8Ds - Problem Solving Process

AGENDA

1. Challenges and obstacles to carry out the Problem Solving Process with the 8Ds methodology

2. Steps in the Problem Solving Process with the 8Ds method (D0 to D8)

8Ds Problem Analysis and Solution Process

CHALLENGES:

➤ Promote Process ownership and problem solving leading

➤ Reduce impact on the organization due to Non-Quality Costs

➤ Define the problem correctly

➤ Determine the root cause of the problem (Occurrence, No Detection, No Prevention)

➤ Fix the root cause, not just remedy symptoms

➤ Take strategic actions on the Quality Management System to prevent the recurrence of the problem

➤ Late response times: Containment, Root Cause, Closure

➤ Trader/ Distributors Sub-Tier Supplier Management

8Ds Problem Analysis and Solution Process

OBSTACLES

➢ A single person develop the 8Ds

➢ Incorrect description of the problem

➢ Assume temporary actions (containment) supersede corrective / preventive actions

➢ Rushing into take actions before identifying the root cause

➢ Make decisions without develop a Structured Analysis method

8Ds Problem Analysis and Solution Process

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- ➢ Do not verify all probable causes

- ➢ Do not take actions on root causes for non-detection and systemic causes

- ➢ Do not controlling and monitoring actions after permanent and corrective actions have been implemented

- ➢ Do not implement the necessary changes to the QMS to prevent recurrence

- ➢ Lack of sense of urgency, no immediate containment actions are taken (e.g. until the claimed part is received on site, waste of valued time and resources)

- ➢ No media resources to attend, follow up meetings (Mic, computer, mobile phone, software)

