8D’s Supplier Process.

8D's Problem Solving Tutorial.

SDE team, May 2018 Rev B

Littelfuse®

Expertise Applied | Answers Delivered

Purpose of 8D's tutorial.

- To have a **standard** and **objective** 8D's tutorial for suppliers.
- SQE & SDE can share and use this file when training a supplier.
- To improve the quality of supplier's 8D report. The supplier can understand clearly how to submit an 8D report.
- To help the supplier find out the systemic root cause (Management Root Cause) and implement the corrective action. Not only focus on shallow cause.

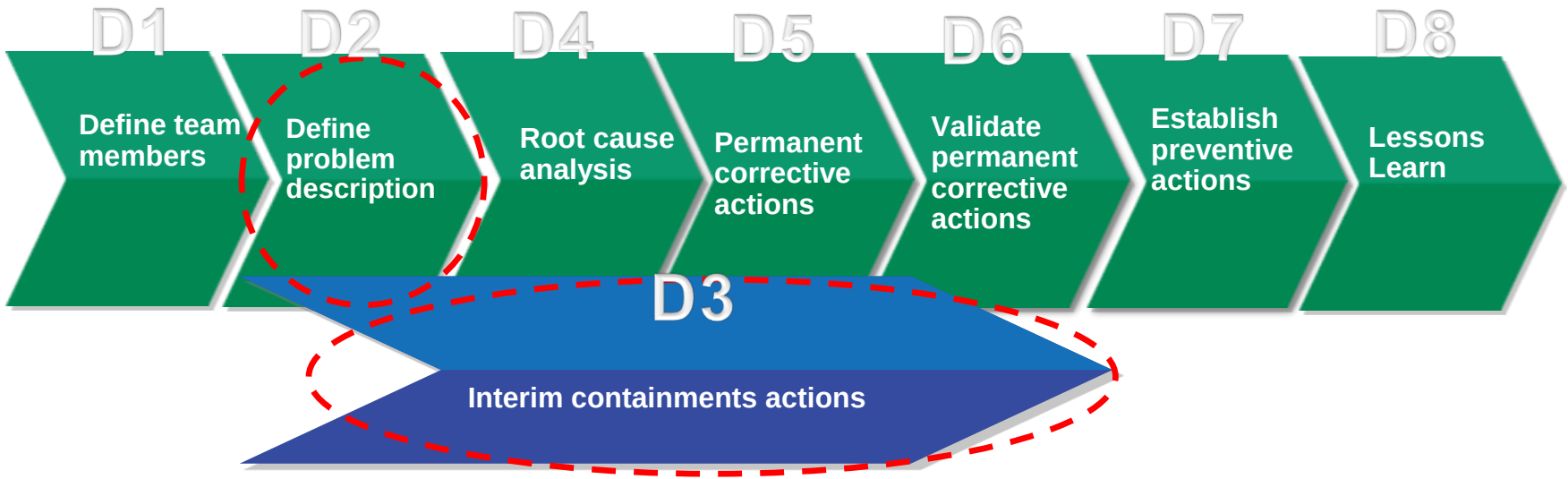
What is an 8D's report?.

- The eight disciplines (8D) model is a quality problem solving tool.

- Its purpose is to identify, correct, and eliminate recurring problems, and it is useful in product and process improvement.

- The approach establishes a permanent corrective action based on statistical analysis of the problem and focuses on the origin of the problem by determining its root causes.

Phases of 8D's process.



D1.- Define team members.

The approach is based on a cross-functional team working together to solve a problem. Teamwork must be coordinated and guided. The team should include only competent persons actively involved in the process and who have been assigned a task or responsibility in subsequent steps. Efficient teams are usually not big.

Task	Action	Output
▪ Select team members	▪ Select members with appropriate skills based on the problem description. ▪ Appointed team leader, a sponsor. ▪ Are all team members reasonability's clear?	▪ Establish a team & define responsibilities among the team members.

D1.- Define team members.

Key questions

✓The Champion of the team has been identified?
✓The people affected by the problem are represented on the team?
✓ Does the team have the right people (technical and specialist skills)?
✓ The team's goals and membership roles have been clarified?
✓ Should customer / suppliers be involved in 8D’s meetings?

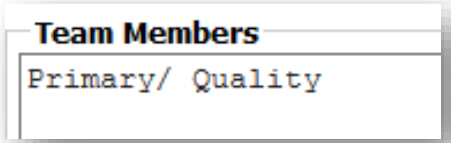
D1.- Good / Not Good Sample.

Good Sample

1D	Team Members	
Department	Name	Title
Quality	Jose Garza	Quality Engineer (Champion)
Quality	Tom Braun	Quality Manager
Production	Cynthia Alonso	Production Manager
Production	Oralia Vazquez	Production Supervisor
Quality	Ruth Perez	Quality Inspector
Manufacturing	Fermin Rodriguez	Manufacturing Manager
Product	Rocio Cruz	Manufacturing Engineer Jr.
Product	Mario Moreno	Product Engineer

1. Multidisciplinary team.
2. Department , name and title are clear.
3. Champion is identified.

Not Good Sample



1. Team members were not identified.
2. Roles are not clear.
3. Champion is unknown.

D2.- Problem Description.

Problem solving must be based on facts, not opinions. It is important to clarify the issue type, what is wrong, when did it happen, how big the failure extent is and how many times it has happened. The description must be specific and easy to understand.

Task	Action	Output
▪ Describe the internal/external customer problem by identifying "what is wrong with what" and detail the problem in quantifiable terms.	▪ Gather and evaluate objective data. ▪ Answer the questions 5 Why's and 2H's. (Who / What / Why / Where / When / How / How often	▪ Description of the fundamental problem based on facts only.

D2.- Problem Description.

Key questions

✓ Has the problem been sufficiently defined?
✓ Analysis has been performed (who, what, where, when, why, how, and how often)?
✓All required data has been collected and analyzed?
✓The problem description has been confirmed as to what the customer(s) and/or affected party(s) are experiencing?

D2.- Good / Not Good Sample.

Good Sample

2D	Problem Definition	Sketch of the Problem (Picture)
Customer Name	Littelfuse	 
Customer Location	Mexico	
Customer Contact	Yoshisumi Kanagusico ykanagusiko@littelfuse.com	
Supplier Part Number	XLEN3516	
Littelfuse Part Name	XLEN3516 250VAC or Less	
Littelfuse Part Number	XLEN3516	
Failure Rate or Quantity	1 Fuse	
Manufacturing Date Code	L4K11F (November 11, 2014.)	
Problem Description (Customer & Littelfuse)	Littelfuse Statement: They will not "ring" continuity with Fluke 87V, will not pass current, but still allow 480V phase to phase and 280V to ground. Supplier Statement: Fuse was received and issue was confirmed during electrical testing. See report below.	

Provided information includes:
1.Problem description reported by Littelfuse and problem description reported by Supplier.
2. Failure Rate.
3. Sketch of the problem
4. Quality data for affected lot or date code

Not Good Sample

Problem Description

There are several coils with conductivity below specification

1. Copy only what Littelfuse team states.
2. Neither Lot# nor failure rate information available.
3. No information of affected parts numbers.

D3.- Develop Interim Containment Actions.

The primary purpose of this discipline is to isolate the issue and protect the customer from receiving more parts with same quality defect.

