Termomeccanica Ecologia

Termomeccanica Group

Termomeccanica S.p.A.

TERMOMECCANICA GROUP

HISTORY

Today **<u>One of the leaders In the European Environmental Market</u>**

2012 **100 years of technology**

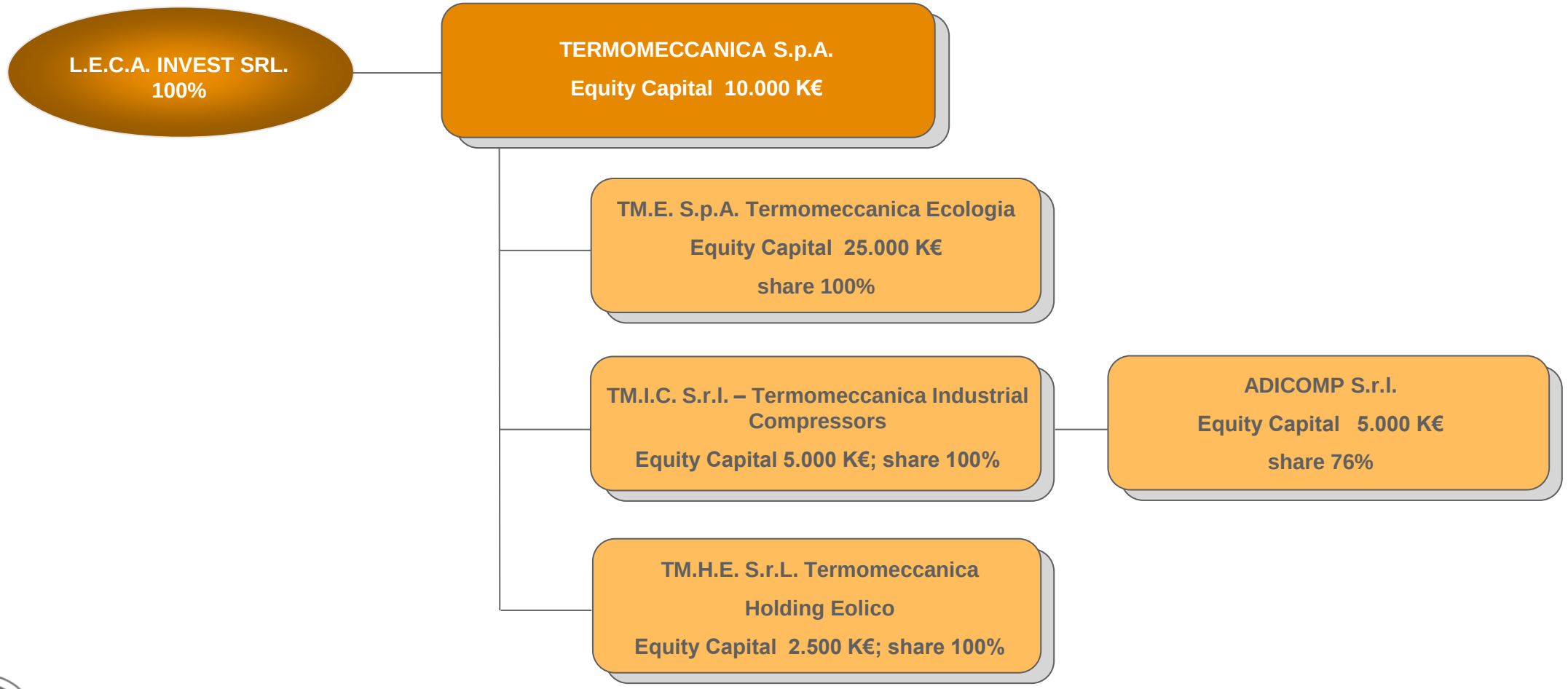
1997 Acquisition of *De Bartolomeis*

1995 Acquisition of *Ansaldo Acque*

1912 Established as A Cerpelli & C.

TERMOMECCANICA GROUP

SHARE HOLDERS AND MAIN COMPANIES



TERMOMECCANICA GROUP

CERTIFICATIONS

ISO 9001:2015

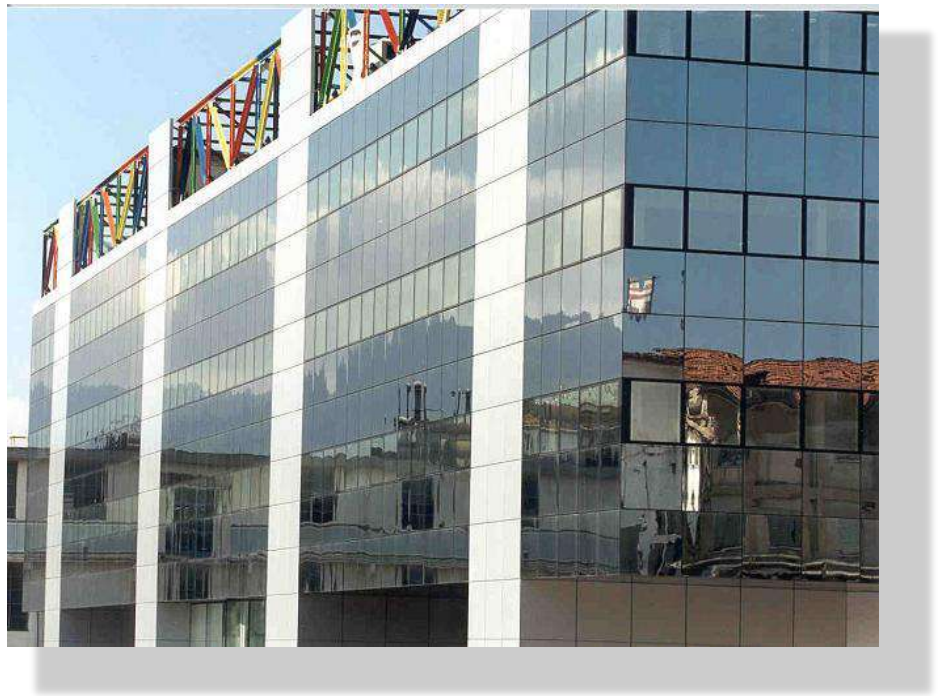
ISO 45001:2018

ISO 14001:2015

SOA GROUP QUALIFICATI ESECUZIONE LAVORI PUBBLICI

GOLD MEMBER OF ISWA International Solid Waste Association

ecovadis



TM.E. COMPANY

INDUSTRIAL PROCESS (TMIP) DIVISION

TM.E. S.p.A. – Termomeccanica Ecologia incorporates the know-how, engineering and construction technology and of the company “C.M.G.” founded in 1977. The company operates in the environmental protection and production sectors making use of C.M.G. credentials, patents and technical expertise in synergy with the know-how and industrial experience of “Termomeccanica Group”. It is organized into two sections

Effluents treatment plants section

The section operates in the design and construction of plants (turn key) for the treatment of waste gas/air, liquids, sludge and gaseous effluents from industries.

Recovery plants section

The section operates in the design and construction of plants (turn key) for the recovery of chemicals (solvents, light and heavy hydrocarbons, etc.)

TM.E. DESIGN PHILOSOPHY

TM.E. STRATEGY : LEAD USER PROCESS INNOVATION

- Possibility to test new technologies, patents and references on real scale;
- Possibility to anticipate and drive new marketing strategy
