Rapid Problem Solving
Training for Suppliers
MANN+HUMMEL GMBH
2012-07-23
(formats see pages 23-25)
One standard method to solve issues like complaints, accidents, any problem (e.g. scrap, logistics, …) in a structured way to avoid repeated issues.

**Mindset**
- Real place
- Real parts
- Real data
- Compare to standards
- Rapid response / deadlines
- Logical thinking
- Responsibilities / ownership

**Method**
- D1 – Problem description
- D2 – Risk on similar products / processes
- D3 – Containment actions (<24 h)
- D4 – Root causes for non-detection
- D5 – Root causes for occurrence
- D6 – Corrective actions (<10 d)
- D7 – Effectiveness of corrective actions
- D8 – Lessons learned (<60 d)
Key points of the RPS mindset

Real Place (GEMBA)
- Go to the place where it happened.

Real Parts
- Take the parts in your hands.
- Compare good with bad parts.
- Analyze the rejected parts, non-conformity & findings

Real Data
- Observe reality by your own. Do not rely on indirect reports!
  (Somebody told me, I have heard, …)
- Speak with operators on the line.
- Speak with facts and data.

Compare to Standards
- Always check whether the standards have been met. Standards can be:
  Drawings, Control Plans, Instructions, standardized work, master samples etc.
Key points of the RPS mindset

Rapid Response
- Protecting the customer has highest priority.
- Go immediately to the „scene“ to analyze the real situation.

Logical Thinking
- Explain with simple words.
- Explain simply the sequence of analysis and actions:
  - The problem is ….
  - The root cause is ….
  - Therefore, the countermeasures are ….
  - And the way we will prevent recurrence is …

Responsibilities
- Production and Plant Managers should personally take leadership in reviewing RPS’s and coach the problem solving teams on a daily basis.
## D1 – Problem Description - Collect All Data and Information

**Enter all available information**

**Confirm completion of D3 / 6 / 8**

<table>
<thead>
<tr>
<th>Opened by:</th>
<th>Supplier:</th>
<th>8D Team (list names/functions involved):</th>
<th>Sign off for completion:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer:</td>
<td></td>
<td></td>
<td>D3: QH</td>
</tr>
<tr>
<td>Part Name:</td>
<td></td>
<td></td>
<td>D6: &lt; 10 working days</td>
</tr>
<tr>
<td>Part Number:</td>
<td></td>
<td></td>
<td>D8: &lt; 60 working days</td>
</tr>
<tr>
<td>Plant Manager:</td>
<td></td>
<td></td>
<td>Quality Manager:</td>
</tr>
<tr>
<td>Production Manager:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### D1: Problem Description

**What is the problem?**

**Why was it a problem?**

**Who detected it?**

**When was it detected?**

**When was it created?**

**Where was it detected?**

**Where was it created?**

**How was it detected?**

**How many detected?**

### 7W & 2H Questions

### D1: When and how many?

### D7: Effectiveness of corrective actions

**Distribution of re-/occurrences**

**Day 1 - 60**

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**Notes:**

- RPS Training English 20120723
RPS / 8D Method

D1 – Problem Description - Collect All Data and Information

❖ 7 W & 2 H questions
- What is the problem?
- Why is it a problem for the customer?
- When was the problem detected?
- Where was the problem detected?
- How was the problem detected?
- Who detected the problem?
- When was the problem created?
- Where was it created?
- How many parts are effected?

❖ IS & IS NOT
- Why does the problem occur under some circumstances and under others it does not? Describe the differences.
- Use information from sorting and inspection activities.

Is / Is Not - Describe the differences:

<table>
<thead>
<tr>
<th>IS Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator 1 AND / OR</td>
</tr>
<tr>
<td>Shift A, B AND / OR</td>
</tr>
<tr>
<td>Cavity 1, 3 AND / OR</td>
</tr>
<tr>
<td>Dimension 1 AND / OR</td>
</tr>
<tr>
<td>Color 1 AND / OR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IS NOT Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator 2, 3, ... AND / OR</td>
</tr>
<tr>
<td>Shift C, D AND / OR</td>
</tr>
<tr>
<td>Cavity 2, 4 AND / OR</td>
</tr>
<tr>
<td>Dimension 2, 3 AND / OR</td>
</tr>
<tr>
<td>Color 2 &amp; 3 AND / OR</td>
</tr>
</tbody>
</table>

RPS Training English 20120723
D2 – Risks on similar products and processes

Evaluate the risk, if other products / processes could be in danger due to the same problem.

