Autonomous Maintenance

Training Pack
Aims & Objectives

Target Audience:
Autonomous Maintenance Champions, Production Teams.

Purpose of Module:
To equip attendees with the knowledge & understanding to participate in Autonomous Maintenance Activities, in order to deliver tangible and sustainable improvements in equipment reliability.

Aims & Objectives:
• Outline the Steps of AM
• Give Practical Guidance on AM roll out
What is Autonomous Maintenance?

• An operator Skill development Programme
• An approach to allow problems to be identified and solved quickly
• An approach to stop accelerated deterioration of plant and equipment
• An approach to stop deterioration related failures
• An approach to stabilise equipment conditions (standards)
• An approach to develop training materials on how to run, operate & maintain equipment
What is Effective Maintenance?

- An Effective Maintenance system will support Autonomous Maintenance.
- Effective Maintenance should also involve all areas of the organisation.
- Information is key.
- Operator and Maintainer training
  - Up-skill Maintenance to be trainers and equipment improvers
  - Up-skill Operators to be equipment maintainers (Autonomous Maintenance)
How do we Implement Autonomous Maintenance?

- Improve Human Resources
- Improve Plant and Equipment
- Improve Corporate Culture
How do we Implement Autonomous Maintenance?

Step 0 - Education - Machine Function

Step 1 - Initial Clean & Inspect

Step 2 - Eliminate Contamination & Inaccessible areas

Step 3 - Develop ‘Provisional’ Standards

Step 4 - Finalise Standards & Train
Evidence of success

Develop confidence in their abilities

Teams practice autonomous kaizen

Change equipment condition → Effect

Reduced defects & failures → Team members change → Effect

Move from reactive to proactive → Zero defects & failures are realised

Change in activities

Positive participation
Kaizen thoroughness of maintenance & control

Teams practice autonomous kaizen

Working environment changes

Change in culture

Evidence of success

* Understanding the machine functions
  Cleaning is inspection
  * Inspection can detect abnormalities
  * Abnormalities can be rectified
  Improve skills

TIME
How does Autonomous Maintenance Work?

• The way that the stages of autonomous maintenance are described as steps, promotes how autonomous maintenance works.

• To get from the bottom to the top it is easier to use evenly spaced comfortably sized steps.

• You must maintain each step as you progress, or the whole thing will crumble.
The 5 Steps of Autonomous Maintenance

Step 0 - Education - Machine Function
Step 0 is about increasing our basic understanding of machine components and function.

To help us with this we utilise the knowledge of engineers, and use machine components sheets to store this information.
• Machine Component Sheets help us to understand how equipment works, and what can cause it to fail

• They also make a very effective training aid
### How Does It Work?

<table>
<thead>
<tr>
<th>Component Function</th>
<th>Possible cause of failure</th>
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### How Can it Fail?

Machine Components - Product Pumps

Sheets
Step 0 - Education - Machine Components Sheets

<table>
<thead>
<tr>
<th>Components</th>
<th>Function</th>
<th>Possible cause of failure</th>
</tr>
</thead>
</table>

TIPS

• Should Initially be Hand drawn

• Should be completed at the machine in question

• Should be led by an experienced engineer
Step 0 - Education - One Point Lessons (OPL’s)

- Tool to Communicate Improvements
- Tool to capture ideas
- Tool to share knowledge
- Tool for effective training
- Three types of OPL
  - Basic Knowledge
  - Improvement Idea
  - Downtime Problem

**ONE POINT LESSON**

<table>
<thead>
<tr>
<th>CREW</th>
<th>CRAFT</th>
<th>T/L</th>
<th>T/M</th>
<th>T/M</th>
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</thead>
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Gauge needs to read between red markers within green zone.
Step 0 - Education - One Point Lessons (OPL’s)

TIPS

• Should Initially be Hand drawn
• Should be 80% Drawing 10% Words
• Should only take 5 mins to teach
• Adopt a company numbering system
• Should be verified by an engineer
• Use the bottom of the sheet as a training record
Step 0 - Education - Instructional Videos

