



tialoc

Incinerators & Thermal
Oxidisers
Energy-from-Waste
Systems



Full Service Environmental Systems Provider
General Contracting
Dual Laminate Pipe & Tank Systems

tialoc

2020.2

Introduction to TIALOC GROUP

We are a leading technology company offering turnkey solutions to industrial clients across the world

Who are we?

- Established in 2001, Tialoc Singapore Group (“**Tialoc**”) is a German-originated group with a proven track record in providing turnkey solutions to its industrial customers in the field of plants and facilities, environmental technology systems as well as composite process equipment
- It is mainly engaged in the following business segments:
 - **Environmental Technology**
 - **General Contracting**
 - **Composite**
- Tialoc serves a wide range of multinational companies (“**MNCs**”) and large local customers in key industrial markets, especially in:
 - Waste-to-Energy (“WtE”) and renewable energy
 - Chemical / Petro-Chemical
 - Pharmaceutical
 - Fine Chemical
 - Semiconductor / Electronics

Company highlights



Offices in Singapore, Malaysia, China, Vietnam, Belgium

Manufacturing facilities in China

References in all major Asian countries and the rest of the world with selected key accounts



900+ Employees

from 20 nations and regions

75% male, 25% female



Performance

- Revenue: EUR 185mn (FY2019)
- Projects: 500+
- Clients: 200+
- Countries: 20+

We design and execute
Environmental Payback Projects

by turning an environmental problem into a revenue stream for our clients

Energy production using industrial effluents, gaseous & solid waste streams and by-products

- Advanced burners
- Incinerators and thermal oxidisers
- Boilers and heaters

Product recovery

- Vapour recovery units (VRU)
- Flare gas recovery (FGRU)
- Sulphur recovery units (SRU)

Safety and environmental protection

- ATEX zone 0 vapour extraction and treatment systems
- Elevated and ground flares
- deNOx and flue gas cleaning systems

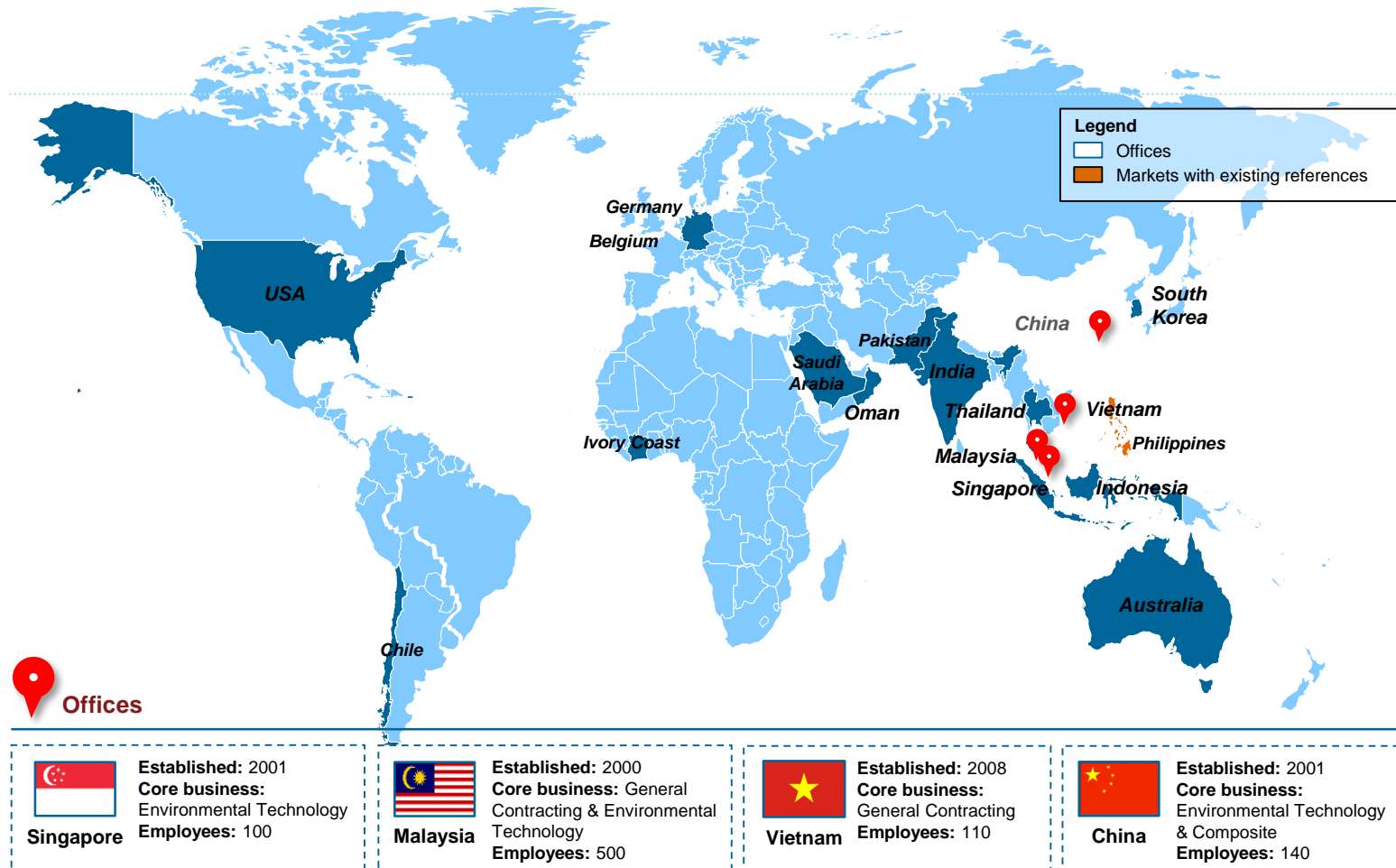
**20 years of Track Record
>1000 Waste Streams Treated**

Proprietary Technology

**Providing Heat from Waste
for 1.5 million People Each Year**

**Saving approx. 6 billion kilo of CO2
Each Year**

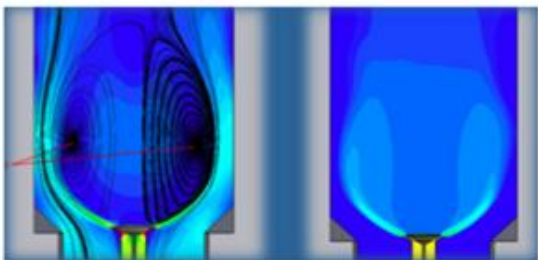
With offices in Singapore, Malaysia, Vietnam, China and Belgium Tialoc has delivered projects to clients globally



Proprietary Core Technologies

Tulip Vortex Venturi Burners

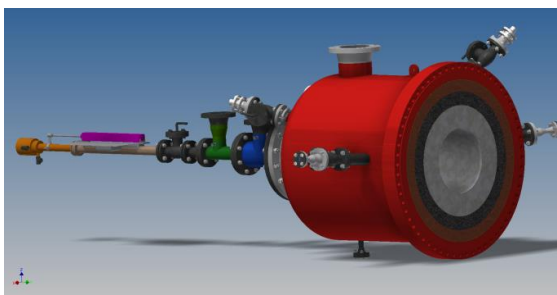
Complete and fast single stage combustion process in a short flame but at high flame temperatures and stoichiometric O₂ ratios, whereby NO_x formation is reduced through speed of combustion and internal mixing and recirculation of the gas flow (applied in ground flares, thermal oxidizers, incinerators, SRU burners, ammonia (NH₃) burners). Avoids need for a pre-combustion chamber and a long burner chamber (compact design).



TVV Burner, AkzoNobel



VFH Burner
in Combustor



SRU MCC burner for BORE refinery, India

Venturi Flame Holder

A flame holder for flare tips and combustor burners, stabilizing the flare's flame under varying (low) load conditions. Also facilitates combustion of waste gases that can change from being low calorific to being high calorific and vice versa.



Before

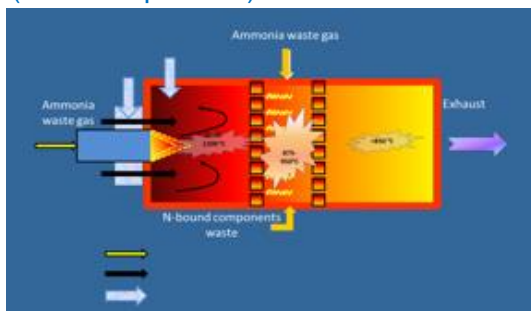


After

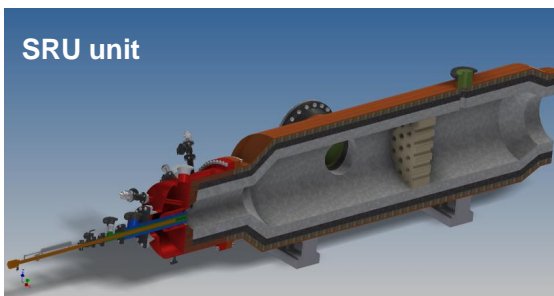
Proprietary Core Technologies

Oxidation-Reduction Concept

A two-stage process whereby waste gas streams that contain ammonia or H₂S are split into two separate streams. The first stream is oxidized in the (Tulip Vortex) burner whilst the second stream is mixed with the combustion gases of the first stream behind a mixing wall placed in the combustion chamber. The resulting reactions yield elemental Sulphur (SRU process) or Nitrogen (ledenOX process).



SRU unit



NRL refinery, India

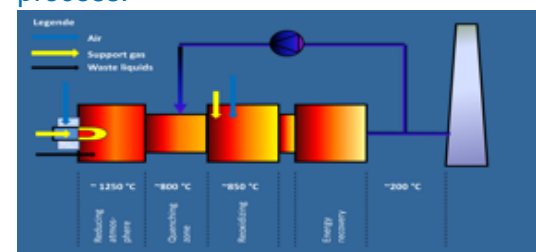
ReduReox plant



AkzoNobel, Mons, Belgium

Redu-Reox Concept

A two-stage process whereby chemical components (often nitrogen containing volatile organic components (VOC)) are first thermally decomposed in an O₂ deprived atmosphere (lambda 0.6-0.7) followed by a complete combustion in an oxygen rich atmosphere (lambda 1.2-1.25) (low NO_x formation). Also used to improve conversion of solid and liquid waste to energy (steam, power) because of lower overall excess oxygen needed to complete the combustion process.



