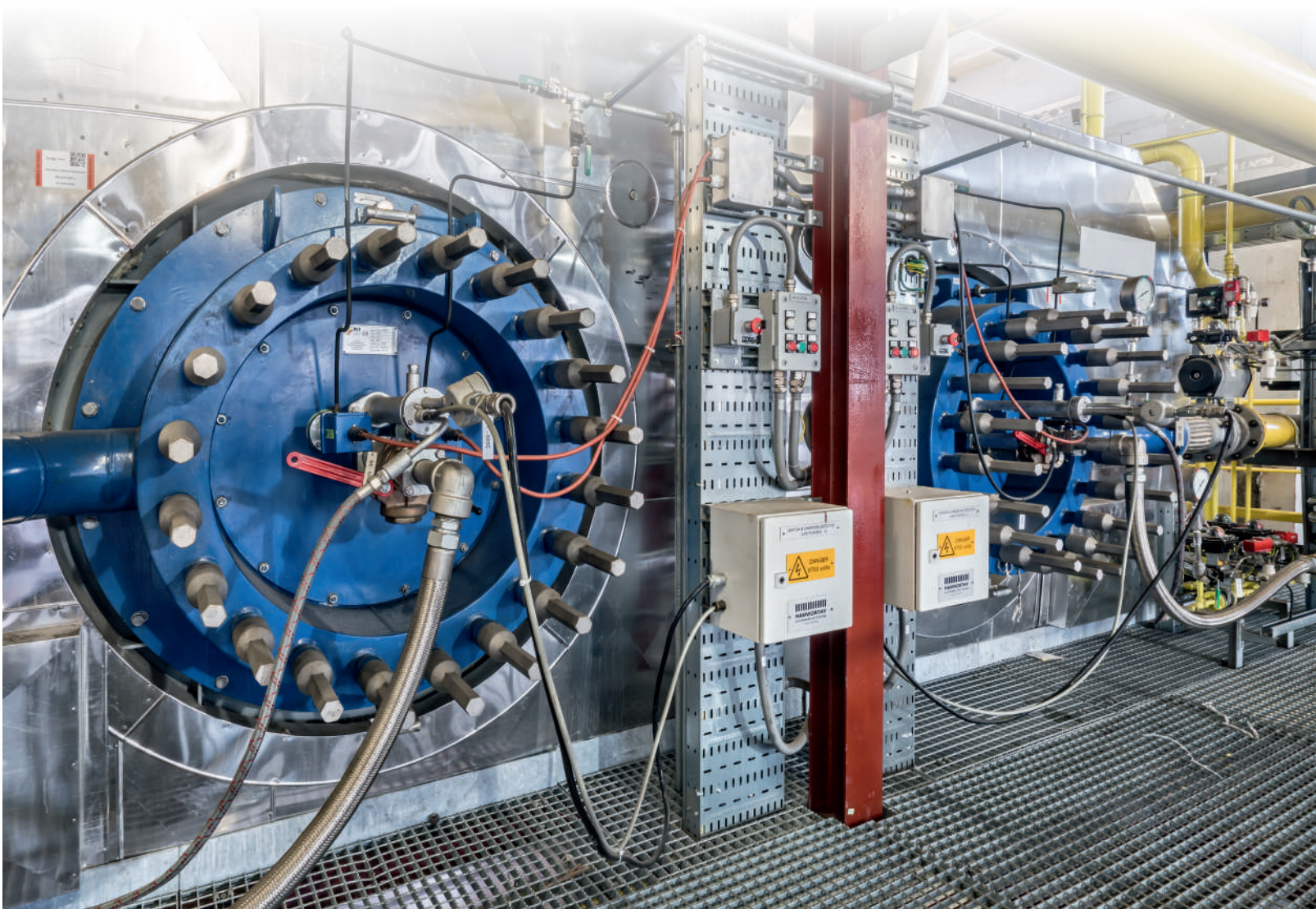
elco

Special Industrial Burners and Combustion Equipment



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ABOUT US

ELCO extends its technical and commercial proposal thanks to the recent acquisition of the BCE company – Burners and Combustion Equipment by Ariston Thermo Group.
Since 1987 ELCO designs, manufactures and provides specific services for energy transformation in the industrial sector.

The Company is manufacturing a wide range of industrial burners, combustion systems, air heaters and thermal oxidizers for the energy and petrochemical markets. It has been developing combustion expertise starting since the 70's years and is producing burners for almost any combustion process; the design is based on a long and well proven tradition of excellence in combustion engineering for the main industrial applications. The production covers burners for any type of gaseous and liquid fuel engineered to comply with specific client's technical requirements and emissions levels.

The company will insure a competent and adequate technical assistance to any client everywhere for the installation, commissioning, start-up and maintenance of the equipment supplied.

MISSION

We shaped our capabilities and strengths so we can provide comprehensive technical and business solutions. Through our core strengths – Value Creation, Expertise, Innovation and Operational Excellence, delivering a new era of technology vision enabling our customers to increase output and improve efficiency while preserving the environment.

Our employees will fully integrate Environmental Health and Safety excellence into business and operations planning and decision making to achieve superior health and safety performance.
The company will manage its operations in accordance with our Environmental Health & Safety, in a manner that controls occupational health and safety risk, protects the environment and the health and safety of employees, customers, contractors, and the public, while fully complying with applicable laws and regulations.

APPLICATION

ELCO supplies burners, components and services to all major boiler manufacturers and complete combustion systems to all major industrial clients for :

- Steam generation
- Power generation
- Refineries
- Chemical plants
- Petro-chemical industry
- Industries

The company are provided to meet the maximum standards of combustion efficiency and the maximum degree of reliability under the most severe operating conditions.

Steam Generators

A water tube boiler is a type of boiler in which water circulates in tubes heated externally by the fire. Fuel is burned inside the furnace, creating hot gas which heats water in the steam-generating tubes.
The heated water then rises into the steam drum. Here, saturated steam is drawn off the top of the drum. In some services (power generation), the steam will reenter the furnace through a superheater to become superheated. Superheated steam is a dry gas and therefore used to drive turbines to produce electric energy by generator.

A fire-tube boiler is a type of boiler in which hot gases from a fire pass through one or more tubes running through a sealed container of water. The heat of the gases is transferred through the walls of the tubes by thermal conduction, heating the water and ultimately creating steam.
Such boilers are usually used where are not requested high power and sometimes are preferred to water tube boiler thanks to their simpler configuration.

Steam boilers are the typical applications of our “M”, “DM” and “DT” burners type which are designed and offered according to the emission levels required and fuels to be burn.

Heat Recovery Steam Generators

A heat recovery steam generator or HRSG is an energy recovery heat exchanger that recovers heat from a hot gas stream, usually coming from gas turbine or engines. It produces steam that can be used in a process (cogeneration) or used to drive a steam turbine (combined cycle).
HRSGs consist of four major components: the economizer, evaporator, superheater and water preheater. The different components are put together to meet the operating requirements of the unit.
Modular HRSGs can be categorized by a number of ways such as direction of exhaust gases flow or number of pressure levels.

The HRSGs systems could be of two type: one, where gas turbine is coupled directly to the steam generator and the major components are disposed in line: superheater, evaporator and economizer (one pressure level); this is the typical application of our burners “DB” type, which are installed inside the duct that connects gas turbine and steam generator. The other type is a classic steam generator: the exhaust gas coming from gas turbine reaches the burners, which are installed on boiler front wall. This is the typical application of our burners “M” or “DM” type, adapted for such application.
In both cases the burner are suitable to work either with hot flue gas stream or fresh air.

