

AN IMPROVED ELECTRICAL PANEL FOR DRIVING THE MAIN TABLE OF VERTICAL TURNING LATHE MACHINE WITH AC SERVO MOTOR

TRIVEDI MEET PARESH¹, MEET MUKESHBHAI PATEL², KRUTANGKUMAR SURESHBHAI PATEL³,
DIKSHANT PARESHKUMAR PATEL⁴

¹Mechanical Engineer, Pass Out from L. J. Institute of Engineering and Technology, Gujarat, India

²UG Student of Automobile Engineering, Indus University, Gujarat, India

³Automobile Engineering, Pass Out from SAL Institute of Technology and Engineering Research, Gujarat, India

⁴Mechanical Engineer, Shree Swaminarayan Institute of Technology, Gujarat, India

Abstract - The invention relates to an improved Electrical panel for driving the main table of Vertical Turning Lathe machine with AC Servo Motor, the improvement is characterized in that providing an AC Servo Motor duly mounted on the machine through applicable modification of the mounting plate to ensure desired alignment; a plurality of indication lamps; electronic control circuit to provide 10V reference point; logic circuits consisting of relays and contactors embedded on the panel control. Forward/reverse operations of the main table including inching and run speed duly controllable by potentiometers; wherein the machine table interfaced with the panel and the panel is enabled to run the table within zero to maximum speed controllable by the potentiometers; allow jog- mode operation with two speed inching for the table movement; implement automatic braking operations; and activate emergency stop signal command.

Key Words: Lathe machine, AC servo motor, Potentiometers, Machine Tool, Automation

1. INTRODUCTION

Table drive systems in Vertical Turning Lathe machine are normally equipped with DC drive DC Motor and drive in the machine with the passage of time exhibit repeated breakdowns in the machine and leading to high idle time. The MTTR (Mean Time to Repair) of the machine becomes high. The availability of the machine to the production was low. Repair of the equipment is difficult because the DC drive systems present almost obsolete. To overcome the above difficulties, a new panel with AC motor and drive that will greatly reduce the MTTR of the machine.

It is therefore an object of the invention to propose an improved Electrical panel for driving the main table of Vertical Turning Lathe machine with AC Servo Motor which reduces the Mean Time to Repair (MTTR) of the Machine.

Another object of the invention is to propose an improved Electrical for driving the main table of Vertical Turning

Lathe machine with AC Servo Motor which increases Mean Time Between Failure (MTBF) of the machine.

Accordingly, there is provided an improved Electrical panel for driving the main table of Vertical Turning Lathe machine with AC Servo Motor which can be interfaced to an AC Servo Drive. The axes in the machine are interfaced with this panel for safest operation. The safety of the machine operation is ensured by simulating and checking the logic.

2. Working of the Invention

2.1 Detailed Description of the Invention

Following operations are included in the operator panel.

- Table running with 0 to max speed by adjusting a potentiometer
- Jog mode with two speed inching operation for table movement
- Automatic Braking operations.
- Emergency Stop.

The logics are implemented with relays and contactors. New electronic circuit is developed to give 10V reference point. Inching and Run speeds are controlled by potentiometers and relay logic. Forward/Reverse Operations of the Table has been designed with relay logics. There are two speeds for Inching operation and present by potentiometers

Following Indication lamps are provided for operator.

- Power Supply OK
- Drive Ok
- OLR Tripped
- Table Forward
- Table Reverse

The motor has been replaced with an AC Servo Motor Trial operations were conducted and also continuous run test

has been done. Load test has been conducted before regular operation of the machine.

A new wiring diagram is designed as given in drawing Figure 1, Figure 2 and Figure 3. After design of schematic diagram, the panel (1 in Figure 4) and equipment's were identified. Mounting dimensions of the motor were checked. Mounting Plate (7 in Figure 8) is modified by milling and drilling. Motor (6 in Figure 8) is fixed with proper alignment. The drive power supply (2 in Figure 5 and Figure 6) and AC drive (3 in Figure 5 and Figure 6) are fixed in the panel. Contactor and relays are fixed in the panel as per standards, 24V Power supply (4 in Figure 5 and Figure 6) and 10V Reference supply has been fixed. A low speed and high speed inching operation is specially provided in this system.