Intellectual Property

Subject	Title of Patent	Status	Date of Issue	Expiration Date	Patent Number
Gas phase photocatalytic spiral reactor for fast and efficient pollutant degradation	Photocatalytic Reactor for oxidation of VOC's in vapour streams	Issued	24-10-2016		16179467.7
ReduReox Process	Een verbrandingsproces en een ovenstroom voor het verbranden van organische stoffen.	Issued	11-06-2019	8-11-2037	BE 1025691
LedeNOx Process	Werkwijze en systeem voor het verbranden van afval dat stikstofgebonden bestanddelen omvat.	Issued	4-06-2019	8-11-2037	BE 1025690
2-stage SRU	Een werkwijze en een systeem voor het herwinnen van zwavel uit een zwavelafval.	Issued	30-07-2019	29-12-2037	BE 1025857
TV2 burner	Brander voor een afvalverbrandingssysteem.	Issued	30-07-2019	29-12-2037	BE 1025856
VFH Burner	Vlamafscherming voor een brander	Issued	31-07-2019	29-12-2037	BE 1025863
HI Combustion Process	Een proces en systeem voor het verbranden van afval	Issued	31-07-2019	29-12-2037	BE 1025864
Split Boiler	Systeem en werkwijze voor warmterecuperatie en reiniging van een uitlaatgas van een verbrandingsproces.	Issued	11-06-2019	8-11-2037	BE 1025689
VIP Control	Dampverbrandingssysteem- en werkwijze met verbeterde regeling.	Issued	15-07-2019	15-12-2037	BE 1025785
VRU-VCU	Dampverbrandingssysteem- en werkwijze met verhoogde capaciteit.	Issued	17-07-2019	15-12-2037	BE 1025798
Vapour Absorption and Recovery Unit	Dampbehandelingseenheid	Issued	31-07-2019	15-12-2037	BE 1025868
Mixed Zeolite Bed + Regeneration Strategy for VRU	Verbrandingssysteem en proces voor het verbranden van een gas in een verbrandingssysteem.	Issued	17-07-2019	15-12-2037	BE 1025793
Burner Tip With Internal Cooling	Designed for 3D printing. Internal cooling of exposed burner tip by either air, fuel or cooling fluid			Under development	
VOC Recovery & Polishing Module	Unit for VOC recovery from tanks by condensing the VOC in a cooled volume of the same. Polishing unit installed to meet emission limits			Under development	

Know-How and Design Tools

Proprietary Engineering Tools

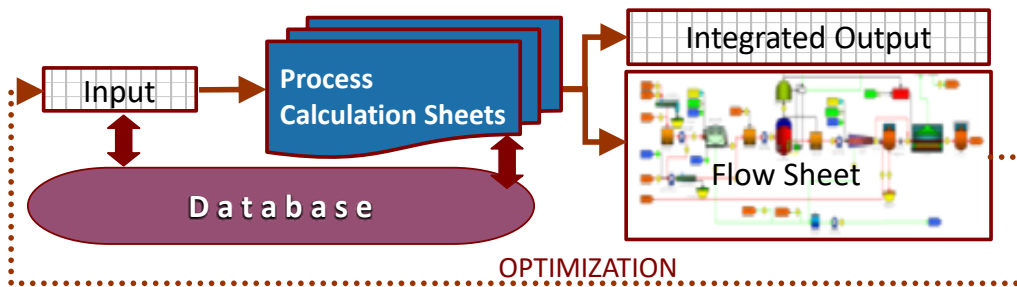
- Process Design Software for
 - Burners
 - Incinerators, combustors, thermal oxidizers
 - Energy from Waste plants
 - Flue gas treatment systems
 - Vapor recovery and treatment
 - Flares and flare gas recovery
- Mechanical Design Software for
 - Burners and Flare Tips
- Process Control Software for
 - Burners and Vapour Treatment Systems

Standard Engineering Packages

- Computational Fluid Dynamics: Numeca (Fluent)
- 3D mechanical design:
 - AutoCAD Plant 3D / PDS
 - Inventor
 - Autodesk Navisworks Simulate
- Heat Transfer: SimuTherm
- EICA Design: E-plan, Siemens WinCC/S7
- Finite element analysis: AutoCAD Revit Structure/Tekla
- Project management and control: MS Project

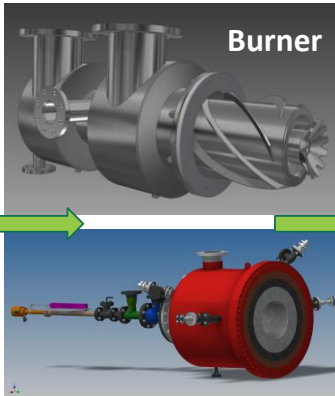
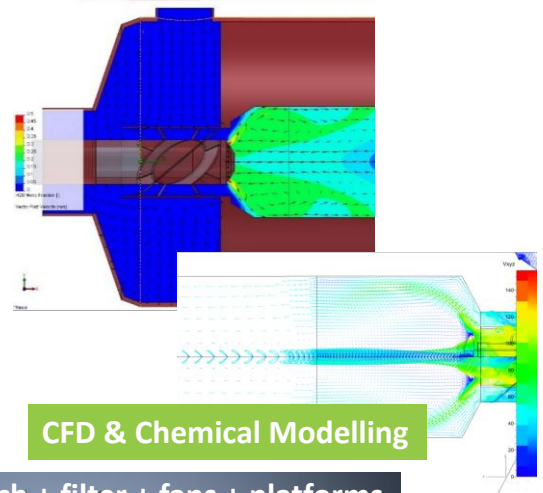


Design Process



Heat and Mass Balance + Equipment Sizing

CFD & Chemical Modelling



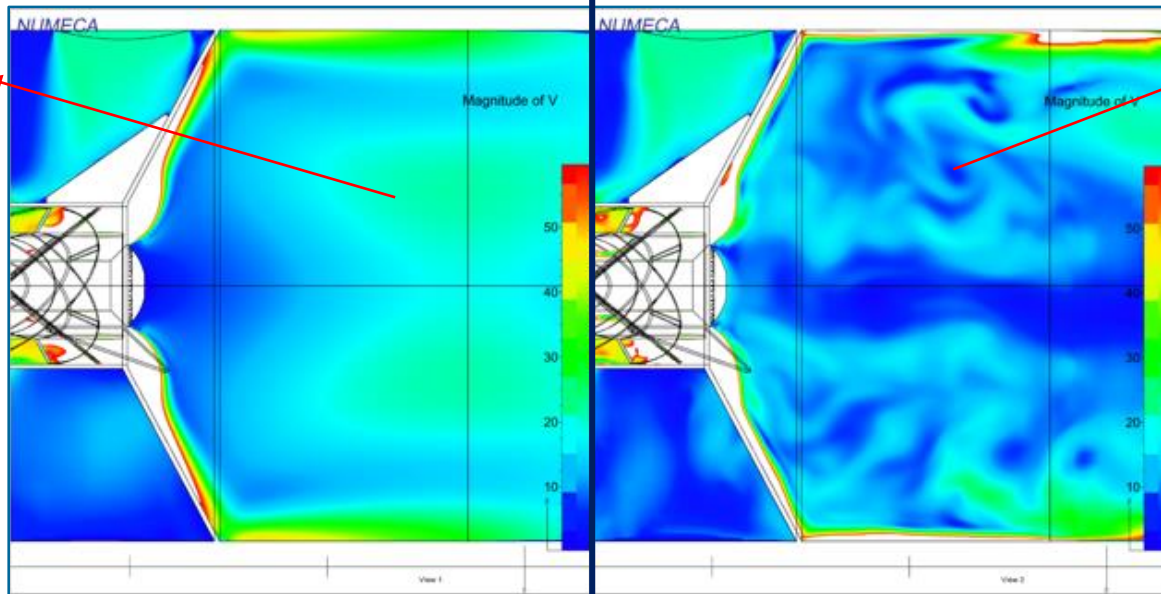
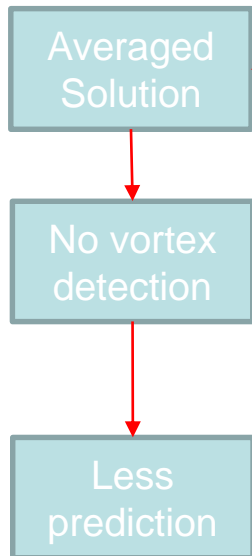
3D Design of Components and Sub-assemblies

Full 3D Model of Plant including Walk-through

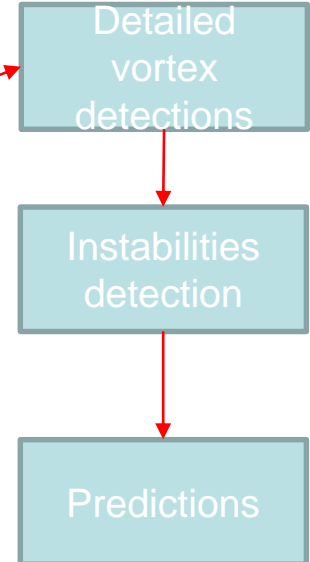
Research & Development

Computational Fluid Dynamics, Chemical Kinetics,
Chemistry Mechanism for Waste Combustion Processes and Burners

CFD RANS – Averaged Equations



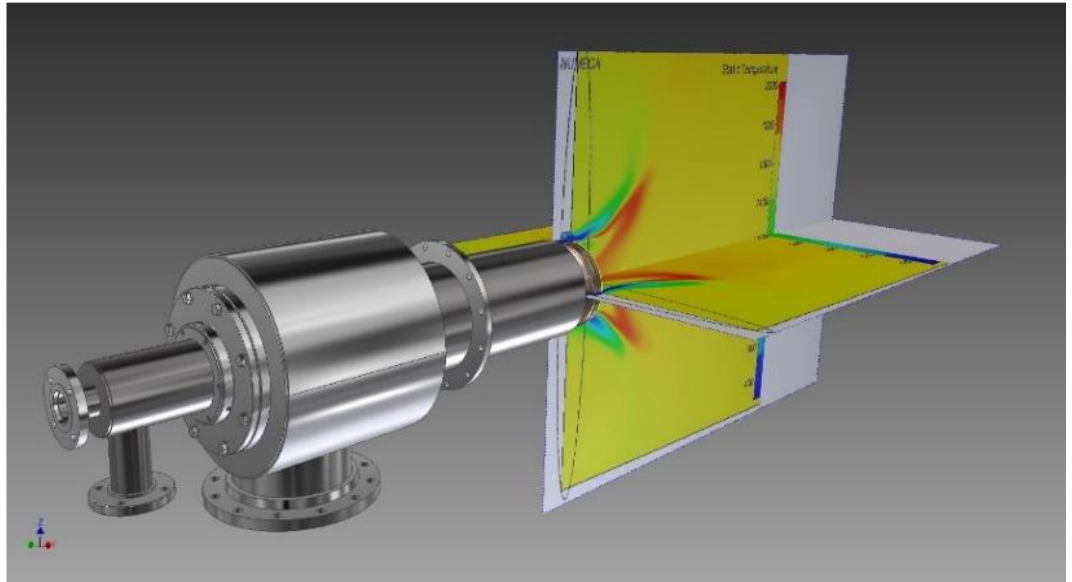
CFD LES – Detailed Equations



Time consuming **NO investment** **NO accuracy** Power computing

Time consuming **Investment** **Accuracy** Power computing

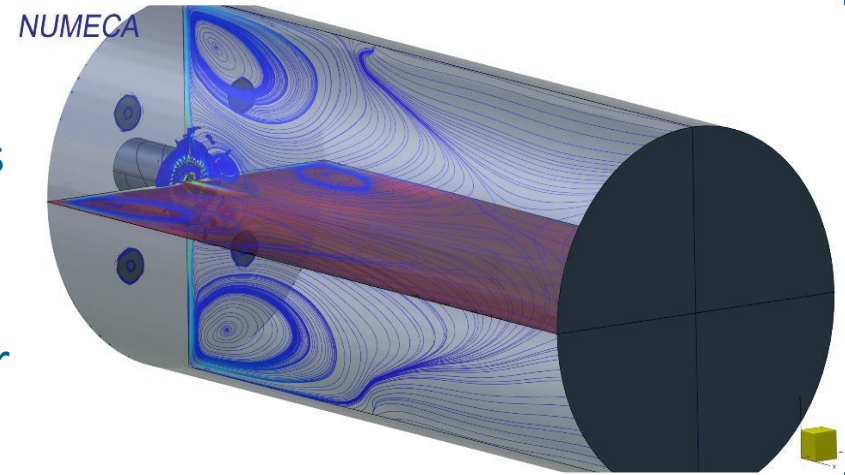
Ultra Low-NO_x Multifuel/Flexifuel Burners



Principles of Ultra Low Nox Burners

Low NOx-low CO combustion achieved by

- Short flame Thin flame
- Controlled flame temperature
 - Flue gas recirculation or air/waste gas premixing
- Staged combustion by staged air
 - Central and peripheral combustion air
- Excellent mixing by double swirl
 - Combustion air and/or waste gas
- Internal flue gas recirculation
 - Venturi effect at burner gun
- Liquid atomisation to obtain gas-like combustion of liquid fuel/waste
 - Ultrasonic injection lance