Task	Action	Output
▪ Determine the most suitable containment actions. ▪ Containment Actions start in the D2(Define problem description) until D6(validate permanent corrective actions) ▪ Define, verify, and implement the Interim Containment Action (ICA) to isolate effects of the problem from any internal/external customer until Permanent Corrective Actions (PCAs) are implemented.	▪ Safeguard the situation by containments actions, to prevent a reoccurrence of the problem at the customer ▪ Containment actions therefore serve only as a safeguard and often bear no relation to the cause of the problem. ▪ Cost considerations should play little or no part in the initial response ▪ Develop a schedule for implementing the containments actions ▪ Blocking of all parts, stock (in-house, transit, customer) ▪ Sorting of parts. *Identify* the good ones from the bad ones.	▪ Customer receives only certified material (While the investigation and resolution of the problem continues). ▪ There is a clear breakpoint with identified good material ▪ All suspect inventory, at all locations, is properly quarantined ▪ Instant information and support to the customer as well as implementation of containment actions is done as quickly as possible.

D3.- Develop Interim Containment Actions.

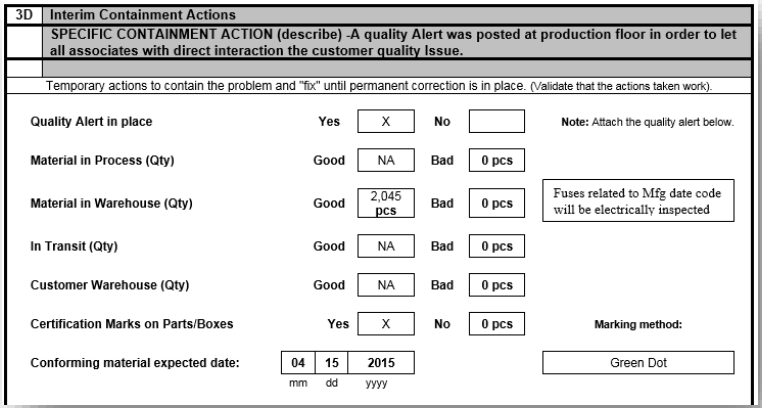
Containing the problem and protecting the customer must occur immediately, 24 hrs is the Littelfuse norm for containment actions to take place.

Key questions

✓Have effective containment actions been implemented?
✓How was the effectiveness of these actions verified?
✓Is the work force responsible for executing the containment actions sufficiently instructed?
✓Do the containment actions give the customer adequate protection against further defects?
✓Are defective products being identified and rejected as early as possible in current process sequence?

D3.- Good / Not Good Sample.

Good Sample



3D Interim Containment Actions

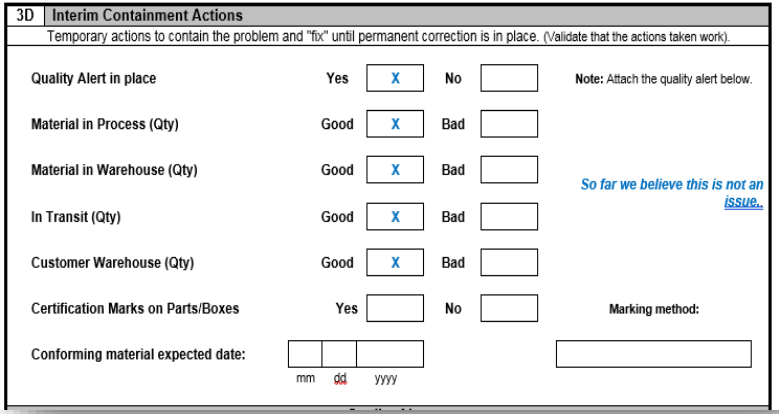
SPECIFIC CONTAINMENT ACTION (describe) -A quality Alert was posted at production floor in order to let all associates with direct interaction the customer quality Issue.

Temporary actions to contain the problem and "fix" until permanent correction is in place. (Validate that the actions taken work).

Quality Alert in place	Yes	X	No		**Note:** Attach the quality alert below.
Material in Process (Qty)	Good	NA	Bad	0 pcs	
Material in Warehouse (Qty)	Good	2,045 pcs	Bad	0 pcs	Fuses related to Mfg date code will be electrically inspected
In Transit (Qty)	Good	NA	Bad	0 pcs	
Customer Warehouse (Qty)	Good	NA	Bad	0 pcs	
Certification Marks on Parts/Boxes	Yes	X	No	0 pcs	**Marking method:**
Conforming material expected date:	04 (mm)	15 (dd)	2015 (yyyy)		Green Dot

1. Effective containment actions including production and inventory in pipe line.
2. Littelfuse is notified of affected material that may be in their pipeline.
3. Clean point is clearly identified and marking method.
4. Quality Alert in place.

Not Good Sample



3D Interim Containment Actions

Temporary actions to contain the problem and "fix" until permanent correction is in place. (Validate that the actions taken work).

Quality Alert in place	Yes	X	No		**Note:** Attach the quality alert below.
Material in Process (Qty)	Good	X	Bad		
Material in Warehouse (Qty)	Good	X	Bad		*So far we believe this is not an issue..*
In Transit (Qty)	Good	X	Bad		
Customer Warehouse (Qty)	Good	X	Bad		
Certification Marks on Parts/Boxes	Yes		No		**Marking method:**
Conforming material expected date:	(mm)	(dd)	(yyyy)		

1. No information of material in pipeline.
2. No clean point identified.
3. No marking method for parts inspected until root causes and corrective actions are in place.

D4.- Define and Verify Root Cause and Escape Point.

To effectively prevent a problem from occurring again, the root cause must be indentified and removed. In rare situations there could be more than one root cause.

Task	Action	Output
▪ Determine technical and systemic root cause using, but not limited to, the following quality tools: - 5Whys - Fishbone - Brainstorming **TRC** = Technical Root Cause **SRC**= Systemic Root Cause	▪ Description of the root causes (TRC and SRC) documented with evidence ▪ Isolate and verify the root cause by testing each possible cause against the problem description and test data. ▪ Isolate and verify the place in the process where the effect of the root cause should have been detected and contained (Escape Point). ▪ The Acid Test: How do you know when you have identified the actual root cause? ***The Failure Mode can be turned on and off .***	▪ The technical and systemic root causes and escape point are confirmed. ▪ Send 4D's report to Littelfuse representative within 4 business days since claim was reported. NOTE: If the root cause of a problem is " operator error" that's not the real root cause. The root cause is more likely that the process is not "error proofed"

D4.- Root Cause Analysis.

When identifying root cause the team should focus on why the issue occurred first, then how the defect was missed and finally what failed on the quality system.

1) Technical root cause

- Root cause on operative/technical level that results from description of logical and functional relationships (cause effect relationship)

Examples:
✓ Physical / Chemical function properties of materials. (e.g. Colour , strength , strain)
✓ In technical process.
✓ Tooling worn.

2) Escape point

- The escape point is the place in the process where the root cause could have been detected and contained , but was allowed to pass. This root cause refers to detection system.

Examples:
✓ Dimension not included on SPC chart.
✓ Tester not capable to detect the issue.
✓ Characteristic is not part of the inspection plan.

3) Systemic root cause

- This root cause refers to the Quality and Manufacturing Systems that surround the product and process (Refer to PFMEA for Product and Process controls).

Examples:
✓ Instructions for the process / product not created, incomplete, unclear or faulty description.
✓ Core tools with faulty implementation, faulty application or unclear.

D4.- Root Cause Analysis (Example).

Problem Description: Customer reported the cover HNXE13 was loose in several sensors, and sticking to the grip in others.

Real Root Cause.

1) Technical root cause

- One side of cover is loose in the sensor.
- The tip end of one of the snap fit legs is sheared off.
- Cover snap fit leg gets damaged during assembly into rotor snap feature.
- High interference on cover leg at rotor flat surface before leading angle begins.
- The snap feature design on rotor (leading angle and cavity opening) not optimized for insertion.

