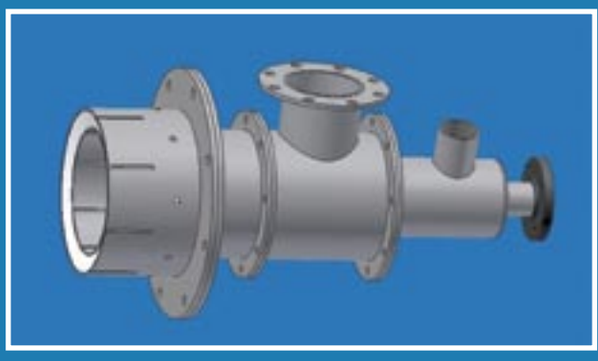
American Combustion

COMBUSTION TECHNOLOGY

to increase production and reduce operating costs



www.us.airliquide.com
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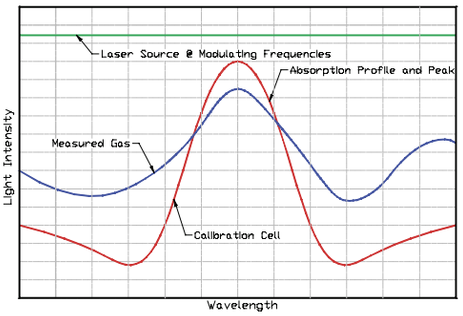
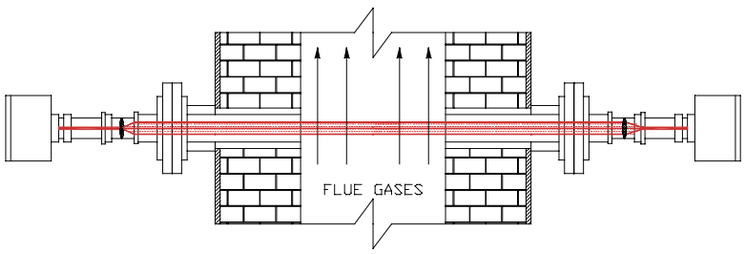
AIR LIQUIDE

Flue Gas Monitoring using TDL Technology



Tunable Laser Diode Technology

- Measure CO, CO_2, O_2 or H_2O in real-time
- Reduce energy costs
- Increase production capacity
- Improve furnace operation and process control
- Optimize flame chemistry to minimize metal losses and oxidation



