

**AUTOMATIC CONTROL OF RING AND COVER WELDING OF AXLE
HOUSING THROUGH PLC**Ramya R¹, Vinod Kumar M S²¹Student, Industrial Automation Engineering, VTU Post Graduation Center, Regional Office Campus, Mysuru²Assistant Professor, Industrial Automation Engineering, VTU Post Graduation Center, Regional Office Campus, Mysuru.

Abstract - The main objectives of any manufacturing industry is the improvement in productivity, reduction cost of production and labor, PLC is being used extensively in industries to control the machine and process. The present project work deals with replacing the delta PLC with Mitsubishi PLC, considering all the disadvantages of the former PLC, and thus improving efficiency of the machine and process in which it is implemented. In the present condition, a number of disadvantage like, wiring number not mentioned, operation and electrical connection are in the single panel, no water flow indication, etc. exist. To reduce these, PLC being replaced with the better one i.e. Mitsubishi Fx3u-64M, thus loss of components being machined is reduced by about 60% and the loss is revenue is reduced by about 70%. Also the breakdown time of the machine is reduced by about 10hr per month.

Keywords – Ring and Cover welding machine, Delta PLC, MITSUBISHI PLC(FX3U-64m), Axle housing, Ladder Diagram (LD) programming, Cost reduction.

I. INTRODUCTION

A PLC is basically a digital computer which is used in the automation of number of electro-mechanical processes, like control of machines in an industry, in amusement parks and in stadiums to control the lighting etc. In place of using relays and microcontrollers, industries today are implementing PLCs. PLCs are capable of adapting to a various automation tasks. These tasks are mainly industrial processes where the cost of developing and maintaining an automation system is higher when compared to the total cost of automation. During the operation of the system, it will be subjected to various changes and the system has to be capable of handling the changes. The applications of PLCs are basically, highly customized systems and thus the cost of a packaged PLC is low compared to the cost of custom designed micro controller

AOL Ring & Cover welding machine It is a conventional type machine. Now it's developed with automatic MITSUBISHI PLC. The axle is imported from the BARATH FOTRAGE, after the process like short blast, seam welding, straddle facing the axle is sent to the ring and cover housing. In the ring and cover machine on both side the welding will take place, at a time the ring is welded in one side and the cover is welded in another side.

II. SYSTEM COMPONENTS

Housing is the outer covering of the axle which hold all the sub-assemblies of the housing. It is the part which is visible in the vehicle. It rests on the chassis supporting the two wheels. Thus this type of welding is performed in the axle housing so as to withstand the forces applied by the vehicle and the surface on which it moves. The axle is imported from the BARATH FOTRAGE, after the process like short blast, seam welding, straddle facing the axle is sent to the ring and cover housing. In the ring and cover machine on both side the welding will take place, at a time the ring is welded in one side and the cover is welded in another side.

