8D’s Supplier Process.
8D’s Problem Solving Tutorial.
SDE team, May 2018 Rev B
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
D2: Define problem description
D3: Interim containments actions
D4: Root cause analysis
D5: Permanent corrective actions
D6: Validate permanent corrective actions
D7: Establish preventive actions
D8: Lessons Learn
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.

<table>
<thead>
<tr>
<th>Task</th>
<th>Action</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Select team members</td>
<td>Select members with appropriate skills based on the problem description.</td>
<td>Establish a team &amp; define responsibilities among the team members.</td>
</tr>
<tr>
<td></td>
<td>Appointed team leader, a sponsor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Are all team members reasonability's clear?</td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Department</th>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Jose Garza</td>
<td>Quality Engineer (Champion)</td>
</tr>
<tr>
<td>Quality</td>
<td>Tom Braun</td>
<td>Quality Manager</td>
</tr>
<tr>
<td>Production</td>
<td>Cynthia Alonso</td>
<td>Production Manager</td>
</tr>
<tr>
<td>Production</td>
<td>Oralia Vezquez</td>
<td>Production Supervisor</td>
</tr>
<tr>
<td>Quality</td>
<td>Rafael Perez</td>
<td>Quality Inspector</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Fermín Rodríguez</td>
<td>Manufacturing Manager</td>
</tr>
<tr>
<td>Product</td>
<td>Rocio Cruz</td>
<td>Manufacturing Engineer Jr.</td>
</tr>
<tr>
<td>Product</td>
<td>Mario Moreno</td>
<td>Product Engineer</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>▪ Describe the internal/external customer problem by identifying &quot;what is wrong with what&quot; and detail the problem in quantifiable terms.</td>
<td>▪ Gather and evaluate objective data.</td>
<td>▪ Description of the fundamental problem based on facts only.</td>
</tr>
<tr>
<td></td>
<td>▪ Answer the questions 5 Why’s and 2H’s. (Who / What / Why / Where / When / How / How often)</td>
<td></td>
</tr>
</tbody>
</table>
### 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**

- **Customer Name**: Littelfuse
- **Customer Location**: [Image of Littelfuse component]
- **Supplier Part Number**: [Image of Littelfuse component]
- **Supplier Part Name**: [Image of Littelfuse component]
- **Fuses**: [Image of Littelfuse component]
- **Type**: [Image of Littelfuse component]
- **Manufacturer Date Code**: [Image of Littelfuse component]
- **Problem Description**: [Image of Littelfuse component]
- **Customer Note**: [Image of Littelfuse component]
- **Supplier Note**: [Image of Littelfuse component]

**Not Good Sample**

- **Problem Description**: There are several coils with conductivity below specification

**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

**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.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>▪ Determine the most suitable containment actions.</td>
</tr>
<tr>
<td>▪ Containment Actions start in the D2(Define problem description) until D6(validate permanent corrective actions)</td>
</tr>
<tr>
<td>▪ 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.</td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<tbody>
<tr>
<td>▪ Safeguard the situation by containments actions, to prevent a reoccurrence of the problem at the customer</td>
</tr>
<tr>
<td>▪ Containment actions therefore serve only as a safeguard and often bear no relation to the cause of the problem.</td>
</tr>
<tr>
<td>▪ Cost considerations should play little or no part in the initial response</td>
</tr>
<tr>
<td>▪ Develop a schedule for implementing the containments actions</td>
</tr>
<tr>
<td>▪ Blocking of all parts, stock (in-house, transit, customer)</td>
</tr>
<tr>
<td>▪ Sorting of parts. <em>Identify</em> the good ones from the bad ones.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>▪ Customer receives only certified material (While the investigation and resolution of the problem continues).</td>
</tr>
<tr>
<td>▪ There is a clear breakpoint with identified good material</td>
</tr>
<tr>
<td>▪ All suspect inventory, at all locations, is properly quarantined</td>
</tr>
<tr>
<td>▪ Instant information and support to the customer as well as implementation of containment actions is done as quickly as possible.</td>
</tr>
</tbody>
</table>
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?
1. Effective containment actions including production and inventory in pipeline.
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.

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 identified and removed. In rare situations there could be more than one root cause.