Introduction

Problem Solving: Is a Structured Process that identifies, analyzes and eliminates the discrepancies of a current non desirable situation compared to an existing standard
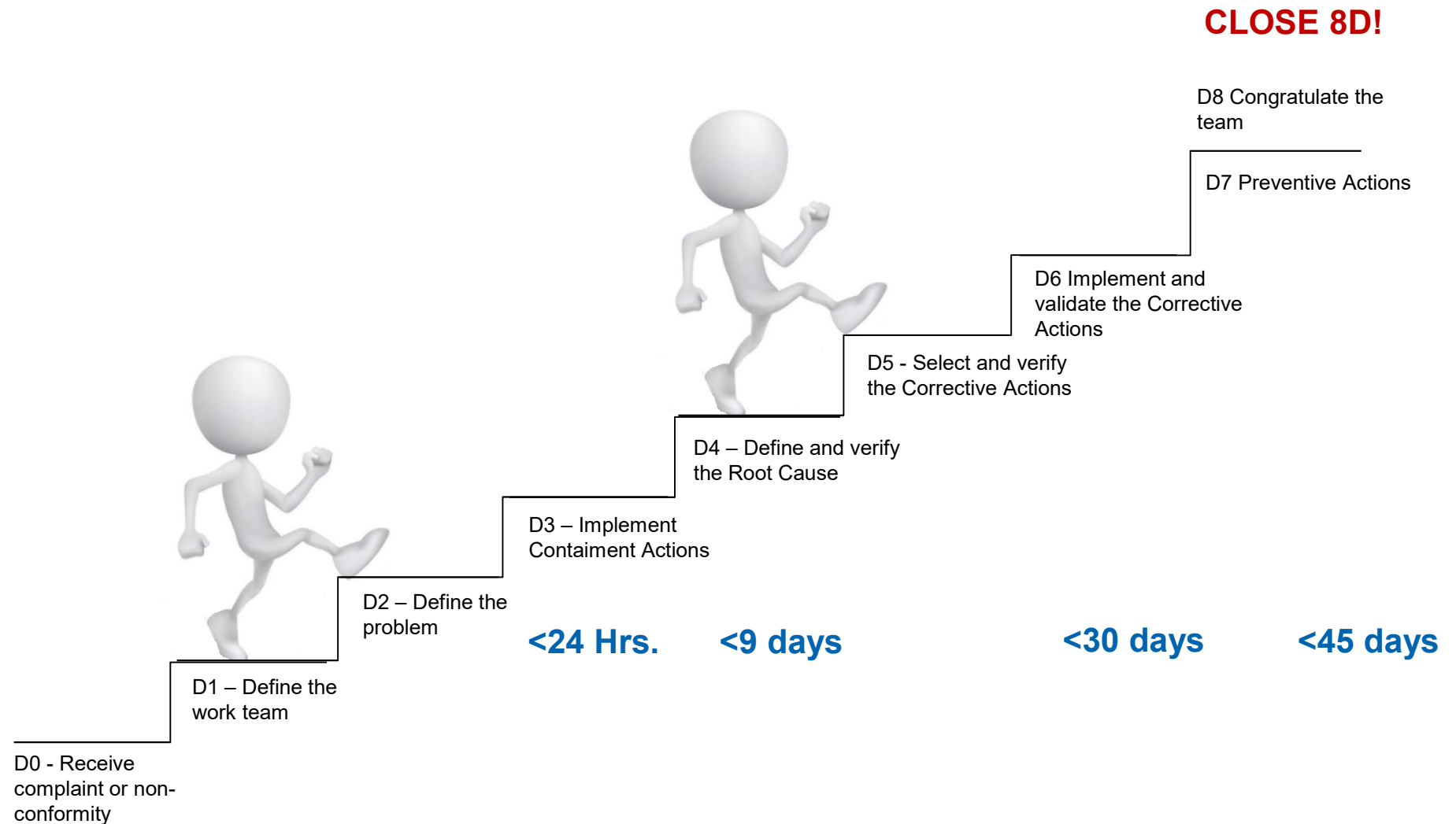
QMS Principle
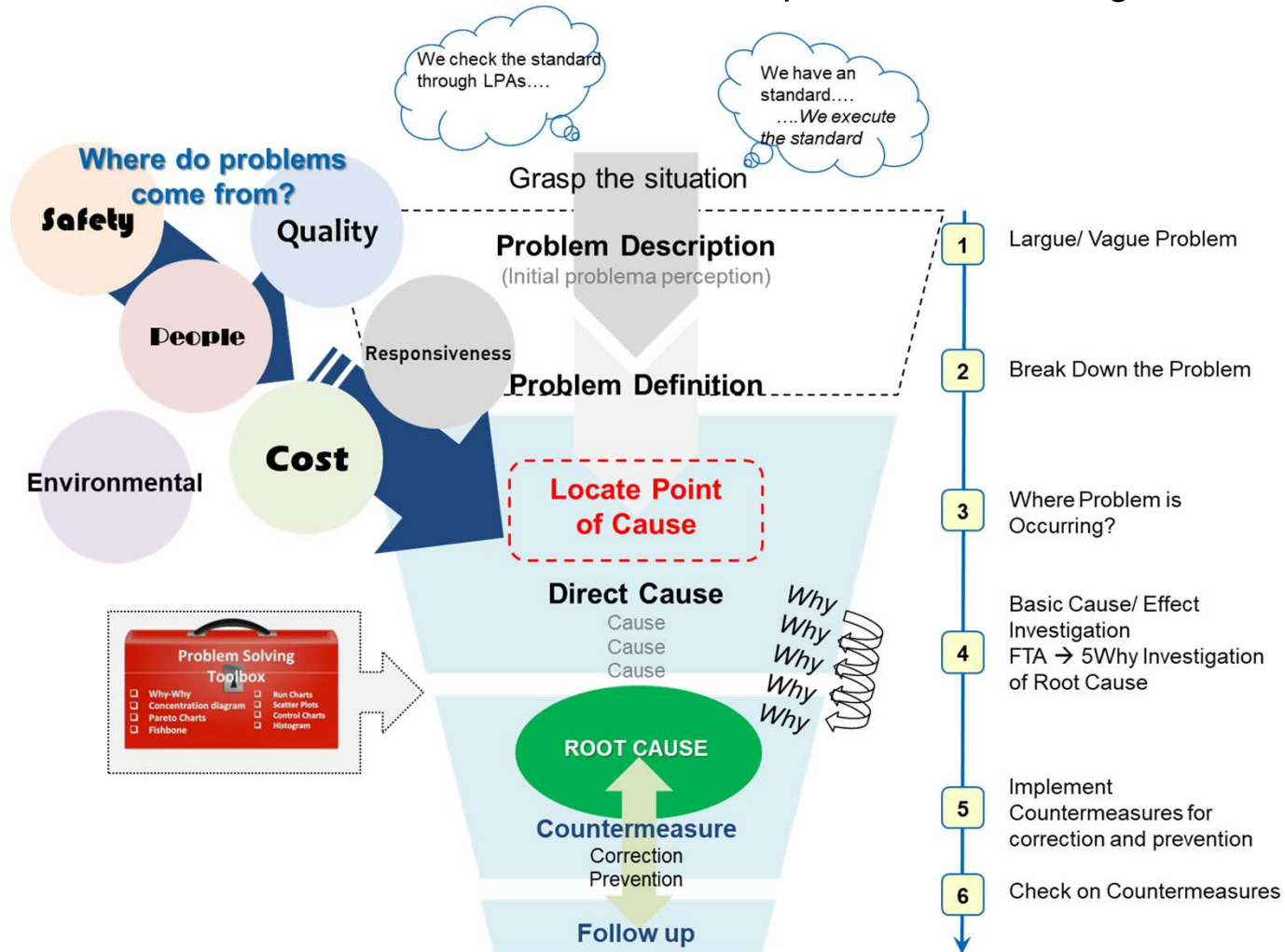
IATF 16949 – 10.2.3 Problem Solving

