

***“Prevention is  
Never Out of Reach”***  
**30th National Aerospace  
FOD Prevention Conference**  
**August 11–13, 2009**

**FOD 101**

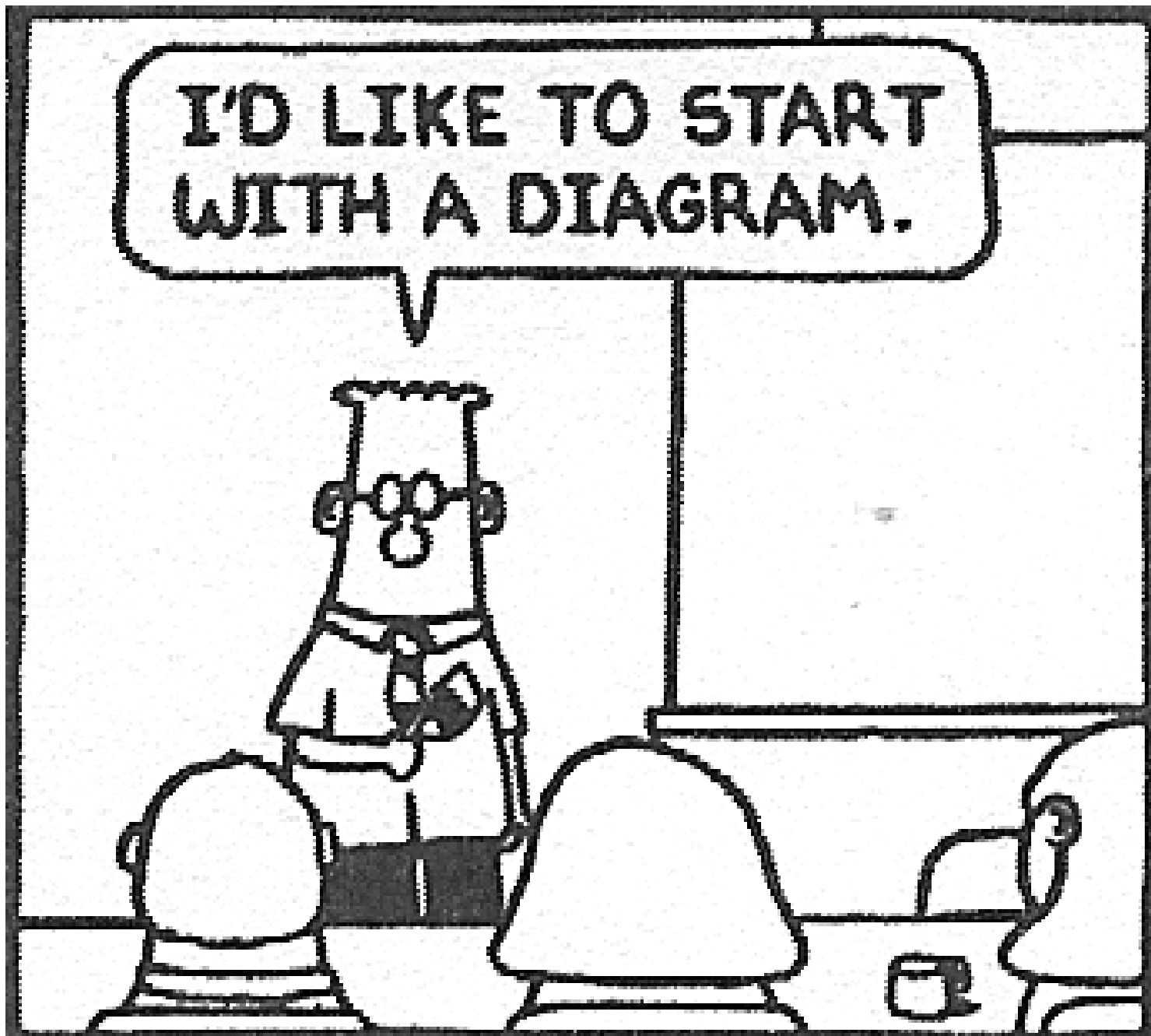
---

**Presented By:**

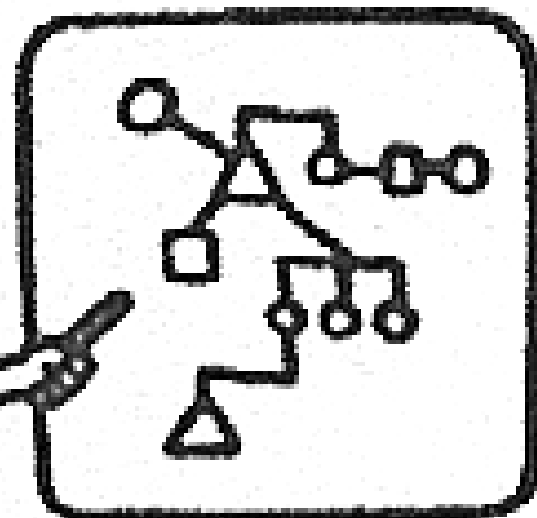
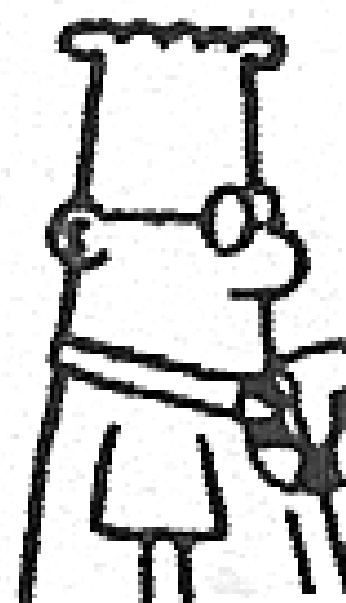
**John Heib  
DCMA Aircraft Operations  
Director for Policy and Training**



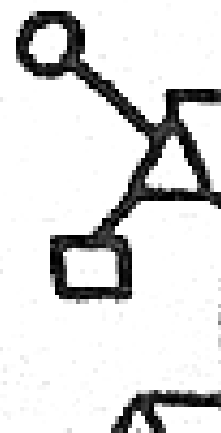
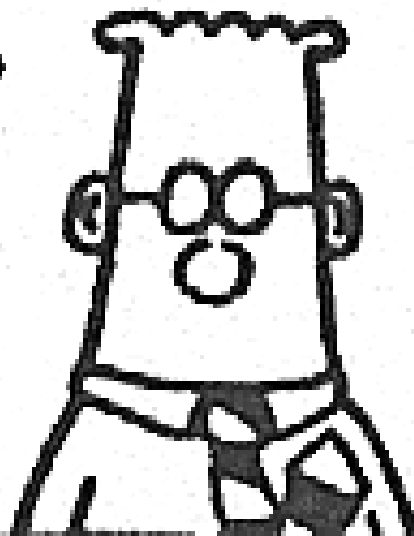
I'D LIKE TO START WITH A DIAGRAM.



