

Successful Implementation – Energy Conservation Measure

Measure
Replacement of indirect heating ovens by direct heating ovens
Equipment
Ovens
Industry / Sector
Automobile
Year of Implementation
1997
Cost Benefit Analysis
o Type of Measure: Marginal investment
o Annual Energy Savings: 68 Mt, of LPG
o Actual cost savings: Rs. 9 lakh
o Actual investment : Rs. 6.0 lakh
o Payback: 8 months
Implementation Highlights
<p>Implementation of the measure has resulted in</p> <ul style="list-style-type: none"> ☞ Annual energy savings of 68 Mt, of LPG ☞ The measure has resulted in energy savings of 20% in heating ovens ☞ Reduction in cold start time ☞ Fast response in oven temperature ☞ Increased awareness among the plant operating personnel about combustion and its principles ☞ Reduction in heating time during cold start ☞ Reduction in bandwidth of oven operating temperature ☞ This measure can be implemented in all types of indirect firing ovens in all type of automobile units ☞ Most ovens in the automobile sector are of indirect type ovens. A possibility exists that all indirect type can be converted with slight modifications ☞ The technology of conversion is domestically available

Summary

Conversion of indirect heating to direct firing ovens resulted in LPG savings and reduction in cold start time of the oven

Background

A leading automobile unit, engaged in producing the two wheelers, had Three indirect heating paint baking ovens, which use LPG for heating.

In indirect heating ovens the re-circulating air is heated by passing over the coils of LPG combustion gases. LPG is burned in a combustion chamber and the combustion gases are passed in tubes while the air is passed over these tubes. The flue gases are then exhausted.

The heat in flue gases can be recovered by converting the existing indirect ovens to direct ovens, in which the hot gases mix with re-circulation air. The hot air is re-circulated through ovens where the painted components are baked at required temperature.

These three ovens consumed about four Mt of LPG per day. The burners combustion efficiency was evaluated after the measuring the flue gas composition for CO₂ and flue gas temperature. The combustion efficiency varied in the range 75-78%

Since LPG is a clean fuel and all latest paint baking ovens are direct fired ovens, in which the LPG is burned in the re-circulation air the burners are converted to direct heating burners by removing the flue gas tubes.

Principle

- ☞ In case of indirect heating the combustion gases which have 20-25% of the total heat content is exhausted to atmosphere
- ☞ The heat in flue gases can be recovered by converting the existing indirect ovens to direct ovens, in which the hot gases mix with re-circulation air.

Details of techno-economics:

Particulars	Actual energy savings
Annual Total energy savings, Mt. of LPG	100
Annual Cost savings, Rs. lakh	12.5
Cost of Implementation, Rs. lakh	8.0
Simple payback period, Year	8 months

**Implementa
tion issues**

However by being apprehensive of quality rejection, energy conservation cell has not taken up this measure. While verifying at site, it is found that all the quality parameters were closely observed over a period of time in association with production group.

After observing the quality parameters the operators and process people were satisfied with the results and energy savings.