- In which other products / processes are same / similar components used?
- Which other products / processes do have the same / similar design?
- In which other products / processes are the same / similar assemblies used?
- Which other products are running on the same line?
- In which other plant(s) is the same product produced?
- ....

<table>
<thead>
<tr>
<th>D2: Risk on similar products, processes</th>
<th>D3: Containment actions (&lt;24h):</th>
</tr>
</thead>
<tbody>
<tr>
<td>104-40:071:124</td>
<td>Problem: can be detected by sorting</td>
</tr>
<tr>
<td>104-40:071:125</td>
<td>(Y/N): visual inspection</td>
</tr>
<tr>
<td>104-40:072:321</td>
<td>Operators informed (all shifts): on 02.02.2011 through shift supervisors</td>
</tr>
<tr>
<td>104-40:072:421</td>
<td>Sorting at the MANN+HUMMEL: customer: Total / NOK: n/a</td>
</tr>
<tr>
<td></td>
<td>Sorting in the MANN+HUMMEL: plant: Total / NOK: 548/2</td>
</tr>
<tr>
<td></td>
<td>Sorting in the logistics platform: Total / NOK: n/a</td>
</tr>
<tr>
<td></td>
<td>Sorting in transit: Total / NOK: n/a</td>
</tr>
<tr>
<td></td>
<td>Sorting at MANN+HUMMEL: supplier: Total / NOK: 326/0</td>
</tr>
</tbody>
</table>
D3 – Containment Actions (<24h)

- Protect the customer immediately
- Protecting the customer is first priority!
  - Inform operators
  - Evaluate if the problem can be detected on the line.
  - Start sorting where ever the products are:
    - Customer
    - MANN+HUMMEL
    - Logistics platforms
    - Transport
    - Supplier
    - Sub Suppliers
  - Use information from sorting (not only ok/nok) for the problem description
  - Install other actions such as 100% inspection, rework, etc
  - Inform your customer(s) about clean point
Record the findings of initial sorting & inspection

How many parts have been inspected at various locations and how many non-conforming parts were found?

<table>
<thead>
<tr>
<th>D2: Risk on similar products, processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>104 40 071 124</td>
</tr>
<tr>
<td>104 40 071 125</td>
</tr>
<tr>
<td>104 40 072 321</td>
</tr>
<tr>
<td>104 40 072 421</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D3: Containment actions (&lt;24h):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem can be detected by sorting:</td>
</tr>
<tr>
<td>Operators informed (all shifts):</td>
</tr>
<tr>
<td>Sorting at the MANN+HUMMEL customer:</td>
</tr>
<tr>
<td>Sorting in the MANN+HUMMEL plant:</td>
</tr>
<tr>
<td>Sorting in the logistics platform:</td>
</tr>
<tr>
<td>Sorting in transit:</td>
</tr>
<tr>
<td>Sorting at MANN+HUMMEL supplier:</td>
</tr>
</tbody>
</table>
# RPS / 8D Method

## D4 & D5 – Root Causes for Non Detection and Occurrence

### D4: Root Cause for Non-Detection

<table>
<thead>
<tr>
<th>Factors under investigation</th>
<th>Where &amp; how check</th>
<th>Standard</th>
<th>Basic part</th>
<th>Good part</th>
<th>Standard fulfilled?</th>
<th>Investigation to validate or discard factors</th>
<th>Responsible [Dead line]</th>
<th>Factor validated?</th>
</tr>
</thead>
<tbody>
<tr>
<td>D = doubt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### D5: Root Cause for Occurrence

