Requirements for Handling of Applied Composites Hardware by Vendors

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Revision Records

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1 Scope
This document establishes standard requirements for handling of Applied Composites (ACSD) hardware or materials, herein referred to as “hardware”, by vendors. All hardware provided, transferred, shipped, or delivered by Applied Composites to a vendor shall be considered Applied Composites hardware. All vendors — whether handling hardware at the vendor’s facility, or at Applied Composites’ facility — are subject to the requirements of this document.

2 Environment
Hardware shall be maintained in a controlled environment — which may include temperature, humidity, cleanliness, or other requirements — whenever specified by a purchase order, specification, T&C document, statement of work, or other formal requirement. The purchase order shall refer to applicable requirements or documents containing the requirements.

When unspecified, hardware shall not be subjected to temperatures outside of 40°F to 90°F. Hardware shall be protected from rain or inclement weather.

3 General

3.1 Contact Materials
The following materials are approved for direct application on hardware:
- Airtech Flashbreaker 1R or 2R non-silicone tape
  - “HT” high tack non-silicone version may also be used except per §4.8
- Airtech Corehold P-HA – for honeycomb core machining only
- Bron BA3869 acryllic double-backed tape – for honeycomb core machining only
- 3M 2090 masking tape
- Bron BA1089 non-silicone tape
- Distilled water when applied by squirt bottle when performing A-scan non-destructive evaluation (NDE)
  - Water shall not be used for C-scan unless specified by the PO

Hot glue shall not be applied directly to hardware. No tapes, adhesives, inks, oils, or other permanent or semi-permanent materials may be applied to hardware unless specifically designated by the engineering specification, drawing, or statement of work. Use of additional contact materials may only be used with Applied Composites Engineering approval.

ACS/reagent grade isopropyl alcohol or acetone shall be used when required for the process and approved by Engineering.

3.2 Gloves
Clean gloves shall be worn when handling uncured adhesives and surfaces that have been prepared for bonding. Gloves shall be made of latex, nitrile, or natural rubber. All gloves shall be powder free. Gloves that have become soiled or contaminated shall be discarded.

4 Handling of Cured Composite Parts
Care shall be taken when handling, transporting, or storing composite parts to prevent damage. Do not allow clothing to contact machined edges of parts. Cloth or other work gloves shall not be worn when handling machined composite parts, unless covered by latex, nitrile, or natural rubber gloves.
When resting parts on work surfaces, avoid contact between the work surface and machined edges. If unavoidable, ensure machined edges are properly padded using polyethylene foam, silicone foam, or neoprene rubber foam. Place a layer of nylon bagging film or ETFE or FEP release film between the foam and the part to prevent catching of free edge fibers. Cloth, wipes, or other fibrous materials that may cause fiber pulls shall not be in contact with machined edges while resting or storing. Prevent parts from overhanging work surfaces where free edges might be bumped accidently. Apply foam protection to exposed edges that may encounter accidental contact. Cordon off areas around large parts to prevent accidental contact.

4.1 Transportation of Parts

Parts shall be moved in a manner that minimizes risk of damage. Parts should be held by the operator with two hands. Large parts shall be lifted and moved by two or more operators as necessary.

Prior to transport of parts, the full path of movement shall be assessed to ensure there are no obstructions along the path that could prevent stoppage or diversion. Ensure path is free from trip hazards or obstructions that could impact or damage the part. If transportation involves rolling of carts, dollies, or tables, the ground shall be checked for cracks, divots, or debris that could suddenly impede cart movement. Extra care, or mitigation steps shall be taken to avoid damage.

4.2 Storage of Parts

Cured composite parts shall be stored with care. Parts in storage shall be separated from other objects and shall be adequately supported and protected to avoid bending, twisting, impact, or other damage. Do not stack or place objects on top of composite parts. Composite parts shall be wrapped in kraft paper, then placed in either a wood storage crate lined with 0.5" minimum EPS foam, or wrapped in one of the following:
- Bubble wrap, 3/16 bubble size, 2 layers minimum
- Bubble wrap, 1/2" bubble size, 1 layer minimum
- Foam sheet per A-A-59135, 3/32" thick, 2 layers minimum

Large parts should be located away from high traffic areas and shall be cordoned off.
Large parts should be stored in a wooden shipping crate whenever possible or should reside on a dedicated fixture to reduce the risk of damage.

4.3 Parts with Unidirectional Fibers

Parts fabricated from unidirectional plies are highly susceptible to damage, especially at machined features. High modulus fibers at free edges are easily caught and disbonded causing fiber pulls. Extra care shall be taken when handling unidirectional parts. When handling fragile parts, latex, nitrile, or natural rubber gloves shall be worn over bare hands. Avoid handling machined edges of parts. Instead grab the open field of part.

4.4 Honeycomb and Sandwich Handling

When handling both bare honeycomb and cured honeycomb panels, care shall be taken to avoid core damage. Parts shall be supported with open palms whenever possible. Avoid grabbing the part with excessive force. Extend all fingers and thumb as far into the panel as possible to increase contact area with the panel. Avoid pinching with fingertips. Core shall not be rolled, bent, flexed, or twisted to the point where node disbond may occur. Hand tools or other objects shall not be placed on top of bare honeycomb core or panels.
Leaning, kneeling, or walking on cured sandwich structures is strictly forbidden unless assessed and approved by ACSD Engineering. If acceptable, Engineering will provide specific written instructions for working on sandwich structures.

Unmachined honeycomb core shall be stored in the original shipment containers from the supplier until they are ready to be machined or used. Core may be consolidated into fewer containers. Material traceability shall be maintained. A corrugated cardboard or plastic layer shall be placed between any stacked pieces of core.