The Organization shall have a documented process(es)….

    a) Defined approaches for various types and scape of problems (e.g. new product development, current manufacturing issues, field failures, audit findings);

    b) Containment, interim actions, and related activities necessary for control of nonconforming outputs (see ISO 9001, Section 8.7)

    c) Root cause analysis, methodology used, analysis and results;

    d) Implementation of systemic corrective actions, including consideration of the impact on similar processes and products;

    e) Verification of the effectiveness of implemented corrective actions;

    f) Reviewing and, where necessary, updating the appropriate documented information (e.g. PFMEA, control plan)

Where the Customer has specific prescribed processes, tools, or systems for problem solving, the organization shall use those processes, tools, or systems unless otherwise is approved by the customer

8Ds Methodology

CLOSE 8D!

D8 Congratulate the team

D7 Preventive Actions

D6 Implement and validate the Corrective Actions

D5 - Select and verify the Corrective Actions

D4 – Define and verify the Root Cause

D3 – Implement Containment Actions

D2 – Define the problem

D1 – Define the work team

D0 - Receive complaint or non-conformity

<24 Hrs.   **<9 days**   **<30 days**   **<45 days**

D0 Receive complaint or non-conformity

➢ The customer reports the symptom, and the affected parts are identified and confirmed
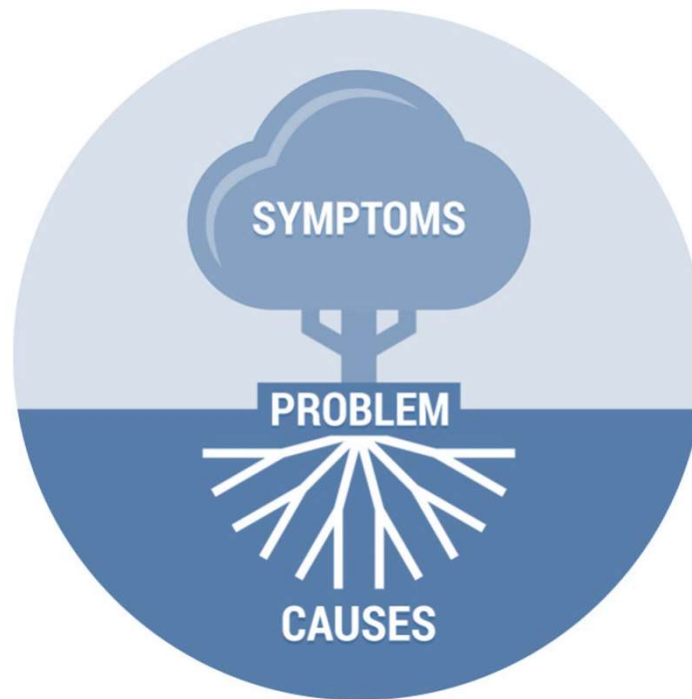
D1 Define the work team

➢ Integrate a multidisciplinary team, with knowledge of the product and process

➢ It is recommended that the following roles participate:

1. Quality

2. Production (operator)

3. Logistics

4. Process Engineering

5. Maintenance

6. Product Engineering

7. Supplier Quality

D2 Define the problem

Define the problem, through :

➢ Identify what is wrong, comparing with the specification

➢ Clarify the problem in terms of quantity, data and facts

➢ Confirm Customer Requirements

➢ Apply 5Ws and 2H methodology

➢ Any ambiguity or inaccuracy in the step D2 can lead
   the team to a wrong cause, followed by action
   and improper corrective actions definition

D2 Define the problem

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5W´s / 2H´s	
What?	What is wrong? What is the problem?
Who?	Who is involved? (plants, shifts, people)
Where?	Where (geographically) is the problem?
When?	When did the failure occur, date and time? Has the problem happened before?
Why?	Why is this a problem?
How much?	How many units does the problem have? What is the size of the Nonconformity?
How?	How is the problem different from the normal (optimal) state? Is the trend in which the problem appears random or does it follow a pattern?

