

# Methodology and Technique of 8D's to Solve the Problem

Suraj Kumar<sup>1</sup>, Dr. Munna Verma<sup>2</sup>, Dr. Dharmendra Kr Dubey<sup>3</sup>

Research scholar, Department of ME, Bhagwant University, Ajmer, India<sup>1</sup>

Assistant Professor, Department of ME, Bhagwant University, Ajmer, India<sup>2</sup>

Professor, Department of ME, Chhatrapati Shivaji Maharaj Institute of Technology, Navi Mumbai, India<sup>3</sup>

**Abstract:** Now a days in market there is too much competition for quality in automotive, crane manufactures etc. large production in different lines i.e., means so many kinds of products are manufactured and for them one is biggest challenge for quality. the 8d technique and their methodology is used to eliminate the problems and issues in production. it can be followed for products, systems and processes. 8d technique is being used as a tool for preventive as well as corrective action. 8d's first importance for client and inner issues. technique of 8d's also applied to understand the issues and how to resolve the issue, by finding the root cause. it works on PDCA cycle. 8d's is also known as team-oriented problem solving (tops). Now this work gives the opportunity in direction of examine how the 8d methodology and technique improve the quality in as well as improve the earnings and reducing defects and keep stable in global market.

**Keywords:** Quality assurance, Tools & Techniques of Quality , 8D's Problem Solving Method, methodology & concept of 8D

## I. INTRODUCTION

8D's method is developed at Ford Motor Company & introduced in 1987 & oriented as TOPS (Goodwin et al., 2019). Implementation of 8-D method shows the frequency of defects before and after implementing the 8D's tool of inverted cables (Vargaes et al., 2020). The Eight steps of Problem Solving approach can be used to identify, rectify as well as to eliminate the quality problems. The whole team should be better and smarter (Lalit Kumar Biban, Deepak Dhouchak & Shakti, 2017). It is designed into eight disciplines which is illaborated step by step of 8D.

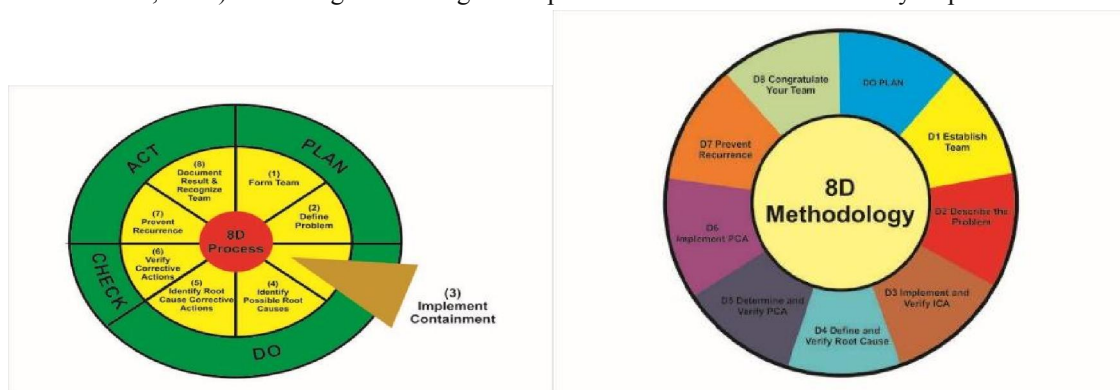
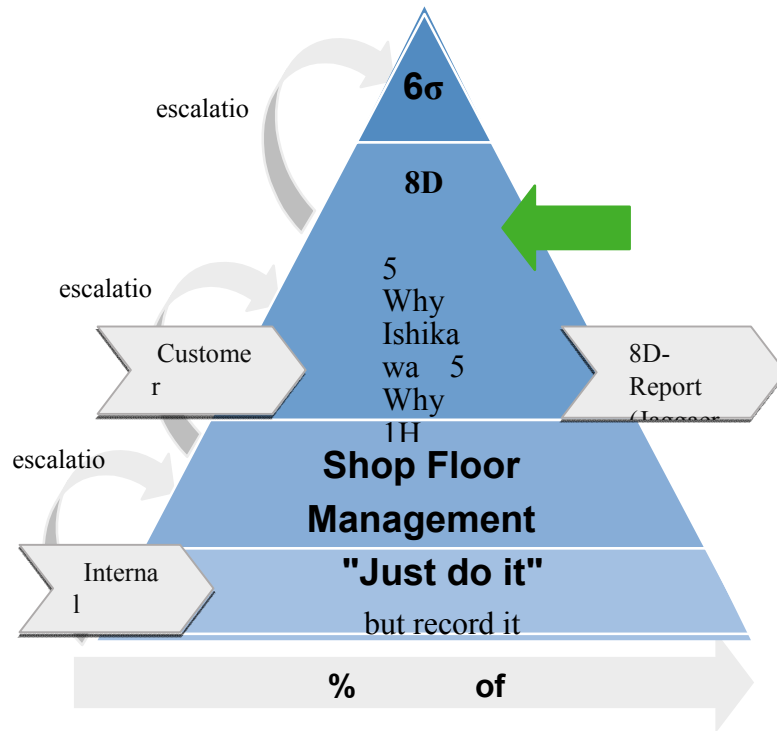