- Holding know how for several technologies with great flexibility to meet different markets and customized Energy & Environmental Requirements

<u>in order to achieve a high level of:</u>

- competitiveness,
- quality,
- flexibility,
- reliability and performance.

TME & Effluent Treatment Plants

TME's core business is the design and construction of **packages**, especially Flue Gas Treatment Plants, for waste gases resulting from industries, such as:

- **Metallurgical**
- **Oil & Gas**
- **Petrochemical**

Termomeccanica Ecologia

Termomeccanica Group

100 years of Italian technology 100 1912-2012 Termomeccanica

NOT IRON Metallurgical Industry ; Flue Gas Treatment solutions

Introduction to NOT IRON metallurgy sector

TME Flue Gas Treatments reduce emissions of environmentally hazardous compounds coming from:

- Smelting/Melting furnaces;
- Refining Furnaces;
- Shaft Furnaces;
- Rotary Kiln Furnaces ;

TME's Technologies are applicable to NOT IRON metallurgical sectors as: SMELTING COPPER, ALUMINIUM CATODES PRODUCTION, ALUMINIUM MELTING, ZINC RECOVERY and PRECIOUS METALS RECOVERY from SCRAP.

Typical Pollutants in copper smelting process

The Inlet Waste Gas to be processed has typically the following inlet pollutants:

DESCRIPTION	UNIT	EMISSION
Solid particles	mg/Nm^3	1500/3000
Cu	mg/Nm^3	250/400
Zn	mg/Nm^3	300/350
Pb	mg/Nm^3	350/450
VOC**	mgC/Nm^3	2000/2500
HCl	mg/Nm^3	200/300
HF	mg/Nm^3	200/300
SO_2	mg/Nm^3	50/150
NO_x	mg/Nm^3	50/900
CO	mg/Nm^3	1000/5000

Emission Guarantees in copper smelting process

TME Flue Gas Treatments are designed to comply with worldwide local regulations and stringent emission limits as resumed below:

Pollutant	Emission Limit Guaranteed
TOC	< 10 mg/Nm^3
NOx	< 100 mg/Nm^3
CO	< 50 mg/Nm^3
Particulate	< 5 mg/Nm^3
HCl	< 10 mg/Nm^3
SO_2	< 50 mg/Nm^3