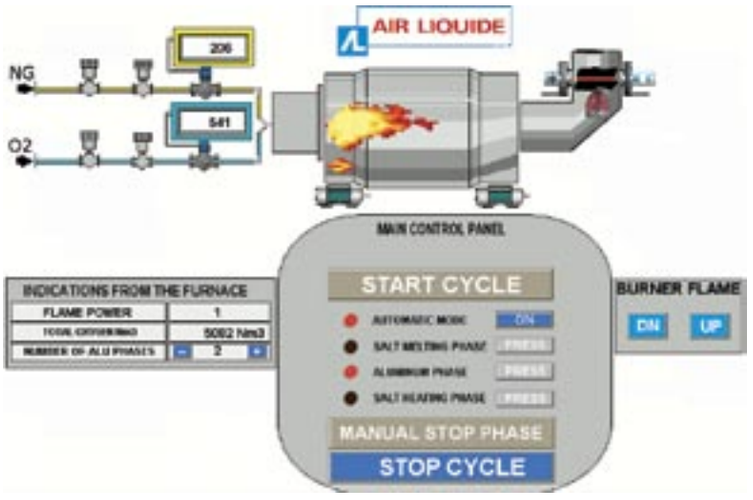
In-situ Measurement

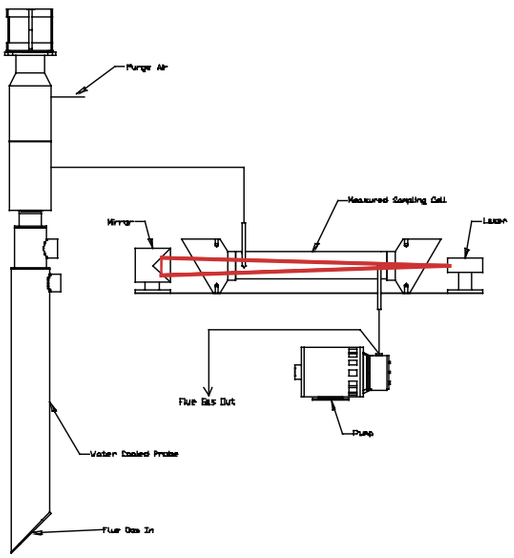
In-situ for Real Time Measurements

- No maintenance
- No moving parts
- Feedback to burner control system

Ex-situ System for High Dust Load Conditions

- Auto clean probe
- Sample delay <10 seconds
- Feedback to burner control system





Ex-situ Measurements

ACI's state of the art in-situ and extractive technologies, coupled with fast response time, allows the control of CO or O_2 inside the furnace to optimize production.

ACI provides complete integration of the TDL measurement and combustion control system.

ACI's Global Offer

- Identification of customer's needs
- Design of optimized combustion solutions
- Fabrication of customized equipment
- PLC & HML program interface
- Equipment start-up & operator training
- Process optimization by metallurgical specialists
- After sales technical support & spare parts

- Industries served:
  - Aluminum
  - Copper/Brass
  - Lead
  - Glass
  - Steel

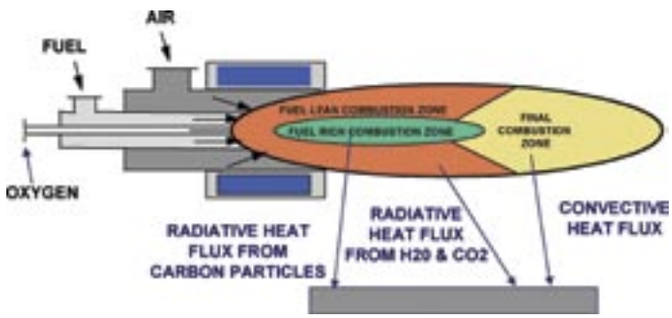
Reference List

COMPANY	LOCATION	EQUIPMENT DESCRIPTION
Asarco, Inc.	Hayden, AZ, USA	PYRETRON System for 300 TPD Copper Slag Cleaning Furnace
Beck Aluminum	Lancaster, PA, USA	PYRETRON (#5 Recycled Oil) Aluminum Reverberatory Furnace
Bermco Aluminum	Birmingham, AL, USA	PYRETRON Well Charged Aluminum Reverberatory Furnace
BHP Copper	San Manuel, AZ, USA	PYRETRON 250 TPD Copper Anode Furnace (2) PYRETRON Vertical Ladle Heating System
Dixie Metals Company	Dallas, TX, USA	PYRETRON 80 TPD Reverberatory Lead Smelter
E. Penn Manufacturing Co.	Lyon Station, PA, USA	PYRETRON 120 TPD Reverberatory Lead Smelter
Exide Corporation	Muncie, IN, USA	PYRETRON 300 TPD Lead Reverberatory Lead Smelter
Gaston Copper Recycling Corp.	Gaston, SC, USA	PYRETRON 400 TPD Copper Melting Furnace (2) PYRETRON 175 TPD Maerz Copper Converter Furnace
Gopher Smelting and Refining	Eagan, MN, USA	PYRETRON 80 TPD Reverberatory Lead Smelter
GNB, Inc.	Los Angeles, CA, USA	PYRETRON 400 TPD Reverberatory Lead Smelter
H. Kramer & Company	Chicago, IL, USA	PYRETRON 35 TPD Rotary Brass Furnace PYRETRON 70 TPD Rotary Brass Furnace
Lebanon Valley Aluminum	Lancaster, PA, USA	PYRETRON (#5 Recycled Oil) Aluminum Reverberatory Furnace PYRETRON (#5 Recycled Oil) Aluminum Rotary Furnace
Logan Aluminum	Russelville, KY, USA	PYRETRON 640 TPD Aluminum Circular Melting Furnace (2)
Maerz-Mueller Copper Tube	Fulton, MS, USA	Air/Fuel & Oxy/Fuel Combination 440 TPD Copper Melting Furnace (2) Bumer System 28 Ton Refining Furnace Launder
Maerz-Kyshtym	Kyshtym, RUSSIA	PYRETRON 350 Ton Copper Rotary Furnace PYRETRON 50 TPD Rotary Brass Furnace (2)
RSR/Entoven & Sons	S. Darley, Derbyshire, UK	PYRETRON 25 TPD Lead Rotary Furnace (4)
Schuylkill Metals	Baton Rouge, LA, USA	PYRETRON Lead Reverberatory Furnace
Sipi Metals	Chicago, IL, USA	PYRETRN 50 TPD Brass Rotary Furnace
Soutern Peru Copper	Moquegua, PERU	PYRETRON (Heavy Oil) 400 Ton Copper Reverberatory Furnace
Southwire Co.	Carrolton, GA, USA	PYRETRON 60 TPH Copper Anode Shaft Furnace PYRETRON 40 Ton Copper Holding Furnace PYRETRON Copper Shaft Furnace Launder System PYRETRON 400 TPD Maerz Copper Reverberatory Furnace Complete Melt Shop (Reverb and Shaft) Control System
UCA	Liege, BELGIUM	Oxy-Fuel System for Combination Shaft/Hearth Copper Melting Furnace
Warrenton Resources	Varrenton, MO, USA	PYRETRON 120 TPD Copper Reverberatory Furnace

