Foreign Object Debris and Foreign Object Damage Prevention Plan

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1.0   Objective:

This document details the policies and practices necessary to ensure that RF-Lambda USA LLC supports the FOD-free fabrication, assembly, test and processing of all components and products.

2.0   Scope:

This plan applies to all manufacturing areas where parts are received, fabricated, assembled, packaged, shipped, stored and/or tested.

3.0   FOD Program Definitions / Acronyms / Terms:

- **Foreign Object (FO) or Foreign Object Debris (FOD)** – A substance, debris or article alien to an aircraft or system, which would potentially cause damage.

- **Foreign Object Damage (FOD)** - Any damage or malfunction attributed to a foreign object that can be expressed in physical or economic terms which may or may not degrade the product's required safety and/or performance characteristics.

- **Potential FOD:**   The Condition where foreign object debris may cause damage/or failure should the product be put into use. Examples are:
  - Metal or wire clippings, solder balls and debris lying in the vicinity or electrical terminals, circuitry, connectors, components, etc.
    Tools, hardware, or debris left in the vicinity

  - Personal items such as badges, hats, pins, pens, pencils, cell phones, pocket lights, keys and etc. normally carried loose on a person or in their pockets.
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- **Foreign Object Elimination (FOE):**   a program or process used to assure a FOD-free product/system.

4.0 General Requirements:

4.1 Reference Documents:

The FOD Prevention Plan is designed to address the concerns outlined in the following documents as related to product/process integrity:

- NAS 412, Foreign Object Damage / Foreign Object Debris (FOD) Prevention
- Bell Helicopter Textron, Inc.
- ISO-9000 Quality Management Standard

4.2   FOD Prevention Training:

All personnel with access to FOD Sensitive Products/Areas shall receive FOD Prevention training, as well as any other group who may contribute to the generation of FOD. Training will be in the form of workshops, and group discussions with some on-the-job training to increase relevance and provide context. Management/ FOD POC is responsible for verifying that all employees working within affected areas/functions have completed the requisite training per company requirements.

4.3   External/Visitor Requirements:

Visitors and other non-RF-Lambda individuals, contractors, and government agency personnel may be escorted within FOD Prevention Areas in lieu of training. If visitors are not escorted, then they must receive a FOD program briefing or complete the employee training. The level of training required for visitors should be at the discretion of management/ FOD POC.

4.4   Housekeeping:

Utilize normal "Clean As You Go" and "6S" routines to provide an organized and professional working environment for personnel and hardware processing. FOD walks should be performed under the direction of management/ FOD POC when possible.

4.4.1   "Clean As You Go":

"Clean As You Go" is an aerospace industry standard routine for cleaning up work areas prior to, during and after work efforts. It is the continuous practice of debris removal and surface cleanliness during manufacturing, maintenance or any operation involving sensitive hardware, equipment or tools. The routine prevents accumulation of FOD, and thus greatly decreases the potential for FOD migrating into or damaging hardware.

The following are good clean-as-you-go practices, and should be applied on an everyday basis:

- Clean up the immediate and surrounding areas when work cannot continue.
- Clean up the area when work effort is complete.
- Clean up the area when departing for 15 minutes or longer.
- Clean up any generated debris that has the potential to migrate to an out of sight or inaccessible area.
- Clean up debris that has the potential to cause damage to hardware and/or would give the appearance of poor workmanship or housekeeping to a customer.
- Clean up the area before the next planned operation in support of an inspection point.
- Clean up the area prior to a work shift change or unplanned delay.

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4.4.2 "6S":

"6S" is a lean manufacturing technique that helps organize a work area to optimize efficiency. Areas setup and maintained using the 6S guidelines are less likely to generate FOD that will become entrapped or result in product damage.

The "6S" acronym stands for:

1. **Sort**: Separating needed materials/tools/etc… from unneeded
2. **Straighten**: Organizing everything in its place. Places should be identified/marked.
3. **Shine**: Establishing general cleanliness and cleaning routines/schedules
4. **Standardize**: Maintaining and monitoring the 1st three S's, and keeping consistency across areas
5. **Safety**: Removing hazards and mistake proofing procedures
6. **Sustain**: Embedding "6S" into the culture, and instilling discipline

4.5   FOD Prevention Area Identification:

FOD Prevention Areas are clearly identified by signage and/or boundary markers. If required, temporary FOD Prevention Areas can be established or existing FOD Prevention Area controls and/or levels (if applicable) may change given the approval of management/ FOD POC.

4.6   Personal Attire and Personal Items:

Proper working attire and control of personal items are essential to prevent the inadvertent invasion or damage to FOD sensitive products. Personal items must be secured or removed to prevent them from becoming FOD. Food and drink should not be allowed within the work area unless it is limited to designated areas.

4.6.1   Designated Food/Drink Areas

These areas must be clearly identified with signage and/or boundary markers. The consumption of food and drink items within the work area should be limited to this area, and items should be transported to this area in a sealed bag/container to limit potential contamination of hardware.

4.7   Incident Reporting:

Incidents involving foreign objects should be reported to management/ FOD POC and investigated to determine the root cause and appropriate corrective actions. The data collected from incident reports can help to identify potential issues as well as help to plan for better control.

