



Supplier Training 8D Problem Solving Approach



What is the 8D method?

8D stands for the 8 disciplines or the 8 critical steps for solving problems.

It is a highly disciplined and effective scientific approach for resolving chronic and recurring problems.

This approach uses team synergy and provides excellent guidelines to identify the root cause of the problem, implement containment actions, develop and then implement corrective actions and preventive actions that make the problem go away permanently.

The 8D:

- Isolates and contains the most basic causes of any undesirable condition.
- Identifies the factors that contribute to the problem.
- Eliminates systemic factors that cause the condition
- Keeps teams from jumping to conclusions too early.
- Prevents problem recurrence.

What are the 8Ds?

Pre 8D: Once a problem has been recognized, the 8 disciplines used to solve it are:

- 1) Team Formation
- 2) Problem Description
- 3) Implementing Interim Containment Actions
- 4) Defining Problem Root Causes
- 5) Developing Permanent Corrective Actions
- 6) Implementing Permanent Corrective Actions
- 7) Preventing Reoccurrences
- 8) Recognizing and Congratulating the Team

Post 8D: Once the problem has been resolved, the team should publish and release a **final report** along with **lessons learned**.

When is an 8D used?

The 8D approach is used to solve critical, major, chronic and recurring problems. The 8D use is typical when:

- The problem complexity exceeds the ability of one person (an expert) to resolve the problem.
- Communication of the problem resolution (during & after) must go across company levels, other departments and/or to customers.
- The customer or management requests 8-D

However, the 8D is not effective for:

- Non-recurring problems or problems which can be solved quickly by individual effort.
- Problems with known root causes.
- Making a decision between different alternatives.
- Problems where the simplest and most obvious solution is likely to be the best or adequate solution.

Why not apply the 8D to all problems?

- The 8D approach takes several weeks to several months in order to solve a problem.
- It takes a minimum of (4) people from at least 4 different organizational areas to effectively apply the 8D team problem solving approach. (Product Quality, Product Engineering, Product Marketing, Manufacturing, Supplier Quality, etc...).
- The 8D team requires senior management support for allocated time/resources and the authority to make the appropriate and required changes.

Pre 8D

This is the preparation step that needs to be done before starting the 8D process.

What kind of preparation is done here?

- A deeper understanding of the problem and its history are necessary to determine if the 8D is the right method to be used for solving the problem.

Recognizing the problem:

- Is it a new problem? Is it chronic?
- Has it occurred before?
- What is the history of the problem?
- How was it solved before?
- Why didn't the solution prevent the problem from happening again?
- What problem solving method was used?
- Does the problem warrant/require an 8D? If so comment why and proceed.

1- Team Formation

Team formation is the first discipline of the 8D approach. This discipline is very important as the 8D is based on the foundation of team synergy. FORM, NORM, STORM, PERFORM is the model. This first discipline will establish a small group of people with the process/product knowledge, allocated time, authority and skill in the required technical expertise to solve the problem and implement corrective actions.

Why is team approach important?

- A team can perform more effectively than individuals trying to solve problems.
- A group of people can communicate and think creatively.
- Brainstorming as a group can stimulate ideas giving the team a better perspective of the problem.

1- Team Formation (continued)

Who should be on the 8D team?

An 8D team consists of 4 to 8 people who are closely related to the problem. It usually involves people from different functions/departments in the organization coming together to solve a common problem.

- **A champion** (i.e. an executive sponsor not a working team member) that is ultimately responsible for fixing the problem.
- **A team leader** (i.e. Quality engineering or Product Manager) - The person who coordinates the entire 8D project through-out all of its disciplines. Makes sure the team is on track and all team members are working together to resolve the problem.
- **An 8D expert** (i.e. Quality Engineering) - A person who knows the 8 disciplines. He/she guides the team through the 8 disciplines using the appropriate quality tools at each step.
- **A subject matter expert** (i.e. PCBA expert, SW controls expert, bearing specialist, vacuum specialist, etc...)
- **Supporting Cast** (i.e. Supplier Quality, Electrical Engineering, Mechanical Engineering, Manufacturing Engineering, Operations, Field Service, RMA, Technical Support, Marketing, SW /Application Engineering, etc...) - people who have practically experienced the problem and understand the pain it causes.

