



Training Organizations to Use Technical Documentation

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It's All About reducing *Failure to Follow Procedures (FFP)*!



- FARs require that Technical Documentation must be complied with.
- If not, we risk FFP events which are *really* bad for the whole organization.
- To comply consistently we need:
 - Good documentation
 - An encouraging Safety Culture
 - Training for all personnel.

Why is FFP Still a Problem?

- “Procedure not followed” re-occurs with depressing regularity in incident and accident reports in aviation (Drury & Johnson, 2015).
- “The number one reason for malfunction was failure to comply with maintenance documentation” (Johnson & Watson, 2001), also Rankin (2008)
- Typically FFP is seen as a cause, not an effect. Thus, we blame whoever failed to follow the procedure. BUT this does not reduce FFP events!

...but Don't we Already Train?



- Maintenance organizations have both a policy on procedure following and training for new hires.
- When an FFP incident occurs, more exhortation and training typically follow.
- ...but the problem persists long-term.
- Need to find out definitively *WHY* these FFP events occur, and industry best practices that have worked to reduce them.



Aviation Maintenance may
be complex...
...but good documentation
helps...
... and so do many other
factors!



Finding Causality (1)

- Comprehensive search of ~100 data and recommendations on FFP prevention.
- Strong repeating patterns of causality.
- Tested these on incident data bases from NTSB and NASA's Aviation Safety Reporting System (ASRS).
- *The patterns were confirmed.*

Finding Causality (2)



- Validated these patterns with over 150 detailed interviews at 8 maintenance sites covering:
 - Users
 - Quality personnel
 - Writers of procedures
 - Managers.
- We asked: What is effective and WHY.

Patterns of Causes of FFPs



- Multiple causes: not just one simple fix.
- There were contributing factors for
 - The people who used the procedures,
 - The procedure itself,
 - The supervision, management and policies,
 - The working environment,
 - ...and even from the aircraft itself not matching the specification in the procedure.
- Boiled down into a simple scheme that covered all the causes we found: **TAPES**

The TAPES Classification

Top Level	Definition
Task	The actual task performed by the actor
Actor	Those involved in conducting aviation maintenance tasks, including the Aviation Maintenance Technician (AMT), MX supervisor, job inspector.
Procedure Document	The written or electronic document used by the actor to perform the task
Environment	The conditions surrounding the task to be performed. Includes physical layout, thermal / visual environment etc. excludes the documents used.
Social	The interactions between people in the broader organization beyond the immediate actor.

We used this to define Good Practices in FFP prevention: e.g. for AMTs

TAPES Best Practices for AMTs: 1

- 1.(T) Correct Procedure at the Working Point
- 2. (T) Perform all Tasks in Specified Order
- 3. (T) Recover from any distractions or Interruptions in the Task
- 4. (T) Ensure each Task Step is Signed-off
- 5. (A) Have Qualifications, Training & Experience for the Task



TAPES Best Practices for AMTs: 2

- 6. (P) Have a Clear Procedure for Successful Task Completion
- 7. (P) Communicate any Irregularities in the Procedure
- 8. (P) Procedure Does Not Require “Tribal Knowledge” to Complete
- 9. (E) Know the Risk Factors that Affect Procedure Following

TAPES Best Practices for AMTs: 3

- 10. (S) Management/ Supervisors Insulate User from Time Pressure
 - 11. (S) Use “Stop & Ask” if not Sure how to Proceed
 - 12. (S) Use a “Second Set of Eyes” to help Ensure Procedure Followed
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- ...and similar Best Practices for other actors in the system.

Does Any of This Actually Work?



- At the maintenance sites visited, we have seen *ALL* of these Best Practices implemented somewhere.
- Best Practices did *NOT* cause the company to go out of business!
- It *IS* possible if *ALL* team members do their part.

From Best Practices to Countermeasures

- Best Practices found for each team member.
- These were organized by the team member who needed to know and use them:
 - Those who use Technical Procedures (e.g. AMTs)
 - Those directly charged with quality (e.g. QC)
 - Those who produce Technical Procedures (e.g. procedure authors)
 - Those who manage the process (supervisors, managers).



Countermeasures

- For each team member, we used TAPES and the Best Practices to develop:
- A **training program** with training objectives, slides, notes for presenters.
- A **checklist** to help team members remember what the Best Practices were.
- An **audit program** to evaluate over time the effectiveness of using the Best Practices.

What do Countermeasures look like?

