Process for Organic Coating

Description

Field of invention

This invention relates to organic coating and more particularly to organic coating of components for electronic equipment.

Background

This invention will be discussed in particular in relation to organic coating of component for electronic assemblies and particularly hard disk drive casing components but the invention is not so restricted and may be applied to other types of components.

Hard disk drive casings are formed from die cast or stamped aluminium to give dimensional stability and strength with lightness but such parts can have problems with particle shedding during use and such shed particles especially hard particles can cause head crash and data error in hard disc drives where tolerances are very fine. Hence, the casings, and particularly the insides of the casings, have to be coated. The current coating used is nickel plating, but this is very plating can be very costly.

Tolerances in hard disk drives are very tight and hence thin and even coatings are desirable, particularly on the inside of the casing. It is also desirable to avoid flash over of coating onto other surfaces of the casing component.

It is the object of this invention to provide a process of coating components which will overcome these problems or at least provide the practitioner in the field with a useful alternative process.

Brief Description of the Invention

In one form, the invention is said to reside in a process of organic coating of a component, the component being one in which coating is required on only one portion and not on another portion,

the process including the steps of;

supporting a component on a first tray, the first tray comprising a shape which masks those parts of the component not to be coated and preventing wrap-around of coating to those parts;

supporting a plurality of the first trays with the component supported thereon in an array on a second tray in a substantially planar arrangement;

applying a coating material onto the array on the second tray;

transporting the coated arrays on the second trays to a flash off oven and holding them therein for a selected period of time; and

transporting the coated arrays on the second trays to a curing oven and holding them therein for a selected period of time.

Preferably the application of the coating material is electrostatic means and the component, the first tray and the second tray are electrically conductive whereby electrically grounding the second tray electrically grounds the component.

Preferably the coating material comprises a water based organic coating material including butyl cellusolve.

In a preferred embodiment the first trays are placed onto the second tray such there is substantially no space between adjacent first trays.

Preferably the first trays and/or the second trays have a relatively low thermal mass whereby to not increase significantly the total heat sink capacity of the component, the first tray and the second tray.

The component can comprises a hard disk drive casing and the coating may be intended to cover only the inside of the casing but the invention is not limited to application to one side only. Alternatively the component can be other parts of a hard disc drive such as the external storage device components and the like components.

In an alternative form the invention comprises a process of organic coating of a casing of a hard disc drive, the casing of a hard disc drive being one in which coating is required on an inside portion of the casing and not on an outside portion of the casing, the process including the steps of; supporting the casing of the hard disc drive on a first tray, the first tray comprising a shape which masks the outside portion of the casing not to be coated and thereby prevents wrap-around of organic coating material to the outside portion of the casing; supporting a plurality of the first trays with the casing supported thereon in an array on a second tray in a substantially planar arrangement; the component, the first tray and the second tray being electrically conductive whereby electrically grounding the second tray electrically grounds the component; electrostatically applying a coating material onto the array of the first trays with the casing supported thereon on the second tray; transporting the coated array on the second tray to a flash off oven and holding it therein for a selected period of time to allow for flow of coating to an even thickness and evaporation of carrier of the coating material; and transporting the coated array on the second tray to a curing oven and holding them therein for a selected period of time to allow for curing of the coating material.

This then generally describes the invention but to assist with understanding reference will be made to the accompanying drawings which show a preferred embodiment of the invention.

In the drawings:

Figure 1 shows a typical component to be coated by the process of the present invention;

Figure 2 shows one embodiment of a first tray of the present invention suitable for holding the typical component shown in Figure 1;

Figure 3 shows an assembly of the typical component of Figure 1 received in the tray of Figure 2;

Figure 4 shows an array of assemblies of Figure 3 supported in one embodiment of a second tray according to the present invention;

Figure 5 shows one embodiment of a second tray according to the present invention; and

Figure 6 shows one embodiment of a coating process according to the present invention.

Description of Preferred Embodiments

Figure 1 shows a typical component to be coated by the process of the present invention. In this case the component is a casing half for a hard disk drive but as indicated earlier the invention is not limited to this application.

The casing 10 has a peripheral clamping surface 12 to engage against a like component (not shown) to form the full casing of a hard disk drive. The casing is formed from die cast or stamped aluminium and as discussed above there is a potential for particles to shed from the inner surface 14 and hence a coating is required on the inner surface. The inner surface can have tight tolerances and therefore a thin even coating is desirable. Electrostatic coating is a useful

technique but coating can build up at the edges of the peripheral clamping surface 12. According to the present invention to avoid this happening the casing 10 is supported in a first tray. The casing may be constructed by other methods such as press fabrication or from other materials such as zinc or steel.

Figure 2 shows one embodiment of a first tray of the present invention suitable for holding the typical component shown in Figure 1. The first tray 20 has a periphery 22 which has an internal shape the same as the external periphery 12 of the casing 10 (see Figure 1) so that there is a close fit between them. The inner surface 24 of the 20 is cut away to reduce the thermal mass of the first tray. The close fit of the first tray with the casing component 10 ensures that there is minimal organic coating material wrap around on the casing.

It will be realised that the design and shape of the first tray 20 is dependent upon the shape of the component 10 and required masking for that particular component.

Figure 3 shows an assembly 28 of the casing 10 of Figure 1 received in the first tray 20 of Figure 2. It can be seen that there is a close fit between the tray and the casing.

Figure 4 shows an array 26 of sixteen of the assemblies 28 of Figure 3 supported in a second tray 30. The assemblies are close together to avoid wastage between them.