D3 Implement Containment Actions

➢ Define and implement Immediate Containment Actions, **Isolating the effects of the problem throughout the supply chain until implementing Permanent Corrective / Preventive Actions**

D3 Implement Containment Actions
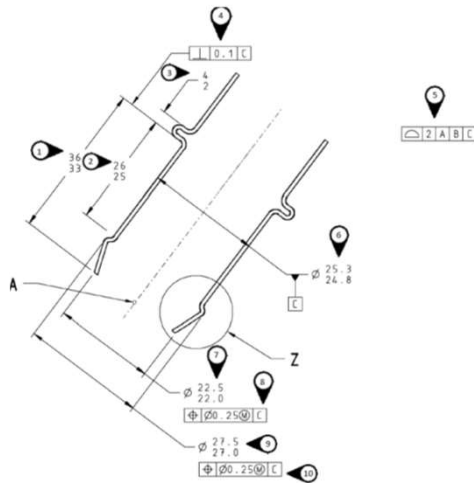
Dimensional Specification

Functional Specification

➢ Containment actions must be executed immediately (<24 hrs.) As soon as the Customer reports a Quality/Deliveries problem associated to a specification (Dimensional, Functional) or non-compliance with any Deliveries requirement

➢ A person should be assigned to Manage the Containment Process and notify the Customer.

Notes:

- Timely and effective containment will avoid extraordinary Non-Quality Costs.
- Containment are not equal to corrective actions

D3 Containment is a Process

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¿What?

- Material Resources
- Tools
- Devices (i.e. gauges)
- Equipment (i.e. measurement)
- Expendables

¿Who?

- Internal People
- External people (representative)
- Customer´s resources

INPUTS

Affected Customer(s) with Manufacturing operations interrupted
- Customer Claim (Official/Non official)
- Initial quantity of rejected material
- Suspect material (to be contained)
- Clean Point required "physical" (zone, color, ink type, i.e. Sharpie)

CONTAIMENT

OWNER: SUPPLIER (Define a leader)
To manage containment process
Active Communication: Internal and Customers
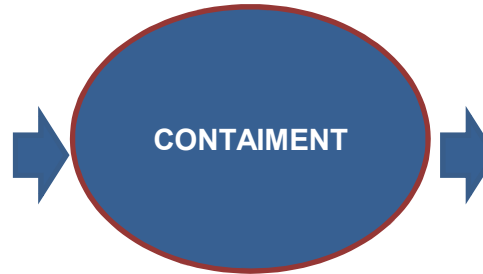
OUTPUTS

Protected Customer(s)
- Sorted material in the whole supply chain (Internal and Customers).

- Rejected Material Disposed:
  - Return it to supplier
  - Scrap it at Customer plant
  - Rework authorized by Customer

¿How?

- Containment Method Defined internally and/or in agreement with Customer
- Provide Specific Training to the involved people (internal/external)
- Verify y Validate Containment Actions
- Alert submitted

¿Where?

In the plant, in Transit, Warehouses, Customer´s plants

¿Meassurement?

- Quantity of defective parts found (Internally, with Customers),
- PPM´s
- Time of Execution/Closing
- Containment Effectiveness (No re-incidences)

D3 Containment in Supply Chain

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¿Where?

