SOFEMA
AVIATION SERVICES

How to Conduct a MEDA Investigation

Sofema Online (SOL) reviews in details the steps required to conduct a high-quality MEDA Investigation.

- Step-by-step breakdown of data collection and interviewing.
- Conducting non-punitive interviews with technicians.
- Gathering and analyzing maintenance documentation and work records.

Introduction - The MEDA (Maintenance Error Decision Aid) Investigation is a highly structured, non-punitive process used to investigate events caused by maintenance technician and inspector performance.

The rigorous structure of MEDA ensures that the investigation consistently probes deep into system failures, moving past the human on the receiving end of the error to the organizational and environmental conditions that set them up for failure.

The cornerstone of the MEDA (Maintenance Error Decision Aid) investigation is the non-punitive interview with the maintenance technician or inspector who was directly involved in the error event.

- Its core philosophy is that people don't intentionally make errors, and the majority of errors are due to systemic contributing factors that management can control.
- The investigation focuses on identifying these factors, rather than merely blaming the individual.
- The success of the entire process, which aims to improve the system, not punish the person, hinges on the investigator's ability to conduct this interview effectively.

The 5-Step MEDA Investigation Process

The entire MEDA process is typically broken down into five distinct steps:

1. The Event Occurs

- A maintenance-related event takes place (e.g., an aircraft component failure, delay, cancelled flight, or a maintenance procedure that resulted in an unexpected outcome or safety hazard).

2. Decision to Investigate

- An initial assessment is made to determine if the event was, or was likely, caused or contributed to by a maintenance technician/inspector error or procedural non-compliance.
- If the answer is Yes, a formal MEDA investigation is initiated. If no human error is suspected (e.g., a pure technical failure from metal fatigue), a standard engineering investigation may continue.

3. Structured Investigation (Data Collection and Interviewing)

- This is the core of the process, detailed in the section below. The primary tool is the MEDA Results Form.

4. Development of Prevention Strategies

- Management reviews the contributing factors identified in the investigation.
- **Corrective actions (prevention strategies)** are developed, prioritized, and implemented to eliminate or mitigate the contributing factors, thus making the maintenance system more resilient.

5. Feedback and Follow-up

- The results of the investigation and the resulting changes are communicated back to the maintenance workforce.
- This step is crucial for reinforcing the "Just Culture"—showing employees their participation led to systemic improvement, not punishment.

Step-by-Step Breakdown: Data Collection and Interviewing - The most critical part of the MEDA process is Step 3: The Structured Investigation, which relies heavily on gathering facts and conducting a focused interview.

Phase 1: Preparation and Initial Data Collection - This phase is conducted by a trained MEDA investigator immediately following the event.

Secure and Preserve Evidence (The Scene)

- **Isolate the area** where the error occurred (if safe and practical) to prevent disturbance of evidence.
- **Photograph/video** the scene, tools, work area, and the condition of the aircraft/equipment *before* it is fixed (if possible).
- **Collect all relevant documentation:**
  - Work card/Task card/Job instruction used.
  - Logbook entries and sign-offs.
  - Relevant manuals, schematics, and technical data.
  - Shift handover logs.
  - Tool check-out records and calibration data.
  - Parts/material usage tags (Part Numbers, Serial Numbers).

Identify Personnel

- Determine the maintenance technician(s) and inspector(s) who were involved in the task that resulted in the error. The focus will be on the person who made the final error/oversight, but the team is often interviewed.

Complete Initial Sections of the MEDA Results Form

- The investigator fills out the administrative details (General Information) and a description of the event (Event).

- The investigator objectively identifies the specific Maintenance Error that occurred (e.g., *Wrong part installed*, *Fasteners left loose*, *Functional test not performed*). This is the *what*—the interview will reveal the *why*.

Phase 2: The Non-Punitive MEDA Interview - The interview is the single most important part of the investigation. It uses a structured format to move beyond the error itself to uncover the environmental, informational, and organizational factors that contributed to it.

- Conduct the interview in a private, neutral, and comfortable location, never on the job floor or in a manager's office, as this can feel intimidating.

  The interview should take place as soon as possible after the event, while the details are still fresh, but only after the technician has had time to rest, if applicable.

The Non-Punitive Introduction - The investigator must explicitly set the non-punitive tone at the very beginning:

- "Thank you for taking the time to speak with me. I want to be clear: this investigation is about fixing the maintenance system, not finding fault with you."
- "Your input is vital. We want to understand the contributing factors, the things like tooling, manuals, lighting, or time pressure, that made the error possible."
- "Any changes we make will come directly from what we learn today."

Preparation and Setting the Stage

- **Trained Investigator:** The investigator must be trained in Human Factors and non-punitive interviewing techniques.
- **Establish a "Just Culture" Philosophy:** The investigator starts by explicitly stating the purpose:
  - "The goal is not to blame or discipline you."
  - "The goal is to understand what happened and why, so we can fix the system to prevent this from happening to anyone else."
  - "Your experience is critical to improving our procedures."