APPLICATION

Waste to Energy Systems

Waste-to-energy (WTE) is the process of generating energy in the form of electricity and/or heat from the incineration of waste. WTE is a form of energy recovery. Most WTE processes produce electricity and/or heat directly through combustion.

Incineration, the combustion of organic material such as waste with energy recovery, is the most common WTE implementation. The combustion of waste may produce many pollutants that must be treated and reduced before the stack, to avoid environmental contamination.

In such systems is necessary to have a combustion system properly designed: the role of the burner (or burners) is to heat up the furnace and the combustion chamber during the start-up phases until a temperature suitable for the introduction of waste and the maintenance of the flame stability by the same. Once the combustion chamber has reached the correct working temperature, the burner is moved in stand-by position and protected from the flame and flue acid gas generated by waste combustion. The burner will return in firing position only if the temperature in combustion chamber reaches the limits imposed by law, or to shut-down the incinerator.

Depending from incinerator's characteristics and Client's request we are able to design such combustion system complete with all ancillaries equipment (combustion air fan, oil & gas skids and so on) and control system. Usually, for the above application, we use "M" or "DM" burners type.

Heaters and Furnaces

In the industrial world are present a huge range of industrial heaters and process furnaces, which are necessary in various processes related to refineries, gaseous and liquid streams treatment or to metallurgical industry.

We are capable to supply some of its products suitable for applications like air heaters, gas heaters, blast furnaces, water bath heaters or glycol reboiler, kiln processes, refinery processes as cracking or reforming, and particular burners for sulphur, installed on sulphuric acid production plants.

SERVICES

ELCO is close to its Customers and, for this reason, is important for us to give all the necessary support, efficient and quick, whenever is necessary. Our service team personnel have a lot of experience in field application and work closely with our technical offices in order to provide the best solution at your problems. We could provide a lot of services from consulting, presale and after sale.

Start-up and Commissioning Assistance
Working closely to power plant manufacturer we are usually called to start-up our combustion system, and tuning our burners into the best configuration, which give to Client the best performance in terms of emission levels and combustion efficiency.

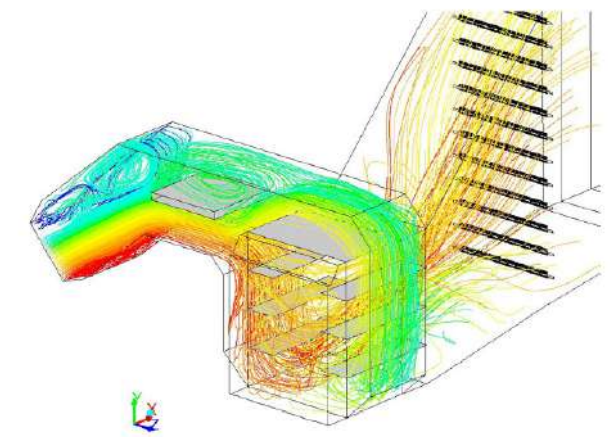
Training of local personnel
Our engineers will transfer their knowledge, thanks to a long experience, to Client's employees, for a correct maintenance and management of the combustion system.

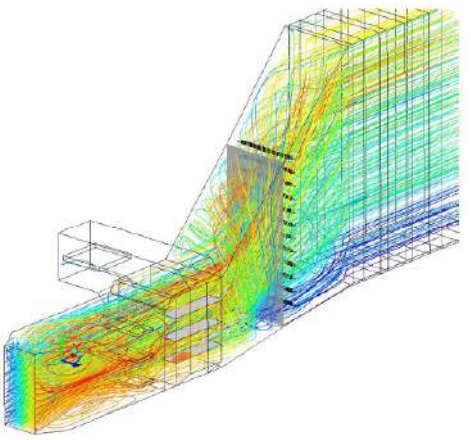
Evaluation and Revamping
Our company has the capabilities to evaluate your combustion system and all the equipment installed to support the process i.e. valve and instrumentation train, burner management system, combustion air distribution, control system and so on in order to provide technical service to upgrade your system. A written relation with technical solutions, which enable our Client to choose the best way to act, basing on its needs and financial possibilities, usually follows such activities.

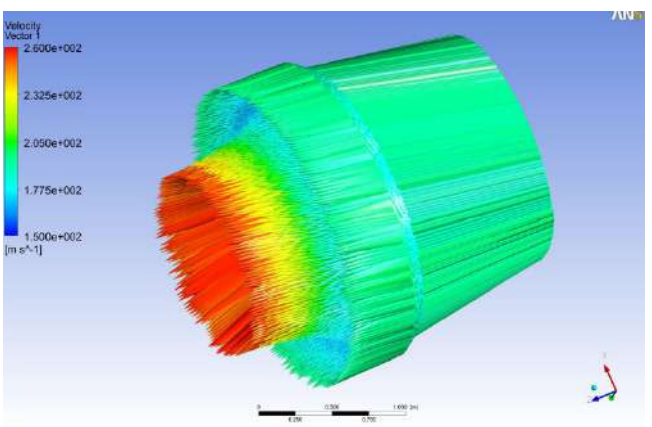
SERVICES

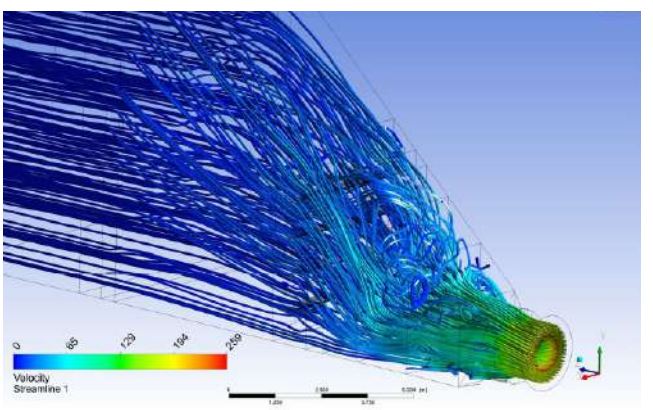
CFD

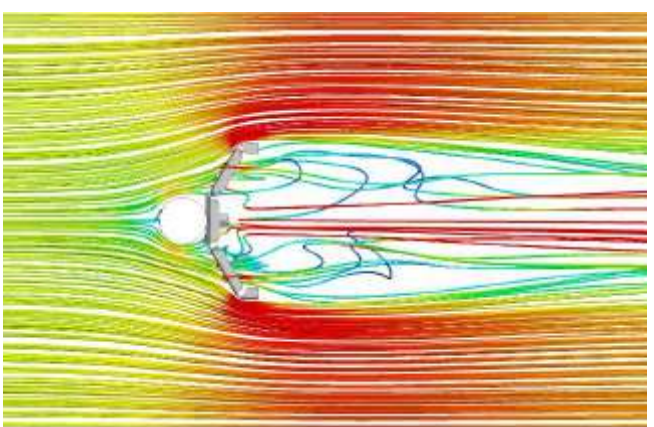
The company can provide support even for CFD (Computational Fluid Dynamics) studies; the CFD can be applied to many situations and applications and we usually provide such service to study the combustion air and flue gas mixing in application with FGR (Flue Gas Recirculation), to study the air distribution inside the burner and the flame shape and distribution, and to study the exhaust gas distribution to the burners coming from gas turbine in Heat Recovery Steam Generators in order to optimize the distribution, the emissions levels and to prevent backfires on the burners.