Guidelines

• Keep it Simple
• Use Own Staff
• Humour
• Maximum 20 mins
• Plan the video
• Communicate intention to all staff
Step 0 - Education - Skills Audit

Guidelines

- Based on detailed checklists that include
  - Skills and Knowledge Required to complete Tasks
  - Notes on how to carry out assessments
  - Based on standard work instructions

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Team 1

- Process AM Skills Training Matrix
  - Under Pinning Knowledge
  - Trained

A N Other

J Bloggs
The 5 Steps of Autonomous Maintenance

Step 0 - Education - Machine Function

Step 1 - Initial Clean & Inspect
Step 1 - Initial Clean and Inspect

- Problem Detection
- Restoration
- Machine Awareness
- Set Standards

Cleaning IS Inspection!
Step 1 - Initial Clean and Inspect

Machine concern / fault analysis

…..through cleaning you touch, through touching you find when you find, you fix !!
# Clean & Inspection Fault Finding Sheet

**Machine:**
M/c 1265  
**Date:** 15/08  
**Completed by:** J Brown

<table>
<thead>
<tr>
<th>No</th>
<th>Location / Fault</th>
<th>Code class</th>
<th>Cause</th>
<th>Temp Perm</th>
<th>Countermeasure</th>
<th>Who</th>
<th>When</th>
</tr>
</thead>
</table>
| 1  | Pressure Gauge not within limit             | H3         | Poor labelling | T         | Ensure manual setting on label  
Write Setting on Setting sheet                                                 | Team   | 1/11 |
|    |                                             |            |             | P         |                                                                                   | Team   | 1/11 |
| 2  | Measuring probe unprotected next to pallet  | E9         | Poor design  | T         | Cover to be made  
Review machine specification                                                   | NCMT  | Wk 26 |
|    |                                             |            |             | P         |                                                                                   | MR    | Wk 26 |
| 3  | Oil Leak next to twin pallet               | L4         | Poorly installed | T         | Fix leak  
Review installation procedure                                                  | Maint  | Wk 25 |
|    |                                             |            |             | P         |                                                                                   | MR    | Wk 27 |

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<thead>
<tr>
<th>Code</th>
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<th>P</th>
<th>W</th>
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<td>6</td>
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<td>Leaking</td>
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**Code:**
- **E:** Electrical
- **M:** Mechanical
- **L:** Lubrication
- **H:** Hydraulic
- **P:** Pneumatic
- **W:** Water

**Class:**
- **1:** Loose
- **2:** Worn
- **3:** Broken
- **4:** Leaking
- **5:** Missing
- **6:** Dirty
- **7:** Difficult to clean
- **8:** Location / Routing
- **9:** Poor design
# Clean & Inspection Fault Finding Sheet

<table>
<thead>
<tr>
<th>Machine:</th>
<th>Date</th>
<th>Completed by:</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Electrical</td>
<td>M</td>
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<tr>
<td>Class</td>
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<td>Loose</td>
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</table>
## Clean & Inspection Concern/Fault Analysis Sheet

### CONCERN / FAULT ANALYSIS

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### CODE CLASS

- **E** = ELECTRICAL
- **M** = MECHANICAL
- **L** = LUBRICATION
- **H** = HYDRAULIC
- **W** = WATER
- **P** = PNEUMATIC

1 = LOOSE
2 = WORN
3 = BROKEN
4 = LEAKING
5 = MISSING
6 = DIRTY
7 = DIFFICULT TO CLEAN
8 = LOCATION & / OR ROUTING
9 = POOR DESIGN
• Makes defects easier to detect.
• Better customer perception.
• Creates a better working environment.
• Aids efficiency and reduces accidents.
• Helps standardisation.
The 5 Steps to Autonomous Maintenance

Step 0 - Education - Machine Function

Step 1 - Initial Clean & Inspect

Step 2 - Eliminate Contamination & Inaccessible areas
Step 2 - Eliminate Contamination and Inaccessible Areas

- Quick Correction
- Maintain Cleaning Standards
- Reduces Inspection Time
- Makes Maintenance Easier
MACHINE MAPPING

• Group exercise.