2) Escape Point

- The quality acceptance criteria did not detect covers that were loose.
- After cover assembly , there was no evidence of loose covers.
- Process instructions called for presence only but retention force was not monitored.
- Product print called only for cover to be locked and present on sensor.
- The retention force spec was not documented into any customer official document.

3)Systemic root cause

- The snap feature on the sensor failed due to the design allowing for interference and insufficient lead in for cover legs to engage into the rotor snap fit opening.
- Snap fit feature in rotor design was not thoroughly analyzed / optimized.
- Efforts were focused on the cover modifications to accommodate function added
- Customer made a late engineering change in the cover design to aid the assembly of the grip into the sensor (Close to SOP)
- Assembly requirements for the sensor in the vehicle application were not fully developed by customer prior to SOP.

D4.- Root Cause Analysis.

Root cause analysis techniques

• **Less Structured Approaches:**
- Intuition, networking, and experience.

• **Structured Approaches:**
- 5 Whys.
- Cause and effect diagram.
- Trend analysis.
- Pareto Diagrams.
- Brainstorming.
- Flow and Process chart.
- other techniques : DOE (design of experiments) , ANOVA (analysis of variance)

NOTE 1: These structured approaches can be used to find out the root cause for occurrence (technical), systemic and escape point.

NOTE 2 : When identifying root cause, the team should focus on why the issue occurred first, then how the defect was missed and finally what failed on the quality/manufacturing system.

D4.- Root Cause Analysis.

Immediate causes are NOT root causes, some commons immediate causes are:

- ✓ Operator not trained.
- ✓ Failure to follow procedures / Work instructions
- ✓ Operator error
- ✓ Inspection not recorded by the operator

These are not root causes, they are just symptoms of the true root cause.

D4.- Root Cause Analysis.

What would be some reasons why true root cause is not identified?

- ✓ Problem description was not well defined.
- ✓ Possibly some of the “facts” are not true. Incorrect data.
- ✓ The right people was not included to fully understand the problem.
- ✓ The team is working on symptoms instead of the real problem.

D4.- Define and Verify Root Cause and Escape Point.

Key questions

✓Have all sources of information been considered in determining the root causes?
✓Why has the problem not occurred before?
✓Is there a provable connection between the problem and particular processes?
✓ The causes were reviewed to determine if, collectively, they account for all of the Problem Description (i.e., the desired performance level is achievable)?
✓ has been Isolated and verified the root cause by testing each possible cause against the problem description and test data?
✓ Have been confirmed the technical and systemic root causes? Escape point?

5Whys.

By repeatedly asking the question “Why” (five is a good rule of thumb), you can peel away the layers of symptoms which can lead to the root cause of a problem.

NOTE: You may find that you will need to ask the question fewer or more times than five before you find the issue related to a problem.

How to Complete the 5 Whys

1.- Write down the specific problem. Writing the issue helps you formalize the problem and describe it completely. It also helps a team focus on the same problem.
2.- Ask Why the problem happens and write the answer down below the problem.
3.- If the answer you just provided doesn’t identify the root cause of the problem that you wrote down in Step 1, ask Why again and write that answer down.
4.- Loop back to step 3 until the team is in agreement that the problem’s root cause is identified. Again, this may take fewer or more times than five Whys

5Whys (Example).

Problem Statement:

Wrong item shipped to customer

Why? The wrong item was pulled from inventory

Why? The item we pulled from inventory was mislabeled

Why? Our supplier mislabeled the item prior to shipping it to our warehouse

Why? The individual applying labels to our product at the supplier placed the wrong label on the product.

Why? Labels for different orders are pre-printed and it is easy to apply the wrong label

Cause and Effect Diagram.

A cause and effect diagram can help in brainstorming to identify possible causes of a problem and in sorting ideas into useful categories.

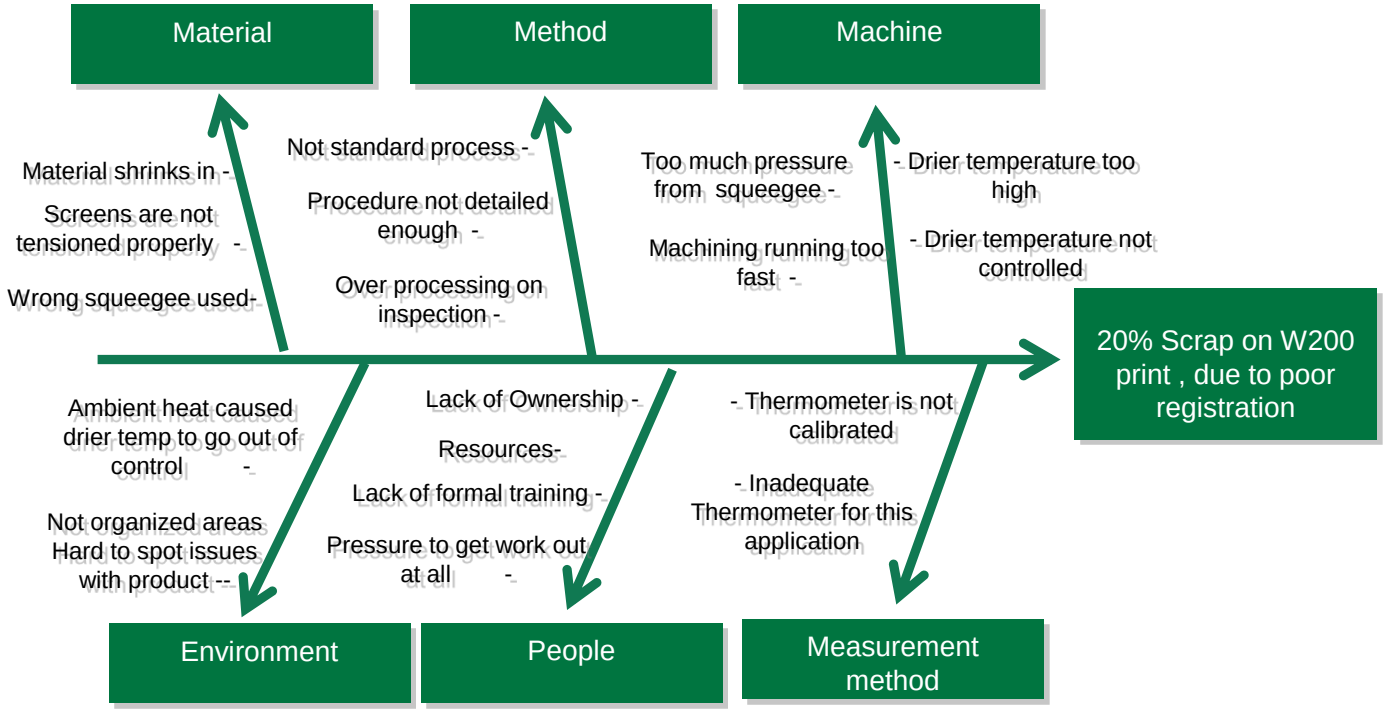
In a cause and effect diagram you will find the following categories : Method / Machine / People / Environment / Measurement Method / Material

How to Complete a Cause and Effect Diagram

1.- Agree on the problem statement.
2.- Brainstorm all the possible causes of the problem. Ask “Why does it happens?” as each idea is given, the facilitator writes the causal factor as a branch from the appropriate category.
3.- Again ask “Why does it happen ?” about each cause . If applicable write sub-causes branching off the cause branches.

