

Name of the Course : **Machine Tool Maintenance**

Course S.No. : **10.01**

Course Duration : **2 Weeks**

Course Content

Theory

1. Industrial Safety
2. Introduction to Machine Tool Maintenance and types of Maintenance
3. Geometrical Test on machine tools – Lathe, Drilling machine, Milling machine and grinding machine
4. Industrial Tribology – Selection and maintenance of lubricants
5. Maintaining history and inspection records of machines
6. Machine tool mechanism and transmission of power drive system in machine tools
7. Fasteners, its types and locking system used in machine tools
8. Bearing types, specification, Bearing selection, Bearing failures, causes and remedy
9. Maintenance of lead screw, ball screws and guide ways
10. Machine tool reclamation techniques by scrapping, types of scrapers and their use in machine tool repairs
11. Tools and equipments for machine tool repair and inspection
12. Condition monitoring methods.

Practical

1. Levelling of surface by sensitive Engineering Spirit level and two column water level.
2. Geometrical Test on Machine Tools – Lathe/Milling machine/Drilling Machine/Grinding Machine
3. Preventive Maintenance of machine tools – Lathe/Milling machine/Drilling Machine/Grinding Machine
4. Dismantling and overhauling/ repair of machine tool sub-assemblies
5. Mounting and dismounting of bearings – Mechanical and thermal methods
6. Dismantling and assembling of Constant mesh Gear Box
7. Applying different types of tools and equipments for repairs and maintenance
8. Vibration analysis by engineering Stethoscope and Shock Pulse Tester
9. Machine tool reclamation by scrapping

Tools and Equipments:

1. Lathe, Milling Machine, Drilling Machine, Grinding Machine, Shaper etc.,
2. Bearing Kit
3. Different types of bearings
4. Spiral heater for assembling of bearings
5. Oil check monitor
6. Hydraulic Pumps (Gear, Vane)
7. Transparent model s – Hydraulic components
8. Hydraulic check valves and Direction Control Valves
9. Engineering Stethoscope and Shock Pulse Tester
10. Constant mesh reduction gear box
11. Standard set of tools and equipments for repair of machine tools
12. Standard set of inspection equipments for inspection of machine tools.

Name of the Course : **5 'S' Work Place Management & Total Productive Maintenance**

Course S.No. : **10.02**

Course Duration : **1 Week**

Course Content

Theory

1. Industrial Safety
2. Introduction to Machine Tool Maintenance and types of maintenance
3. Autonomous Maintenance
4. 8 Pillars of Total Productive Maintenance
5. Major Losses associated with production
6. Condition Monitoring Methods
7. Total Productive Maintenance – Policies and Goals
8. 5 'S' Work Place Management
9. 7 QC Tools

Practical

1. Autonomous maintenance practices on machine tools
2. Practice on 5 'S' implementation
3. Practice on sorting and arranging
4. Practice on TPM – Check points on Bearing, Lubrication, and Hydraulics
5. Preparation of layout for a given task.

Tools and Equipments:

1. Lathe, Milling Machine, Drilling Machine, Grinding Machine, Shaper Etc.,
2. Paint, Ropes etc., for marking.
3. Standard set of tools and equipments for repair of machine tools.
4. Standard set of inspection equipments for inspection of machine tools.

Name of the Course : **Maintenance Engineering of Machine Tools**

Course S.No. : **10.03**

Course Duration : **2 Weeks**

Course Content

Theory

1. Industrial Safety
2. Introduction to Maintenance Engineering and duties and responsibilities of maintenance Engineers
3. Machine capability study and necessity for up keeping the machine condition
4. Types of maintenance – Time based and condition based maintenance
5. Analysis of repetitive equipment failures and corrective measures taken
6. Estimation of maintenance cost, forecasting of spare parts, methods of procurement and Inventory control
7. Preparation of preventive maintenance schedule and inspection schedule
8. Assessment of tools, equipments and skill requirements for equipment maintenance
9. Bearing – types, specification, bearing selection, bearing failures, causes and remedy
10. Basic Hydraulics and Hydraulic pumps – Gear pumps, Vane pumps, Piston pumps, etc.,
11. Hydraulic Control valves, Hydraulic circuits and maintenance of hydraulic system
12. Hydraulic Oil, lube oils and greases – characteristics and applications
13. Condition monitoring methods & equipments.
14. Machine tool reclamation by latest techniques.
15. Lean maintenance.

Practical

1. Preventive Maintenance of machine tools – Lathe/Milling machine/Drilling Machine/Grinding Machine
2. Mounting and dismounting of bearings – Mechanical and thermal methods
3. Viscosity measurement of Lube oil, Lubricant contamination test by oil check monitor
4. Dismantling and assembling of Hydraulic pump (Gear, Vane)
5. Exercise on Transparent models of Hydraulic Components
6. Dismantling and assembling of Hydraulic Check valve and direction control valve
7. Vibration analysis by engineering Stethoscope and Shock Pulse Tester

Tools and Equipments:

1. Lathe, Milling Machine, Drilling Machine, Grinding Machine, Shaper etc.,
2. Bearing Kit
3. Bearing test rig
4. Different types of bearings
5. Spiral heater for assembling of bearings
6. Oil check monitor
7. Hydraulic Pumps (Gear, Vane)
8. Transparent model s – Hydraulic components
9. Hydraulic check valves and Direction Control Valves
10. Engineering Stethoscope and Shock Pulse Tester
11. Constant mesh reduction gear box
12. Standard set of tools and equipments for repair of machine tools
13. Standard set of inspection equipments for inspection of machine tools.

