

Conformal Coating Processes

ACI Technologies can assist its users with process development and experimentation through the use of the conformal coating capabilities in the Demonstration Factory. Four types of coating processes are available at ACI Technologies: dip coating, manual spray coating, programmable spray coating, and manual brush application. (Manual brush application will not be discussed in this article.)

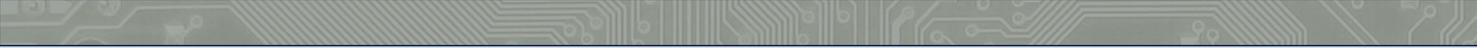
Manual spray coating is the most commonly used method at ACI Technologies. This type of application allows a wide variety of parts to be coated with minimal process development effort. A handheld spray coating booth, shown in Figure 1, is available and is regularly equipped with a silicone resin (SR) coating material. This booth has self-contained material and solvent storage tanks and pumping capabilities as well as variable coating pressure and flow rates. It also incorporates a large exhaust port to minimize build-up of flammable solvents during the spray process. The exhaust is filtered to prevent coating build-up in the facility exhaust infrastructure. These filters must be changed regularly as cured coating can build up on the filter material and reduce exhaust flow. The spray booth also contains a turntable to allow the operator to easily rotate the part undergoing coating while minimizing handling of the uncured coating.

The drawbacks to handheld spray coating are the difficulty in changing material types and the need to mask any areas where coating is not desired. This process does not allow the operator to avoid any areas on the assembly without risking inappropriate variation in applied coating thickness, so areas where coating cannot be applied must be masked. Masking techniques can vary, but the two most common are manually applied tape and mechanical fixturing. Each has its advantages and drawbacks. Manually applied tape has a low material cost, but the application is very labor intensive and can have variation in the areas masked from assembly to assembly. Fixtures are more costly but ensure consistent masking. They require regular cleaning of coating buildup and must be revised if significant changes are made to the design of the assembly.

Changing material types in the handheld spray coating booth requires significant effort to ensure all residual material is purged from the feed lines between the storage tanks and the spray gun. Residual material left in the feed lines can result in contamination of the new material, which could lead to inhibiting the cure of the new material or affect the ability of the material to adhere to the assembly.



Figure 1: A Gen3 Systems handheld spray booth located at ACI Technologies.



The handheld spray coating booth can also be used for manual aerosol spray coating. This most commonly occurs when ACI Technologies is tasked to spray a small quantity of assemblies or where the risk of contamination is high from the SR coating normally used in the spray gun. This type of application leverages the advantages of the exhaust and turntable in the spray booth while avoiding the issues related to purging the old material from the system. The concerns about masking remain the same across both manual spray processes.

ACI Technologies also has a dip coating process available. This process is well suited for high volume applications with minimal coating type changes due to the amount of material required to fill the tank and initiate the process. The equipment at ACI Technologies has two separate tanks to allow for use of two different materials without the need to remove and discard large quantities of coating. The equipment allows for changes in the dip speed, the tank dwell time, and the removal speed.

The biggest disadvantage of a dip coating process is the use of open tanks of material. To reduce the risk from flammable solvent evaporation, the equipment at ACI Technologies uses a nitrogen

blanket to inert the area just above the open tank where solvent buildup can occur. The exhaust system is also designed to evacuate any vapors that have accumulated. Additionally, the pot life of a coating in an open tank is significantly less than the unopened shelf life. This makes dip coating unsuitable for processes where coating is only occasionally performed.

The final coating process available at ACI Technologies is selective spray coating. This process has recently been introduced to the Demonstration Factory and should provide the advantages of automating the spray coating process (low process variability, high throughput) without some of the disadvantages of manual spray coating (labor intensive masking or costly hard-tooled fixtures). The major disadvantage of automated spray coating is the initial programming required for each application. Once the programming task is completed, the automated process is well suited for high volume applications regardless of product mix as well as applications where masking isn't a viable option.

If you are in need of assistance with your conformal coating application process, contact the ACI Technologies Helpline at 610.362.1320, email helpline@aciusa.org or visit www.aciusa.org.

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