Program Name

Foreign Object Debris/Damage (FOD) Control Plan

Document Number: TBD Rev: TBD

Date: TBD

Contract: TBD

Cage Code: TBD

Company Name

Company Address

Prepared By: Name Job Title Department	Date: TBD	Reviewed/Approved By: Name Job Title Department	Date: TBD
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REVISION HISTORY

REVISION LETTER	REVISION DATE	DESCRIPTION OF CHANGE	CHANGED BY
-	TBD	Initial Release	TBD

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1.0 Purpose

==Company Name (if RMS supplier) or Program Name (if RMS program)== has established this Foreign Object Elimination (FOE) Plan to ensure the safety, quality, and reliability of its products. The purpose of this plan is to provide all of the requirements and procedures to prevent, detect, and eliminate Foreign Objects in all ==Program Name== products at ==Company Name.==

2.0 Applicability/Scope

This plan applies to all ==Program Name== products and all areas which handle, process, or test ==Program Name== products. shall follow this FOE Plan.

3.0 Definitions

3.1 Clean-As-You-Go: A process used to instill routine cleaning in the work environment.

3.2 Foreign Object Elimination: FOE

3.3 Process Consumables: Supplies that are expendable and require periodic replacement through normal use. These supplies are typically not re-usable. Examples include: gloves, brushes, tape, cotton swabs, cleaning wipes, etc.

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

3.5 Foreign Object (FO): Unwanted object, debris, or article that has the potential to negatively impact a component, subsystem, or system.

3.6 FOD Critical Area: Any area where product is located and exposure to foreign objects could potentially cause a system or product failure due to deterioration, malfunction, or damage.

3.7 FOD Critical Supplier: Any supplier that provides a product that could potentially contain FOD.

3.8 Line Stock: Non-serialized hardware bulk stored in bins. Examples can include nuts, rivets, connectors, washers, screws, o-rings, bolts, shims, spacers, etc.

3.9 Shadowbox/Shadowboard: A storage system that contains marked locations (cut-outs, labels, pictures, etc.) for each item so that a missing item will be readily noticeable and easily identified.

4.0 Acronyms

4.1	CAB	Corrective Action Board
4.2	FO	Foreign Object(s)
4.3	FOD	Foreign Object Damage
4.4	FOE	Foreign Object Elimination
4.5	NAS	National Aerospace Standard
4.6	RMS	Raytheon Missile Systems
4.7	FCA	FOD Critical Area

5.0 Roles and Responsibilities

Rearrange this section as needed. All of the responsibilities listed should be used, however, the job titles listed within a responsibility may change.

Responsibilities	Roles			
	Management	Engineering	Quality	Applicable Section
Authors and updates the FOD Control Plan.	X			5.1
Reviews and assesses the FOD prevention program and makes necessary changes.			X	6.2
Ensures that every reported FOD incident is investigated and root cause and corrective action is preformed.				4.3
Verifies that all FOD Critical Suppliers have an effective FOE Program in place.			X	3.2
Conducts scheduled audits of FOD Critical Areas to assess the effectiveness of the FOE program.				2.1
Obtains FOD incident data from each area supervisor.	X			1.7
Compiles FOD metrics and analyzes data to ensure that the FOE program is effective.			x	7.1
Reports FOD metrics to Operations Management and				5.6

the Corrective Action Board (CAB).				

5.1 FOD Focal Point
 Authors and updates the FOD Control Plan.
 Reviews and assesses the FOD prevention program and makes necessary changes.
 Ensures that every reported FOD incident is investigated and root cause and corrective action is preformed.
 Verifies that all FOD Critical Suppliers have an effective FOE Program in place.
 Conducts scheduled audits of FOD Critical Areas to assess the effectiveness of the FOE program.
 Obtains FOD incident data from each area supervisor.
 Compiles FOD metrics and analyzes data to ensure that the FOE program is effective.
 Reports FOD metrics to Operations Management and the Corrective Action Board (CAB).

5.2 Operations and Engineering Management
  5.2.1. Assigns FOD Focal Points.
  5.2.2. Reviews FOD metrics to ensure that the FOE Program is effective.
  5.2.3. Ensures that all appropriate personnel are FOD trained and comply with the requirements detailed in the FOD Control Plan.
  5.2.4. Establishes a Corrective Action Board to ensure that FOD trends are addressed and root causes are corrected.

5.3 Engineering
  5.3.1. Designs hardware to minimize the use of FOD generating materials.
  5.3.2. Designs hardware to minimize FOD entrapment areas.

5.4 Supply Chain Management
  5.4.1. Supplier Stuff

5.5 Area Supervisor
  5.5.1. Documents every FOD incident that occurs in the area.
  5.5.2. Performs root cause and corrective action on every FOD incident that occurs in the area.