Name of the Course : **Painting Techniques, Defects & Remedies**

Course S.No. : **10.04**

Course Duration : **1 Week**

Course Content

Theory

1. Safety Precautions
2. Painting tools & Equipments
3. Surface preparation of Metals & wood
4. Varnishing of wooden surfaces.
5. Constituents of Paints
6. Application of paints
7. Car Finishing
8. Cement surface defects & wall painting
9. Painting defects & remedies
10. Lettering & Stencilling

Practical

1. Safe working practices
2. Wooden surface preparation & painting
3. Polishing / varnishing of wooden surface
4. Metal surface preparation & painting
5. Colours & mixing of colours
6. Letter writing & Stencil cutting practice.
7. White colour washing of walls

Tools and Equipment & Material:

1. Scrapping knife
2. Different colour & variety paints
3. Varnish, Red oxide primer, wood primer, putty, Thinner, & Wall primer.
4. Stencil paper, Drawing sheet, water colours, pallet board, straight edge, scale, pencil, eraser, drawing board, & sponge
5. Brushes (Suitable for walls, wooden surface, metal surface, letter writing & Sign boards)
6. Spray Gun, Compressor, Air filter, & flexible hose
7. Emery sheet, wooden block, sand paper, wax polish, Applicator, Colour powders, Containers (1 litre capacity), Waste, Filter Cloth, Stirrer , M.S. Plate, String, & empty drums.
8. Ladder
9. Standard set of tools and equipments for painting

Name of the Course : **Condition Monitoring & Failure Analysis of Bearings**

Course S.No. : **10.05**

Course Duration : **1 Week**

Course Content

Theory

1. Industrial Safety
2. Introduction to Machine Tool Maintenance and types of maintenance
3. Bearing – types, specification, and inspection
4. Bearing selection, bearing failures, causes and remedy
5. Lubricant types, characteristics, oil selection and lubrication methods
6. Condition monitoring of bearings
7. Failure Analysis.

Practical

1. Mounting of bearing using Bearing mounting kit
2. Mounting of bearing using spiral heater
3. Viscosity measurement of Lube oil
4. Lubricant contamination test by oil check monitor
5. Sound monitoring by engineering Stethoscope
6. Shock monitoring by Shock Pulse Meter
7. Data collection, recording and analysis of failures.

Tools and Equipments:

1. Bearing mounting Kit
2. Bearing test rig
3. Different types of bearings
4. Spiral heater for assembling of bearings
5. Oil check monitor
6. Viscosity measuring equipment
7. Engineering Stethoscope
8. Shock pulse meter
9. Standard set of tools and equipments for repair of machine tools
10. Condition monitoring & failure analysis software & kit.

Name of the Course : **Material Handling In Machine Shop**

Course S.No. : **10.06**

Course Duration : **1 Week**

Course Content

Theory

1. Industrial Safety
2. Material Handling
3. Fluid power system (Hydraulics & Pneumatics)
4. Fluid power symbol, elements & their circuits.
5. Chains, hooks & ropes.
6. Hydraulic Jacks, Fork Lift, Chain Hoist & Trolleys.
7. Cranes.

Practical

1. Overhauling of Hydraulic Jacks
2. Servicing of Hydraulic valves.
3. Knots used in material handling.
4. Operation & Maintenance of Fork Lift
5. Operation & Maintenance of Chain Hoist
6. Operation & Maintenance of Trolleys.

Tools and Equipments:

1. Hydraulic Jacks
2. Hydraulic Valves
3. Ropes
4. Fork Lift
5. Chain Hoist
6. Trolleys.
7. Standard set of tools and equipments for repair of machine tools.
8. Simulation software like Automation studio.

Name of the Course : **Basic CNC Machine Maintenance**

Course S.No. : **10.07**

Course Duration : **1 Week**

Course Content

Theory

1. Industrial Safety
2. Maintenance aspects and types of maintenance
3. CNC Machines & their types.
4. Numbering System
5. Hydraulic , Pneumatic & Electrical Systems used in CNC M/Cs.
6. Switches, Relays, Contactors, Feedback devices & Solenoid Valves.
7. Role of PLC & Ladder Programming.
8. Machine Diagnostics

Practical

1. Identification of CNC machine elements
2. PLC ladder programming & checking
3. Servicing Hydraulic & Pneumatic solenoids
4. Interfacing relays, switches, feedback devices with the PLC.
5. Troubleshooting.

Tools and Equipments:

1. PLC Trainer Kit
2. Electro Hydraulic Trainer kit
3. Electro Pneumatic trainer Kit
4. CNC Machine with servo drives (Milling machine – 1 No. Lathe – 1 No.)
5. CNC Systems (Sinumerik latest version – 1 No. & Fanuc latest version – 1 No.)
6. Standard set of tools and equipments for repair of machine tools
7. Simulation software.