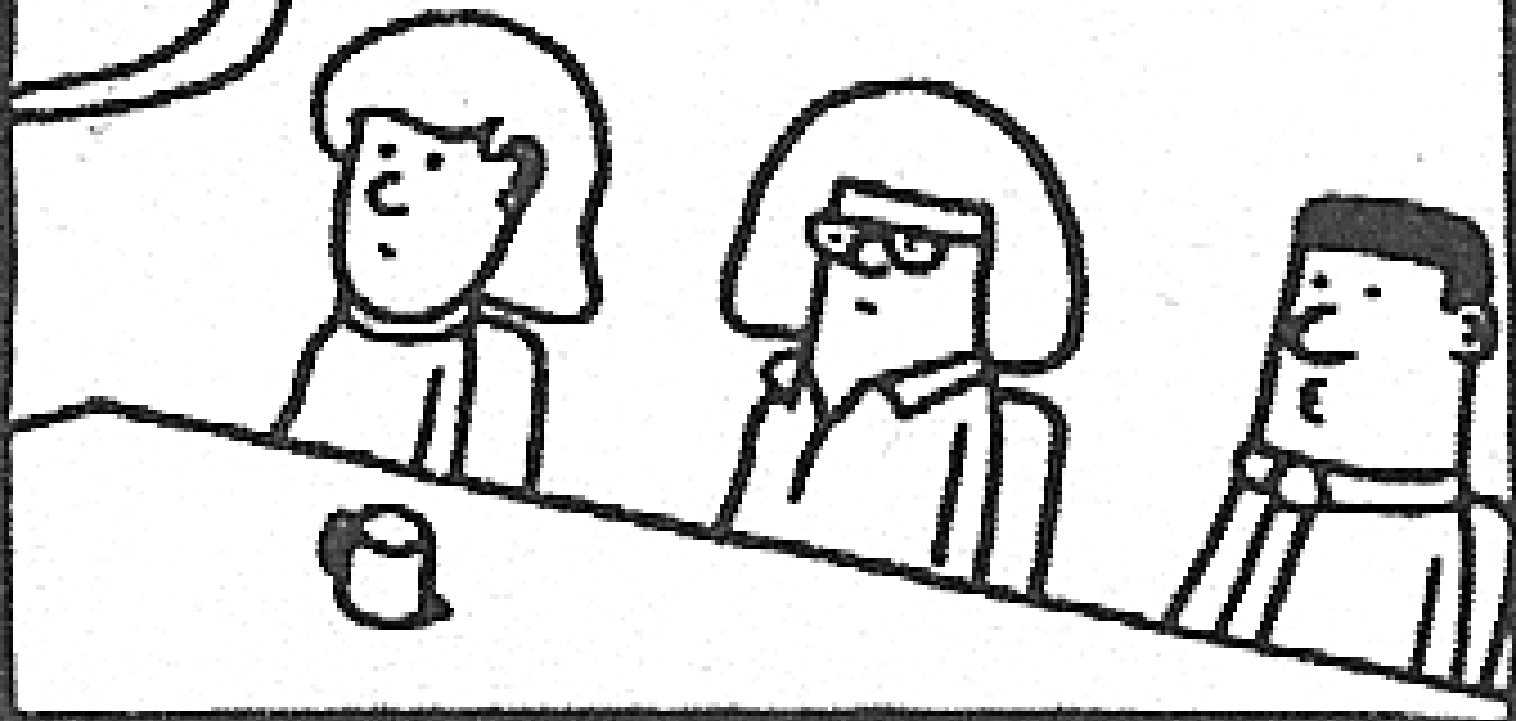
IT'S A BUNCH OF SHAPES CONNECTED BY LINES.



NOW I WILL  
SAY SOME  
IMPRESSIVE  
WORDS.