1- Team Formation (continued)

Responsibilities:

- The team leader must generate a list defining the team structure in order to ensure that a team was actually formed for the 8D project. This list is also useful to define the function/role each team member will play in the 8D project.
- The team leader must schedule meetings periodically to review progress of the 8D project and discuss action items in order to meet all expectations.
- The team leader must maintain minutes of the meeting documenting all that happened in the meeting. Meeting minutes may include:
 - Team progress.
 - Key decisions reached in the meeting.
 - Planned versus actual completion dates for all actions.
 - Who needs to take what action? When? Where? How?
- Team leader may change any member's roles and responsibilities once the problem statement is further refined and understood.
- Team members must complete their actions and report back to the team leader.

2- Describe the Problem

Describing the problem starts with a well-thought-out problem statement.

The problem statement will:

- Communicate the scope of the problem that the team is working on and get the team focused.
- Provide information relevant to the problem: data and information on what the problem is and what the problem isn't.
- Clarify the role the team should play (determine root causes and implement or recommend a solution), specify the deadline and include monetary limits for the team.
- Lays down expectations from the team and deliverables that will be measured.
- Be the output of a process used to amplify the problem statement in terms of Who, What, Why, Where, When, and How Big (how much, how many, how often - level of pain).

Tools to be used:

- Data collection for background information (is / is not analysis).
- Pareto charts.

2- Describe the Problem (continued)

| | IS | IS NOT |
|------------------------|--|---|
| Who | Who is affected by the problem? Who first observed the problem? (internal/external) To whom was the problem reported? | Who is not affected by the problem? Who did not find the problem? |
| What | What type of problem is it? What has the problem? What is happening? Do we have physical evidence of the problem in our possession? | What does not have the problem? What could be happening but is not? What could be the problem but is not? |
| Why | Why it is a problem? Is the process where the problem occurred stable? | Why is it not a problem? |
| Where | Where was the problem observed? Where does the problem occur? | Where could the problem be located but is not? Where else could the problem be located but is not? |
| When | When the problem was first noticed? When has it been noticed since? | When the problem could have been noticed but was not? |
| How Much / Many | Quantity of problem? How Much is the problem causing in dollars, people, & Time? | How many could have the problem but don't? How big could the problem be but is not? |
| How Often | What is the trend (continuous, random, and cyclical)? Has the problem occurred previously? (If so attach previous analysis) | What could the trend be but is not? |

3- Containment Actions

An interim containment action means that a “band-aid” is put in place to prevent the effect of the problem or to prevent the full effect from impacting customers and/or employees while a permanent solution is being developed and implemented. Interim containment may include: quality alerts, inventory purge and inspection, sorting bad parts from good ones, adding short term operations, reviewing current procedures, using additional labor on the process, additional inspection and tests, etc...

Why is interim containment necessary?

- While the problem solving team is trying to find the root cause of the problem and implement corrective actions, there will be some defective products produced by manufacturing.
- It is important to prevent these defective parts from reaching the customer. Interim containment guarantees that the defects are contained in the facility till the problem is completely solved.
- If defective parts make it to the customer, it may result in field failures, warranty claims and customer complaints.

3- Containment Actions (continued)

Check Points:

- Have the interim containment measures been verified to work?
- Are they appropriate? Are they effective?
- Has the impact of the interim containment measures been tested to ensure that no additional problems are being created?
- Are the actual additional costs of the containment measures known? Have they been verified that they are “worth” it?
- Never allow an interim containment action to cover the gravity of the problem thus reducing the need for a permanent solution.
- Interim containment if left alone will become part of the process. It can become a hidden action that does not add any value, but adds only cost. In lean manufacturing this is a waste that needs to be removed.
- Containment is NOT a solution, nor is it a corrective action.
- Containment actions could be implemented internally (local inventory, WIP, finished goods), globally (spares depot, repair sites, etc...) at a supplier site or at a customer site depending on the nature of the problem.

