10.2 Plating

NICKEL PLATING IN THE HOME WORKSHOP

S. Greenway

This article is based on the use of the Standard Nickel Plating Kit, which comprises Nickel Salts, Metal Cleaner, Anodes, Pumice Powder, Comparator Papers, Filter Papers, Copper Wire. It is especially suitable for small parts, such as nuts and bolts, handles, badges etc., etc., but having a maximum capacity of 4½ in. x 4½ in. x 3 in. Providing care is used, professional quality plating can be done in the workshop quickly, simply and inexpensively. Due to the poisonous nature of the chemicals that would be required, cadmin, chromium and the alkali copper plating are considered outside the scope of the home workshop. With the modern nickel plating solutions, it is no longer necessary to prior copper plate parts. If a larger installation is required from that described herein, it is best that the solution be used cold, thus allowing the use of a plastic tank and a reduced electrical current.

The proposal herein contained for the heating of the tank is based on the assumption that mains services are not available at the installation. If a mains electrical supply is available it is preferable to use this for heating, employing either a boiling ring or a suitable electric element properly housed.

The construction of the tank is both simple and effective. Modifications can, of course, be made depending upon materials and facilities available if the basic principles and comments are not ignored.

Constructing the Tank

A six pint, eight inch enamel saucepan (obtainable from Woolworths) is used as the plating tank, which is supported on the wall on brackets 10 ins. above the bench to allow a paraffin heater to be placed underneath.

The anode Bar is made from ⅛ in. brass rod formed into a square and firmly soldered together as shown in Fig. 1. For suspending the Anodes, 2 x O.B.A. brass screws are drilled ⅛ in. dia across the heads and soldered securely to the centre of the two opposite sides. The remaining two sides are insulated by short lengths of plastic tubing to support the Cathode bar. To enable the electrical connection to be made, a further O.B.A. screw is drilled ⅛ in. dia. down the head and soldered to the bar as shown.

The Cathode Bar is likewise constructed of ⅛ in. brass rod, two lengths being bent and soldered side by side. Three O.B.A. hexigon brass nuts (with 1/16 in. dia. holes drilled through across the flats) being soldered on as illustrated. Finally a screw for the electrical connection as described for the anode bar is attached.

IN NO CIRCUMSTANCES should non-nickel nuts, bolts or anode suspenders (which may be used in a modified construction of the tank) be permitted to come in contact with the solution.

The Electrical Equipment

A 6 volt motor cycle battery is used as the power source and should preferably, but not essentially be supported by a battery charger. The current is controlled by the simple expedient of a small bulb holder fixed on the wall adjacent to the tank and wired up as shown on Fig. 2. As the system requires 0.1 amps to plate each square inch, it follows that if 10 sq. ins. are to be plated 1 amp is required, therefore a 6 volt, 6 watt (1 amp) bulb is put into the circuit. This figure of 0.1 amps to the sq. in. is a maximum and gives about .001 inch deposit per hour. Should it be required to plate a large part and the current required would be obviously excessive from the source, a lower amps. sq. in. ratio may be used and a longer time given. All electrical connections should be well made and easily detachable. For the purpose of making and breaking the circuit, it is recommended that crocodile clips be used at the battery connections.

Preparing the Tank

The solution of Nickel salts is prepared as follows:—

1. Put 6 pints of warm water (100 degrees F. max.) in the saucepan (not aluminium and add 24 oz. of the salts—stir until completely dissolved.
2. Check specific gravity with a battery hydrometer. This should be 1110 s.g. If it is too high, add water—if too low add more salts.
3. Filter the solution thoroughly to remove all suspended impurities.
4. Check the p.H. value (as described later) which should be 5.6 to 5.8. If it is too high add drops of clean battery acid and mix thoroughly before re-checking. If too low, sprinkle small quantities of Nickel Carbonate onto the surface and stir until dissolved. This should only be necessary if too much acid is added when lowering the p.H. value.

IT CANNOT BE STRESSED TO STRONGLY that the entire success of the Plant depends on absolute cleanliness when mixing, using and storing the solution.

