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MAINTENANCE POLICY AND PROCEDURES
SECOND EDITION

HOW TO SET UP AND RUN YOUR
MAINTENANCE DEPARTMENT

BY

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INTRODUCTION

MAINTENANCE MANAGEMENT CRITICALITY

Maintenance management of a business entity's assets has a direct quantitative and qualitative effect on the productive output of the business entity. Activities designed to optimize the effective maintenance of a business entity will maintain or increase asset value and productivity. Ineffective maintenance of assets will result in reduced output and productivity due to equipment deterioration, reduced throughput, and increased equipment breakdowns.

The maintenance function has traditionally been considered an overhead cost drag on production. The actual function of Maintenance is as a super-set of Production, wherein automated equipment, equipment operators, and maintenance personnel have displaced large numbers of hand-labor workers.

Maintenance and maintenance management should be distinct from Production. Maintenance and Production must work together to make the business a complete entity. This includes production, administration, maintenance, transportation, shipping/receiving, etc. Each department is dependent on all the others and no single department is more critical to success than the other.

Maintenance and Production have the same overall goal of maximum production and quality from existing assets and raw materials. The necessity for separation is in management's maintenance policies charging Maintenance with the responsibility for protecting and maintaining company assets, whereas Production is charged with using those assets to meet output goals. Optimum balance and cooperation between the two philosophies will result in effective maintenance management and effective production management.

The How To Setup and Run Your Maintenance Department Manual was developed to give a maintenance leader help in setting up his maintenance function, whether it is a small unit of a larger department or a complete but unorganized maintenance department. The policies and procedures may be modified to adapt to each particular business need.

Be sure to check the material contained in the Appendix. This material can save you much time and effort. Take advantage of information and material already developed. I have included a sampling of Preventive Maintenance Sheets. These samples can be supplemented by the customer through utilization of the blank sheet format and manufacturer's recommended maintenance procedures for a particular piece of equipment.

Make certain to use the manufacturer's recommended spare parts list to develop your own spare parts list. These lists are sometimes overzealous in recommended parts and quantities, but this can be tempered through experience.

Set up your work order system with rounds lists as soon as possible. Track all work and callouts. Prepare daily weekly and monthly summaries of work accomplished and work planned. Track parts and equipment used and all other costs ferociously. Prepare a sharp and accurate budget and keep to it unless authorized to exceed it for special circumstances.

Gradually change the mindset of your staff from an outside agency performing tasks to one of a specialized and highly trained organization facilitating PRODUCTION.

II. MAINTENANCE DEPARTMENT POLICY

1. Management Responsibility

1.1 The Maintenance Manager shall set departmental goals, plan, organize, and control the activities under his jurisdiction.

1.2 All goals shall be specific, well defined, and quantifiable, with an estimated time of achievement given for each goal.

1.3 Each goal shall be communicated freely and clearly to all those involved.

1.4 Goals shall be reviewed regularly by the Maintenance Manager, Maintenance Supervisor, and operations representatives.

2. Organization

2.1 Plant Maintenance, Engineering, Operations and Production must share responsibility in a coordinated effort to optimize facility performance.

2.2 Plant maintenance, as a service function, has responsibility for safe, efficient, and technically sound execution of maintenance work.

2.3 Engineering has responsibility for providing technical information, guidance, and support to operations and maintenance as part of the team effort.

2.4 Operations and Production, as equipment owners, have accountability for their maintenance costs.

2.5 Maintenance Department shall prepare, implement, promulgate, and maintain a clear set of departmental operating instructions.

3. Administration

Administrative operations of the Maintenance Department include:

3.1 Program coordination for the Department and liaison with all other Departments for the procurement and maintenance of all real property, production equipment, utility services, and communication services.

3.2 Preparation of Maintenance Department budgets.

3.3 Coordination with other departments in the preparation of their maintenance budgets.

3.4 Preparation of project cost estimates; proposal, justification, and management of capital projects and expenditures.

3.5 Maintenance of records of planned and current construction and maintenance contracts.

3.6 Review and filing of reports from inspectors and insurance carriers and preparation of status reports to appropriate management.