Pyretron™ Burner System

- Staged high radiative burner technology
- +50% increased in melting rate
- Decreased total energy cost
- Uniform heating of refractory
- High flame velocities
- Optimized oxygen usage

- Applications:
- Lead smelters (reverb, rotary)
- Aluminum secondary smelter
  - Well charged, direct fired, rotary
- Copper and brass smelters / holders
  - Anode furnace, reverb furnace
  - Rotary brass, copper shaft
- Ladle pre-heaters



Burner Technology

For standard Pyretron™ applications, the fuel is oxidized with both oxygen and air.

The combustion is staged and occurs within three zones:

- Primary fuel rich zone: central zone of flame generates carbon particles to provide intense radiative heat transfer
- Secondary fuel lean zone: high velocity peripheral zone with excess oxidizer
- Final zone: combustion is completed in final zone

American Combustion (ACI) designed and patented this innovative approach to high temperature combustion technology in industrial furnaces.

Pyretron's™ flame is designed to sustain any variation in oxygen flow. Its oxygen consumption can be set according to process needs.

Brand Name	Part Number	Firing Rate - Range		
		Minimum	Nominal	Maximum
Pyretron I	PT 750	150 KW	750 KW	1000 KW
	PT 2000	400 KW	2000 KW	3000 KW
	PT 4000	600 KW	4000 KW	5000 KW
Pyretron II	PT2 1500	275 KW	1500 KW	2000 KW
	PT2 2500	350 KW	2500 KW	3000 KW
	PT2 5000	800 KW	5000 KW	6000 KW
	NF 1500	300 KW	1500 KW	2000 KW
	NF 2500	450 KW	2500 KW	3000 KW
	NF 5000	900 KW	5000 KW	6000 KW
	NF 8000	1400 KW	8000 KW	9600 KW
	NF 14000	2400 KW	14000 KW	16000 KW

