

An Introduction to Electroplating process.

Here we would like to help beginners understand the most important aspects of electroplating:

The Electroplating process is a method for coating (electro deposition) conductive (metal) objects with any other type of metal such as copper, nickel, gold, rhodium, chrome, silver, brass, bronze, tin, lead, zinc etc.

You will find these processes quiet simple if you know how to carry them out. The electroplating business is becoming more and more popular and you can easily get involved. Most types of electroplating processes are not expensive to set up (in comparison with other types of businesses) and it is very profitable. The electroplating process is widely used in industries such as jewellery, medical, electronics *etc.* An electroplating process is suitable for the professional usage such as coating of different small car parts, decoration works, craft works and model making, as well as for many engineering, restorers, arts, and other projects.

As a beginner, to learn the electroplating technique you need to be patient and, initially, spend some time on each new item, which you electroplate for the first time. Then you will start achieving excellent results very quickly. We would like to recommend you to keep notes each time you complete a project it will help you in the future. Thickness and quality of coating is a complex combination of electric current, voltage, temperature of solution, time of exposure, quality of chemicals, position of plating objects, distance between the object and an anode, your equipment and of your experience as well. Therefore, the more jobs you carry out, the more experience you will gain, you will find the quality improving, and you will carry out each project much quicker. In electroplating, it is important to understand that many things depend on the material you are using, its form, size, quality, temperature, the solution used and the time that different processes take. Therefore, it is advisable to keep notes of all those things including the type of anode, the voltage, dimension between anode and cathode, *etc.* In addition, many videos and other useful information is now available on the internet.

Three different types of electroplating process:

1. Tank plating process is the most popular and useful process that is suitable for all types of electroplating or electroforming processes. It produces a high quality surface of plating objects and allows you to plate many items at the same time. You can also clean or electro-polish the plating objects in a tank as well. Using this process, you can plate many objects inside and outside as well. It is very quick (plating time is usually 30-60 seconds) but this process requires equipment such as a power supply (rectifiers), tanks, anodes, cathode-turning stands, heating and agitation systems. This equipment is very useful because it allows you to do many additional processes such as electro cleaning, stripping, electro etching and electro polishing. Usually each process, including rinsing, requires one tank each with a correct solution. For example, just dip plating objects in a cleaning tank first, then take it out and dip it in a rinsing tank with tap water and finally dip it in a tank with the plating solution. Switch your power supply (rectifier) ON and wait for few seconds (timing depends on the process). Then, you will find your item fully plated.

2. The Brush Plating process is widely used to plate fixed items like kitchen and bath taps, showers, tubes *etc.* It gives you a good quality of plated surface if you are experienced enough and if the object for this process has been prepared properly. The chemicals for this process are more expensive (if compared against tank plating chemicals) because they are more concentrated and you will be able to plate only one object at a time. However, for brush plating process you have to know that objects can be plated outside only. This process is fully suitable only for Gold, Silver, Nickel, Copper and

Chrome plating. If you wish to plate your objects in other metal (like zinc, tin, bronze *etc.*), you will have no choice but to use a tank plating process to get a good quality of plating surface).

3. The Pen plating process can be used to plate very small details, or individual small parts on a large object. For example, you can plate the fingernails or eyebrows on a bronze statue in silver. Pen plating is suitable only for Copper, Gold, Rhodium and Silver plating processes.

In simple terms, all of these processes consist of allowing an electric current from a rectifier to flow through a solution between metallic or other conducting materials placed in the solution at the positive (anode) and negative (cathode) terminals of a direct current circuit. The current flow in the circuit results in the release of charged metal particles called "ions" into the solution. They pass from the positive terminal (anode). We refer to the object being plated as a "Cathode".

What we should have to start a tank electroplating process?

To answer this we need to clarify first four questions:

A. Which process we are going to use - gold plating, chrome plating *etc.* We need to know this in order to get the right rectifier with correct amperage/voltage options. In addition, we have to decide if we need an "Agitation" and "Heating" options for plating tanks, which chemicals we will need, type of anodes *etc.*

Useful points on electroplating stations (rectifiers):

* Cathode Rotating Stand (CRS) - helps you to get a better quality of surface of the object you are plating and helps you to save money (because of additional anodes) on solutions. In addition, it saves your time as plating process goes much quicker.