Rapport Building and The Open Narrative

- **Rapport:** Start with easy, neutral questions (e.g., "How long have you been doing this job?").
- **Open Narrative (Tell-Me-Everything):** Ask the interviewee to recount the task in their own words from start to finish, without interruption.
  - *Example:* "Can you walk me through, step-by-step, everything you did on that task? Include what you were thinking and what was going on around you."

Environment and Timing - Key Interviewer Techniques for Success

Technique	Description
Active Listening	Focus on the content, body language, and tone. Do not interrupt or judge. Use verbal cues like "I see" or "Go on."
Use Cognitive Prompts	Encourage deeper recall by asking the technician to visualize the scene. *("When you were putting the part in, what did it feel like?")*
Focus on the System	Continually redirect the conversation away from the technician's mistake and toward the systemic factors. (e.g., *Instead of: "Why did you forget?" Say: "What factors led to that memory lapse?"*)
Maintain Neutrality	Use neutral language. Avoid leading or judgmental terms like *careless, mistake, or oversight*.
Probe with "Tell Me More"	When a critical factor is mentioned (e.g., "I was tired"), respond with a non-judgmental prompt: *"That's important. Tell me more about how that fatigue affected your work."*

The previous discussions established the MEDA framework and the critical role of non-punitive interviewing.

The next vital step in a MEDA (Maintenance Error Decision Aid) Investigation is the systematic gathering and analysis of maintenance documentation and records.

This process provides the objective, factual context against which the technician's subjective account (from the interview) is validated and understood.

This step is essential for moving past individual error and uncovering systemic flaws in procedures, tooling, parts supply, and quality assurance.

Structured Questioning (Using the MEDA Checklist)

- The investigator systematically moves through the **Contributing Factors Checklist** on the MEDA Results Form.
    - This checklist is a comprehensive list of potential factors grouped into categories (e.g., Task, Information, Environment/Facility, Tools/Equipment, Leadership/Supervision, Individual Factors).

- For each category, the investigator asks open-ended questions designed to uncover systemic issues.
- Its core philosophy is that the majority of errors are due to systemic contributing factors that management can control.
- The investigation focuses on identifying these factors, rather than merely blaming the individual.

MEDA Factor Category	Example Interview Questions
Information	"Were the technical manuals accurate and up-to-date?" "Was the work card easy to follow?" "Was the required information available at the job site?"
Task/Job	"Was the procedure repetitive or confusing?" "Did you feel the task complexity matched your training?" "Were there any new or subtle differences in the task today?"
Environment/Facility	"How was the lighting and temperature?" "Was there excessive noise or vibration?" "Did the weather/shift work affect the task?"
Individual Factors	"Did you feel rushed or under time pressure?" "Did anything distract or interrupt you during the critical steps?" "How was your personal fatigue level?" (Note: This must be asked with sensitivity and within the Just Culture framework.)
Leadership/Supervision	"Were you given clear instructions for the job?" "Did you have adequate resources and support?" "Was the job assigned with realistic time expectations?"

Identifying Prevention Strategies

- After identifying the contributing factors, the investigator asks the interviewee for their expert opinion on how to fix them.
- *Example:* "Now that we know [Factor X] contributed to the error, what do you think is the best way to change our system so this doesn't happen again?"
- This step is vital for employee buy-in and generating realistic, practical solutions.

Closing the Interview

- Thank the interviewee for their honesty and valuable input.
- Reiterate the non-punitive nature of the process.
- Inform them that they will receive feedback on the changes made as a result of the investigation.

Finalizing the Investigation - Review and Confirmation

- The investigator reviews the MEDA Results Form, marking all identified contributing factors and prevention strategies.
- The final report includes the sequence of events, the error, the contributing factors, and the employee-suggested solutions.
- Work Card/Task Card/Job Sheet**:** The specific document used by the technician to perform the work. Crucial analysis points include:
    - Clarity and Ambiguity: Were the steps clear? Was any terminology confusing?

  - Completeness: Were all necessary steps included (e.g., re-arming, safety wire, lock-wiring, functional checks)?
  - Sign-offs: Were all required sign-offs completed correctly and in the proper sequence?
- Maintenance Logs/Aircraft Logbook: Records detailing the aircraft's recent history, including the write-up that prompted the maintenance and the technician's sign-off for task completion.
- Certification of Release to Service (CRS): The final document confirming the aircraft/component was cleared for operation.
- Supply and Logistics Records - These documents verify the availability and condition of resources, often pointing to major systemic issues.
- Parts and Materials Records:
  - Traceability: Did the installed part match the part number on the work card? Was the part's tag (e.g. Form 1 – 8130-3 Tag) correct, valid, and easily readable?
  - Kitting and Shortages: Was the correct kit available? Were there any deferred items or known shortages that forced a deviation from the procedure?
- Tool Control Records:
  - Calibration: Was the specific tool used within its valid calibration date?
  - Availability: Was the required tool readily available, or was the technician forced to use a substitute or wait for one?
  - Foreign Object Debris (FOD) Control: Were all tools accounted for before the area was closed up?
- **Procedural and Historical Context** - These documents establish the systemic environment and history of similar issues.
- **Supporting Documentation**: Schematics, Component Maintenance Manuals (CMMs), Illustrated Parts Catalogs (IPCs), and Wiring Diagrams used for reference.
- **Previous Similar Events:** Safety Management System (SMS) database entries or MEDA reports for similar errors in the past, often revealing a recurring systemic problem.
- **Training Records:** The technician's training file to verify they were qualified for the specific task and received relevant human factors training.