4.5 Working Over Parts

Working over parts poses additional risk as dropping tools or hardware can cause impact damage. All company policies for operator safety shall be observed. Take care when handling tools, hardware, or other objects over parts. Tether tools when possible. Tethers shall not be of excessive length that allows tools to swing and impact parts if dropped. When working on scaffolding, secure items and tools in bags or bins between use. Implement impact mitigation whenever possible, which may include plywood, foam, or similar layers designed to prevent damage from tool drop.

Immediately report all impacts or drops to ACSD even if no visible damage exists. Barely visible impact damage (BVID) can cause failure down the line.

When required by ACSD, fracture critical parts shall be accompanied by an impact/drop log.

When working over parts, care shall be taken to avoid FOD. When drilling or machining, vacuums shall be used to reduce particles and shavings from falling on the part. Cleaning shall be performed to remove any remaining FOD. When installing fasteners, all hardware shall be accounted for. Shear-off components from Hi-Lok, Composi-lok, and rivets shall be collected and discarded. Parts shall be visually inspected to ensure the absence of FOD. Clothing and shoes shall be free from dust, dirt, or debris that can fall on the part. Proper PPE (harmnets, beard nets, lab coats, booties) shall be worn IAW the requirements of the work area to prevent FOD.

4.6 Cleaning Machined Edges

When solvent cleaning parts per Engineering instructions, do not allow wipes to snag machined edges. When cleaning surfaces, wipe in one direction starting on the part, working towards the free edge. When cleaning machined edge faces, wipe in one direction, moving along the edge. Do not move the wipe up or down which may snag fibers. If necessary, fold the wipe to a handleable size to avoid excess material from snagging edges.

When cleaning holes with a solvent-moistened swab, ensure the swab does not snag fibers. Swab in a slow, controlled manner. Avoid using swabs with loose or errant fibers.

4.7 Hand Tools

Metallic tools or abrasives shall not contact the hardware unless specifically designated by the engineering specification, drawing, or statement of work. Dynamic loads (hammering, pounding) shall not be applied directly to the hardware.

4.8 Tape Application and Removal

Avoid placing tape over machined composite features or edges, as tape may catch fibers causing fiber pulls. When removing tape from hardware, pull the tape at a low angle relative to the part surface. When removing tape from a laminate edge, the tape shall be removed starting from the inside of the part, working toward the free edge. Pull the tape parallel to the fiber direction.
As required, use isopropyl alcohol or acetone to breakdown tape adhesive prior to removal to reduce the risk of fiber pulls.

Only low-tack Flashbreaker 1R or 2R may be used on unidirectional composite parts. Flashbreaker 1R-HT or 2R-HT (high tack) may not be used on parts with unidirectional fibers.

4.9 Peel Ply Removal
Peel ply materials on composite parts shall not be removed or disturbed by vendors without Engineering approval.

5 Handling of Metallic Parts
Care shall be taken when handling, transporting, or storing metallic parts to prevent damage. Do not allow clothing to catch or snag part edges.

When resting parts on work surfaces, ensure the surface is clean and free of burrs or FOD that may scratch the parts. Prevent parts from overhanging work surfaces where free edges might be bumped accidently. Cordon off areas around large parts to prevent accidental contact.

5.1 Thin Metallic Facesheets
Thin facesheets shall not be allowed to bend or twist in a manner that kinks or permanently deforms the facesheet. Facesheets shall be fully supported by the work surface when rested horizontally. Unless supported by tooling, facesheets shall be carried vertically. The operator(s) shall hold the sheet from the upper corners, allowing gravity to suspend the panel. Do not use excessive gripping force which may bend or dent the facesheet.

ACSD shall immediately be notified of all dents, dings, or damage to panel facesheets. No rework – including bending, hammering, pressing, or smoothing – of facesheets shall occur without formal written disposition from Engineering.

5.2 Transportation of Metallic Parts
Metallic parts shall be transported IAW the requirements of §4.1.

5.3 Storage of Metallic Parts
Metallic parts shall be stored IAW the requirements of §4.2. Thin metallic facesheets shall be stored either:
- In a wooden, foam-lined crate fully enclosing the part
- In a panel cart or rack that rigidizes the facesheet and is capable of protecting against accidental damage.

5.4 Primed Components
Components that have been etched and primed shall be handled using gloves IAW §3.2. Parts shall be protected from accidental contact with tools, or other objects that may scratch or damage the coating. When resting primed components on a work surface, place a clean cloth, foam pad, or similar protection under the part to prevent scratching and accidental contamination.

Small, primed components such as honeycomb panel inserts shall be stored in individual plastic bags or separated in “egg carton” type containers made of foam or fibrous material.

6 Workmanship Requirements

6.1 Composite Parts
Cured composite parts shall be free from delaminations, blisters, burrs, voids, broken fibers, loose fibers (fiber pulls), dry fibers, cracks, bridged fibers or foreign materials (FOD).
6.1.1 Deburring
Burr and frayed edges at holes, edge trims, and machined features are not acceptable. Vendors contracted to machine composite parts shall deburr IAW SDC_PS_121.

6.2 Metallic Parts
Metallic components shall be free from gouges, dents, dings, burrs, scratches, or discoloration, and shall meet the requirements of the engineering drawing. Sharp edges should be broken to a max of 0.015". Scratches in coatings including primer, anodize, chem film, or similar coatings shall be submitted to Engineering for disposition.

7 Damage
Prior to starting work, the vendor shall visually inspect all hardware for damage, defects, anomalies, or discrepant data. All damage shall be promptly reported to ACSD. If damage occurs during work, a formal nonconformance report (NCR) shall be generated documenting the damage. No repair or rework shall commence unless authorized by ACSD.