Michael Greenman, Contributing Editor

Advanced Oxy-Fuel-Fired Front-End System

The glass industry is widely recognized as one of the most energy-intensive manufacturing industries in the United States. Natural gas, which accounts for ~80% of the energy used, is one of the largest costs in the manufacture of glass products.

The implementation of oxy-fuel-fired furnaces and a host of new generation burners have yielded much improved furnace energy efficiency and productivity. However, with the improved efficiency at the back end of the furnace, the front end now, in many cases, uses the most energy.

Few innovations have changed front-end technology in the last 50 years. To address this, three glass companies and two leading suppliers have formed a consortium to develop and demonstrate a new technology for the front end of the furnace in multiple glass industry sectors.

Oxy-gas-fired front-end technology promises to significantly reduce natural gas consumption, lowering front-end energy usage by up to 70%. This technology will work with current production technology or can be systematically integrated into the development of advanced melting systems.

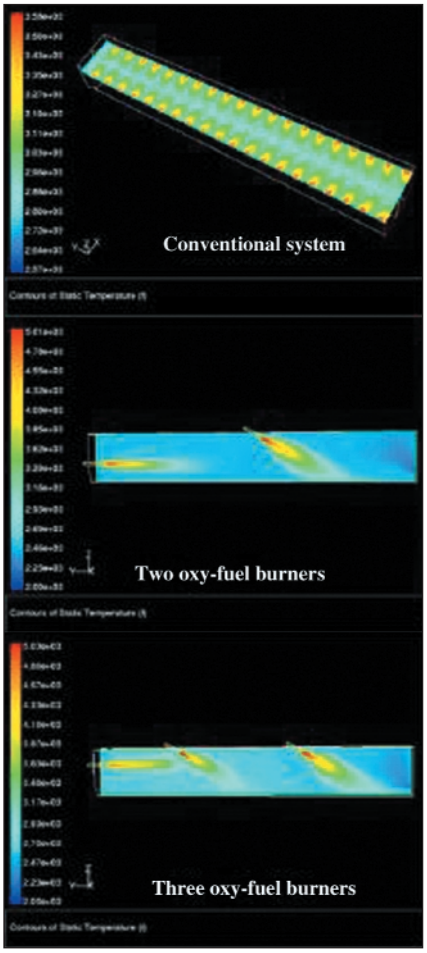
Project

Funded under DOE's Industrial Technology Program, a project for the Development/Demonstration of an Advanced Oxy-Fuel-Fired Front-End System will develop an oxygen combustion front-end technology that delivers high energy efficiency, improved glass quality and robust environmental performance.

The two-year project intends to:

- Develop burner systems that can be integrated into an operating front-end system;
- Develop and test a firing system that will reliably meet the needs for front-end system operations with minimum capital costs;
- Field test the firing system(s) to obtain information on controllability, durability and other criteria;
- Demonstrate the technology on a production front-end system with >20 firing zones to prove the various benefits;
- Spread the technology to other sectors of the glass industry.

The project started in September 2003. In the first phase (year 1), project partners will design and model an oxy-fuel front-end burner system, develop an oxy-fuel combustion system for integration into the front end, perform computer modeling on integration, and conduct multiburner tests on a laboratory forehearth system.



Comparison of conventional technology vs. oxy-fuel-fired front-end system.

In the second phase (years 1 and 2), the partners will conduct field tests of single- and multiburner operations, then conduct a field evaluation of a production forehearth/channel.

In the final phase (year 2), the partners will design, engineer and integrate a system for field demonstration; model performance and glass quality; prepare a demonstration site; install the system on a fiberglass front end; and demonstrate the technology.

Multiple sectors of the glass industry would benefit from new front-end technology, in particular, fiber, lighting, television and container glass. The potential benefits include:

- Up to 70% reduction in front-end energy usage;
- Up to 90% reduction in NO_X emissions;
- Up to 70% reduction in CO_2 emissions.

At the completion of the project, the partners intend to continue research to adapt the technology for use in as much of the glass industry as possible. Limited modifications and field trials will prove the technology's production worthiness for each candidate sector.

Editor's note: Details of this project were extracted from the DOE Fact Sheet.

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