

ELECTROPLATING

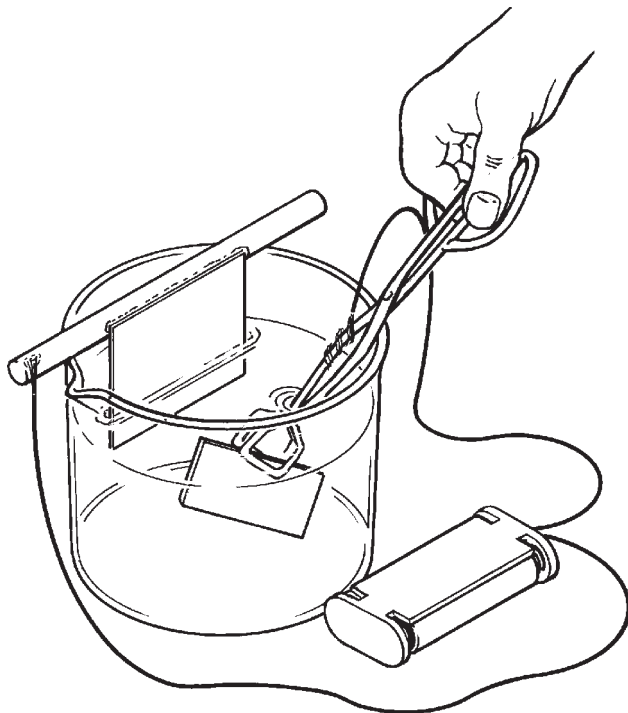
Electroplating is a means of depositing a very thin layer of metal onto another metal surface. It is done for different reasons:

- To protect surfaces - e.g. coating steel with copper to prevent it rusting.
- To improve appearance - e.g. coating a dull alloy with chromium.

THE ELECTROPLATING PROCESS

Electroplating is a very simple process. The main requirement is a bath of water in which metal salts are dissolved (the ELECTROLYTE). A piece of metal (the ANODE) is connected to the positive side of a power supply and is suspended at one end of the bath. The anode is normally made of the same metal that is plated onto the workpiece - e.g. nickel. The workpiece (the CATHODE) is connected to the negative side of the power supply and is lowered into the bath. Current flows through the electrolyte causing metal to come out of solution and plate the workpiece.

If the anode is made of the same metal as the dissolved salts, it will gradually dissolve, replacing the metal deposited on the workpiece from the electrolyte. If it is made of a different metal such as copper, the bath will be depleted during plating and will need to be replenished with more salts.



PRACTICAL NICKEL PLATING

Nickel plating provides a tarnish-resistant coating similar in appearance to chromium. An effective bath is made using the following proportions:

Nickel sulphate	300 gram per litre of distilled water
Nickel chloride	45 - 55 gram per litre of distilled water
Boric acid	30 - 40 gram per litre of distilled water

An alternative is to buy the mixture of salts already made up from an electroplating supplier.

NOTE: This nickel plating bath (sometimes called the Watts solution) will only plate non-ferrous metals such as copper and brass. It will NOT plate steel or aluminium.

It is convenient to use a rectangular plastic or glass container for the bath because a metal anode has to be suspended at one end. The illustration shows how the bath is arranged. For small areas of plating - e.g. up to 40 square cms - use two 1.5 cells in series (giving 3 V for the power supply). Hold the workpiece in a pair of tongs for convenience.

To plate a piece of work, follow these steps:

1. Make sure the workpiece has a good finish. The plating bath will not improve a rough surface. Polish the work with metal polish and clean with a soft white tissue until all traces of black deposit come off onto the tissue. Do not touch the surface of the workpiece after this.
2. Wipe the edge of a sheet of paper over the surface of the bath to remove any thin film of grease or dirt.
3. Hold the workpiece in the tongs and immerse in the bath - making sure that it is agitated or moved quickly all the time it is in the bath. Adequate plating will take about 15 seconds only !
4. Remove the workpiece from the bath and then rinse under running water and dry with a tissue.

FAULT FINDING CHART

SYMPTOM	CAUSE	REMEDY
No deposit on work.	Flat battery.	Check connections, especially between nickel foil and rod. Test for continuity by touching a 4 V bulb between the foil anode and the tongs. It should light.
Patchy plating.	Flat battery.	Check cells.
Lack of agitation.	Work surface dirty. Start again from buffing stage.	Wipe surface and/or filter.
	Contaminated bath.	Agitate.
	Workpiece too large for the supply.	Reduce the size of the workpiece or add cells to provide a higher current.
Plating darker at edges or corner.	Current too high - causes 'burning'.	Reduce the battery voltage and/or increase agitation.
No plating at base of relief details or in small crevices and re-entrants etc.	Main surface of workpiece tends to have a shadowing or masking effect. The extent to which this happens depends on the 'throwing power' of a bath.	Continue plating and agitate for longer.