Fig. Intro" 1" Diagram of 8-D in term of PDCA (Ref. PDCA cycle)

There are many problem-solving tools and technique that is shown in problem - solving pyramid depending on time/complexity and the percentage of problems .

### 8D Methodology Introduction:

Primary target of the 8D technique is to find the the root cause of issues, rectify them and eliminate problems in a team approach, while making the problems solved useful in product and process improvement.



**Figure 1: pyramid of problem-solving pyramid**

**Problem:** To deviate from aspect state, then it is proposed and to implement in a short-term fix and a long-term solution to prevent the recurring issue and in this 1-5-20 technique is followed. The 8D essential and critical steps are to achieve this:

- D1:** Formation of a problem-solving team
- D2:** Problem description **D3:** Containment action
- D4:** Root cause analysis
- D5:** Potential corrective action
- D6:** Implement corrective action
- D7:** Take preventive action
- D8:** Closure & team celebration

**1-5-20 technique is as:**

1 1 day or after 24 hours receiving the complaint, the supplier has to define and to communicate the containment actions (D1-D3).

5 After Five working days supplier has to define as well as to communicate the root cause analysis along with corrective plan (D1-D5).

20 After twenty working day supplier has to communicate about the implemented corrective and preventive actions (D1-D8).

**D1: Team Formation**

In this step problem-solving team is defined to form a problem-solving team. Selected members should be from different fields, they will be from production, quality, development, operation etc.

**Team of experts**

Members should have the Competency  
To analyze the root cause

Have ability to define and implement corrective and preventive actions as well as ability to monitor the result  
They will be listed with their function.

Leader of the team is whole sole responsible for the perfectly execute of the 8 steps.

Result

A team is defined.

- Leader of team is define
- Multifunctional team along with different skills & knowledge
- Main key is Communication
- Resources are identified and approved by management

D 2: Problem Description- To define the quantify and describe the issues.

Procedure:

Short description- working title that has a identification for team members

Detailed description includes:

- a) detail of customer inspection report
- b) failure effect
- c) To identify the exact failure reason
- d)5W1H method:
- e) all available information:

Production date, shift batch

Measurement results

Rejected quantity

5W1H Method

This method is a 6 questions technique.

Bring questions related to problem core points

Justify the problems

To create the mutual understanding within team

Find out the data and facts resulting from the issue.

to obtain the details, data and facts resulting from the problem.

Question		Explanations
1.W	What?	What specific object has the p
2.W	When?	When was the problem obser
3.W	Where?	What part/place did the proble
4.W	Who?	Can the problem be associate
5.W	Which?	Is there a trend?
1.H	How?	How is the deviation from des

Figure 2: 5W1H Method

What specific product has the issue? For fact-based information such as object or type, number is helpful.

When issue observed? Detail such as time, date, shift or interval are important.





Which part and on which place the issue occurred?

Can problem have linked with skills? Can error linked with certain qualifications? On which shift, which employee is affected and what qualification is required?

Is there a inclination? Does the error occur chronically? Observations can be confirmed by key figures?

How is the divergence from the desired state. Divergence must be evaluated by the data.

Result

	Take sufficient time to understand the issue
	Use data and facts
	summary problem statement & specification
	start to think where else?

D3: Containment actions

Determine and execute containment actions to isolate the issue from any customer to avoid the assembly and delivery of suspected part.

**Procedure**

Containment is nothing it's a kind of isolating step to protect the customer

Problem must be hold and suspicious parts to be separated and quarantined.

