

# 8D Methodology : From Concept to Application Across Manufacturing Industries

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## ABSTRACT

In the manufacturing organizations the process management and quality management is most important functions. Today's, in a competitive environment to stable organization for long time the organizations want to be successful they must quickly acclimate to changing conditions. If the problems are occurring in the organization related to the product and process the organization should be able to solve occurring problems with the flexibility towards conditions. In the organization there are various tools and methods are used for solving the occurring problems. But, there are one of these methods is 8D (Eight Disciplines). It is a structured process to solving the problems. The 8D methodology allows to solve the problems on time and correctly. Due to that fact, the 8D methodology is one of the best usable approaches for improving the quality of product, process and sort out the complaints of customer. In this research, the 8D methodology has been applied to solve the problems in the automotive industries. The subject area will yield a large value to implementing the 8D methodology for academics, advisers, researcher, and practitioners.

**Keywords :** The Quality Assurance, Quality Tools & Techniques, 8D Methodology, and Root Cause Analysis.

## I. INTRODUCTION

The 8D method is a technique, in which the main principle is a consistent or a standardized process with an importance on specifics, it is also beneficial to improving the product quality and the working processes. When the problems takes place in the working place and customer end then the 8D method reach the origin of the problem and determine its root causes (Bogan, C.E. and M.J. English, 1994). This method is also known as various other names like Global 8D, 8D, and Ford TOPS 8D.

During the Second World War the United States Government talking about a process which is used to solving military problems with a standard then the US Government implement the 8D method first time. The methodology to apply to military standard and was referred to as the Army Directive 1520 "Remedies and Disposal of nonconforming material." After that the Ford Motor Company in 1960, 70 used the 8D method in their production line and taking decisions about the facing problems and solving problems permanently. After using this method by Ford Motor Company this

method was popularized World Wide (Dhafr, N., M. Ahmad, B. Burgess and S. Canagassababady, 2006).

In 1987 the Ford Motor Company was set up a course "Team Oriented Problem Solving." This course was designed for eliminate recurring problems to effective way. The 8D method is necessary comprehensive and structured approach to problem solving in the automotive assembly and production line (Deepak Dhouchak, 2017).

## II. METHODS AND MATERIAL

In the organizations that use a method of addressing problems such as method 8D significant competitive advantage. They can:

- To identify the root causes faster and easily implemented permanent corrective action.
- In the event of a problem it is easy to ensure lasting customer satisfaction.
- Prevent reoccurrence.
- Learning through shared information to be re-used.

The 8D method has consists of several parts, which is known as 8D report. These are the following steps:

### D1: - Make a Team (Team Approach)

In this step the main purpose to establish a team of selected member with adequate knowledge about the process and product. They know about where the problem occurred, why the problem occurred, and they have experience in the technical disciplines needed to solve the problem and taking action. The team have been 4-10 members with all the necessary knowledge and experience (Dhafr, N., M. Ahmad, B. Burgess and S. Canagassababady, 2006).

### D2: - Problem Description

In this step of 8D methodology we have identifies the problem to be solved, and explain the specified details of problem with all necessary parameters. In this step the team member first analysis the problem, and how it has been often. In this research, here we find the problem is occurring in the alternator assembly. The problem is alternator bracket M10 Mounting Lug is broken at customer end when the alternator is mounting on their desired place at engine.

### D3: - Interim Containment Action

The interim containment action (ICA) is a temporary action to protect the customer from the problems on the spot when the problem has been occurred. This action has been removed after creating a permanent action. Here we know that the alternator bracket is broken when they mounting. So the team gives the order to customer put the all pieces at hold for the replacement with new good condition pieces.

### D4: - Define and Analysis the Root Cause

The root cause must be identified to take permanent action to eliminate it. The problem is occurring during the root cause at casting process.

- Comparative analysis listing differences and changes between “Is” and “Is Not”.
- Development of root cause based on remaining items.
- Verification of the root causes through data collection.

- Review Process Flow Diagram for location of root cause.
- Determine Escape Point, which is the closest point in the process where the root causes could have been found but was not.

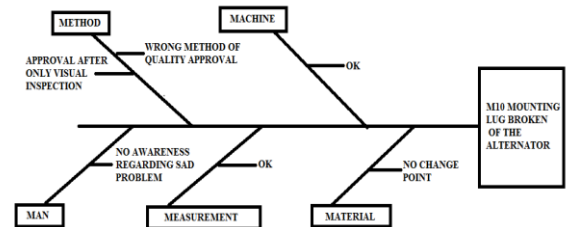


Figure 1: 8D Approach

### D5: - Determination of Permanent Corrective Action

The principle of this step is to select the best permanent corrective action to exclude the root cause and remove the leak permanently by applying best cure. In this research, the worker is not aware about temperature and pressure applying during the casting of the bracket. This is the main leak find out during the root cause. The trainer gives the training to worker about the all process takes place during the casting and aware about the work.

### D6: - Implementation and Validation of Permanent Corrective Action

In this step, the main purpose is to plan, implement and validate the selected permanent corrective actions. Before, the implementation and validation of the permanent corrective action remove the implemented interim corrective action or temporary actions.

### D7: - Preventing a Recurrence of the Problem

In this step, there are modifying the all necessary documents, systems, operations and procedures according to the permanent corrective action to prevent a recurrence for future similar problems.

### 8D: - Conclusion of the Problem and Congratulate Team

In this step, the main purpose is completing all documentation work in 8D report and congratulate team.

### III. RESULTS AND DISCUSSION

In his own study, we are using 8D method to solve the problems of the customers. In our case it was a problem that occurred during the alternator assembly, the alternator bracket M10 mounting lug is broken at customer end. The customer complaints is the problem

to company. The team of problem solving applying 8D method and find out that what is the problem and how it was occurred and root cause the problem. This problem was solved by using the 8D report.

