



PYREJET™
*Four steelmaking functions.
One tool.*

Use it for:

*Oxy-fuel combustion
Melt decarburization
Carbon injection
Post-combustion*

*Innovation. Experience.
Air Liquide America with
American Combustion technology.*



AIR LIQUIDE™



Air Liquide America, through its American Combustion division, now offers the PYREJET: a single, wall-mounted, multi-function tool for the EAF. The PYREJET is a patented innovative solution for maximizing EAF energy efficiency and steel output.

Features

PYREJET is comprised of water-cooled, copper burner tiles containing a deep combustion chamber for flame formation and shape control that is attached to the PYREJET body. The combustion chamber protects the nozzle from plugging and splashing slag and steel through the use of pilot flames.

The body can be easily disconnected from the combustor and removed without disconnecting the utilities lines to the PYREJET.

The PYREJET provides a supersonic oxygen stream – typically Mach 2 to Mach 2.5 velocity – capable of melting and refining up to 2 meters away.

Each oxygen flow, peripheral for the burner function and central for the lancing function are independently controlled with high, turn-down ratios. The optimal management of the two oxygen streams allows both maximized system performance and reliability and minimized utility consumption.

The combustor is equipped with a replaceable carbon injection pipe located near the PYREJET centerline to allow for carbon to be entrained and driven into the slag by the highly aspirating oxygen stream.

The robust design of the PYREJET and its copper panel reduces associated maintenance and minimizes refractory wear.

Benefits

- Increased productivity
- Reduced operating costs
- Improved operational consistency
- Elimination of movable lances
- Enhanced safety & energy efficiency with closed slag door operation
- Reduced operator work load via preprogrammed profile
- Maximized active power input
- Improved melt carbon control
- Reduced CO and NOx emissions

PYREJET™
assembly



Minimum piping and space requirements allows for ease of maintenance.

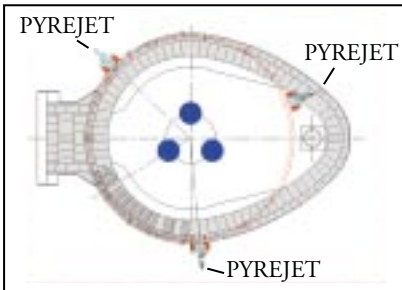


PYREJET™ nozzles are compact and easily retrofitted into existing panels.

Customized Solutions

The most advanced combustion/injection technology takes EAF operation to the next level. PYREJET incorporates an oxy-fuel burner, and oxygen lance and carbon injection functions in one process-control tool. ALARC™ PC can be integrated as an option for optimized post-combustion in the EAF. The complete system can be tailored for each individual operation to optimize energy cost and maximize the output.

Initially the PYREJET operates as an oxy-fuel burner for scrap heating and cutting. Subsequently, it operates as a supersonic oxygen lance and carbon injector. Multiple injection points of precisely controlled carbon flow improve foamy slag, allow maximized metallic yield and provide for superior melt-in, carbon control, including recarburization.



Each **PYREJET™** system is custom engineered based on furnace geometry and exhaust flow patterns.

The efficiency of chemical energy is maximized by the uniform delivery around the EAF shell via PYREJET. A typical installation will include two or three multi-function PYREJETs, located in the “cold spots” of the EAF.

	Reference	3-PYREJET
Power on Time, mn	50	44
Electrical Consumption, kWh/t	378	330
Natural Gas Consumption, Nm ³ /t	0	8.0
Oxygen Consumption, Nm ³ /t	45	57
Carbon Injection, kg/t	8.5	6
Yield, %	90.5	91.5
Electrode Consumption, kg/t	2.3	1.9
Refractory Consumption, kg/t	6.8	4.3

Results

- Up to 60 kWh/t reduction of electrical consumption, leading to electrical energy input as low as 340 kWh/t
- Up to 20% reduction in electrode consumption
- Up to 12% reduction in power on time
- Over 1% increase in metallic yield
- Over 30% decrease in refractory consumption

U.S. Patents

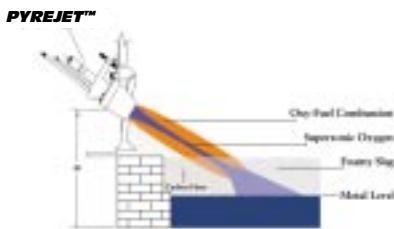
American Combustion pioneered this technology and patented it in the mid 1980's

U.S. Patents

4,622,007	5,843,368
4,642,047	5,858,302
5,599,375	5,904,895
5,714,113	5,954,855
5,788,921	

This technology is also patent pending worldwide

As of June 2002, more than 20 furnaces are equipped with **PYREJET™** system.

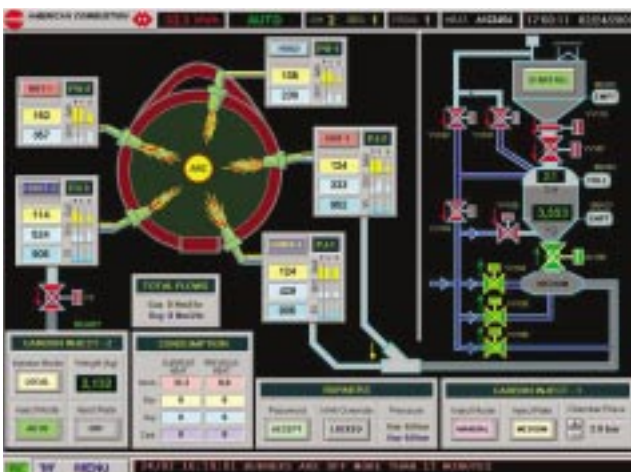


Schematic of **PYREJET™** multi-functions and location in the EAF



The **PYREJET™** System

Each PYREJET installation is designed to meet specific operating and economic requirements. The PYREJET system is a flexible solution that can be optimized to reflect changes in the EAF plant conditions through time.



The **PYREJET™** control system is based on PLC of customer choice. HMI screens include operation, maintenance, setpoints, alarms, utility consumption, carbon injection control (optional). The system is fully automated and does not require operator's involvement during normal operation.

- PYREJET burners (up to 5 MW for the oxy-fuel burner capacity), each having supersonic oxygen injection capability for melt decarburization and carbon injection for slag foaming
- Copper panels
- Valve train for oxygen and natural gas
- Process Control solutions including PLC and HMI programming for a fully-automated injection of fuel, oxygen and carbon
- ALARC™ PC injectors (optional)
- A dense phase, continuous flow, single or dual line carbon injection system(s) can be provided as a part of the PYREJET system if existing injection equipment is insufficient or inadequate

Air Liquide America and American Combustion: the right solution

With 100 years of experience in the industrial gas market, Air Liquide challenges a wide scope of technologies and associated services. This experience combined with American Combustion's expertise for industrial combustion for the steel industry makes Air Liquide and the PYREJET technology your total solution.

For more information about the PYREJET technology, or Air Liquide products or services, please contact:



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