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4.7.1   Incident Reporting Criteria:

An incident report is required when one or more of the following criteria are met:

- Damage to hardware or equipment is identified and confirmed to be caused by an unknown source of FOD.
- FOD that is visible to the unaided eye is discovered in a FOD Sensitive Product after the operation in which it was introduced has been completed, during a time when one would expect the product to be FOD free.
- An object is lost, misplaced, or unaccounted for within a FOD Sensitive Product or Area, and is not located and removed before the task and any task-related close-out inspections are completed.
- An open hole or vacant position is discovered within a FOD Sensitive Product where an item is normally mounted, attached, or applied.
- An object is found within a shipping or storage container that is foreign to the package contents or packaging material.

Note: *If FOD is introduced, discovered, and removed before the operation in which it was introduced is completed, it is not considered an incident.*

4.7.2 Processing Incident Reports:

An initial incident report should be issued no later than 48 hours after the initial discovery of an incident. The initial report does not require cause and corrective action information but should inform the appropriate parties that an incident has occurred. Management or the FOD POC should assign the task of determining the root cause and corrective action (may be themselves). The assignee should then conduct the investigation and report back their initial findings within 2 weeks so the information may be logged.

4.8 FOD Walk s / Walk Downs / Sweeps:

A walk down is an informal activity where local personnel physically walk through a FOD Prevention Area to inspect the areas cleanliness and remove loose or unwanted items.

Items collected during an FOD walk are not reported via an incident report unless otherwise dictated by management/ FOD POC. After a sweep, the manager or FOD POC should discuss with the team the findings to identify trends or problem areas and work out solutions.

4.9 Records Requirements:

Incident reports, walk-down findings, surveys and other data should be retained for a period-of-time in accordance with company procedures or at the discretion of management / FOD POC.

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5.0 Additional FOD Prevention Practices:

5.1 Equipment (Test, Support, and/or Facility) & Tooling Maintenance

All equipment used in the processing of FOD Sensitive Products, including test equipment, facility items, production equipment, tooling, shipping products, and support equipment must be thoroughly inspected to ensure they are in proper working condition, and that no foreign object can migrate and/or damage the hardware. Maintenance of equipment shall be performed as required to preclude the risk of FOD incidents.

5.2 Tool Accountability & Control

Tools in FOD Prevention Areas should be traceable to their owner and/or their storage locations. Tool accountability/control systems may vary throughout a facility as influenced by usage and area requirements.

Note: Not all products/areas require a tool accountability/control system. Management/ FOD POC should decide which method(s) are most appropriate based on the standard work performance and area of use.

Some examples and descriptions of tool accountability/control systems are listed below for reference:

- **Etching –** A tool accountability system whereby the tool is engraved, leaving a permanent mark or design. Serial numbers, barcodes, or other marks can be etched into the tool so that it can be identified as belonging to a specific location or tool box.
- **Color coding –** A tool accountability system in which a color scheme is used to identify where a tool belongs. This is most often utilized when identifying tools that belong to a specific kit or toolbox. Colors are usually apparent on the tool handle or have been attached to the tool in the form of a tag or adhesive.
- **Tool Chits –** A tool accountability system in which tool users are assigned tokens, or "chits", that must be physically left in place of the tool when it is removed from storage. The tool chit often has the borrower's name, identification number, and/or picture on it.
- **Contents Inventory Sheet –** A basic tool accountability system whereby a list of all items kept within a storage location are recorded. The list may include details such as make, model number, quantity, etc… At the end of a specified time-period, the items physically remaining in the storage location will be compared to the contents inventory sheet to determine if any items are missing.
- **Tool check-out / check-in sheet –** A basic tool accountability system whereby a record of all tool movements from or to a storage location are recorded. Records may include details such as who is removing/returning the tool and where/why it was used. At the end of a specified time-period, the sheet should be reviewed for items that have not been returned to the storage location and are not currently accounted for.
- **Electronic chip encoding –** A tool accountability system that uses radio frequency identification (RFID) technology to uniquely tag and identify a tool. Electronic chips are embedded or attached to the tool that, when scanned, will provide information. This method is often paired with ADUs or other scanners to track tool usage and/or location.

- **Shadow board / Shadow box –** A tool accountability system that provides a visual reference for the contents belonging to a storage location. Items are outlined (shadow board) or their footprint is engraved (shadow box) in a specific storage location. The footprint or outline is referred to as the item's shadow. This method works best when the outlines or engravings provide strong color contrast with the storage surface

  Note*:* Small tools (e.g., drill bits), which do not promote the ability to be individually Identified, should be stored within a sealable container. The container can then be identified (e.g., sterilized, tagged, color coded) with it's respective storage location or owner, and the contents can be accounted for on an inventory sheet. When these bits are required for use, the entire container should be removed. Upon checking the container back in, the employee or tool crib attendant should verify that all contents listed on the inventory sheet are inside.

5.2.1 Tool Transportation

Tools that are transported in portable tool containers or brought from one area to another should be tracked using a check-in/check-out sheet. The sheet should identify both the borrower and the intended location of the tools (e.g., in portable toolbox #123 or in use at location xyz).

5.3   Miscellaneous Small Parts (MSP) and Consumables:

All miscellaneous small parts (MSP) and consumables that are utilized on a day to day basis, shall be controlled, maintained and disposed of by management direction. It is recommended that these items be stored and transported in sealable containers to prevent them from becoming loose items and ultimately FOD. Small parts organizers or bins are recommended for this purpose.