

Auditing of Composite and Metal Bonding Facilities

Part 1 Facility Control

Course Outline

- Introduction
- Facility Control
- Material Control and Testing
- PAA (Phosphoric Acid Anodizing)
- Bonding Procedures and Processes
- CASE Specific Requirements Pertaining to Bonding Operations
- Q&A

Primary References: While it is understood that there are as many processes and process control methods as there are manufacturers, the primary sources for reference material used herein will be the highly accepted industry standards developed by the Boeing Company.

- BAC 5514 (Bonding Requirements)
- BAC 5555 (PAA of Aluminum)
- BSS 7002 (Storage of TATS materials)
- AC 145-6
- C.A.S.E. 1-A Standard

Facilities Control

In order to ensure a proper bond and clean bond surfaces, various precautions must be taken. There are numerous ways to achieve the conditions required for an effective bonding operation, but they all center on one goal: CLEANLINESS.

CCA (continued)

Incoming air shall be filtered. The filters shall be periodically checked, cleaned or replaced to ensure proper operation. (BAC 5514) This requirement can usually be met by a schedule (kept current) indicating the periodic requirements. This requirement is for the conditioned air entering the room as well as pressurized air used for tank agitation in the process lines.

Incoming air: (continued)

Boeing has also developed a test, described in BSS 7217. This very simple test involves a mirror and an air blower. Simply discharge the air used onto the mirror and visually inspect for particulate matter, oil or the presence of water on the mirror. There should be some objective evidence of this test being performed.

Positive Air Pressure

The standard requires that the CCA maintain a positive differential air pressure to prevent outside, unfiltered air from entering while doors are opened. It states that this must be verified with access doors or other openings closed and spray booths and related exhaust fans in full operation.

Positive Air Pressure (cont.)

Positive air pressure can be evidenced in numerous manners. It can normally be obtained by providing supply vents only from the central heat and air system. Devices as diverse as digital pressure indicators, manometers or a simple piece of toilet paper held to a door opening may be used to verify this condition.

CCA (continued)

Enclosed areas are required. Doors and other openings must remain closed when not in use. The auditor should observe if this condition is being met and look for the presence of automatic door closure devices. While not required, these are a method to ensure compliance with this requirement.

CCA (continued)

Floors within the CCA must be sealed and/or covered with non-flaking, easily cleaned material. The standard offers examples of this material as paint, vinyl tile, etc. This type of floor covering, along with regular cleaning, will prevent the introduction of airborne particulate matter from the floors substrate (usually concrete).

Floors (continued)

Only the following methods may be used for cleaning within the CCA:

1. Mops wet or dampened with water.
2. Vacuuming: exhaust air filtered (to the same degree as incoming air) or vented outside the CCA.
3. Chemical mopping with mops treated with propylene glycol or slightly tacky epoxy resin.
4. Solvent cleaning (table tops and tools).

Cleaning Schedules

Cleaning is required within the CCA whenever there is visible signs of accumulated dust or other contaminants. Minimum cleaning schedule as follows:

24 hrs: Tables, floors, hand tools or anything that might contact the adhesives.

30 days: Shelves and surface areas.

Annually: Walls, ceilings, beams, overhead fixtures, lights, spray booth, ovens, monorails.

Cleaning Schedules (Continued)

Please note that cleaning is required whenever there is a noticeable accumulation of dust, dirt or other debris. This requirement supersedes any scheduled cleaning.

CCA Don'ts:

Smoking, eating or consuming beverages are not allowed within the CCA. Water from a permanently mounted drinking fountain is permitted. Chewing tobacco is not permitted, however, chewing gum is allowed.

CCA Don'ts (Continued)

Do not permit contaminants detrimental to adhesion such as dirt, grease or oil to accumulate on materials, tools, parts or equipment taken into the CCA.

CCA Don'ts (Continued)

Do not permit processes or operations which produce uncontrolled spray, dust, fumes or particulate matter in the CCA.

CCA Don'ts (Continued)

Do not allow the temperature to deviate from the required 65 to 90 degrees F. The limit of 90 F may be waived in the areas directly adjacent to drying or curing ovens provided these areas are separated from the rest of the area. Recommended temps conducive to working with adhesive materials are 70F+/- 5 for spray ops and 65F+/-5 for lay up.

Additional requirements

Structural fiberglass, graphite, and aramid epoxy composites may be laid up or assembled concurrently with metal bond assemblies utilizing the same controlled contamination area. The following restrictions apply:

Additional Requirements (cont)

Within the CCA metal bond operations shall be segregated from composite operations. This segregation shall include an identified contiguous floor area, separate work tables and separate shop aid tools. Additionally, personnel who have worked outside the CCA within a given shift shall put on new, clean gloves prior to handling the parts.

CASE 1A Requirements Related to CCA's

- 3.C.10 (Quality Programs) States that the repair vendor must have procedures used for: References, where applicable, to the manufacturer's inspection standard for a particular article including references to any data specified by that manufacturer and/or owner/operator.

CASE 1A (continued)

- 10.B. (Housing and Facilities) States that the repair station must provide:
 - B.1.) Housing for the facilities, equipment and personnel consistent with its rating. And....
 - 2.e.) Ventilation, lighting and control of temperature, humidity, and other climatic conditions sufficient to ensure personnel perform maintenance, or alterations to the standards required by the part.