# VERTICAL MILLING CENTER MACHINES STATUS MONITORING SYSTEM FOR INDUSTRIAL APPLICATION USING GSM

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**Abstract** - The paper describes status monitoring system for vertical milling center machine. In todays age monitoring the machine has become of fundamental objective. But its not necessarily probable that the individual monitoring the machine will be physically present at the machine. Thus online monitoring system of the machine has became trendy. This paper gives the method to be used for online machine status monitoring of the vertical milling center machine with the help of GSM module .we can be monitor the machine without being physically present at the location of the machine. We can get the status of machine through SMS.

***Key Words***:-*GSM/GPRS-(Global system for mobile/General packet radio system), CNC machine (Computerized numerical controller)*

## 1. INTRODUCTION

Machine has became integral part of day to days life. The range where machine are used is getting wider and wider with time. It made the life of mankind easier and saved the task. Thus indirectly saves the money in the form of profit. The production capacity is changed for some number of units to thousands of unit per unit time.

We can get the optimum profit from the machine if they are monitored. But the traditional method of machine monitoring system was probably based on bus network to monitor the machine. Due to complexity of machine and the conditions where it is placed, the traditional system showed some error or incorrect output. Also it showed difficulty in maintenance and establishing proper bus network. The machine status monitoring can help us to know its workability and profitability of the machine. The time required to complete the particular tasks can be estimated. Also it help us to monitor the faults occurring within a machine this discards stoppage of working by the machine. The machine status monitoring system form other location is possible with the use of GSM/GPRS technology. It allows the user to monitor his machine from far away location. It allowed the user to have real time monitoring of the system not necessary to be physically present near to the machine.

## 2. VERTICAL MILLING CENTER MACHINE

At very first glance when we see the VMC machine it looks like a drill press machine but there are very much differences between them. Here, we are taking the inputs from the VMC machine to analyze its different parameters. V544 MACPOWER CNC machine is a machine where Full view of a 3-axis clone of a Bridgeport-style vertical milling machine Milling is the process of machining using rotary cutters to remove material[1] by advancing a cutter into a workpiece. This may be done varying direction[2] on one or several axes, cutter head speed, and pressure.[3] Milling covers a wide variety of different operations and machines, on scales from small individual parts to large, heavy-duty gang milling operations. It is one of the most commonly used processes for machining custom parts to precise tolerances[5]. The VMC has the spindle that takes side as well as end loads. Spindle helps to make the accurate movement of workpiece in all three axis. The spindle axis is vertically moved. The VMC machine does all three types of work:

1. Milling

2. Boring

3. Drilling

There are two types of vertical milling, the bed mill and turret mill. To achieve cutting the bed has the table which move perpendicular to spindle axis while is case of turret mill the tables moves perpendicular and parallel to spindle axis. Basically the VMC machine is used for cutting and milling purpose.

**Fig 1:** Vertical Milling Center Machine

## 3.  METHODOLOGY:

The system has Atmega 2560 Arduino board. It is used for taking the inputs from the Vertical Milling Center Machine. The Atmega 2560 is further connected to GSM SIM 900 module where data is serially received. The received information is sent to a individual or client through SMS on his mobile. The basic system block diagram is as given below.
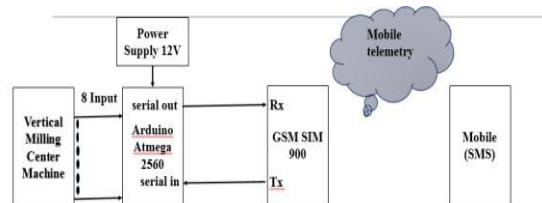


Fig2: System Block Diagram

The system has 230 V AC to 5 V DC converter SMPS to provide continuous power supply of 5 v to the Arduino board. The inputs coming from VMC machine are of the Range of 0-24 V But the maximum input acceptable by Arduino board is 5v.thus The OPTO PC 817 is used to step down the voltage to 5V and pass it to the arduino. The relay are also used in the hardware. These relay changes the state of input.
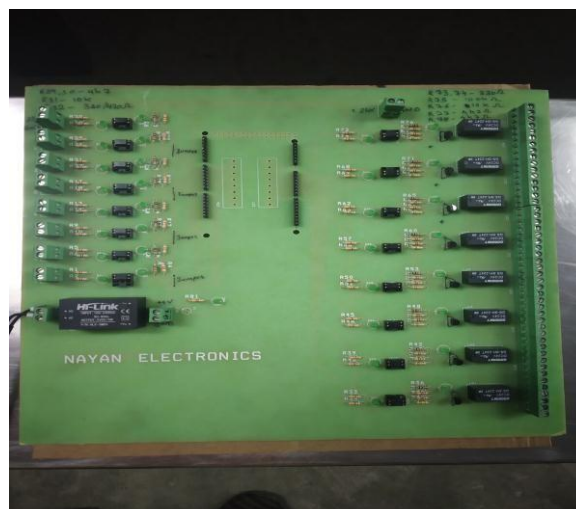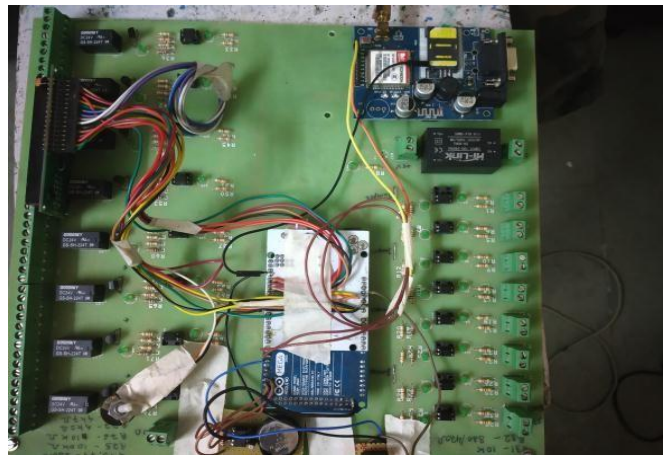