- The **training programs** have been designed as an integrated approach, so that different team members are mutually supported.
- EXAMPLE: Every site had a policy of always following procedures, *BUT* the policy was not always enforced, e.g. because of schedule pressures.
- We cannot expect procedure-users to follow the policy unless management/supervisors enforce it. *AND* if the procedures are well designed.



How are the Four Training Programs Structured?

- This training program comprises slides to give:
 - Detailed training objectives
 - What are FFP events?
 - Why do FFP events matter?
 - TAPES classification of causes.
 - Who needs to prevent FFP events?
 - Best Practices for Team Members (~15 slides)
 - What tools do we have to help?
 - Personal Checklists
 - Audits
 - Take-home message

Check	Good Practice: Before Task
	1. I had the qualifications, training and experience to perform the task.
	2. I had the correct procedure at the working point.
	3. The procedure was clear on the steps I needed to take to complete the task successfully.
	4. I had a way to check the task effectivity.
	5. I had sufficient time to follow the procedure.
	6. I was prepared to use “Stop and Ask” if needed.
	7. I knew who my second set of eyes was for this task.

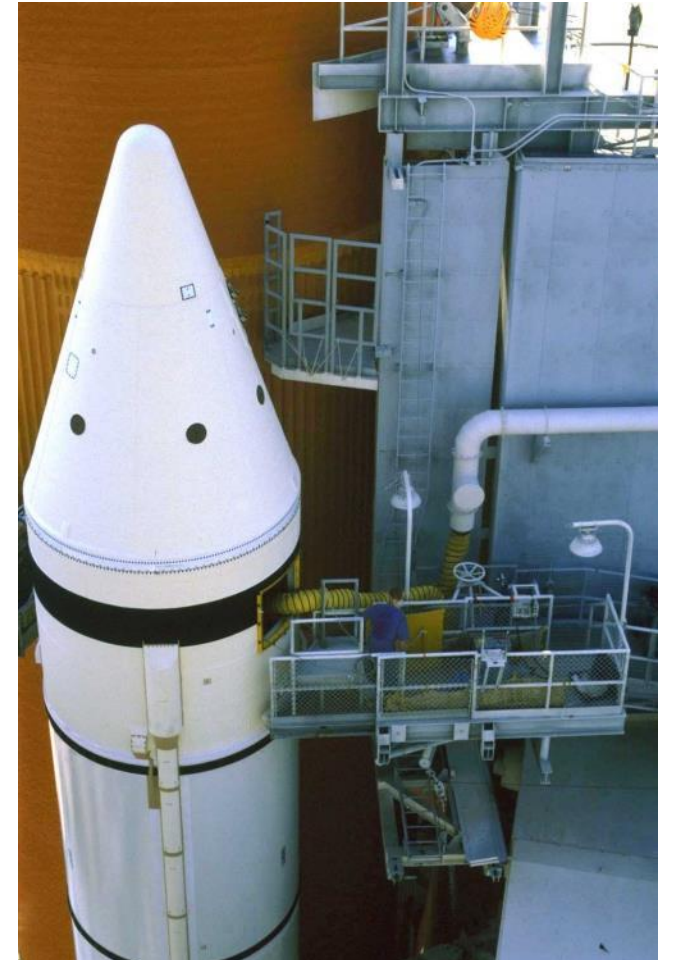
Example: Personal Checklist for AMTs

Good Practice	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. I had the qualifications, training and experience to perform the task.					
2. I had the correct procedure at the working point.					
3. The procedure was clear on the steps I needed to take to complete the task successfully.					
4. I had a way to check the task effectivity.					
5. I had sufficient time to follow the procedure.					
6. I was prepared to use “Stop and Ask” if needed.					
7. I knew who my second set of eyes was for this task.					
8. I performed all task steps in correct order.					
9. I signed off each task step.					
10. I recovered from any interruptions or distractions.					
11. My knowledge, plus the task card, were sufficient to perform the procedure without relying on Tribal Knowledge.					

Example: AMTs Audit Form

Fundamental Logic:

- Nobody comes to work to fail to follow procedures
- If somebody does not follow the procedure, it is a system problem, not just an individual user problem. (Unless very rare malfeasance!)
- We have proven and data-driven methods to design procedures so that errors are reduced.
- We have examples of good management / supervisor safety culture.
- We have good ways to train for Best Practices.
- **LET'S JUST DO IT!**



AEG Can Help You!