Process Solutions

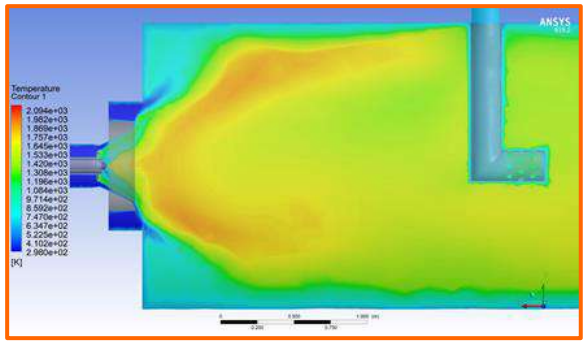
Typical Plant Configurations / Components:

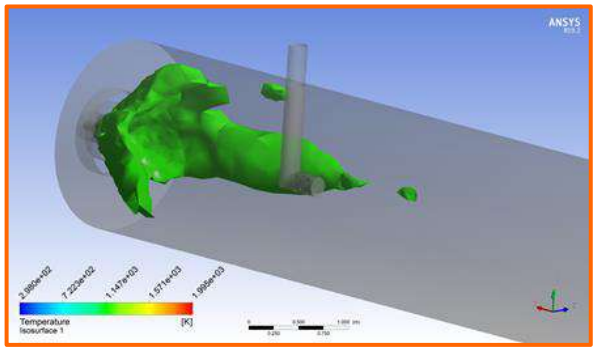
- Afterburner / Post-Combustion;
- Quenching Tower;
- Hydrated Lime and Pulverized Activated Carbon Injection;
- DeDioxins unit;
- Wet Scrubbers / Packed Towers;
- SNCR DeNOx systems;
- Cyclonic Separators, Dust Filters;
- Extraction fan + Chimney .

Optional systems :

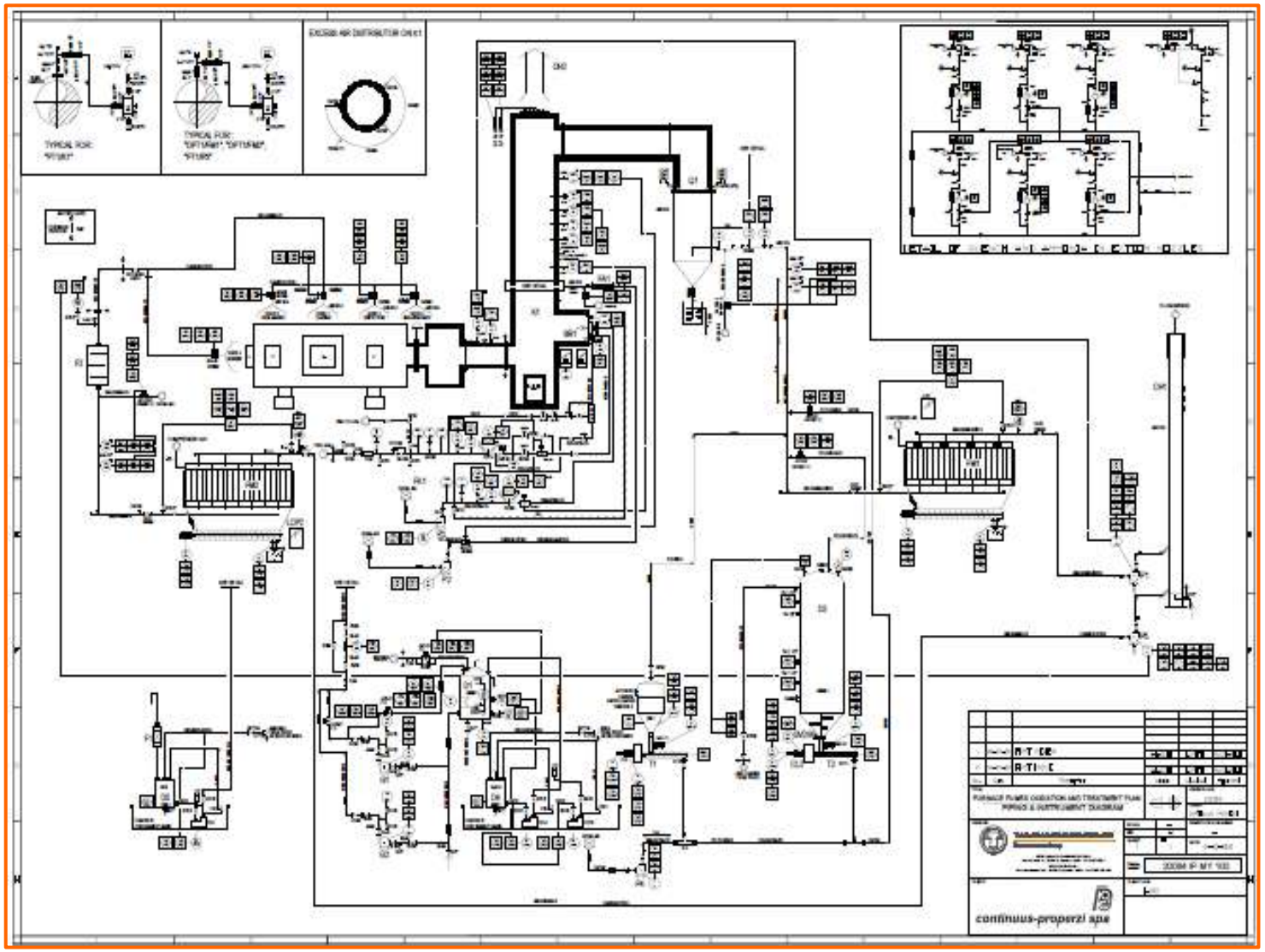
- Hoods / Ventilation of Furnace Environment;
- Waste Heat Recovery Systems ;
- Regenerative Thermal Oxidizers (RTO) applications.