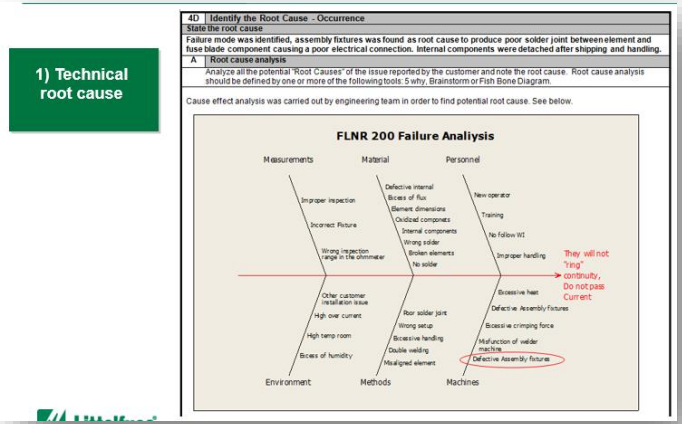
Tips:
- Consider drawing your cause and effect diagram on a flip chart or large dry erase board.
- Use this tool to keep the team focused on the causes of the problem, rather than symptoms

Cause and Effect Diagram (Example).



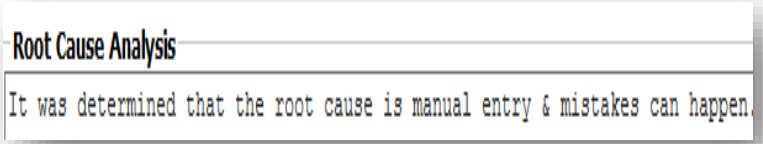
D4.- Good / Not Good Sample.

Good Sample



1. True root cause identified through 5whys / Ishikawa diagram. Analysis addresses occurrence, escape point and system root causes.
2. Quality issue can be turn off and on. (root causes are verified and linkage is established to original failure mode)

Not Good Sample



1.No quality tools were used to find out the root cause.
2. Root cause was not verified.
3.- Addressing the symptom but no the real root cause.

D5.- Choose and Verify Permanent Corrective Actions for Root Cause and Escape Point.

The goal of corrective actions is to remove the root cause and prevent the problem from ever happening again. If good corrective actions are taken , the issue must not occur again.

Task	Action	Output
• Develop and evaluate corrective actions for technical and systemic root causes and escape point. TRC = Technical Root Cause (Occurrence). SRC = Systemic Root Cause.	• Define corrective actions to eliminate the root causes (occurrence & non-detection; TRC & SRC)with evidence of effectiveness • Consider all the corrective actions that can eliminate the problem. • For each determined root cause(TRC and SRC) appropriate corrective action plan defined. • Verification: no induction of new problems through implementation of corrective actions.	• There is a set of well defined Corrective Actions for the Occurrence, Detection/Escape and System. • There is data to show a direct link between the action and the root cause that was identified.

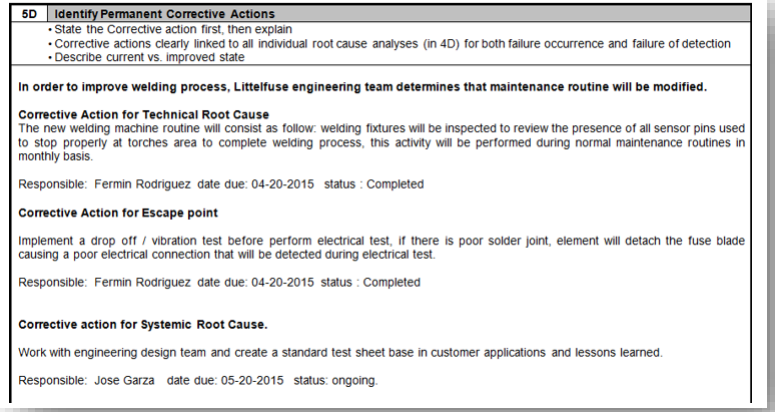
D5.- Choose and Verify Permanent Corrective Actions for Root Cause and Escape Point.

Key questions

✓Have all possibilities for determining permanent corrective actions been thoroughly exhausted?
✓Have the “correct “ indicators been used to prove the effectiveness of the corrective actions?
✓An action plan has been defined (responsibilities assigned; timing established; required support determined)?
✓Is there any emergency plan in case corrective actions do not result in the desired success or if the actions cause other/new defect?

D5.- Good / Not Good Sample.

Good Sample



5D	Identify Permanent Corrective Actions

- State the Corrective action first, then explain
- Corrective actions clearly linked to all individual root cause analyses (in 4D) for both failure occurrence and failure of detection
- Describe current vs. improved state

In order to improve welding process, Littelfuse engineering team determines that maintenance routine will be modified.

Corrective Action for Technical Root Cause
The new welding machine routine will consist as follow: welding fixtures will be inspected to review the presence of all sensor pins used to stop properly at torches area to complete welding process, this activity will be performed during normal maintenance routines in monthly basis.

Responsible: Fermin Rodriguez date due: 04-20-2015 status : Completed

Corrective Action for Escape point

Implement a drop off / vibration test before perform electrical test, if there is poor solder joint, element will detach the fuse blade causing a poor electrical connection that will be detected during electrical test.

Responsible: Fermin Rodriguez date due: 04-20-2015 status : Completed

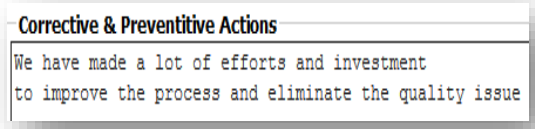
Corrective action for Systemic Root Cause.

Work with engineering design team and create a standard test sheet base in customer applications and lessons learned.

Responsible: Jose Garza date due: 05-20-2015 status: ongoing.

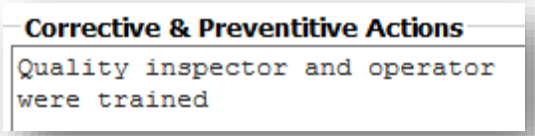
1.Corrective actions addresses all root causes identified.
2. Responsible for each action is identified as well as due date and status.

Not Good Sample



Corrective & Preventitive Actions

We have made a lot of efforts and investment
to improve the process and eliminate the quality issue



Corrective & Preventitive Actions

Quality inspector and operator
were trained

1. Specific corrective actions are not clear.
2. Status of implementation of corrective action is missed.
3.- Training is not an acceptable corrective action.

D6.- Implement and Validate Permanent Corrective Actions.

The purpose of this step is to verify if the corrective actions implemented on 5D section, removed the root cause.

Task	Action	Output
• Plan and implement selected permanent corrective actions. • Determine a plan to remove the interim containment action. • Monitor the long-term results.	• Validate effectiveness after implementing and ensure that there are no negative consequences. • Monitoring of corrective actions • Monitoring of defect occurrence • Document results	• There is data to show that the effectiveness of each Corrective Actions was properly evaluated. • After the actions were implemented, there is evidence that the failure mode/defect has not reoccurred, it is detected with 100% confidence and the Quality and Manufacturing systems were updated as a result. • Containment actions from D3 may be removed (prior agreement with the customer), based on evidence.

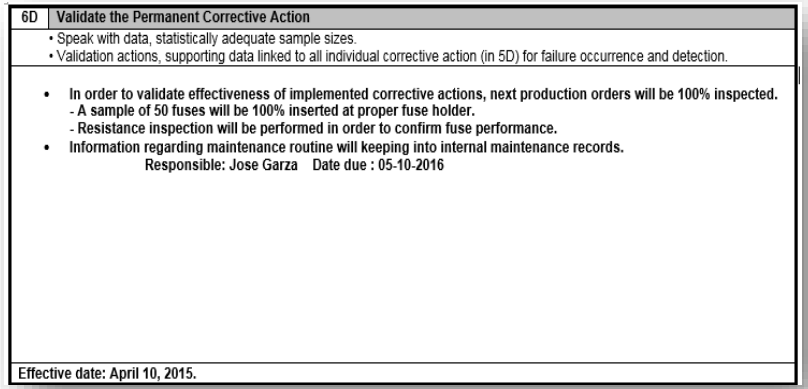
D6.- Implement and Validate Permanent Corrective Actions.

