

# FOREIGN OBJECT DAMAGE PREVENTION





# OBJECTIVES

- ❑ When you complete this material, you will be able to:
  - Understand the consequences of foreign object damage
  - Understand key terms and definitions
  - Identify the different FOD prevention area designations and requirements for those areas
  - Know whom to contact for more information



**Foreign Objects are a major cause of aircraft damage and unscheduled maintenance. Damage can result in minor repairs or catastrophic events. Preventing FOD is everyone's responsibility. FOD includes hardware, tools, parts, metal shavings, broken hardware parts, pavement fragments, rocks, badges, hats, paper clips, rags, trash, paperwork and even wildlife. Any foreign object that can find its way into an aircraft or engine can contribute to FOD.**



# Key Terms and Definitions



# FOD: Formal Definition

- ❑ **Foreign Object Damage (FOD) - Any damage attributed to a foreign object that can be expressed in physical or economic terms which may or may not degrade the product's safety and / or performance characteristics.**
- ❑ **Foreign Object Debris (FOD) - A substance, debris, loose hardware, or article alien to a vehicle or system which could potentially cause damage.**
- ❑ **Anything that is where it doesn't belong can be FOD!**



# FOD Prevention Areas (FPAs)

## □ Definition:

- The general area where maintenance, manufacturing, modification and production of aircraft / sub-assembly operations are conducted.



# ***FOD Awareness***



- **A FOD Prevention Area where manufacturing or modification processes remain open without any potential for FOD entrapment. This includes but is not limited to: Components or assemblies undergoing manufacturing or modification without any closeout activities on the product.**



# *FOD Control*



- ❑ **A FOD Prevention Area where assembly or modification processes occur. This includes but is not limited to: Components or assemblies undergoing manufacturing or modification in the process of becoming a completed aircraft.**





# *FOD Critical*



- **A FOD Prevention Area where assembly, modification and Flight and Ground Operations require the highest level of preventative measures. The elimination of FOD contamination, entrapment, migration or damage is most critical to safeguard the product.**



# Aircraft Footprint/ Shadow

## □ Definition:

- A silhouette of the aircraft/product extending 3-15 feet around the aircraft/product based on Site/Program instructions



# Clean As You Go

## □ Definition:

- **“Clean As You Go” is the on-going/in-progress practice of removing debris during manufacturing, fabrication, modification, operations, or maintenance on/in the aircraft, part, component assembly, sub-assembly, or engine to ensure the product is FOD free. “Clean As You Go” shall be enforced in all environments including fabrication.**



# Housekeeping

## □ Definition:

- Housekeeping is the practice of keeping work areas organized, clean, with items properly stored. These areas include, but are not limited to; aisles, jigs, tooling, fixtures, work benches, decks, work stands, tool boxes, tool/tote trays, floors, tables, outside areas, and fabrication. It is everyone's responsibility to keep work areas clean and orderly. Items not in use and not properly stored, shall be addressed as a violation of the housekeeping standard.



# Our Policy



# Our Policy

- FOD prevention is everyone's responsibility at LM Aeronautics.**
- The goal of the FOD Prevention Program is to prevent and eliminate FOD.**
- The FOD Prevention Program applies to all LM Aeronautic activities throughout development, design, procurement, assembly/build, delivery, and support of our products.**
- The FOD Prevention Program provides processes and information necessary for success.**



**This policy is company-wide, and applies to all sites and individuals who conduct work at or visit our company.**

**Non-compliance may result in immediate removal from the facility.**



# How the Policy Is Put Into Practice

- ❑ **Clean As You Go is always in effect**
- ❑ **FOD is an issue in all areas**
- ❑ **Each site is divided into four FPA types:**
  - **Non-Designated- Most basic; includes office areas**
  - **FOD Awareness – No final close-out entrapment**
  - **FOD Control - Higher potential for entrapment**
  - **FOD Critical - Most sensitive areas**
  - **Highest risk areas require more prevention**





