A method of locally plating an injection molded part includes delimiting two or more portions of the part by electrical insulation between the portions and successively plating each portion of the part by successively placing one or more electrodes on the surface of each portion. The insulation between the portions is obtained by dual injection molding of the part whereby a material that can be plated is injected to constitute the portions and a material that cannot be plated is injected to constitute a delimitation.
METHOD OF LOCALLY PLATING A PART

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is based on French Patent Application No. 02 00 036 filed Jan. 3, 2002, the disclosure of which is hereby incorporated by reference thereto in its entirety, and the priority of which is hereby claimed under 35 U.S.C. §119.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a method of plating a part of any shape and size and in particular to partial plating of different portions of a part.

[0004] 2. Description of the Prior Art

[0005] Plating is a technique routinely employed in many industries and produces parts with a chromium, titanium or gold appearance, for example. Plating is essentially a reaction of electrolytic deposition of a metallic salt on a metal, generally to preserve it from oxidation. Thus plating a part produces a metallized and non-oxidizable appearance.

[0006] Plated parts are not necessarily made of metal and for reasons of cost and ease of creating complex shapes can be made of other materials, for example plastics materials. Plastics materials are low-cost materials that are easy to work and all kinds of shapes of parts can be obtained, especially with prior art techniques of injecting plastics materials into a mold. Various families of plastics materials can be used for injection molding, such as polycarbonate (PC) and acrylate butadiene styrene (ABS), for example. Also, some families of plastics materials can be plated, such as ABS, for example, but not others, for example polycarbonate.

[0007] Accordingly, plating of plastic material parts has many applications in diverse industries, such as the automobile industry, the mobile telephone and personal digital assistant industry, and any other industry necessitating imparting a metallized and non-oxidizable appearance to a plastics material part.

[0008] Plating a plastics material part essentially requires the following steps: the part is dipped into a chemical acid bath that attacks the plastics material surface and creates cavities on the surface of the part. The part is then dipped into a plurality of metallic baths in succession to deposit metal (for example copper and/or nickel) in the surface cavities of the plastics material and to carry out the plating as such by depositing metal salts that react electrolytically with the metal previously deposited. The metal salt baths can be based on chromium, titanium or gold, for example, depending on the required final appearance of the plated part. For the electrolysis reaction to take place, it is essential to place at least one electrode on the part to be plated when it is dipped into the plating baths.

[0009] Accordingly, the plating of plastics material parts is tending to expand mostly in industries that are design led. In particular, it enables parts to be made from low-cost materials having different continuous surface portions with different metallic appearances (for example chromium and gold).

[0010] Depending on technical and aesthetic requirements, it may be advantageous for the same part to have different metallization finishes, i.e. for the same part to be locally plated with different metallic appearances or effects in different portions.

[0011] Various techniques for partly plating parts with areas with distinct finishes have already been proposed in the art. A first technique consists of producing a plurality of different plastic material parts, plating them separately and completely using appropriate metal salts, and then assembling them to form the finished part having different finish areas corresponding to the various original parts. The assembly step is difficult, costly in terms of time and mediocre in terms of quality, since a transitional groove between the areas (the original parts) remains after assembly.

[0012] Another technique, described in the patent application JP 59-126790, consists of producing a single plastics material part and delimiting portions of the part by printing a boundary by means of an insulating ink. The entire part is then successively dipped into different metal baths, and in the last plating bath the electrodes are disposed inside an insulated portion of the part. This technique produces different plating finishes on different portions of the part by moving the electrodes from one portion to another before dipping it in each of the corresponding plating baths. However, this technique is limited to parts of simple shape because printing the insulation between the different portions of the part is limited to a plane surface. It is therefore impossible to delimit portions of parts of complex shape using the above technique.

[0013] The above prior art techniques have limitations that the present invention eliminates.

[0014] To this end, the invention proposes to delimit the boundary between portions of a part to be plated that are integrated into the volume of the part to provide better accuracy and better flexibility of shape, in particular with the possibility of delimitation in three dimensions.

SUMMARY OF THE INVENTION

[0015] To be more specific, the invention provides a method of locally plating an injection molded part, the method including delimiting two or more portions of the part by electrical insulation between the portions, and successively plating each portion of the part by successively placing one or more electrodes on the surface of each portion, in which method the insulation between the portions is obtained by dual injection molding of the part whereby a material that can be plated is injected to constitute the portions and a material that cannot be plated is injected to constitute a delimitation.