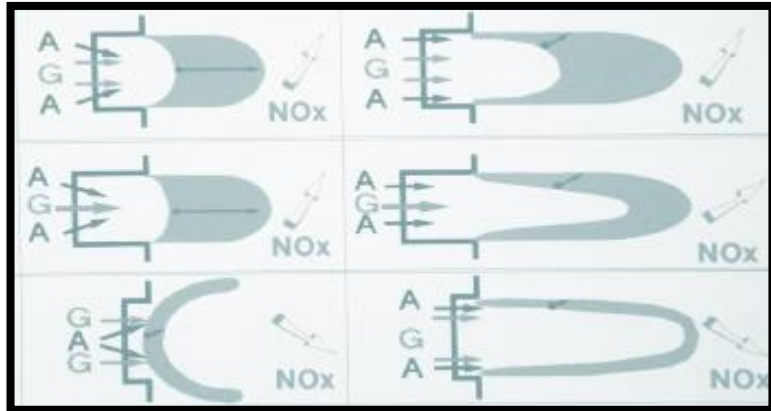
Principles of Ultra Low Nox Burners

Flame Types

- B

- C

- D

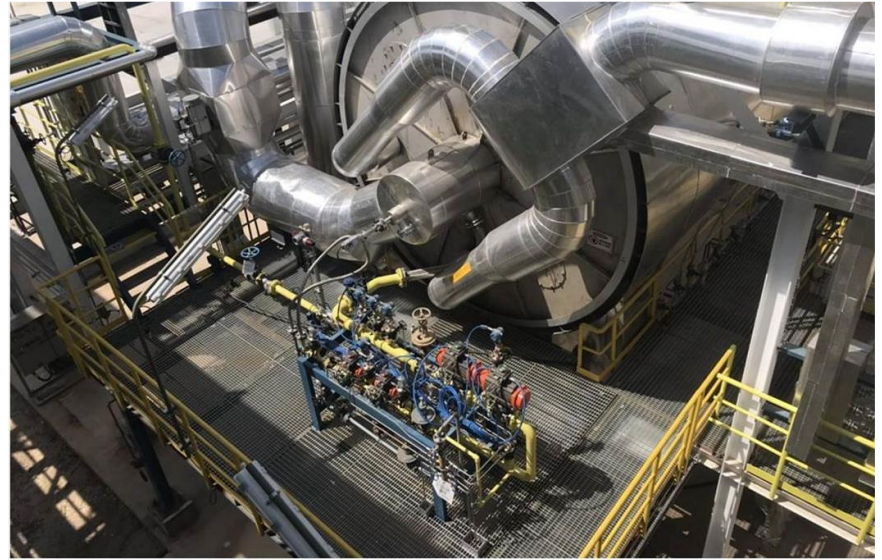


Typical NOx Levels (mg/Nm³)



Conclusions

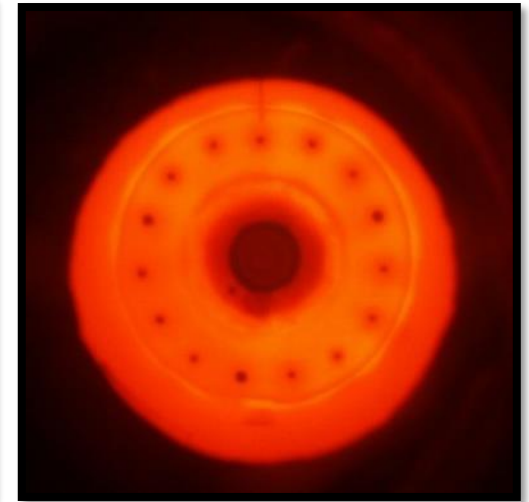
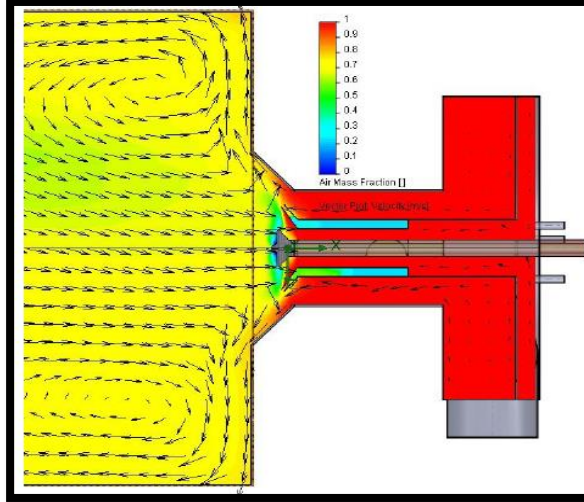
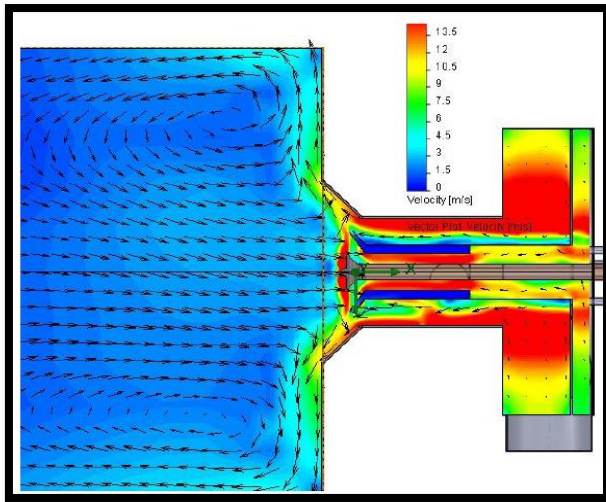
- Shape and temperature of flame determine NO_x formation
- Temperature of flame controlled by flue gas recirculation or combustion air/lean gas mixing
- Burner internals will ensure good mixing between fuel and air. Swirl in front of burner produces excellent mixing and controls flame length
- Staged air results in staged combustion and minimisation of thermal NO_x formation
- Ultrasonic liquid atomisation results in gas-like combustion of liquids
- **Job specific burner design based on CFD modeling ensures optimal performance for a given fuel or fuel mixture**



Ultra Low NOx MultiFuel Burner

- **Tulip Vortex Venturi (TV²) Burner**
 - Fast and complete oxidation of fuel using a short, thin flame
 - Combustion chamber is no longer required
 - Colour of the flame (light blue transparent) illustrates fast oxidation of hydrocarbons, including carbon
 - Fast and compact combustion = high flame temperatures → high NOx formation potential
 - This does not occur if the burner design reduces the residence time of N₂ in the high temperature zone
 - Affinity of oxygen for carbon and hydrogen > affinity for nitrogen
 - NOx is only formed if residence of nitrogen in high T zone is too long
 - By minimising the excess oxygen in the flame front, NOx formation is further minimised

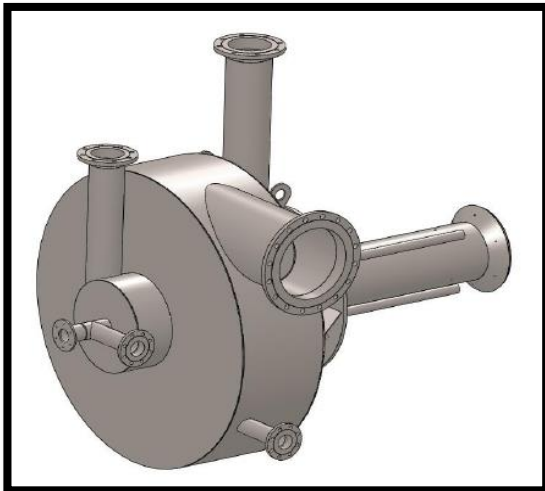
Ultra Low NOx Multifluids Burner



Velocity profile (left) and concentration (right) in the burner during combustion of waste liquids and waste gases. The incinerator walls are cooled by the peripheral combustion air. A strong recirculation in the centre ensures a stable and controlled flame and low CO and NOx formation. A uniform distribution of the concentration is immediately obtained

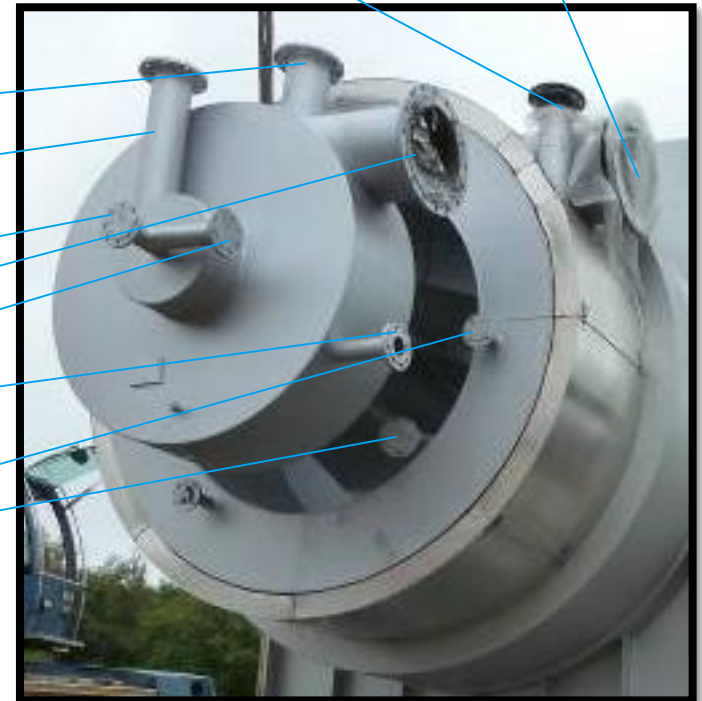
Ultra Low NOx Multifluids Burner

Typical external configuration of a Multifluids burner for gases and liquids



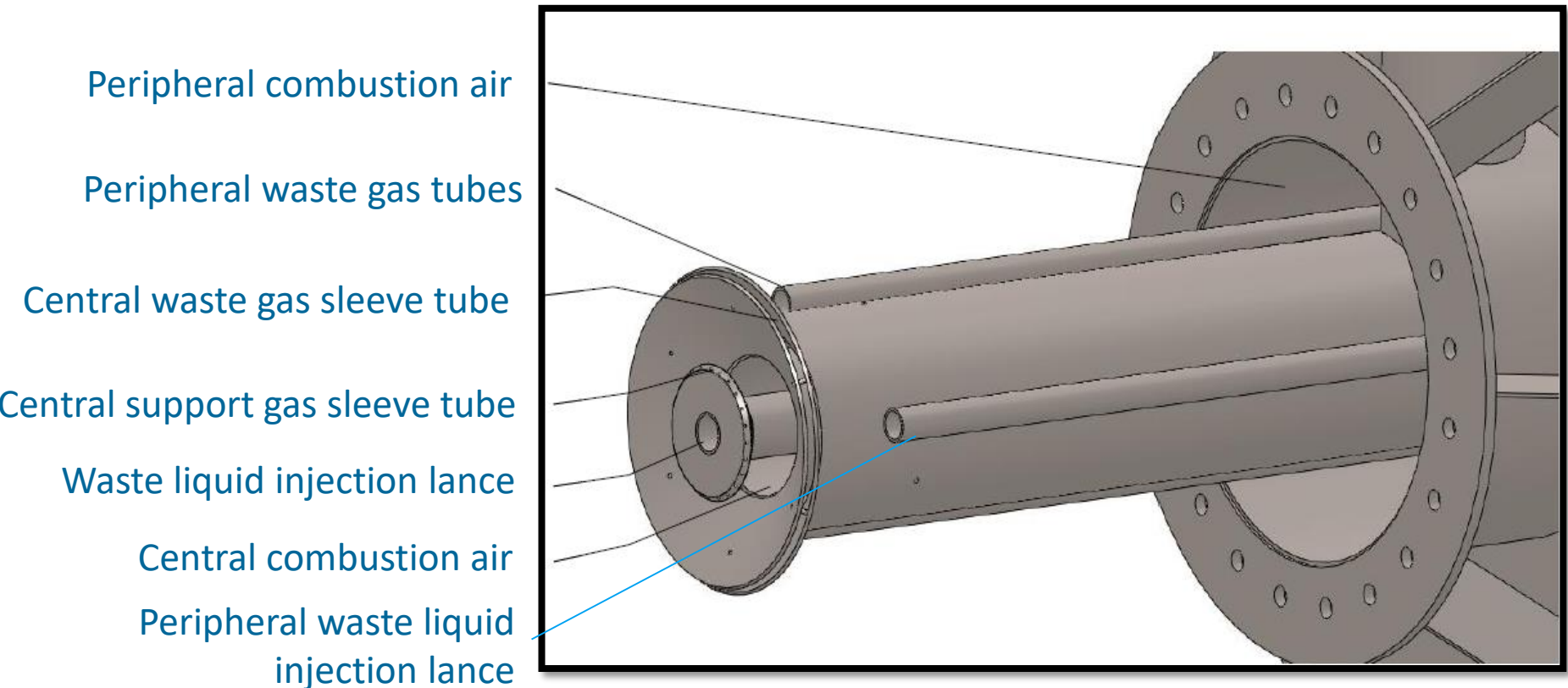
Flue gas recirculation
Waste gas

Lean Waste Gas
Rich Waste Gas
High LHV Waste Liquid
Combustion air
Support gas/fuel
Steam
Waste gas or liquid
Pilot Burner

