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# Micro Controller Based Alert System for Gas Flow In an Industrial Furnace

ARULARASAN.R[1], PREMKUMAR.M[2], SARATHKUMAR.M[2], JAGATHEESAN.G[2], MUBARAK.B[2].

[1,] *Faculty,* [2,] *UG Students,*

*Department of Mechanical Engineering, University College of Engineering Arni*

*Thatchur, Thiruvannamalai (DT) - 632326, India*

*Email: mpkr163@gmail.com[2], sarath.ucea@gmail.com[2], vrarasan@gmail.com[1]*

Abstract: In a NOCOLOK brazing furnace Nitrogen is passed through the different zones. Usage of Nitrogen is to reduce the amount of the Oxygen level. This Nitrogen is injected in five different pipes. Each pipe has one gate valve and one solenoid system for flowing. Generally, Furnace has two modes. One is Manual mode and second is Auto mode. If auto mode is on, the flow is passed in both Solenoid system and gate valve. If Manual mode is on, the flow is passed in the Gate Valve only. At end of the first shift, the mode will change by operator. Because the cores are not loading into the furnace. So the operator will change into Manual mode. In the Manual mode, Nitrogen flow is reduced. Similarly, at the starting of the next shift, the operator changed into Auto mode. But the drawback is, if operator does not change the mode at particular time. So Nitrogen flow is wasted. Our scope is to reduce the usage of Nitrogen flow by using GSM Modem. The output signal from the Auto or Manual mode Switch connected with Micro controller Board. The output from this board is connected with GSM modem input. So, the changed mode is detected and it gives alarm and message output to the operator and top level group.

*Index Terms- BRAZING, FURNACE, NITROGEN, GSM FLOW ALERT, MICRO CONTROLLER*

## 1. BRAZING PROCESS:

In a special type of NOCOLOK Furnace brazing process can be carried out for fabricating purposes. Brazing is a process for joining similar or dissimilar metals using a filler metal. Brazing covers a temperature range of 900ºF - 2200ºF (470ºC - 1190ºC). Brazing differs from welding in that brazing does not melt the base metals; therefore brazing temperatures are lower than the melting points of the base metals.