Describe meanwhile restricted steps in addition the regular process flow (what action: 100% inspection, sorting, rework of the parts)

Restraint actions are reasonable if they ensure that no further defective parts come to the customer.

For each restraint action responsibility is to mention and monitored the start date as well as current status.

Collected data & monitored status should verified to check the effectiveness.

D3: Root cause Analysis-Decide, identify, and verify root causes



Figure 3: Procedure D 3

Application

After doing the problem description in D2 we have to follow up with the root cause analysis in D4.

**Root Cause Types:**

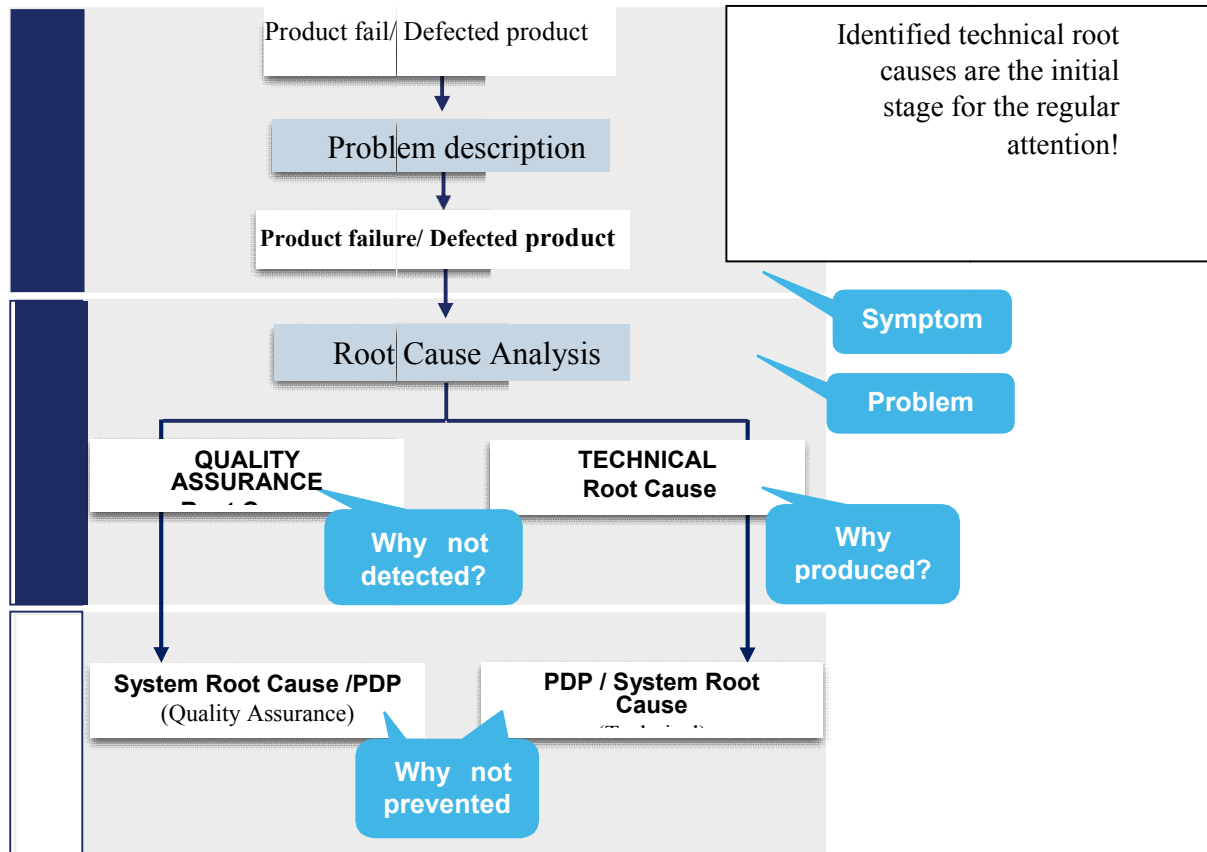
To ensure that same issue don't reoccur in the future, all levels of reason must be considered.

We have to analyze the reoccurred case & not identify the:

**Technical root cause** which tells the reason of defect in the product.

**Quality Assurance root cause** which tells the reason why the defective product was not identified and did get away to the customer.

To deep analysis we must considered failures in development phase (PDP) to find out the answer why the problem was



not prevented.

**Figure 4: Root Cause Analysis**

**QM tool for the root cause analysis:**

For root cause analysis which depends upon on the evaluation of the problem for this we different tools.