5.6 All Employees
  5.6.1. Report all FOD incidents and suggestions to area supervisors.
  5.6.2. Follow all of the requirements in the FOD Control Plan.
  5.6.3. Maintain a FOD-free work environment.

6.0 **FOE Program Training**
  6.1 **Class name/number, who takes it, frequency, minimum content (actual product, FO & FOD photos), review and update period, training records (covered by ISO?)**

6.2 The following employees shall be trained in Foreign Object Elimination (FOE) by successfully completing Fill in class here.

      i. Personnel who enters FOD Critical Areas, including support staff, custodians, etc.

      ii. Design engineers

      iii. Supply chain

   b. Retraining shall occur annually

   c. FOE training shall include:

     Yadda, yadda

Untrained visitors and personnel awaiting training may enter a FOD Critical Area only when escorted and supervised by a FOE-certified RMS employee.

FOE Training shall be reviewed on a regular basis and updated, if needed. At a minimum, the FOE Training will be reviewed annually and after major FOD incidents. A primary goal of these reviews are to ensure lessons learned and real life examples of FOD defects are captured and shared.

7.0 Design Considerations
Minimum design guidelines, materials selection guidelines (corrosion by-products, labels)

Design engineers shall consider FOE in their designs and strive to eliminate opportunities for creating or containing FOD. The appropriate FOE guidelines depend greatly on the specific design. However, some general rules of thumb apply to most designs:

7.1 Minimize the number of fasteners and threaded holes
7.2 Minimize the number of blind holes and cavities which can hide FO
7.3 Replace threaded through holes with threaded blind holes in order to capture shavings generated during assembly
7.4 Use captive fasteners where possible

8.0 Supplier Flow Down
ID FOD Critical Suppliers (and Criteria for determining FCS?), what to flow down & how, ability to audit, FOD defect tracking,

8.1 Quality shall establish a list of FOD Critical Suppliers for Program Name.
   8.1.1. Company Name (if RMS supplier) or Program Name (if RMS program) shall flow down FOD requirements to all FOD Critical Suppliers to ensure that an effective FOE Program in place and a FOD-free product is being produced. These requirements shall be flowed down from SCM with the use of a quality note.

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8.1.2. FOE programs shall be established for all FOD Critical Suppliers ==five tiers== below ==Company Name (if RMS supplier) or RMS== or until the chain of FOD Critical Suppliers ends.

8.1.3. All supplier FOD defects shall be documented, tracked, and followed up with root cause and corrective action by ==Quality.==

8.1.4. FOD Critical Suppliers will be audited for FOD on a ==monthly== basis by ==the supplier Field Engineer== using ==Checklist ####== to ensure that an effective FOE Program is in place and that the supplier's facilities are clean and FOD-free.

8.1.5. Any lessons learned regarding FOD shall be shared with all FOD Critical Suppliers.

9.0 Controlling Access into FOD Critical Areas

9.1.1. Designation of FCA

9.1.1.1. All FCA shall be include a sign posted at each active entrance stating "FOD Critical Area" (see example in Appendix)

9.1.1.2. All FCA shall be designated with a the following

9.1.1.2.1. physical barrier such as walls, rope, chain,

9.1.1.2.2. taped-off area on the floor, marked with FOD "pods" (example shown in Appendix)

9.1.1.3. Administrative areas, such as office spaces, internal to a FOD Critical Area can be exempt from the controls of this procedure if no product is present in the space