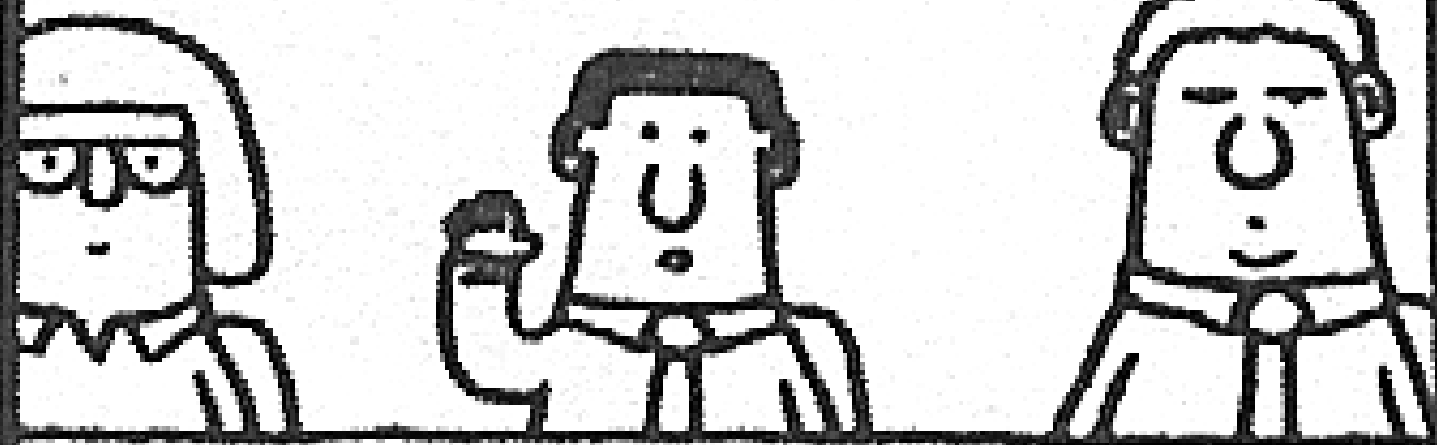
**SYNCHRONIZED  
INCREMENTAL DIGITAL  
INTEGRATED DYNAMIC  
E-COMMERCE SPACE.**

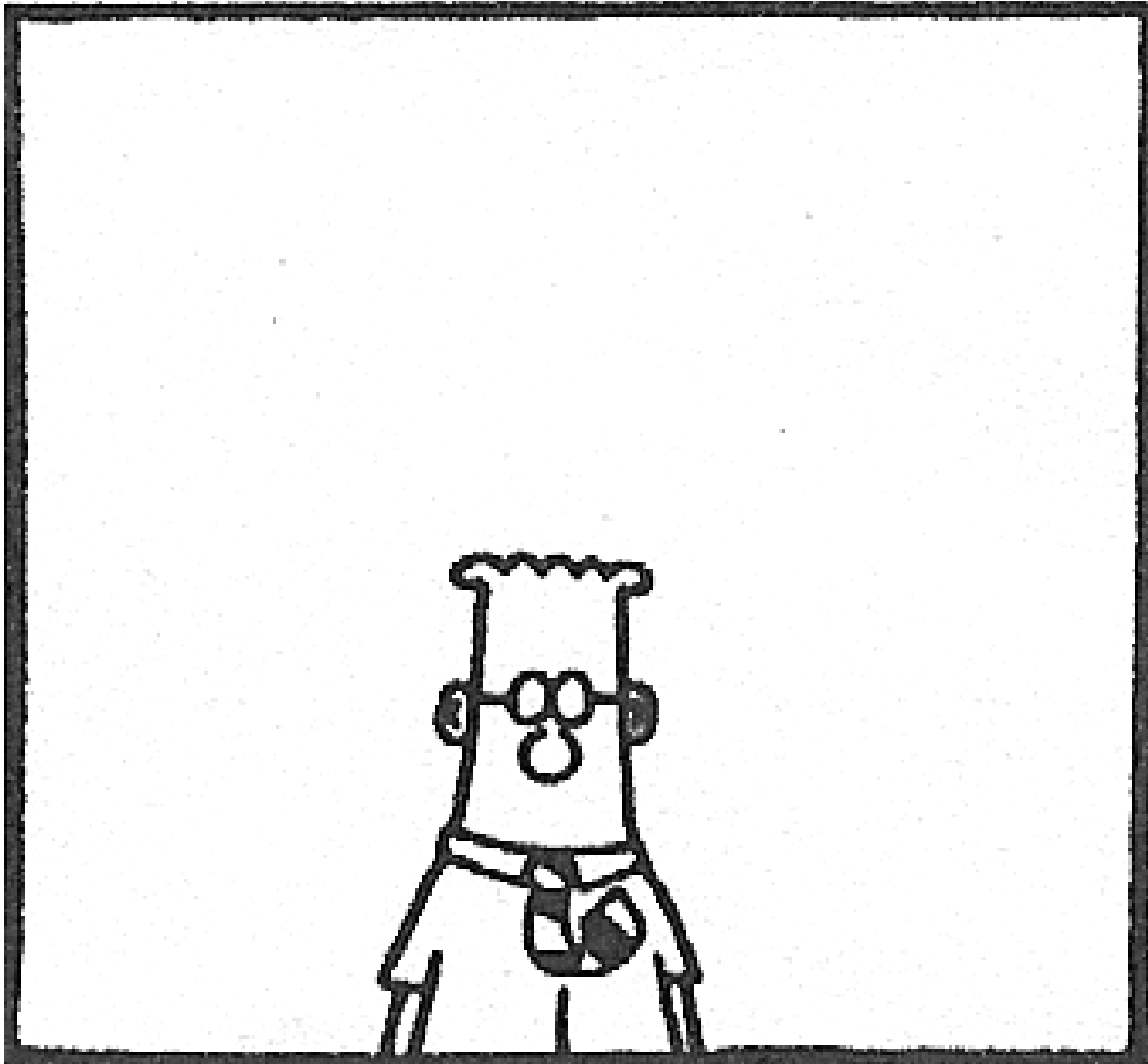


ANY  
QUESTIONS?



MAY I HAVE  
A COPY OF YOUR  
PRESENTATION?





THE RESULTS OF MY  
EXPERIMENT ARE  
DISTURBING.