### Task

- 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

### Action

- 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.*

### Output

- 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.

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.

Real Root Cause.
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.

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

20% Scrap on W200 print, due to poor registration

- Material
  - Material shrinks in...
  - Screens are not tensioned properly...
  - Wrong squeegee used...

- Method
  - Not standard process...
  - Procedure not detailed enough...
  - Over processing on inspection...
  - Too much pressure from squeegee...
  - Machining running too fast...

- Machine
  - Drier temperature too high...
  - Drier temperature not controlled...
  - - Thermometer is not calibrated...
  - - Inadequate Thermometer for this application...

- Environment
  - Ambient heat caused drier temp to go out of control...
  - Not organized areas: Hard to spot issues with product...

- People
  - Lack of Ownership...
  - Resources...
  - Lack of formal training...
  - Pressure to get work out at all...

- Measurement method

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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.

<table>
<thead>
<tr>
<th>Task</th>
<th>Action</th>
<th>Output</th>
</tr>
</thead>
</table>
| - 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**

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**

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.

<table>
<thead>
<tr>
<th>Task</th>
<th>Action</th>
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</tr>
</thead>
<tbody>
<tr>
<td>• Plan and implement selected permanent corrective actions.</td>
<td>• Validate effectiveness after implementing and ensure that there are no negative consequences.</td>
<td>• There is data to show that the effectiveness of each Corrective Actions was properly evaluated.</td>
</tr>
<tr>
<td>• Determine a plan to remove the interim containment action.</td>
<td>• Monitoring of corrective actions</td>
<td>• 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.</td>
</tr>
<tr>
<td>• Monitor the long-term results.</td>
<td>• Monitoring of defect occurrence</td>
<td>• Containment actions from D3 may be removed (prior agreement with the customer), based on evidence.</td>
</tr>
</tbody>
</table>
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

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.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>• Establish preventive actions to avoid occurrence comparable problems in other business or production processes and products.  &lt;br&gt;• Look Across and Fan Out methodologies</td>
<td>• Transfer acquired experiences via Lessons Learned to other/comparable products, processes, production sites and divisions.  &lt;br&gt;• 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).</td>
<td>• Updated standards (QM-system, design rules, work instructions etc.) are released; experiences are exchanged (Lessons Learned).  &lt;br&gt;• There is evidence that Lessons Learned were applied to similar products and processes that are sensitive to the same defect or failure mode</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>TD</th>
<th>Preventing Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define improvements in systems and process to prevent problem from recurring. Ensure that corrective action remains in place.</td>
<td></td>
</tr>
<tr>
<td>Examine similar products and processes and implement corrective actions across the organization where applicable.</td>
<td></td>
</tr>
</tbody>
</table>

- Training to all associates with direct interaction will be conducted.  
  Responsible: Cynthia Rodriguez  
  Date: 04-15-2014  
  Status: Done

- Implementation of corrective actions to similar process.  
  Responsible: Fermín Rodríguez  
  Date: 05-30-2015  
  Status: Ongoing

### Not Good Sample

<table>
<thead>
<tr>
<th>TD</th>
<th>Preventing Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define improvements in systems and process to prevent problem from recurring. Ensure that corrective action remains in place.</td>
<td></td>
</tr>
<tr>
<td>Generic statement to implement corrective across the organization for similar products. If applicable.</td>
<td></td>
</tr>
</tbody>
</table>

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

### Good Sample Table

<table>
<thead>
<tr>
<th>Document</th>
<th>Responsible</th>
<th>Completion Date</th>
<th>Action Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrigitive actions validation</td>
<td>Jose Garza</td>
<td>April 8, 2015</td>
<td></td>
</tr>
<tr>
<td>Maintenance Quality</td>
<td>Miguel Barroa</td>
<td>April 2, 2015</td>
<td></td>
</tr>
<tr>
<td>Associates Training</td>
<td>Rocio Cruz</td>
<td>April 8, 2015</td>
<td></td>
</tr>
<tr>
<td>Fix Welding Fittings</td>
<td>Miguel Barroa</td>
<td>April 2, 2015</td>
<td></td>
</tr>
<tr>
<td>Update PFMEA</td>
<td>Fermín Rodríguez</td>
<td>April 10, 2015</td>
<td></td>
</tr>
<tr>
<td>Update control plan</td>
<td>Jose Garza</td>
<td>April 10, 2015</td>
<td></td>
</tr>
<tr>
<td>Update flow chart</td>
<td>Jose Garza</td>
<td>April 10, 2015</td>
<td></td>
</tr>
</tbody>
</table>

### Not Good Sample Table

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.