Key questions

✓Do the selected corrective actions represent the best possible long term solution?
✓The plan has been communicated to those that have a need to know?
✓Has a schedule been drawn up for the implementation of the corrective actions?
✓What monitoring methods have been defined? (evidence of effectiveness)
✓All changes are documented (e. g., FMEA, Control Plan, Process Flow)?

D6.- Good / Not Good Sample.

Good Sample



6D	Validate the Permanent Corrective Action

- Speak with data, statistically adequate sample sizes.
- Validation actions, supporting data linked to all individual corrective action (in 5D) for failure occurrence and detection.

- In order to validate effectiveness of implemented corrective actions, next production orders will be 100% inspected.
  - A sample of 50 fuses will be 100% inserted at proper fuse holder.
  - Resistance inspection will be performed in order to confirm fuse performance.
- Information regarding maintenance routine will keeping into internal maintenance records.

Responsible: Jose Garza Date due : 05-10-2016

Effective date: April 10, 2015.

1. Clear plan to validate the effectiveness of corrective actions implemented.
2. Effective date is clearly identified.
3.- Responsible for each action is identified as well as due date and status

Not Good Sample

1. Actions to validate the effectiveness of corrective actions are not clear.
2. Responsible to complete each verification action was is not clear.

D7.-Preventing Recurrence.

Preventive actions remove causes for a potential problem and prevent it from ever happening. 7D actions are proactive and oriented towards a potential event in the future.

Task	Action	Output
• Establish preventive actions to avoid occurrence comparable problems in other business or production processes and products. • Look Across and Fan Out methodologies	▪ Transfer acquired experiences via Lessons Learned to other/comparable products, processes, production sites and divisions. ▪ Modify / update the necessary systems including policies, practices, and procedures to prevent recurrence of this problem and similar ones. (e.g. PFMEA, Control plan, flow chart, inspections sheets, work instructions).	• Updated standards (QM-system, design rules, work instructions etc.) are released; experiences are exchanged (Lessons Learned). • There is evidence that Lessons Learned were applied to similar products and processes that are sensitive to the same defect or failure mode

D7.- Preventing Recurrence.

Key questions

- ✓ Are there similar situations/processes elsewhere in your plant/division/company which can benefit from what your team has learned?
- ✓ How can the solutions implemented in step D6 be systematized, written into policies, and/or added to “lessons learned?”
- ✓ What else can be done to insure this situation doesn’t reappear elsewhere?

D7.- Good / Not Good Sample.

Good Sample

7D Preventing Recurrence

Define improvements in systems and process to prevent problem from recurring. Ensure that corrective action remains in place.
- Examine similar products and processes and implement corrective actions across the organization where applicable.

- **Training to all associates with direct interaction will be conducted.**
  Responsible: Cynthia Rodriguez date due : 04-15-2014 status ; Done
- **Implementation of corrective actions to similar process.**
  Responsible: Fermin Rodriguez date due: 05-30-2015 status: ongoing

A Review all affected Documents / Systems

Document	Responsible	Completion Date	Action Number
Corrective actions validation	**Jose Garza**	**April 8, 2015.**	
Maintenance Routine	**Miguel Ibarra.**	**April 2, 2015.**	
Associates Training	**Rocio Cruz.**	**April 8, 2015.**	
Fix Welding Fixtures	**Miguel Ibarra**	**April 2, 2015.**	
Update PFMEA	**Fermin Rodriguez**	**April 10,2015**	
Update control plan	**Jose Garza**	**April 10,2015**	
Update flow chart	**Jose Garza**	**April 10,2015**	
Other (Define)			

1. Related documents were updated.
2. PFMEA and control plan were updated.
3. Responsible were assigned for each activity.
4. Corrective actions were implemented across the organization where applicable (report shows evidence of implementation)

Not Good Sample

7D Preventing Recurrence

Define improvements in systems and process to prevent problem from recurring. Ensure that corrective action remains in place.
- Generic statement to implement corrective across the organization for similar products. If applicable.

- **Supplier has regularly scheduled audit trips to Plater for verification and validation.**
- **Corrective actions have been applied to All Littelfuse Parts.**

1. Responsible were non identified.
2. Neither due date nor status of actions are clear.
3. PFMEA and Control plan were not updated.

D8.- Recognize Team and Individual Contributions.

This step is to recognize the team efforts and special team member contributions. This is also a good point to document lessons learned.

Task	Action	Output
• Conduct final meeting with the 8D team. • Prerequisite: Completion of all steps D1 to D7.	• Review and evaluation of steps D1 thru D7 • Conclusion of the problem solving with agreement of the involved persons, if necessary customer • The way the team and its members are acknowledged is only limited by the creativity of the organization.	• 8D activities related to this problem finally concluded. No open or “in-progress” action items. • Recognize each team member and their contributions. • Obtain customer approval to formally close the 8D’s

D8.- Recognize Team and Individual Contributions

Key questions

- ✓ Have the root causes been eliminated?
- ✓ All the corrective actions been implemented?
- ✓ Have monitoring processes been put in place?
- ✓ Has the customer been notified of the final conclusion?
- ✓ Team process has been evaluated and lessons learned identified?
- ✓ All current and past team members are being recognized?
- ✓ Did the Quality Manager and Plant Manager review and approve the 8D's report (sign off)?

D8.- Good / Not Good Sample.

Good Sample

8D	Lessons Learned for future applications
Littelfuse problem solving teams seek to capture "lessons" where problem solving is required and then document them appropriately.	
Lessons Learned	
A total of fuses of Phase 1 (FLSR, LSRK & IDSR 125-200A) will be improved due to this change. Set up meeting to review the implementation of each corrective action, and then close the 8D's report. Responsible: Tom Braun Date due: 05-30-2015 status: ongoing	

* Blank spaces: Not applicable.

Management Review & Approval			
Yes / No	Title	Name	Date
Yes	Quality Manager	Tom Braun	April 15, 2015.
Yes	Plant Manager	Chris Smith	April 15, 2015.

1. Quality and Plant Manager sign off.
2. Identification of lessons learned.

Not Good Sample

8D	Congratulate the Team
Littelfuse problem solving teams are recognized periodically for their positive contribution to solve customer issues.	
Lessons Learned	
Thanks to the team for their continued support	

* Blank spaces: Not applicable.

Management Review & Approval			
Yes / No	Title	Name	Date
	Quality Manager		
	Plant Manager		

1. Report was not approved by the quality manager nor plant manager.

Example of 8D's report

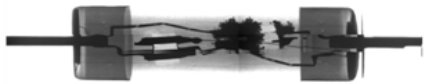
D1.- Define Team Members.

The approach is based on a team working together to solve a problem. Teamwork must be coordinated and guided. The team should include only competent persons actively involved in the process and who have been assigned a task or responsibility in subsequent steps.

1D	Team Members	
Department	Name	Title
Quality	Jose Garza	Quality Engineer
Quality	Raul Uribe	Quality Manager
Production	Cynthia Alonso	Production Manager
Production	Oralia Vazquez	Production Supervisor
Quality	Ruth Perez	Quality Inspector
Manufacturing	Fermin Rodriguez	Manufacturing Manager
Product	Rocio Cruz	Manufacturing Engineer Jr.
Product	Mario Moreno	Product Engineer

D2.- Problem Description.

Problem solving must be based on facts, not opinions. It is important to clarify the issue type, what is wrong, when did it happen, how big the failure extent is and how many times has it happened. The description must be specific and easy to understand. - See more.

