Aviation Relentless Root Cause - Using 8D for Difficult, Recurring or Critical Problems

Sofema Online (SOL) www.sofemaonline.com takes a deep dive into the 8D analysis process

Introduction

The 8D (Eight Disciplines) problem-solving process is a comprehensive approach used primarily in the manufacturing and engineering industries to address and correct issues to prevent their recurrence. It was originally developed by Ford Motor Company in the 1980s and has since become a standard in various industries for tackling complex problems.

How the Process Works

The 8D process involves the following eight steps:

D1: Form a Team - Assemble a group of people with the product/process knowledge, allocated time, authority, and skill in the required technical disciplines to solve the problem and implement corrective actions.

D2: Describe the Problem - Define the problem in measurable terms. Specify the internal or external customer problem by describing it in specific terms.

- Describing a problem accurately and in detail is crucial to successful problem solving, particularly in the D2 phase of the 8D problem-solving process.
- A well-defined problem statement ensures that everyone involved understands the issue clearly and can contribute effectively to finding a solution.
- Use Measurable Terms - Quantify the problem wherever possible. Using measurable terms means describing the problem with numbers, dimensions, frequencies, and other quantifiable data.
- Impact of the Problem - Describe the impact of the problem. This includes how the problem affects the system, the customer, and the business. Understanding the impact helps to prioritize the problem-solving efforts based on severity and urgency.
- Be specific about where and when the problem occurs. If the problem is intermittent, try to specify the conditions under which it arises.
- Symptoms vs. Root Causes - Focus on symptoms and observable facts rather than jumping to potential causes. It's important to describe what is happening rather than why you think it is happening.
- Historical Data and Comparisons - Include historical data or comparisons if they add clarity to the scope or nature of the problem.
- Use Visuals and Documentation - Where applicable, use diagrams, charts, graphs, or photographs to help visualize the problem.
- Feedback from Stakeholders - Incorporate feedback from all relevant stakeholders, including customers (external or internal), operators, maintenance teams, etc. This ensures that all aspects of the problem are captured and understood from different perspectives.

D3: Develop Interim Containment Plan - Implement and verify interim actions to isolate the effects of the problem from any customer until permanent corrective action is implemented.

For each containment action identified, develop a detailed implementation plan. This plan should include:

- Resources required: List the manpower, tools, and materials needed.
- Action steps: Describe step-by-step how the containment will be implemented.
- Timeline: Establish how quickly the containment actions can be deployed and the expected duration until a permanent solution is in place.
- Responsibilities: Assign team members to oversee and execute different aspects of the containment plan.

With the plan in place, move forward with implementing the containment measures. Ensure all team members understand their roles and the importance of the containment actions. It's critical to act swiftly to minimize impact.

Provide training and clear communication to everyone involved in the changes brought about by the containment measures. This includes production staff, quality control personnel, and any other employees affected by the adjustments.

Once containment measures are in place, monitor their effectiveness continuously. Check if the problem is effectively isolated and if there are any unintended consequences arising from the containment actions. Be prepared to make adjustments as necessary to improve containment.

- Document all actions taken, including who was involved, what was done, when it was implemented, and any observed outcomes.
  - This documentation will be essential for later stages of the 8D process and for any audits or reviews.
- Verify Containment Effectiveness
  - Verify that the containment measures are effectively preventing the problem from impacting customers. This can be done through additional testing, customer feedback, or other verification methods.
- Prepare for Permanent Corrective Action

D4: Determine and Verify Root Causes and Escape Points - Identify all applicable causes that could explain why the problem occurred. Also, identify why the problem was not noticed at the time it occurred. All causes shall be verified or proved, not determined by superficial guesswork.

This critical step is aimed at uncovering the fundamental reasons behind a problem and identifying the reasons why the issue was not detected or prevented by existing controls.

- The first task in D4 is to pinpoint the root causes of the problem.

- Comprehensive collection of data related to the problem, including timestamps of occurrences, operational data, machine settings, and outputs at the time of the issue.
- Application of systematic methods to analyze the data and generate hypotheses about the root causes. Common techniques include:
- 5 Whys Analysis: Asking "Why?" repeatedly until the fundamental cause is identified.
- Fishbone Diagrams: Categorizing potential causes into broader themes such as People, Processes, Machines, Materials, Environment, and Measurement.
- Pareto Charts: Identifying the most significant causes that contribute to the problem, based on frequency or severity.
- Scatter Diagrams: Looking for relationships between variables to pinpoint potential causes.