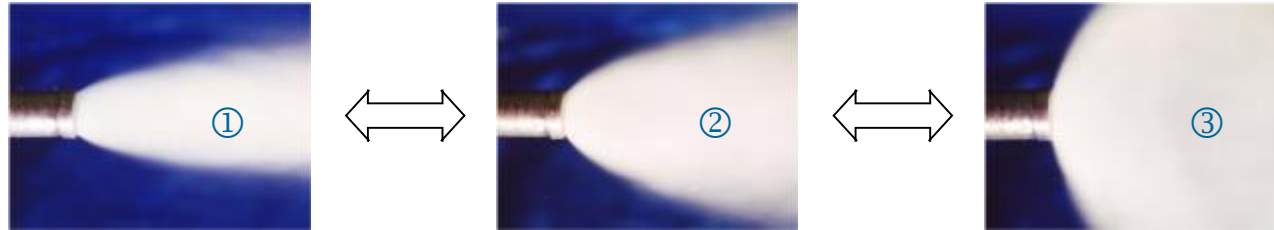


Ultra Low NOx Multifluids Burner

Typical internal configuration of an Europem Multifluids burner for gases and liquids



Liquid Burners: Ultra Sonic Atomization



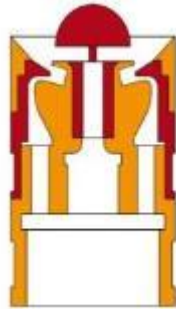
Integrated design of burner, HI combustion chamber and ultra sonic atomisation nozzles:

- ‘Tulip nozzle ‘ with different “flame former rings”
- right shape for atomization in the HI zone
- avoids high concentration of combustibles close to nozzle
- Eliminate formation of cokes and CO
- Eliminate plugging of burner nozzles

N .. SR — C



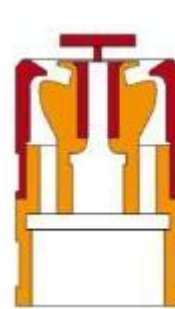
N .. SR — M



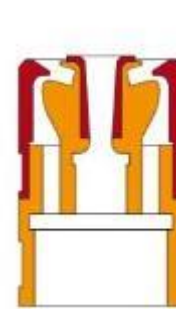
N .. I — C



N .. I — M

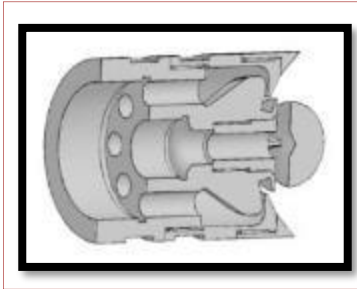


N .. I — S



Liquid Burners: Ultra Sonic Atomization

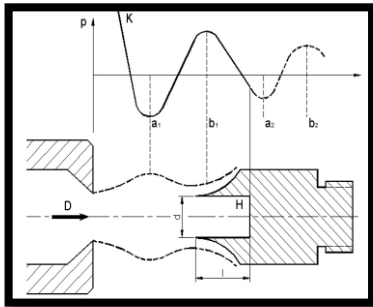
ULTRASONIC ATOMIZER-HARTMANN GENERATOR



Liquid fuels such as fuel oil, sulfur, residues, liquor, sludge or acid can be atomized using Ultrasonic Nozzle.

Uses an atomizing fluid such as superheated steam or compressed air.

Operates based on the Hartmann Generator principle developed in early 1970s
In 2007, the nozzle was optimized, now has a fuel turndown ratio of 3:1 to 10:1.



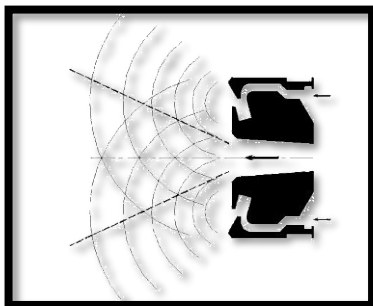
Hartmann Generator principle:

Through a jet nozzle (D), a gaseous fluid flows with supercritical pressure ratio – meaning sonic speed.

A periodical structure will build up in the stream (dotted line).

Graph K shows the pressure cycles along the length of the gas stream.

Oscillations occur by filling (pressurizing) and deflating the hollow space H.



A Hartmann Generator is placed as a concentric ring around a central liquid fuel pipe.

The high exit speed of the atomizing fluid (compressed air, steam or combustible gas) alone achieves a rough atomization, caused by the negative pressure.

The ultra-sonic effect created by the Hartmann Generator oscillates the pre-atomized droplets at a high frequency, and further fragments the droplets into a very fine mist.

Tulip Vortex Venturi Burner Models

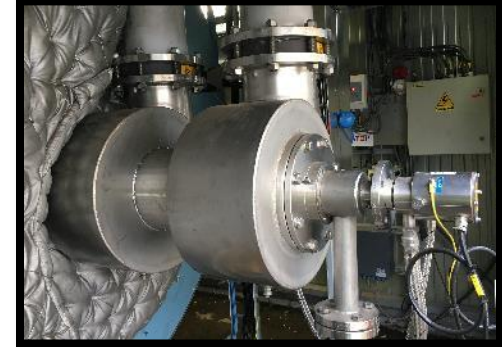
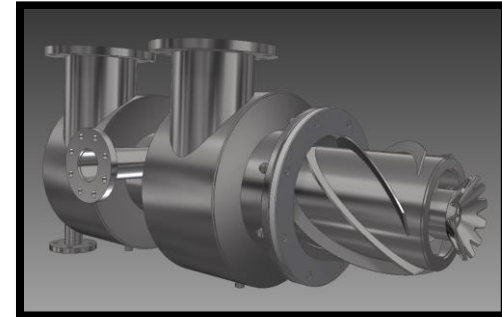
- Flexifuel: multifuel burner, one combustible at the time
 - gas/liquid/gas/liquid
- Multifuel: multifuel burner, different combustibles simultaneously
 - gas/liquid/gas+liquid



NG/Hydrogen Flexifuel



NG/Hydrogen/Slurry/Waste Gases Multifuel



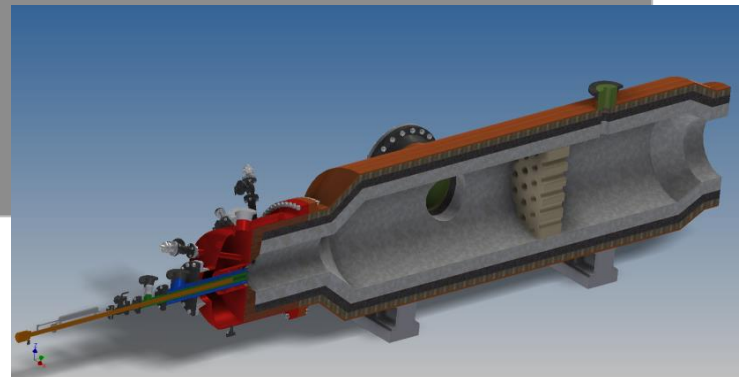
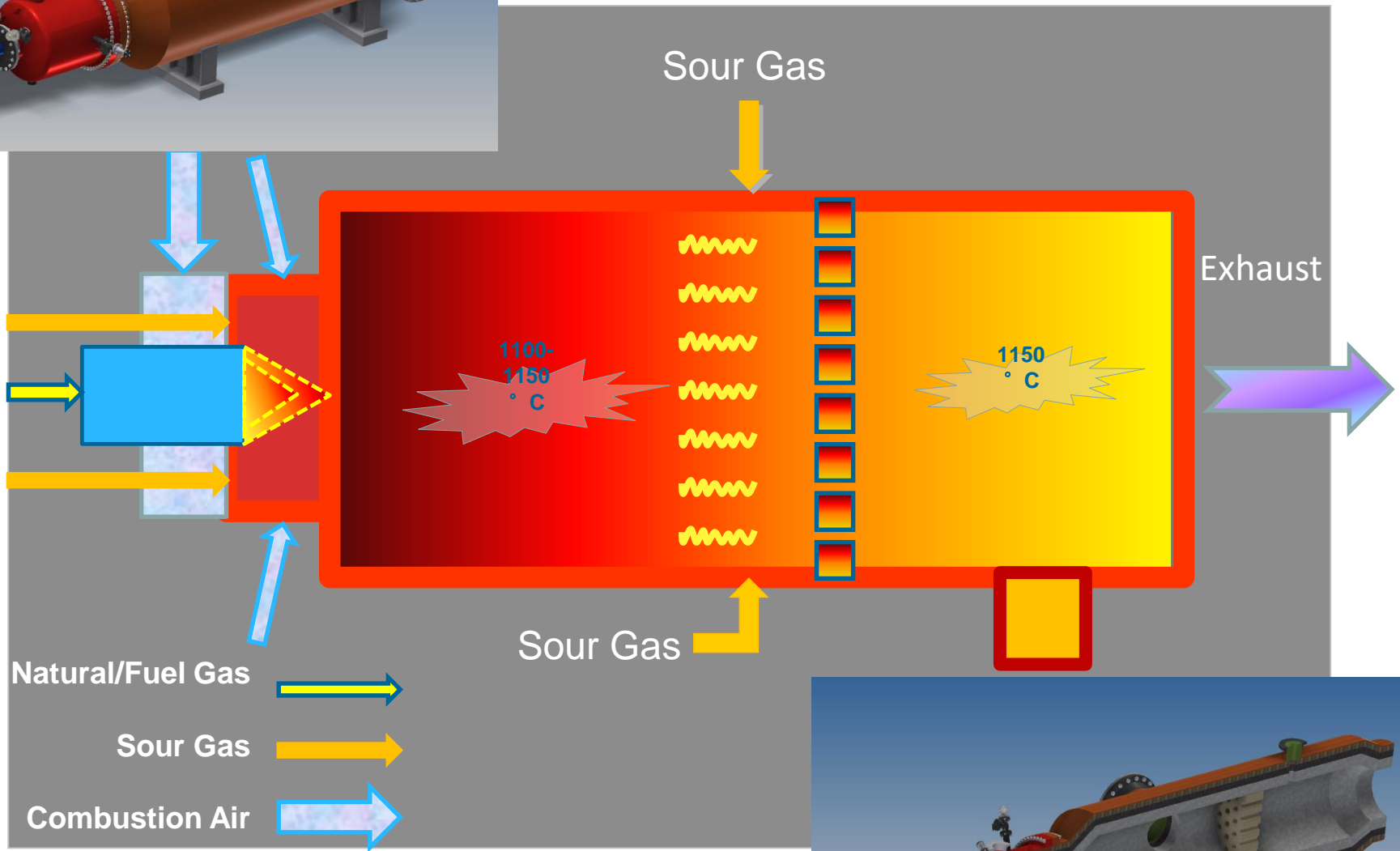
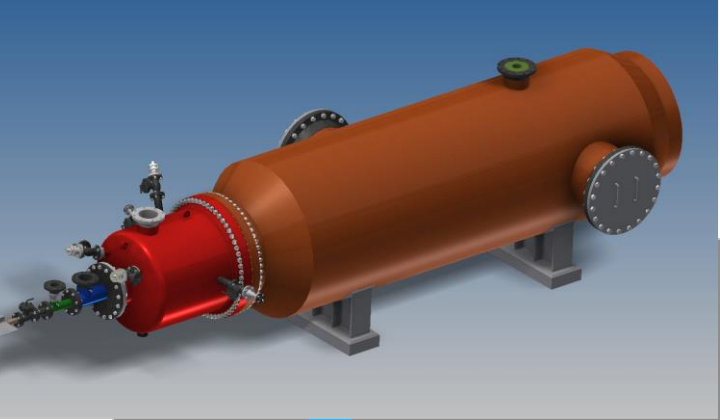
NG/Waste Gas Multifuel