3.7 Processing of work requests; planning and scheduling of work; provision of required parts, materials, and equipment; and maintenance of all equipment records.

3.8 Management of parts, materials, and equipment for which the Maintenance Department is held responsible.

3.9 Preparation of appropriate reports, statistics, and recommendations on Maintenance Department activities.

3.10 Solicitation, preparation, and administration of appropriate service contracts.

3.11 Maintenance of appropriate records pertaining to labor under the jurisdiction of the Maintenance Department.

4. Authority

4.1 Each Department shall delegate authority to responsible subordinates to allow accomplishment of maintenance objectives and goals.

4.2 Each Department shall formally document and maintain a list of personnel with Work Request approval authority and provide such list to the Maintenance Department.

4.3 Each Department shall establish approval levels for overtime work and aggregate maintenance costs.

number than estimated should be proposed to start out with. Management should be apprised of the fact that the staffing and hourly personnel may need to be increased in the future.

2. Maintenance Staff required: Maintenance Manager, one to three Foremen, one Planner for 12 to 20 craftsmen, Purchasing and Parts Clerk, Maintenance Clerk, and one to three Engineers.

3. Vehicles required: pickup for Manager, pool pickup for Engineers, and crew vehicles as required fitting maintenance needs.

4. Maintenance Unit would utilize engineering services of company headquarters as necessary with associated costs included in overhead.

5. Contractor services should be utilized as required to fill gaps in department manpower, including engineering and design services.

E. Budget

1. Develop projected costs to be billed through work orders to each proponent.

2. Develop monthly and annual projected unit budget.

F. Reports and Presentations

1. Prepare and send weekly reports and monthly summaries to Plant Manager and Production Manager.

2. Prepare draft presentation on proposal for formation of new maintenance responsibilities and submit to Plant Manager for comments.

3. Incorporate changes from first draft comments into second draft presentation.

4. Prepare slide presentation with verbal commentary of new unit proposal.

5. Rehearse and then give presentation to Plant Manager

6. Incorporate changes and prepare and give presentation to Plant Manager and company headquarters.

PREVENTIVE MAINTENANCE SHEET

| |
|----------------------------------|
| Plant: |
| Building: |
| Department: |
| Line #: |
| Equip. Name: |
| Item Name: Air Conditioning Unit |
| Asset #: |
| Serial #: |
| Model# |

| |
|--------------|
| Mfr: |
| Size: |
| Voltage: |
| |
| PM Type: |
| PM Code: |
| PM Interval: |
| PM Wk/Yr: |

PM PROCEDURE

| |
|--|
| *** Air Conditioning Unit *** |
| ___ 1. If major repairs are required, open a Maintenance Work Order. |
| ___ 2. Carry out Lock Out/Tag Out (LOTO) prior to beginning work. |
| ___ 3. Check that pressures and temperatures are within manufacturer's specified ranges. |
| ___ 4. Check operation of thermostat for heating and cooling operations. |
| ___ 5. Activate each safety device to ensure proper operation. |
| ___ 6. Inspect condenser coils and clean. |
| ___ 7. Replace or clean air filter. |
| ___ 8. Inspect blower motor(s), check operation and amperage, check bearings, check fan blade(s) for damage and balance, lubricate bearings, if required. |
| ___ 9. Inspect condenser motor(s), check operation and amperage, check bearings, check fan blade(s) for damage and balance, lubricate bearings, if required. |
| ___ 10. Inspect electrical contacts for loose connections and burned contacts. |
| **With Unit Running** |
| ___ 11. Check and record discharge air temperatures. |
| ___ 12. Check condensate drain pan and line for proper drainage. If no condensate from unit, get water and pour into condensate pan to ensure proper drainage. If drain line is plugged, clean out and test drainage, again. |
| ___ 13. Inspect evaporator coil for damage and clean. |
| ___ 14. Repair or replace all damaged or inoperative equipment. Record work and parts used. |
| ___ 15. Clean area and remove tools, meters and gauges. |
| ___ 16. Remove LOTO and restore equipment to service. |
| |

possibly a module of a Computerized Maintenance Management System (CMMS) or a paper file system.

