

# PLC Based Fly Ash Evacuation System in Thermal Power Plant

Umesh S. Deo<sup>#1</sup>

<sup>#</sup>Asst. Engineer, C&I 2X500 MW, BTPS, MSPGCL

<sup>1</sup>umeshdeo@gmail.com

**Abstract**— PLC Based Fly ash evacuation system which include vacuum conveying and transport system. Where the dry fly ash from hoppers will be evacuated and stored in a buffer hopper. Below buffer hopper air lock vessels are installed from which the ash will be transported by Transport air upto Silo. From this silo the ash is transported to cement industries.

**Keywords**—PLC based Fly ash evacuation & Transportation

A. Fly ash vacuum extraction and pressure conveying.

## I. Vacuum conveying system (Fig 1)

In this system the fly ash from hopper is extracted by means of a vacuum pump and this ash is collected at Buffer hopper. There are 4 branches; each branch is having 9 no's of hoppers in a line and a common header valve. To open the particular ash intake valve of hopper the common header valve must be open also at a time only one ash intake valve will open. The setup vacuum is taken by opening the header valve and closing the all 9 no's of ash intake valve and vacuum breaker which is installed on buffer hopper. After setting the required vacuum then one by one ash intake valve will open as ash started to come in branch the vacuum will increase which indicates that fly ash is being extracted. But in case of vacuum goes above limit then corresponding vacuum breaker valve will open and the vacuum will drop to its initial set value.

Ash level sensor are installed in each hopper to indicate the level of hopper such as Low & High level which is useful to empty the hopper which shows high level indication. PLC logic is developed to evacuate the ash in auto mode also, where after starting the system in auto corresponding header valve will open after getting open feedback to plc corresponding ash intake valve will open. This valve gets open until vacuum comes down to low set point after vacuum comes to low set point delay is given to ensure hopper is empty the plc will give open command to next hopper automatically. This system also can be operated manually by opening the required valve in case specific hopper is getting full each time.

1) *Pressure conveying system (Fig 2)*: Two no's of air lock vessel are connected to each buffer hopper. Both air lock vessel cycle operated in auto mode one filling and other conveying. Four no's of valve are equipped with one air lock vessel which are called as 'inlet', 'Discharge', 'Fluidizing', 'vent'. PLC logic is developed to operate the air lock vessel cycle in auto mode with timer which is user-editable. Transport air compressor must be on to start the cycle of air lock vessel.

Once get the start permissive the cycle will be started and initially vent valve will open for certain time for air venting from vessel after sometime ash inlet valve will open and ash is collected from buffer hopper into air lock vessel after time elapsed both valve will close and Fluidizing valve and discharge valve will open the purpose of a fluidizing valve is to spread and lift the ash which is transported up to SILO from where the dry ash is given by truck to cement industries. Different timers are used in logic such as

- Venting time (Vent valve will open for particular time)
- Ash inlet valve open time (Ash inlet valve will open for particular time)
- Fluidizing time (Fluidizing valve will open for particular time)
- Discharge time (Discharge valve will open for particular time)