Process Design



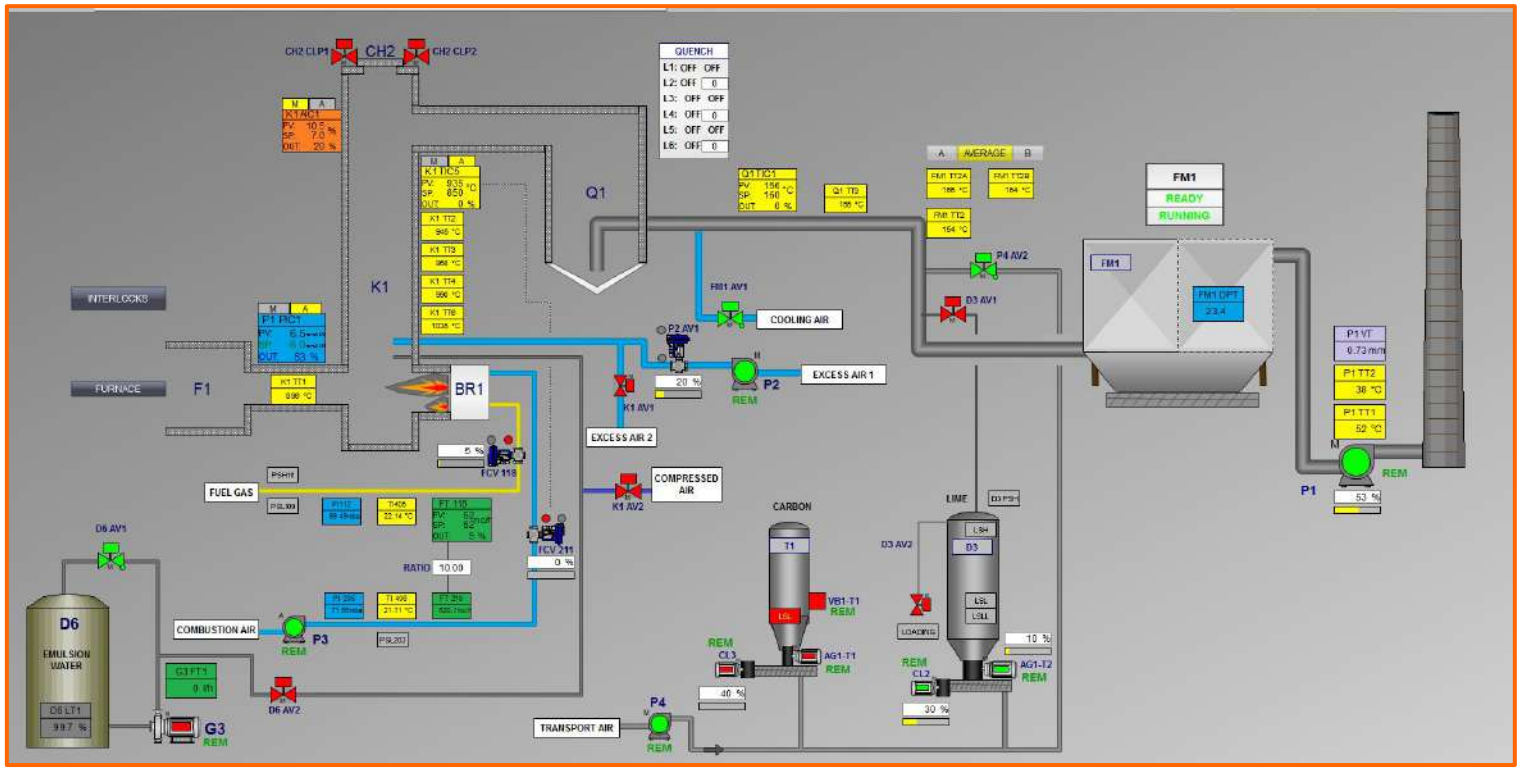


ANSYS® FLUENT®



Control system

TM.E. plants are completed by a control system which permits to manage all the variables in the plant, such as oxygen concentration, pressure and temperature.