<table>
<thead>
<tr>
<th>Factors under investigation</th>
<th>Where &amp; how check</th>
<th>Standard</th>
<th>Basic part</th>
<th>Good part</th>
<th>Standard fulfilled?</th>
<th>Investigation to validate or discard factors</th>
<th>Responsible [Dead line]</th>
<th>Factor validated?</th>
</tr>
</thead>
<tbody>
<tr>
<td>D = doubt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### D4 & D5: 5 Why’s

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
</tbody>
</table>
FICS: Factor Investigation and Compliance to Standards

- Investigate (I)
- Potential Factors (F)
  - **6 Ms:**
    - Machine: Production equipment, Inspection
    - Man: Operator
    - Material: Drawing / Control Plan
    - Measurements: How, who, how often, where, when, what is inspected?
    - Mother-Nature (Environment): Lighting, Working, Conditions, ....
  - with Compliance (C)
  - to Standards (S): what are the Standards?
Why was the problem not detected before delivery or in production or during the development phase?

- Which possible factors have you detected in the IS / IS NOT analysis?
- Compare to the standard, verify the standard.
- Validate the identified factors e.g. by reproducing the non-conformity or dismiss the factor.
- Take the validated factors and use 5 Why’s to drill down into management and organizational root causes.

If you do not know how to fill in D4 or D5 please read our MANN+HUMMEL norm MHN 930 010-1
How to fill the table

4.4.4.2 Factor under investigation
Start with the factors identified in D1 under IS / IS NOT analysis
Any factor (such as process parameters, dimensions, characteristics of a material, way to do an operation, particular operator, particular machine, etc) linked to the issue must be recorded.
In this section, nominate precisely the factor only (never qualify the factor as good, bad, big, small...): e.g. temperature of the mould for instance.

4.4.4.3 Where & how checked?
In this column, precisely describe HOW and WHERE the factor is checked:
For example: Initial sampling, incoming inspection, 1st piece ok inspection, final inspection, by caliper, visually, 3D machine, etc

4.4.4.4 Standard
Enter the nominal and tolerances of the defined factors. It can be the extract of a drawing, control plan, work instruction, reference of master samples, etc. Whatever it may be, it must be with facts and data or referenced to a clear nominated document that can be included in the analysis file. In this case, it must be precised.

4.4.4.5 Bad parts / Good parts
Enter the values of the factor on bad and good parts produced in the same process and when the problem happened or at least as close as possible to the time the problem happened
The data or the facts must be directly comparable, same units, same calculation method. If factor concerns a manual operation, the operation is described to highlight the commonality and the differences. MHN 930 010-1 MHN 930 010-1 / Rev 0 Issue 09/2010 Page 7 of 8

4.4.4.6 Standard fulfilled?
## D4 - Root Causes for Non Detection – Examples

<table>
<thead>
<tr>
<th>Factor under investigation</th>
<th>Where &amp; how checked</th>
<th>Standard</th>
<th>Bad parts</th>
<th>Good parts</th>
<th>Standard fulfilled? (Y/N/D*)</th>
<th>Standard ok? (Y/N/D*)</th>
<th>Investigation to validate or dismiss factor</th>
<th>Responsible / Deadline</th>
<th>Factor validated? (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Inspection</td>
<td>Final Inspection</td>
<td>Instruction</td>
<td>Crack on connector</td>
<td>No crack on connector</td>
<td>N</td>
<td>Y</td>
<td>Send parts with cracks through final (visual) inspection in Shift A</td>
<td>Mr. Fish / 10.02.2011</td>
<td>Y</td>
</tr>
<tr>
<td>Leakage test to detect cracks</td>
<td>Final Inspection</td>
<td>No inspection standard / No customer requirement Acc drawing 1 l/min at 2 bar high pressure</td>
<td>No leakage test</td>
<td>No leakage test</td>
<td>D</td>
<td>N</td>
<td>No leakage test since SOP (Start of Production) implemented</td>
<td>Mr. King / 10.02.2011</td>
<td>Y</td>
</tr>
</tbody>
</table>
Why did the problem occur?