If **Potential cause is known** (by the knowledge as well as by the experience)

5-Why is used to identify the root cause.

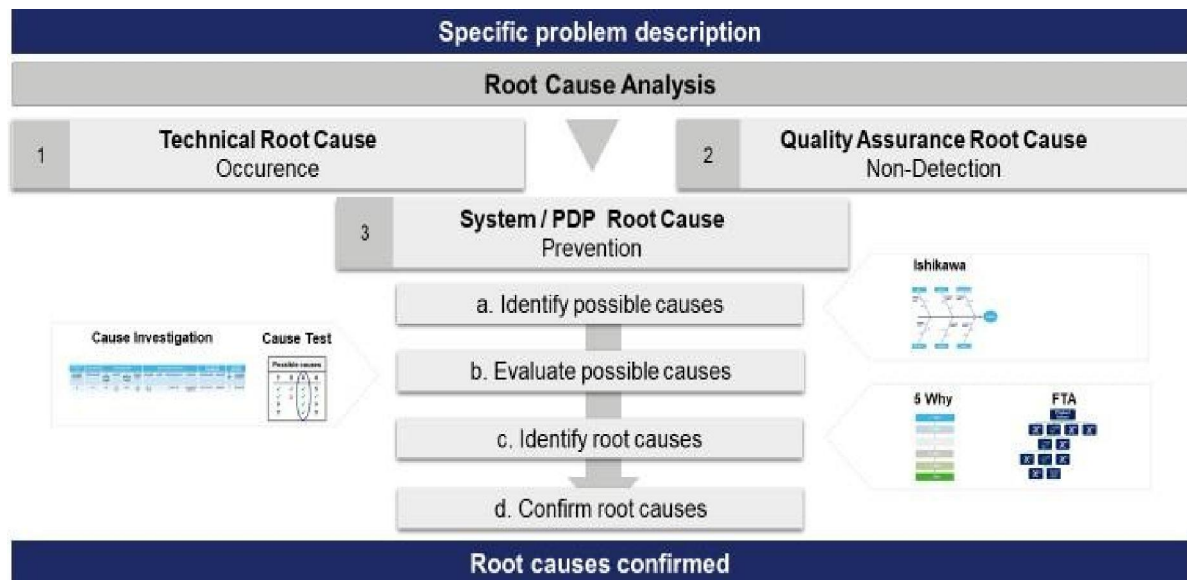
If **Potential cause is unknown** and less complicated

Ishikawa is used to identify the possible causes and uses 5 Why otherwise Fault Tree Analysis (FTA) is used to locate the root cause and confirm it.

If **Potential cause is unknown** and more complicated

5 Why 1H along with Ishikawa is used to identify the possible reason as well as 5 Why or FTA uses to identify the root cause and confirmation.

If **Potential cause is unknown** along with multi parameter problem



statistical method is used to identify the possible causes and uses 5 Why otherwise FTA.

**Figure 5: Root cause analysis**

**Procedure**

Root cause analysis is divided in four stages.

Identify the possible reason

**Ishikawa diagram**

Cause-and-effect diagram, also known as fishbone diagram due to its shape.

It should only be used if an identification of possible causes on IS / IS NOT is not possible

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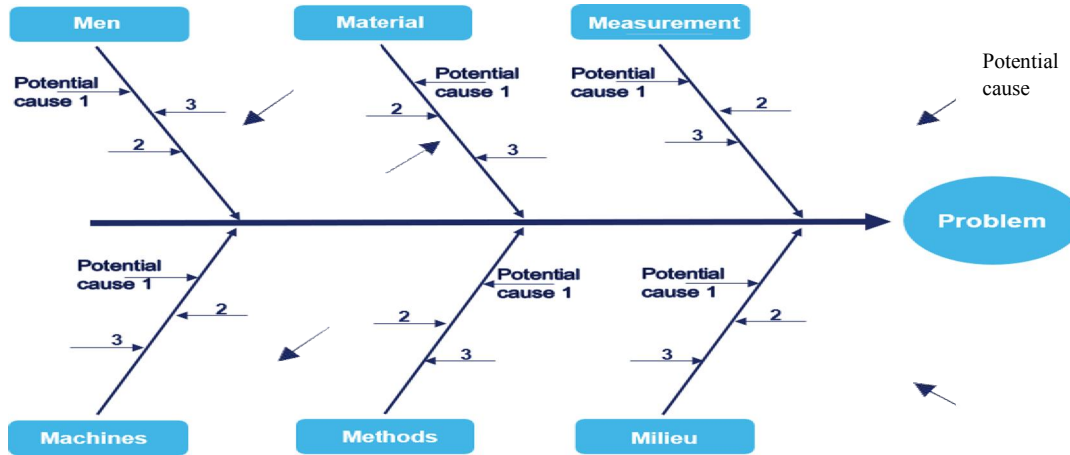


Figure 6: Ishikawa diagram

**Procedure**

Formulate the problem.