2D	Problem Definition	Sketch of the Problem (Picture)
	Customer Name	
	Littelfuse	
	Customer Location	
	Mexico	
	Customer Contact	
	Yoshisumi Kanagusico ykanagusiko@littelfuse.com	
	Supplier Part Number	
	XLEN3516	
	Littelfuse Part Name	
	XLEN3516 250VAC or Less	
	Littelfuse Part Number	
	XLEN3516	
	Failure Rate or Quantity	
	1 Fuse	
	Manufacturing Date Code	
	L4K11F (November 11, 2014.)	
	Problem Description (Customer & Littelfuse)	
	Littelfuse Statement: They will not "ring" continuity with Fluke 87V, will not pass current, but still allow 480V phase to phase and 280V to ground. Supplier Statement: Fuse was received and issue was confirmed during electrical testing. See report below.	

D3.- Develop Interim Containment Actions.

The primary purpose of this discipline is to isolate the issue and protect the customer from receiving more parts with same quality issue.

3D	Interim Containment Actions
	SPECIFIC CONTAINMENT ACTION (describe) -A quality Alert was posted at production floor in order to let all associates with direct interaction the customer quality Issue.

Temporary actions to contain the problem and "fix" until permanent correction is in place. (Validate that the actions taken work).

Quality Alert in place	**Yes**	X	**No**		**Note:** Attach the quality alert below.
Material in Process (Qty)	**Good**	NA	**Bad**	**0 pcs**	
Material in Warehouse (Qty)	**Good**	2,045 **pcs**	**Bad**	**0 pcs**	Fuses related to Mfg date code will be electrically inspected
In Transit (Qty)	**Good**	NA	**Bad**	**0 pcs**	
Customer Warehouse (Qty)	**Good**	NA	**Bad**	**0 pcs**	
Certification Marks on Parts/Boxes	**Yes**	X	**No**	**0 pcs**	**Marking method:**
Conforming material expected date:	**04** (mm)	**15** (dd)	**2015** (yyyy)		Green Dot

D3.- Develop Interim Containment Actions.

The primary purpose of this discipline is to isolate the issue and protect the customer from receiving more parts with same quality issue.

Quality Alert

QUALITY ALERT

CUSTOMER COMPLAINT No. 26531

OUR CUSTOMER Littelfuse REPORTED THE

PART NUMBER XLEN3516 WITH THE FOLLOWING ISSUE:

They will not "ring" continuity with Fluke 87V, will not pass current

El cliente se que queja que el fusible no activo para la funcion

en la que fue instalado.

PAY SPECIAL ATTENTION TO THE ISSUE REPORTED BY OUR CUSTOMER AND MAKE SURE THE PRODUCT COMPLY WITH ALL LITTELFUSE SPECIFICATIONS.

DISPLAYED (DATE): 15-Apr-15 DUE DATE: 15-May-15

Effective Date: April 15, 2015.

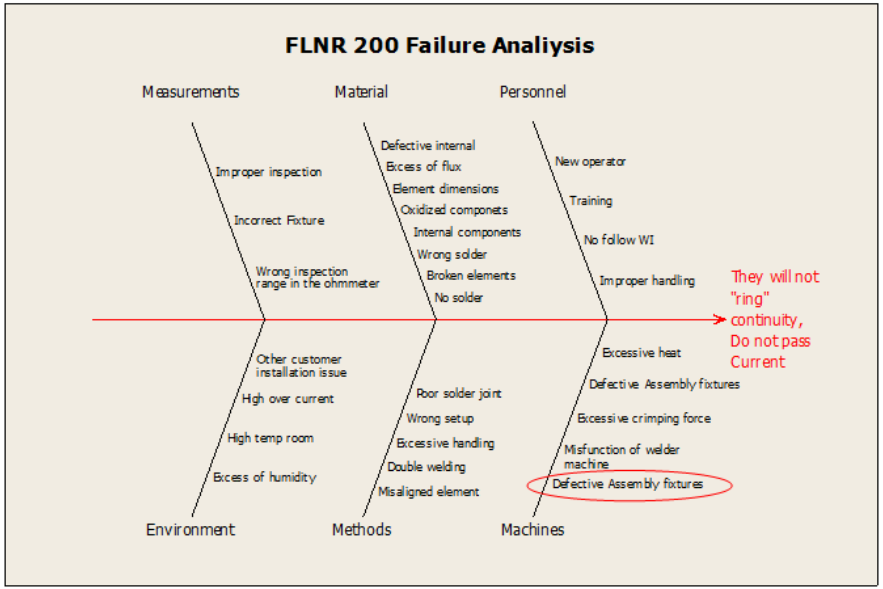
D4.- Define and Verify Root Cause and Escape Point.

To effectively prevent a problem from occurring again we have, the root cause must be indentified and removed. In rare situations there could be more than one root cause.

1) Technical root cause.

4D	Identify the Root Cause - Occurrence
State the root cause	
Failure mode was identified, assembly fixtures was found as root cause to produce poor solder joint between element and fuse blade component causing a poor electrical connection. Internal components were detached after shipping and handling.	
A	Root cause analysis
Analyze all the potential "Root Causes" of the issue reported by the customer and note the root cause. Root cause analysis should be defined by one or more of the following tools: 5 why, Brainstorm or Fish Bone Diagram.	

Cause effect analysis was carried out by engineering team in order to find potential root cause. See below.



D4.- Define and Verify Root Cause and Escape Point.

To effectively prevent a problem from occurring again we have, the root cause must be indentified and removed. In rare situations there could be more than one root cause.

1) Technical root cause.

B	Action Plan
	Based on the multidisciplinary team analysis, describe the actions used to verify the root causes. • Use pictures to explain if needed.

In order to determine the root causes the following actions will be conducted:

- Visual and dimensional analysis. Responsible: Jose Garza Date due 04-18-2016 status : Done
- Electrical checking. Responsible: Jose Garza Date due 04-18-2016 status : Done
- X-Ray Analysis Responsible: Jose Garza Date due 04-18-2016 status : Done
- Tear Down Analysis. Responsible: Jose Garza Date due 04-18-2016 status : Done
- Failure Mode Reproduction Responsible: Rocio Cruz Date due 04-18-2016 status : Done
- Review production process in order to determine the root causes. Responsible: Jose Garza Date due 04-18-2016 status : Done

D4.- Define and Verify Root Cause and Escape Point.

To effectively prevent a problem from occurring again we have, the root cause must be indentified and removed. In rare situations there could be more than one root cause.

1) Technical root cause.

C Failure mode reproduction (optional)

Explain how the failure mode was reproduced.
- Use pictures to explain if needed.

Visual and Dimensional analysis.

Fuse	Resistance	Alignment	Information Label	Dimensional
FLNR200ID	Open	PASS	PASS	PASS

Dimensional analysis fuse length

Spec 7.125± .060 -7.065+7.185

Dimensional analysis fuse body

Spec 1.494± .008 -1.486+1.502
Lec. 1.500

No issues were found during dimensional analysis.