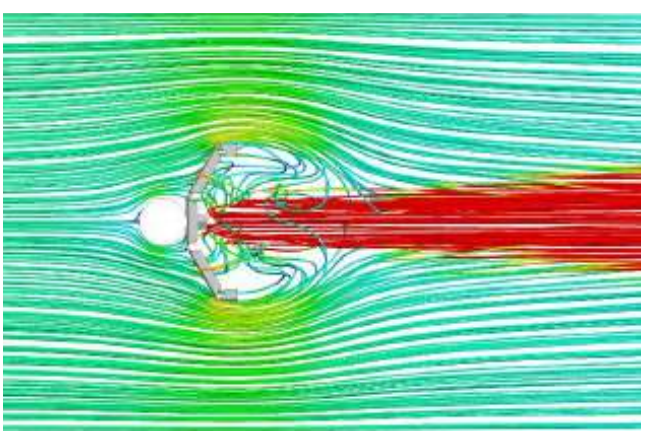






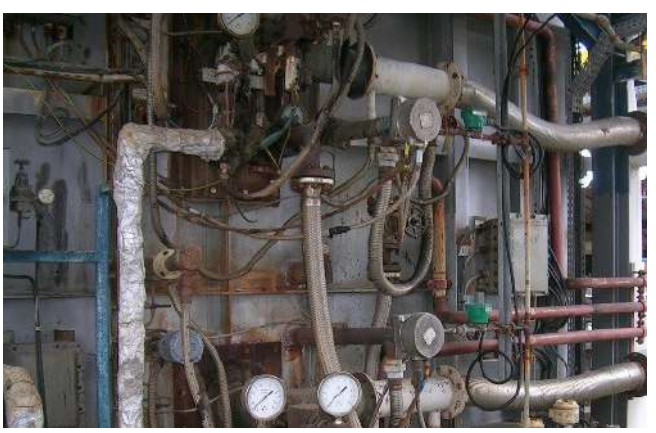






REVAMPING

The company can provide a technical, competent and adequate support for revamping and retrofitting activities, in particular concerning the replacement of an old and obsolete combustion system with a new one in order to increase the safety, the performances and reach low emissions levels according to the local regulation and to optimize the combustion and increase the efficiency of the system.
A really good interaction between our commercial and technical departments permits us to follow the client from the first evaluation activities and feasibility studies till the supply, erection, commissioning and training of local personnel.
ELCO has performed many of these activities in Italy, but we also have some references in the middle east, in the northern Africa, and in central America.



PRODUCTS

Steam generation

Power generation

Refineries

Chemical plants

Petro-chemical industry

Manufacturing industries

DT

ULNOx type burners

ELCO Ultra Low NOx "DT" type burners are designed to satisfy the most stringent restrictions on pollutant emissions on fuel gas firing, with or without Flue Gas Recirculation (FGR) while providing high combustion efficiency and reliability with all kinds of gaseous fuels.
Thermal NOx reduction is achieved by separating both the combustion air and the fuel gas in "primary" and "secondary" flows which ensures a "staged" combustion with less "hot spots" where NOx formation would be critical.
Typical applications of these type burners includes forced or balance draft boilers as well as any kind of refinery or industrial furnace, thermal oxidizers and process heaters.

Two air registers control combustion air flow. Each register is consisting of an axially moving drum controlling primary / secondary air rations. Strong combustion air vorticity is achieved by means of primary and secondary air swirlers whose position is set during the start – up and commissioning phases to provide the proper air turbulence which ensures optimal mixing with the gas.
In order to provide very low NOx emissions, the fuel gas is distributed in a wide volume to provide high combustion efficiency while reducing overall flame intensity. Most of the fuel gas is injected through a fuel gas distribution plenum equipped with a set of lances.

Each lance is provide with a "multi jets" nozzle which injects the fuel gas outside the refractory throat. The nozzles can be rotated without halting burner operation to optimise gas distribution, achieving low emissions and combustion efficiency. An additional central gas lance is fed with a small portion of the fuel gas, ensuring very high flame stability over very wide burner firing ranges

SOME REFERENCES

CASSINO (Italy)	1 steam boiler revamping, 2 burners 10,7 MW each
KIYIKÖY (Turkey)	10 water bath heaters, 1 burner each heater, 10 MW each burner
PORTO MARGHERA (Italy)	2 steam boilers, 2 burners each boiler, 31 MW each burner
ASHALIM (Israel)	1 steam boiler, 2 burners 52 MW each
MILAZZO (Italy)	1 steam boiler revamping, 2 burners 50 MW each
TOLMEZZO (Italy)	1 steam boiler revamping, 2 burners 27 MW each
TORVISCOSA (Italy)	1 steam boiler, 2 burners 29 MW each
BOLGIANO (Italy)	3 steam boilers, 1 burner each boiler, 37 MW each burner
VAL D'AGRI (Italy)	1 steam boiler, 2 burners 57 MW each
REGGIO EMILIA (Italy)	1 steam boiler, 2 burners 20 MW each
SINGAPORE	1 hot oil heater, 1 burner 11,7 MW
ROTTERDAM (The Netherlands)	1 hot oil heater, 1 burner 11,7 MW

MAIN CHARACTERISTICS

- Burner designed to meet Client's specific requirements
- Highly reliable and efficient as demonstrated by a large number of installed units
- Primary and secondary air registers to control the distribution of combustion air inside the burner (manual or automatic)
- Primary and secondary air swirlers to ensure air vorticity and distribution
- Fuel gas distributed through a plenum with adjustable nozzles and a central gas lance for flame stability
- Capable of burning different kinds of gaseous fuels at the same time
- Can be operated either with fresh or pre - heated combustion air
- High flame stability over a wide turn - down range
- Can be operated with Flue Gas Recirculation (FGR) to further reduce pollutants emissions

BURNER DATA

Firing rate	up to 70 MW
Flame dimensions (*)	adjustable
Materials	carbon steel stainless steel
Combustion air	up to 550 °C
Turndown	8:1
Pressure drop	200 - 250 mm wg

(*) Flame dimensions vary with firing rate

TYPICAL GUARANTEED EMISSIONS (*)

Natural gas firing w/o flue gas recirculation
- NOx 65-90 mg/Nm^3
- CO 30 mg/Nm^3 or lower

Natural gas firing with flue gas recirculation
- NOx 40-50 mg/Nm^3
- CO 30 mg/Nm^3 or lower

(*) ref. to 3% O_2 dry flues, combustion air @ ambient temperature; the emissions could be different depending of application and must be evaluate Job by Job

STANDARD SCOPE OF SUPPLY

- Burner with fuel gas equipment (central gas lance, fuel gas distributor and stainless steel nozzles)
- Refractory throat design for manufacturing by Client
- Air wind box (alternatively we can provide the lay - out drawings for manufacturing by Client)
- Combustion air isolating and balancing dampers (multi - burners application)
- Pilot igniter (High energy, high tension, premixed or non-premixed type with ionization rod)
- Flame detection system
- Burner management system (BMS)
- Piping and instrumentations trains

DM

Low NOx type burners

"DM" type burners are equipped with two air registers suitable for any kind of liquid and/or gaseous fuel with the possibility to fire one or more fuels at the same time. Combustion air is divided into "primary" and "secondary" flows resulting in stratified combustion. This solution allow a general reduction of combustion temperature and therefore lowers thermal NOx generation.
They are provided with a series of gas lances made from stainless steel which can be adjusted during the operation. These lances injected the larger part of fuel gas; a small quantity is injected through a central gas gun to ensure the flame stability.
When is requested a mixed gas/oil applications, a liquid atomizer replaces the central gas gun.