Escape Point Analysis

- After identifying potential root causes, the next step is to determine escape points.
- Escape points are weaknesses in the quality control process where the problem could have been detected but wasn't.
- This part of the analysis involves:
  - Detailed examination of the entire process flow to understand where controls are in place and where they might be missing or ineffective.
  - Evaluation of the existing controls to determine if they were bypassed, failed, or were not adequate to detect the problem.
  - Considering the possibility of human error, training deficiencies, or miscommunication that might have allowed the problem to escape detection.
- Hypothesis Verification
  - Once potential root causes and escape points are hypothesized, they need to be verified. This involves testing each hypothesis to see if addressing it would prevent recurrence of the problem. Verification strategies include:
- Documentation and Reporting
  - Accurate documentation throughout the process of identifying and verifying root causes and escape points is vital.
    - All findings from the analyses and verification processes
    - .Information about the data collected and the analytical methods employed.
    - Which hypotheses were confirmed as true root causes and how they were verified.
  - Root cause and escape point analysis may need to be iterative. If initial hypotheses are disproven, or if implemented changes do not lead to improvement, it may be necessary to revisit the data, refine hypotheses, and conduct further analysis.

D5: Choose and Verify Permanent Corrective Actions (PCAs) - Select the best corrective actions that will resolve the problem without causing undesirable side effects. Verify that the selected corrective actions will resolve the problem for all affected customers.

- Here the team selects and validates solutions that will permanently eliminate the root causes identified in D4.
- This step ensures that the problem is resolved efficiently and effectively without introducing new issues. Here's a detailed review of how to conduct D5 effectively:
  - After identifying the root causes and escape points, the team must brainstorm possible solutions that address these causes comprehensively.
  - Assess each proposed solution for feasibility, cost, implementation time, and resource requirements.
  - Evaluate potential side effects of each solution on the process, product, and other system components. (It's important to ensure that the solution doesn't create new problems elsewhere.)
  - Gather data on the performance of the corrective actions during the pilot phase.
  - Develop a detailed plan for implementing the corrective actions across all relevant areas.
- Set up systems to monitor the outcomes of the corrective actions. This could include quality checks, performance metrics, or regular audits.
- Establish channels for receiving feedback from operators, customers, and other stakeholders on the effectiveness of the corrective actions.
- Continuously assess the solution to ensure it addresses the problem under all operating conditions.
- Document all aspects of the corrective actions.
  - Decision-Making Process
  - Implementation Details
  - Verification Results

D6: Implement and Validate Corrective Actions - After the best corrective actions are selected, they are implemented. It includes taking necessary steps to make the changes needed and monitoring the changes to ensure effectiveness.

Here the focus is on implementing and validating the corrective actions that were selected during D5.

- Implementation of Corrective Actions
  - Develop a comprehensive plan that outlines the steps, resources, timelines, and responsibilities.
  - Ensure that adequate resources, including personnel, tools, and materials, are available to implement the changes.
  - Conduct training sessions for all affected personnel.
  - Manage the change process by keeping open lines of communication with all stakeholders.
- Monitoring and Adjustment
  - Set up key performance indicators (KPIs) relevant to the corrective actions.
  - These indicators will help measure whether the implemented changes are achieving the desired results.

- Schedule regular review meetings to discuss the progress of the corrective actions and any challenges encountered.
- Establish feedback mechanisms to gather insights from employees and other stakeholders on how the changes are affecting day-to-day operations.
- Validation of Corrective Actions

D7: Prevent Recurrence - Modify the management systems, operation systems, practices, and procedures to prevent recurrence of this and all similar problems.

- "Prevent Recurrence," is focused on ensuring that the corrective actions implemented are not just a one-time fix but are integrated into the organization's systems and processes to prevent future occurrences of the same or similar issues.
- Review of Corrective Actions and Outcomes
- Identify Systemic Changes Needed
- Modify Management and Operational Systems
- Risk Management Integration
  - Risk Identification
  - Risk Assessment
  - Risk Mitigation

Continuous Improvement

- Adopt a continuous improvement mindset to keep refining the processes and systems. This involves:
  - Regular Reviews and Audits
  - Feedback Mechanisms
  - Performance Metrics
  - Documentation and Communication
  - Change Logs

- Cultural Integration

  - Have leaders endorse and model the changes.
  - Recognize and reward compliance and improvements related to the new systems and processes.

D8: Congratulate Your Team

- Recognize the collective efforts of the team.
  - The team members are formally thanked for their efforts, which can help build morale and encourage strong problem-solving in the future.