Sulphur Recovery Units

Thermal Reactor and Tailgas



Sulphur Recovery Units



SRU

SRU = Sulfur Recovery Unit:

For waste air / gas streams containing a substantial percentage of H₂S

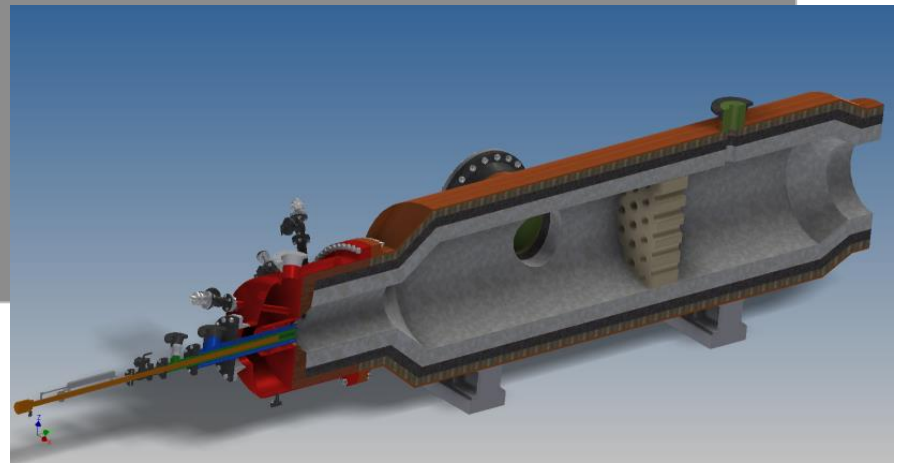
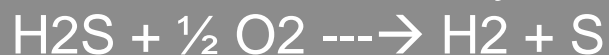
The first step of the Claus process is the complete free-flame oxidation of 1/3 of the H₂S to SO₂ in a reaction furnace:



The SO₂ and the remaining H₂S then undergo the Claus reaction both in the reaction furnace and a series of catalytic reactors:

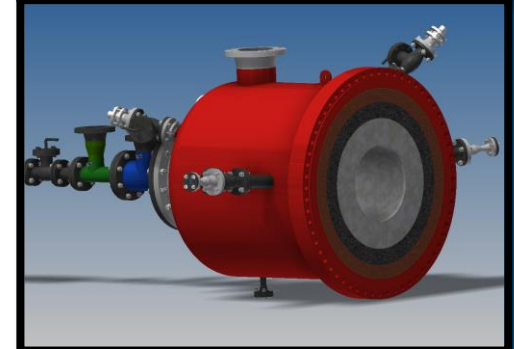
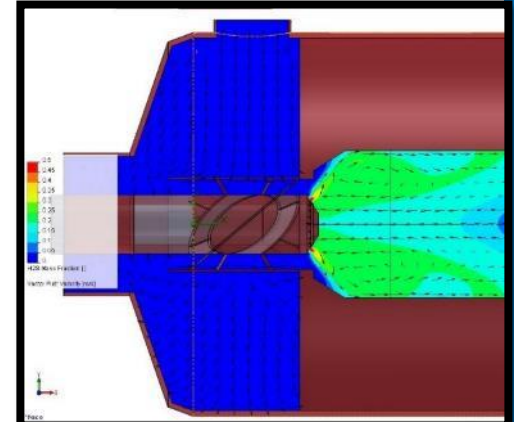


The overall chemistry is:



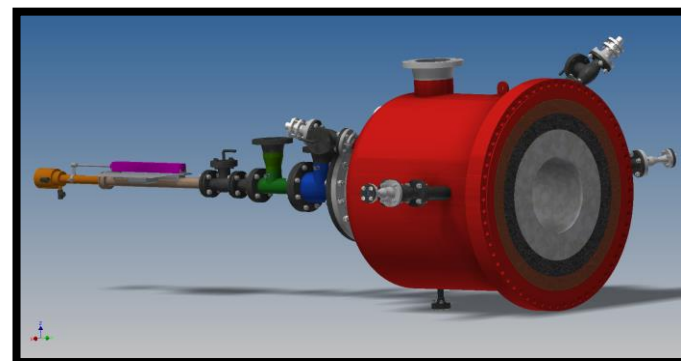
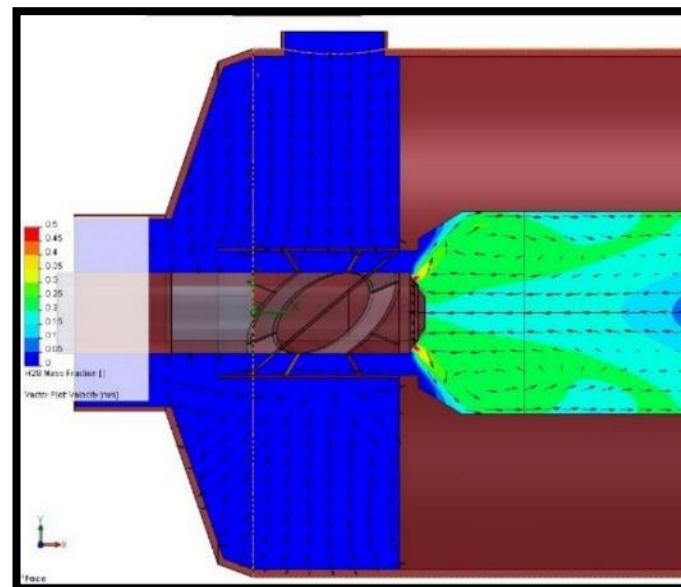
Sulfur Recovery Unit Burners

- **Burner Designs**
 - Thermal Reactor Burner
 - Tail Gas Incinerator Burner
- **Concept & Advantages**
 - Short flame → ultra low NO_x
 - Flame contained in burner housing → economical design
 - Double swirl → high intensity mixing
 - Internal recirculation → uniform reactions
- **Advantages**
 - Ultra low NO_x and CO (<80 and <5 mg/Nm³ resp)
 - Ultra pure S
 - No ammonia sulfate contaminations
- Developed using CFD Modelling in combination with over 25 years of experience with operating SRU burners



Sulfur Recovery Unit Burners

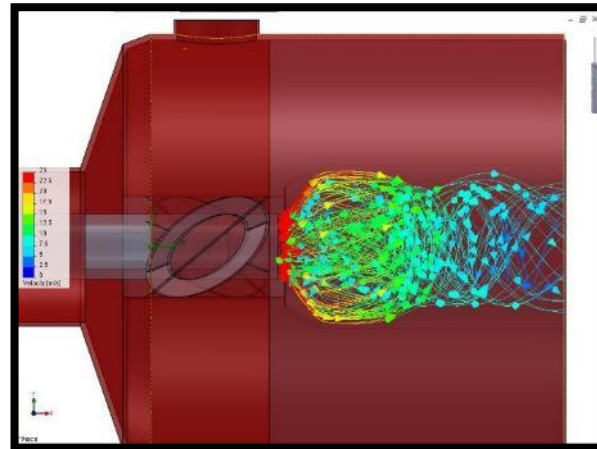
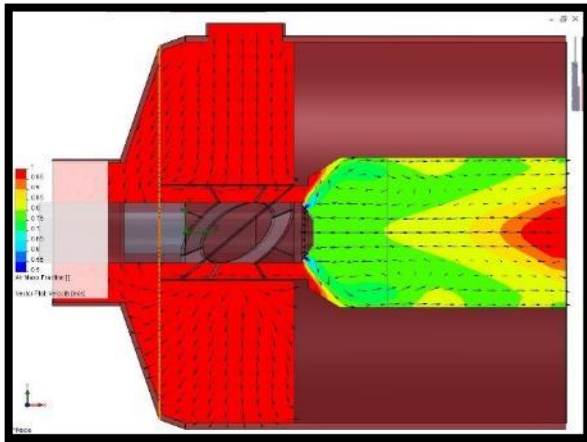
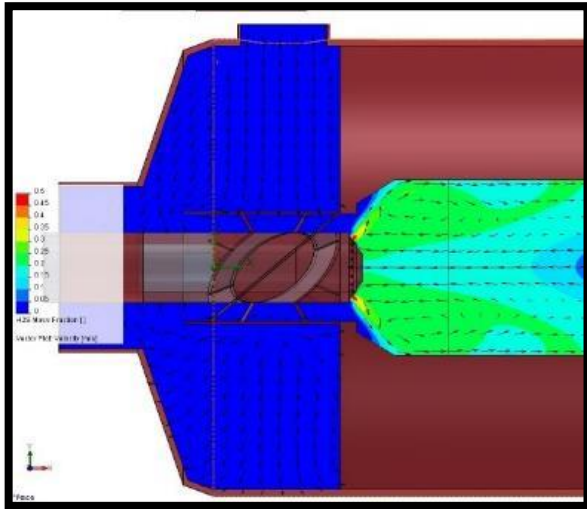
- **Burner Designs**
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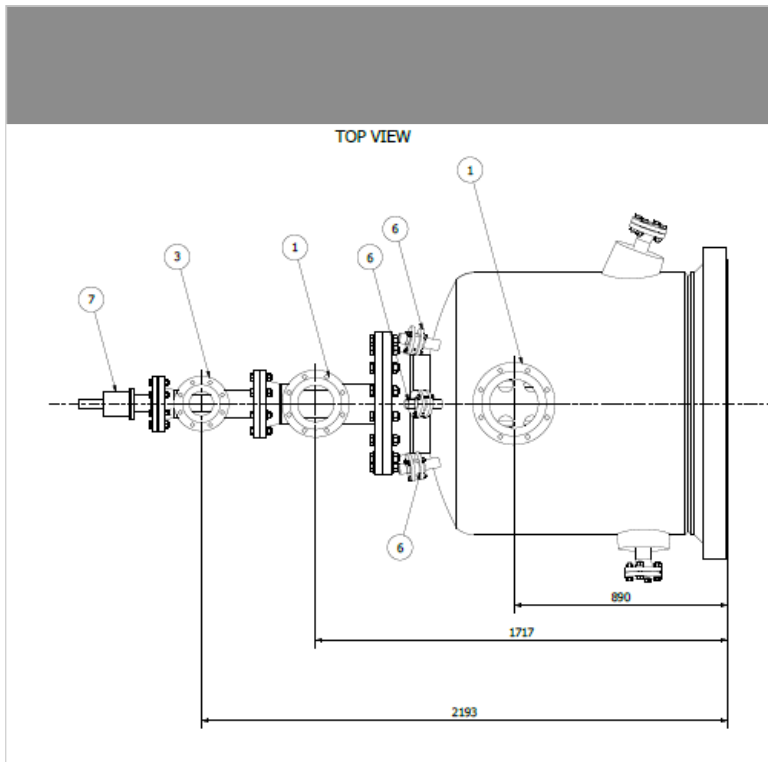
SRU Burner

