

# Machinery Maintenance Practical

## 'L' Scheme Syllabus



Prepared by  
**N.Sivaraman, Lecturer (SS)**  
**G.Venkateswaran , Lecturer (SS)**



Department of Printing Technology  
Arasan Ganesan Polytechnic College, Sivakasi

# **MACHINERY MAINTENANCE PRACTICAL**

## **PREFACE**

This book covers all the topics in a clear and organized format for the Third year Diploma in Printing Technology students as prescribed by the Directorate of Technical Education, Chennai, Tamilnadu. It is confidently believed that this book furnishes the students the necessary study material. The topics covered were neatly illustrated for better understanding of the students.

The book's step-by-step lessons in large, eye pleasing calligraphy make it suitable for both direct one-to-one tutoring and regular classroom use. The book is prepared in normal everyday English and is free from professional jargon characteristic of so many reading instruction books.

All of the lesson pages were carefully designed to eliminate distraction and to focus the pupil's full attention on the work at hand.

N.Sivaraman, Lecturer (SS) / Print. Tech.  
G.Venkateswaran, Lecturer (SS) /Print. Tech  
Arasan Ganesan Polytechnic College  
Sivakasi.

## CONTENTS

<b>S.No</b>	<b>List of Exercises</b>	<b>Page No.</b>
1.	Handling and application of tools – Pipe wrench, Spanner, Vernier Caliper, Micrometer, Feeler Gauge, Dial Gauge and Screw Driver	1
2.	Removing, Tensioning and mounting of various drives (motor belt and transfer & delivery chains)	3
3.	Checking the leveling/alignment of the machine or motor	4
4.	Checking and adjusting the performance of Gripper	5
5.	Assembling and dismantling of bearings/gears/cams/springs	6
6.	Oil changing, air filter cleaning and lubricating the points	7
7.	Check and replace electrical component like fuses	8
8.	Performing the solid print test for identifying mechanical problems in the machine	9
9.	Trouble shooting in maintenance – removing damaged screws/pins/bolts and nuts	10
10.	Checking the sensors and adjusting its setting	11

**Ex No.1****HANDLING AND APPLICATION OF TOOLS PIPE, WRENCH, SPANNER, VERNER CALIBER, MICROMETER, FEELER GAUGE.****Aim :**

To handling and application of tools pipe wrench, spanner, vernier caliber, micrometer, feeler gauge.

**PROCEDURE :****❖ Wrenches :**

1. It may be noted that wrong selection of screw driver application of under pressure. This tool is used to tighten or loosen the nuts and bolts. It's may be single or double ended spanner it may also be closed and spanner where one of its end is closed completely to form hexagon or square. This removes possibility of slippage.
2. T.socket wrench or box spanner may also provide greater average pipes wrenches are used for connecting conduct pipe

**❖ Vernier caliber :**

1. Vernier caliber consist of two steel rules which guide among each other one is called main scale and other one is called vernier scale. Main scale is engraved on a L-shaped frame which contain the fixed jaw and measuring tip.
2. Vernier scale slides on the main scale and it contain the movable jaw and measuring tip when the two measuring tips contact each other then reading will be zero. The design of measuring inside and outside features.

**❖ Screw Driver :**

1. It is a common tool for maintenance and assembly work various types of screw drives and available today it may pressure spoil both the screw head and screw driver tip.

**❖ Micrometer :**

1. It is a very much useful instrument for taking external dimension up to an accuracy of 0.01mm.
2. Here the job to be measured is placed between the anvil and spindle as shown in the fig. By rotating the sleeve spindle moves towards anvil and tight the job now ratchet is tightened and the micrometer is taken out of job.
3. The dimension now can be read primarily from the linear scale on the barrel which processes. For each turn of the circular scale the thimble moves fractionate.
4. These micrometer are available in different ranges micrometer should be repeat clean error correction to be made properly if any error is there.

**❖ Dial indicator :**

1. Dial gauge are used for the following purpose :
  - a) To check the trueness of running shaft.
  - b) To check the parallelism of work piece.
  - c) To check the irregularities of flat surface.
2. It has a feeler pin below the dial a slightest pressure is transmitted to the pointer through a gear train drive in such the ratio that exact reading is shown on the dial.

3. In printing dial gauges are frequently used with block gauges for checking the parallelism of metal rollers and unit parallelism, etc., sometimes this used to measure the difference between the actual dimension with the designed dimension.
4. One complete revolution of pointer indicates movement of 1mm and as the dial as divided into 100 division it gives a reading with an accuracy of 0.01mm.

❖ **Feeler gauge :**

1. The gap of clearance between the mating surface can be checked with feeler gauges they are simply precision steel blades. The thickness of which are 0.03 to 1 mm pivoted together the thickness of the gauges is clearly marked on it. In printing this gauges are used to find the clearance between bushes and bore wall gap between plate and blanket cylinder and bearing wear etc..