9.1.2. Prohibited Materials

9.1.2.1. Food, drinks

9.1.2.1.1. Exception for water, if required by a doctor and contained in a company supplied water bottle

9.1.2.2. Candy, gum, mints

9.1.2.3. Tobacco products

9.1.2.4. Personal items- purses, pictures, stuffed animals, ==radios==

9.1.2.4.1. Exception for wallets and/or money that is stored in a pocket and not removed while in the FOD Critical Area

9.1.2.5. Clothing with rhinestones, sequins, glitter, beading or other things that may come off

9.1.2.6. Hats

9.1.2.7. Jewelry

9.1.2.7.1. Silicone rubber bracelets (i.e. LiveStrong advocacy bracelets)

9.1.2.7.2. Pins on lanyard, shirts, ties, etc.

9.1.2.7.3. Exception for watches, rings and Medic Alert bracelets or necklaces if they are secured with tape

9.1.2.8. Hair clips, unless they are in use

9.1.2.9. Hygiene products- hairspray, hairbrushes, lotion

9.1.2.9.1. Exception for ESD lotion supplied by the company

9.1.2.10. Cosmetics- powder, eye shadow, lipstick, lip balm

9.1.2.11. Medicine- prescription and over-the-counter

9.1.2.11.1. Exceptions allowed with a <mark>doctor's note</mark>, such as inhalers
9.1.2.12. Pens with caps
9.1.2.13. <mark>Pencils,</mark> Erasers
9.1.2.13.1. Exceptions for pens or pencils specifically required by work instructions
9.1.2.13.2. Common office supplies- Staples, staplers, hole punchers, paper clips, push pins, tacks, binder clips
9.1.3. **Limited Use Materials**
9.1.3.1. Unfinished wooden items
9.1.3.2. Foam materials that are deteriorated condition
9.1.4. **Non-Essential Items**
9.1.4.1. Any items (tools, hardware, consumables) that are not required for working within the FCA shall be left outside the area.
9.1.4.2.

10.0 Product Environment
10.1 Facility Maintenance

FOD Critical Areas shall be kept in good repair. If any of the following conditions are found, a work order must be placed <mark>within a week</mark> of discovery to fix the problem.

- o Damaged walls
- o Damaged doors
- o Damaged ceiling and floor tiles
- o Standing water
- o Excessive rust
- o Floor tape or markings in poor conditions
- o Chipped or peeling paint
- o Damaged chairs or workstations
- o Damaged signs
- o Errant tape & Velcro™

An autonomous source (i.e. management, industrial engineering, quality) shall perform a monthly walk-about to check for facilities problems. Any employees who work within the area shall report facilities problems to supervision or management.

10.2 Housekeeping
Housekeeping within FOD Critical Areas is the responsibility of <mark>all employees</mark> that work within the area.

Within a FOD Critical Area there must be a checklist in place to address the regular cleaning of the following areas of the facility:

1. work surfaces

2. test equipment
3. workstation overhead lighting
4. chairs
5. floors
6. storage racks
7. equipment
8. work station drawers
9. common areas such as walk ways
10. totes
11. tacky mat checks
12. walls
13. air ducts

Production staff shall be responsible for

Table 1: Daily, Production Staff

Work Benches and Tables	Wipe top, bottom, sides, legs, lights, cables, and other items associated with bench and table	
Test Stations	Wipe outside portion of test stations, including top, bottom, sides, legs, lights, cables	
Chairs	Wipe all parts of chairs, including wheels, seats, back rest, supports	
Tools	Tools, PA's, test fixtures	
Floor	Sweep under work benches, test stations, tables	

Table 2: Weekly, Production Staff

Cabinets	Inside, top, sides, handles, contents	
Racks	All shelves, casters, posts	
Totes	Inside and out	
Trash Cans	Wipe outside	
Hazmat Containers	Wipe outside	

Custodial Responsibilities
- Plant-wide housekeeping run rules are being developed by Cesar Romero of Facilities
- Working with El Segundo to standardize
- Will probably reference whatever they come up with

The tables below are the checklists in place for the cleanrooms in 809.

Table 3- Daily in 100K Cleanrooms

Empty trash cans		
Clean doors		
Vacuum Floors		
FOD Walk + Bag and Tag		

Table 4- Weekly in 100K Cleanrooms

Damp Mop Floors		
Clean the tops and sides of all cranes		

Table 5: Daily in 100 and 10K Cleanrooms

Table 6: Weekly in 100 and 10K Cleanrooms

Vacuum Floors		
Clean walls		
Clean doors		
Clean glass		
Empty trash cans		
Damp mop floors		

Wipe return vents		
Clean sink and water fountains		
Wipe outside of gowning cabinets		

10.3 Construction or Facilities Work

All FCA must have procedure in place to control facilities maintenance work that is performed. A REA/IPT/CCE/Quality person shall ensure that hardware is adequately protected when the work is going to take place and that the appropriate steps have been put in place to ensure that the area is cleaned before work can resume in the area.

Gowning

All personnel in a FOD critical area shall wear a lab coat (ESD if appropriate) to prevent street clothing items from coming loose in the FOD critical area.

Gloves and other protective garments shall be worn as called out in work instructions.

e. Clean-as-you-go?

Clean as you go shall apply to all areas of the FCA, by forcing people to clean up after them selves

All personnel shall follow a "Clean-As-You-Go" approach to keeping work stations and adjacent areas clean. "Clean-As-You-Go" is described below:

Work stations and immediate areas (including floors) shall be cleaned between major operations to ensure debris that has been generated is removed and poses no risk to future operations.

Cleaning process:

Protect or cover product to ensure paths for FOD to be introduced into the product.

Discard used consumables.

Remove unneeded supplies and return tools to their designated location.

Wipe down work surfaces to remove any visible debris.

Work stations shall be cleaned when work cannot continue or work is completed (e.g. breaks, lunch, end of shift, etc.)