Cap dimensions OD

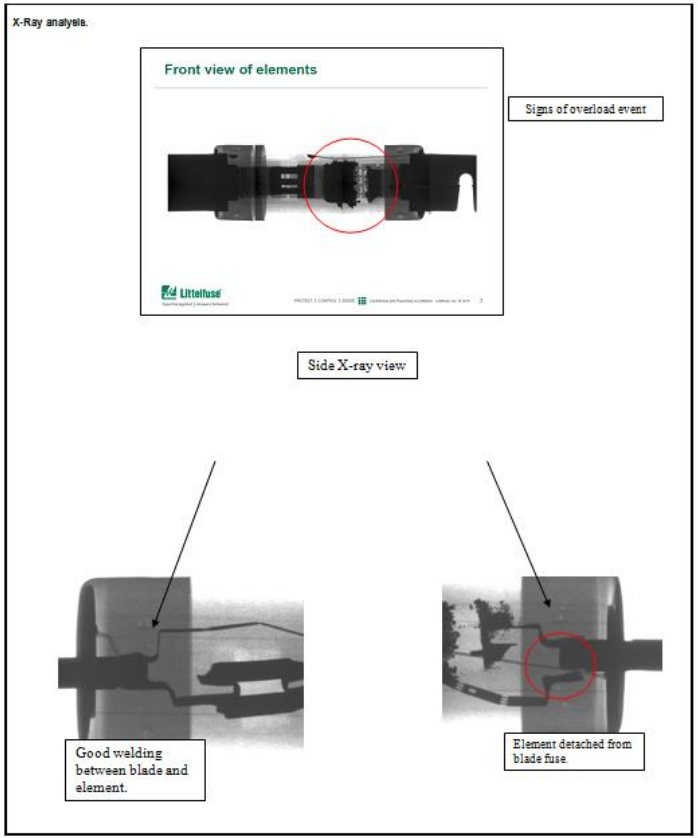
Spec. 1.537± .005 -1.532 +1.542
Lec. 1.539

Dimensional analysis fuse alignment

D4.- Define and Verify Root Cause and Escape Point.

To effectively prevent a problem from occurring again we have, the root cause must be indentified and removed. In rare situations there could be more than one root cause.

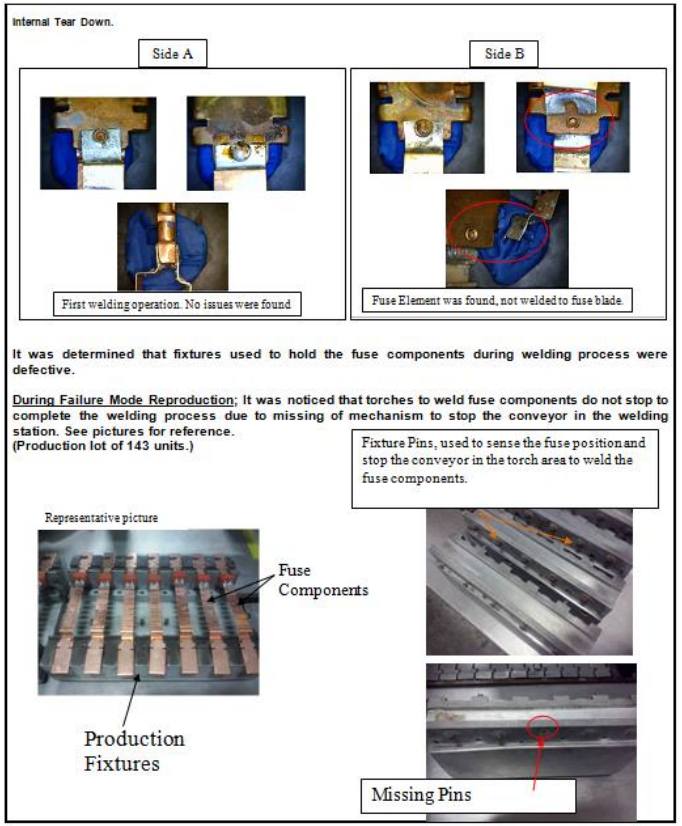
1) Technical root cause.



D4.- Define and Verify Root Cause and Escape Point.

To effectively prevent a problem from occurring again we have, the root cause must be indentified and removed. In rare situations there could be more than one root cause.

1) Technical root cause.

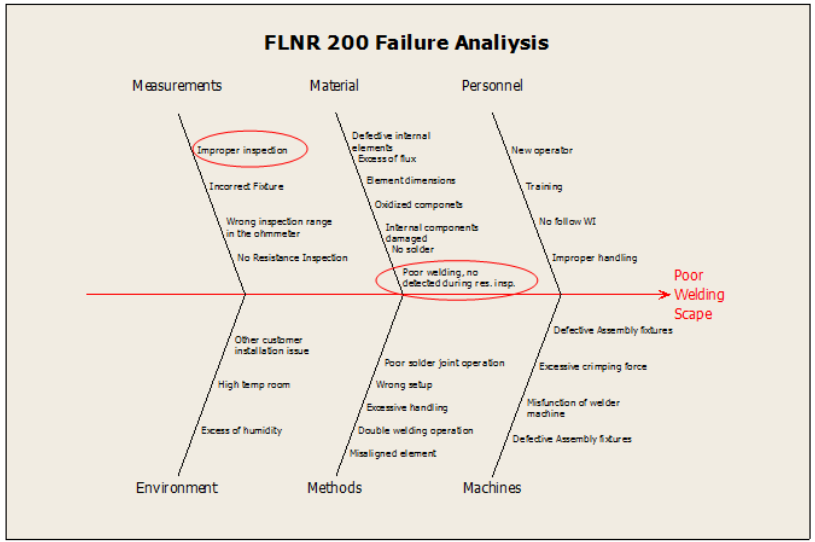


D4.- Define and Verify Root Cause and Escape Point.

To effectively prevent a problem from occurring again we have, the root cause must be indentified and removed. In rare situations there could be more than one root cause.

2) Escape Point.

4D	
State the root cause - Escape	
Fuse escaped to 100% resistance inspections points due to components were joined and due to poor welding combined with shipping and handling caused the issue reported.	
A	
Analyze all the potential "Root Causes" of the issue reported by the customer. Root cause analysis should be defined by one or more of the following tools: 5 why, Brainstorm or Fish Bone Diagram.	

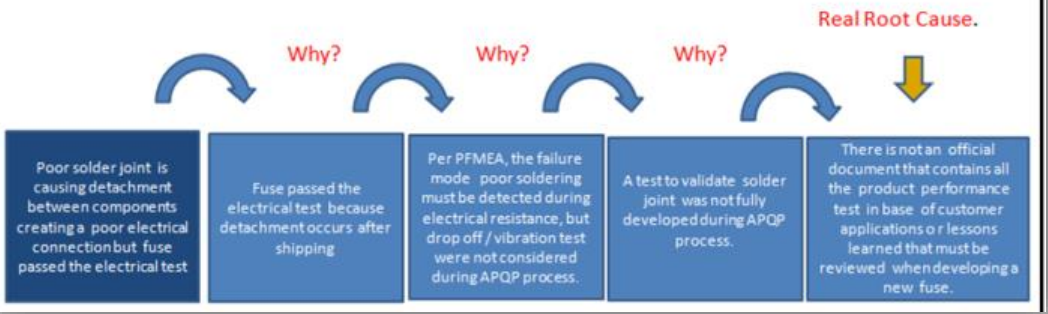


D4.- Define and Verify Root Cause and Escape Point.

To effectively prevent a problem from occurring again we have, the root cause must be indentified and removed. In rare situations there could be more than one root cause.

3) Systemic root cause.

4D	
State the root cause - Systemic	
There is not an official document that contains all the product performance test in base of customer applications or lessons learned, that must be reviewed when developing a new fuse.	
A	
	Analyze all the potential "Root Causes" of the issue reported by the customer. Root cause analysis should be defined by one or more of the following tools: 5 why, Brainstorm or Fish Bone Diagram.



D5.- Choose and Verify Permanent Corrective Actions for Root Cause and Escape Point.

The goal of corrective actions is to remove the root cause and prevent the problem from ever happening again. If good corrective actions have been taken , the issue must not occur again.