A procedure for recording the use of current parts and material will ensure that the current inventory will remain more or less relevant till the inventory can be relocated to a secure storeroom(s). The Project Manager will need to check equipment manuals to determine a list of required and critical spares and material needed to keep the plant running efficiently on a cost effective basis.

This list can be compared with what is actually in the inventory. Senior maintenance and production employees can be consulted on the makeup of the final list of required parts and material. The Project Manager can set up a list of preferred suppliers and vendors for the list.

A significant amount of the material and spares may be held at the supplier's warehouse and purchased as needed. This requires a degree of trust and reciprocity between the Company and the supplier. The Company will develop the list of preferred suppliers as suppliers who deliver on time, accept returns, open in the night for an emergency, and otherwise provide excellent service.

In return, the Company will purchase most of the parts from these preferred suppliers. The number of preferred suppliers should be fairly small, four or five, for a Company of three hundred to five hundred employees.

The Maintenance Department will set up and maintain the list of preferred suppliers and vendors. Maintenance will prepare a format for rating these suppliers and also prepare a form for investigation of a defect in a supplier's service or parts/material delivery. A significant defect or after several defects and consultations with the supplier with no improvement could result in the concerned supplier being de-rated from preferred supplier to supplier and replaced by a competitor supplying goods in the same area. This supplier would then become one of the preferred suppliers.

The Project Manager will develop a layout for the storage of the proposed inventory of parts and material decided upon in the consultations with the concerned departmental experts. The layout should try to group parts such as electrical, instrument, electronic, bearings, motors, gears, gearboxes, etc. Ample accommodations should be made for the addition of more parts in each area and correspondingly more part assigned numbers in the database.

Once the layout has been completed, the Project Manager will enter dimensions and sizes for the needs of the storeroom(s). If there is not space in the plant buildings for the storeroom, an addition to the plant will need to be planned and constructed. A secure storeroom is critical to the success of the program.

Assuming the storeroom is built or allocated from existing space, the area is made secure with locked access for salaried personnel and Stores personnel only. An office space for files, paperwork, computers, printers, etc. will need to be within the enclosed security area.

Storage bins and shelving for the parts and material will then be set up and labeled. Only then can the process of relocating the existing parts and material begin. Prior to moving, a list of labels for all the parts and material for the storeroom will be printed out and made ready for the relocated material.

As the parts and materials are brought to the storeroom, the labels will be affixed to the items. The labels will have the name, assigned part number, manufacturer's part number, and storage location number. The item will then be placed in the assigned storage space.

Immediately upon completion of relocation of existing inventory, the storeroom personnel and any other assigned personnel will conduct a complete and comprehensive inventory of all items in the storeroom(s). This inventory will be entered

B. Contractors

In some cases contractors and other non-employees may need to enter PRCS to perform work. The requirements and procedures for contractor entry into any PRCS are contained in Section VII.

C. Changes in Space Use or Configuration

When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the space is to be re-evaluated and, if necessary, reclassified as PRCS.

D. Confined Space Reclassification

A permit-required confined space may be reclassified as a non-permit required confined space under the following conditions:

1. The space poses no actual or potential atmospheric hazards, the hazards are eliminated without entry, and the non-atmospheric hazards remain eliminated.
2. Entry into the space to eliminate the hazards is under an authorized permit and testing and inspection during the entry demonstrate the hazards were eliminated without requiring continuous forced air ventilation.
3. A certification is documented showing hazards were eliminated. See Attachment 1 (Reclassifying Confined Spaces Form).
4. If hazards arise within a permit-required space that has been reclassified to a non-permit required space, each person must exit the space and the space is to be re-evaluated to determine if it must be reclassified as a permit-required space.