4- Develop Root Cause

Defining the root causes of a problem is the core of the 8D problem-solving process. This is normally the toughest aspect of the problem-solving process; if the root causes of the problem were obvious, then the problem would have been solved already. There are usually two families of causes at work when we know there is a problem:

- The first, the causes that appears to be the problem, are frequently symptoms, not root causes.
- The second, the specific causes that allowed the apparent symptoms to occur, are the root causes and often buried deep in the process.

Tools to be used:

Pareto Charts

Affinity Diagram

Brainstorming Session

5-Whys Process

Fishbone Diagram

Fault Tree Analysis

Statistical Analysis

ANOVA

DOE

Regression Analysis

Hypothesis Testing

GR&R

Flow Charts

Audits

FMEA

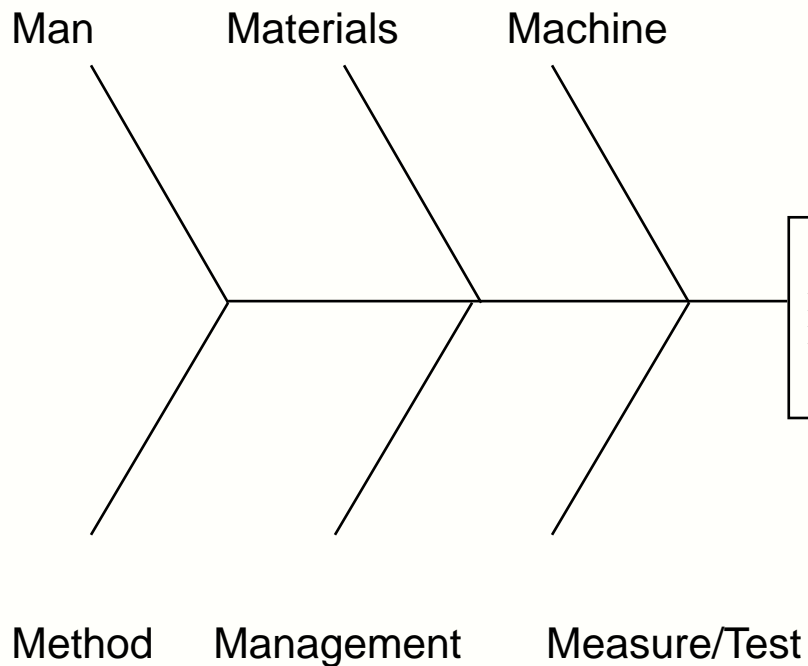
4- Develop Root Cause (continued)

Check points:

- Make sure the cause identified is not just a symptom but is the actual root cause.
- Do not cure the symptom, as this may be the reason for the problem to recur.
- Ask the Root Cause Question: “Do these causes explain all that is known about what the problem is, as well as all that is known about what the problem isn’t?” This is really a two-part question: make sure the root causes found fit both the “is” and the “isn’t” sections of the question. If the causes being tested don’t fit both, then they are probably not the root causes.
- Have the root causes identified been verified? Verification may require a series of confirmation runs.
- Can you induce the failure? (turn the failure mode on/off)
- How did it happen? How did it get out?