SRU Burner

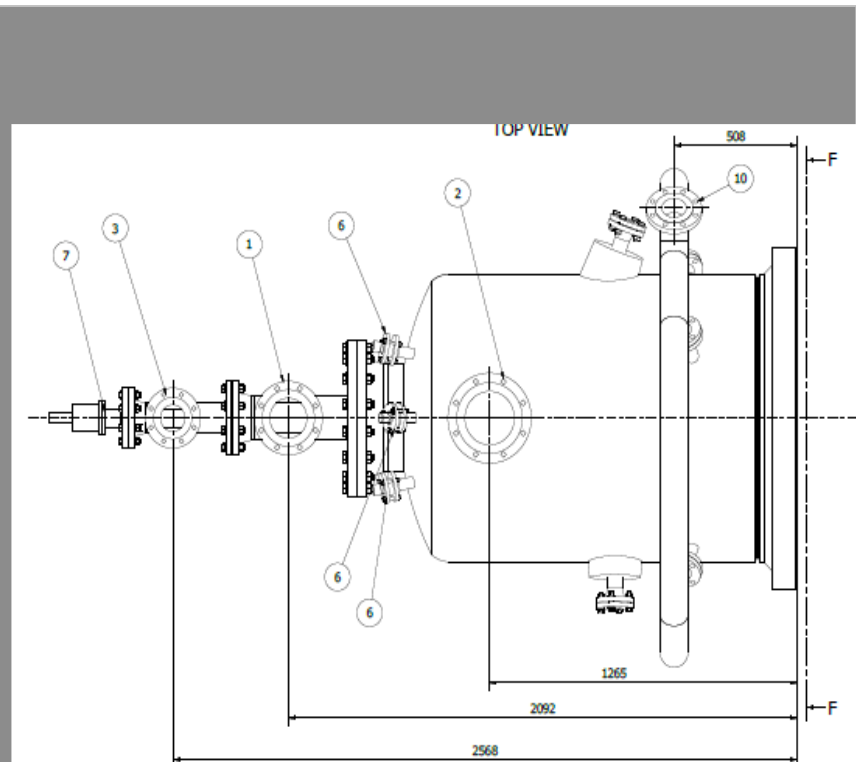
- Internal mixing and recirculation
- Short H₂S and NH₃ reaction times
- Homogeneous temperature and concentration profiles in burner
- Double swirl concept



SRU Burners



One-stage burner



Two-stage burner

Incinerators and Thermal Oxidisers



Incinerators & Thermal Oxidisers

- **Fuel**
 - Waste gas
 - Effluents and liquids
 - Sludge and slurries
 - Solids
 - Multifuel
- **Design**
 - Tailgas incinerators
 - Low Energy deNO_x incinerators
 - High Intensity incinerators
 - Redu-reox incinerators
 - Vertical and horizontal incinerators
 - Rotary kiln
 - Fluidised bed furnaces

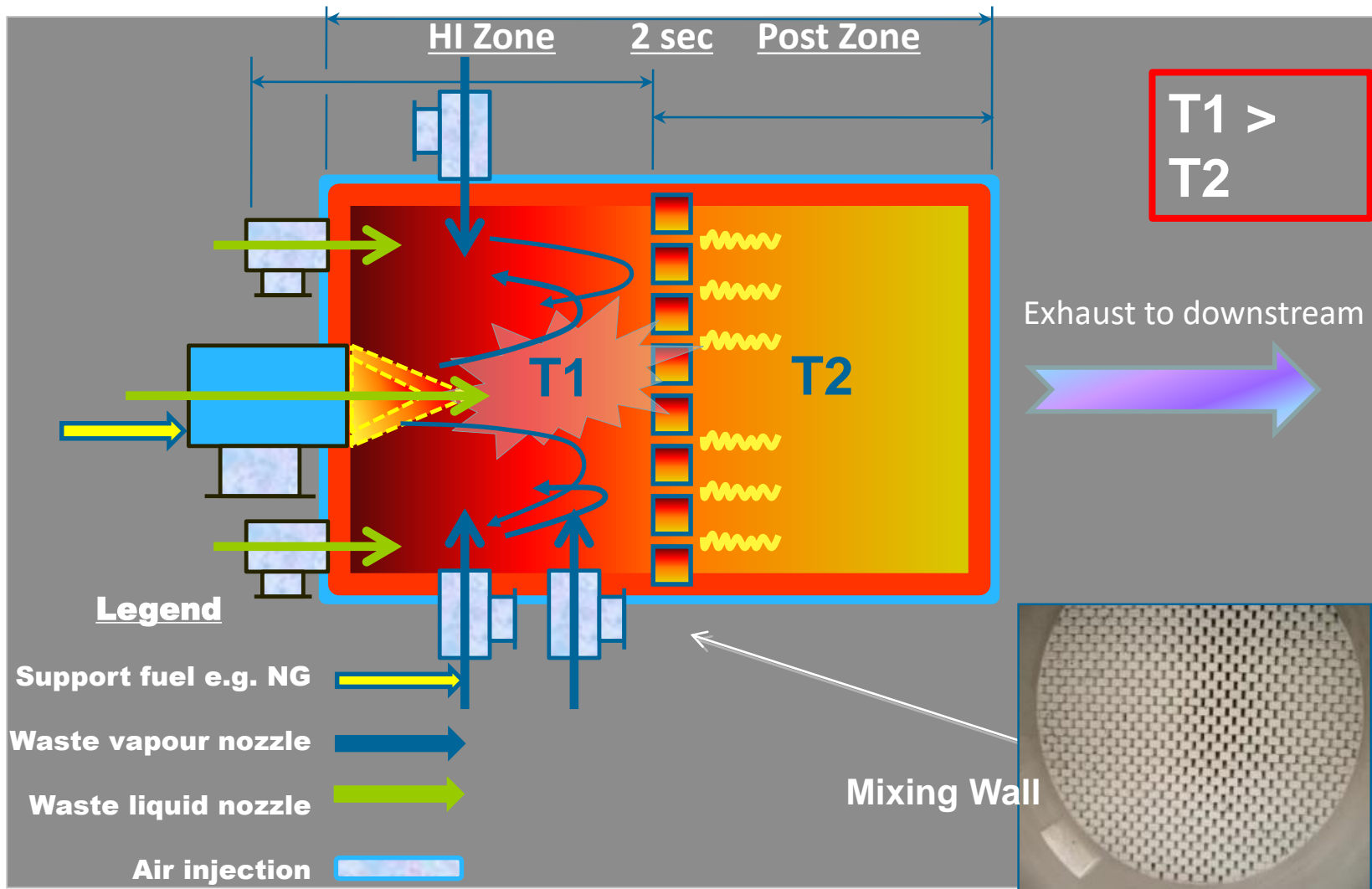


Waste Gas Incinerator

- **Fuel**
 - High calorific waste gas
 - Low calorific waste gas
 - Tailgas
 - Vapours
- **Design**
 - Ultra-low NOx burner
 - Pre-combustion chamber for waste gas
 - Stable flame under varying loads
 - Staged combustion



High Intensity Incinerator



High Intensity Incinerator

- Mixing wall
 - Creates high temperature zone around flame (1400-1600° C) to ensure complete oxidation
 - Increase turbulence to avoid cold spots and this CO formation
 - Zone after mixing wall ensures gases remain above 850° C during 2 sec.
 - ➔ Waste gases and liquids are injected in HI zone through burner and series of injection lances
- Advantages
 - All hydrocarbons are destroyed
 - No CO formation
 - Complete odour destruction
 - Up to 20% fuel saving
 - Destruction efficiency over 99.999%

Liquid Incinerators

Our waste liquid atomizer can comply with :

- Varying viscosity
- Continuous changing compositions
- Polymerization and crystallization
- High molecular weights
- Presence of ash, dust, metals, particulates
- Sludge, residues, liquors