Air vorticity is generated and guaranteed by the vanes which formed each air register. The position of such vanes is set during the start - up phases and is important to control the flame intensity and shape which are different from one combustion chamber to another or from one fuel to another.
Fuel gas is distributed through an external plenum and a series on gas lances each of which is provided with a skew faced "multi jets" nozzle which can be adjusted and rotated to optimise gas distribution without halting burner operation.

"DM" type burners are designed to meet low NOx requirements while providing high combustion efficiency and extreme versatility.
Typical applications of these type burners includes forced or balance draft boilers as well as any kind of refinery or industrial furnace, thermal oxidizers and process heaters.

SOME REFERENCES

WARRI REFINERY (Nigeria)	1 steam boiler, 4 burners 26 MW each
BERINGEN (Belgium)	1 WTE boiler, 2 burners 32 MW each
BASRAH REFINERY (Iraq)	1 steam boiler, 2 burners 51 MW each
LORDEGAN (Iran)	3 steam boiler, 2 burners each burner, 43 MW each burner
MILAZZO (Italy)	1 post combustion revamping, 3 burners 19,7 MW each
ADRA OILFIELD (Iraq)	6 steam boilers, 1 burner each boiler, 34 MW each burner
ANZOATEGUI (Venezuela)	3 steam boilers, 4 burners each boiler, 33 MW each burner
SUZZARA (Italy)	1 steam boiler, 2 burners 18,3 MW each
TOBOLSK (Russia)	4 steam boilers, 3 burners each boiler, 33 MW each burner
JEBEL ALI (U.A.E.)	2 steam boiler, 8 burners 38 MW each

MAIN CHARACTERISTICS

- Highly customisable: each burner is designed to meet Client's specific requirements
- Reliable and efficient as demonstrated by a large number of installations worldwide
- Double air registers to control the vorticity and distribution of combustion air inside the burner (manual or automatic)
- Fuel gas distributed through a plenum with adjustable nozzles and a central gas lance or liquid fuel atomizer
- Capable of burning one or more fuels (gaseous or liquid) at the same time
- Can be operated either with ambient temperature or pre – heated combustion air
- Can be operated with flue gas recirculation for emissions reduction
- High flame stability over a wide turndown range

BURNER DATA

Firing rate	up to 80 MW
Flame dimensions(*)	adjustable
Materials	carbon steel stainless steel
Combustion air	up to 550 °C
Turndown	8:1
Pressure drop	150 - 200 mm wg

(*) Flame dimensions vary with firing rate

TYPICAL GUARANTEED EMISSIONS (*)

Natural gas firing
- NOx 140 - 150 mg/Nm^3
- CO 30 mg/Nm^3

Heavy fuel oil firing (N content 0,2 % by weight)
- NOx 400 mg/Nm^3
- CO 100 mg/Nm^3
- Particulate 50 mg/Nm^3

(*) ref. to 3% O_2 dry flues, combustion air @ ambient temperature without FGR; the emissions could be different depending of application and must be evaluate Job by Job

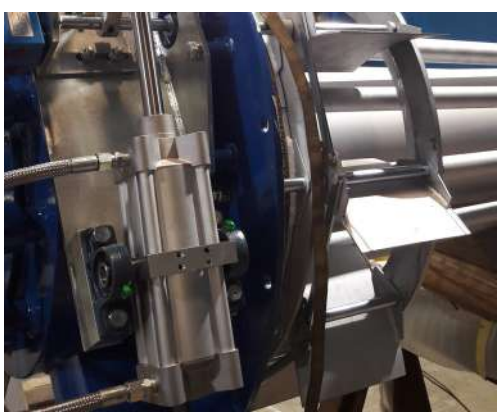
STANDARD SCOPE OF SUPPLY

- Burner with fuel gas equipment (central gas lance, fuel gas distributor and stainless steel nozzles)
- Refractory throat design for manufacturing by Client
- Air wind box (alternatively we can provide the lay - out drawings for manufacturing by Client)
- Combustion air isolating and balancing dampers (multi - burners application)
- Pilot igniter (High energy, high tension, premixed or non-premixed type with ionization rod)
- Flame detection system
- Burner management system (BMS)
- Piping and instrumentations trains

M

Low NOx type burners

"M" type burners are equipped with one air register suitable for any kind of liquid and/or gaseous fuel with the possibility to fire one or more fuels at the same time. These are our classic burners and we have a large number of references around the world.
They are provided with a series of gas lances made from stainless steel which can be adjusted during the operation. These lances injected the whole or larger part of fuel gas with the possibility to install a central gas lance which injected the remainder part. This solution ensure a better flame stability.
Combustion air reaches burner throat thanks to air register which can be manual or automatic.
When is requested a mixed gas/oil applications, a liquid atomizer replaces the central gas gun.



Air vorticity is generated and guaranteed by the vanes which formed the air register. The position of such vanes is set during the start - up phases and is important to control the flame intensity and shape which are different from one combustion chamber to another or from one fuel to another.
Fuel gas is distributed through an external plenum and a series of gas lances each of which is provided with a skew faced "multi jets" nozzle which can be adjusted and rotated to optimise gas distribution without halting burner operation.
"MPJE" type burners are designed to meet classic emissions requirements and reach the compromise between cost and performance while providing high combustion efficiency and extreme versatility.
Typical applications of these type burners includes forced or balance draft boilers as well as any kind of refinery or industrial furnace, thermal oxidizers and process heaters.

SOME REFERENCES

ASSIUT (Egypt)	2 steam boilers, 2 burners each boiler, 23 MW each burner
POINT LISAS (Trinidad & Tobago)	2 steam boiler revamping, 4 burners each boiler, 17,5 MW each burner
COLOMBO (Sri Lanka)	1 steam boiler, 2 burners, 12,7 MW each burner
(Egypt)	1 steam boiler, 2 burners 22,8 MW each
MARY WELAYATY (Turkmenistan)	3 steam boilers, 2 burners each boiler, 28 MW each burner
TERNI (Italy)	1 steam boiler, 2 burners 29 MW each
S. VITTORE DEL LAZIO (Italy)	2 steam boilers, 2 burners each boiler, 21,7 MW each burner
VILLORBA (Italy)	1 steam boiler, 2 burners 35 MW each burner
ROMA (Italy)	1 steam boiler, 1 burner 46 MW

MAIN CHARACTERISTICS

- Highly customisable: each burner is designed to meet Client's specific requirements
- Reliable and efficient as demonstrated by a large number of installations worldwide
- Single air register to control the vorticity and distribution of combustion air inside the burner (manual or automatic)
- Fuel gas distributed through a plenum with adjustable nozzles and a central gas lance or liquid fuel atomizer
- Capable of burning one or more fuels at the same time
- Can be operated either with ambient temperature or pre – heated combustion air
- Can be operated with flue gas recirculation for emissions reduction
- High flame stability over a wide turndown range