Data Entry and Trend Analysis

- The data from the completed form is entered into a central database.
- Over time, this data allows the organization to perform trend analysis (e.g., Is 'Time Pressure' a recurring factor? Are errors more common on the night shift?). This is the long-term benefit of the MEDA process.

The Core Philosophy: Just Culture

The non-punitive nature of the interview is supported by the principle of Just Culture. This means:

- No Blame: The organization accepts that human error is inevitable and is a symptom of systemic weaknesses, not a personal failing. The focus shifts from "Who made the error?" to "Why did the system allow the error to happen?"
- Trust and Honesty: Technicians are assured that if they are honest about the contributing factors, they will not face disciplinary action, provided their actions were not a malicious or reckless violation of policy.
- Learning Opportunity: The technician is viewed as the "world expert" on the job conditions and is key to identifying the factors that need fixing.

Preparation and Setting the Scene - Thorough preparation ensures the technician feels respected and safe, maximizing the quality of the data collected.

Investigator Readiness

- The investigator must be trained in Human Factors and cognitive interviewing techniques.
- They must be impartial and not directly in the technician's supervisory chain.
- The investigator must have the MEDA Results Form ready, which serves as a structured prompt for the discussion.

Sequence and Chronological Analysis - Compare the documents with the technician's timeline from the interview to identify points of failure:

- **Timeline Discrepancies:** Did the time recorded on the work card match the time the technician said they performed the task? Discrepancies may point to time pressure, 'pencil-whipping' (signing off work before completion), or working through a shift change.
- **Procedure Deviation:** Did the technician follow the steps exactly as written and signed off? If not, the documents must be analyzed to understand *why* they deviated (e.g., the procedure was physically impossible, a step was clearly wrong, or it was common practice to shortcut a step).
- **Handover Points:** If the task spanned a shift change, review the documentation for the clarity and completeness of the shift-handover briefing/log. Poor handover notes are a classic contributing factor to error.

The "Maintainability" and "Usability" Analysis
This focuses on whether the documentation itself was a contributing factor.

Analysis Area	Focus Question	Systemic Factor Revealed
Document Usability	Was the instruction confusing, poorly printed, or excessively long?	Poor technical authoring, documentation control.
Contradictory Data	Did the CMM contradict the Task Card? Was the previous log entry inaccurate?	Flawed information management or revision control.

Analysis Area	Focus Question	Systemic Factor Revealed
Access to Data	Did the technician have to leave the job site to get the manual?	Inadequate access to technical data at the point of use (e.g., poor Wi-Fi, not enough terminals).
Inspection Points	Were mandatory inspection points clearly defined and were the inspectors' sign-offs timely?	Flawed Quality Assurance (QA) or supervision.

Linking Records to Contributing Factors

The objective evidence in the records should be used to confirm or refute the subjective factors raised by the technician in the interview.

- **Technician claims 'Wrong Part':** Check the Parts Usage Tag. Was the wrong part issued from the store (a logistics factor)?
- **Technician claims 'Time Pressure':** Check the task's allocated time versus the actual time recorded in the log. Was the original planning unrealistic (a leadership/supervision factor)?
- **Technician claims 'Wrong Tool':** Check the tool crib records. Was the correct tool checked out? Was it found to be unserviceable later (a facilities/equipment factor)?

Summary of the benefit of Employing the MEDA Process

The core philosophy of Just Culture underpins the entire approach.

- By treating the technician as the "world expert" on their working conditions, the investigator can move past the visible error and uncover the systemic contributing factors—related to information, environment, tools, or leadership, that set the individual up for failure.
- By meticulously cross-referencing subjective interview data with objective maintenance records, the final MEDA report produces a factual basis for credible and effective solutions.
- Ultimately, the MEDA process is not an exercise in blame; it is a closed-loop learning system. Its consistent application allows organizations to eliminate recurring issues, build resilience into their procedures, and continuously reinforce a safe, honest, and high-performing maintenance environment.
- By gathering and cross-referencing this documentation, the investigator moves the finding away from a "human error" label and firmly establishes the organizational and systemic contributing factors that MEDA is designed to address.
- The final MEDA report uses the factual basis of the records, combined with the context from the interview, to formulate credible and effective prevention strategies.