E. Alternate Procedures for Entering Permit-Required Confined Spaces

Alternate procedures can be used for entry into a PRCS under the following conditions:

1. The only hazard posed is an actual or potentially hazardous atmosphere;
2. It has been demonstrated that continuous forced air alone is sufficient to maintain safety for entry;

above except for how to isolate equipment/machinery for lockout/tagout and conditions for restarting machinery or removing tags.

Authorized employees (new, transferred or others) will receive training prior to their initial involvement with any lockout or tagout operation.

Retraining will be given for authorized and affected employees whenever there is a change in machines, or equipment or process that presents a new hazard or a change in Company HECP. Retraining will also be given when the annual inspection identifies a deficiency in the procedures.

A list of names and dates of training will be maintained by Industrial Safety and Human Resources.

7. Annual refresher training will be conducted.

B. Periodic Inspection

On a periodic basis, less than annually, a designated employee, who is not involved in the HECP being inspected, will conduct an inspection of the Hazardous Energy Control Procedure (HECP).

2.4.13.1 Nameplates and rotation arrows shall be Type 316 Stainless Steel or Monel, securely fastened by pins of similar material, and shall be located such that the information can be read after the equipment is installed. Entries shall be marked by etching, engraving or other method of permanent marking.

2.4.13.2 The following data is required on the generator nameplate in addition to the requirements of NEMA MG1-22 and ISO 8528-5 and may be on a separate nameplate:

- a) Buyer's Purchase Order number
- b) Manufacturer's location
- c) Rotor weight
- d) Manufacturer's order reference number
- e) Insulation system designation

2.4.14 Residual Magnetism

The manufacturer of the diesel engine shall consider the detrimental effect on bearings of having residual magnetism levels in rotating and stationary parts of magnetic materials above 3 gauss. A statement shall be included in the bid explaining the steps taken during manufacture to limit residual magnetism to below this level.

3 ACCESSORIES

3.1 VOLTAGE REGULATOR

3.1.1 Generators shall incorporate an excitation system with automatic voltage regulator (AVR). The AVR unit shall maintain generator terminal voltage within +1/-1% of nominal value over the load range up to full load. Voltage level

#2 CLIP MACHINE MECHANIC'S INSPECTION CHECKLIST

SAFETY must be YOUR Number One Priority

Check at the Start of Each Shift

| | |
|-------------------------------|-------------|
| Equipment Number: | Date: |
| Operator: | Time/Shift: |
| Department: MAINTENANCE - 288 | Supervisor: |

I. Clip Machine Checks

| | |
|---|--|
| Power is on and controls are energized and all indicator lamps are functional | Press urethane switch to activate urethane feed tube operation into clips |
| Air is on for urethane bucket ram and gauge reads 30 PSI | Place glass in fixture against all locators to enable circuits |
| Urethane hose heater cord is plugged in and hose is warm to touch | Press glass cycle button causing fixture to press glass into clips |
| Urethane bucket has urethane and bucket warmer is operating in cool weather | Verify 6 urethane beads (2.0mm) at center edge of large clip and 3 beads (1.0 mm) at center edge of small clip |
| PLC panel power cord is plugged in and PLC and urethane flow indicator are on | Ensure urethane ejector has no air leaks at hose fittings |
| Clip machine air regulator is on and is set to 6 PSI | If flow problem, check air pressure first |
| Test urethane feed tube operation, adjustment, and urethane flows with no air bubbles | To check urethane ejector for bypass leakage; shut off air and bleed off air pressure, remove ejector cap, check for curlicues of urethane; if so, replace ejector |
| Verify pin location on fixture | After ejector installation, tighten urethane fittings on ejector |
| Test clip holder verification switch: a) clip present; b) clip upside-down | Restore air pressure, bleed air bubbles, make adjustments to ejector flow screw |
| Place set-up part on fixture | Ensure operation of all sensors and switches. Replace/repair as required |
| Verify clips are pinned and part is in contact with all datums | Ensure all nuts, bolts, screws, parts, and equipment are in place and functioning |
| Place clips in clip holder chucks | If machine needs work and downtime, contact OE Production Supervisor |

Remarks: (explain all items needing attention or repair)