SUPPLIER	CUSTOMER BOCAR	CUSTOMER OEM

Raw Material Warehouse — Process / Engineering / Labs / Offices / Others… — Finish Goods Warehouse — In Transit → Raw Material Warehouse — Process — Finish Goods Warehouse — In Transit → Raw Material Warehouse ⇄ Warehouse 2 — Process — Finish Goods Warehouse — Field
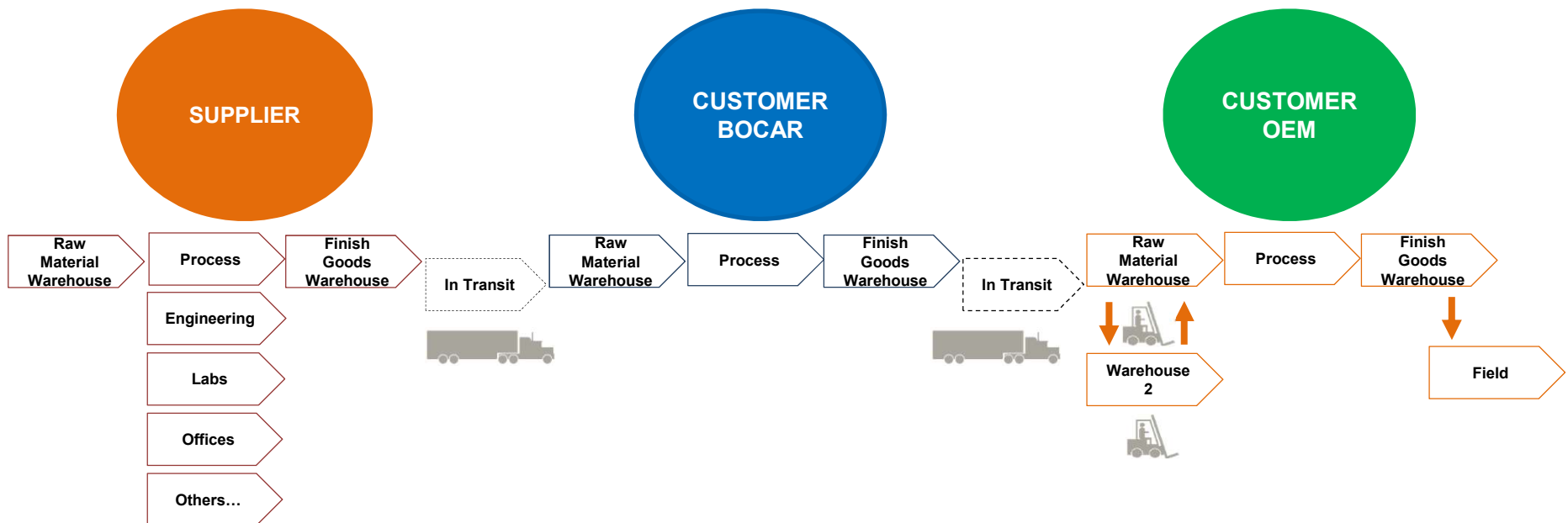
D3 Containment Timeline

¿When does the Containment Process end?

Containment

| Root Cause Analysis And Corrective Actions Definition | Implementation of Corrective & Preventive Actions | Verification of Corrective/ Preventive Actions |

<24 Hrs.   **<9 days**   **<30 days**   **<45 days**
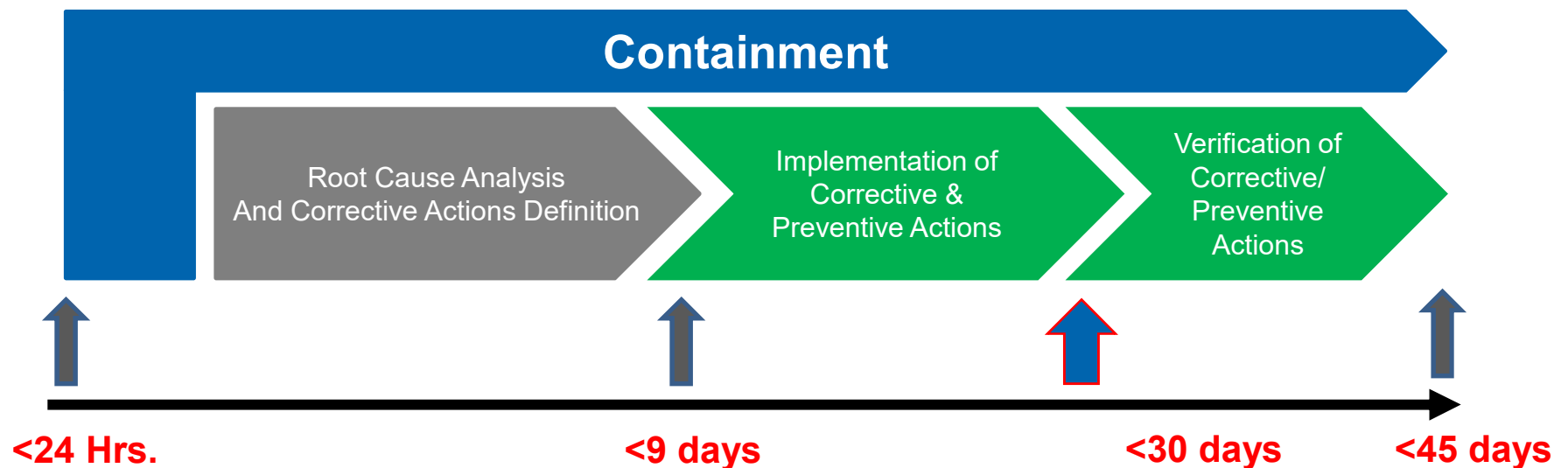
Until the <u>Clean Point of Corrective Actions defined</u> has been sent to Customer