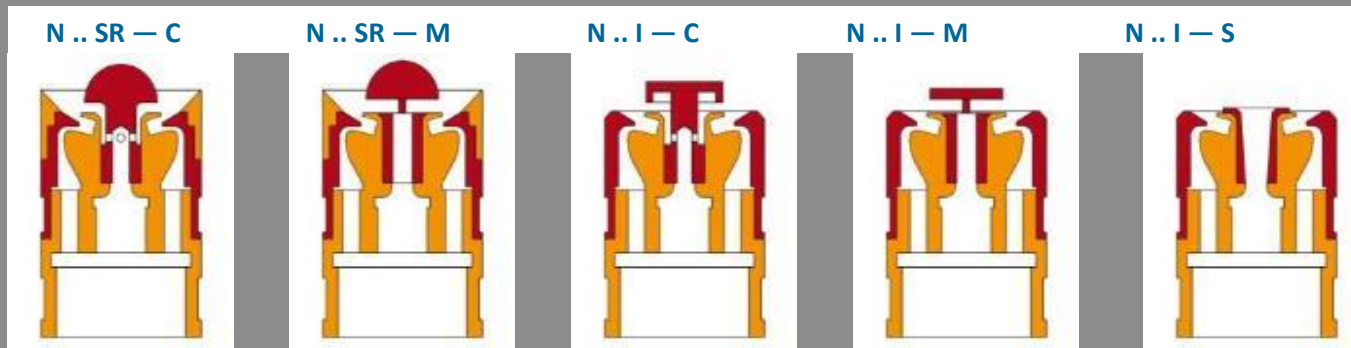


Ultra Sonic Atomization

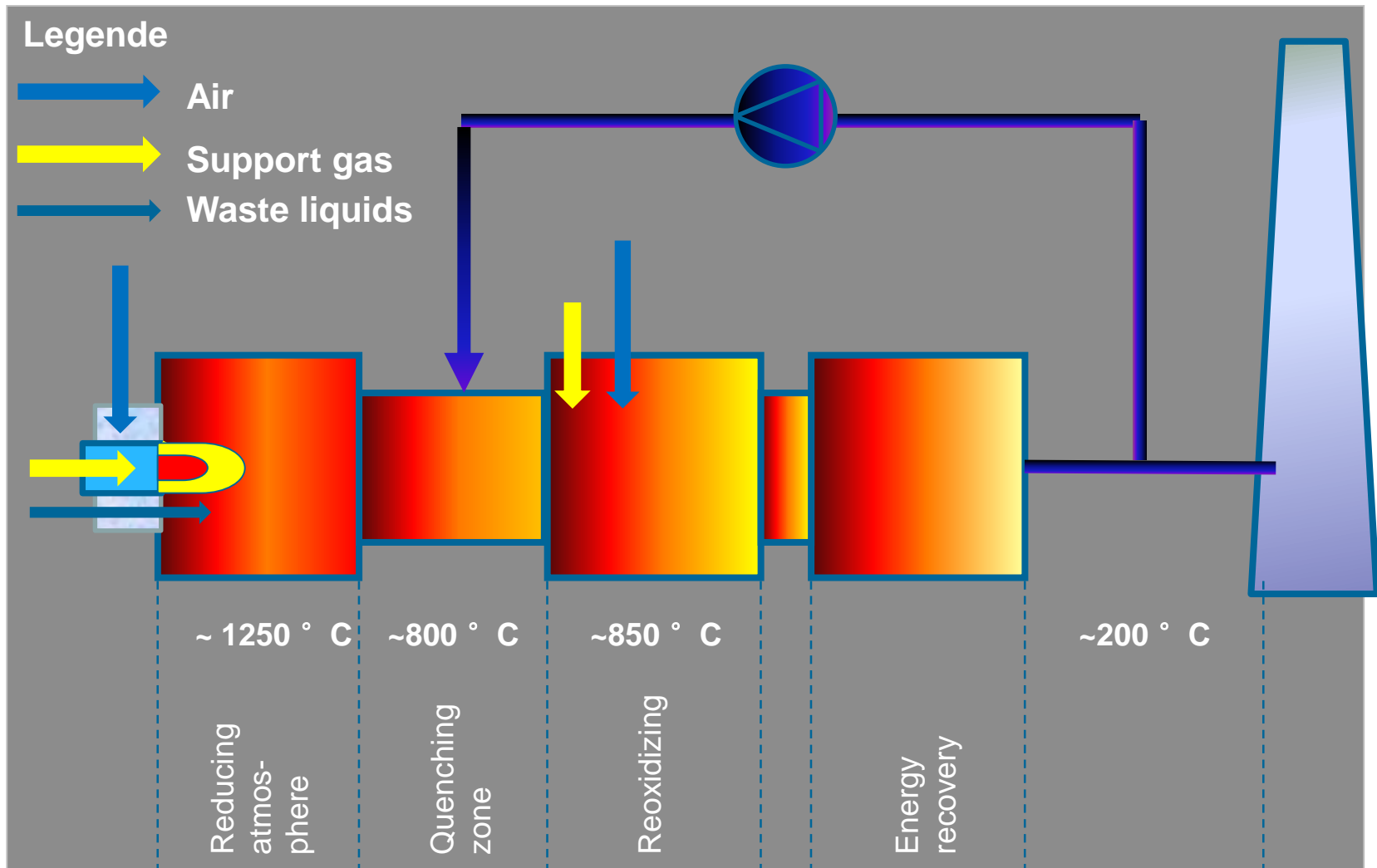


Integrated design of burner, HI combustion chamber and ultra sonic atomisation nozzles:

- ‘Tulip nozzle ‘ with different “flame former rings”
- right shape for atomization in the HI zone
- avoids high concentration of combustibles close to nozzle
- Eliminate formation of cokes and CO
- Eliminate plugging of burner nozzles



Thermal deNOx: Redu-ReOx



Thermal deNOx: Redu-ReOx

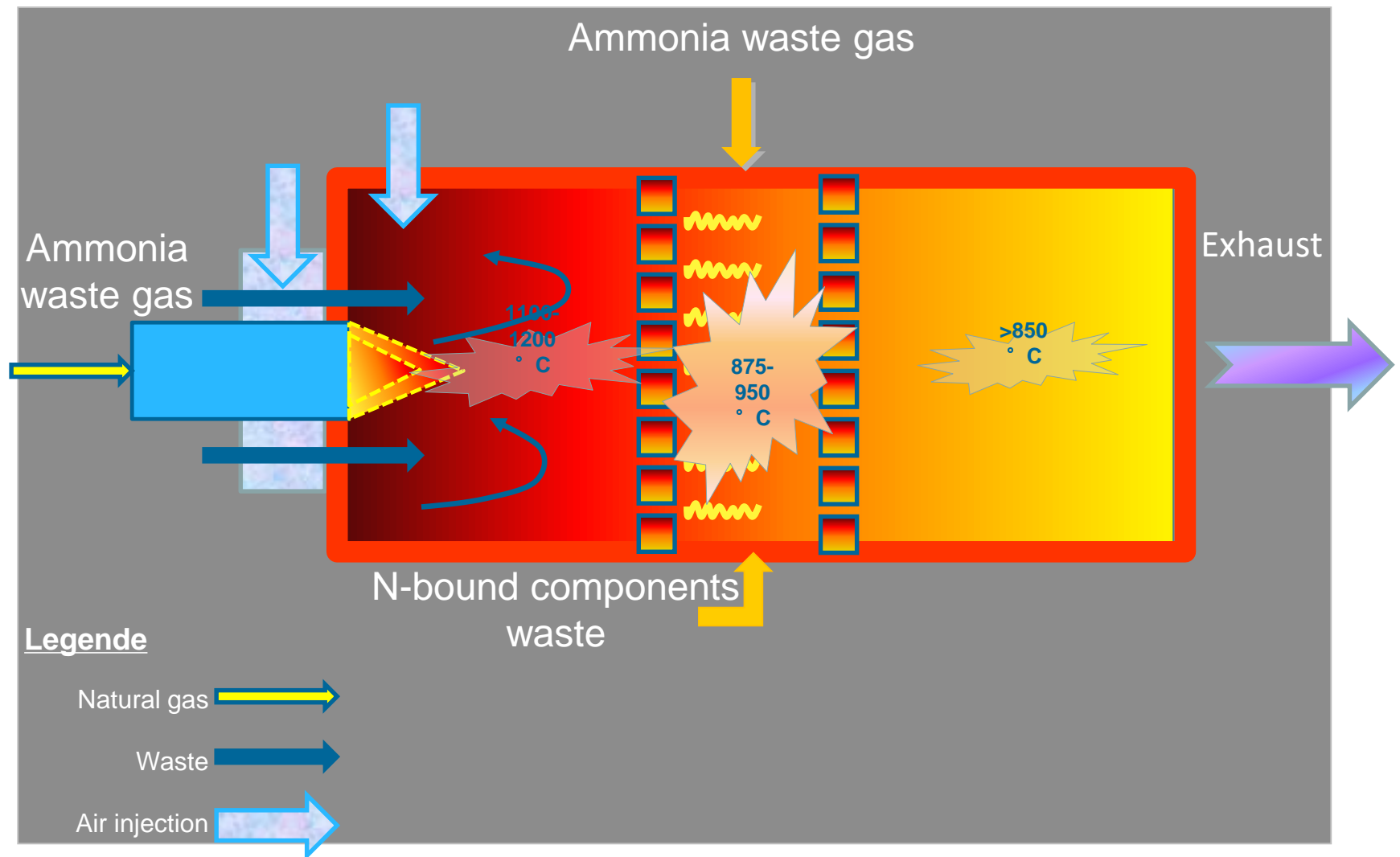
Redu-ReOx implies 3 reaction chambers:

Reducing atmosphere chamber : temperature $> 1250^{\circ}\text{C}$. Oxidation with a shortage of oxygen: free oxygen will combine itself with hydrogen to form H_2O . No oxygen left to combine with nitrogen to NO_x . Incomplete combustion of waste components.

Quenching chamber : Reduces temperature to $< 800^{\circ}\text{C}$. Will prevent NO_x formation in post-combustion zone. “Cold” flue gases typically taken downstream from energy recovery system, are used for lowering the temperature.

Re-Oxidation chamber : for post-combustion of remaining waste components. At temperatures $< 900^{\circ}\text{C}$ such that pumped-in oxygen will react with carbon rather than with nitrogen. Remaining free nitrogen will be converted to N_2 .

Thermal Oxidation with LedeNOx



Thermal Oxidation with LedeNOx

LeDeNOx = Low Energy DeNOx :

For waste air / gas streams containing a small percentage of nitrogen bound components.

The N-bound components in the waste gas are used themselves to promote the DeNOx reaction.

System can be equipped with additional SNCR system (injection of deNOx reagent).

Lower energy consumption by means of energy recovery and because of savings on DeNOx reagent.

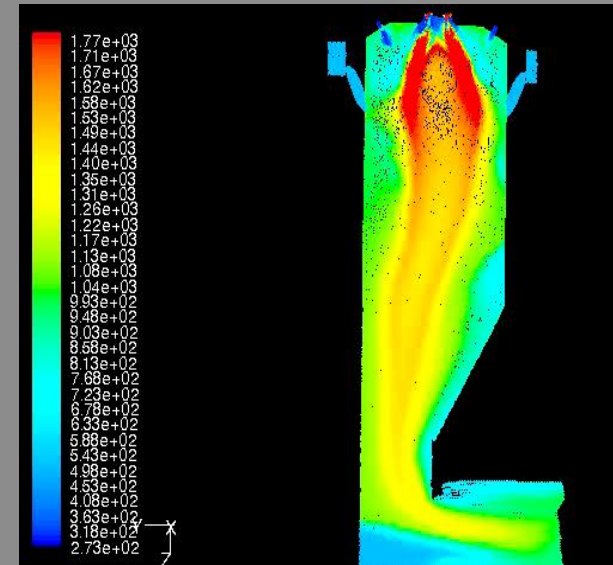
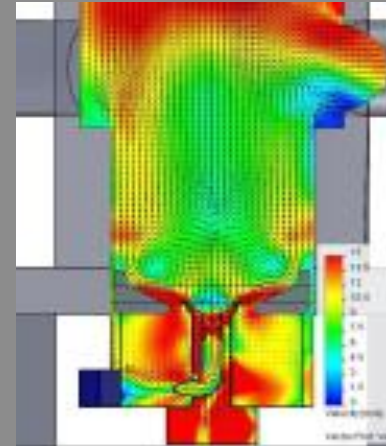
Vertical Incinerators

Upfired

- Waste gases

Downfired

- Brines, suspension, sludge
- Wastes with low melting ashes
- Burner arrangement and injection lances placed on platform at the roof
- Bottom configuration depending on type of ashes
 - Entrainment box (dry ashes)
 - Water bath (salts)
 - Wet ash conveyor/screw (dry ashes/salt)
 - Submerged bottom (ashes and flue gases flow through water bath)



Rotary Kiln Incinerators

Rotary kiln furnaces

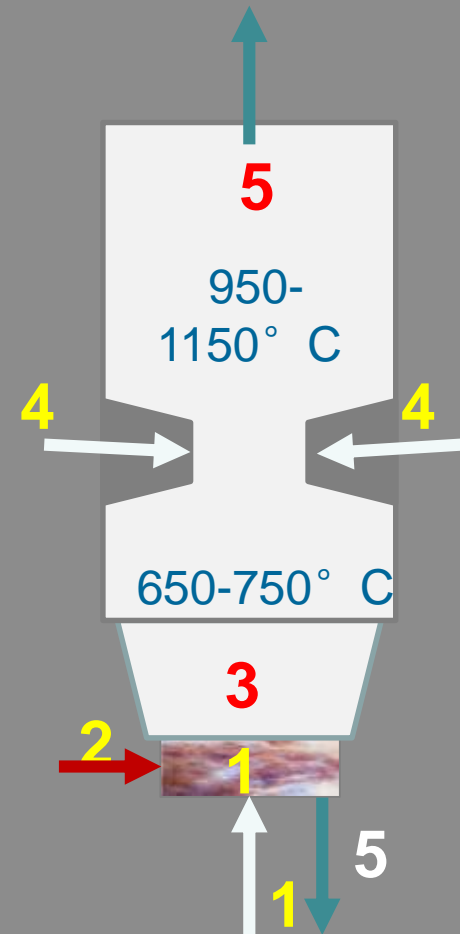
- Waste is fed to the drum by screws or ram feeder
- Combustion air and/or contaminated/odorous air is injected at high velocity through the front wall
- An internal recirculation of combustion gases is created, resulting in a homogeneous residence time and temperature of the gases in the oxidation chamber
- Mixing of the solids is controlled by the inclination and rotation speed of the drum
- Proprietary drive and seal design
- Capacities ranging from 150 kg/h to 5 T/h