---

---

**This Presentation  
is Rated:**

---

---



**NAS-412**

**For National Aerospace Standard 412,  
and graphic depictions of broken  
aircraft**

**It is suitable for all audiences who  
work in and around the aerospace  
industry**



---

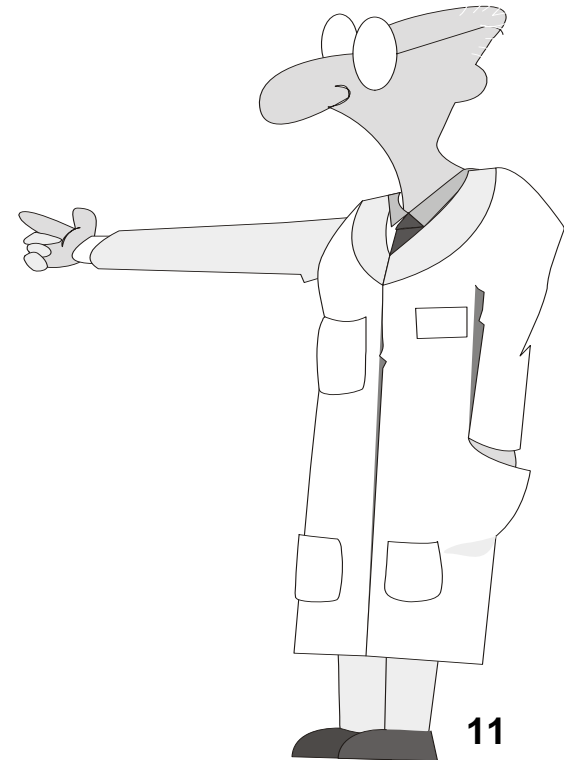
# Pay Attention

---



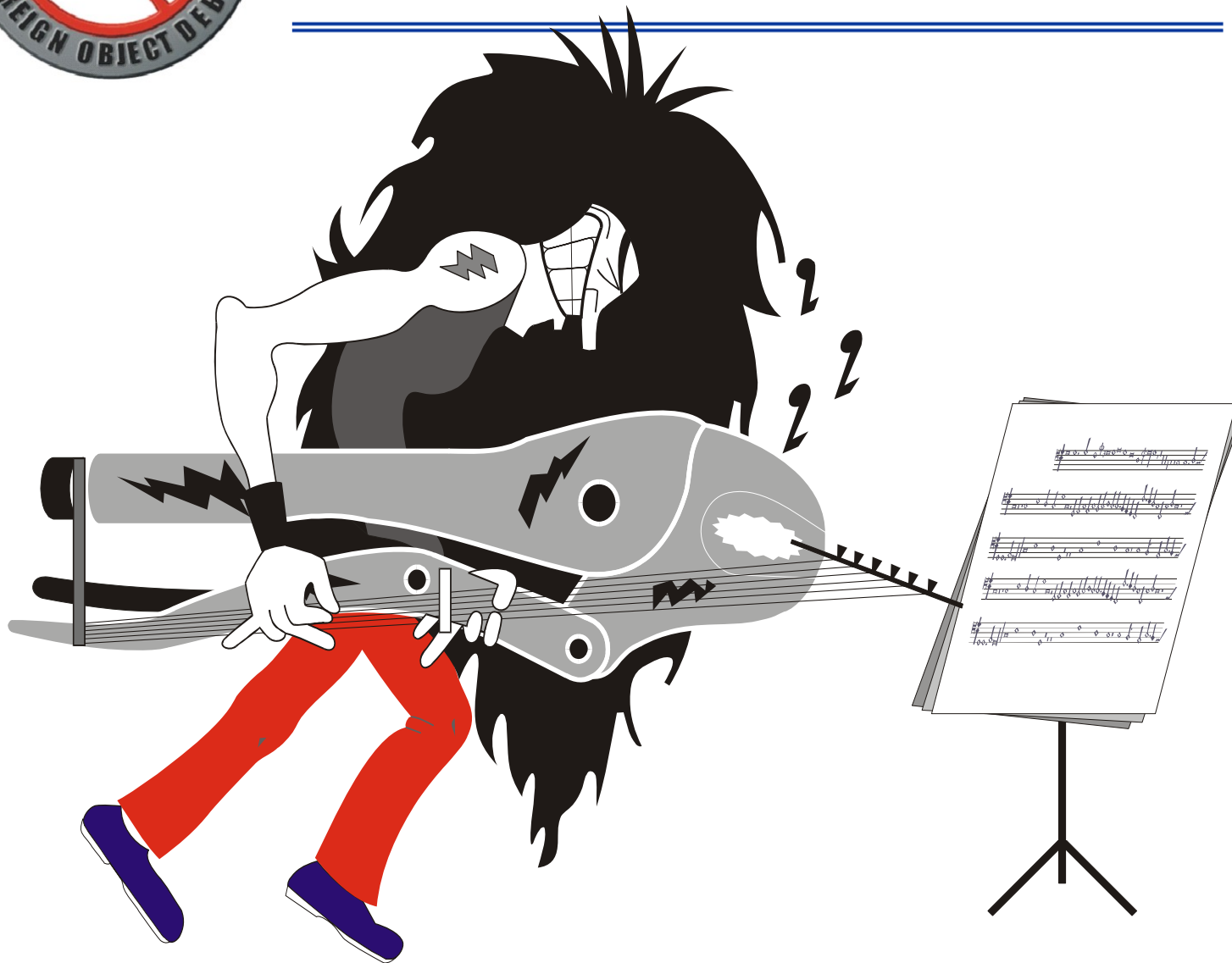
**Today we're going to talk about-**

- **Basic FOD Terms**
- **Bare bones FOD Prevention**
- **Where to start**
- **FOD prevention resources**





# Terms

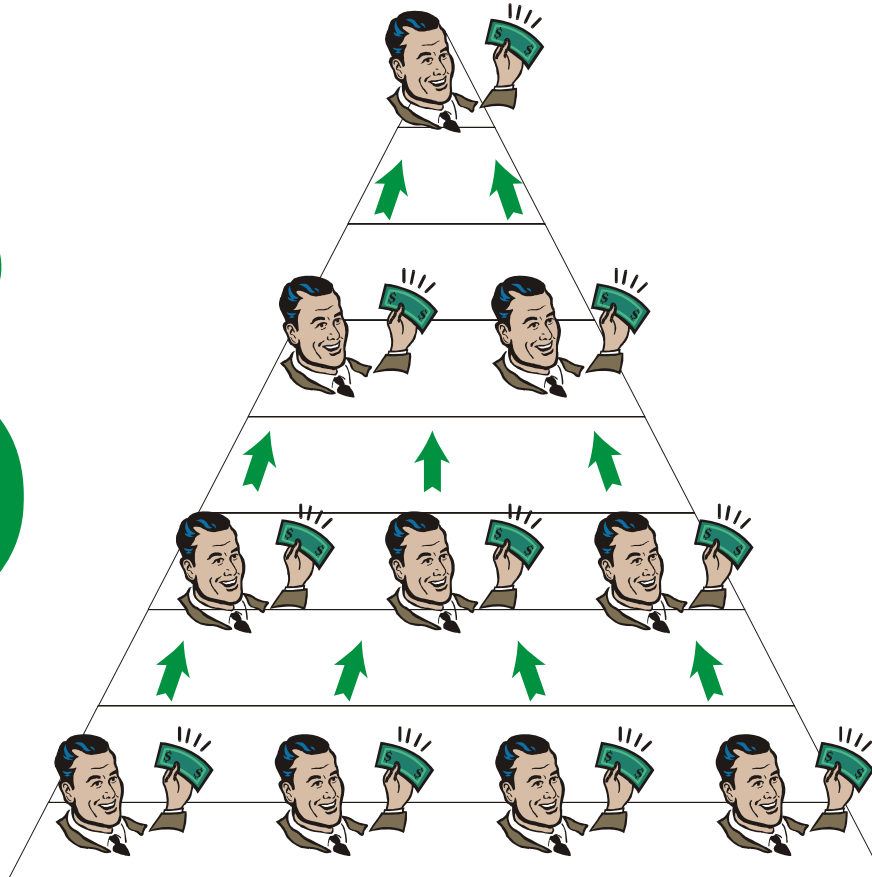




# FOD



## Friends of Distinction





# FOD



**Foreign  
Object  
Debris**



**Also known as  
Foreign Objects  
or "FO"**

**Foreign  
Object  
Damage**



**Also known as  
"A Bad Thing"**



# TOOLS



**Webster's view...**

**Tool** \ˈtül n [ME, fr. OE *tōl*] a handheld device that aids in accomplishing a task.





---

---

# TOOLS

---

---



**For our purposes Tools fall into two categories...**

- **Handheld tools that can be *easily* marked to identify ownership**
  - **Company owned**
  - **Privately owned**
- **Miscellaneous Spare Parts**
  - **Consumables (drill bits, apex tips, nuts, bolts, wire, glue, paint, sealant, rags, etc.)**
  - **Hardware (Allen wrenches, clecoes, files, sockets, henways)**



# FOE



## Foreign Object Elimination

**A program or process used to assure a FOD-free Product/system. (NAS 412)**

**Synonymous FOD & Tool Control, and FOD Prevention**



---

---

# Basic FOD Prevention

---

---





---

---

# Basic FOD Prevention

---

---



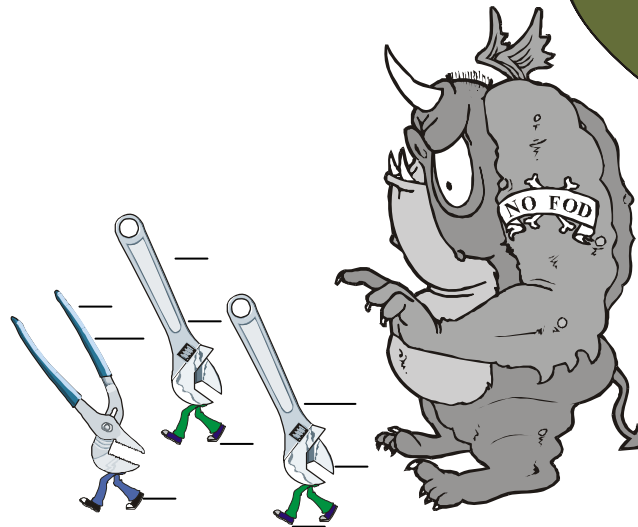
10. Tool Control
9. Lost Tool Procedures
8. Misc. Spare Parts Control
7. Controlling FOD Migration
6. Housekeeping
5. Measurement
4. FOD Awareness POC
3. Training
2. Employee Buy In
1. Company Commitment