5D	Identify Permanent Corrective Actions

- State the Corrective action first, then explain
- Corrective actions clearly linked to all individual root cause analyses (in 4D) for both failure occurrence and failure of detection
- Describe current vs. improved state

In order to improve welding process, Littelfuse engineering team determines that maintenance routine will be modified.

Corrective Action for Technical Root Cause

The new welding machine routine will consist as follow: welding fixtures will be inspected to review the presence of all sensor pins used to stop properly at torches area to complete welding process, this activity will be performed during normal maintenance routines in monthly basis.

Responsible: Fermin Rodriguez date due: 04-20-2015 status : Completed

Corrective Action for Escape point

Implement a drop off / vibration test before perform electrical test, if there is poor solder joint, element will detach the fuse blade causing a poor electrical connection that will be detected during electrical test.

Responsible: Fermin Rodriguez date due: 04-20-2015 status : Completed

Corrective action for Systemic Root Cause.

Work with engineering design team and create a standard test sheet base in customer applications and lessons learned.

Responsible: Jose Garza date due: 05-20-2015 status: ongoing.

D6.- Implement and Validate Permanent Corrective Actions.

The purpose of this step is to verify if the corrective actions implemented on 5D section, removed the root cause.

6D	Validate the Permanent Corrective Action
	• Speak with data, statistically adequate sample sizes. • Validation actions, supporting data linked to all individual corrective action (in 5D) for failure occurrence and detection.
	• **In order to validate effectiveness of implemented corrective actions, next production orders will be 100% inspected.** **- A sample of 50 fuses will be 100% inserted at proper fuse holder.** **- Resistance inspection will be performed in order to confirm fuse performance.** • **Information regarding maintenance routine will keeping into internal maintenance records.** **Responsible: Jose Garza Date due : 05-10-2016**
Effective date: April 10, 2015.	

D7.-Preventing Recurrence.

Preventive actions remove causes for a potential problem and prevent it from ever happening. 7D actions are proactive and oriented towards a potential event in the future.

7D	Preventing Recurrence
Define improvements in systems and process to prevent problem from recurring. Ensure that corrective action remains in place. • Examine similar products and processes and implement corrective actions across the organization where applicable.	
• **Training to all associates with direct interaction will be conducted.** **Responsible: Cynthia Rodriguez date due : 04-15-2014 status ; Done** • **Implementation of corrective actions to similar process.** **Responsible: Fermin Rodriguez date due: 05-30-2015 status: ongoing**	
A	**Review all affected Documents / Systems**

Document	Responsible	Completion Date	Action Number
Corrective actions validation	**Jose Garza**	**April 8, 2015.**	
Maintenance Routine	**Miguel Ibarra.**	**April 2, 2015.**	
Associates Training	**Rocio Cruz.**	**April 8, 2015.**	
Fix Welding Fixtures	**Miguel Ibarra**	**April 2, 2015.**	
Update PFMEA	**Fermin Rodriguez**	**April 10,2015**	
Update control plan	**Jose Garza**	**April 10,2015**	
Update flow chart	**Jose Garza**	**April 10,2015**	

D8.- Recognize Team and Individual Contributions.

This step is to recognize the team efforts and special team member contributions. This is also a good point to document lessons learned.

8D	Lessons Learned for future applications

Littelfuse problem solving teams seek to capture "lessons" where problem solving is required and then document them appropriately .

Lessons Learned

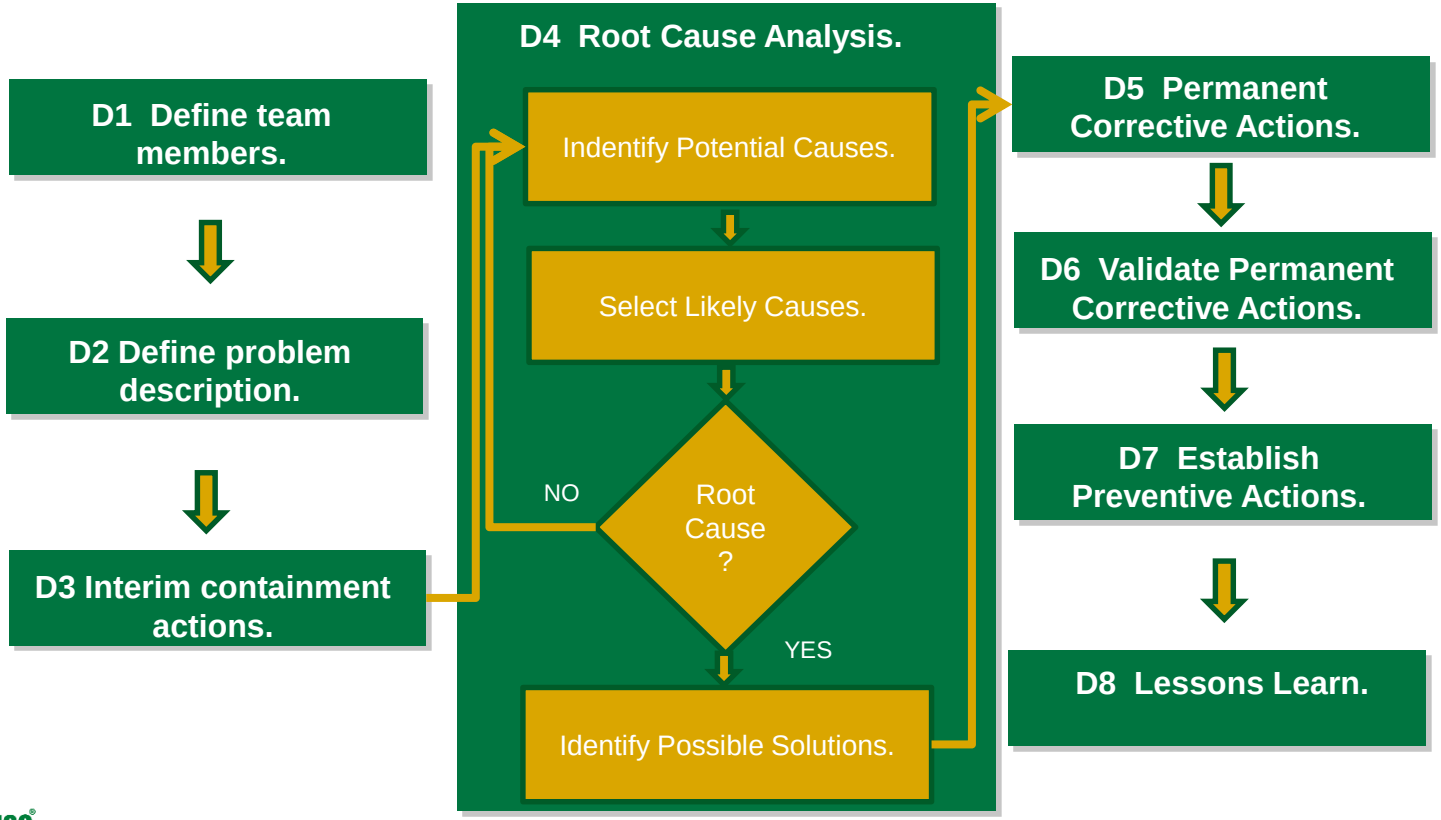
A total of fuses of Phase 1 (FLSR, LSRK & IDSR 125-200A) will be improved due to this change.

Set up meeting to review the implementation of each corrective action, and then close the 8D's report.
Responsible: Tom Braun Date due: 05-30-2015 status: ongoing

* Blank spaces: Not applicable.

Management Review & Approval			
Yes / No	**Title**	**Name**	**Date**
Yes	**Quality Manager**	**Tom Braun**	**April 15, 2015.**
Yes	**Plant Manager**	**Chris Smith**	**April 15, 2015.**

8D's Problem Solving Flow Chart.



END