BURNER DATA

Firing rate	up to 80 MW
Flame dimensions(*)	adjustable
Materials	carbon steel stainless steel
Combustion air	up to 550 °C
Turndown	8:1
Pressure drop	150 - 200 mm wg

(*) Flame dimensions vary with firing rate

TYPICAL GUARANTEED EMISSIONS (*)

Natural gas firing
- NOx 160 - 170 mg/Nm^3
- CO 30 mg/Nm^3

Heavy fuel oil firing (N content 0,2 % by weight)
- NOx 400 mg/Nm^3
- CO 100 mg/Nm^3
- Particulate 50 mg/Nm^3

(*) ref. to 3% O_2 dry flues, combustion air @ ambient temperature without FGR; the emissions could be different depending of application and must be evaluate Job by Job

STANDARD SCOPE OF SUPPLY

- Burner complete with single air register and fuel equipment (central gas lance / liquid fuel atomizer, fuel gas distributor and stainless steel nozzles)
- Refractory throat (set of preformed refractory bricks made from 42 - 44% Al2O3)
- Air wind box (alternatively we can provide the lay - out drawings for manufacturing by Client)
- Combustion air isolating and balancing dampers (multi - burners application)
- Pilot igniter (High energy, high tension, premixed or non-premixed type with ionization rod)
- Flame detection system
- Burner management system (BMS)
- Piping and instrumentations trains

DB

Duct burners

"DB" type burners are designed to work inside Heat Recovery Steam Generator (HRSG) to increase the thermal energy content in flue gas from gas turbine. Duct burners are usually used in combined cycle and they can work either with fresh air (when gas turbine is turned off) or exhaust gas. For this reason they are made from stainless steel in order to resist to the high temperature inside the duct (up to 500 °C).
Critical conditions at the gas turbine discharge (gas flow rate, temperature, stream vorticity and duct lay - out) often require a CFD study to provide the best solution and guarantee the best performance in terms of operating, maintenance and expected life of the combustion system.

Duct burners are generally provided in several rows depending of the thermal power required and the general duct arrangement.
Each row is completely filled by stainless steel baffles which have a modular design that ensure the mixing between gaseous fuel and flue gas or fresh air; such baffles are fixed on gas distributor by screwed nozzles also made from stainless steel.
Fuel gas is injected through a fuel gas distribution tube equipped with a set of the above mentioned nozzles. Each "multi jets" nozzle injects the fuel gas inside the combustion chamber.
Each distributor is supported by a carbon steel front plate which is flanged to the duct wall. The front plate has also the support for flame scanner and pilot igniter.
This system guarantee a wide turndown range (10 : 1 for each row) and low pollutants production.

SOME REFERENCES

DIECIMO (Italy)	1 heat recovery steam generator, 1 burner, 4 rows, 21 MW
DIECIMO (Italy)	1 heat recovery steam generator, 1 burner, 4 rows, 28 MW
OMEGNA (Italy)	1 heat recovery steam generator, 1 burner, 3 rows, 9 MW
SESTO SAN GIOVANNI (Italy)	1 heat recovery steam generator, 1 burner, 4 rows, 16 MW
COATZACOALCOS (Mexico)	1 heat recovery steam generator, 1 burner, 12 rows, 185 MW
BOLGIANO (Italy)	1 heat recovery steam generator, 1 burner, 4 rows, 30 MW
ALBA (Italy)	1 heat recovery steam generator, 1 burner, 4 rows, 23 MW
CORINTH REFINERY (Greece)	1 heat recovery steam generator, 1 burner, 3 rows, 9 MW
CARTIERE LUCCHESI (Poland)	1 heat recovery steam generator, 1 burner, 2 rows, 5,3 MW
CARTIERA PIERETTI (Italy)	1 heat recovery steam generator, 1 burner, 4 rows, 25 MW

MAIN CHARACTERISTICS

- Burner designed to meet Client's specific requirements
- Highly reliable and efficient
- Fuel gas is distributed through an internal pipe which support the baffles and the screwed nozzles
- Capable of burning different kinds of gaseous fuels
- Can be operated either with fresh air or GT exhaust gas
- High flame stability over a wide turn - down range

BURNER DATA

Firing rate	up to 3,5 MW/m
Flame dimensions (*)	
Materials	carbon steel stainless steel
Combustion air	up to 550 °C
Turndown	10:1
Pressure drop	10 mm wg

(*) Flame dimensions vary with firing rate

TYPICAL GUARANTEED EMISSIONS (*)

Natural gas firing in fresh air with FGR

- NOx 110 mg/Nm^3
- CO 110 mg/Nm^3

Natural gas firing with gas turbine exhaust

- NOx - mg/Nm^3
- CO - mg/Nm^3

Post firing emissions are depending from the conditions at gas turbine discharge

(*) ref. to 15% O_2 dry flues, fresh combustion air @ ambient temperature; the emissions could be different depending of application and must be evaluate Job by Job

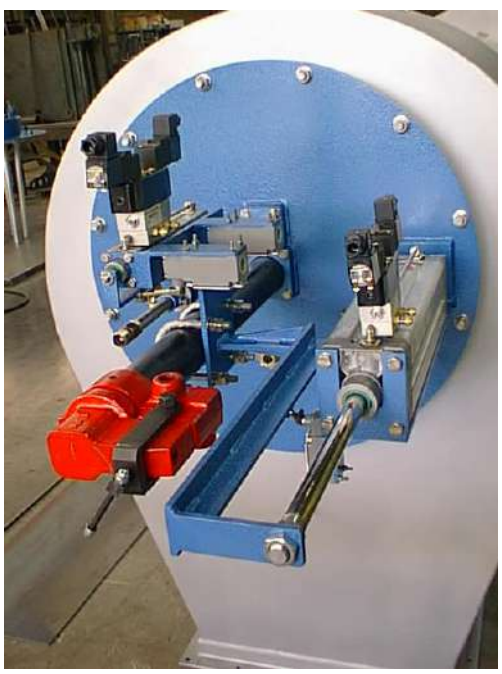
STANDARD SCOPE OF SUPPLY

- Burner with fuel gas equipment (peephole, baffles and stainless steel nozzles)
- Frontal plate with flanged connections to HRSG and to fuel gas distributor
- Pilot igniter (High energy, high tension, premixed or non-premixed type with ionization rod)
- Flame detection system
- CFD study
- Local control panel
- Burner management system (BMS)
- Piping and instrumentations trains

VRGO

Burners

Burners type "VRGO" are typically equipped with a series of gas lance and one central gas lance. If designed to burn heavy fuel oil or diesel oil, the central gas lance is replaced with fuel oil/diesel atomizer.
The "VRGO" burners are designed to reach high efficiency combustion level and can be supplied as part of new combustion systems as well as revamping of existing plants.



The typical supply is completed with combustion air wind box and combustion air isolating and balancing damper. In "VRGO" burner the air vorticity is guaranteed by a swirler made from stainless steel installed near the burner throat on an apposite tube.
The simple and compact design enable the use of these burners in a wide range of application and in particular they are largely use in small systems as heaters or preheaters or where is necessary a series of burners like in furnaces.