# 10. TOOL CONTROL

**Any formal system designed to assure that each tool that goes onboard the aerospace vehicle comes back off.**





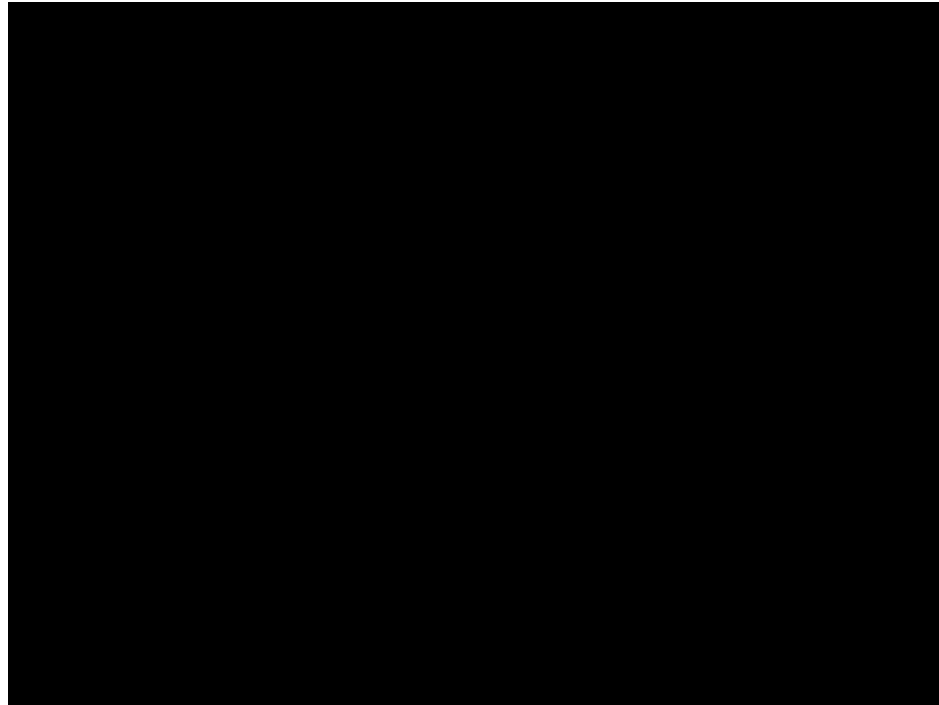
---

---

# TOOL CONTROL EXAMPLE

---

---

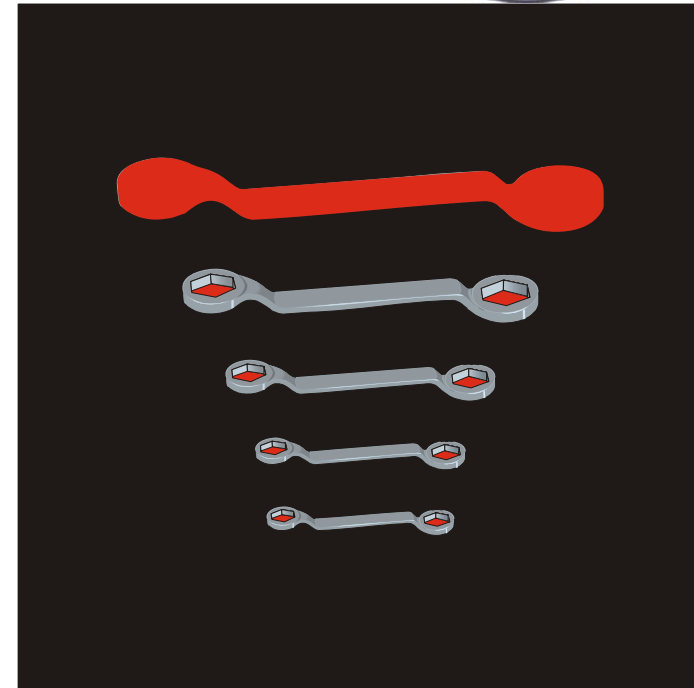




# TOOL CONTROL Basics

## ✓ Shadowboxed Tools

- Initial expense
- Easy inventories
- Background/Foreground



## ✓ Composite Tool Kits

- Can be used in conjunction w/SB
- Should include only the tools needed for specific task



# TOOL CONTROL Basics



## ✓ Tool Tethers

- Used in areas around structural work stands or any other locations where a dropped article could result in damage to the flight hardware, injury to personnel, or where difficulty in retrieval would result if the tool were dropped.

## ✓ Chit Systems

- Provides easy inventory of checked tools
- Loose chits can become FOD themselves



# TOOL CONTROL Basics



## ✓ Marking Tools

- Bar coding
- Employee numbers
- Color coding
- Absolutely necessary to identify previously lost tools

## ✓ Maintain a clean work area

**Clean-as-you-go**

## ✓ Tool Gnomes

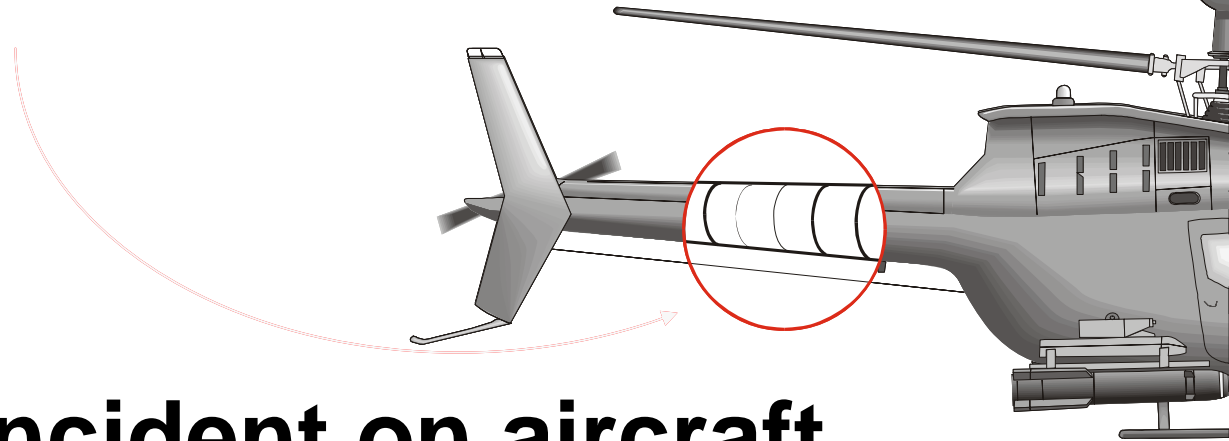




## 9. LOST TOOL PROCEDURES



- ✓ **Non-attributable reporting**
- ✓ **Search until tool is found or you're sure it's not on the aircraft**



- ✓ **Annotate incident on aircraft forms if tool is not located**



# 8. SPARE PARTS CONTROL



- ✓ **Containerize (*Covered spring-loaded containers*)**
- ✓ **Take only what you need to complete the task (**LEAN Manufacturing**)**
- ✓ **Clean-as-you-go**





---

# 7. PREVENTING FOD MIGRATION

---



- ✓ Seal open areas
- ✓ Use intake/exhaust covers
- ✓ Shield areas below where work is performed
- ✓ Use approved caps to seal open hydraulic lines and protect disconnected electrical plugs
- ✓ Clean-as-you-go



# 6. Housekeeping



- ✓ Regular sweeping of taxiways & runways
- ✓ FOD Walks
- ✓ Clean-as-you-go
- ✓ Well lit work areas
- ✓ Containerized hardware





