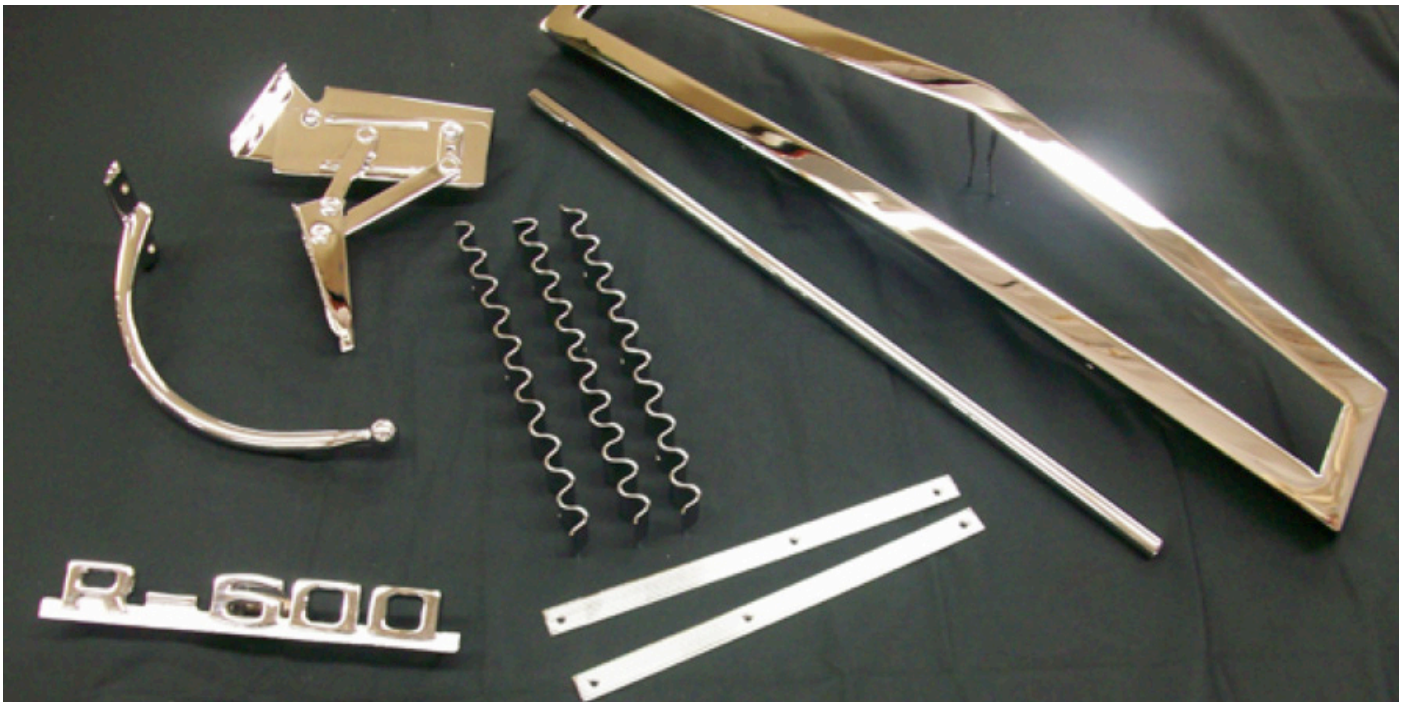
PLASTIC PLATING MACHINE

Electroplating involves applying a metal coating, chromium, or silver coating on a metal part to enhance its capacity to resist corrosion and wear. It also makes the part to be adhesive to paints especially if the metal parts need to look beautiful for the final products specifications and requirements.

However, there are sometimes when you may have to handle projects for clients whose manufacturing operations center around producing plastic objects like polypropylene, Teflon, ABS or polycarbonate. What will you do? Except to make the plastic materials able to conduct electricity. How is the next question, the answer becomes, metalize the materials by coating them with metal through the process of electroplating on plastic. You will have to give these materials a metal finishing to enhance their electrical conductivity capacity.



Plating on Plastic

Initially, people often refer electroplating as “metal on metal,” but nowadays, electroplating on plastic has come to the limelight with adequate plastic plating equipment which you can utilize to achieve your plastic plating requirements. It didn’t just start in this generation but as far back as the 1960s when the first metal plating on plastic process was successfully developed for the automotive industry.

Those days, people who were into automotive manufacturing were looking for methods to increase the fuel efficiency of the vehicles they manufacture. As a result, they started making use of plastic components and parts that are lightweights. With

the electroplating process, they were able to metalize these plastic parts so that they can still the same attractive looks which car buyers found appealing.