8- DISCIPLINE PROBLEM SOLVING APPROACH						
Customer Ref No/ NC No.		Reported Complaint		Category		Page No :- 1
Date of complaint	09-02-2016	4M Distribution		Model	<b>7001</b>	
Part Name	alternator bracket		Part No	7009	Department	<b>casting</b>
<b>1. USE THE TEAM APPROCH :</b>			<b>2. PROBLEM DESCRIPTION :</b>			
Champion :			What is the problem ?	M10 mounting lug broken		
Team Leader :			Why is it a problem ?	Casting defect		
Team Member	Dept	Title	Where was it detected ?	Customer End		
			When was it detected ?	When mounting the alternator at vehicle		
			Who detected the problem ?	Customer		
			How many ?	minor		
			Spec.Requirement	Part should be defect free		
			Observation(NG)	Part broken due to casting defect		
			Deffective Qty	seven pieces		
			Lot Size	100	Mfg. Dt.	

3. Containment Actions / Customer Protection (Within 48 hours)					
Immediate Action		Leader	Implementation Date	Closure Date	
1. All material verified at customer and Jumps end					
2. Inform to all concerned					
3. All NG material isolated from line					
All available stock was isolated and sorted with the following results.					
Date	Location	Total Qty	OK Qty	Ng Qty	Identification Mark
	Customer End	100	93	7	Red Tag
	Jumps (Assly line)	200	180	20	Red Tag

4. Define & Verify Root Cause - 5 Why 1H (Within 3 days)						
	1st WHY	2nd WHY	3rd WHY	4th WHY	5th WHY	1H
<b>Occurrence</b> ( Burr observed in slot)	M10 Mounting Lug Broken	The DEH bracket braked due to cold shut observed at that portion	Fitment not possible at customer end	Setting pieces of Die casting mix with OK supply	Wrong method of quality approval, approval given only after visual inspection	1. All temp. and Pressure parameter do not check during casting 2. Training to be provide to the casting operator,
<b>Outgoing (Burr observed in slot )</b>	Inspector has not checked the parts	quality approval given only after visual inspection	Part handover process not followed	Check on check system not available for all areas		1. PDI check sheet to be made, 2. Operator training
5. Work out the suggested ideas (min. one Poke-Yoke) and verify the root cause within 7 calendar days;						
Action				Responsible	Date of Implementation	
A new bracket has been changed in alternator				Assembly line		
The all casting process should be changed permanently according to root cause analysis				Quality Department		
Fixed all the temprature and pressure parameter according to requirement				Quality Department		
<b>Result of the root cause verification;</b>						

6. Define & Implement the permanent corrective actions within 14 calendar days;		
Action	Responsible	Date of Implementation
All the related document should be changed for future prevention	Quality Department	
<b>Tracking of the effectiveness (validation)</b>		
<b>Responsible</b>		
<b>Check date</b>		
7. Measure to avoid the repetition of the problem, prevention of recurrence of the defect for similar pers or process within 14 days;		
<b>Product/Product FMEA</b>	<b>Actions:</b> All material of casting should be changed according to the quality issues, approved by QC Department.	
<b>Process/Process FMEA</b>		
<b>Control-plan</b>		
<b>Instruction</b>		
<b>Responsible</b>		<b>Date:</b>
<b>Results:</b> After taking all these actions we solve the problem of customer and prevention of recurrence for the future. Congrets our team		

Figure 2: 8D Reports

## Counter Measurement Sheet


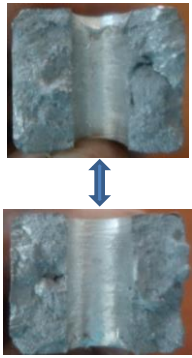
Countermeasure Sheet			Approved by	Checked by	Prepared by
Customer Name :-		Location :-		Complaint Reference No :- 300	
<b>1. Occurrence details :-</b>		<b>Sr. No.</b>	<b>3. Counter measure</b> (Containment, Corrective & Preventive Action Plan)	<b>Target Date</b>	<b>Status</b>
Product :-	Alternator Assembly	<b>A</b>	<b>Containment Action:</b>		
Model :-	JS1008	1	Put on hold all defected pieces at customer end for replacement		Complete
Failed Qty :-	7Pc	<b>B</b>	<b>Corrective Action:</b>		
Batch Code :-		1	A new bracket has been changed in alternator.		Complete
Problem reported date :-		2	The all casting process should be changed permanently according to root cause analysis.		Complete
		3	Fixed all the temp. and pressure parameters as required.		Complete
		<b>C</b>	<b>Preventive Action:</b>		
<b>Problem :</b>		1	All the related document should be changed for future prevention.		Complete
M10 Mounting Lug Broken		<b>Photo (Before)</b>		<b>Photo (after)</b>	
<b>2. Why Why Analysis :</b>					
<b>Why-</b>	M10 mounting lug broken.				
<b>Why-</b>	The DEH bracket braked due to cold shut observed at that portion.				
<b>Why-</b>	Fitment not possible at customer end.				
<b>Why-</b>	Setting pieces of Die casting mix with OK supply				
<b>Why-</b>	Wrong method of quality approval, approval given only visual inspection.				
<b>Root cause :-</b>	Analysing on cold shut with material temp, die temp, and injection pressure.				
<b>4. Standardisation:-</b>	<input type="checkbox"/> Drawing <input type="checkbox"/> PFMEA <input type="checkbox"/> Control Plan <input type="checkbox"/> PFD <input checked="" type="checkbox"/> PCS <input checked="" type="checkbox"/> IS				

Figure 3 : Counter Measurement Sheet

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