B. vacuum & pressure Conveying

Vacuum Extraction System

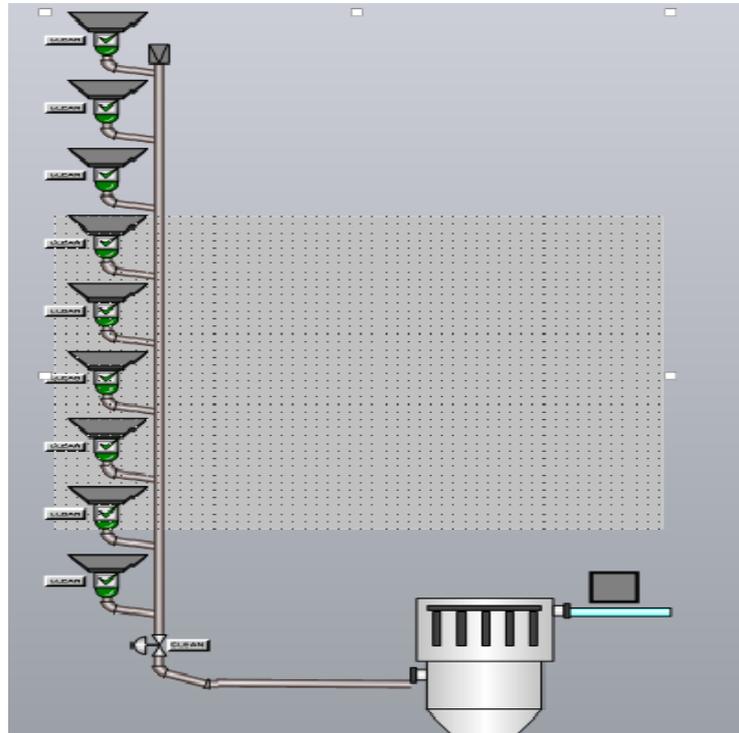


Fig. 1 vacuum Extraction system

Pressure conveying system

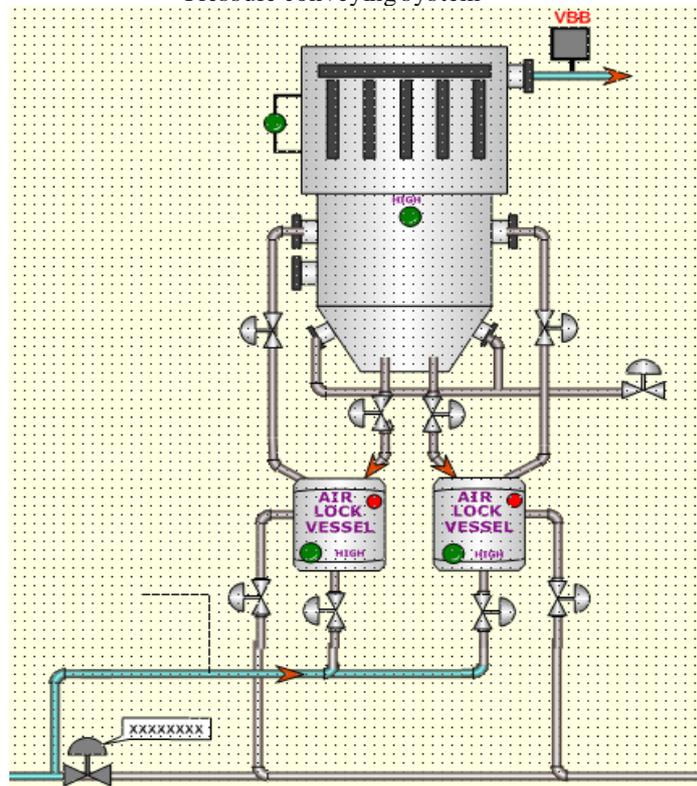
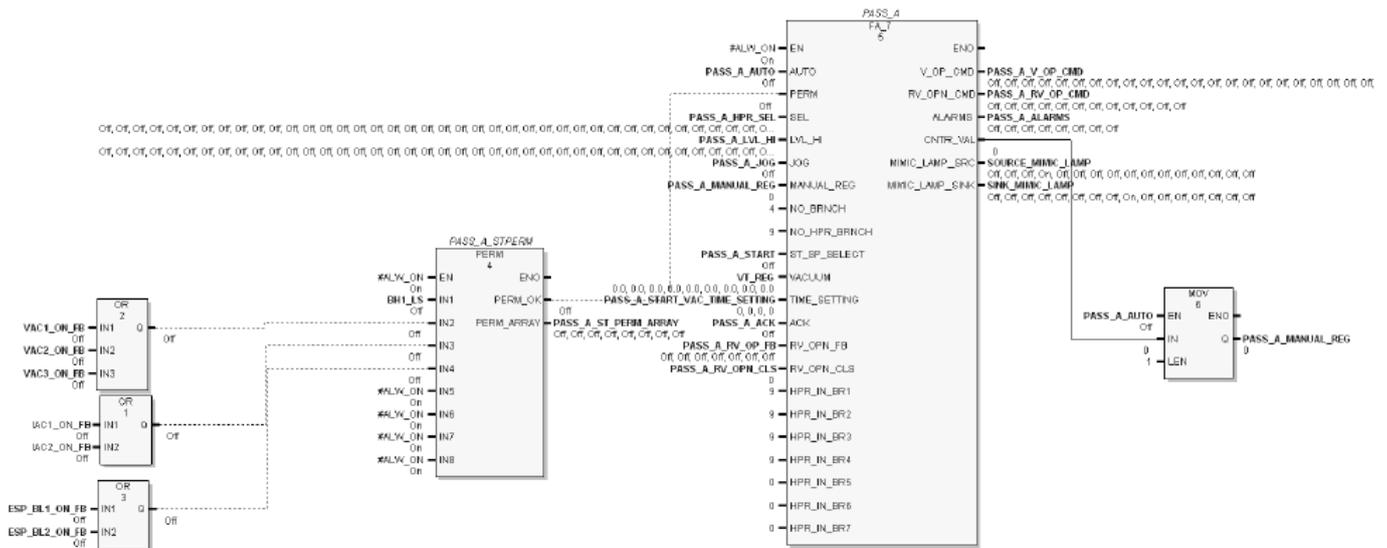


Fig. 2 Pressure Conveying System.



Basic logic for Ash intake valve opening & header valve opening for vacuum conveying is shown above.

### I. CONCLUSIONS

In this way the fly ash generated in the boiler after burning the coal this fly ash is evacuated in as systematic manner by using PLC based automation with minimum manpower required. Also the fly ash is useful for cement industries for making the ash bricks. The fly ash may be mixed with water and will form the slurry, this slurry is also conveyed with the help of heavy duty pumps.

### REFERENCES

- [1] Maharashtra State Power Gen. Co. Ltd.
- [2] Techpro ash take limited. 129A, S.P. Mukherjee road, 5<sup>th</sup> floor, Kolkata-700 026
- [3] TATA Projects Ltd, Hyderabad.
- [4] Development consultants pvt.ltd, Mumbai.