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

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

Not Good Sample

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

Lessons Learned

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

A total of fuses of Phase 1 (FLSR, LSRK & IDSR 125-20A) will be improved due to this change.

Set up meeting to review the implementation of each corrective action, and then close the ID’s report.

| Responsible | Tom Braun | Date due: 05-30-2015 | status: ongoing |

Management Review & Approval

<table>
<thead>
<tr>
<th>Yes / No</th>
<th>Title</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Quality Manager</td>
<td>Tom Braun</td>
<td>April 15, 2015</td>
</tr>
<tr>
<td>Yes</td>
<td>Plant Manager</td>
<td>Chris Smith</td>
<td>April 15, 2015</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Department</th>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Jose Garza</td>
<td>Quality Engineer</td>
</tr>
<tr>
<td>Quality</td>
<td>Raul Uribe</td>
<td>Quality Manager</td>
</tr>
<tr>
<td>Production</td>
<td>Cynthia Alonso</td>
<td>Production Manager</td>
</tr>
<tr>
<td>Production</td>
<td>Oralia Vazquez</td>
<td>Production Supervisor</td>
</tr>
<tr>
<td>Quality</td>
<td>Ruth Perez</td>
<td>Quality Inspector</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Fermin Rodriguez</td>
<td>Manufacturing Manager</td>
</tr>
<tr>
<td>Product</td>
<td>Rocio Cruz</td>
<td>Manufacturing Engineer Jr.</td>
</tr>
<tr>
<td>Product</td>
<td>Mario Moreno</td>
<td>Product Engineer</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Problem Definition</th>
<th>Sketch of the Problem (Picture)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer Name</strong></td>
<td><a href="image">Image of fuse</a></td>
</tr>
<tr>
<td>Littelfuse</td>
<td></td>
</tr>
<tr>
<td><strong>Customer Location</strong></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td></td>
</tr>
<tr>
<td><strong>Customer Contact</strong></td>
<td></td>
</tr>
<tr>
<td>Yoshisumi Kanaguisco <a href="mailto:ykanagusiko@littelfuse.com">ykanagusiko@littelfuse.com</a></td>
<td></td>
</tr>
<tr>
<td><strong>Supplier Part Number</strong></td>
<td></td>
</tr>
<tr>
<td>XLEN3516</td>
<td></td>
</tr>
<tr>
<td><strong>Littelfuse Part Name</strong></td>
<td></td>
</tr>
<tr>
<td>XLEN3516 250VAC or Less</td>
<td></td>
</tr>
<tr>
<td><strong>Littelfuse Part Number</strong></td>
<td></td>
</tr>
<tr>
<td>XLEN3516</td>
<td></td>
</tr>
<tr>
<td><strong>Failure Rate or Quantity</strong></td>
<td></td>
</tr>
<tr>
<td>1 Fuse</td>
<td></td>
</tr>
<tr>
<td><strong>Manufacturing Date Code</strong></td>
<td></td>
</tr>
<tr>
<td>L4K11F (November 11, 2014.)</td>
<td></td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>3D</th>
<th>Interim Containment Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIFIC CONTAINMENT ACTION (describe)</td>
<td>A quality Alert was posted at production floor in order to let all associates with direct interaction the customer quality issue.</td>
</tr>
</tbody>
</table>

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

**Quality Alert in place**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>✗</td>
<td></td>
</tr>
</tbody>
</table>

Note: Attach the quality alert below.