D4 Define and Verify the Root Cause

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➢ Define Root Cause for: **Occurrence, Detection, Prevention**

➢ The effect should be replicated (turn on-off the failure mode)

➢ Trace a Problem to its Origins

INPUTS:

- Problem Statement
- (5W + 2H)
- Contained Problem
- Point of Cause
- FMEA

Root Cause Analysis

OUTPUTS:

- True Root Cause for:
  Occurrence
  Escape
  Systemic (Non prevention)

D4 Define and Verify the Root Cause

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SYMPTOMS
The results or consequences of the problem (Obvious)

➢ **POSSIBLE CAUSES**:
These are the unproven causes, based just on the existing available data, and they could explain why the problem occurs.

It is Not Ok with regards to... Data and Facts (How many?)

PROBLEM
The Difference between the reality and the specification, standard, objective.

➢ **ROOT CAUSE:**
These are the PROVED and VERIFIED causes that explain how does the problem is happening, focused to Occurrence, Non Detection and Non Prevention.

CAUSE
The underlying roots; this is a SYSTEM underneath the Surface that is the REAL SOURCE of the problem (things not obvious).

➢ **PROBABLE CAUSES:**
These are the Identified Causes with a direct relationship to the Occurrence, Non Detection and Non Prevention of the problem, which must be analyzed and confirmed to be defined as Root Cause.

Ishikawa Diagram

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MANPOWER

Knowledge
The people know how to do the job rightly?

Flexibility
Is properly managed? Evolution is followed?

Training
Are the people qualified?

Fatigue
Ergonomic conditions and working day are suitable?

Skills
Have the people the enough expertise to perform the job?

Craftsmanship
¿Is the content of the process with a high content of craftsmanship activities?

MATERIALS

Performance
Is known how the raw material variation have influence on the process? Is the Raw –material current (not expired)

Identification
Is the raw material properly identified to avoid improper usage?

Standard Packaging
Is the suitable packaging based on Performance Test?. Is the packaging cleaned by a defined frequency? Is there a Rust Preventative properly applied for product conservation until point of use defined by Customer?

Inventory Control
FIFO is properly followed? Racks at warehouse allow a proper FIFO handling?

Incoming Inspection
Supplier rejections, inspection records/trends

Sub-Suppliers
What is the contribution from different suppliers? What is the variation between suppliers?

Changes
Have there been recent changes in the Raw Material?

METHOD

Operations evaluated
Was the operation performed according with Control Plan? ¿How the decision is made to determine if the operation should be performed in an specific way?

Standardization
The Control Plan and FMEA have been updated in a regular basis? Were those updates developed throughout the Process? Lessons learned are being considered, documented, implemented, validated, standardized in the QMS?

Exceptions
When the procedure is not possible to apply, does a response plan exist? Is there any Deviation to the standard process approved by Customer?

PROBLEM

MOTHER NATURE

Cycles
Are there patterns in the process related with environmental conditions?

Temperature and Humidity
Is the temperature or humidity influencing in the process

Illumination
Is the illumination properly followed and maintained?

Contamination
Is the product/process properly conserved from local/external contamination?

Cleanliness
Is the neatness of the facilities decisive for the process / product?

MACHINE

Capability
Are the machines working under the required capability

Settings
Are the settings properly followed, recorded?

Differences
Are being considered differences between production lines, tools

Maintenance
Preventive maintenance is properly followed?

Spare parts
Are the spare parts replaced accordingly?

Application
Are only the assigned/approved machines and tools used?

MEASSUREMENT

Definition
Are the significant characteristics defined and measured in product/process?

Measurement frequency
¿Are the measurement intervals appropriate to maintain the process controlled?

Availability
Are que measurement devices available in the specific operations?

Calibration and verification
Are the measurement devices, checking fixtures, holding fixtures properly measured, calibrated and verified?

Sampling Size
Is the sampling size suitable? Does it provides useful data to take decisions?

Masters
Are being used masters/pattern and have been approved by a third party Lab?

