Hard chrome plating is difficult. There are so many variables to consider and procedures to follow that only a large volume book can hope to discuss all of them. Here are a few cautions that deal with factors other than the plating solution itself that have an influence on the quality of the hard chrome deposits.

**Rectifiers and power supplies**

The use of low ripple power supply is essential for good hard chrome plating. Ripple is the AC component of the DC power. Ripple should be 5% or less for chrome plating. Tap switch controlled rectifiers have 5% ripple only when all three dials are at the same position. Motor generators have less than 1% ripple. "Silicon controlled rectifiers have 5% ripple only when it is used at full capacity. The ripple increases significantly as the load decreases. Variac (variable transformers type of rectifiers) rectifiers use a variable contact on the transformer and these rectifiers have less than 5% ripple at all loads or position of the tap slide. These rectifiers are limited to about 2000 amps. They become very expensive for high Amperage loads. What is wrong with ripple? Ripple causes significant loss of covering power and throwing power. This means that chrome will not cover low current density areas, leaving unplated areas. All electrical connections and contacts must be clean and not hot during use. Hot connections rob current from the plating surfaces and waste electrical power. Current interruption causes white areas in the chrome deposits.

**Racks**

Metal build up on rack tips is not acceptable. Plating area is increased and ribs current that should to the work piece. Also the usual nodular build up on the rack tips can entrap various preparatory chemicals that cause contamination of the chrome plating solution that can cause early dumping of the chrome plating bath. And also leave un-plated areas adjacent to the rack tips. The rack coatings can split and cause contamination and loss of plating adjacent to the rack tips.

**Anodes**

Insoluble lead alloy are used for chromium plating anodes, including lead-tin, lead-antimony or lead-silver. Some anodes have a copper core to increase the conductivity and aid rigidity. Anode area should be 1.5 to 2 times the cathode area. New anodes must be conditioned by dummy plating for a period of time, 15 - 30 minutes to form lead peroxide, a brown/black film on the surface. This lead peroxide persists during proper plating. An in active anode will have a yellow lead chromate film. The yellow color means that the anode has not had proper contact. The yellow film will not conduct much electricity, resulting in poor covering power and poor plating on the work piece adjacent to the errant anode. To correct this, the anode must by electrolyzing in a chrome solution until the lead peroxide film replaces the yellow chromate. If the yellow coating is too thick to remove by electrolysis, it may have to be cleaned by using a proprietary lead anode cleaner. Arranging the anodes in good proximity to the cathodes (work pieces) will allow the current to flow uniformly over the work pieces being plated. It is good practice to electrolyze the anodes using a dummy cathode, for 15 -30 minutes to assure that the chrome peroxide film is proper applied.

**Preparation for chrome plating**

Good cleaning of the work pieces is essential. Hot alkaline cleaners are efficient in removing most oils, and metal working fluids. Following the cleaner and rinsing, various acids are used. The acids use depends on the type of metal to be plated. Surface conditioning is most often done in a chrome solution (not the chrome plating solution) by reverse electrolyzing (the work is the anode, + connection) Reverse treatment in the chrome plating solution should not be used. It will shorten the life of the plating solution, by causing iron contamination, along with other alloying constituents of the work piece, and raise the trivalent chromium content of the plating solutions. Trivalent chrome is a contaminant along with the many others than can enter the chrome plating bath.

Work pieces should be relative smooth, free from metal slivers, pits and other surface defects that might have contaminants trapped inside pits or defects.

**Do's**

Use low ripple (5% or less) power supplies for chromium plating. Keep all electrical connections clean and tightly connected. Make sure racks are connected tightly the current supply.

Clean and tighten all electrical contacts.
Keep rack tips and all holding devices free of chrome nodule build up that can rob current and entrap pre-treatment chemicals inside to bleed out into the chrome solution.

Maintain a steady and correct temperature of the chrome solution. The properties of the deposit are strongly influenced by even small changes in temperature.

Maintain the level of the chrome solution to prevent concentration variances.

Maintain the lead alloy anodes by periodic cleaning, electrolyzing and good electrical contacts.

Place anodes where they can be as direct in proximity to the parts being plated (cathodes).

Clean the work pieces well before chrome plating.

Calculate the area of the items to be plated. Wrong Current density can cause poor covering or throwing power if the area is too high or nodular deposits if the area is too low for the current.

**Don'ts**

Use the plating solution to reverse treat the work pieces. That practice will shorten the life of the plating solution and result in poor quality chrome deposits.

Use the plating solution if it is high in tri-valent chome, high in iron or other contaminants loss of covering and throwing power result.

Allow chlorides enter the chrome solution. The usual source is from some city waters. As little as 0.02 g/L can cause dull deposits.

Use racks that have split coatings. Splits entrap acids, cleaner or other contaminants that cause defective plating.

Allow the solution level to drop below the established location.

Allow the percent ripple from the rectifier or any power source to exceed 5%

Allow particulate matter to get into the chrome solution that cause nodular or rough deposits.

Allow the temperature of the chrome solution to vary more than 1 degree. The hardness and other physical properties of the deposits can vary significantly with small differences in solution temperature.