In the search for a perfect process, there was a major advancement that took place which was developing an effective chemical process that will prepare the surface of ABS, acrylonitrile butadiene, which is a thermoplastic polymer that is both tough and resistant to impact as automotive manufacturing applications require. This advanced process proved to be very beneficial because of its ability to provide the required adhesion between the metal coating and the ABS substrate.
Benefits of electroplating on plastic

There are many benefits to electroplating plastics like:

1. Plating plastics makes the plastic more attractive thereby improving it to seem like high quality material.
2. It also serves as a protective shield for a substrate against corrosion.
3. Electroplating plastics also enhances the material's capacity to resist the chemicals involved in manufacturing.
4. When plastics are electroplated, they can be stronger and also resist wear easily.
5. It serves as an appearance enhancer for substrates to produce that shiny appearance that the owners of these products desire.
6. With electroplating, a plastic surface that was originally no-conductive can conduct electricity. This ability makes the work of electronic part manufacturers, automobile and aircraft components manufacturers very easy.
7. It also protects the substrates from harmful gases.
8. Plating helps to minimize energy dissipation.

Plastic chrome plating equipment

Plastic plating equipment for chrome plating can work for both rack plating and barrel plating depending on the requirements of your project. The equipment can also be modified if the requirements dictate. The tank material can be either stainless steel, PP or PVC as the case may be. There are different models which you can also choose like there are three of them which is popular in the industry. You can get the Automatic Plastic chrome plating equipment, the Semi-automatic, and the manual Plastic chrome plating equipment.

The cooling system for these plastic chrome plating equipment is PLC, PCS, PC and Computer control. The heating is typically electronic, Hot water and steam. Other surrounding equipment of plastic chrome plating equipment can be filters, rectifiers, air blower, pipe, a system for waste gas treatment, etc.

One good thing about getting a good brand of plastic chrome plating equipment is that you can use it to hand metal plating and plating of plastic products as well.

Tools

A good plastic chrome plating equipment usually comes with two kinds of tools which can handle both rack plating and barrel plating depending on the type of plastic materials you want to plate.

Heating and Cooling

Depending on the efficiency and usage ratio of the equipment, the materials used for the heating devices and the heat sensors are made to adapt to the tank where it works so that there will not be corrosion or damages.

Ventilation system

The plastic chrome plating equipment has an integrated exhaust which works efficiently. The gas hoods and air ducts release waste gas so that there wouldn't be any contamination of equipment and the staff. The ventilation system parts are made of PP, and they work satisfactorily.

Transporter

The three kinds of model for plastic chrome plating equipment are all designed to be stable, durable, safe, low noise and efficient. No matter the model you decide to choose, you can be sure of efficient plastic plating.

BCD Positioning

You can edit the program so that controlling it while it is transporting products to different treatment tanks can be easy. For the lifting and the descending, a chain or a belt is conveying which is associated with the system's turbine reducer. The hoist of the plastic chrome plating equipment can either ascend or descend to the tanks at the same time. The accurate positioning system makes the hoist to travel smoothly and steadily with a vertical speed of 20CM/SEC and horizontal speed of 60CM/SEC.

There is some safety protection which you can use while using a plastic chrome plating equipment.

1. There is time-out protection to ensure that there will not be motor overload and you can view the status on a monitor.
2. There is also protection in all the directions to make sure that the equipment will not overheat when there is overload.
3. The position of the equipment in every direction can be protected, and you can watch it on a monitor for cases of collision
4. You can also lock motions from every direction for cases of operational mistakes.
5. There is also an emergency stop, and the hoist cable trench is of SUS304.

Rectifier

The rectifier is responsible for providing a proper and stable voltage and current for the plastic chrome plating equipment line. The operator can also set the voltage mode and current mode manually.

For the secondary distribution box, the cable arrangement all conform to CNS standard while the main distribution box is on the rectifier's non-fuse switch where the clients can reach it.

Filtration system

The purpose of this system on a plastic chrome plating equipment is to filter the chemical and remove every impurity in it to ensure a smooth coating. It also mixes the chemical so that there will be an even distribution of the density and the temperature to achieve a homogenous coating.

Plastic materials fit for electroplating

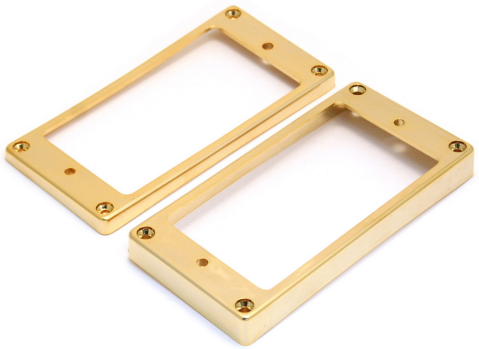
The first successful plating was on ABS which is made up of 90% metal plating plastic applications. From then, the search for appropriate techniques that can electroplate many plastic materials continued till presently when they are readily available. Right now, many materials can be electroplated successfully. Some of these plastic materials are called thermoplastics showing that they can melt and become moldable if exposed above a particular temperature level and become solid again upon cooling. Some of the plastics that be plated upon are:

Polycarbonate

This name is a group of durable and strong thermoplastic polymers which are always used in aerospace, data storage, construction and automotive applications.

