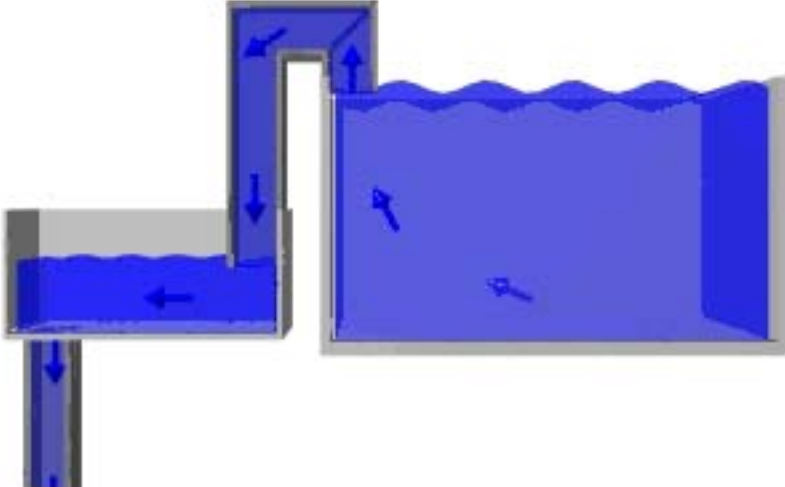
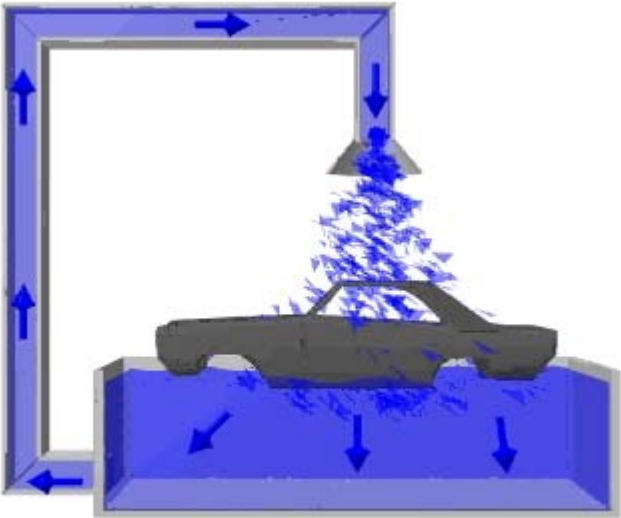


Material and Energy Balances

Car Pre-painting Supplement: Information Hotspot Index

<u>Term</u>	<u>Hot Spot Text</u>
Accelerator A	<p>During the phosphate conversion coating process, a thin film of hydrogen is formed on the metal surface which slows the growth of crystals. This problem alleviated with Accelerator A. Accelerator A, a sodium nitrate solution, is an oxidizing agent which converts the hydrogen into water.</p> <p>An added benefit of Accelerator A is that it oxidizes any iron which has dissolved in the phosphate solution. The iron concentration must be controlled to minimize the formation of crystalline iron phosphate and zinc phosphate which result in a darker color and higher coating weights.</p>
Activating Agent	The activating agent reacts with the metal surface to create nucleation sites for crystal growth.
Add 1	Add 1 is the hydroxide solution which raises the pH.
Add 2	Add 2 is an acidic solution which lowers the pH.
Additive 1	Additive 1 is a fluoride used to enhance the conversion coating process on the aluminum portions of the vehicle bodies.
Additives A, B, and C	Additives A, B, and C are chemicals which include metal ions, organic acids or chelating agents. They control the overall characteristics of the crystalline coating and are added only as needed.
Alkaline Cleaner	<p>The alkalines (hydroxides, phosphates, carbonates, silicates, etc...) chemically react with the surface oils and dirt. The alkaline components also suspend particles into solution so that they don't redeposit onto the metal surface.</p> <p>The alkaline cleaner is the most common cleaner used by the metal finishing industry to date.</p>
Bonderite P	Bonderite P is the phosphate material added (along with water) to coat the metal surface.
Carry-out	"Carry-out" is defined as the solution which gets dragged out from one stage to the next.
Caustic	The caustic cleaner used in this stage is a corrosive chemical.
Colloid	A colloid is a homogeneous mixture of insoluble liquids.

Dumped	When the pre-wash (or any other stage) is dumped, the entire tank is drained into the waste water treatment system.
Overflow	<p>The stage 2 tank overflows into the stage 1 tank. In stage 1 a tank overflow pipe discharges into the floor drain at a rate of 1.5 GPM.</p> 
pH and the Solubility of Chromate Species	The water solubility of the hexavalent Cr and environmental concerns have led to the use of reduce chromates where a percentage of the Cr is Cr^{+3} ions. However, Cr^{+3} precipitates out of the solution at a pH above 4.8. Therefore, the pH is kept between 4.0 and 4.5.
Recirculating	<p>Occurs in Stage 10.</p> 
Soft Water	Soft water contains less minerals than hard water, specifically less calcium magnesium and iron.

<p>Sludge</p>	<p>Sludge is produced by the iron which is first dissolved into the phosphate solution and then oxidized by Accelerator A.</p> <p>The sludge is an insoluble mixture of ferric phosphate and ferrous phosphate.</p> <p>The sludge is allowed to precipitate out and is passed through a filter press for dewatering. At this point the sludge is made up of 30-40% solids.</p> <p>The phosphate solution is then returned to the tank and the sludge is eventually disposed of in a landfill.</p>
<p>Temperature (110 to 120°F)</p>	<p>Temperature plays a key role in the conversion coating process because the solubility of zinc phosphate decreases with increasing temperature.</p> <p>Therefore, too high a temperature will cause excessive sludge formation while too low temperature will yield low coating weights.</p>
<p>Unwanted Deposits</p>	<p>These consist of dirt and residue left over from the stamping and welding process.</p>