Brainstorm may be the possible reason for the problem and allocate them to different M- categories “6 M-Men, Material, Measurement, Machine, Method and Milieu. As per difficulty M`s can be added.

Each collected reason for cause, builda cause and effect theory.

Test all cause-and-effect theory which is based on investigations to confirm or eliminate them.

Prioritize the cause and effect theories which fully explain the reason to create the such issue and confirm it in the next step.

**Result**

The possible reason of a problem is systematically determined as well as visualized and Evaluate

1.2.2 Possible causes

Review and update the problem detail as well as check relevant standard.

1.2.2.1 Cause test

The Cause Test is a technique to verified the possibility of main causes which is based on data.

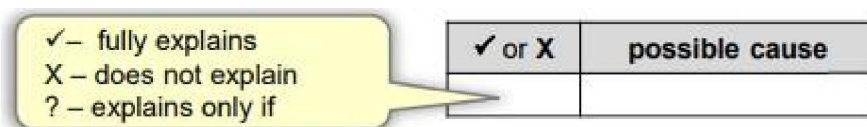
Each and every possible cause check if, it explain each and every data. As per results following options are:

probable reason interprets the facts (✓)  confirmed as potential cause

probable reason doesn't interpret all facts (X)  eliminated as potential cause

If not clear (?) or the probable reason explain only facts under certain assumptions  further investigations are needed: in this situation use the Cause Investigation

Then we will decide most likely causes: What cause fully explains the facts and fewest assumptions?



**Cause investigation**

To be used for more complexive cases

Possible causes		Standard and Specification		Cause Investigation		
Possible Cause	T QA	Standard	Specification	Action	Responsible	
Ø too big	T	drawing	20 ± 0.2 mm	Test 25 Perts	Mr. Check	

**Figure 7: Cause Investigation**

**Possible causes:** List of identified possible causes.

**Classification:** “T” □ technical; “QA” □ quality assurance

**Specification:** Standard which is correlated to possible causes & specifications

**Cause Investigation:** Investigations to validate the possible causes. Mention responsible, due date as well as result.

**Measurement Results:** Mention in result GOOD and BAD parts & whether it is □ Yes / No

**Check:** On behalf of Additional investigations and consulting of experts can we identify the GOOD & BAD parts.

**Evaluation:** Evaluate the possible cause to eliminate the reoccurrence.

Identify the root cause

Why Analysis

By the help of 5 Why Analysis the main cause of a problem are investigated in order to find out the root cause.

Procedure

Define the problem with the team.

Ask: Why the problem occur?

After the answer, again ask: Why?

Repeat this step 5 times

**Figure 8: 5 Why analysis**

Sometimes the root cause found after 2-3 round of “Why” but sometimes, it take 5 times or more.

Result: Root Cause is identified.

Fault Tree Analysis

By the help of Fault Tree Analysis, main cause of the problem is investigated in order to find out the root cause.

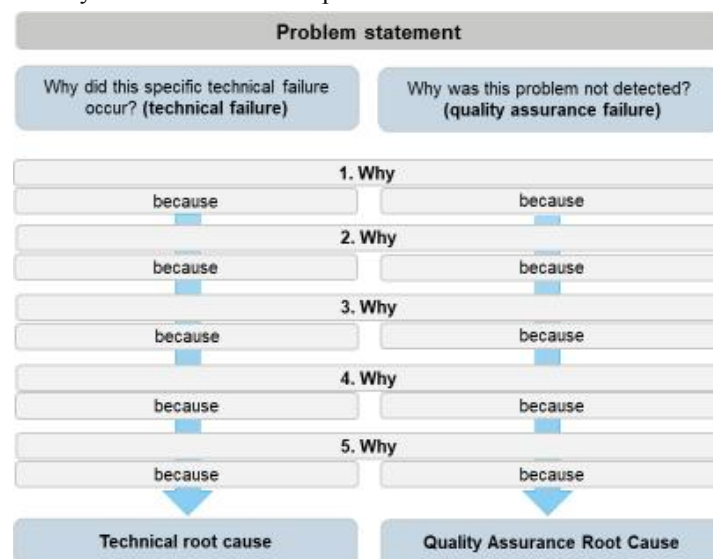
Procedure

Select root cause type: technical, QA or PDP / system root cause.