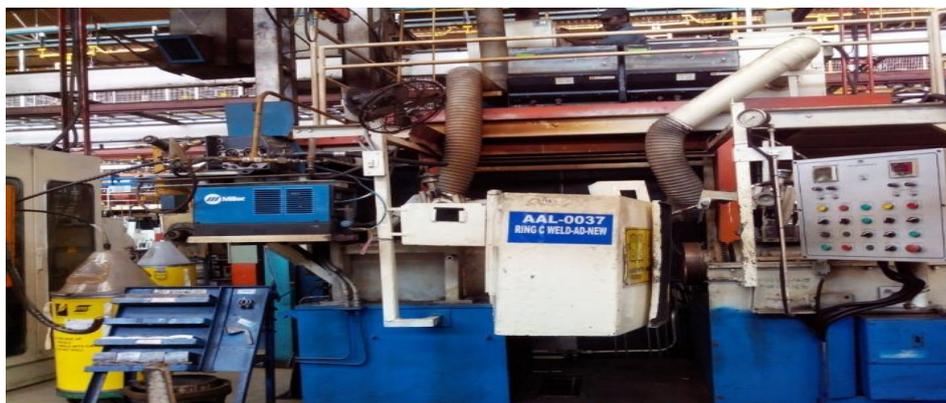


Fig1: Ring and Cover welding machine

Welding parameters

Table1: Welding parameters

Sl no	Parameters	For Cover	For Ring
1	Current (AMPS)	340-400	340-400
2	Voltage (V)	30-34	30-34
3	Torch Angle	35-50deg	35-50deg
4	Gas Flow Rate (LPM)	18-30 LPM	18-30LPM
5	Stick Out (MM)	18-24	18-24
6	Speed (RPM)	580+_10RPM	580+_10RPM



Fig 2: Ring and Cover Housing

The working of Ring & Cover welding machine was difficult for the workers for troubleshooting since the electrical control i.e. SMPS,SSR, VFD etc. and operation control of the machine were in a single panel. And the water flow indication was not specified in the panel board for cooling of welding torch. Before implementing the MITSUBISHI PLC, Delta model was being used. Working with this delta model was not worker friendly. Also there was no provision to reload the program into the machine after debugging.



Fig 3: Before implemented panel board

After implementing new PLC:

- Break down time = 3-4 hrs./ month.
- Loss of components = 40-50/month.
- Total loss ~INR 69,940/-

The loss of components, and thus the loss in revenue is reduced by about 70%.

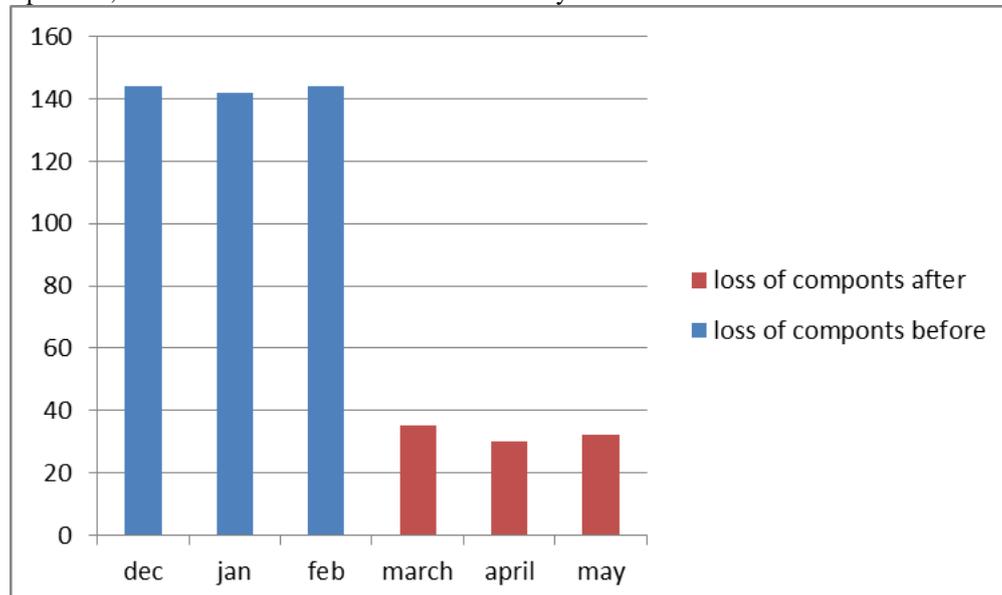


Fig 6: Loss of components before and after implementing new PLC.

V CONCLUSIONS

The basic objective of the project was to reduce the loss of components being machined and also easy troubleshooting. As studied, the Delta model PLC (DVP-PS02) had a number of disadvantages like, both the operation and electrical controls were on the same panel board thus making it difficult for the operator, and also the water flow indication was not provided. Considering all the disadvantages a new Mitsubishi PLC (FX3U-64m) is considered. The loss of components is reduced from 140-145/ month to 40-45/month. Also the break down time of the machine is reduced from 12-15hrs/month to 3-4hrs/month. Thus there is reduction in loss of components and loss in revenue by about 70%.

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