---

## 5. MEASUREMENT

---



***“Those who cannot remember the past are condemned to repeat it.”***

**--George Santayana**

***“Every time history repeats itself, the price goes up.”***

**--Anonymous**



## 5. MEASUREMENT



- **How do you know if your FOD Prevention Program is working?**
  - Formally track program
  - Analyze data
  - Take appropriate actions
  - Repeat





# Gather Data



**FOREIGN OBJECT ELIMINATION/HOUSEKEEPING CHECK LIST**

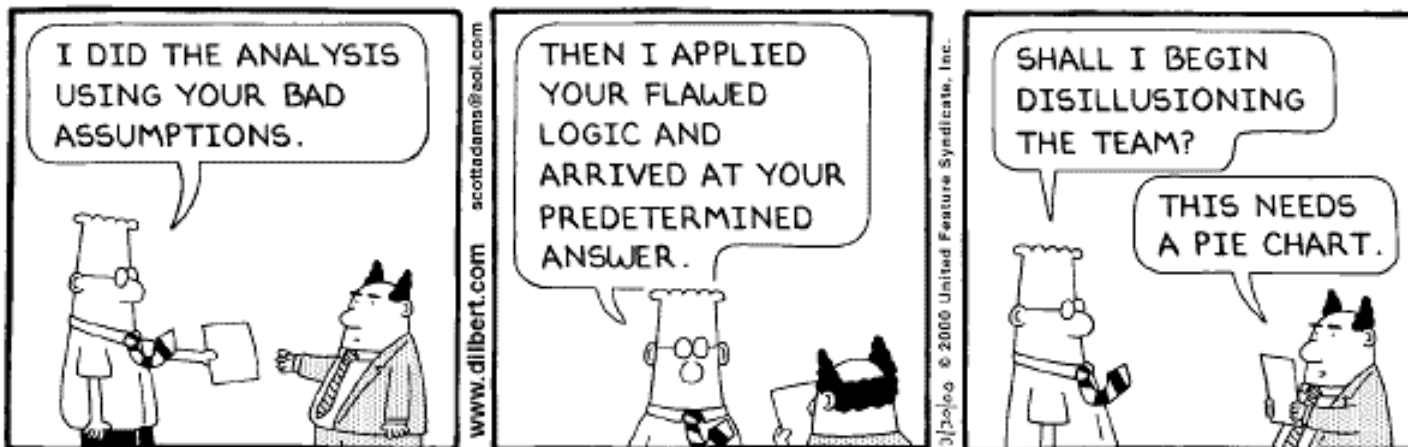
SECTION \_\_\_\_\_ MONITOR \_\_\_\_\_ SUPERVISOR \_\_\_\_\_

	SAT	SUN	MON	TUE	WED	THUR	FRI
Foreign Object Elimination and Housekeeping Daily Inspection Requirements							
Assemblies are free of loose standard parts, tools, and other foreign objects or any excess accumulation of assembly debris.							
F.O.E. bags are available and in use.							
Tables, rollaways, standards or staging that are in close proximity of major assemblies are clean and free of tools, standard parts or other foreign objects unless properly contained.							
During work in process, standard parts are kept in flip lid containers; tools, clamps, clecocs, etc, are in plastic tote trays.							
Fluid fittings and lines (test or assembly) stored or installed, are capped and kept in clean storage. Bearings, bushings, RDP ends are protected.							
Electrical plugs are capped and in clean storage.							
Opening into areas that cannot be cleaned are covered.							



# Analyze

**If you don't like what your data is telling you, fix the cause – not the data!**

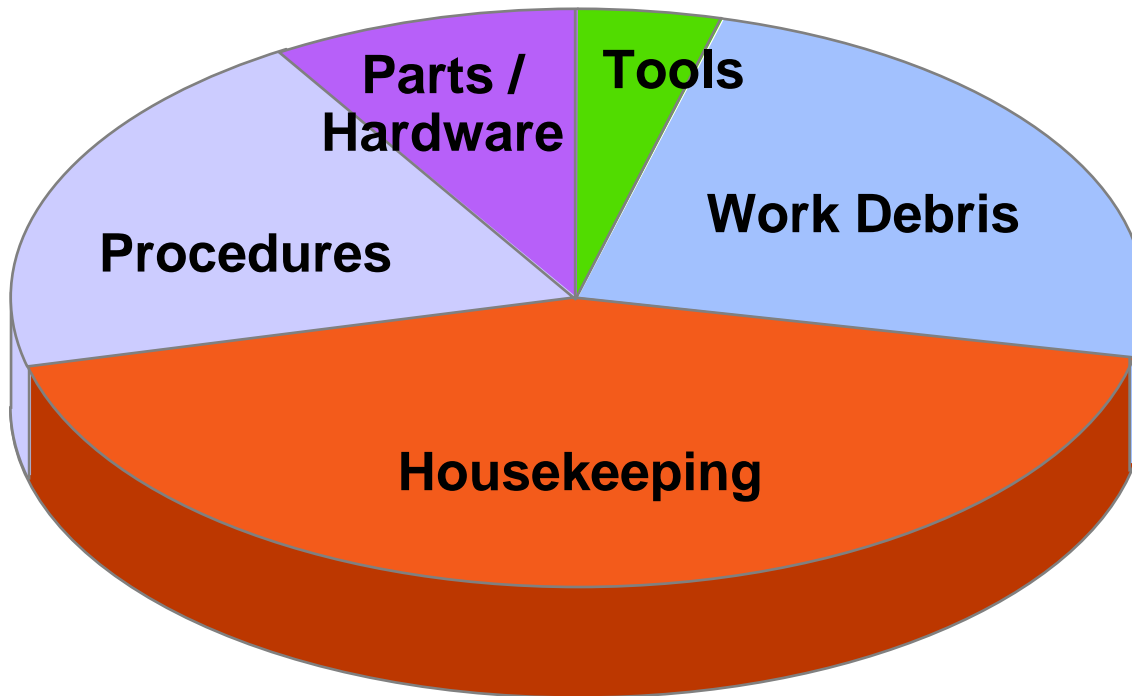


Copyright © 2000 United Feature Syndicate, Inc.  
Redistribution in whole or in part prohibited