Basis for the FTA is itself Problem failure. First of all, listed potential causes or factors which create the problem.

Find root cause: Identify the potential causes which is validated in stage A as well as in stage B. Process

repeated again and again to identify the root cause of the problems.



**Figure 9: Fault Tree analysis (FTA)**



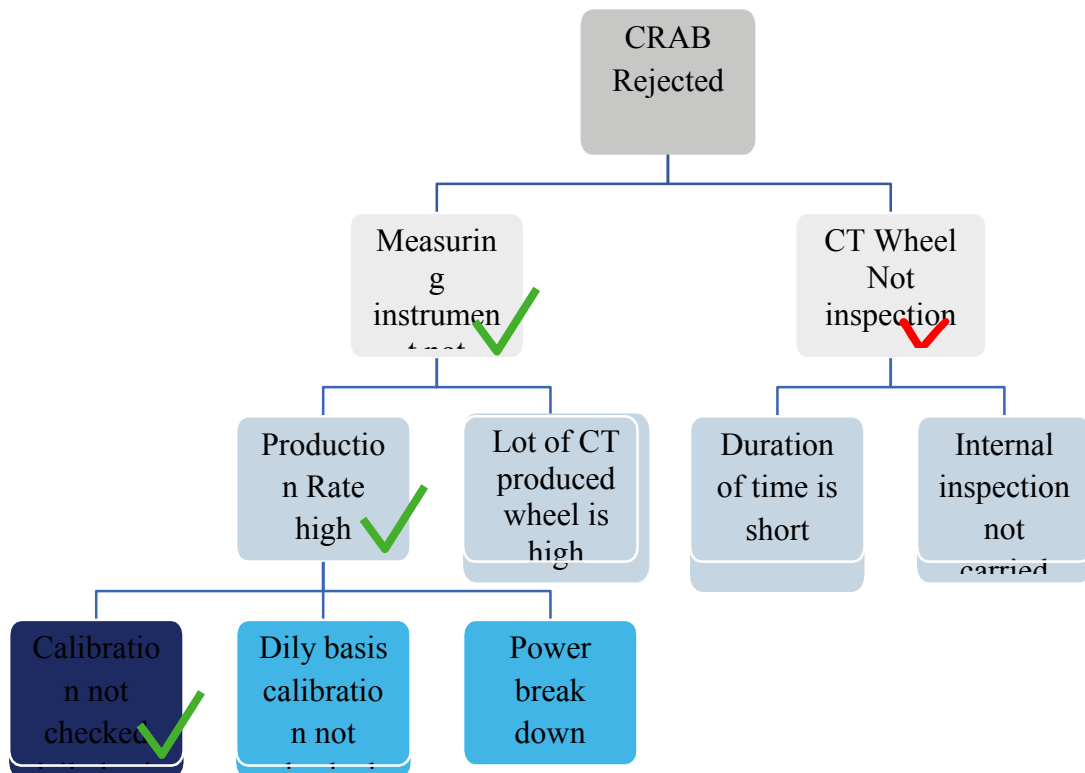
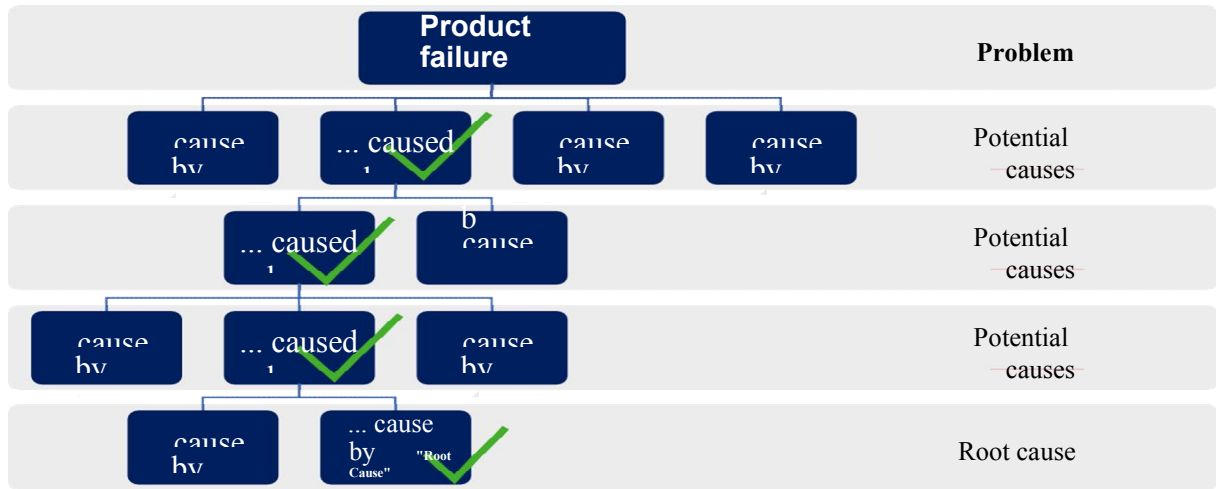