SOME REFERENCES

SAZEH-JAHANPARS (Iran)	1 Incinerator, 12 burners 16 MW each
MODUGNO (Italy)	1 Biomass furnace, 2 burners 20 MW each
ONESTY REFINERY (Romania)	3 Furnaces, 14 burners each furnace, 3,7 MW each
QASR GAS DEV (Egypt)	1 Bath heater, 6 burners 2,7 MW each
MASSAFRA (Italy)	1 Biomass furnace, 2 burners 11,3 MW each
PARAFFINE SARDE SARROCH (Italy)	1 Diathermic oil heater, 1 burner 2,4 MW
PORTO MARGHERA (Italy)	1 Diathermic oil heater, 3 burners 2,8 MW each

MAIN CHARACTERISTICS

- Highly customisable: each burner is designed to meet Client's specific requirements
- Reliable and efficient as demonstrated by a large number of installations worldwide
- One central swirler to control combustion air distribution and vorticity
- Fuel gas distributed through a plenum with adjustable nozzles and a central gas lance
- Capable of burning one or more fuels at the same time
- Can be operated either with ambient temperature or pre – heated combustion air high flame stability over a wide turndown range

BURNER DATA

Firing rate	up to 25 MW
Flame dimensions(*)	adjustable
Materials	carbon steel stainless steel
Combustion air	up to 400 °C
Turndown	5:1
Pressure drop	50 - 100 mm H2O

(*) Flame dimensions vary with firing rate

TYPICAL GUARANTEED EMISSIONS (*)

Natural gas firing
- NOx 200 mg/Nm^3
- CO 50 mg/Nm^3

Heavy fuel oil firing (N content 0,2 % by weight)
- NOx 400 mg/Nm^3
- CO 100 mg/Nm^3
- Particulate 50 mg/Nm^3

(*) ref. to 3% O_2 dry flues, combustion air @ ambient temperature

STANDARD SCOPE OF SUPPLY

- Burner complete with fuel equipment Refractory throat
- Air wind box complete with multi louver combustion air damper for air isolating and balancing
- Central gas lance/Liquid fuel atomizer
- Fuel gas distributor and stainless steel nozzles
- Pilot igniter
- Flame detection system
- Burner management system (BMS)
- Fuel gas/oil/atomizing steam or air valve and instrumentation trains

Special

Burners

BLAST FURNACES BURNERS

These kind of burners are suitable to operate in metallurgical processes where the operating temperatures are very high. In fact, our blast furnace burners are usually made from Inconel/Hastelloy, materials suitable to resist to severe working conditions.
These burners are usually equipped with a central pilot igniter operating with natural gas or rich gas, which ensures a correct combustion of the gaseous stream fired by burner. Burners are fed by a low LHV gas coming from process (Coke Oven Gas or similar) and, when not in operation, they are cooled by a nitrogen stream.
No air register is installed in such burners; the burner is provided complete with a central swirler to guarantee a minimum combustion air vorticity.
We could also provide the supply of complete fuel gas skids and control system.

AIR HEATERS, INCINERATORS, KILN BURNERS

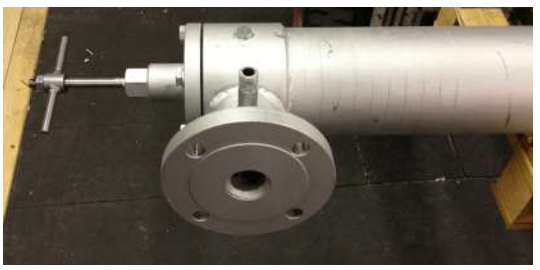
ELCO "KS" type burners are generally used in processes where are not required particular performance like restricted emission levels or high thermal power demand. Such processes could be air or gas heaters, incinerator or biomass boiler where they are used for start-up and heat-up of generator.
These burners are not provide with air wind box; combustion air comes from a distributor duct which is flanged directly to burner. There isn't an air register but only a diffuser for air distribution.
ELCO can also supply burners for "KILN" processes: these burners have similar design to "KS" burners but they can be adapted to KILN furnaces conditions. According to the system in object, KILN burners could have one, two or three combustion air distributor suitable for fresh or pre-heated combustion air. They are usually supplied complete with refractory throat and, if required, with isolated wind box.
KS and KILN burners can operate either with gas or fuel oil/ diesel oil.

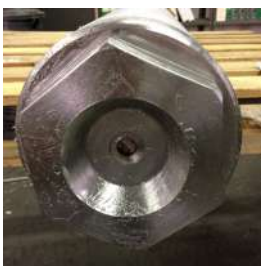
SOME REFERENCES

RAVENNA (Italy)	1 steam boiler, 3 burners with tail gas external scroll
ANGUL (India)	1 Blast Furnace, Hot Stoves pilot burners
PORTO MARGHERA (Italy)	1 steam boiler, 2 burners with off gas external scroll
BHILAI (India)	1 Blast Furnace, Hot Stoves and Top Ignitor Pilot Burner
BHUSHAN (India)	1 Blast Furnace, Hot Stoves and Top Ignitor Pilot Burner
SESTO SAN GIOVANNI (Italy)	1 biomass incinerator, 2 start-up burners
(Italy)	1 FB Biofuel boiler for incinerator, 2 start-up burners
DEGUSSA AG (Germany)	1 steam boiler, 2 burners with off gas external scroll
ASSEMINI (Italy)	1 Sulphur Furnace, 2 sulphur burners
SCARLINO (Italy)	1 Sulphur Furnace, 2 sulphur burners

OFF GAS & LOW LHV BURNERS

Some industrial processes produce synthesis and recovery gaseous streams which have, as main characteristics, high temperatures, low pressures and, most important, very low calorific values.
ELCO can design and supply burners suitable to burn such gaseous streams, to recover the energy that otherwise would be lost. These burners are supplied with external gas scroll, through which the gaseous stream is injected inside combustion chamber. Each burner is also supplied complete with gas lances and central gas gun, which are necessary to heat up the system before syngas injection.
Sometimes, when the calorific value is very low, the central gas gun or a continuous pilot is kept operational.
If there is the presence of two syngas streams which have very different characteristics in terms of volume and operating conditions, we could provide burners with double external gas scroll.





SULPHUR BURNERS

Sulphur is one of raw materials used in sulphuric acid production plant or in plant where sulphur is necessary to generate other chemical products (for example aluminum fluoride). In these processes, the sulphur is burned inside a refractory furnace to produce its derivates.
ELCO can supply this kind of burner complete with tip and plug for mechanical atomization of sulphur. For this reason is important that sulphur reaches the burner at high temperature and pressure and at liquid state. To guarantee the correct combustion conditions, the burner is traced by steam to maintain the temperature and avoid solidification.
Normally we supply also a natural gas/oil burner, which is necessary to heat-up the furnace and reach the correct operating conditions. Once reached the conditions, the burner's central body is replaced by sulphur burner to initialize the process

High Energy / Tension Ignitors

ELCO produces a wide range of industrial electric ignitors suitable for the light up of large industrial burners.
The most powerful ignitors are based on high - energy systems developed over decades of experience in applications requiring safe and reliable operation, such as power generation plants and steam generating utilities.
The High Energy ignition systems ensure a number of robust intermittent sparks realised by the energy accumulated by a capacitor, providing more powerful ignition capacity than high tension arc electrodes.
The HE series of ELCO ignitors includes gas electric ignitors, light oil electric ignitors, without or with premixed air, suitable for continuous operation, as well as the direct spark ignitor for light up of heavy oil.
Usually the igniters are an integral part of the supply of burners or combustion systems but we can also provide the single pilot igniter as a part of new combustion system as well as revamping of existing systems.