Teflon

This brand name describes a kind of polytetrafluoroethylene (PTFF) which DuPont Company developed for the manufacturing of non-stick kitchen cookware.



Polysulfone

These are thermoplastic polymers popular for being strong, high-service temperatures and transparent. These group of plastic materials is mainly used as filtration media, flame retardants and serve as dielectrics in parts like capacitors.

Polyoxymethylene (Polyacetal)

These materials are engineering thermoplastic which is used in high-performance applications for those components and parts that require high stiffness, strong dimensional stability, and low friction.

Phenolic

These groups are laminated materials mainly for the manufacturing of molded products.

Even though most plastic materials can be electroplated, few others cannot be plated successfully. Materials like Valox product is not plating adhesive.

Due to the uniqueness of metal plastic plating, some metals can successfully provide a coating on plastic materials. For example, if you need to make the substrate to be an electrically conductive plastic, use copper to electroplate on it. To improve the appearance of the material for aesthetic appeal, use either silver or gold plating on it. Some industries also use nickel plating on plastic materials successfully. Some of the metals that can work for plastic plating are:

Nickel; this metal is a better substitute to chrome due to its bright appearance.it is also less toxic and serves better when you want to plate automotive parts. It serves as a protective shield for the plastic materials against wear and corrosion. If you want to enhance these nickel's capacities, increase the hardness by alloying it with metals like tungsten and tin for a stronger protective shield.

Chrome; chrome is a carcinogen and also an air pollutant that can wreck hazards as listed in the United States Agency for environmental protection. However, many shops that specialize in metal finishing use chrome for various automotive applications. Despite being dangerous to humans, electroplating with the metal can assure you of a smooth finish on the surface of the plastic material. Also, it is also suitable for enhancing corrosion resistant capacity of a substrate and also provides a strong aesthetic appeal. Another downside to chrome plating is that it involves a complex process that involves up to thirty steps with strict adherence to EPA regulations.

Gold; if you use gold for plastic plating, you can be sure that the appearance of the plastic parts will improve. Other benefits of gold plastic plating are the ability to resist corrosion and provide high electrical conductivity capacity to the plastic material. Many electronic components and parts come with gold platings, and it is also useful for high-temperature applications due to its wonderful heat-shielding properties.

Copper; these metals have the highest capacity in conductivity. This nature makes it the best choice for turning non-conductive metal surfaces to conductive metal surfaces. Copper plating plastic is low cost when you compare it to other metal, and this is part of why many industries utilize it for electroplating plastic materials.

ABS Chrome Plastic Plating process/method

If you want handle chrome plastic plating, you must first realize that the process in this type of electroplating is different from the usual method. Some more steps need to follow before you apply the coating to realize the best results. The first thing is that you must clean the substrate surface thoroughly to make it free of debris and dirt that affect the adhesion of the material to coating. After removing the dirt and debris, you have to etch the substrates in a chromic acid to enhance adhesion, and later you will neutralize excess chromic acid if any.

When you are through with neutralizing excess acid, activate the surface of the substrate with a tin salt and palladium solution and then, apply the copper coating or electroless nickel. When you get to this point, follow the standard electroplating techniques to apply your metal coating.

To arrange the whole ABS Chrome Plastic Plating process in a sequence, you can take the following steps:

1. Pre-clean the plastic material
2. Rinse in cold water
3. Neutralize excess chrome
4. Rinse in cold water again
5. Etching
6. Rinse
7. Neutralize again in 2% of sodium bisulfite solution

8. Rinse in cold water
9. Item
10. Sensitizer
11. Rinse in cold water
12. Electroless Nickel
13. Rinse in cold water
14. Copper Plating
15. Bright Nickel
16. Dragout
17. Rinse in running tap water
18. Decorative chrome
19. Cold water rinse
20. Hot water rinse
21. Chromium plating

It is always difficult to successfully electroplate on plastic materials, and because of this challenges, it is advisable to monitor the whole process closely and also perform some troubleshooting steps to check out issues like:

1. Excess chromic acid concentration during the etching step which can cause insufficient adhesion
2. Too high plating bath temperature which can make the plastic material to warp
3. Inadequate plating on material part edges which shows that there was a high accelerator temperature applied during the removal of excess stannous hydroxide
4. Overly shiny plastic material parts as a result of a short etching process.