# Analyze

Look for patterns, trends, and areas that need greater focus



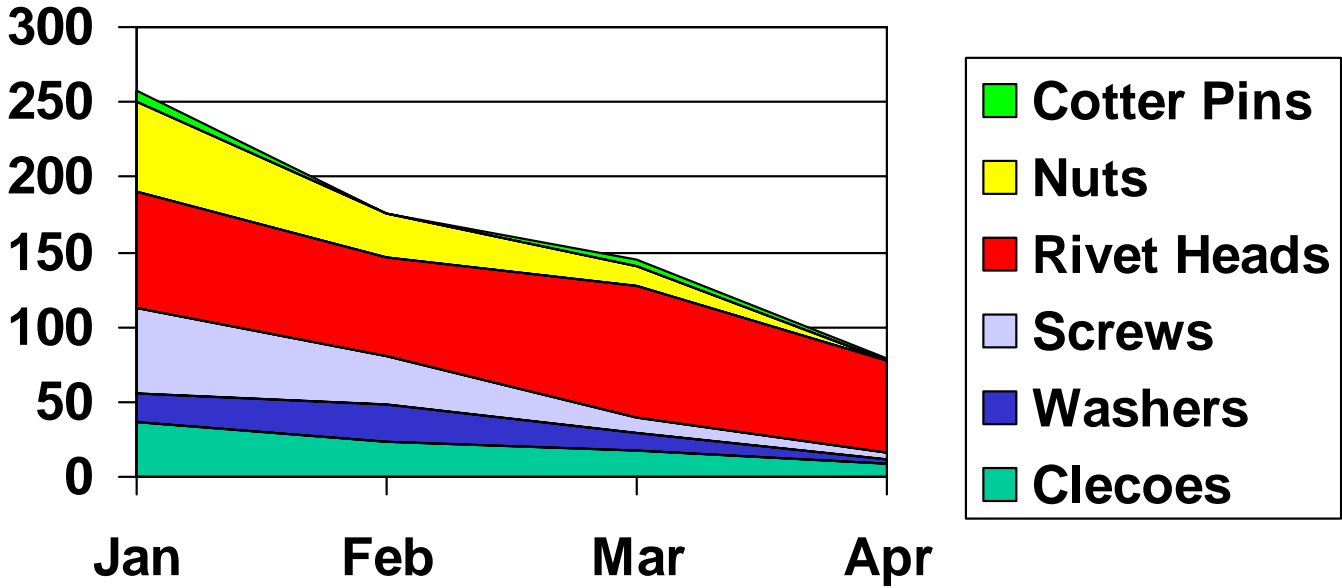
Monthly FOD Discrepancy Cause Rollup



# Analyze



## Miscellaneous Spare Parts Found



**NOTE: Downward trend in all categories except Rivet Heads**



# TAKE APPROPRIATE ACTIONS



**Punish the Gravity**



# ACTIONS SHOULD ADDRESS ROOT CAUSE



**Root Cause**  
123 Dandelion Way  
Weed, CA 96064

**Dear Root Cause,**

We've noticed that the design of the rivet gun causes the spent rivet heads to be ejected with sufficient velocity to scatter them throughout the work area. Attaching a simple bag to the ejector port would provide a simple yet effective control method, virtually eliminating our number one source of FOD.

**Sincerely,**

**The FOD Manager**



## 4. FOD POC



- ✓ **Conducts FOD Audits**
- ✓ **Investigates FOD incidents**
- ✓ **Ensures corrective actions address root causes**
- ✓ **Oversees overarching FOD prevention training curricula**
- ✓ **Gets free membership in company's coffee club**

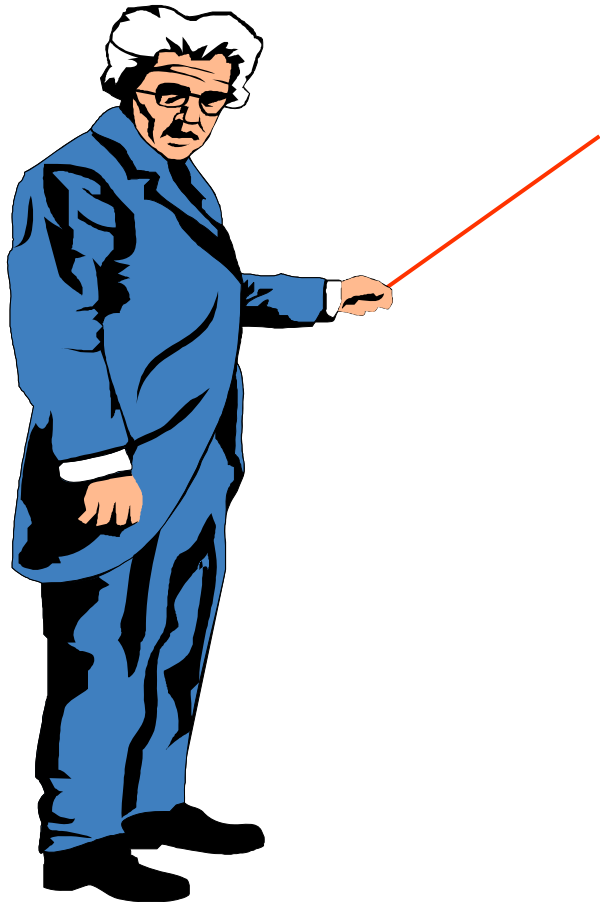




---

# 3. TRAINING

---



## Initial

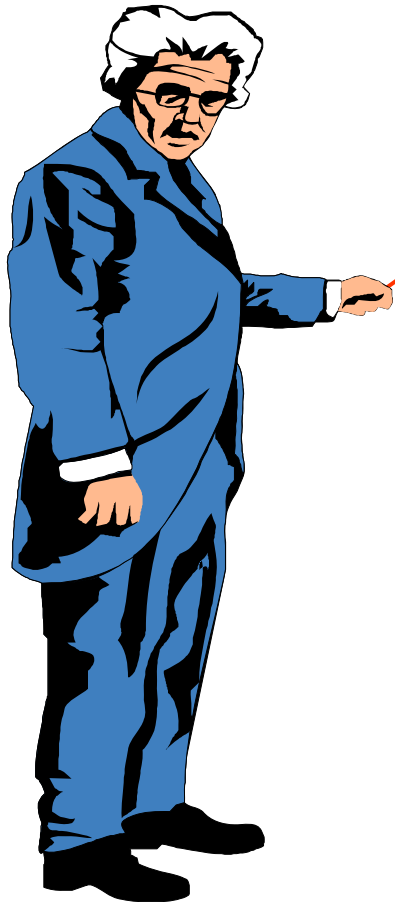
- How to
- ROE

## Recurring

- ROE changes
- Trends
- Interest items



# TRAINING SUBJECTS (NAS 412)



- Proper storage, shipping and handling of material, components, and equipment.
- Techniques to control debris.
- Housekeeping.
- Cleaning and inspection of components and assemblies.
- Accountability/control of tools and hardware.



# TRAINING SUBJECTS, Cont.



- Control of personal items, equipment and consumables.
- Care & protection of end items.
- Quality Workmanship (“Clean-As-You-Go,” inspection).
- Flight line, taxiway and ramp control methods.
- How to report FOD incidents or potential incidents.