Variation
Is the measurement system variation known and controlled?

D4 Root cause definition and verification

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MANPOWER

Skills - *Have the people the enough expertise to perform the job?*

Knowledge - *The people know how to do the job rightly?*

Fatigue - *Ergonomic conditions and working day are suitable?*

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D4 Root cause definition and verification

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METHOD

D4 Root cause definition and verification

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MEASUREMENT

D4 Root cause definition and verification

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EXAMPLE

D4 Root cause definition and verification

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EXAMPLE

D4 Probable cause analysis: Ishikawa

EXAGE

EXAMPLE

MANPOWER

Vision problem

Personnel expertise

Fatigue

MATERIAL

Part design

Mirror cover switch failure

Bulb failure

MOTHER MATURE

Temperature

lack of illumination

Smoke

EFFECT

Sun visor light does not work

Temperature and work cycle

Machine wearness

MACHINE

Work instruction is not properly defined

Problem with visor wire routing

PFMEA review

METHOD

Functional test is not defined

Pull test is not properly defined

MEASUREMENT

D4 Probable cause analysis: Factor analysis

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		Standard	**Result**	**Link with the problem**
Sun visor light does not work	**Bulb failure**	Bulb 0.02 +/- 0.01 ohm	0.025 ohm	NO
	Mirror cover switch failure	Switch 0.6 +/- 0.1 ohm	0.61 ohm	NO
	Problem with visor wire routing	Visual inspection	Black wire is not connected	**YES**
	Functional test is not defined	Visual inspection for wire routing presence	Visual inspection for routing presence does not assure the mirror light function	**YES** → 5 Why
	PFMEA review	PFMEA should be revised on a yearly basis	PFMEA revisión is not effective, sun visor light failure mode is not defined in PFMEA	**YES**

D4 Probable cause analysis:
5 Why

Therefore

OCCURRENCE: WHY THE DEFFECT WAS PRODUCED, HOW DID IT OCCUR?

Black wire is not connected

Why

The wires were not properly welded

Therefore

Why

Wire insulation jacket interfered with the welding

Therefore

Why

Conductor lenght was not enough for the appropriate welding operation

Therefore

Why

Insulation jacket cut machine parameter was not properly defined

ROOT CAUSE

D4 Probable cause analysis: 5 Why

Therefore

NON DETECTION: WHY THE PROBLEM WAS NOT DETECTED?, HOW DID THE PROBLEM SCAPE?

Visual inspection for routing presence does not assure the mirror light function

Why

Therefore

Bulb light is not verified

Why

Therefore

Sun visor cover is not opened during the assembly operation

Why

Therefore

The functional test is not defined in testing work instruction and Control Plan
ROOTCAUSE

Why

D4 Define 5 Why´s?

SYSTEM: WHY THE FAILURE WAS NOT PREDICTED?

Therefore

PFMEA revisión is not effective, sun visor light failure mode is not defined in PFMEA

Why

Therefore

PFMEA revisions does not take place at floorshop with focus on current controls verification and new failure mode identification

Why

Therefore

PFMEA Procedure does not define the appropriate guidelines/criteria for PFMEA Review

Rootcause

Why

Therefore

Why

5 Why Tips

➤ Who? Is never asked
➤ Prioritize root causes at the end of each "Why-Why" branch (use data)
➤ Develop a plan for each root cause selected

➤ These are never root causes:

- Not enough inspection
- Operator Negligence
- Operator Error
- Isolated case

➤ Now that we know the root cause(s) of the problem, these are never preventative countermeasures:

- 100% inspection
- Will be more careful
- Will continue to watch for this
- Any action without an assigned responsibility and an implementation date

D5 Select and verify corrective actions

➢ Do not rush into the implementation of corrective actions if the root cause has not been verified

➢ Select permanent corrective actions to eliminate the root cause of occurrence (direct), the escape point (no detection), and the systemic (no prevention).

➢ Verify the effectiveness of the actions

D6 Implement and validate corrective actions

➢ Plan and implement the permanent corrective.

➢ Containment actions conclude once the corrective actions are implemented and its effectiveness is proven

➢ Monitor and verify the results of long-term corrective actions.

Plan- Do - Check - Act

D7 – Preventive actions

- ➤ Review and / or update the following documents:

- ➤ Implement corrective actions to similar processes / products

- ➤ Flowchart

- ➤ Process FMEA

- ➤ Control plan

- ➤ Work instructions

- ➤ QMS documents (procedures, internal standards, policies, etc.)