Figure 9: Example FTA

Choose the safe, easy, quick and cheap way to confirm the root causes. Reoccurring the defect, turn the failure on/off and switch on/off the root cause to represent the problem disappears.



Different **root cause types**



Identify the root causes **systematically**



**Different tools** depending on complexity



**Verify and confirm** each root cause using data and facts

D5: Potential corrective action

Determine potential corrective action: verify as well as chose the most effective one.

Procedure

Identification

List of all potential corrective action to enclose all root cause to identified in D4.

Verifications as well as evaluations

It is important to prove that actions can solve the problems

To make sure all possibilities has been considering that means compare all advantages / disadvantages

\*Risk analysis: should be careful for unwanted side-effect.

Selection

Target: chose the best options schedule, rate, ...

Possibility to decide: agreement, settlement, majority, organize, ...

Result

Most effective effort able corrective action is selected.

D6: Apply corrective action

Cover up the root causes from D4 (technical and quality assurance)

Use the simplest most cost-effective solution

Should be aware for unwanted side-effects

Verification and confirmation of possible measurement on behalf of the objectives of investigation

D6 is implementation and validation of the corrective action.

Procedure

1.1 Implementation plan

To ensure for perfect result after implement an action.

1.2 Proof of effectiveness

After the implementation, the effectiveness of actions must be checked:

Quick check  encouragement test

Long term check  process capability, failure analysis, ... problem solved?

Containment actions (D3) can be removed for effective corrective actions

Result

Corrective actions are implemented and checked.

Take Follow up about corrective action plans

Confirm the effectiveness using data and facts

Withdraw containment action

Update related standards

D7: Take corrective action

Define and implement action to prevent reoccurrence of the failure in future.

Update relevant documents

A new standard to prevent reoccurrence should be established

Drawing modified (internal / external)

FMEA's

Control plan

List Special Characteristics (product and process)

Product standard guideline

Process standard guideline

Maintenance plan (preventive and productive)

Supplier Quality Assurance documentation

Share information

Transfer to products & processes which are existing today.

Prevent failure for **future** products and processes.

Prevent reoccurring problem

Update relevant standards (drawings, control plan, FMEA, ...)

Read across / Yokoten: transfer to similar products

Lessons learned: failure prevention  identify and correct systemic weaknesses

D8: Closure and team celebration

Accept the collective effort of the team and appreciate the team effort.

In this step distinct feature of conclusion can be done:

Complete the 8D report

Congratulate your team

Share findings or customer feedback with the team

Approval of the 8D-report

Every 8D process must be completed by the plant or quality manager!

All actions & documentation closed and completed

Recognize the team

8D approval

Review the process 8D Assessment

Tools and techniques used in 8D

1. Flow chart

2. Check sheet

3. 5W, 2H (what, why, where, who, when, how, how much)

4. Root cause analysis

5. Ishikawa diagram

Application of 8D

Major non-conformances

Customer complaints

Reoccurring issues

Team approach needed

Provide best solution

Easy to implement

Used in manufacturing industries

## II. CONCLUSION

8D's methodology is one of the important techniques to solve the problem with less/minimum error .8D's tool identified the root cause before preventive action. By the help of this tool and techniques company group, individual everyone get benefits. To start with your knowledges of subject's matter and your best experiences. Pay attention to the customer side when implementing the solution.

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