[0016] According to one feature each portion is successively plated by moving the electrode(s) from one portion to another and dipping the part into successive different metal baths.

[0017] The invention also provides a part having a surface comprising two or more separate portions that are locally plated with different finishes and are separated by a delimitation incorporated into the volume of the part.

[0018] According to one feature the delimitation consists of a material that cannot be plated, such as polycarbonate.
According to another feature the plated portions of the part are made of acrylate butadiene styrene or acrylate butadiene styrene/poly carbonate.

The invention applies in particular to a mobile radio terminal comprising a shell having an exterior surface comprising two or more separate portions locally plated with different finishes and separated by a delimitation consisting of a material that cannot be plated.

BRIEF DESCRIPTION OF THE DRAWING

The features and advantages of the invention will emerge more clearly on reading the following description, which is given by way of illustrative and non-limiting example and with reference to the single figure of the accompanying drawing, which shows three steps of a plating method according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with the invention, two portions 30, 31 of a part 10 are plated with different finishes. The part 10 is advantageously obtained by a conventional injection molding process which enables virtually any shape to be obtained and more specifically by dual injection of a material that can be plated and a material that cannot be plated.

The material that can be plated can be a plastics material, for example, such as acrylate butadiene styrene (ABS) or acrylate butadiene styrene/poly carbonate (ABS/PC), which can be etched by acid baths to deposit particles of metal and to perform a plating reaction by depositing metal salts, as already described. The material that cannot be plated can be poly carbonate (PC), for example, which resists acid bath etching and therefore does not allow the deposition of metallic particles or the plating reaction.

The injection mold for producing the part 10 is adapted to allow dual injection in accordance with a particular shape (step a). The shape is chosen to enable the inclusion of a boundary forming a delimitation 15 between the different portions 30, 31 to be plated differently in accordance with the intended design. Thus the delimitation 15 is incorporated into the volume of the part 10 and can be defined in three dimensions. The number of distinct portions to be plated is not limited to two.

After dual injection molding in an appropriate mold and extraction of the part from the mold using conventional techniques, the part 10 is plated. For this purpose, the entire part 10 is preferably dipped into acid baths that attack the material that can be plated constituting the portions 30 and 31 of the part 10 but not the material that cannot be plated constituting the delimitation 15. Cavities for metal deposits are therefore formed only on the surfaces of the various areas of the part 10 to be plated.

Then, electrodes 40 are placed inside a first portion 30 which is insulated from the other portion 31 by the delimitation 15 (step b). The entire part 10 is then dipped into the metal baths, but the electrolytic plating reaction can take place only on the surface portion 30 of the part in contact with the electrodes 40.

This operation produces a partially plated part 10 with a given finish, and can be repeated on the said portions of the part 10 (step c). The various plated portions 30, 31 are continuous and the shape of the delimitation 15 between them can be complex.

The invention can be applied to a part for automotive vehicles made of plated plastics material with different finish areas or to a mobile radio terminal such as a mobile telephone or a personal digital assistant, consisting of a shell with different distinct portions of its exterior surface locally plated with different finishes separated by a delimitation incorporated into the volume of the part.

There is claimed:

1. A method of locally plating an injection molded part, the method including delimiting two or more portions of said part by electrical insulation between said portions and successively plating each portion of said part by successively placing one or more electrodes on the surface of each portion, in which method said insulation between said portions is obtained by dual injection molding of said part whereby a material that can be plated is injected to constitute said portions and a material that cannot be plated is injected to constitute a delimitation.

2. The plating method claimed in claim 1 wherein each portion is successively plated by moving said electrode(s) from one portion to another and dipping said part into successive different metal baths.

3. A part having a surface comprising two or more separate portions that are locally plated with different finishes and are separated by a delimitation incorporated into the volume of said part.

4. The part claimed in claim 3 wherein said delimitation consists of a material that cannot be plated.

5. The part claimed in claim 4 wherein said material that cannot be plated is poly carbonate.

6. The part claimed in claim 3 wherein said plated portions of said part are made of acrylate butadiene styrene or acrylate butadiene styrene/poly carbonate.