

# Semi Automatic MV Coil Taping Machine

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**Abstract-** The semi-automatic MV coil taping tool machine is a machine which is used in taping MV coil used in MV motors. In the past, the whole process was done manually with hands by workers, which led to inconsistency and inaccuracy. Semi-Automatic Coil Taping Machines eliminate the inconsistency and inaccuracy that results while doing manually. Semi-Automatic taping tool machine is cost efficient and gives quality insulation also it requires less man power with no skilled worker required. In this automatic coil taping machine the taping head is weightlessly suspended from an overhead track way, and provides a fast; accurate and consistent method of operator guided mechanized tape application with virtually no preparation or very less set up time being required.

## I. INTRODUCTION

This particular project is provided by Siemens Pvt. Ltd. with main aim to fix Semi-Automatic machine and optimize the machine for better use. This machine was not in use from past 2 years due to multiple issues and error giving by machine which costed the company not only time but also delay in production.

So to fix this machine we need to do troubleshooting and optimize it according to the use of worker so he can operate this machine with ease.

In this paper we are explaining how we troubleshooted multiple issues and optimized this machine with help of worker.

## II. METHODOLOGY

There are two methods followed in this particular research:

### A. Troubleshooting

The main cause of the problem was servo motor driver which in this particular case was MINAS-S series. Multiple issues this servo motor was giving was rotation was not smooth, position accuracy was bad, initial (home) position varies, motor produced abnormal sound and vibration.

#### 1). Problem: The rotation is not smooth.

The main cause of the problem was the gain was not appropriate and position commands are not stable. So it was necessary to make some changes in the setting of servo motor driver. The function of driver was Increased by the value of Pr11 (1st velocity loop gain), Set a torque filter (Pr14) and then further increase the value of Pr11.

#### 2). Position accuracy is bad.

This problem is either caused due to loop gain is too low or load inertia is large. By counting the number of feedback

pulses on monitor screen of PANATERM while repeating travel back and forth within a fixed distance the controller can be adjusted. When load inertia was large by checking the overshoot at stop using the wave form graphics function of PANATERM and by adjusting gain of amplifier it was fixed.

#### 3). Initial (home) position varies

Variation in home position is caused when z-phase output is not detected and creep speed to initial position is too high. To lower the creep speed, we increased the length of initialization sensor so the decrease in the speed started prior to the edge, by this while coming to end it stops. The z-phase accords to the centre of the proximity dog, so by performing initialization correctly according to controller it was set.

#### 4). Motor produces an abnormal sound and vibration

This is mainly caused due to velocity detection filter is not proper by increasing the value Pr13 (speed detection filter) until the sound decreases to an acceptable level or return the value to 4 (i.e. default).

### B. Optimization

This process was done with help of worker so that we can analyze where the difficulties are faced by workers while doing this process. Below are the difficulties and solution we made and proposed to the company

#### 1). Optimization with help of torsion spring:

While handling the acceleration handle with help of which the worker used to accelerate servo motor in order to tape the coil they were compelled to keep the hand on handle until the next process is started this was because the spring used was compressive spring which after several uses used lose its strength so in order to get rid of this problem we introduced torsion spring which has high strength and is durable for long time. The way we engineered the spring in the handle is shown in figure (Fig.1) below. (Below image is the replica done in solid works software)

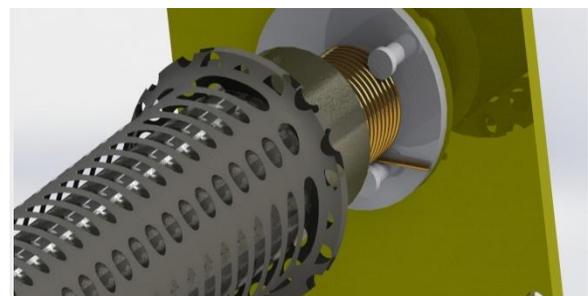


Fig. 1

### III. CONCLUSION

This overall project was completed successfully with no more issues and errors. This machine is now completely workable and due to optimization used worker don't find any difficulty in handling this machine various proposal were put forward for more improvement of machine. Siemens Pvt. Ltd. has accepted our proposal and assured to look forward into this. Presently this machine is now taping 5 coils in an hour which has saved much time of workers and also increased the production. Till date no further issue is registered.

### ACKNOWLEDGEMENT

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included; I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/fact/data/source in my

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