Internal wiring is done with proper capacity of wires. External interface wiring also has been done with existing panel and motor. Mounting Plate (7) is modified by milling and drilling. Motor (6 in Figure 8) is fixed with proper alignment. After design of schematic diagram of the panel (1) consists of the drive power supply (2), AC drive (3), 24V Power supply (4), 10V Reference and accessories. A low speed and high speed inching operation is specially provided in this system.

Panel Power up and checked for basis startup. Drive parameter has been entered and tuning has been done. Load test and trial operations are carried out. Machine handed over to production.

3. Description of Drawings:

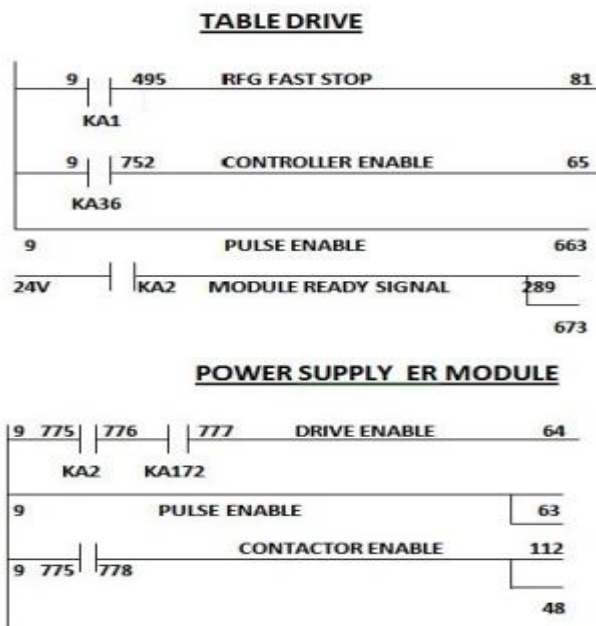


Figure 1

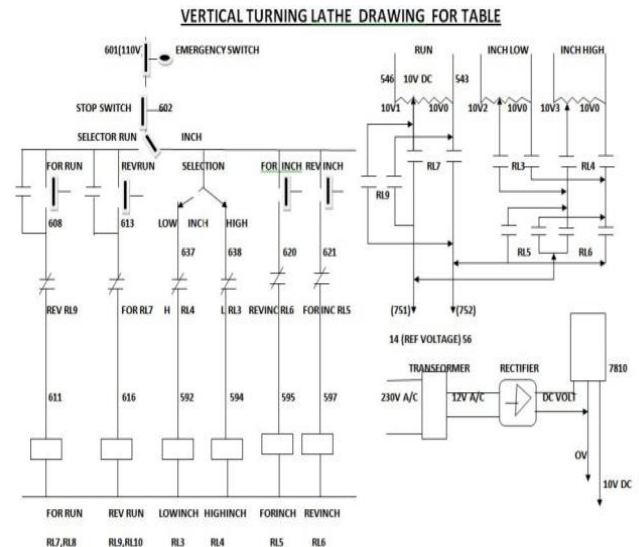


Figure 2

Figure 1 and Figure 2 are newly designed Electrical Diagram given here for reference. The wiring and interface has been done as per the given diagram

Figure 3 shows Newly built Electrical Panel of the machine



Figure 3

Figures 5 and Figure 6 shows Internal Assembly of Newly built Electrical Panel.



Figure 4

4. CONCLUSION

This technology will be extremely beneficial to production units and who are using vertical CNC Lathe Machine and will help to prevent errors in Manufacturing. It's a low-cost product, thus it's cost-effective in terms of money, with a high-quality component. In addition, it will also increase the accuracy of the CNC machine, increase the production rate and Automation will help to reduce time in completing the job

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BIOGRAPHIES



Mr. Trivedi Meet Pares , was a student of department of mechanical engineering, L. J. institute of engineering and technology, Gujarat Technological university.



Mr. Meet Mukeshbhai Patel, is pursuing Automobile engineering from Indus university



Mr. Krutangkumar Sureshbhai Patel, is an Automobile engineering with passout from SAL Institute of Technology and Engineering Research, Gujarat Technological university



Mr. Dikshant Pares is a Mechanical Engineer, Shree Swaminarayan Institute of Technology, Gujarat Technological University