

## **General maintenance of plants**

### **Expected Learning Outcome**

- Meaning of maintenance
- Types of maintenance
- Objectives and functions of preventive maintenance
- Mechanical maintenance standard for refrigeration plant

### **10.1.Introduction**

A major part of the expenditure is generally on the men, material and maintenance in an industry. Every machine will require repairs even if it is best designed, hence the repair must be done at such a time when it may have least disruptions, i.e. machine may be repaired when it is not being used or its use may be postponed without affecting the production of the whole concern. Therefore, checking of the machine is generally done when it is not in operation, so that the defect, if any, can be immediately and easily rectified without causing extensive damage to the plant.

In this way, we say that maintenance is responsible for the smooth and efficient working of an industry and helps in improving the productivity. It also helps in keeping the machines in a state of maximum efficiency with economy.

Realizing the high importance of maintenance of plants and equipments, National Productivity Council, undertook the survey of engineering industries and found that due to failure of the plants, equipment and machineries, non-availability is 28 per cent. Looking to this high percentage of failures, it is essential that the engineering units should improve their maintenance system.

### **10.2.Types of Maintenance**

Generally maintenance can be done in the following two ways:

- Breakdown maintenance
- Preventive maintenance

In the first case of maintenance, repair can be done after the breakdown occurs while in the second case maintenance is done on the basis of prediction or on the basis of periodical checking.

#### **10.2.1. Breakdown maintenance**

Breakdown of a machine can occur due to the following two reasons:

- Due to unpredictable failure of components which cannot be prevented;
- Due to gradual wear and tear of the parts, which can be eliminated to a large extent by regular inspections, known as preventive maintenance. From experience it can be decided that, when a part should be replaced, so that breakdown can be avoided.

In breakdown maintenance, defects are rectified only when the machine cannot perform its function any longer, and the production department is compelled to call on the maintenance engineer for the repairs. After repairing the defect, the maintenance engineers do not attend the machine again until another failure occurs.

In this type of maintenance, repair shall have to be done on failure, thus it may disrupt the whole production, if it is performing an important work. The method is much expensive also due to increase of depreciation cost, payment to idle operators, overtime to the maintenance staff for doing the emergency repairs.

### **10.2.2. Preventive maintenance**

Preventive maintenance is sometimes termed as “planned maintenance” or “scheduled maintenance” or “systematic plant maintenance” etc. It is an extremely important function for the reduction of maintenance cost and to keep the good operational condition of equipment and hence increases the reliability. Preventive maintenance aims to locate the sources of trouble and to remove them before the breakdown occurs. Thus it is based on the ideas “prevention is better than cure”. Scheduled maintenance, is always economical than unscheduled maintenance, as we all know that, “a stitch in time saves nine”.

Best safeguard against costly breakdown is to inspect, lubricate and check up the equipment as frequently as possible. To take full use of equipment and to maintain it in reliable condition, necessary measures should be taken to prevent overloading, dampness negligence and misuse of machines. Frequency of inspection should be decided on the basis of the importance of the machine; wear and tear of the machine and its delicacy. This periodic inspection or checking helps to find out the reasons leading to breakdown and to rectify them, when they are in minor stages. Thus the repair can be done when one wants to do it, i.e. when it has least effect on the production schedule. Further this repair requires lesser time as compared to that of breakdown repair and thus down time is reduced by doing preventive maintenance.

### **Objects of Preventive maintenance**

Preventive maintenance has following main objects

- To obtain maximum availability of the plant by avoiding breakdown and by reducing the shutdown periods to a minimum.
- To keep the machine in proper condition so as to maintain the quality of the product.
- By minimizing the wear and tear, preserve the value of the plant.
- To ensure for the safety of the workers.
- To keep the plant at the maximum production efficiency.
- To achieve all the above objectives with most economical combination.

### **10.3. Functions of Plant Maintenance Group**

Important functions of Plant Maintenance Group are:

- Lubrication as per scheduled programme.
- To carry out running repairs and preventive maintenance in-situ.
- Routine inspection of equipments as per check list.
- Forecasting requirement of spare parts etc.
- To initiate recommendations about modifications, improvisation etc. for improving equipment efficiency.
- Advice Central Maintenance Group and overhaul schedules.

### **10.4. Mechanical maintenance standards for refrigeration plant**

- To maintain the compressor and the whole system in a satisfactory condition for a longer service the periodical overhauling must be executed and some performance parts must be repaired or replaced in accordance with the following maintenance standard.
- If the system is operated for 8000 hours in a year the valves should be inspected once or twice before the annual overhauling.

- If ammonia refrigerant is used in the system, much carbon is generated in the oil due to high discharge temperature, and then the discharge valve must be dismantled to remove the carbon deposition and at the same time the foul oil should be replaced so that the performance parts will wear less.

**Periodical overhauling**

- It is standard to overhaul at the end of every 5000 hours of operation.
- If the refrigeration system is not fully operated by overhauling may be done once in 2 or 3 year