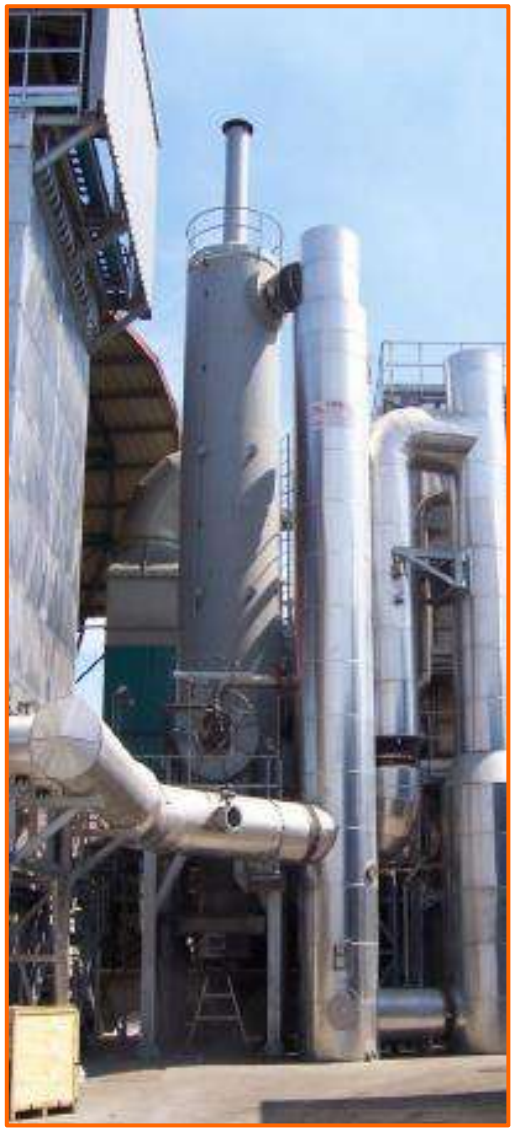


The control system is designed to permit real time plant checking.

It is also possible to provide the remote assistance from our headquarter to ensure technical support for the plant operators.

Typical process data in copper smelting

- **Source of wastes**: air from copper scraps foundry / Shaft Furnace
- **Pollutants in Flue gas:** HCl, HF, SO2, CO, VOC particulate
- **Oxidation Temperature:** 850 °C
- **Minimum Residence Time:** 2 sec
- **Plant sections**: Thermal oxidation, Quench, Dry abatement with chemical injection and final scrubber



TME's technologies for processes in copper smelting

Thermal oxidation section

This section is dedicated to the thermal oxidation of the pollutants present in flue gas coming from copper furnace.
Key points:

- VOCs and CO abatement by means of thermal oxidation;
- Possibility to oxidize the methane slip coming from the copper furnace;
- Burning system adjustable to the different stages of the copper smelting process.

TME's technologies for processes in copper smelting

Wet and dry purification section

Flue gases containing acid compounds (such as HCl, Cl2…), SOx, dioxins and furans or high concentrations of NOx can be treated with:

- Quenching Tower with Caustic Solution Injection;
- Hydrated Lime, Sodium Bicarbonate and Pulverized Activated Carbon Injection;
- Wet Scrubbers / Packed Towers / Spray Driers;
- DeDioxins Units;
- Emulsion Water Injection Lances; SCR/ SNCR DeNOx systems.