Figure 5 shows the second tray 30 in more detail. The second tray 30 comprises a periphery 32 to retain the casing and first tray assemblies 28 closely together and is sized to receive a selected number of such assays without gaps between them. One again, however, it is desirable to have minimum thermal mass to avoid the requirement of extra heat in the flash off and curing stages as

discussed below and hence the support surface of the trays is formed from a plurality of wires 34.

As an electrostatic organic coating process is preferred, both the first trays and the second trays and the casing itself are preferably formed from an electrically conductive material such as steel or aluminium.

Figure 6 shows one embodiment of the various stages of a coating process according to the present invention.

In the first several stages a casing 10 is placed onto a first tray 20 (as shown in Figure 3) and a number of the assemblies of the casing 10 and first tray 20 are supported in the second tray 30 (as shown in Figure 4). The second trays 30 are then transported into a coating stage 40 where the insides of the casings are coated with a thin organic coating. The rotary atomiser coating device 42 provides a dome shaped pattern 44.

After the coating stage the second trays are transported into a flash off stage 50 where the coating can flow to give an even coating and water carrier is allowed to flash off before curing.

After flash off the trays are transported to a curing oven stage 60 where the organic coating material is cured by cross linking to produce a finished organic coating.

In a preferred embodiment the coating material is a water based organic material such as Valspar paint (Valspar Corporation, Minneapolis, MN, USA) using a Nordson Rotary Atomiser (Nordson Corporation, OH, USA). The Rotary Atomiser is used to coat water based organic coating materials evenly with a thickness of 8 +/- 2 microns. Preferably the organic coating material has

butyl cellusolve added at a concentration of up to 2% is added to increase the viscosity (increase from 20 secs to 25 secs on a Zahn 2 cup) of the lacquer (by chemical bonding of the alcohol groups) and also to improves the wettabiltiy (or prevents drying of the lacquer) in the nozzle. This can be very important in a tropical climate.

Control of 8 +/- 2 microns is made achievable by the addition of the butyl cellusolve (to make the application pattern more consistent) and using auto control of fluid delivery via optical feed back to converter (flow meter to CPU) to control the fluid regulator prior to the atomizer for accurate delivery. The whole system is grounded and the lacquer is electrostatically charged (to a tight set of conditions for uniform film build). If for any reasons the micro amps reading of the charge is too high the thickness control will be out. RPM of turbine is important as well as the air vector (air that determine the shape of the dome of the pattern of the rotary atomizer).

It will be seen that in this invention there is provided a process of organic coating which uses a tray in tray design to prevent wrap around on the edges as well as on the back of the components but without significantly increasing the total heat sink capacity of the whole system. The tray system consisting of two components, namely the rack or second tray and mini trays or first tray. In a preferred embodiment the racks hold 16 mini trays which in turn house the hard disk drive casings. The carrier tray must be easy to clean and stackable. The design of the carrier system and conveyors ensures that whole system is grounded and elimination of wrap around effects with minimum barriers.

Throughout this specification various indication are given as to the scope of the invention but the invention is not limited to any one of these but may reside in two or more combined together. The embodiments illustrated are for example only and not for limitation.

Claims

1/ A process of organic coating of a component, the component being one in which coating is required on only one portion and not on another portion, the process including the steps of;
supporting a component on a first tray, the first tray comprising a shape which masks those parts of the component not to be coated and preventing wrap-around to those parts;
supporting a plurality of the first trays with the component supported thereon in an array on a second tray in a substantially planar arrangement;
applying an organic coating material onto the array on the second tray;
transporting the coated arrays on the second trays to a flash off oven and holding them therein for a selected period of time; and
transporting the coated arrays on the second trays to a curing oven and holding them therein for a selected period of time.

2/ A process as in Claim 1 wherein the application of the coating material is electrostatic coating and the component, the first tray and the second tray are electrically conductive whereby electrically grounding the second tray electrically grounds the component.

3/ A process as in Claim 1 wherein the coating material comprises a water based organic coating material including butyl cellusolve.

4/ A process as in Claim 1 wherein the first trays are placed onto the second tray such there is substantially no space between adjacent first trays.

5/ A process as in Claim 1 wherein the first tray and/or the second tray has a relatively low thermal mass whereby to not increase significantly the total heat sink capacity of the component, the first tray and the second tray.

6/ A process as in Claim 1 wherein the component comprises a hard disk drive casing or other electronic component and the coating is intended to cover only a selected side of the casing or electronic component.

7/ A process of organic coating of a casing of a hard disc drive, the casing of a hard disc drive being one in which coating is required on an inside portion of the casing and not on an outside portion of the casing,
the process including the steps of;
supporting the casing of the hard disc drive on a first tray, the first tray comprising a shape which masks the outside portion of the casing not to be coated and thereby prevents wrap-around to the outside portion of the casing;
supporting a plurality of the first trays with the casing supported thereon in an array on a second tray in a substantially planar arrangement;
the component, the first tray and the second tray being electrically conductive whereby electrically grounding the second tray electrically grounds the component;
electrostatically applying an organic coating material onto the array of the first trays with the casing supported thereon on the second tray;
transporting the coated array on the second tray to a flash off oven and holding it therein for a selected period of time to allow for flow of coating to an even thickness and evaporation of carrier of the coating material; and
transporting the coated array on the second tray to a curing oven and holding them therein for a selected period of time to allow for curing of the coating material.

8/ A process as in Claim 7 wherein the coating material comprises a water based organic coating material including butyl cellusolve.