UNIT 7 MAINTENANCE SCHEDULE OF VARIOUS EQUIPMENT

Structure

7.1 INTRODUCTION

In this unit you will learn about maintenance schedules for various construction equipment.

Objectives

By the end of this unit, you would be able to explain

- the need for maintenance schedules,
- the need for maintenance after each shift and after every working season,
- maintenance schedules vs civil construction programme, and
- project manager's role in maintenance schedule.

7.2 MAINTENANCE SCHEDULES

Maintenance schedules list the requirements of each equipment shown in the register of equipment in so far as routine maintenance is concerned. A typical schedule card indicates :

1) Grade of labour or manpower required.
2) Frequency of the work to be done.
3) Details of the work to be done.
4) Estimated time for the execution of the work.

Where equipment are identical or similar the schedules are repeated on additional cards so that a complete schedule exists for each equipment. The preparation of the maintenance schedule is a skilled task. Not only must all necessary maintenance activities be identified and recorded, but the frequencies must be evaluated with availability for maintenance in mind as well as other more obvious factors including manufacturer's instructions.

Grouping work by slight adjustments of the frequencies can have a most beneficial effect on the operation of a maintenance programme.

Basic data can frequently be obtained from manufacturer's manuals but not all manuals have necessary information, or have the information in the required form. The maintenance planning engineer must therefore use any available information as a basis but must interpret it in accordance with the local requirements and with his own knowledge and experience. (Obviously care must be taken within the guarantee period of new equipment to conform with any special instructions which form part of the manufacturer's guarantee.)

SAQ 1

What are maintenance schedules and what does a maintenance schedule card indicate?

7.3 MAINTENANCE AFTER EACH SHIFT

On projects where work is carried out in one or two shifts, each shift being of 8 to 10 hours, maintenance is carried out after each shift so that the equipment may be available for the next shift. Such maintenance will help to maintain a high rate of equipment production.

In case of three shift working, the work is executed round the clock and no time is available for maintenance work. In such cases it is advisable to have extra standby units which can be serviced while the other machines are working. As many as 30% of the main working units should be kept as standby for this purpose.

SAQ 2

How is the maintenance of equipment carried out in case of 1, 2 and 3 shift working?

7.4 DAILY MAINTENANCE

Some maintenance is required to be carried out daily on some components of an equipment following inspection. These are discussed below.

7.4.1 Daily Tyre Inspection

All tyres should be inspected daily, preferably when the vehicle returns to the workshop after completing its daily duty. This inspection should include a visual or hammer inflation test to detect gross under-inflation, a quick examination for nails, cuts, flints and a check for any visual evidence of impending tyre failure. Any tyre under suspicion should be replaced before the vehicle is returned back for service.

7.4.2 Daily Engine Inspection

Before the start of the day's work, the engine should be inspected. The things to be observed are the water level in the radiator, the level of the engine oil with the dip stick, the oil level in the brake oil container, the starting and stopping of the engine, the lights on the head and the tail, the brakes and the movement of the gear levers. Any difficulty in operating the levers should be rectified. The water and oil levels should be made good. Bulbs and brake linings should be replaced where found defective. The radiator fan belt should be checked for tightness and replaced if badly worn out.

7.4.3 Daily Battery Inspection

The battery terminals should be checked everyday for their tightness. If found loose, they should be tightened. The level of the acid and the specific gravity should be checked. If the specific gravity is less than specified, then acid of the prescribed density should be filled otherwise distilled water may be used to top up the level of the fluid. The belt should be checked for tightness in case a dynamo is fitted on the engine.

SAQ 3

i) What are checked in tyres during daily inspection?

ii) What would you check in an engine on a daily inspection?

iii) What are the features checked in a battery during daily inspection?

7.5 MAINTENANCE AFTER EVERY WORKING SEASON

After every working season, the equipment is sent to the main project or central workshop for a thorough inspection and repair. Things that could not be done in the field workshop are done in the off season. All equipment are given a once thorough checking and reports of the operators are studied for their remarks before the maintenance is taken up. Such components that require to be replaced or repaired and remounted are attended to and the machine rendered fit for operating in the next season.

SAQ 4

What is the need for maintenance after every working season ?