The ignitors can be supplied with in-built flame scanners or ionisation flame rods, with automatic retraction drivers and with power supply units for installation in any environment and hazardous area.
High Energy Electric Ignitor has been capable to withstanding to every temperature which could be present inside wind box and which can be up to 350 °C, and the discharge head itself must withstand to the very high radiation temperature close to the burner flame. The ELCO unit is suitable for a maximum surface temperature of 750 °C at the discharge head.
The ignitor consists of three main parts, namely: Control Box, in which the power for the discharge is generated High Voltage Armoured Cable, used to carry this power to the ignitor itself
The Special Ignitor End, at which the discharge occurs across a semi conductor gap
We can provide ignitors for a wide range of application and for any kind of industrial process as industrial boilers for steam/ power generation which burners where installed on boilers front wall or at boilers corners (tangential combustion), refinery or industrial furnace, thermal oxidizers and process heaters and so on.

SOME REFERENCES

(Abu Dhabi)	3 units, mod. HE 168 A
FENICE MIRAFIORI (Italy)	2 units, mod. HE 568 premixed type
(Turkey)	48 units, mod. Special for coal steam boiler
(Iran)	10 units, mod. HT 468

PILOT DATA

- Materials — carbon steel, stainless steel
- Fuel — natural gas, refinery gas, LPG, propane, diesel oil
- Combustion air — up to 550 °C
- Premixing air — instrument/service air @ ambient temperature
- Gas pressure — 0,4 - 0,5 barg
- Premixing air pressure — 0,4 - 0,5 barg
- Liquid fuel pressure — 8 barg (min)
- Electrical construction — IP 65, Eexd IIB, Eexd IIC

PILOT BURNER TYPE

Any pilot igniter could be support flame detection if required. Here below are listed our igniter models:

- HE 168 — Is designed for intermittent use and is suitable for flame detection if required. It's normally used in the large part of our installation and where no particular characteristics are required.
- HE 568 — As for HE 168 this pilot is designed for intermittent use, it can accept flame detection and we can provide either explosion proof execution or a system suitable for safe area; the principal difference is that such system is premixed type which is important to guarantee the flame stability in some cases.
- Special — We also provide a wide range of special ignitors different from our typical supply designed basing on Client's specific requirements or for particular uses and plants where are required dimensions, materials or operating mode different from the above mentioned igniters.
- HT 468 — If required we could also provide High Tension Ignitor which is self—aspirated type and therefore premixed type. The ignition power is provided by an electrical arc between electrodes (there is only transformer inside the Control Box supplied).

STANDARD SCOPE OF SUPPLY

- Pilot igniter (High energy, high tension, premixed or non-premixed type with ionization rod)
- Control box for safe or hazardous area complete with flame amplifier where required
- High voltage armored cable
- Flexible hoses for fuel gas / fuel oil to pilot igniter, premixing air where is required, cooling air
- Flame detection system
- Piping and instrumentations trains

BMS

Burner Management System

ELCO can provide complete solutions for the safe and efficient start - up, operation and shut - down of complete combustion systems for Water tube boilers, Heat Recovery Steam Generator (HRSG), Waste to energy incinerators, Waste liquid and gaseous streams incinerators and many other industrial applications.
The typical Burner Management and Control System is consisting of two separated units as per NFPA 85 "Boilers and Combustion Systems Hazards Code - Last Edition" requirements. Upon Client's requirement simpler systems designed are also available.
ELCO engineers develop all the engineering lay - out drawings, electrical schemes and software in house.
The BMS ensure that burners start - up, shut - down and operation take place under safe and controlled conditions, acquiring signals from in field instrumentation and performing all trips related to safety.

ELCO can also provide the Control system which is also connected to field instrumentation and provides the continuous modulation of the burner firing rate, according to the requirements of Client's process. A SCADA - Basic graphic interface is provided with the control system to ensure that Client's personnel can easily operate and oversee the plant.
All the systems are designed to be linked in a control network using all main standard communication protocols (ModBus, Profibus, TCP/IP, etc.).
ELCO continued support ensures competent and adequate technical assistance to any Client everywhere in the world, following installation, commissioning, and start - up of the combustion system, and providing maintenance and spare parts to maximize the system's lifetime.

SOME REFERENCES

BERINGEN (Belgium)	Waste to energy system - Siemens S7-300 F
MONDIAL CARTA (Italy)	Heat Recovery Steam Generator - Siemens S7-412 H/F
MIRAFIORI (Italy)	Revamping of Idrotermici Steam Boiler - Hima H51q-HS
MELFI (Italy)	Revamping of Macchi Steam Boiler - Hima H51q-HS
BOLGIANO (Italy)	Heat Recovery Steam Generator - Siemens S7-400 H/F
MILAZZO (Italy)	Revamping of Idrotermici Steam Boiler - Hima H51q-HRS
PONTECCHIO MARCONI (Italy)	Waste incinerator - Hima H41q-HS
TOBOLSK (Russia)	Steam Boiler - Siemens S7-414 H/F
SAN VITTORE DEL LAZIO (Italy)	Solid Waste Incinerator - Siemens S7-315 F

The BMS engineered by ELCO are able to control and manage various combustion systems, with one or multi burners boiler which operate with one or multi fuels at the same time. The systems are usually based on Programmable Logic Circuit (PLC) complete with all necessary hardware and I/O modules, buttons and lamps for operator interface and visualization of alarms/trips from cabinet front.
We could provide as well to special systems based on timers and relays for particular application.
The BMS is designed according to the Client's specific requirements for Fail Safe PLC with single or redundant CPUs and power supply units. System architecture allows maximum modularity and ease of maintenance.
Each BMS is supplied completely configured, cabled and wired to terminal strips in a free standing cabinet and tested (with Client witnessing if required) at our workshop by means of an I/O simulator.
All main PLC brands can be provided. In particular we usually supply:

- HIMA
- Siemens
- Allen Bradley

STANDARD SCOPE OF SUPPLY

- Burner Management System completely assembled and tested at our workshop with issue of internal test certificate (if required, test could be witnessed)
- BMS detailed lay-out drawing
- BMS electrical schemes and I/O lists
- Local panel (usually one for each burner) with push buttons and lamps wired and tested
- Operating and maintenance manuals

Assembled Oil & Gas Skids

ELCO is able to provide engineering and/or complete supply of mechanically, electrically and pneumatically assembled skids. Typically we supply skids for heavy fuel oil/diesel oil and fuel gas feeding line to burners.
Each skid is normally designed according to the relevant Code & Standards for such equipment, i.e. ASME, PED, API, TEMA, ATEX and so on.
Fuel oil heating and pumping unit are necessary where fuel oil combustion is required. In such combustion system, fuel oil must reach the burners with a correct temperature (to reduce the viscosity) and correct pressure (to guarantee a stable atomization). This is what fuel oil skids are made for. Depending on combustion system power and relative design criteria (pressure limits, overdesign, available stream, redundant logics), we supply every items necessary to the correct operating of the system which skid is connected to.

