Steelmaking Linz-Donawitz Converter Gas Recovery and Reutilization Technique at CSN Brazil
Jessica A. Herrera, Ricardo Hyslop and Ana Villegas
The University of Texas at El Paso & Companhia Siderúrgica Nacional

**BACKGROUND**

One of the biggest problems faced by steel companies worldwide, is the recovery of energy during the different processes that are carried out in the production of steel. The development of new technologies for steel making has allowed the recovery and reuse of energy generated during the basic oxygen furnace converter process process. The implementation of these technologies at CSN Brazil will be of great benefit for the companies energy efficiency as a whole.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Oxygen %</th>
<th>Carbon Monoxide %</th>
<th>CO2 %</th>
<th>CH4 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 1</td>
<td>1.2</td>
<td>3.4</td>
<td>8.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Sample 2</td>
<td>1.5</td>
<td>3.2</td>
<td>7.8</td>
<td>0.5</td>
</tr>
<tr>
<td>Sample 3</td>
<td>1.8</td>
<td>3.0</td>
<td>7.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Sample 4</td>
<td>2.0</td>
<td>2.8</td>
<td>7.2</td>
<td>0.9</td>
</tr>
</tbody>
</table>

**METHODOLOGY**

The OG-Boiler system is based on Japanese technology, which has had great acceptance within the steel industry. With 192 OG System implemented in the world, these systems is the most popular BOF Gas recovery device in the world. Current patent for the OG-Boiler system is held by its two Japanese developers, Nippon Steel & Sumimoto Metal Japan and JP Steel Plantech Co.
The OG-Boiler System is divided into two main parts; the OG System and the Steam Boiler Addition. The OG System itself is constituted by 5 main parts; the PO Control, Hood Dolly, Dust Collector, 3-way Valve and Flare stack. The Steam Boiler Addition has three main parts the Deaerator, Steam Boiler and Accumulators.

**PROBLEM DESCRIPTION**

The Companhia Siderúrgica Nacional located in Brazil, requires the implementation of a system that allows them to efficiently recover the maximum amount of discharge gases from the BOF converter. These gases have a high content of CO carbon monoxide that can be used as fuel, becoming an alternative energy source within the process.
The main objective of this project is to propose a system aimed at the capture of LD gas that is wasted during the process carried out in the BOF converter, to be reused as a source of energy in the coke oven batteries.

**INSTRUCTORS**

Faculty: Rafael Gutierrez, PhD, UTEP
Teacher Assistant: Carlos A. Garcia Gonzalez, PhD Student, UTEP

**EXPECTATIONS OF IMPLEMENTATION**

Using the calculator developed during the project the and the current state of the BOF gas produce in CSN the amount of recovered gas per year will be between 315 and 405 million tons of steel per year.

The following graph shows the approximate expected gas recovery from OG system using the historical production data of the last thirteen years at CSN.

**CONCLUSION**

After the analysis of different options for LD gas recovery and reuse it was concluded that the OG system with the steam boiler addition will be the best option for CSN Brazil given that the OG system is a well recognized system around the world with more than 190 systems already implemented. Its high efficiency of recovery will be of great use at CSN since it will increase the amount of high quality gas available for reuse.

**TEAM**

Students: Ana Villegas, Ricardo Hyslop and Jessica Herrera