7.6 MAINTENANCE SCHEDULES Vs CIVIL CONSTRUCTION PROGRAMME

The maintenance of equipment and plants should be done at a time when there is no requirement for such plant. Thus, major repairs of equipment and plant should be planned for execution during the monsoon season when the actual construction work is suspended. During the working season only minor repairs, routine maintenance or servicing should be carried out.

SAQ 5

How are maintenance schedules matched with civil construction programmes?

7.7 PROJECT MANAGER'S ROLE IN MAINTENANCE SCHEDULE

The project manager should be accountable for all equipment maintenance and repair on schedule. Experience in equipment maintenance and repair is important to the project manager. Equally important is his ability to instruct, lead, and inspire people. Additionally, the manager must be able to evaluate facts and make good management decisions.

7.7.1 Project Manager's Records

For individual machines, the project manager should keep records that show :

1) Hours worked per day, hours worked per month, and total hours worked per year.
2) Idle time in hours and the total number of hours lost in downtime. These should be identified as "Downtime-Idle" or "Downtime-Actual Repair Time"
3) Preventive field maintenance.
4) Repairs and failures.
5) Labour cost.
6) Cost of parts, lubricants and fuel.

Analysing records of failures and repairs will reveal the need for changes in the preventive maintenance programme, correction of operator habits, or purchase of different equipment.

Analysis of the cost and extent of field maintenance will help project manager to evaluate and reduce owning and operating costs. The machine application should be described along with the operating conditions. Severe operating conditions will account for increased cost of maintenance and repair.

Regular evaluation of the machine by the project manager, job superintendent, and operator will establish the machine's overall acceptability. Factual performance data are the best media of communication between the equipment manager and machine operators, as well as between the project manager and the job superintendent.

7.7.2 Repair or Replacement Decisions

Good equipment records and cost accounting facilitate better management decisions. Thus, if a large crawler tractor has accumulated high maintenance expense, one might come to the easy decision to replace it rather than repair it again. However, if records show that the working conditions were severe, not much might be gained by replacing it. With proper equipment records, a great deal of guesswork is eliminated and the probability of reaching the best decision is increased.

7.7.3 Maintenance Programme Coordination

Coordination of maintenance programmes and construction operations is a most important responsibility. With cooperation between operating personnel and mechanics, and the support of equipment dealer service personnel, the equipment manufacturer can develop and implement a successful preventing maintenance programme. Personal experience in the field will help him to improve and tailor service procedures to minimise equipment downtime and maintenance cost.

7.7.4 Personnel Training

Training service and maintenance personnel is another task for the project manager. Wherever specialisation is feasible, individual job skill training will increase efficiency of personnel. Equipment dealers will assist equipment managers in personnel training, and provide literature and training aids.

7.7.5 Authority of Project Manager

Decisions affecting the life and operating cost of equipment are not always controlled by the project manager. The authority of the equipment manager may or may not include, for example, the right to shut down a machine for repairs. However, it is always his responsibility to notify the project manager of the possible consequences of abusing a machine, or running it when repairs are obviously required.

SAQ 6

i) What records of individual machines should the project manager keep?

ii) How would you take a decision on either repair or replacement?

iii) Why is coordination necessary in a maintenance programme?

7.8 SUMMARY

In this unit you learnt about the maintenance schedules for various equipment. What maintenance is to be done after each shift, every day and after every season are brought out. How the maintenance schedule should match with the civil construction programme is important. The role of the project manager in the maintenance schedules has also been explained. The decisions he may take on repair or replacement of equipment, the action taken to coordinate the various aspects of a maintenance programme, measures to train personnel on a maintenance programme are to be recorded by him. His authority on the project is also explained.

7.9 KEY WORDS

Maintenance	:	A combination of any actions carried out to retain an item in, or restore it to, an acceptable condition.
Maintenance Schedule	:	A comprehensive list of maintenance and its incidence.
Repairs Maintenance	:	Repairs maintenance (as required) is simply doing maintenance work as the need develops. This elementary approach has sometimes been replaced by periodic overhauls and other preventive-maintenance practices.
Spare Parts	:	These are the "insurance" items that are stocked for specific plant equipment to guard against prolonged equipment downtime.
Downtime	:	Period of time when a device is not working.
Cost of Production Downtime	:	When equipment failures occur and equipment remains down through lack of spare parts or materials, the resulting losses termed as cost of production downtime.

7.10 ANSWERS TO SAQs

Check answers of all SAQs with respective preceding text.