Work stations and immediate areas shall be cleaned when work debris has the potential to migrate into product.

10.4   **Tool and Workplace Organization**
10.4.1.   Tools Storage
10.4.1.1.   Tool storage shall remain organized and FOD-free at all times.
10.4.1.2.   All tools shall be individually identifiable and traceable to their assigned storage location by the user.
10.4.1.3.   Tool storage will be accomplished through the use of _____
A. Shadowboxes
B. Shadowboards
C. Labeled locations

        D. Tethering
        E. A tool crib
        F. Other - Please Specify

10.4.1.4.   All tools shall be inventoried on a ==daily== basis.

10.4.1.5. All items (including tools, process consumables, test fixtures, etc) in FOD critical areas shall be stored in individually identifiable designated location ==(traceable ?)==

10.4.2.   Cabinets, drawers, and shelves shall be organized and free of clutter and debris

==10.4.3.   Items stored in cabinets drawers shall be kept in labeled locations or shadow boxes/boards (no miscellaneous storage allowed)==

10.4.4.   Nonessential items (including personal items, extra office supplies) are prohibited from FOD critical areas

10.4.5.   Items shall not be stored directly above work surfaces in a way that could potentially cause damage to hardware.

10.5   **Material Handling and Parts Protection**

10.5.1.   Product shall be covered when not in work or not attended (this includes times when personnel are away from the workstation on lunch or break).

10.5.2.   ESD sensitive hardware shall be covered using ESD safe bagging or totes.

10.5.2.1. Exceptions are allowed for hardware that can be damaged if covered. (e.g. wet solder paste on circuit card assemblies, parts being cured, etc.)

10.5.3.   It may not be feasible to cover large product. In those instances, only the external holes or FOD migration paths shall be covered. Alternatively, chains or other barriers shall be employed to restrict entry of personnel near unattended product.

10.5.4.   Product shall be kept in sealed totes or other protective container/packaging when being stored or transported.

10.5.5.   It may not be feasible to contain large product. In those instances, only the external holes or FOD migration paths shall be covered. Alternatively, ropes, or other barriers shall be employed to restrict entry of personnel near unattended product.

10.5.6.   Totes, bags and all other product storage containers shall be inspected for FOD and cleaned as needed prior to use.

10.6 **FOD Incident Reporting and Investigation**

10.6.1.   Product shall be examined for FOD before any cavities or housings are closed, sealed or made inaccessible. Special attention shall be paid to screw holes and blind holes. Any FOD shall be removed and a FOD Incident Report, Form 22225RMS completed and submitted to local supervision if applicable.

10.6.2.　　The following are guidelines for determining if a FOD Incident Report, Form 22225RMS needs to be completed when FOD is found during assembly, test or inspection operations:

> 1. Was the FOD found during a customer inspection or internal formal inspection?
> > If YES – Stop work and file a FOD incident report.
> > IF NO – continue to the next question
> 2. Given the recent operations the hardware has been exposed to, is this type of "FOD" expected to be present?

If YES - Move on to the next question

If NO - Stop work and file a FOD incident report.

Are there procedures in place to address the "FOD"? Example – work instructions which include a cleaning process after generating debris.

If YES - No FOD incident report is needed and normal work may continue after FOD is removed

If NO - Stop work and file a FOD report.

If an item is dropped or lost inside a FOD Critical Area it must be found. No further assembly/test/inspection activity shall be performed until the item has been located, accounted for, or investigation determines it is not in the hardware.

A FOD Incident Report, Form 22225RMS shall be filled out if an investigation determines that the lost item has the potential to be inside hardware.

10.7　　Audits and Metrics

Audits

> Daily FOD checks are performed by all employees in each work area
> > These FOD checks include
> > > Tool Control
> > > Housekeeping
> Weekly FOD walks are performed by area supervision
> > FOD Walks
> Monthly FOD Audits are performed by Quality
> > Quality

Metrics

a. FOD defects and incidents are recorded and categorized by root cause. FOD metrics are tracked by quality and shared with management and all other personnel. FOD metrics are posted the FOD awareness bulletin board.

b. Audit Results for the past 12 months are tracked by Quality and shared with management and all other personnel. Audit results are posted on the FOD awareness bulletin board.

    10.8   **Assembly Operations**

11.0   References

    11.1   FOD (Foreign Object Debris) Awareness Training – TTC4191

    11.2   Foreign Object Debris (FOD) Report – Form 22225RMS

    11.3   Manufacturing Procedure 1455 Rev.A- Work Area Environmental Control Minimum Foreign Object Elimination (FOE) Plan

    11.4   National Aerospace Standard 412 (NAS-412) – Foreign Object Damage/Foreign Object Debris (FOD) Prevention.