• Lead by an experienced engineer/maintainer.

• Use in conjunction with “Tags”.

Planned Maintenance - Initial Equipment Survey

INITIAL EQUIPMENT SURVEY
Step 2 - Eliminate Contamination - Machine Mapping

TIPS

• Group Exercise
• Identify Sources of contamination
• Identify inaccessible areas
• Should be led by an experienced engineer
• Can be used in conjunction with a red tag exercise
Step 2 - Eliminate Inaccessible Areas - Machine Mapping

TIPS

• Aim to reduce cleaning time
• Aim to reduce inspection time
• Make essential equipment access easier
• Simplify equipment operations
The 5 Steps to Autonomous Maintenance

Step 0 - Education - Machine Function

Step 1 - Initial Clean & Inspect

Step 2 - Eliminate Contamination & Inaccessible areas

Step 3 - Develop ‘Provisional’ Standards
Step 3 - Develop Provisional Standards

- Cleaning Standards
- Lubrication Standards
- Inspection Standards
- Schedules
Step 3 - Develop Provisional Standards - Cleaning, Lubrication and Inspection

<table>
<thead>
<tr>
<th>Date:</th>
<th>Machine: Lathe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process:</td>
<td>JIG REMOVAL</td>
</tr>
</tbody>
</table>

### Cleaning Items

<table>
<thead>
<tr>
<th>C</th>
<th>Item to Clean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LOCATING PINTLE</td>
</tr>
<tr>
<td>2</td>
<td>AREA AROUND SHAFT</td>
</tr>
<tr>
<td>3</td>
<td>SUPPORTING ACTUATOR SHAFT</td>
</tr>
<tr>
<td>4</td>
<td>GENERAL AREA</td>
</tr>
</tbody>
</table>

### Lubrication & Inspection Items

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<thead>
<tr>
<th>D</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LOCATING PINTLE - INSPECT FOR WEAR, LUBE WHERE NECESSARY</td>
</tr>
<tr>
<td>2</td>
<td>SUPPORTING ACTUATOR SHAFT - AS ABOVE</td>
</tr>
<tr>
<td>3</td>
<td>REPORT ANY DAMAGE TO TEAM LEADER</td>
</tr>
</tbody>
</table>
The TPM Board

- Policy Goals Targets
- Machine Component Sheets
- Countermeasures OPL’s
- Hard To Access Areas Improvement OPL’s
- Before / After Photos
- Audit Checklist
- 30 Problem List
- Efficiency Chart
- Graph Of Problem Areas
- Box of Red Tags
- Radar Chart
- Red Tag Record Sheet

Before / After Photos
The TPM Board

TIPS

• Display all work from steps 1 - 3
• Locate the board in the work area
• Present the board & improvements to senior managers
• Ensure that the board is up to date and owned
• Establish a standard that other boards can adopt
The 5 Steps to Autonomous Maintenance

Step 0 - Education - Machine Function
Step 1 - Initial Clean & Inspect
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Step 3 - Develop ‘Provisional’ Standards
Step 4 - Finalise Standards & Train
Step 4 - Finalise Standards and Train

Management Buy Off

Structured Training

Standard Practice

Effective Knowledge Management
Step 4 - Finalise Standards and Train - Deployment

Trainer

Group leaders

All the operators
Step 4 - Finalise Standards and Train - Training Contents

Training Should Include:-

• Parts names, structure and function of equipment
• Problems and their corrective actions
• Keypoints, methods, and criteria for inspection
• Inspection practice
### Task:
Inspect bath pegs for any damage and check that the springs are in position.
Check nipper roller for any damage.

#### INSPECTION STANDARD
- **Tools and Materials:**
- **Reason for inspection & function of part:** To reduce risk of cans falling off in bath and damage to cans.
- **Safety:**
  - Isolate air on machine and inform others.

#### Frequency:
Weekly

#### TRAINING
- **Contents:**
  - Component Sheets
  - One Point Lessons
  - Standards
  - Work Instruction Sheets