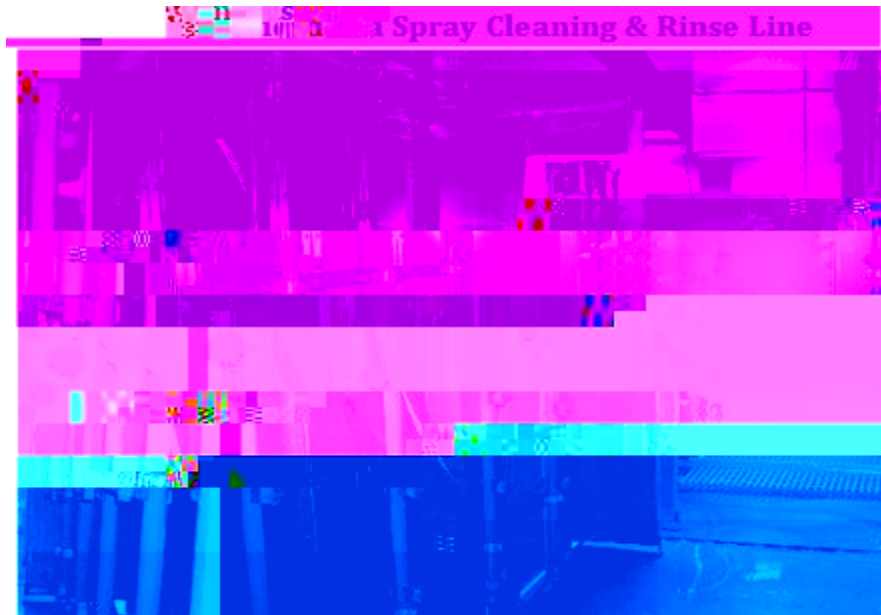


Spray Cleaning for Excellent Pre-Cleaning

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.



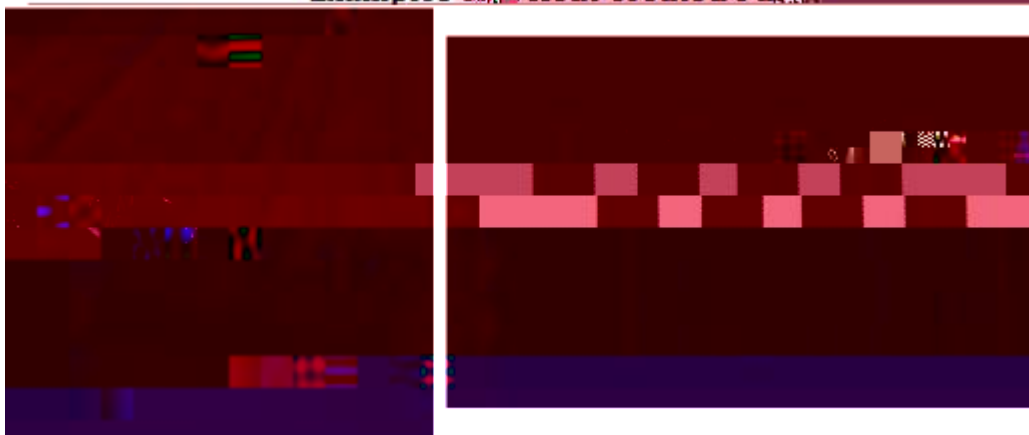


1. Versatility of Metal

"The versatility of metal is a key factor in its widespread use in manufacturing. Metal can be 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 preventive.
- Storage based on humidity and time may result in or accelerate rusting.

Examples of Heat Treated Parts





2. Effective on multiple metal substrates

- It is all too common to have a mix of products or a 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 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



The sprayed cleaner is recirculated through a side tank or sump. Oils and grease float to the surface and are removed by applying a suitable belt or wheel or using membrane filtration. Removing the soil 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:

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 cleaner's mechanical spray.
- 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.



5. Troubleshooting

The most common barrier between you and satisfactory spray cleaning is parameters - time, temperature, and concentration.

- If the cleaner is under-concentrated, adjust as required.
- If the cleaner temperature is out of range, adjust accordingly.
- Check for and modify the contact time. Confirm whether different oils are 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 provide an optimum spray pattern. Check for proper positioning of spray nozzles.
- If soil is re-depositing on parts, maintain oil removal equipment. The cleaner may have