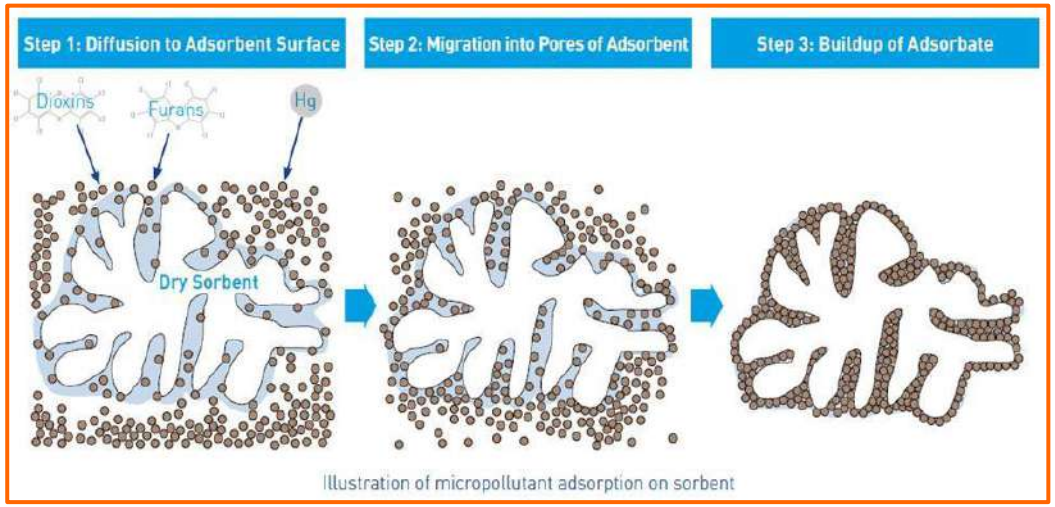
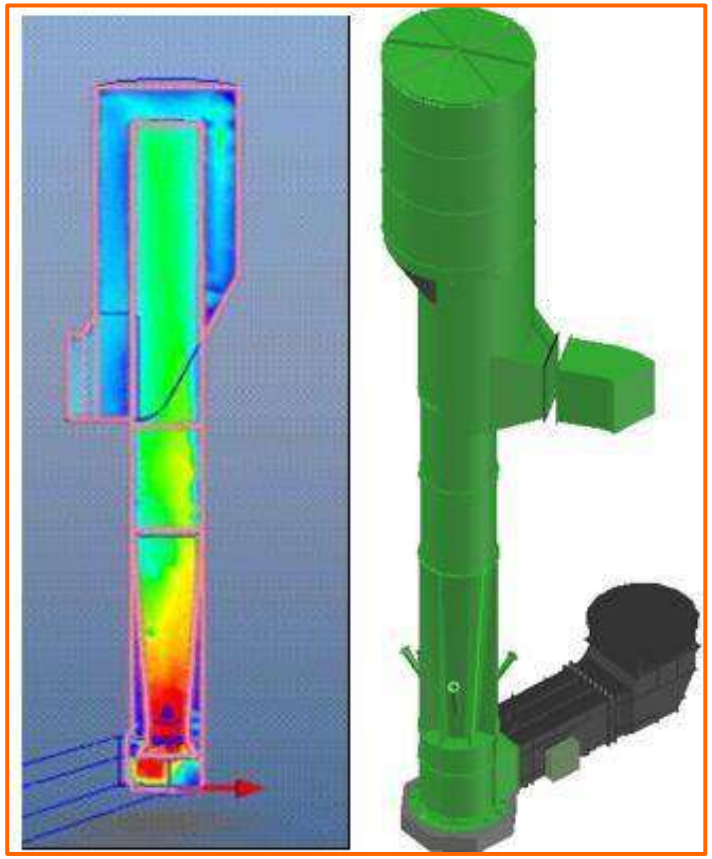
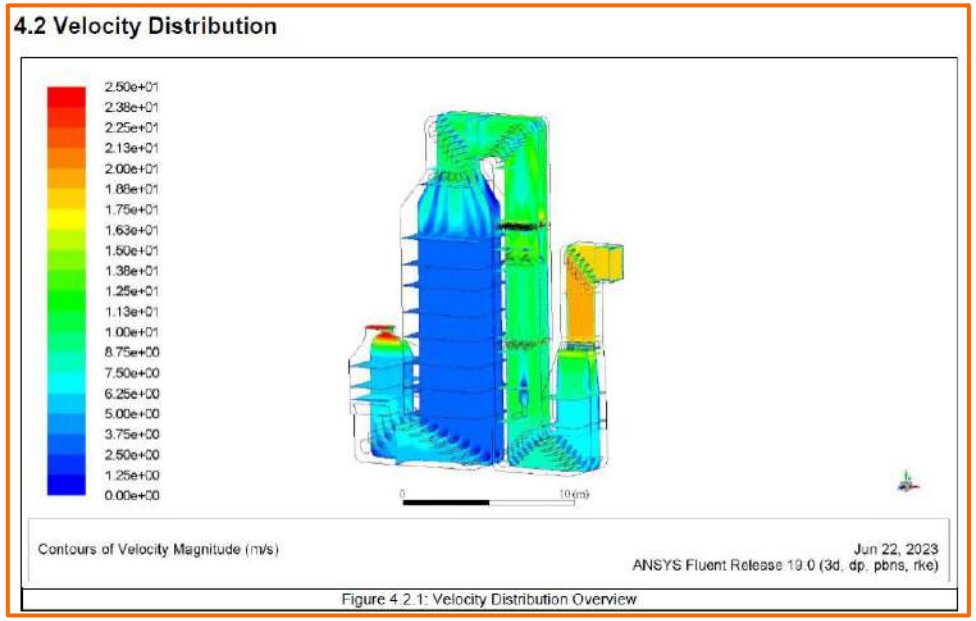


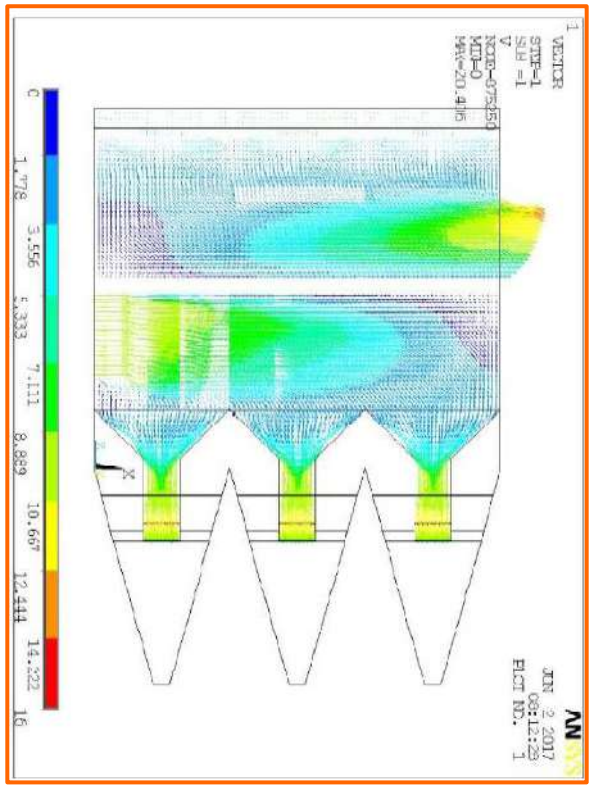
Illustration of micropollutant adsorption on sorbent