- Which possible factors have you detected in the IS / IS NOT analysis?
- Compare to the standard, verify the standard.
- Validate the identified factor e.g. by reproducing the non-conformity or dismiss the factor.
- Take the validated factors and use the 5 Why’s to drill into management and organizational root causes

### D5: Root cause for occurrence

<table>
<thead>
<tr>
<th>Factor under investigation</th>
<th>Where &amp; how checked</th>
<th>Standard</th>
<th>Bad parts</th>
<th>Good parts</th>
<th>Standard fulfilled? (Y/N/D*)</th>
<th>Standard ok? (Y/N/D*)</th>
<th>Investigation to validate or dismiss factor</th>
<th>Responsible/Dead No line</th>
<th>Factor validated? (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting temperature</td>
<td>Temperature display</td>
<td>620 ± 5°C</td>
<td>621°C</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Melting temperature depends on melting oven: constant temp of 620°C. No impact on melting behavior. Temp in melting pot computer controlled and monitored. No deviations recorded.</td>
<td>Mr. King / 10.02.2011</td>
<td>N</td>
</tr>
<tr>
<td>Mould temperature</td>
<td>Temperature display</td>
<td>340 ± 20°C</td>
<td>?°C</td>
<td>334°C</td>
<td>D</td>
<td>D</td>
<td>Trials to cast at 300°C: No proper joint in the area of the 2 melt fronts (parting area) due to too low temp / too fast cool down of melt</td>
<td>Mr. King / 10.02.2011</td>
<td>Y</td>
</tr>
</tbody>
</table>
### D4 & D5 – ask five times „why“

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Why have cracks at final inspection in shift A not been detected?</td>
<td>Why was Mr. Mogler not inspecting?</td>
<td>Why has the “new” inspector not been trained?</td>
<td>Why was the operator not listed in the Qualification Matrix?</td>
<td>Why has Production Dept. missed to list him?</td>
</tr>
<tr>
<td>Because visual inspection in shift A was not conducted by Mr. Mogler but another operator</td>
<td>Because he was helping out at another work station and the other operator / “new” inspector has not been trained for final inspection.</td>
<td>Because he was not listed in the qualification matrix and therefore has received no training / no back up for Mr. Mogler</td>
<td>When he started, Production Dept. has missed to list him due to lack of capacities / no back ups considered for Mr. Mogler.</td>
<td>There is no formal process for new employees.</td>
</tr>
<tr>
<td>Why were parts at temp &lt; 320°C (mold temp.) produced?</td>
<td>Why was temp display not considered?</td>
<td>Why is there no First Off part / production approval?</td>
<td>Why is production approval no standard procedure?</td>
<td></td>
</tr>
<tr>
<td>Temp display / machine settings not considered but production started (defect parts most likely start up parts)</td>
<td>No First Off or official production approval procedure in place</td>
<td>This is no standard procedure.</td>
<td>Because production start not considered as critical</td>
<td></td>
</tr>
</tbody>
</table>
Main questions to be answered for D4 / D5--*

- Did we follow the Standards?
- Are operators trained and are they working according to standard procedures?
- Is a Control Plan available and followed?
- Were defects rated as critical in the FMEA?
- Are procedures for First Off available and followed? (First off OK, Poke Yoke’s proved, process parameters……)
- Have recently changes to product or process been introduced?
- Does the Standard meet the requirements?

Identifiy potential root causes why the problem has not been detected when occurred. Only validate then. Use data from problem description (D1) to identify factors & impacts for further investigations.
For EVERY verified factor of NON DETECTION AND OCCURRENCE define a corrective action that eliminates the root cause permanently.

- A responsible for each action.
- A due date to validate and finalize the action.

Note
- Do not initiate corrective actions BEFORE D4 & D5 are completed.
- Ensure, that there are corrective actions for each root cause for non detection AND occurrence.
- Check, whether implemented actions do not cause any other problems by applying D7.

<table>
<thead>
<tr>
<th>Action</th>
<th>Responsible</th>
<th>Deadline</th>
<th>Action</th>
<th>Responsible</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>FMEA updated</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control plan updated</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Workstation docs updated</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lessons learned sheet created and distributed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
D7 – Effectiveness of corrective action

- Use the tracking chart to prove that the problem is solved and root causes eliminated permanently:
  No more nok parts after the implementation of corrective actions should appear.
  If there is any recurrence, the real root cause has not been identified properly and further actions have to be taken. Return to D4 / D5 – Root Causes for Non Detection and Occurrence.
Learn from the failures.