Main items that take place on fuel oil skid can be inlet and outlet strainers, pumps with coupled electric motors, heat exchangers which could be electrical or feeding by medium or low pressure steam, fuel oil control and recirculation valve, steam control valve (if any), valves and instrumentation train for local/ remote control and management, junction box cabled and wired, compressed instrument air distribution for pneumatic valves. Moreover is important to maintain in temperature the fuel oil line, in particular when the unit is not in operating, to avoid occlusions by cold oil and to guarantee the prompt availability when necessary; this could be made by electric tracing or steam tracing (with low pressure steam) around the piping and components.
We could provide equally to diesel oil skid supply, basing on the same Standard and Codes and design criteria. Such systems are simpler than previous because diesel oil is easy to treat; in fact the heating line is not necessary (electric or made by steam) as well as tracing and therefore the equipment installed are less than the other, if compared to the same power required.

SOME REFERENCES

ANGUL (India)	1 top ignitor skid, 3 hot stoves skids - Coke oven gas
MINA AL AHMADI (Kuwait)	1 heavy fuel oil pumping and heating unit - Heavy fuel oil
S. VITTORE DEL LAZIO (Italy)	2 main skids, 2 burner local skids - Natural gas
CAPANNORI (Italy)	1 main skid, 4 duct burner local skids - Natural gas
VILLORBA (Italy)	1 main skid, 2 burner local skids - Natural gas
(Qatar)	1 main pressure reduction station - Natural gas

As described for heavy fuel oil and diesel oil, ELCO is also able to provide engineering and/or complete supply of local and general fuel gas skids for any type of gas (natural gas, hydrogen, coke oven gas, nitrogen, oxygen, and so on).
The skid is supplied mechanically, electrically and pneumatically assembled and we could provide also a local control panel if necessary and if requested by type of application.
Feeding units to burner/s are typically complete with relevant instrumentation, manual and pneumatic valves, flow meter and control valve which regulates fuel flow rate basing on thermal power required from combustion process, both for gas and oil.
Regarding fuel gas skids we could also supply pressure reduction station which are necessary when fuel gas is provided at high pressure in front of fuel gas skid operating pressure (typically 3 barg).
ELCO can also supply, before the final assembly, several test on piping i.e. pressure test, welding test (WPS/PQR, LP, PMI), painting test and issue to Client the relative certificates.

STANDARD SCOPE OF SUPPLY

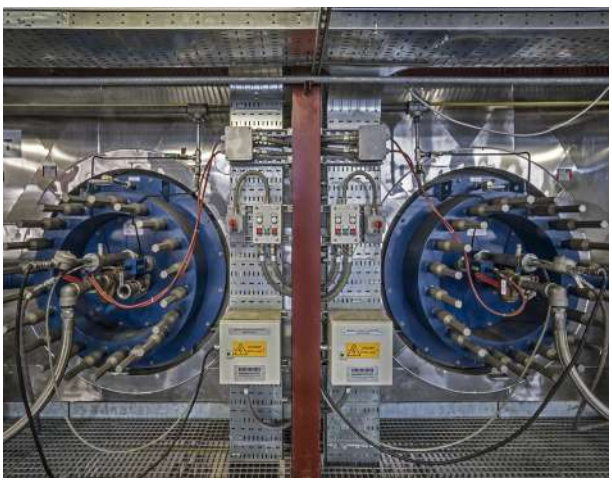
- Fuel gas/Heavy fuel oil/Diesel oil completely assembled with mechanical, electrical and pneumatic connection, wired and tested where requested, complete with all the relevant items which guarantee the correct and safe operating of the system
- Detailed drawing of the whole system
- Design of each item of skid
- Electrical connection, schemes and logics (if any)
- Tests and procedures with relative certificate made on Code & Standards basis or on Client's request (if applicable)
- Assembly and maintenance manuals

References

296 MW

4 x DT 25″ (4 x 30 MW)
4 x DT 32″ (2 x 38 MW)
2 x DT 20″ (2 x 12 MW)

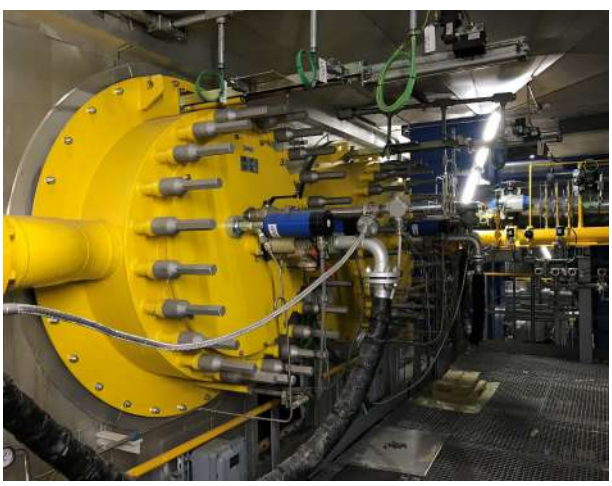
Turin, Italy



300 MW

6 x DT 37″ (6 x 50 MW)

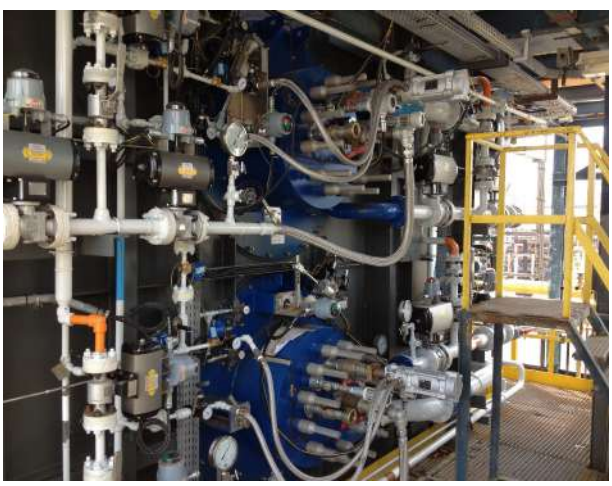
Brescia, Italy



160 MW

2 x DT 36″ (2 x 50 MW)
3 x DM 40″ (3 x 20 MW)

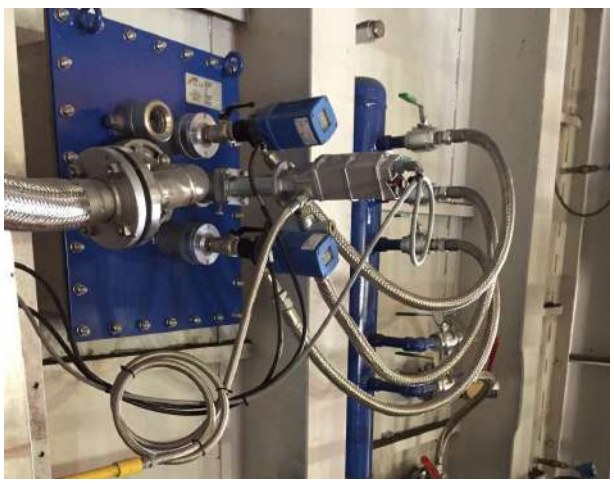
Milazzo, Italy



160 MW

2 x M 38x36"" (2 x 80 MW)

Assuan, Egypt



33 MW

1 x DB 33 (1 x 33 MW)

Bolgiano, Italy

110 MW

2 x DT 23" (2 x 20 MW)
2 x DT 21" (2 x 21 MW)
1 x DT 28" (1 x 28 MW)

Reggio Emilia, Italy

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