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Report On
Project NC/IND/99/966
Improving Energy Efficiency in the Glass Industry through
Process Control Software
Contract No. 2000/268

TERMS OF REFERENCE

Introduction & Background

Firozabad located 45 km east of Agra in India is labeled as the Glass City of India for holding as many as 300 small scale Glass Units in its fold. Together it accounts for 70% of the glass produced in the small-scale sector in India, generating employment for more than 150000 people.

The making of Glass in the City dates back to almost 300 years. While many developments took place in the process of evaluation of a cluster of small-scale glass industries in the region, the technological developments did not keep pace with the rest of the world. The furnaces have been operating at a very low thermal efficiency. Until 1997 coal was the main fuel for Firozabad industry, which make control of combustion difficult. However, with the availability of Natural gas from the year 1998, the furnaces can now be precisely controlled on the desired parameters leading ultimately to the conservation of energy.

Energy Management Centre, Kerala have been awarded a UNIDO Contract No. 2000/268 to Design and Install process control devices to improve energy efficiency in Firozabad Glass Industry, as part of UNIDO Project NC/IND/99/966 on Integrated Energy and Environment Programme for the Glass Industry. However, to assist EMC in their task, there has to be a knowledgeable agency that not only understands the furnace design and operation, but also the glass melting technology.

Scope Of Technical Assistance:

1. Identification of two glass units in Firozabad, one with tank furnace while other with Pot furnace which are not only willing to install the control system but have the necessary infrastructure to support the system.
2. Energy audit of the units by measurement of data like temperature, flue-gas analysis, fuel consumption prior to installation of system.
3. Analysis of data and identify control parameters and range.
4. Assisting contractor personnel in the setting up of data logging device.

5. Assisting contractor personnel in the interpretation of data and defining of the parameters for the control device.
6. Assist contractor personnel in the installation of control device and training of workmen in industry.
7. Assist in the modification of system until it is accepted by industry personnel.
8. To assist in organizing meetings with concerned agencies like EMC, CMS, PCRA & industry personnel and also to co-ordinate the plan of action.
9. Organize workshop with other industry owners to demonstrate the system and explain its advantage in furnace control and fuel savings.
10. Provide conveyance and other office related support to EMC team to carry out their work smoothly.
11. To perform any other activity considered necessary in the interest of the project.

DETAILS OF WORK DONE

Point-wise detailed description of Technical Assistance provided by CDGI to EMC as per Terms of Reference is given here under:

1. Identification of two Glass units in Firozabad, one with tank furnace while other with Pot Furnace which are not only willing to install the control system but have the necessary infrastructure to support the system.

Status: Two Glass units in Firozabad viz. M/s Tiger Sons Pvt. Ltd. With Tank Furnace and M/s Deluxe Glass Industries with Pot Furnace were identified for the purpose.

2. Energy Audit of the two units by measurement of data likes temperature, flue-gas analysis, fuel consumption prior to installation of system.

Status: Data like temperature, flue-gas analysis, fuel consumption prior to installation of the system was measured to the possible extent and Energy Audit of the two units were conducted.

3. Analysis of data to identify control parameters and range.

Status: Data were analyzed and the control parameter and range for both the units were identified.

4. Assisting contractor personnel in setting up of data logging device.

Status: All assistance was provided to the contractor personnel and data logging device in both the units were set up successfully.

5. Assisting contractor personnel in the interpretation of data and defining of parameters for the control device.

Status: Contractor personnel were assisted in the interpretation of data and defining of parameters for the control device.

6. Assist contractor personnel in the installation of control device and training of workmen in the industry.

Status: Contractor personnel were assisted in installation of control device in both the units. However training of workmen in the industry could be completed only in M/s Deluxe Glass Industries. Training of workmen in M/s Tiger Sons Pvt. Ltd. could not be completed due to delay in commission of the system. The training of workmen in the later will be completed immediately after the system is commissioned.

7. Assist in the modification of system until it is accepted by industry personnel.

Status: Modification of the system is under process for easier acceptance by the industry personnel. Furthermore, it is an ongoing activity.

8. To assist in organizing meeting with the concerned agencies like EMC, CMS, PCRA & industry personnel and also to co-ordinate the plan of action.

Status: Total five meetings were organized on different occasions.

9. Organize workshops with the other industry owners to demonstrate the system and explain its advantage in furnace control and fuel saving.

Status: A workshop was organized on 12 July 2001 and the system in Deluxe Glass Industries was demonstrated to over 20 industry personnel and its advantages in furnace control and fuel saving was explained to the participants. After commissioning of the system in Tiger Sons another workshop will be organized.

10. Provide conveyance and other office related support to EMC team to carry out their work smoothly.

Status: All necessary assistance and support was provided to the EMC team and the work was carried out smoothly.

11. To perform any other activity considered necessary in the interest of the project.


Status: All such activities were performed as and when required.

SUMMARY & RECOMMENDATIONS

The above project was awarded mainly to Energy Management Centre, Trivendrum and partly to Centre for the Development of Glass Industry, Firozabad for providing Technical Assistance to EMC, Under the "Integrated Energy & Environment Program for Glass Industry of UNIDO. Glass industry in Firozabad running at very low overall energy efficiency contributes substantially to environmental pollution. Reason for lower energy efficiency is old technology and manual control of furnace operation. Lack of instrumentation results in substantial loss of production, especially in case of pot furnaces. For identification of controlling parameter first energy audit of the furnaces were conducted and it was identified that overwhelming of permissible temperature range is the major reason for lowering of productivity and so energy efficiency of the furnace. Accordingly under the above project attempts were made to design an instrument capable of recording the furnace temperature and giving alarm, visual as well as acoustic, in case the temperature crosses the preset temperature limits either lower or upper.

The developed instrument named as **Temperature Monitoring and Alarm System (TMAS)** has a number of facilities to help the workmen in controlling the furnace properly as well as to help the owner in detecting lapses in furnace control committed by the operator. One such system has been installed in M/s Deluxe Glass Industries having Open Pot Furnace and the other in M/s Tiger Sons Pvt. Ltd. having Tank Furnace. The system is suitable for entire range of working temperature and has proved very helpful in checking pot failure by helping the operator to revert the furnace temperature to the permissible limit immediately. And this is supposed to cover one of the major reasons of lower productivity and energy efficiency. The system has been highly appreciated by industry personnel. Although the system does not appear to reduce the fuel consumption very much directly but when saving due check on pot failure and others converted to fuel saving its contribution is definitely appreciable.

The system will prove even more beneficial in case of Closed Pot furnaces where the service conditions are more serious and the frequency of pot failure is higher. Its utility in case of tank furnaces, where working cycle is different, are to be established but encouraging results are expected. Presently the initial cost of the system is being felt on higher side and further efforts are required to modify the system to lower its initial cost for easier acceptance of industry.


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