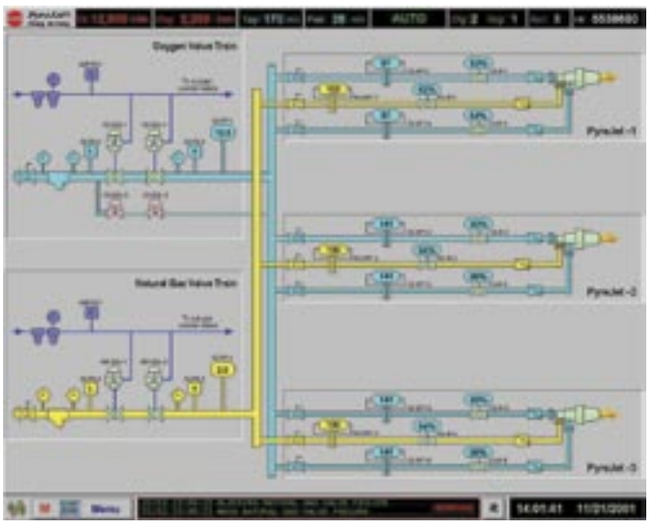
The Pyretron™ burner has a low NOx emission level due to:

- Staged combustion
- Good mixing and reduced residence time
- Independent control of the oxygen/ air ratio.

Control and Monitoring

- ACI oxygen valve train lines are all stainless steel to resist the propagation of a flame at oxygen pressure up to 200 psig (~14 bar) even when subjected to a strong initiator
- ACI valve trains are compliant with CE norms or with NFPA 86 CGA G-4.4-2003 norms
- ACI fuel valve trains can be designed to use natural gas, coke oven gas or fuel oils

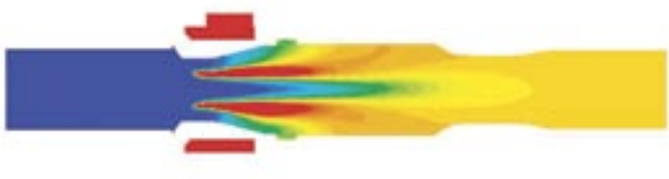
PLC & HMI Control



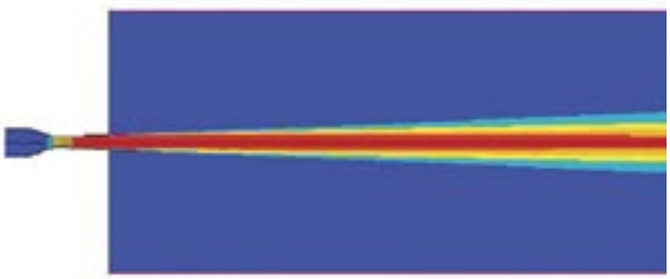
ACI's control system, based on the client's choice of PLC, provides operating control and diagnosis for the system.

The HMI screens display information for safe operation, set points and system alarms. Supervisory personnel can review and modify the set points on secured screens.

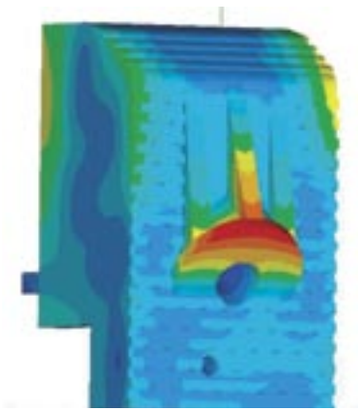
Modeling Capabilities Assist in New Equipment Development



Improved Burner Design
for Optimizing Gas Mixture



Laval Nozzle for Highly
Focused Oxygen Jet



Optimizing Water Cooling
Circuits for High Heat Flow

American Combustion

Contacts

ACI division of AIR LIQUIDE ADVANCED TECHNOLOGIES U.S. LLC
200 Chastain Center Boulevard
Suite 295
Kennesaw, Georgia 30144
Phone (800) FLAME 22 - Fax (678) 354 8235

aci.info@airliquide.com
aci.techsupport@airliquide.com

www.americancombustion.com

AIR LIQUIDE INDUSTRIAL U.S. LLC
2700 Post Oak Boulevard
Suite 1800
Houston, Texas 77056-8229
Phone (800) 820 2522 - Fax (877) 715 4799
us.info@airliquide.com

L'AIR LIQUIDE SA.
75 Quai d'Orsay
Paris, France 75321
Phone +33 1 40 62 55 55

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