TME's technologies for processes in copper smelting

Wet and dry purification section





TME’s technologies for processes in copper smelting

From left to right: Lime silo, Baghouse filter, post-combustion chamber

TME’s technologies for processes in copper smelting

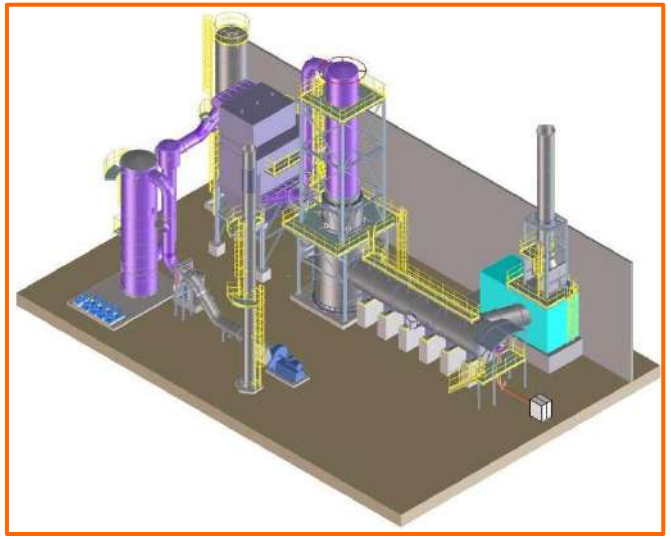
From left to right: Post-combustion chamber, Lime silo, baghouse filter and stack

TME’s technologies for processes in copper smelting

EXPERIENCE 1	
Source of wastes	**Waste gas from copper foundry**
Capacity	**20000 Nm^3/h**
Pollutants in Air	**HCl, SO_2, CO, VOC particulate**
Oxidation Temperature	**850 °C**
Residence Time	**2 s**
Material of Construction	**AISI 316 SS**
Plant sections	**Heat recovery section, Quench, Dry abatement with chemical injection**

TME's technologies for processes in copper smelting

EXPERIENCE 2	
Source of wastes	Waste gas from copper foundry
Capacity	25000 Nm^3/h
Pollutants in Air	HCl, HF, SO_2, CO, VOC particulate
Oxidation Temperature	850 °C
Residence Time	2 s
Material of Construction	SAF 2507 / AISI 316 SS
Plant sections	Quench, Dry abatement with chemical injection and final scrubber



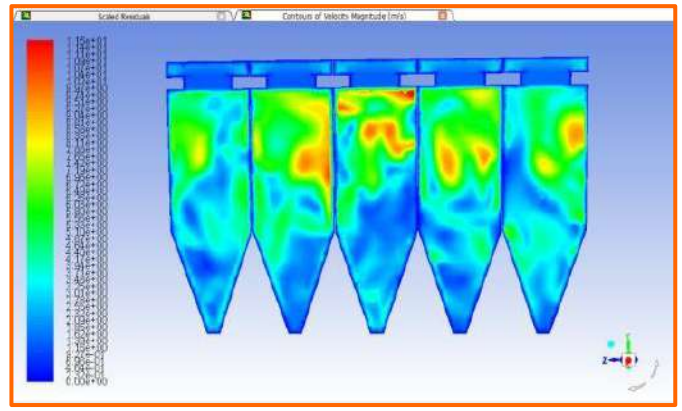
TME's technologies processes for flue gas treatment