# FOD Areas and Requirements



# FOD Prevention Areas (FPAs)

- **All LM Aeronautics Sites/Programs use the progressive approach to FOD Risk Mitigation utilizing Area Designations to specify the level of controls required to ensure a FOD Free Product. The LM Aero FOD Designations are: Non-Designated Area, FOD Awareness Area, FOD Control Area and FOD Critical Area.**



# FOD Prevention Areas (FPAs)

FOD Designation	Work Performed	Work Performed	Work Performed	Work Performed
Not Designated	Fabrication of Materials with <u>Zero Closure or Entrapment</u>	Manufacturing of Structure such as skin, bulkhead.	Backshop Laboratories, NDI, Support Offices, warehouses, cribs and aisle ways.	Storage of capped/protected panels or minor sub-assemblies
FOD Awareness	Manufacturing of Sub-Assy, Assembly, and Component with no final close-out, entrapments.	Disassembly for Extensive Modification Input	Covered/Installed FOD Barrier Component Storage	Backshop Support such as: Battery, Wheel & Tire, AGE/Yard Maintenance
FOD Control	Ramps, Taxiways, Aircraft parking spots without Aircraft present, Minor Systems Installation without Safety of Flight Closure. Ejection Seat Build	Mating Processes Engines, Ejection Seats, and Canopy in storage.	Minor Closure areas not Safety of Flight. Component Build or Mod closures not Safety of Flight	Wing Install Modification reassembly short of Safety of Flight Close-out.
FOD Critical	Engine Installation and Operation, Engine Maintenance	APU/JFS/IPP/GTC Installation/Operation Fuel Cell Maintenance Final Close out Safety of Flight Areas	Ramps, Taxiways, Aircraft parking spots with Aircraft present Canopy Maintenance Ejection Seat Maintenance, and Modification	Systems Operations Checkouts on Completed Aircraft, Completed Aircraft In The Open In Flight Operations



# FOD Awareness Areas

- ❑ **Clearly marked with approved signs at a minimum.**
  - **Housekeeping and clean-as-you-go standards are strictly enforced**
  - **Food and drink allowed only in designated areas**



# FOD Control Areas

- ❑ Clearly marked with approved signs at a minimum.
- ❑ Housekeeping and clean-as-you-go standards are strictly enforced
- ❑ Dress code, including jewelry, strictly enforced
- ❑ Lockheed Martin provided Personal Packs may be used (use determined by Program)
- ❑ Food and Drink is only allowed outside of the footprint/shadow of the Aircraft/Product in approved designated areas. Water/Sports drink (Gatorade type) in closable containers are allowed in the working environment , but shall remain outside of the footprint/shadow of the Aircraft/Product.
- ❑ Must be FOD-certified to enter or escorted by someone with a current FOD certification



# FOD Critical Areas

- Clearly marked with approved signs at a minimum.
- Unassigned items are logged in/out
- Housekeeping and clean-as-you-go standards are strictly enforced
- Lockheed Martin provided Personal Packs may be used (use determined by Program)
- Must be FOD certified to enter or escorted by someone with a current FOD certification
- No food and drink are allowed
- Dress code, including jewelry, strictly enforced



## ***Specific Procedures for Personal Tool Control used in FOD Designated Areas***

- ❑ **The organization or program responsible for bringing a contractor or vendor on site is responsible for ensuring the contractor or vendor develops and works to a FOD control Plan. A FOD Control plan must include the following elements:**
  - Describe the housekeeping methods used to control FOD migration.
  - Describe the barriers used to control FOD migration.
  - Identify the POC for all FOD control issues
  - FOD Control and FOD Critical designations should be temporarily declassified during maintenance or construction work. Contact the program FOD manager or FOD Site Lead to temporarily declassify a FOD designation. Upon completion of the work complete a thorough FOD walk of the work area(s), then contact the program FOD manager or FOD Site Lead for areas inspection and to reestablish the FOD designation.