**Material in Process (Qty)**

<table>
<thead>
<tr>
<th>Good</th>
<th>NA</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 pcs</td>
</tr>
</tbody>
</table>

**Material in Warehouse (Qty)**

<table>
<thead>
<tr>
<th>Good</th>
<th>2,045 pcs</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 pcs</td>
</tr>
</tbody>
</table>

Fuses related to Mfg date code will be electrically inspected

**In Transit (Qty)**

<table>
<thead>
<tr>
<th>Good</th>
<th>NA</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 pcs</td>
</tr>
</tbody>
</table>

**Customer Warehouse (Qty)**

<table>
<thead>
<tr>
<th>Good</th>
<th>NA</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 pcs</td>
</tr>
</tbody>
</table>

**Certification Marks on Parts/Boxes**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>✗</td>
<td></td>
</tr>
</tbody>
</table>

Marking method: Green Dot

**Conforming material expected date:**

<table>
<thead>
<tr>
<th>04</th>
<th>15</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>dd</td>
<td>yyyy</td>
</tr>
</tbody>
</table>
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

CUSTOMER COMPLAINT No. 26531

OUR CUSTOMER REPORTED THE
Littelfuse

PART NUMBER XLER3216 WITH THE FOLLOWING ISSUE:

They will not "ring" continuity with fuse STV, will not pass current

El cliente se queja que el fusible no active para la función
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.

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 to identify and remove the root cause. In rare situations, there could be more than one root cause.

1) Technical root cause.

<table>
<thead>
<tr>
<th>Action Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on the multidisciplinary team analysis, describe the actions used to verify the root causes.</td>
</tr>
<tr>
<td>- Use pictures to explain if needed.</td>
</tr>
</tbody>
</table>

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: Rodolfo 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.
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.

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

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

2) Escape Point.
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.
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.

<table>
<thead>
<tr>
<th>5D</th>
<th>Identify Permanent Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- State the corrective action first, then explain</td>
</tr>
<tr>
<td></td>
<td>- Corrective actions clearly linked to all individual root cause analyses (in 4D) for both failure occurrence and failure of detection</td>
</tr>
<tr>
<td></td>
<td>- Describe current vs improved state</td>
</tr>
</tbody>
</table>

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 performing 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.

<table>
<thead>
<tr>
<th>6D</th>
<th>Validate the Permanent Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Speak with data, statistically adequate sample sizes.</td>
</tr>
<tr>
<td></td>
<td>• Validation actions, supporting data linked to all individual corrective action (in 5D) for failure occurrence and detection.</td>
</tr>
</tbody>
</table>

- 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, 2016.
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.

<table>
<thead>
<tr>
<th>7D</th>
<th>Preventing Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Define improvements in systems and process to prevent problem from recurring. Ensure that corrective action remains in place.</td>
</tr>
<tr>
<td></td>
<td>Examine similar products and processes and implement corrective actions across the organization where applicable.</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>A</th>
<th>Review all affected Documents / Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Document</td>
</tr>
<tr>
<td>A</td>
<td>Corrective actions validation</td>
</tr>
<tr>
<td>A</td>
<td>Associates Training</td>
</tr>
<tr>
<td>A</td>
<td>Fix Welding Fixtures</td>
</tr>
<tr>
<td>A</td>
<td>Update PFMEA</td>
</tr>
<tr>
<td>A</td>
<td>Update control plan</td>
</tr>
<tr>
<td>A</td>
<td>Update flow chart</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>8D</th>
<th>Lessons Learned for future applications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Littelfuse problem solving teams seek to capture “lessons” where problem solving is required and then document them appropriately.</td>
</tr>
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<table>
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<tr>
<th>Lessons Learned</th>
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<tbody>
<tr>
<td>A total of fuses of Phase 1 (FLSR, LSRK &amp; IDS 125-200A) will be improved due to this change.</td>
</tr>
<tr>
<td>Set up meeting to review the implementation of each corrective action, and then close the 8D’s report.</td>
</tr>
<tr>
<td>Responsible: Tom Braun  Date due: 05-30-2015  status: ongoing</td>
</tr>
</tbody>
</table>

* Blank spaces: Not applicable.

<table>
<thead>
<tr>
<th>Management Review &amp; Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes / No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>
8D’s Problem Solving Flow Chart.

D1 Define team members.
D2 Define problem description.
D3 Interim containment actions.

D4 Root Cause Analysis.
- Identify Potential Causes.
- Select Likely Causes.
- Root Cause?
  - NO
  - YES: Identify Possible Solutions.

D5 Permanent Corrective Actions.
D6 Validate Permanent Corrective Actions.
D7 Establish Preventive Actions.
D8 Lessons Learn.
END