CH-06 Maintenance of Machine Tools

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1.Maintenance:-

Maintenance can be defined as those activities required to keep a facility in as built condition. So that it continuous to have its original productive capacity.

1.1 Need of maintenance activity:-

1. To ensure maximum availability of plant,equipment and machinery for production utilisation through planned maintenance.

2. Tum maintain plant ,equipment and facilities at an economical level of repair at all times.

3. To maintain accuracy of tool.

4. To repair in working condition at all the times.

1.2 Importance of maintenance activity:-

1. Quality of product.

2. Cost control

3. Customer service

4. Market reputation

5. Cost of investment.

1.3 Types of Maintenance :-

a) Unplanned maintenance

1. Breakdown maintenance

2. Corrective maintenance

b) Planned maintenance

1. Routine maintenance

2. Preventive maintenance

3. Predictive maintenance

a) Breakdown maintenance:-

Breakdown maintenance is also called as repair maintenance. Breakdown maintenance is done when machine gets shutdown. It involves repair or replacement of components that have failed.it is suitable for small industries having less number of machines.

b) Routine maintenance:-

Routine maintenance can be defined as a procedure followed regularly or as a cyclic operation recurring periodically.It is the simplest form of planned maintenance but very essential. It involves minor jobs such as cleaning , lubrication, inspection and minor adjustment. Inspection include bearing,coupling, foundation ,bolts ,protective covers etc

c) Preventive maintenance:-

This is one of the oldest maintenance system being practiced in industries. Preventive maintenance is the planned maintenance of plants and equipment in order to prevent or minimise breakdown and depreciation rate.

d) Predictive maintenance:-

Predictive maintenance is carried out as the machine are running in their normal production mode. Predictive maintenance means predicting the failure before it occurs. It includes identifying the root cause for failure and eliminating those cause before the result in extensive damage.

e) Corrective maintenance:-

Corrective maintenance is defined as maintenance work that involves the repair or replacement of component that are about to fail or have failed or breakdown.

Functions of preventive maintenance:-

1. To prevent the machine from failure.

2. By analysing and planning of failure for the elimination.

3. Periodic inspection of plant and equipments.

4. Repetitive servicing ,cleaning and painting of equipments.

Advantages of preventive maintenance:-

1. Flexibility allows for adjustment of maintenance periodically.

2. Greater safety for workers.

3. Fever large scale or repetitive repairs.

4. Minimised loss of production due to breakdown.

5. Greater control and supervision can be obtained.

2.Basic maintenance practices.

2.1. Bearing

Factors of failure.

a. Dirt

b. Fatigue

Cause:-

a. they are embedded in the bearing lining deforming the structure beneath.

b. When the running time exceeded the allowable capacity ,the bearing fails due to fatigue.

Correction:-

a. Proper maintenance.

b. Grinding and polishing the journal surface.

c. Proper lubrication

2.2. Coupling

Coupling is a device used to connect to shaft together at their ends for the purpose of transmitting power.

Factors of failure

a. Improper installation

b. Poor coupling selection

c. Operation beyond design capabilities.

Correction

a. Perform visual inspection

b. Checking for sign of wear or fatigue.

c. Cleaning coupling regularly

d. Checking and changing lubricant regularly if the coupling is lubricated.

2.3 Shaft:-

Shaft is used to transmit the power from one place to another. The main failure of shaft is misalignment.

System of Misalignment

a. Abnormal noise

b. Excessive vibration and friction.

c. Improper rotation of shaft.

Maintenance:-

Maintain the alignment of shaft by using different alignment methods. By using filler gauge or by using dia indicator method.

2.4 Pulley:-

Pulley are used to change the direction of an applied force, transmit rotational motion or realise a mechanical advantage in either a linear or rotational system of motion.

Maintenance:-

a. Use proper Pulley.

b. Balance the pulley correctly.

c. Alignment of pulley.

d. Lubricating the moving parts periodically.

e. Check the belt mounting, tightness of belt and group of pulley.

3.Repair cycle analysis:-

In repair cycle analysis the details which are analysed in long period of time and decision will be taken whether the machine tools equipment are fit or not. The repair which are carried out at a planned interval comes under preventive maintenance. it can be classified as

a. inspection (I)

b small repairs (S)

c.medium repairs (M)

d. complete overhaul (C)

This repairs are carried out on the equipment in a sequence which is well defined for the particular equipment.

Need of repair cycle analysis

a) To carrying out inspection repair and complete overhaul of the machine.

b. To know when the inspection or repair turns come.

c. To determine number of workers, quantity of spares, material required.

3.1 Repair complexity :-

It is defined as indication of complexity of a machine tool. It tells about how complex a machine is to be repaired by using repair complexity we can prepare the maintenance schedule, cost of repair, manpower required and spare required etc.

3.2 Cause of breakdown:-

a. Excessive friction between parts.

b. Failure to replace parts that are known to wear.

c. Neglected cooling system.

d. Overload of machine.

e. Neglecting common faults.

f. Improper handling of the machine by operators.

Difference between preventive maintenance and breakdown maintenance.

Preventive maintenance	Breakdown maintenance
1. It is time based maintenance. 2. It is done at the present schedule. 3. It is carried out as the machine are running. 4. Even if the performance capability of machine is good the maintenance is done on schedule.	1. It is need based maintenance. 2. It is done when need is occur. 3. It is done when machine gets shutdown. 4. Machine condition is not concerned ,maintenance is done at breakdown.

3.3 Maintenance manual:-

When we purchase new equipment or machine tool, every manufacturer supplies a preventive maintenance schedule with this machine tool or equipment. This preventive maintenance schedule or based on the vast experience of the manufacturer and this documents are called maintenance manual.

3.4 Maintenance record:-

Record keeping in maintenance is very important. By using previous information and its analysis it is easy for maintenance department regarding decision making when any defect occurs in machine. Maintenance records are the part of maintenance documentation that contains failure, faults and maintenance information related to the parts.

3.5 Housekeeping:-

Housekeeping means to clean the plant and equipments so the workers can work in healthy environment. Housekeeping is nothing but cleaning and sweeping operations. It also means that the proper equipment, tools, items are placed in it's distinct place so it can be easily available when it is required.

4.Total productive maintenance (TPM):-

TPM is a system of maintenance and improving the integrity of production and quality system through the machine equipment, process and employees that adds business value to the organisation.

4.1 Objectives of TPM:-

a. Avoid wastage in a quickly changing economical environment.

b. Producing goods without reducing product quality.

c. Reduce cost.

d. Zero breakdown and zero defect.

4.2 Principles of TPM:-

a. Focused improvement

b. Autonomous maintenance.

c. Planned maintenance.

d. Quality maintenance.

e. Cost deployment.

f. Early equipment management.

g. Training and education.

h. Safety and health.

4.3 Benefits of TPM:-

1. Environment of all people in support function for focusing on better plant performance.

2. Better utilised work area.

3. Reduce repetitive work.

4. Reduce administrative cost.

5. Reduce inventory carrying cost.