Lacquer

By L.P. Trinity

This article is for the newcomer to the lacquer room, in hope that it will provide a simple, efficient way to recognize and correct the following problems. Test instruments used to troubleshoot frequently encountered problems are discussed, and even the most experienced user may appreciate a review of basic problem-solving techniques. The following problems relate to dip and spray applications when using air dry or baked lacquers.

Blushing—Blushing can be caused by high humidity and temperature. As solvents evaporate and the surface of the substrate cools, condensation will form, resulting in a milky look. Appearance can range from a dull to a whitish film. Remedies include heating to evaporate the moisture, or adding retarder solvents (slow evaporating) to the lacquer mix to slow the drying time. This allows the water vapor to dissipate; simply re-spraying or re-dipping the lacquered part to open the film and allow evaporation of the moisture also works well. Control the humidity in the lacquer room by air conditioning or de-humidifying.

Dry Spray—Dry spray occurs when not enough lacquer is applied to the part. This may happen if the operator has the spray gun too far from the part, the air pressure too high or is spraying too quickly. Positioning the spray gun closer to the work, keeping the air pressure in the range of 40–60 psi and slowing the passes over the part will help resolve this problem.

Fish Eyes—Fish eyes are round circles that appear in the lacquer film. They can usually be traced to contamination on the surface of the substrate. Silicone contamination can cause this; great care should be taken, therefore, to avoid silicone contamination from entering the lacquer room area, either directly or indirectly, from other processes in the shop.

Orange Peel—Orange peel is a lacquer film that resembles the skin of an orange. It occurs if the lacquer is too viscous, needs slower solvent evaporation or the air pressure is too low to properly atomize the lacquer. Thinning the lacquer, thereby lowering the viscosity or adding a retarder solvent and increasing the air pressure to the range of 40–60 psi, can solve this problem.

Poor Adhesion—Poor adhesion can result when the substrate has not been cleaned thoroughly. The contaminants left on the surface interfere with the lacquer film formation, causing an improper bond to the surface of the part. Washing the part in solvent or degreasing again usually clears this.

Rainbow—Rainbow, sometimes called iridescence, happens if the lacquer solids are too low. Adding more lacquer to the mixture will raise the solid level. It is not always necessary to remove the defective coating; spraying a second topcoat or double dipping can eliminate the iridescent film.

Spotting—Spotting out is common during times of high humidity. Usually not a lacquer problem, it can be caused by cyanide being trapped in the pores of the metal when electroplating. New techniques in rinsing and the addition of anti-tarnish chemicals in the final plating rinse have helped control this condition in recent years. Heating the parts before lacquering, which allows moisture to dissipate from the pores, has also cured this condition.

White or brown spots may appear on the surface of sprayed parts when water or oil find their way into the air lines. White spots indicate water and brown spots indicate oil. Draining the air compressor or changing the oil filter will clear this condition.

Problems Cured by Heat

Some problems unique to lacquers that are heat cured are:

- Blisters or bubbles in the lacquer film will appear if the flash-off time between applying the lacquer and curing is not sufficient to allow proper solvent evaporation.
- Over-curing the lacquer by baking at a high temperature or leaving parts in the oven too long can result in brittle or discolored films. Following the recommended time and temperature cycle will solve these problems.
- Under-curing can cause the film to remain soft and easily marred. Leaving the parts in the oven at a higher temperature or a longer period of time can be the solution.

The troubleshooting techniques mentioned above, when combined with lacquer testing instruments, will provide the lacquer operator quick and immediate resolutions at the source, thereby eliminating more serious failures down the road.

Continuity testers or holiday detectors can determine that parts are lacquered properly and that there are no voids in the film that can invite premature corrosion of the substrate. Oven recorders can be used to make sure that temperature gauges are operating properly; this will avoid over- and under-curing. Viscosity cups, when used in combination with a thermometer and stopwatch, can prove helpful in maintaining proper lacquer mixtures at levels that have been found to cause a minimum of problems. Viscosity cups #2 and #3 should be used for spray applications; a #1 cup is the choice for dip operations.

Good Housekeeping

There is no better way to eliminate rejects in the lacquer room than by practicing good housekeeping. Maintaining a clean lacquering area will stop many problems before they start. Using the right coating for the job and keeping an open line of communication between lacquer operators and lacquer suppliers will further eliminate problems.

Summary

These recommendations will not cure all problems associated with lacquering, but they will go a long way toward making the applications more dependable and repeatable. P&SF

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