- ➤ Update Lessons Learned

D8 Team Recognition and Closure

➢ Officially conclude team activities.

➢ Ensure that the 8D's report has been updated, difussed and closed with the Customer

➢ Ensure that all those people and functions that must know the report 8D's have been informed.

➢ Ensure that the 8D's report and all supporting documents be retained in the historical archive as required by the SGC.

Benefits of conclude the 8D process

For the **supplier**:

➢ Reduces the impact of Non-Quality Costs
➢ Promotes problem solving and prevention
➢ Improve quality and productivity
➢ Avoid future problems
➢ Improve customer satisfaction

For the **customer**:

➢ Increase confidence in a
   supplier
➢ Possibility for new business

SPM BU 2019 - 2021

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2019

Quality KPI´s	Results
Customer Evaluations	75.1%
Customer Claims	56
PPM´s Customer	9
NQC´s	8.9%
% Sx / Sales	6.9%

2020

Quality KPI´s	Results	
Customer Evaluations	94.9%	⬆
Customer Claims	20	⬆
PPM´s Customer	4	⬆
NQC´s	5.5%	⬆
% Sx / Sales	4.9%	⬆
BQOS (2020 Outputs Evaluation)	74.7%	
10 QB´s (January 2021)	73.8%	

2021

Quality KPI´s	Results	
Customer Evaluations	99%	⬆
Customer Claims	4	⬆
PPM´s Customer	2	⬆
NQC´s	3.9%	⬆
% Sx / Sales	3.6%	⬆
BQOS (Inputs and Outputs Evaluation - Start February 2021 @ 57.6%)	82%	⬆
10 QB´s (Start January 2021 73.8%)	84%	➡

| Road Blocks |
|---|
| Turn over |
| Lack of Training |
| Operative discipline Deviation / Missing |
| OT & Outsourcing support |

Key Drivers
Roadmap consolidation
Operational Discipline Start Up
Financial Challenge Board
QRQC Reinforcement
War Rooms Launch
BQOS & 10QB´s Start up

Key Drivers
Operational discipline follow up T&VR
Standard Job Observation - Training
SPC for Key Process Characteristics
Process Capability measurement
Defect typology – Metallurgic solutions
BQOS & 10QB´s stabilization & maturity

Economic impact of Non-conforming Product

$ Cost

Internal

+ Customer 1
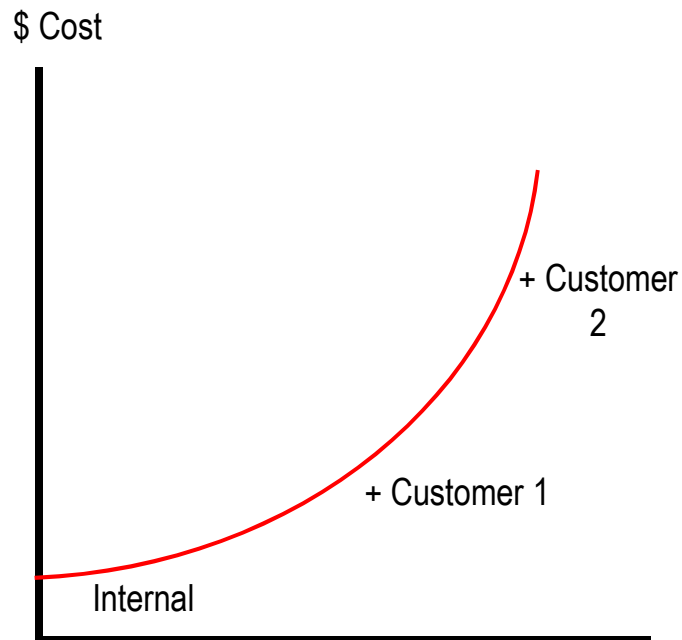
+ Customer 2

- ➢ Rejected Material Quantity (component, assemblies)
- ➢ Initial Sorting at Customer's plant (s)
- ➢ Customer Line (s) Stops
- ➢ Replacement of rejected material
- ➢ Expedited Material (Premium Freight)
- ➢ Material transfers (Quarantines, warehouses)
- ➢ Laboratory analysis
- ➢ Functional testing
- ➢ Warranty Claims
- ➢ Reworks
- ➢ Audits of Client (s)
- ➢ Etc.

- ➢ Sign Credit / Debt Note

Thanks for your participation !!!

Please correctly implement this tool in your Organization and with your Clients