* Agitation Systems (Air or Mechanical) - widely used to stir a plating solution inside a bath. It saves your time and it requires less solution than usual.

* Heating system - allows you to get a high quality of surface (plating area) and saves your time on plating process. For example, if you try to plate copper ring in solution with room temperature - it may take several minutes but if you plate the ring in solution with temperature about 35-70 C - it will take about 30 seconds only.

* Stripping option - allows you to change the polarity (positive and negative) in your plating tank without using your hands - just turn the switch into a correct position. Very safe and healthy option when you plate large number of objects (work with high level of amperage).

B. How many items we want to plate at the same time? We need to know this in order to get the correct sized plating tank and anodes.

C. What is a maximum size of items we intend to plate? We need to know this to ensure that we have a correct sized plating tank, anodes, and a powerful enough power supply (rectifier).

D. Are we going to plate old or new objects? If we going to plate an old object we need to choose a rectifier with stripping option because it takes off the old surface first for the re-plating process.

Below is an example of the equipment and accessories required to plate a copper ring in 22 Ct Gold:

a) The power supply (rectifier) with 3 tanks for electro cleaning, rinsing and plating processes. As we mentioned before there should be an agitation and heating options in the plating tank for a best result.

If you plan to re-plate old objects - you will need one more tank for electro stripping process and a rectifier (electroplating station) with a "stripping" option.

b) Gold plating/stripping anode.

c) Chemicals to make up the cleaning, stripping and plating solutions.

How to choose amperage of power supply (rectifier):

Most beginners are incorrectly trying to choose the correct amperage of power supply (rectifier) for their work based on the size of the plating tank. It is not the correct way as you will order much more powerful machine than you will required in reality. To choose the correct power supply (rectifier), you need to base your decision on the area of all plating objects that you are going to place in a plating tank at the same time. For example, if you have a 250 x 250 x 250 mm (10 x 10 x 10 inch) tank for gold plating process (that just requires 1 A per sq. inch amperage) you will require a rectifier that will give you amperage of 100 A. However, in reality, if you place just a few objects in the tank with total plating area of 5 sq. inch then you will require a rectifier of just 5 A. No matter how big your tank is, the important part is the plating area only. Unfortunately, we cannot use car batteries or other non-regulated power supplies and adaptors if we want to achieve a good quality of surface. We must have a facility to regulate the voltage/amperage depending on the type of plating process (Gold, Chrome, Nickel *etc.*), the type of object needs to be plated (round, square *etc.*), their size and other factors such as the type of chemicals, quantity of objects, temperature of solution *etc.*

How to choose an anode for your work:

It depends on the material, size and the shape of the item that needs to be plated. These three things determine the anode and solution that you will require. The anode is the positive ('+') electrode, which is placed in the tank opposite the object that you are going to plate (cathode) which is a negative ('-') electrode. Anodes should perfectly suit the item being plated so they must be chosen accordingly.

The most popular types of anodes for most popular processes are:

1. Copper anode for the copper plating process.
2. Gold or 316+ stainless steel anode for the gold plating process.
3. Silver or 316+ stainless steel anode for the silver plating process.
4. Nickel anode for the nickel plating process.
5. Brass anode for brass plating process.
6. Rhodium (or rhodium plating) anode for the rhodium plating process.
7. Peroxide Lead Anode for a chrome plating process.

It is also necessary to choose the correct size of anode. It should be approximately twice the size of the cathodes (plating objects) and anodes should be placed on two sides of the tank or (better, if you do not use a cathode rotating stands) on all four sides. In addition, if your item is not flat, it may be necessary to shape the anode to suit the form of the object being plated. Again - if you have a CRS (Cathode Rotating Stand) in your tank - you do not need any special anodes or a lot of them, as the CRS allows you to plate any object in a high quality with one flat anode only. It will also help you to

make your work much quicker and it will save your solutions that you plan to use for this process. Please find any type and size of the CRS you may require in our Internet-shop ("Accessories").

To summarise - there are 3 vital things that guarantee the success of the electroplating process:

1. The plating process is only possible with the correct anode.
2. Size of anode MUST BE twice the size of the surface area of all the objects that you are going to plate.
3. You may require a CRS, heating or/and agitation system in a plating tank to get a good result.