Maintenance of the solution is necessary over a period of use as both the specific gravity and the p.H. value tend to rise. These should be checked and restored regularly by the methods described

The Anodes—plates of pure nickel approx. 4 in. x 2 in. should be drilled for attachment to the Anode Bar and before placing in the tank should be covered in clean nylon bags.

Cleaning Routine for the Parts

For first class results, care should be taken in preparing the parts. In the case of polished brass or previously nickel plated parts no physical cleaning should be necessary. At the other extreme, when restoring badly rust-pitted parts, all pitting must be removed using a fine file. The parts will then require polishing, starting with a No. 120 Emery cloth and working down through 240 and 360 grades wet and dry paper (used dry) to a final polish with 500 grade. To facilitate this process, for high volume work, the use of a power tool would be advantageous.

Before cleaning commences the parts must be wired up on 24 guage copper wire, preferably soldered to the part in some obscure location or firmly twisted around the part. From this stage onward the part must be handled only by the wire.

1. De-Grease. The special cleaner is mixed with warm water at a ratio of ½ oz. to one pint. A four pint enamel saucepan is used to hold the solution which should be brought to near boiling point. The parts should be fully submerged and agitated occassionally for 3 minutes or so (This solution can be re-used).
2. Wash in a large bucket of clean water, agitating the parts vigorously. The parts should now be kept wet and kept hung in the bucket when not being processed.
3. Scouring. The parts should be scrubbed hard with pumice powder using a soft toothbrush. To ensure cleanliness use a wooden board as a base and a stick of wood for holding down the parts.
4. Wash, as in 2 above.
5. Acid Etch. The parts should be submerged in 20% Hydrochloric Acid solution for about one minute. The solution can be obtained from a chemist and should be stored in a wide necked screw top plastic container.
6. Final Wash. The parts should be washed thoroughly under a running tap for about one minute.

Plating Instructions

a. Check Specific Gravity and the p.H. value of the solution and raise its temperature to 90-100 degrees F.
b. Calculate the surface area of the part/s to be plated and put the requisite bulb (0.1 amps per sq. in.) in position. It is recommended that when plating a batch of small parts the surface area be equivalent to the area of the submerged anodes.
c. Secure all electrical connections to ensure that the current flows immediately the parts are placed in the tank.
d. Check that the current is flowing in the right direction.
e. Clean the parts by the routine given above, attach them securely to the cathode bar and lower gently into the tank.
f. During plating occasionally slide the cathode bar along the anode bar to agitate the solution and to release the bubbles that form on the parts.
g. Check that plating is taking place by lifting the cathode bar slightly and observing the nickel on the wire. DO NOT lift the parts clear of the solution.
h. When plating has been completed (from ½ to 1 hour) the parts should be washed and dried prior to final polishing, the battery disconnected and the tank covered.

DO NOT ATTEMPT to plate Aluminium, Zinc or Stainless Steel parts

Checking p.H. Value

This is merely a test for the very small amount of acid in the solution. A piece of comparative paper is torn from the block, dipped into the solution and any surplus shaken off. A few seconds allowed for the colour to change and the test strip is then compared for colour with the chart inside the book. If the colour does not fall within the 5.6 to 5.8 range adjustment is necessary as described above.

Blanking Off

The simplest way to avoid nickel plating the screw threads on bolts etc. is to wire the parts so that the threads are clear of the solution. If this is not possible the parts should be "blanked off" with a piece of material cut from one of the proprietary self adhesive sheets (avoid the use of black tape). In the interests of economy, when plating parts such as lock rings etc. which are visible from one side only removing the anode from the back of the parts will reduce the deposits by 75%.

The construction outlined above, in conjunction with my Standard Nickel Plating Kit will give an identical, reduced size set up of the normal commercial nickel plating installation. Therefore, providing the polishing is carried out with diligence perfect, professional, quality plating will result.

"All That Glisters Is Not Vintage Nickel" — (with apologies to Thomas Gray 1716-1771)

KEN LINDSAY

I am prompted to write by the two letters from John Dean and Colin Fine-Thompson in the February Magazine on the subject of plating finishes for vintage machinery.

