6. PLANNED MAINTENANCE SYSTEM

Planned maintenance carried out by the maintenance department must be coordinated with the autonomous maintenance activities of the operations department so the two departments can function together like the wheels of a car.

Until general inspection becomes part of the operator's routine, the assistance of the maintenance department will be required more often than it was before the TPM development program was introduce. For example, operations will rely on maintenance to point out weaknesses and design counter-measures for problem areas. Moreover, accidental breakdowns, while gradually decreasing will continue to demand attention. Thus, the workload of the maintenance department will probably hit an all time high. This temporary excess workload should be handled promptly through overtime and sub-contracting, however, to support the commitment of the operators. Otherwise, the operators will lose their enthusiasm for developing autonomous maintenance.

The volume of maintenance work will diminish once again when general inspection has become part of the operators' routine. The number of breakdowns will decrease significantly and maintenance department activities will also lessen. At this point, the maintenance department should focus on its own organization.

Development of a scheduled or periodic maintenance program should actually begin before the operators' general inspection procedure has been completely set up. As mentioned earlier, the maintenance department must develop equipment standards independently, so that during the autonomous inspection stage they can be compared against the standards being set by the operations department. A clear division of the responsibilities of two departments is the key to thorough and effective inspection and can be accomplished only when both sets of standards are combined. If scheduled maintenance is inadequate in a company; it should be reevaluated and improved as part of the TPM development program.

Furthermore, to maximize the effectiveness of its activities, the maintenance department should reevaluate control of spare parts, dies, tools, inspection devices, and drawings.

A distinctive feature of this maintenance system is the "L&S maintenance meeting" held daily at 9 a.m. A these meetings production line managers and supervisors (L) and members of the staff (S) as maintenance and engineering supervisors, discuss planning and scheduling for production line stops and maintenance works. The meetings promote speedy implementation of monthly and weekly scheduled maintenance and more efficient handling of daily breakdowns.

Certain salient features of maintenance planning and control system are given below:

MAINTENANCE PLANNING SCHEDULOING AND CONTROL

- **PREPARE MASTER EQUIPMENT LIST**
- **COLLECT EQUIPMENT DATA**
- **CATEGORISE THE EQUIPMENT**
- **PREPARE PM MAIN LIST**
- **PREPARE MAINTENANCE INSTRUCTIONS**
- **PREPAREE PM CARD**
- **PREPARE ROUTINE LISTS**
- **PREPARE ANNUAL PM SCHEDULE**
- **DESIGN WORK PLANNING AND SCHEDULING SYSTEM**
- **DESIGN MAINTENANCE CONTROL SYSTEM**

MAINTENANCE ACTIONS

MAINTENANCE ACTION	PURPOSE
1. LUBRICATION 2. CLEANING 3. ADJUSTMENTS 4. APPLICATION OF PROTECTIVE COATING	TO RETARD OR SLOW DOWN THE PROCESS OF DETERIORATION
5. EXAMINATION OF COMPOENTS 6. ANALYSIS OF HISTORY OF BEHAVIOUR OF MACHINE/COMPONENTYS	ASSESS THE EXTENT OF WEAR AND DETERMINE, ON WHAT BASIS, THE ACTION REQUIRED TO CHECK A BREAKDOWN
7. REPLACEMENT OF WORN-OUT COMPONENTS 8. REPAIR OF CRACKS AND OTHER REPAIRABLE DAMAGES	RESTORE THE ORIGINAL OPERATIONAL CAPACITY OF THE MACHINE AND PREVENT FURTHER DAMAGE
9. MODIFICATION	TO REDUCE THE FREQUENCY OF BREAKDOWNS AND TO REDUCE MAINTENANCE COSTS
10. REPLACEMENT OF EQUIPMENT	TO CHOOSE A BETTER ALTERNATIVE WITH A VIEW TO MINIMISE TOTAL COSTS

PREVENTIVE MAINTENANCE MAIN LIST

EQUIPMENT: VACUUM PUMP

EQPT NO	SUB-ASSEMBLY	TIME IN	S/R	CAT	MI NO	ACTIVITY DESCRIPTION
243802	VACUUM PUMP	4	R	MF	101	Check bearing temp. Max 75 C, glan for leakage. Check oil level, foundati bolts. Check for cracks in pipe work, abnormal noise, guard fastening
243802	PUMP & MOTOR	12	R	SPM	105	Check bearing using SPM
243802	VEE BELT TRANSMISSION	4	R	MF	201	Listen to abnormal sounds. Check belts & Pulleys for wear and damage Check cover for damage and fasteni

PREVENTIVE MAINTENANCE MAIN LIST

EQUIPMENT: VACUUM PUMP

EQPT NO	SUB-ASSEMBLY	TIME IN	S/R	CAT	MT NO	ACTIVITY DESCRIPTION
243802	VEE BELTS TRANSMISSION	24	S	MF	108	Check tension of belts, alignment, wears of belts and pulleys. Control th adjustment screws. No. Of oil or grease on the belts.
243802	ELECTRIC MOTOR	4	R	MF	101	Check motor temp. vibrations, abnormal noise. Check that motor cooling systems are clear. Check fan covers grill for cleanliness.
243802	EELCTRIC MOTOR	24	S	E	201	Check insulation, cable, fan, etc.

M-instruction
No.018 D

CENTRIFUGAL PUMP

Check the bearing temperature by hand. The bearing temperatures should not differ Substantially from inspection to inspection. With roller bearings, the max. permissible temperature amounts to 75 C. If the temperature differ considerably from the temperature measured during the previous inspection, this generally suggests a fault such as

MAX. BEARING TEMPERATURE 75 C

-“excessive lubrication” (roller bearings)
-bearing damage
-overloading

It may be advisable to listen to the bearings with the aid of a stethoscope, etc.

Feel the pump by hand. Vibrations may be due to

UNDESIRABLE NOISE VIBRATIONS

- damaged bearings
- damaged pump impellers
- cavitation
- faulty coupling alignment or excessive coupling wear
- loose foundation bolts

Check any leakage at inlets and outlets, as well as at shaft seals.

LEAKAGE

A small amount of leakage is useful for Lubricating the stuffing box. If the leakage At the stuffing box is excessive, tighten the Gland. Tighten each nut in stages of about 1/6 of a turn. Wait a little and check whether the stuffing box.

STUFFING BOX