## ***Specific Procedures for Personal Tool Control used in FOD Designated Areas***

- **If the scope of work changes after the FOD Plan has been approved, then a new FOD Plan must be submitted and approved before the “new” work can start.**
  - ***Where it is not possible to declassify the FOD designation to accomplish the work, contractors, vendors or maintenance personnel will utilize a method of tool accountability.***
    - *They shall have an inventory of all tools brought into the FOD Control area that identifies them to the contractor, vendor or maintenance personnel. The contractors, vendors or maintenance personnel shall account for all tools at the end of the job or work day whichever occurs first by conducting a tool inventory.*
    - *In FOD Critical Areas. Prior to beginning work contact the program FOD manager, or in his/her absence, the FOD Site Lead to develop a tool and item control plan.*
- **The LM Aero representative overseeing contractors to ensure compliance with the terms of the contract, purchase order or other authorizing documents, ESH and FOD procedures will coordinate with the program FOD representative to ensure a suitable method of tool accountability is established prior to working in a FOD Control or Critical area**





# Visitor Guidelines

- Visitors to FOD Control and FOD Critical areas must be escorted at all times!
  
- Individuals being escorted must comply with area guidelines.
  - Keep track of your tools & other items
  - Report any lost or missing items to the area Supervisor
  
- If you have any questions or are unsure about these and other guidelines, ask your escort.



# For More Information

**Contact your**

**Buyer or**

**Sponsor**



**LM Sponsor / Non-Employee Signature Required**

**Per AC-6874:** Sponsors and Escorts of all Non-Employees requiring access to the LM Aero Facility must ensure that Non-Employees have completed the FOD Prevention Self-Study Materials available on the LM Aero Material Management external website at:

[http://www.lockheedmartin.com/us/aeronautics/materialmanagement/scm-terms/scm-terms\\_fod.html](http://www.lockheedmartin.com/us/aeronautics/materialmanagement/scm-terms/scm-terms_fod.html)

Upon completion of the Self-Study Material, The Non- Employee will present a hard copy with required signatures to the LM Sponsor upon arrival to the facility.

By signing below, the Non-Employee acknowledges their awareness and responsibility to fully comply with LM Aero FOD Prevention policies and procedure as defined in the FOD Prevention Self-Study Materials while on LM Aero Property.

By signing below, the LM Sponsor / Escort acknowledges the Non-Employee has completed the FOD Prevention Self-Study Materials per AC-6874.

Non-Employee (Print) \_\_\_\_\_ Company \_\_\_\_\_  
Signature \_\_\_\_\_ Phone No \_\_\_\_\_

Non-Employee (Print) \_\_\_\_\_ Company \_\_\_\_\_  
Signature \_\_\_\_\_ Phone No \_\_\_\_\_

Non-Employee (Print) \_\_\_\_\_ Company \_\_\_\_\_  
Signature \_\_\_\_\_ Phone No \_\_\_\_\_

Non-Employee (Print) \_\_\_\_\_ Company \_\_\_\_\_  
Signature \_\_\_\_\_ Phone No \_\_\_\_\_

Non-Employee (Print) \_\_\_\_\_ Company \_\_\_\_\_  
Signature \_\_\_\_\_ Phone No \_\_\_\_\_

Non-Employee (Print) \_\_\_\_\_ Company \_\_\_\_\_  
Signature \_\_\_\_\_ Phone No \_\_\_\_\_

Contractor Management (Print) \_\_\_\_\_ Company \_\_\_\_\_  
Signature \_\_\_\_\_ Phone No. \_\_\_\_\_

LM Aero Sponsor (Print) \_\_\_\_\_ Employee No. \_\_\_\_\_  
Signature \_\_\_\_\_ Dept. \_\_\_\_\_ Phone No. \_\_\_\_\_