I comment on the basis of having carried out a fair amount of nickel plating for both myself and friends, starting off with a Dynic Kit but having since developed to a fairly sizeable set-up capable of dealing with any motorcycle parts and most car parts — (bumpers excepting!). In doing so, I have had a good deal of helpful advice from the main international supplier of plating equipment — Cannings of Birmingham — as well as contact with several commercial plating operations. However, I appreciate that a little knowledge is a dangerous thing and would welcome any corrections to the following conclusion I have drawn.

First of all let me say that over recent years I have come to agree wholeheartedly with John Dean's views on nickel plating for vintage machines.

Apart from the matter of personal preference for bright or dull finish, the controversy has to some extent I think been caused by developments in nickel plating techniques since the advent of chromium plating around 1930.

Prior to this date nickel plating has been carried out by the "Albo" or Watts method — relatively simple processes producing the lovely patina to which John Dean refers. "As plated" the finish is dull, silvery white or grey and this can be polished in varying degrees by hand or machine buff through a range of brightness to the "concours glitter" which has come to be accepted as "de rigeur" for the "Best of Show" contenders. Left without regular polishing this will revert to an antique patina, although I suspect that nickel was never polished to this degree when machines left the works and a more period finish would be a regular hand buffing to achieve the mellow finish referred to by John Drew.

After the inception of chromium plating, nickelling was still necessary, as I am sure most readers will be aware, underneath the chromium layer. The reason for this being that chrome is porous and an item which was "chromed only" would very quickly rust as moisture penetrated the chrome and attacked the underlying steel. Hence the layer of nickel provides the anti corrosion protection as it had always done — but the decorative effect was obtained from the chromium which relies on a highly polished surface for its reflective brightness. This requires that the surface upon which the chromium is deposited is also highly polished and bright. With the original Albo nickel solutions this meant that the dull "as plated" nickel required a further labour intensive polishing operation prior to deposition of the chromium layer. Hence the development of "bright nickel" plating solutions whereby the items emerged from the nickel tank in the "bright polished" condition. This was achieved by using different combinations of nickel salts with various chemical additives and these types of nickel solutions have, invariably been used by commercial platers, for many years, for obvious economic reasons. They produce the bright finish from the tank but in my experience the nickel plate is often yellow rather than the silver/pewter colours from the Albo solutions.

So here I think lies the main source of our general acceptance of bright nickel as the "normal" nickel plated finish. The restoration of old motorcycles was a minority interest until a few years ago, but since then we, dedicated dirty finger nail brigade, have taken our boxes of bits along to commercial plating establishments to be "nickel plated". So what do we get! The modern bright nickel finish of course, which is the only process they have available nowadays, and most of us who are not fortunate enough to have known the original veteran and vintage as new, have become conditioned to accepting this as the original finish.

Even those of us who have bought Stan Greenway's excellent starter kits (which use Albo salts) and persevered with the hours of filthy, laborious, soul destroying preparation work to produce our concours contenders have then tended to polish up to the highest finish we could achieve, which is probably much brighter than the original "as new" condition.

With regard to the point made by both John and Colin (whose vintage nuts I can highly recommend!!) that stainless steel when polished can look like nickel. Personally I have never found this and in fact my experience is that it looks nearer chrome plate than nickel. I have just completed a MKIII Douglas rebuild which arrived with a pair of "new" 10 year old exhaust pipes which turned out to be stainless steel. As the pipes are high level on this model, I then made up a pair of heat shields for the pipes from an old stainless steel baking tray — all these items when polished, were to my eyes, almost indistinguishable from the chromed silencers. Colin refers to Spec 304 stainless but I have no idea of the steel spec. for my items. Perhaps Colin, to whose engineering knowledge I defer, might like to comment further on the various grades of stainless steel.

So — to revert to the question of nickel finish, it is possible to reproduce the charming original finish to which John refers — but, I like many others I suspect, must admit to finding it very difficult to resist the temptation to buff up a sparkling shine. Somehow it seems to give the ultimate satisfaction, and justifies all those grubby hours, when that final polish transforms a pile of restrained and charming dull nickel into rows of glistering "vintage" motorcycle parts.
