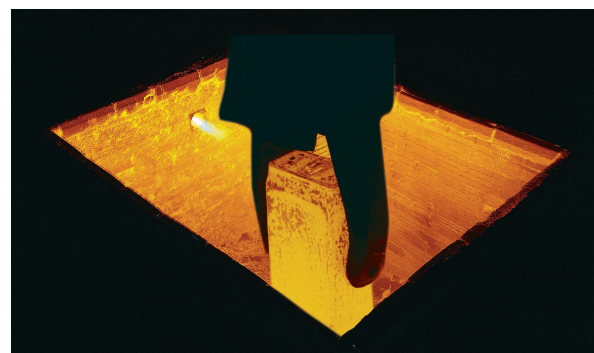


Reference Installation Summary

Oxy-fuel combustion in a pit furnace

Installation Date	1998
Equipment	2 gas-cooled oxy-fuel burners Flow trains and control system
Fuel	Natural gas
Customer	Reiner Brach GmbH & Co. KG



Background

Reiner Brach GmbH is an independent steel company based in Bremen. They produce material for rolled steel finished products such as ingots, forging semis, slabs etc. from structural and high alloy steels. They also produce flat steel rolled products from 30-800mm thickness and up to 2,500mm wide. In 1998 the company decided to convert one of its pit furnaces to oxy-fuel combustion with a view to achieving the objectives listed below.

Customer Objectives

- ▶ More flexible control of the burner power and also the temperature.
- ▶ To reduce the costs associated with maintenance and down-time.
- ▶ Improved quality particularly with regard to reduced scale formation.
- ▶ To reduce exhaust gas emissions.
- ▶ To reduce specific fuel consumption.

Oxy-fuel – Leading Edge Technology

Linde has pioneered the development of the use of oxy-fuel combustion for heating furnace applications. With over 50 installations world-wide they were a natural choice for a partner when Rainer Brach decided to carry out this project, The Institute for Energy and Process Technology in Bremen was also invited to take part in order to make a comprehensive study of the results of the conversion.

Using oxy-fuel combustion substantially increases the thermal efficiency of a furnace. The main reasons for this are that the radiant heat transfer properties of the furnace gases produced by oxy-fuel combustion are significantly better than those of air-fuel. Also, due to the absence of nitrogen in the combustion mixture, the volume of exhaust gases is reduced substantially, thus the total heat losses via the exhaust gases are also as a result substantially reduced. As a result of the improved thermal efficiency, the heating rate and therefore productivity are increased and less fuel is required to heat the product to a given temperature, i.e. specific fuel consumption is reduced. This helps to make a valuable contribution to reducing the overall environmental impact of the company's operations on the local environment.

Oxy-fuel combustion systems offer several ways in which improvements in quality can be achieved. By using specially designed high velocity burners it is possible to achieve a more uniform temperature distribution within the furnace which can lead to valuable improvements in quality. In addition, the use of oxy-fuel combustion can shorten the heating time thus helping to minimize the formation of scale and therefore improving quality. Oxy-fuel burners are much smaller and generally less complicated than air-fuel burners which have a form of heat recovery system. Breakdown times and maintenance costs can therefore be reduced considerably.

The Equipment Installation

The equipment installed was as follows:

- ▶ 2 x 1.3 MW Linde designed gas-cooled oxy-fuel burners with pilot ignition and flame-watch facility.
- ▶ Separate flow trains for both oxygen and natural gas to the main burners and pilot burners.
- ▶ A complete control system allowing individual control of each burner.

Results

The following performance results were achieved as a result of the conversion to oxy-fuel combustion.

- ▶ More accurate temperature control and improved temperature uniformity.
- ▶ Energy consumption reduction of between 25-40% was achieved.
- ▶ Significant reductions in maintenance and plant operating costs.
- ▶ Substantial reduction in NOx emissions.
- ▶ Overall flue gas volumes have been reduced by 75% when compared with a comparable furnace that is heated using an air-fuel combustion system.

Customer Benefits

Several key benefits have been achieved as a result of the use of oxy-fuel combustion technology in this furnace.

- ▶ Improved product quality has been achieved as a result of more accurate temperature control and better overall temperature uniformity.
- ▶ Lower operating costs as a result of lower specific fuel consumption, increased productivity and reduced maintenance costs.
- ▶ More accurate temperature control of the plate material.
- ▶ Improved environmental performance as a result of reduced overall volumes of emissions and, in particular, reduced NOx and SOx.

Other leaflets about our complete range of applications and products are available in all sales offices.

Our experts are available for consultation.