OXY-COMBUSTION IN FURNACES

Intervening Technique	Optimisation of Gas Consumption through Oxygen Enhanced Combustion in Furnaces
Description	Glass manufacturing is a very energy intensive industrial process. Glass is produced by heating the raw materials like silica (Silicon dioxide), sand (Quartz), iron oxide, and other Materials to about 1500 to 2000 ^{0}C. Glass manufacturers who need to increase pull rate (pull rate is the velocity of the glass sheet) and improve quality, consistency, and thermal efficiency while decreasing NOx emissions can use Oxy-Fuel technology. Oxy-Fuel technology has proved to be one of the most energy efficient combustion processes for glass melting furnaces. Ideal burners for any furnace would have the following characteristics: • Flexibility with respect to flame length and heat transfer. • Continuity of operations, which can be adjusted during use. • Multiple fuel usage. • Robust and compact design. The Oxy-Fuel burners have most of the above characteristics. It has been observed by a major company in combustion technology that in Oxy-Fuel combustion the volume of the flue gases is approximately 20% of that in the Air-Fuel combustion resulting in a reduction of the amount of heat lost through flue gases. They have developed their own-patented burners and found it to be one

of the most efficient ways of reducing NOxs, achieve maximum efficiency, and reduce particulate emissions from glass furnaces. Additional advantages of Oxy-Fuel Combustion in the glass industry are:

- Better glass quality.
- Very low NOx and particulate emissions.
- No air preheating necessary.
- Suitability at higher pull rate.
- Better sequencing of the furnace.

Thus with oxygen enrichment, more heat is transferred to the product, less heat is lost in the exiting combustion gases, and the combustion process becomes more efficient. With proper furnace design and burner selection, reduction of NOx by 50-70%, as compared to regenerator furnace is achievable. In addition, reduction of batch carry over is possible.

Depending on the furnace operation and the efficiency of the operation, fuel savings can range from slightly over 50% to only 10%, so all the variables need to be reviewed prior to deciding if oxy combustion is a viable option. It is possible to convert specific zones of existing furnaces to oxy-fuel, or to add oxy-boosting burners as required at strategic locations in addition to air-fired burners.

The conversion from an air-fuel combustions system to an oxy-

fuel system will require a complete burner replacement. “Oxy-fuel burners are of a different design than air-fuel burners; it is not possible to simply insert an oxy-fuel element into an air-fuel burner.

Oxy-fuel combustion is not the answer to all applications, so it is very important to determine if it is a viable alternative. That said, in some processes that cycle, where loads are taken from cold to hot and melted, going from air combustion to oxy combustion not only reduces fuel use but can reduce cycle and heat-up time. This is where the operator can see significant cost reductions. Add to this the potential for reduction in total NOx emissions and the ability to reduce the plant’s carbon footprint by reduction in fuel use, and the benefits of oxy-fuel can be important. Before replacing or adding air-fuel combustion systems, it can be valuable to take a look at the oxy-fuel option.

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Savings after Oxy - Combustion in Furnace:-

Industry	Investment in Rs.	Annual Saving per Annum in Rs.	Saving of Natural Gas & Oil	Payback in Months	Reduction in GHG
Container Glass	2,50,00,000 (for 2 Furnace)	1,29,50,000	718063 SCM	24	1344.93 MT of CO2
Figure Glass	2,20,00,000 (for 2 Furnace)	86,17,695	574513 SCM	30	1076 MT of CO2
Figure Glass	1,20,00,000	81,98,000	430191 SCM & 79360 Litre	18	890 MT of CO2