- Sustainability, by improving the standards.
- FMEA, work instructions, control plan, new or updated standards

### D8 - Lessons Learned (<60 working days)--*

<table>
<thead>
<tr>
<th>Action</th>
<th>Responsible</th>
<th>Deadline</th>
<th>Action</th>
<th>Responsible</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>FMEA updated</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Lessons learned sheet created and distributed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The "Rapid Problem Solving (RPS) / 8D" form is your "working" document and guides you through the methodology.

- All relevant data and information to be transferred to the "Supplier 8D" Report.
- Only the "Supplier 8D" has to be submitted to M+H.--**

**Note:**

In addition to these training documents the MH Standard for Rapid Problem Solving has been modified for suppliers and should be made available to them: MHN 930 010-1.

The MHN and related templates to the RPS are available on DDM.
RPS / 8D Method

Summary

- Collect data and information and describe the problem (D1)
- Problem analysis IS - IS NOT, compare real parts with standards and describe the differences (D1)
- Identify risks for similar products & processes (D2)
- Immediate Containment: Protect the customer! (D3)
- Identify root causes for non detection / occurrence and 5 Why's, if the „factor under investigation“ has been validated (D4/D5)

Do not fill in D6 – D8 before D1 – D5 is filled completely!

- Define corrective actions (D6) and implement.
- Control effectiveness (D7). Return to D4 / D5 in case of any recurrence.
- Lessons Learned - Standardize procedures, CP, FMEA…….) (D8)
- Complete the Supplier 8D Report and submit final version to M+H

Avoid recurrence by implementing the right corrective actions!
Rapid Problem Solving Method RPS-8D

- Since calendar week 30/2012 you receive together with each complaint an excel-format (xlms).

- activate this format by clicking on the button „Add-ins“ (first line, right side)

- Now another line opens with more buttons. You can now fill in the format, in case missing, please add another line/ more lines by clicking on the buttons in the second line.

- In case you added too many lines, just leave them as they are, they do not disturb.
### 8D - Report

**Started:** 15.05.2012  
**Status Date:** 23.07.2012  
**Our Ref. No.:** 200053577  
**Supplier Ref. No.:**

| **Header Data** | **Customer / Location:** MANN+HUMMEL GmbH / Grönerstraße 45 / D-71636 Ludwigsburg  
**Supplier / Location:** HK Gietlager GmbH / In der Klinge 3 3 / D-74078 Heilbronn

| **Manufacturing Date:** | **Part No.:** 210101213

| **Delivery No.:** | **Part Name:** EINPRESSSTEIL

| **Contact Person Customer:** | **Email:** brigitte.chrestels@mann-hummel.com

| **8D Team** | **Phone:** +497141983511

<table>
<thead>
<tr>
<th><strong>First Name</strong></th>
<th><strong>Last Name</strong></th>
<th><strong>Teamleader</strong></th>
<th><strong>E-Mail - Address</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXX</td>
<td>XXXX</td>
<td>XXXX</td>
<td>XXXX @mann-hummel.com</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>D1 Problem Description (&lt;24h)</strong></th>
<th><strong>Question</strong></th>
<th><strong>Answer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Complain:</strong></td>
<td><strong>Why is it a problem?</strong></td>
<td><strong>scratch is deep and sharp</strong></td>
</tr>
<tr>
<td></td>
<td><strong>When was it detected?</strong></td>
<td><strong>yesterday, 2nd shift 22.07.2012</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Where was it detected?</strong></td>
<td><strong>production MHH Ludwigsburg</strong></td>
</tr>
<tr>
<td></td>
<td><strong>How was it detected?</strong></td>
<td><strong>scratched during production</strong></td>
</tr>
</tbody>
</table>

**Relevant in this 8D:** Scratch
Please send back your information

- After having filled in the format, please save and send it back to MANN + HUMMEL.

THANK YOU