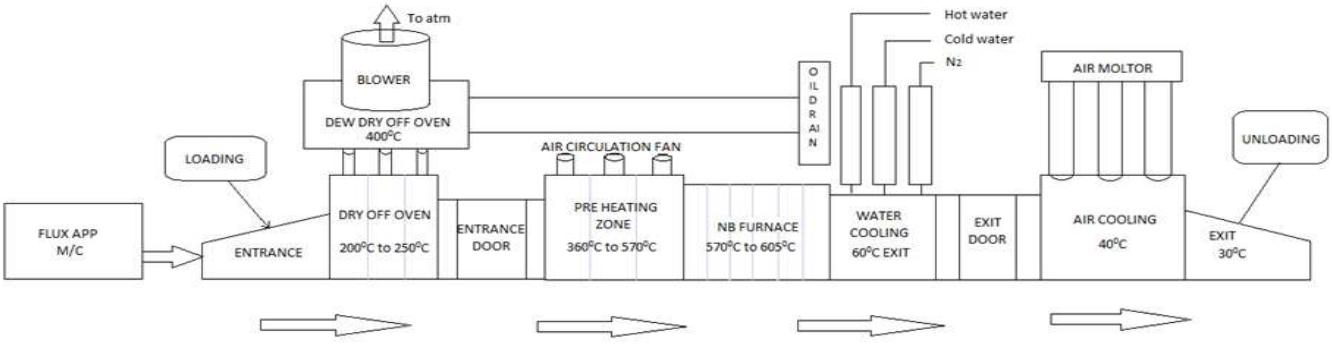


**Fig.1 NOCOLOK Brazing Furnace layout**

**2. BLOCK DIAGRAM OF FLOW ALERT SYSTEM:**

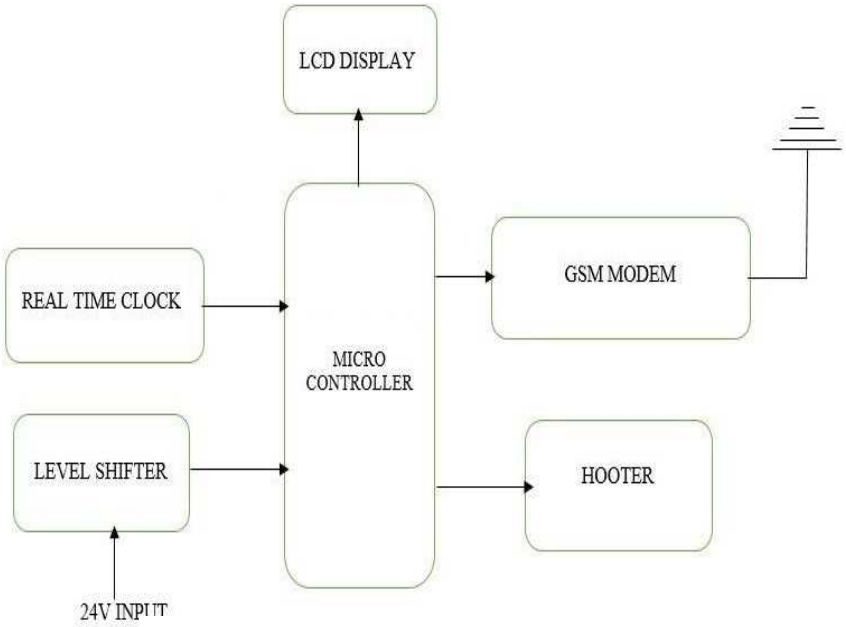


**Fig.2. Block diagram of flow alert**

**3. ASSEMBLED DIAGRAM OF MICRO CONTROLLER WITH GSM**

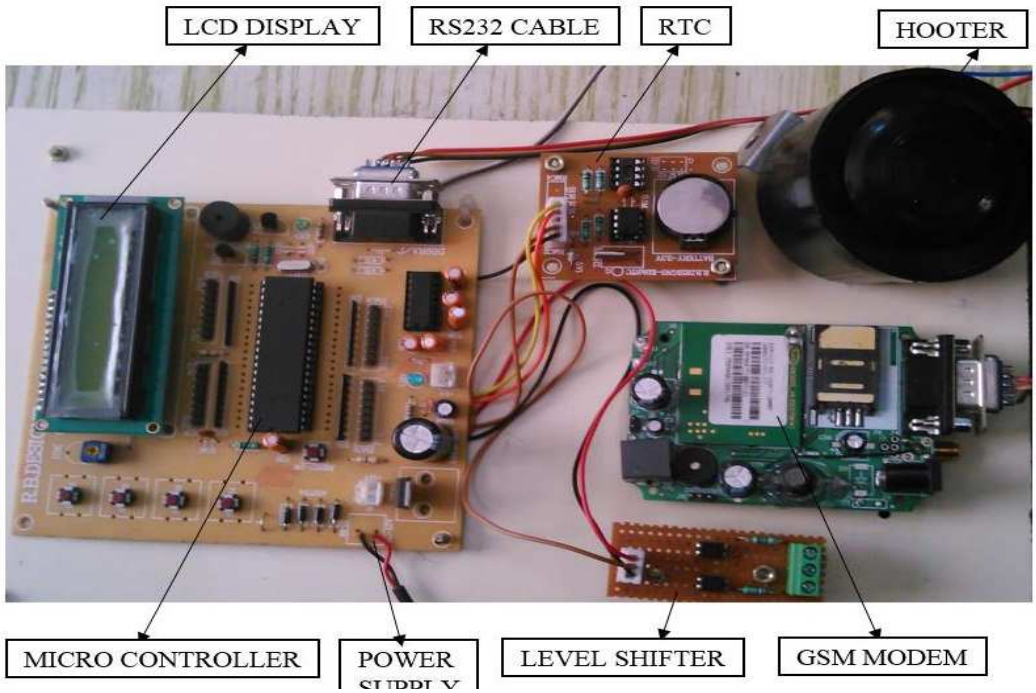


**Fig.3. Assembled diagram of Micro controller with GSM**

## 4. FLOW ALERT SYSTEM - METHOD DESCRIPTION:

In a NOCOLOK BRAZING furnace Nitrogen is passed through the different zones. Usage of Nitrogen is to reduce the amount of the Oxygen level. This Nitrogen is injected in five different pipes. Each pipe has one gate valve and one solenoid system for flowing. Generally, Furnace has two modes. One is Manual mode and second is Auto mode. If auto mode is on, the flow is passed in both Solenoid system and gate valve. If Manual mode is on, the flow is passed in the Gate Valve only.

At the end of the first shift, the operator will change the mode into Manual. Because the cores are not loaded into the furnace. In this mode, flow of Nitrogen is partially reduced. Similarly, at the starting of the next shift, the operator changed into Auto mode. But the drawback is, if operator does not change the mode at particular time. So Nitrogen flow is wasted. So we change the system initially, output from the Manual or Auto mode in the furnace, is connected into level shifter.

Level shifter is used for prevent high voltage from affecting the system receiving the signal. Then the output signal is connected with Micro Controller. The Micro Controller is connected with LCD, GSM Modem and Hooter. If the operator changes the mode, output from the mode is sending to the Micro Controller. Then GSM modem gives the SMS based alert to the operator and the top level group.

## 5. PROCUCTIVITY IMPROVEMENT:

| S.NO. | DESCRIPTION | BEFORE | AFTER |
|---|---|---|---|
| 1. | PEOPLE | Operator cannot change the mode at correct time. | This system alerts the operator to change the mode at correct time. |
| 2. | MAN POWER | Additional operators required. | Addition-al operators are not required. |
| 3. | QUALITY | Mode is not changed at a correct time. The quality of product is poor. | Here, the mode is changed at correct time. So, the quality of product is good. |
| 4. | PRODUCT | More no. of rejected parts. | Less no. of rejected parts. |
| 5. | COST | Usage of Nitrogen is high. So total cost high. | Usage of Nitrogen is reduced. So total cost is reduced. |

## 6. COST REDUCTION:

- In Auto mode Nitrogen flow is = $120m^3$/hr = $2m^3$/min
- In Manual mode Nitrogen flow is = $80m^3$/hr = $1.33m^3$/min
- Therefore, we reduce the Nitrogen flow is $0.67m^3$/min

1 kg of Nitrogen = Rs. 8.63

0.67 of Nitrogen = Rs. 5.782 (per min)
If we change the mode on after 5 min = Rs. 28.9
If we change the mode on after 1 hour = Rs. 346
If we change the mode on after (every day1 hour delay)1 month = **Rs.10407.93**

## 7. CONCLUSION:

- With the proper usage of this GSM based flow alert system, alerts and messages to the operator to change the mode in correct time can be sent.
- Due to change of mode in correct time, Flow of nitrogen usage can be reduced. So cost of brazing can be reduced.
- So productions cost can be reduced significantly.
- So the quality of the product is improved.
- Improved safety and smooth operation of process and provide proper working environment.
- Our total cost of the components is Rs.7149. Reduced Nitrogen cost for one month (every day 1hour delay) is Rs.10407.93. So we get back the amount within one month. So this economical.

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