Plastic Plating Applications

Plastic plating is still mainly used by automotive industry but other industries like internal fittings, ie, plumbing, and electronics/electrical. Let's check them out one by one.

Plastic plating application on automotive industry

Following the indications from Global Market Insights, it is clear that polymer accounts for 15-20% of the weight of car parts. Apart from providing a lighter weight material option, plastic parts make the design more flexible. Also, engineers have many options for developing unique styles to differentiate their product from others due to the bendable and moldable nature of plastic materials to accommodate any shape requirement.

OEM and aftermarket parts manufacturers are also using plastic plating for their products. The most common metal which the automotive industry is using to electroplate plastics is nickel because it can provide the same bright finish on plastic car parts which was unique to chrome. The automotive industry is making use of plastic nickel plating to improve the appearance of automobile exterior and interior parts like wheels, light bezels, grilles, gear shift knobs, bumpers, door handles, and emblems. Sometimes, instead of pure nickel, automobile industries use chromium-nickel alloy.

Electroless nickel plating and nickel electroplating provide some functional benefits for manufacturers. The use of nickel coating enhances the ability of certain parts to resist corrosion and wear. It also increases the lubricity of the plastic materials to prevent friction-induced wear.

Plastic Plating applications on Electronics

Electrical applications are only covering a small portion of the plastic plating market. However, the process involved in plastic plating plays an important role in some of the manufacturing procedures of electrical and electronics industry. When it comes to decorative applications, the industry uses nickel plating and nickel chromium plating to enhance the look of those plastic trimmings on mobile phones and computers. They also serve as appearance enhancer for switched, buttons and knobs on many electronics and electrical appliances which people use at home.

Plating helps to change many non-conductive plastic surfaces to conductive surfaces. With the coating from electroplating, some electrical parts that pass through regular handling and exposure can resist premature wear. The advent of plastics that are resistant to heat necessitated the use of nickel plating on connector blocks so that engineers can solder their surfaces. When it comes to producing circuit systems, electroplating becomes necessary especially the systems that have interconnecting paths features.

Plastic Plating application on Plumbing

When it comes to plumbing, manufacturers are now making use plastic fixtures instead of brass because of its inexpensive and lightweight nature. As a result of using this alternative, effective electroplating on the plastic techniques has become a necessity.

Initially, plastic plumbing fixtures were produced with colored plastics, but right now, people demand shinier and brighter bathrooms and kitchens. This demand is increasing the importance of using metal-plated plastic products instead of colored plastics.

These types of plumbing products increase design possibilities and provide greater flexibility if you compare them with brass. They also offer more hygienic benefits for users. Although nickel plating on plumbing fixtures can be beautiful, if you still apply a gold finish on it, these fixtures can awe the people who want more upscale and elegant appearance for their kitchens and bathrooms.

Recent developments in plastic plating

There are many recent developments in plastic plating which I want you to know. Although the whole idea of plastic plating is still gaining grounds, new techniques are also coming up in the industry.

- Double layer nickel plating
  One of such developments is the double-layer nickel system which features a semi-bright nickel coating under a bright nickel topcoat. This technique enhances the corrosion capacity of the plastic part.'
- Microdiscontinous chromium technique
  The second innovation in plastic electroplating is where chromium layer is microporous, or the layer exhibits an extensive microcracked structure to increase the corrosion resistance capacity of nickel or chromium deposits.
- Plastic resins combined with electroplating
  There are formulations of many polycarbonates and ABS blends which makes the plastic materials stronger and also ductile after electroplating. The feature of excellent ductility is more applicable to automotive industry because it helps the plastic parts to recover from the impact.

Difference between metal plating and plastic plating

Now that we have seen that both metals and plastics can pass through electroplating process to provide a coating that will make them stronger and durable, let's consider the differences between metal plating and plastic plating.

1. Materials

The materials differ in the sense that in metal plating, you can electroplate on metal materials like zinc alloy, iron, copper alloy. But for ABS plating, the material you are plating is plastic.

2. Cost

The cost of carrying out metal plating and plastic plating are entirely different depending on the material you are using, the thickness which the client specified and the tests you have to carry out after plating.

When you compare costs of plating the same coating layer on both metal and plastic, be sure that you will spend more on plastic plating because the processes and the difficulty level is higher and larger in plastic plating.

3. Processes

Each of metal plating and plastic plating follows different processes. There are like twelve challenging processes in plastic plating while metal plating involves only five processes.

4. Characteristics

Both metal plating and plastic plating has different characteristics. Plastic plating involves activation and chemical plating to make the materials surface conductive to be adhesive to the metal film.

5. Design

When it comes to metal plating equipment, you need to consider only the product, but for plastic plating, you must check the product structure, layout, and nozzle design. If you don't find a suitable plating nozzle for plastic plating, you will fail to proceed or produced deformed results.