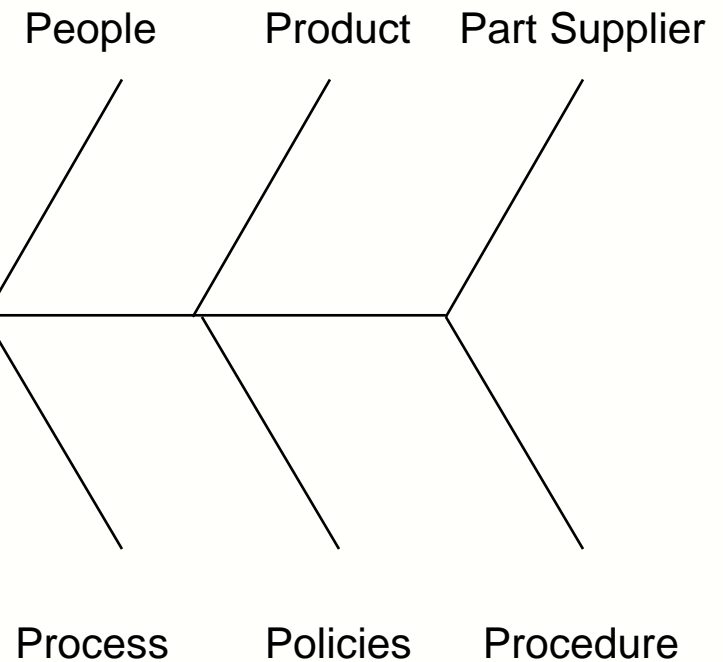
4- Develop Root Cause (continued)

Why part is defective? (6M)



Why did it get out? (6P)

Failure Mode



4- Develop Root Cause (continued)

5-Why Process?

Failure mode root cause:

- **FMRC1:** Add 1st why
- **FMRC2:** Add 2nd why
- **FMRC3:** Add 3rd why
- **FMRC4:** Add 4th why
- **FMRC5:** Add 5th why

Escape root cause:

- **ERC1:** Add 1st why
- **ERC2:** Add 2nd why
- **ERC3:** Add 3rd why
- **ERC4:** Add 4th why
- **ERC5:** Add 5th why

5- Develop Permanent Corrective Actions

Often the solution or solutions become obvious once the root causes are known. However, sometimes, a systematic approach is needed to use the root cause analysis to develop a solution. If the solution is obvious, select the best solution or mix of solutions that will lead to a robust, yet cost-effective, resolution. If solutions are not yet evident, follow the data trail. When solutions are not obvious, often the root cause has not been found.

Criteria for choosing the best solution:

- Practical - The 8D team should be able to implement the solution practically.
- Feasible - The solution must be feasible.
- Cost effective - Implementing and using the solution must be cost effective.
- Robust - The solution shouldn't fail when used in production. Robustness of the solution is an essential characteristic (error proofing, impact-effort matrix)
- Team Champion must have full buy-in to Permanent Corrective Actions and facilitate their implementation.

5- Develop Permanent Corrective Actions (continued)

Validating the solution is important:

- It is necessary to establish that the solution will make the problem go away without leading into other unwanted issues. That is why the 8D team should try out the solution with small quantities first to verify its effectiveness.
- A design verification test (DVT) and/or a reliability demonstration test (RDT) may be required depending on the solution.
- The solution is first to be tried on small lots to validate that it has indeed solved the problem prior to full implementation.

5- Develop Permanent Corrective Actions (continued)

Check points:

- Do not develop solutions that do not consider the practical aspect of production.
- Never forget to consider the capability of manufacturing (machines, people, etc...) when developing solutions.
- Never forget to consider the capability of the supplier when developing new parts or tighter specifications.
- Has the solution passed the tests of practicality, feasibility and cost-effectiveness?
- Is the solution robust and capable of preventing a recurrence of the problem?
- Does the ROI (return on investment) or the payback of the solution justify the cost of implementing the solution?
- Can the solution be implemented within the required deadline?
- Is training required? If yes, have plans been generated?
- Is the solution in violation of the copy exact terms or POR? If yes, have plans been communicated with customers?

6- Implement Permanent Corrective Actions

Once the solution and its implementation are approved, the next step is to create an Action Plan. The Action Plan outlines what steps are needed to implement the solution, who will do them, and when they will be completed. A Simple Action Plan merely documents what needs to be done, who will do it, and when will it be done by. A complex solution needs more thorough planning and documentation.