**Fig2:** Hardware

**Fig 3:** The system setup

### 3.1. Inputs from Vertical Milling Center Machine

The inputs are defining the status of the machine. They initially at low level (o) and becomes high (1)(at 24v) when get any input from the machine. These inputs are given to the eight pins of microcontroller.

The eight inputs are:

1. A0: Power on / off

2. A1: Machine Idle / Busy

3. A2: Machine Emergency press

4. A3: Spindle

5. A4: Auto/Jog/MPG mode

6. **A5:** Lubrication

7. **A6:** Coolant Spray

8. **A7:** Flush

Different sensors are used for taking inputs from VMC machine as: Ex: Hall Effect sensors (33620629E) for Machine Idle/Busy, Spindle Temperature sensor (L M 35) for Coolant Spray, Lubrication Oil sensor for sensing the Lubrication. Float sensor.

### 3.2 Output:

The output will be shown on the LCD display and the mobile no of client or the concerned supervisor. Also the output of the status will be shown on the server page. The any kind of fault or misbehavior from **the** input side is observed it can be corrected remotely through SMS feedback.

The system is very beneficial when it comes to its profitability. It helps us to monitor the machine not being physically present at the plant. And thus it helps to maintain the quality of product being produced. The maintenance of the machine will be reduced with such kind of system and so the cost.

### 4. RESULTS AND DISCUSSION

The output will be displayed on mobile screen a follows

**Fig 4:** SMS Sent Using GSM

A0 A1 A2...Are the inputs Input high shows that the input is at logic high level. The SMS is sent on the mobile no through GSM SIM 900. Also the same message will be displayed on the LCD display.

Also using relay we are able to change the state of the input with simple SMS send to GSM. The change in inputs state is as shown below. The system is capable of giving the real time information about the VMC machine. It influence the quality of product and avoid chance of getting faulty product. It also improves passing rate and life of the machine and helps us to achieve centralized control of machine.
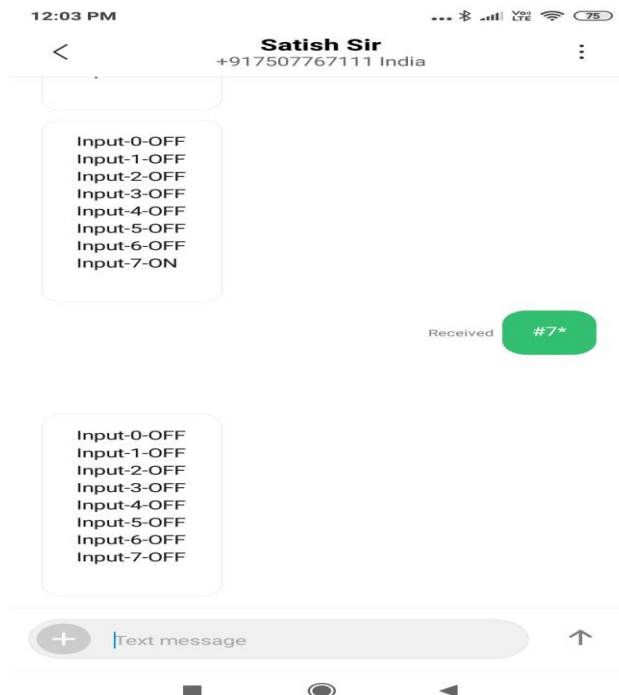


**Fig 5:** Change in Input State through SMS

## 5. CONCLUSION

The proposed system gives best solution for monitoring the Vertical milling center machine. The system is low cost with very less complexity and hardware giving the best results.. We get the status of VMC machine through SMS and in case we

want to change the state of input from high to low and vice versa, it is possible through a simple msg sending to the GSM. The system reduces the maintenance of machine and avoid faults possibly can occur.

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