**Conclusion:**

Thus we understand to handling and application of tools pipe wrench, spanner, vernier caliber, micrometer, feeler gauge.

**Ex No 2. Removing tensioning mounting of varidrives.****Aim :**

To do removing tensioning mounting of varidrives.

**Types of drivers :**

Chain drive, Belt drive, Gear drive.

**Chain drive :**

A positive transmission of power by the help of chain is very much common especially for light and medium drives chain drives consist of usually fitted on driving and driven shaft in printing industry chain is used for power transmission speed conversion and elevating and conveying system some examples are given below pile board for sheetfed presses to drive water pan roller.

**Types of chain :**

Roller chain drive, Silent chain drive.

**Belt drive :**

The belt and rope drive system is widely used in pair transmission system the belt are used to transmit power which rotate at the same speed or different speed. The belt are made from leather cotton rubber and synthetic materials. The belt is running over two pulleys as shown in figure. The pulley on the rotating shaft it is called as driver or follower varying the diameter of the two pulleys can vary the speed of the driven shaft. For an unscratched are usually classified into following ways will be in tension and compression respectively in between there is natural section which has no tension and compression of the belt and corresponding radius is called as effective radius of rotating.

**Types of belt drives :**

The types of belt drive are usually classified into the following ways . Flat belt drive, Rope drive, Tooth belt drive.

**Gear drive :**

A gear is a machine that transmits mechanical rotary power from one shaft to another at shorter distance smoothly and positively.

**Types of gear :**

Spur gear, Helical gear, Bevel gear, worm gear, Herring bone gear, Rack and pinion gear.

**Ex. No. 3. The leveling the alignment of the machine and motor correcting it to required level****Aim :**

To find the leveling the alignment of the machine and motor correcting it to required level and spirit tools.

**Materials :**

Spirits tools, dial gauge magnetic stand spanner.

**Procedure :**

Clean the surface of the machine or machine bolt where leveling to the check find the accuracy of spirit level and dial gauge that is position check the leveling of the machine or motor are various places if any deviation found of the reading may be correct by screwing or unscrewing the leveling bolt under the machine base. Simultaneously check the alignment of the machine respect other units accessories. If alignment is found wrong the shift the unit machine motor to be required place finally once again check the leveling and alignment for exact required level it all found of then grinding of the machine.

**Conclusion :**

Leveling and alignment of the and the deviation in the reading is noted down for the correction.

**Ex. No 4    Checking and adjusting the performance of grippers****Aim :**

To Checking and adjusting the performance of grippers.

**Tools and material :**

Feeler gauge screw driver degree wheel paper strip key and cloth.

**Procedure :**

Mount the degree wheel the respective place and set in zero position find the degree an angle given in the service manual and accordingly rotate in cylinder in the recommended angle of gripper setting cut a sample of thickness of point 0.63mm-0.05mm(paperfilm)loosen the grippers bolt with help of allenkeys or screw driver.Each individual gripper fingers has to be check for the amount of the gripper fine by inserting the paper strip feeler gauge should be pelled out with slight resistance with indicates the correct amount of gripper bine check and adjust the all the grippers for proper setting conduct a trial and carry tested for any misregistration in the multicolor print.

**Conclusion :**

Checked all the grippers and adjusting is carried in the wherever required.

**Ex. No. 5. Assembly and dismantling of bearing/Gearing/Cams/Springs.****Aim :**

To do a Assembly and dismantling of bearing/Gearing/Cams/Springs.

**Tools and material required :**

Hammer,nylonrod,puller,spanner pipewrench or clip remover,vernier caliper feeder gauge,etc.

**Bearing :**

Remove the guards and doors of the machine.Remove the nuts bold unclip of the bearing area by using the piller selevy and steadly remove the bearing and check its condition.Also examine the surface of the shaft for any damage it any new bearing in required to replace than refer the manual for the respective bearing heat some quantity of oil input the heavy kind of gear into hot pot and leaving for sometimes put the help at hand glass pack the below from the immused oil ready put in over the shaft it required use nylonrod the hammer for placing it in exact position new check the bearing condition manual byit found ok done assembly with airtcle nuts and bolts.Apply lubrication before running .

**Gear :**

Remove the circlip nuts warshes and bolt of the gear.Fixed the fully check the shaft surface condition and place insert the gear the respective gear with the help of nylonel and the hammer apply lubrication and carry test.

**Cames :**

Remove the twall kinds and cams place the newly made cam the respectively place and fix the twell kinds apply lubrication and carry test.

**Springs :**

Remove the spring put the help of screw drives replace the old spring put the new one use thread to fix the spring if necessary check it functioning.

**Ex. No 6. Oil changing airfilter cleaning and lubricating the points****Aim :**

To do Oil changing airfilter cleaning and lubricating the points.

**Tools and material :**

Spanner,screw driver,oilgan and lubricating.