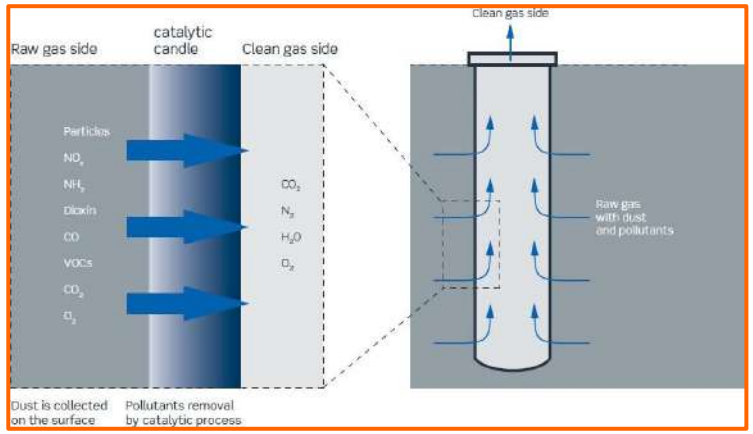
Semi-Dry Unit

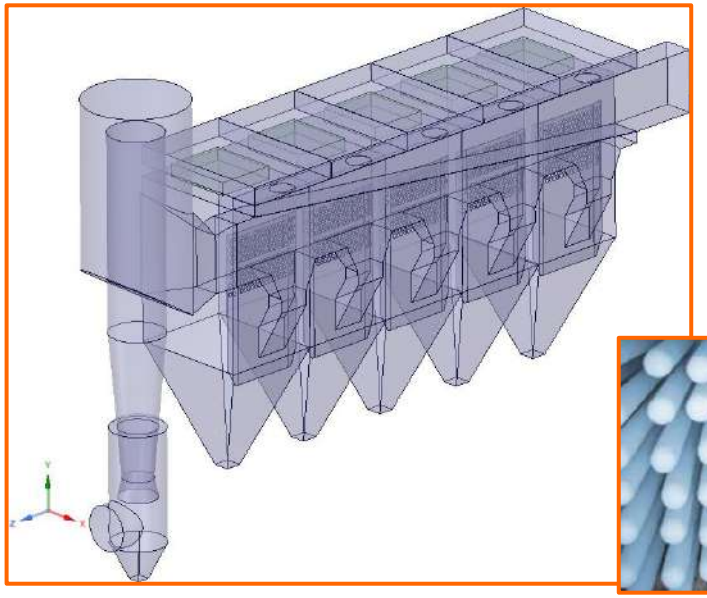
Absorption Towers

TME’s technologies processes for flue gas treatment

Baghouse/Candles Filter







TME’s technologies processes for flue gas treatment

Flue Gas (VOC polluted) Treatment options

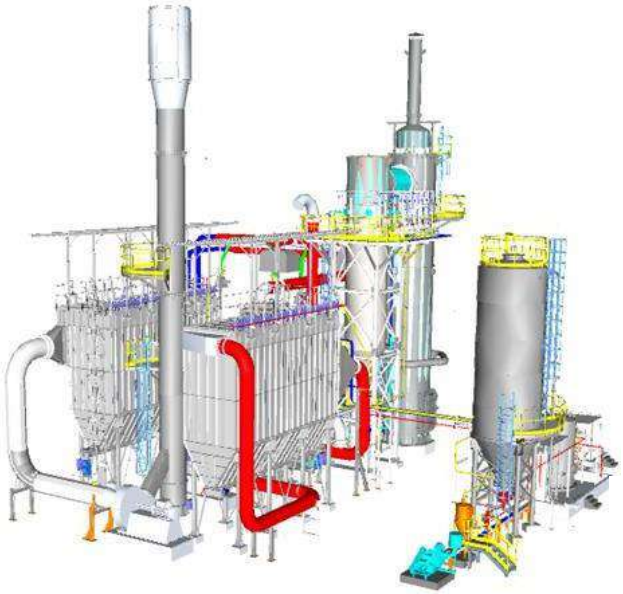
TME can provide different solutions, including:

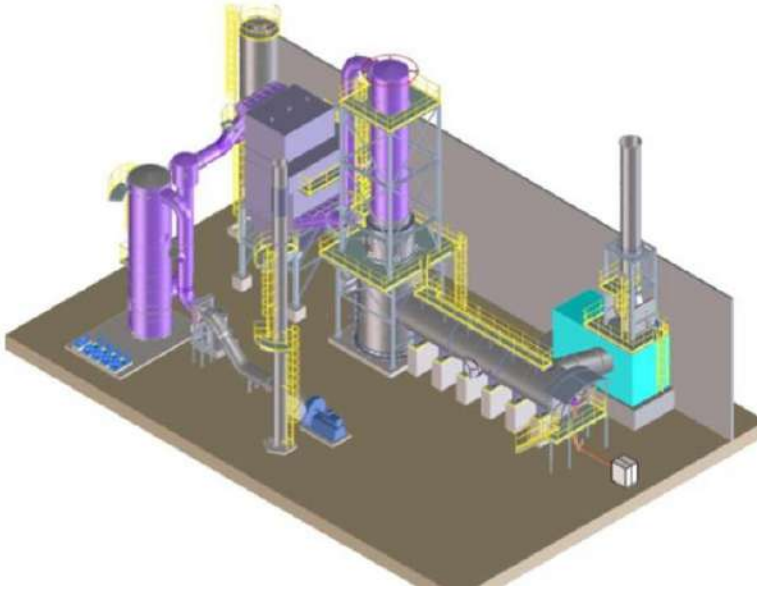
Regenerative Thermal Oxidizer (RTO)

Thermal Oxidizer (TO)

TME study case by case the best solutions to meet clients requests/needs .

TME & 3D Modeling





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