# 2. EMPLOYEE BUY IN





## 2. EMPLOYEE BUY IN



**...employee involvement is the key to a  
successful program. NAS-412**





## 2. EMPLOYEE BUY IN



**What is the most effective method of getting good employee Buy In?**

- a. Stick approach**
- b. Carrot approach**
- c. Throw money at the problem**
- d. Form an employee run FOD & Tool Control Team to design company's program**



---

# 1. ORGANIZATIONAL COMMITMENT

---



**Means...**

**Talking the Talk**

***and,***

**Walking the Walk**



---

---

# That's Right!

---

---



**A successful FOD Prevention Program requires committing more than just resources. It requires embracing a FOD free work ethic throughout the entire organization... from the CEO down.**



# 1. ORGANIZATIONAL COMMITMENT



## THE WRONG WAY

***‘I fully support the implementation of Total Quality Management (TQM). However, TQM must be implemented at the unit level, not at my level.’***

**--Anonymous former General  
to his Commanders**

***‘Qu'ils mangent de la gâteau,’ or  
‘Let them eat cake.’***

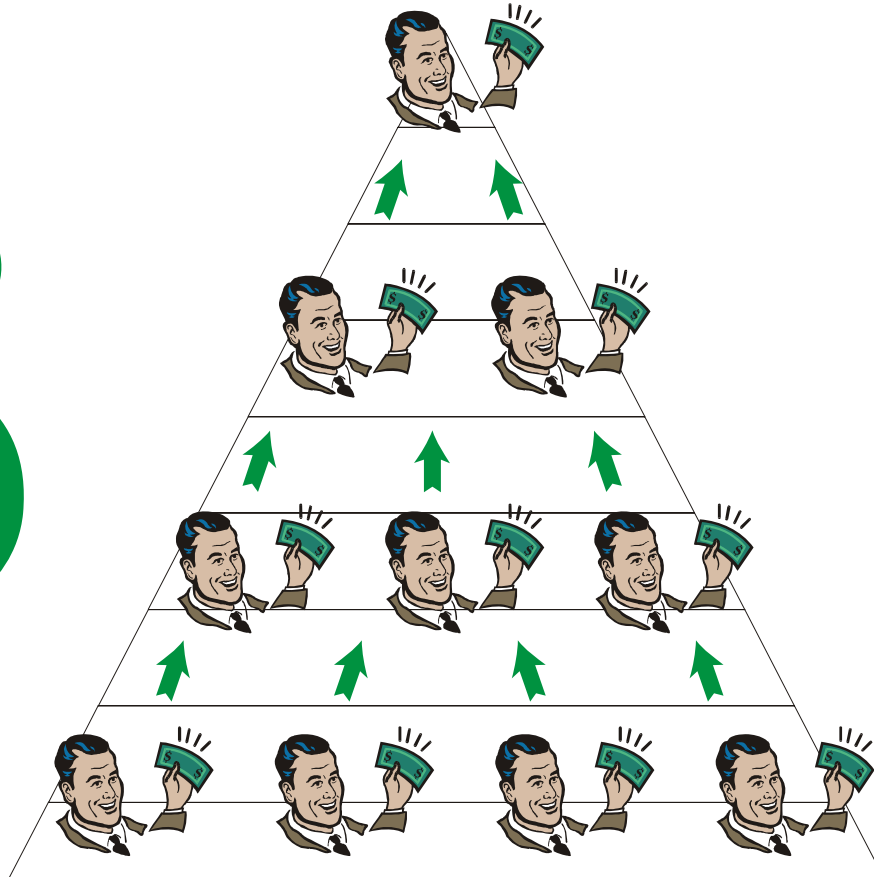
**--Marie Antoinette on how to deal with a  
bread shortage**



# FOD



## Friends of Distinction





# How To Get There





---

---

# How To Get There

---

---



**Get employees involved from the start.**

**Clearly demonstrate company commitment from the start.**





# How To Get There



**Use a process oriented approach...**

- ✓ TQM/TQL
- ✓ PROCAS
- ✓ ORM





# Evolving Process



**Metrics**

**Standard Tool Kits**

**Shadow Boxed Tools**

**Tool Kits**

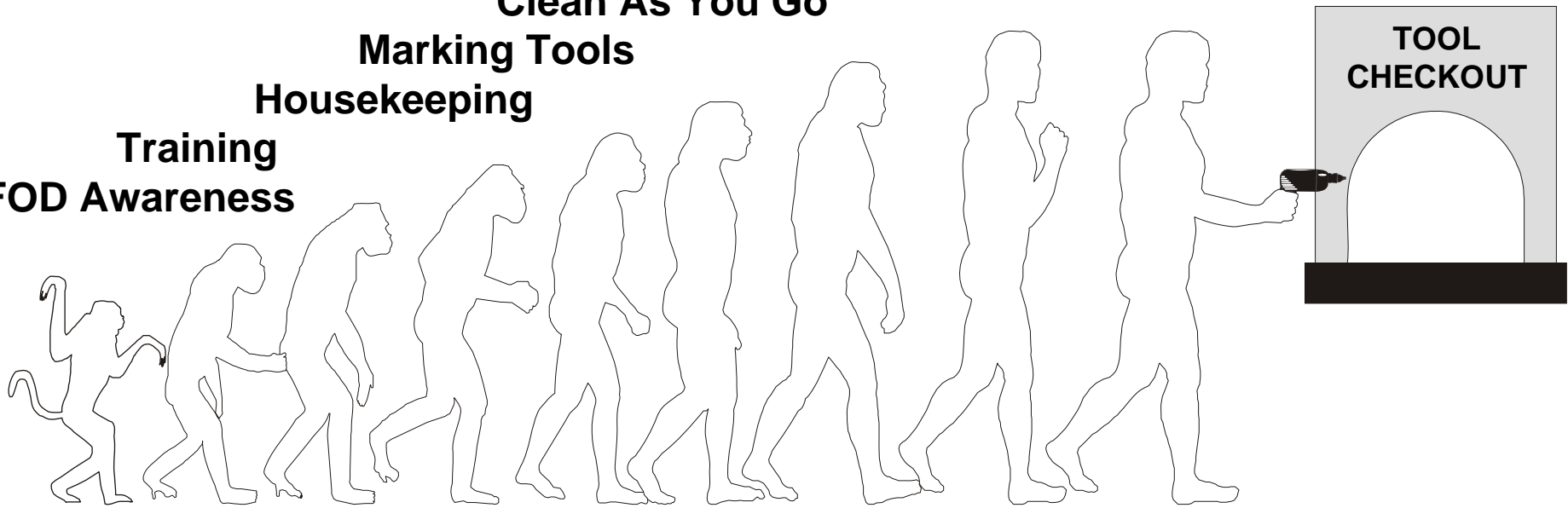
**Clean As You Go**

**Marking Tools**

**Housekeeping**

**Training**

**FOD Awareness**





# Need More Help?



**You don't  
have  
to reinvent  
the wheel!**





# Resources



- NAS 412 ([www.aia-aerospace.org](http://www.aia-aerospace.org))**
- ORM Service Guidance (OPNAVINST 3500.39, AFI 90-901, FM 100-14)**
- FOD Service Guidance (MIL-STD-980, AR 385-95)**
- NAFPI ([www.nafpi.com](http://www.nafpi.com))**

***“Prevention is  
Never Out of Reach”***  
**30th National Aerospace  
FOD Prevention Conference**  
**August 11–13, 2009**

**FOD 101**

---

**Presented By:**

**John Heib  
DCMA Aircraft Operations  
Director for Policy and Training**