**Materials:**

oil, oilfilter, airfilter and lubricating pipe.

**Procedure :****a. oil charging :**

Check the viscosity of the preset oil,check the level of oil the indicator refer the manual for the exact quality and recommendation clean the entire oil tank with dust and dirt also clean the oil filter in require replace it poor the recommended oil with the help of funnel and filter tip the exact indicator level.Run the machine and check the oil lubricating.

**b. airfilter cleaning :**

Remove the air filter from the compressor motor clean the filter with the help of corrosion other wise replace with new filter after cleaning the filter dry and fix back.

**c. lubricating points :**

Prepare a list to be lubricated note down the recommended dry and frequently apply lubricant through instruction follow the instruction from the manual while the lubricating final out the black edge is any in exact quantity and amount.

**Conclusion :**

changing oil airfilter cleaning and lubricating the points are carried out the above procedure.

**Ex. No 7. Check and replace electrical component like fuses  
(relay conductor on/of switch)**

**Aim :**

To Check and replace electrical component like fuses relay conductor on/of switch

**Equipment and tools needed :**

Multimeter tester, screw driver cutting pliers fuse etc.

**Procedure :**

Find the input alternative current line coming into the fuse carrier. Open the fuse carrier box take the multimeter and put the dial in continuity test mode find the resistance whether it is minimum or maximum if the resistance is found minimum otherwise take the multicolor proof one near to the fuse is not kept is not feet should then the fuse must be blown out while replacing the fuse use exact ones required while replacing the fuse exact ones required.

**Conclusion :**

New electrical components are checked and replaced whenever necessary.

**Ex No. 8. To perform the solid print test identifying the mechanical problem in the machine.****Aim :**

To perform the solid print test identifying the mechanical problem gear sticks bearing condition impression setting roller setting etc.

**Tools and material :**

Ink,paper,t-spanner,screw driver,eye glass,micrometer.

**Procedure :**

To perform setting of rubber roller impressin setting and other things.Corry the make ready procedure for printing ensure the paper and ink quality before printing.Perform the solid printing with proper ink setting of keys.Take out the printed with proper ink after the delivery after place the solid printed paper on a table and visualize and entire print.Find for gear sticks where patches while lines inproper printing whire holes crosting etc..according to the problems study that machine condition like bearing gear rollers and improper impression settings.Make necessary replacement and recondition or the machine part it proper standard.Agsin carrier solid print test to find out the problem in any further.Its is adjusible to carry out wash and cleaned the proper solution.

**Conclusion :**

To due to the solid print test identifying the mechanical problem like gear sticks bearing condition impression setting roller setting etc. and they rectified of a satisfactory.

**Ex. No 9. Trouble shooting in maintenance removing damaged screw, pin, bolt nuts, and driller**

**Aim :**

To remove the damage screw pins bolts and nuts.

**Tools and materials required :**

Screw driver, Spanner, hammer, punch, nylon rod, bolts and nuts.

**Procedure :**

Before double shooting of damage screw pins and bolt and nuts. Find the condition of damage. With help of a punch and hammer also screw driver try to apply the force slowly and unscrew the bolts. It can't be removed with the help of punch and screw driver then try to drill it with help of driving machine try to drill out broken screw and bolt. After removing the damaged screw bolt and pin thread. With help of reamer and taper reform the thread. Now put the new bolt and screw the reconditioned area.

**Conclusion :**

Damaged screw bolts and pins removed as per the above procedure.

**Ex. No 10. Check the sensors and adjusting its setter****Aim :**

To check the sensor position and adjusting its setting.

**Tools & Material :**

1.Screw driver 2.Spanner 3.Multimeter

**Sensor and detector :**

Sensor is a device used to detect measure or record physical phenomena such as heat radiation and to respond by transmitting the information initiation changes or operating controls.

Detect is a device used to sense the presence of some thing such as heat radiation other physical phenomena.

**How sensor work :**

A photoelectric sensor has two main components an emitter and a receiver. The emitter contains the light source which is either an LED or a laser the emitter light source is pulse modulated by an oscillator. The receiver contains an auto electronic element such as a phot transistor or a photodiode which detect the light from the emitter. The receiver is set to produce an output signal which occurs either above or below a specified intensity of the light received from its emitter most sensors allow adjustment of how much light will cause the output of the sensor to change state. Detect the target at a specific distance according to the angle of the reflected light beam. Unaffected of highly reflective target background. Stable detection to targets of colors and materials with varying reflectance. Highly accurate direction of minute of objects.

**Procedure :**

Set the emitter and receiver as per the instructions. Check the receiver for its output signal receiver from the emitter. Adjust the emitter for proper receiving of signal from receiver. Fine tune the register value of the photocell. Adjust the emitter and receiver and in the sensor works. Either adjust the angle of the receiver or maintain the distance between emitter and receiver.

**Conclusion :**

We have adjusted the sensor setting as per the above procedure and it works well.