Check points:

- Is a Simple Action Plan (who will do what by when) adequate or will a Complex Action Plan be needed?
- If a Complex Action Plan is needed, have Activity Plans, Gantt Charts and PERT Charts been developed?
- Part of implementing a solution is to document new procedures or changes to procedures as well as any changes that relate to the organization's quality system; has this been done?
- Has training to support the new system (s) been developed and provided?
- After people use the new or revised process a few times, they most likely will have some improvement ideas. Have the suggestions been assessed, and have corresponding adjustments been made to the process, has the documentation been updated, and has retraining been provided?

7- Prevent Re-occurrence

The job of a problem-solving team is not complete once the solution is implemented. Preventing recurrence is an important part of a problem's solution. To prevent recurrence of the problem, the team must verify that the outcome of their Action Plan works and they must validate that the outcome is on-target. Verification is testing that the solution produces the desired outcome; validation is ensuring that the outcome really solves the problem.

Check points:

- Has the outcome of the Action Plan been verified to work?
- Has the outcome been validated to be on-target?
- Have Action Plan results been documented, related procedures updated, and corresponding changes to any affected quality system elements made?
- Have audits been established to assess the use and effectiveness of the solution to ensure that the gains are held?
- Have the results been leveraged to prevent occurrences of like problems in all similar operations?
- Are all necessary controls for the solution are in place?

Tools to be used:

Control charts

Control plans

Histogram

Capability Analysis

FMEA

GR&R

8- Recognize the Team

Once a team has completed implementing the solution and ensured that the solution works, all team members deserve to be congratulated. Team members need to know that their efforts are appreciated and that the organization knows about their accomplishments.

- The organization (leadership group) shall recognize the team for their efforts in a timely manner.
- The project team shall recognize those that have provided the team with support and assistance.

Post 8D

Once the problem has been resolved, the team should publish and release a final report along with lessons learned.

- The 8D report gives a quick snapshot of what was done in the project and categorizes them under the 8 Disciplines.
- The report serves as a communication tool showing overall progress of the 8D project along with actions taken.
- Also, a very useful tool to share is the "Lessons Learned" and project findings.
- Completed 8Ds to be posted on the shared quality site (under 8D reports).



8D Problem Report

Add Report Title

Add report author name

Add report date



8D Problem Report

Add Report Title Here

1 2 3 4 5 6 7 8

| | |
|---|---|
| <p><u>D1: Team Formation</u> Leader: Add team leader name Members: Add team members (name / position)</p> | <p><u>D5: Develop Permanent Corrective Action(s):</u> Short Term: List short term corrective action(s) identified</p> <p>Long Term: List long term corrective action(s) identified</p> |
| <p><u>D2: Problem Statement</u> Add team problem statement</p> | |
| <p><u>D3: Containment Action(s):</u></p> <p>Supplier: Add containment action(s) taken at supplier here Stock: Add containment action(s) taken in parts in stock WIP: Add containment action(s) taken on parts in WIP FGI: Add containment action(s) taken on parts in FGI Repair Centers: Add containment action(s) taken at repair centers Customer: Add containment action(s) taken on at customer sites</p> | <p><u>D6: Implement Permanent Corrective Action(s):</u> List corrective action(s) implemented</p> |
| <p><u>D4: Develop Root Cause(s)</u></p> <p>Failure mode root cause: FMRC1: Add 1st why FMRC2: Add 2nd why FMRC3: Add 3rd why FMRC4: Add 4th why FMRC5: Add 5th why</p> <p>Escape root cause: ERC1: Add 1st why ERC2: Add 2nd why ERC3: Add 3rd why ERC4: Add 4th why ERC5: Add 5th why</p> | |
| | <p><u>D8: Recognize the Team:</u> List action(s) taken to recognize the team</p> |

Action Item Table

| # | Actions | Owner | Date Due | Date Completed | Comments | Status |
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