Fluidised Bed Incinerators

Fluidisation Process

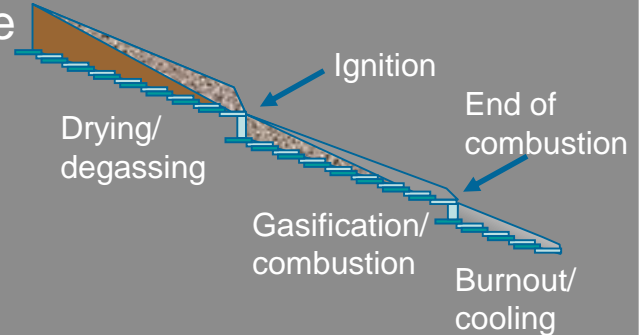
1. Calibrated sand is fluidised by injection of primary air.
 - Primary air is distributed over the section by a proprietary air distribution system.
 - The sand mass is maintained at 650-750° C (radiative+convective transport from freeboard to fluidised bed)
2. Fuel is injected into the fluidised sand bed
3. The fuel is gasified through contact with the hot sand mass
4. Syngas is completely oxidised by secondary air at >850° C
5. Ash is transported by flue gas to boiler and filter or sinks to the fluidised bed bottom



Grate Technology

Reciprocal Grate Furnace

- Three-stage combustion grate to support the thermal conversion process
 - Drying-degassing
 - Gasification-combustion
 - Post-combustion-burnout
- Six-stage combustion air control
 - Three zones under gasification – combustion grate
 - Three zones in the vertical combustion chamber
- Syngas is completely oxidised by secondary air at $>850^{\circ}\text{C}$
- Combustion zone integrated in waste heat recovery boiler
- Capacity from 2 000 kg/h – 20 000 kg/h



Energy From Waste Solutions

- Proprietary Technologies
 - Andicos Process for Co-treatment of Organic Waste and Sewage
 - LedeNOx, HI, ReduReox, ERTO,... Static furnace for liquids and gases
 - Fluidised Bed Gasification Process for Refuse Derived Fuel and Sludge
 - Rotary Kiln Redu-Reox Process for Municipal Solid Waste, RDF, Medical Waste,....
 - Grate Based Mass Burn Energy from Waste for Municipal Solid Waste
 - Range of Static Furnace EFW Designs for Gaseous and Liquid Waste
 - Catalytic Reduction Oxidation Systems for Removal of NOx, Dioxins, PCB's, CO, TOC from Flue Gases

Energy from Waste Plants

- **Fuels**
 - Fossil fuels, biofuels, biogas
 - Waste gas, fuel gas
 - Effluents, spent solvents
 - Sludge and slurries
- **Combustion Systems**
 - Static furnaces
 - Rotary kiln furnaces
 - Fluidised bed furnaces
 - Grate furnaces
- **Flue gas treatment**
 - SNCR & SCR deNO_x
 - Scrubbers
 - Dry and semi dry systems



Technology Review Solid Waste Combustion

	Small Fuel Size	Medium Fuel Size	Large Fuel Size	Low LHV Fuel	High LHV Fuel	Low Ash Melting Point	Capacity
Rotary Kiln	++	++	++	+	++	++	Small to Medium
Bubbling Fluidised Bed	+	++	--	++	+	--	Small to Medium
Circulating Fluidised Bed	++	--	++	+	++	-	Large
Air Cooled Grate	--	+/-	++	+/-	+/-	+	Small to Medium
Water Cooled Grate	+/-	+/-	++	-	+	++	Small to Medium
Traveling Grate with Spreader Stoker	+	+/-	--	+	+	+	Small to Medium
Vertikal Downfired	+	-	--	++	++	++	Small to Medium

Our Clients





Energy for India



ODFJELL

INEOS



GDF SUEZ

NAM



AkzoNobel
Tomorrow's Answers Today



WINNING FORMULAS



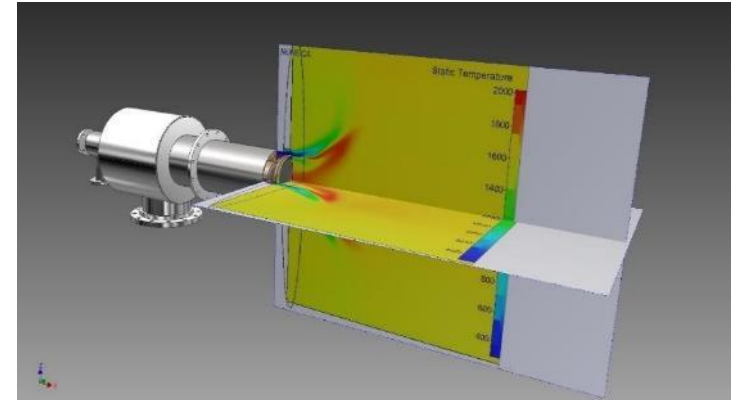
Selected Burner References

Multifluids (gas/liquid) Burners

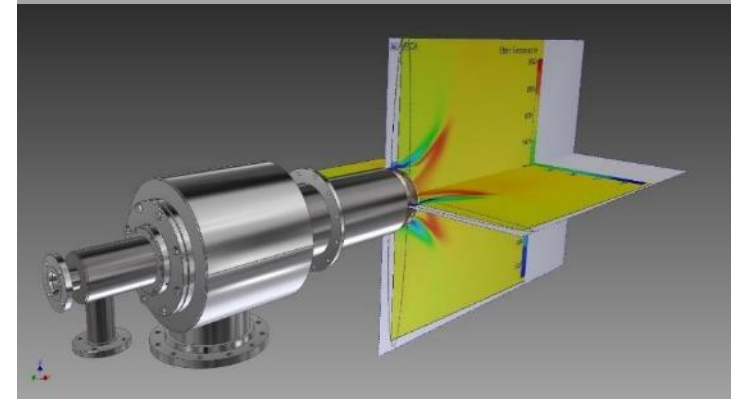
- AkzoMons, Ghlin, Belgium: 8 MW, 2 waste liquids + 6 waste gas streams
- ADPO, Antwerp, Belgium: 12 MW, 2 liquids + 3 waste gases
- Orpic/Liwa Plastics, Sohar, Oman, 2*1 MW liquids + natural gas burner

Multifuel/Flexifuel Gas Burners

- Solvay, Pont-de-Claix, France: 3 * 20 MW, H₂ + natural gas
- GobiGas, Göteborg, Sweden: 25 MW, waste gas + natural gas
- AkzoNobel, Rotterdam, Netherlands: 20 MW, H₂ + natural gas
- ITC Rubis, Antwerp, Belgium: 20+4+4MW, waste gas + natural gas
- EOC, Oudenaarde, Belgium: 8 MW, natural gas + waste gas



We link our 3D mechanical design with our CFD/combustion modelling



Selected Burner References

Lean Gas Burners

- CAIRN India, Rajasthan : 20 MW, waste gas + fuel gas
- Carsid, Belgium : 20 MW burner
- Evonik, Worms, Germany : 60 MW Radial Staged Air Burner with satellite burners

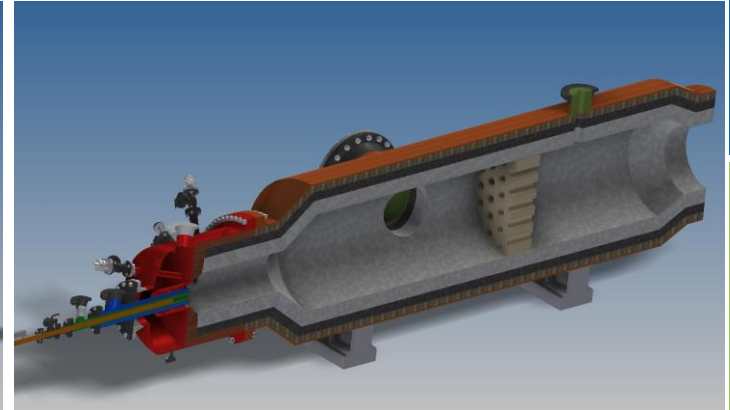
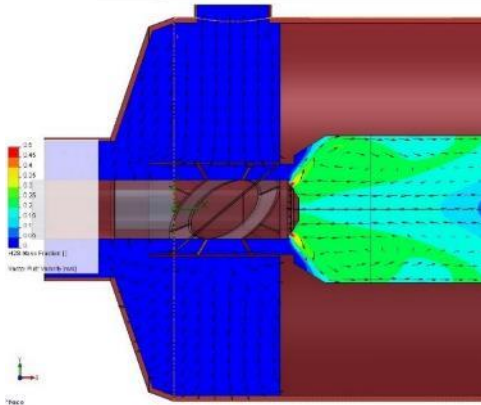


Selected Burner References



SRU Burners

- Afton Chemicals, Feluy, Belgium : 5 MW H₂S Incinerator Burner (2009)
- ONGC, Uran, India : 10 MW h₂s Incinerator Burner (2019)
- NRL, Numaligargh, India : 3 MW MCC Burner (2018)
- NRL, Numaligargh, India Incinerator Burner (2018) : 1 MW and 2 MW Tailgas
- BORL, Madhya Pradesh, India : 20 MW MCC Burner (2018)
- Undisclosed Client : 8 MW Tailgas Incinerator Burner (2020)



EOC, Oudenaarde, Belgium



- **Combustibles**
- Natural Gas + Waste Gas incl. iso-butadiene
- **Capacity**
- 3 MW
- 4 TPH steam @ 23 bar
- **Design**
- TV² Burner in Flame Tube Boiler
- **Commissioned:**
- 2017



Akzo Nobel (Nouryon), Mons, Belgium



- **Combustibles**
- Waste gas
- High Calorific Effluents & Suspensions
- **Capacity**
- 8.2 MW
- 1.3 TPH waste liquids & suspensions
- 6 TPH waste gases
- 10 TPH steam @ 23 bar
- **Design**
- Redu-Reox incinerator + SNCR DeNOx
- Flame tube WHRB
- **Contract**
- EPC
- **Commissioned:**



Desotec, Roeselare, Belgium



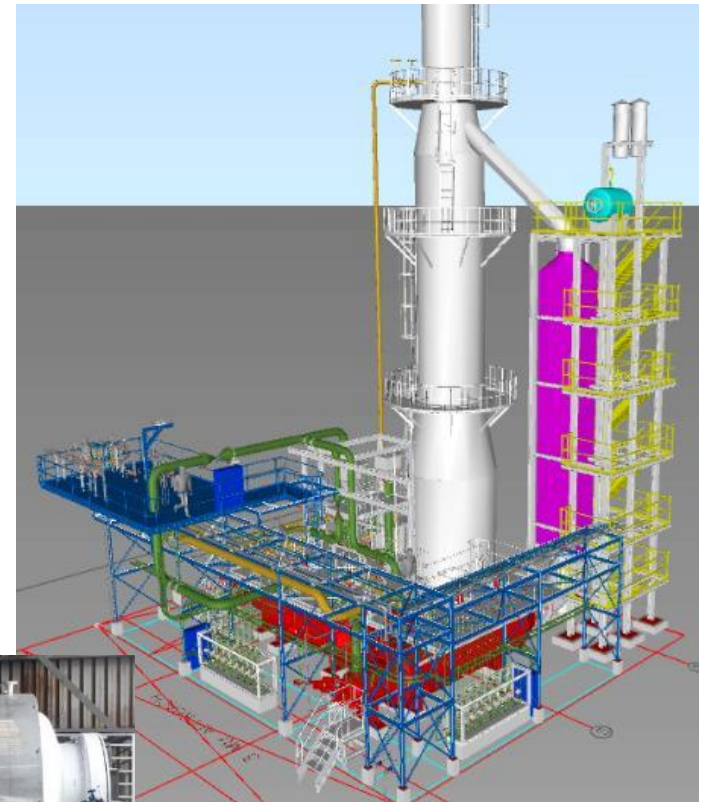
- **Combustibles**
- VOC's from spent activated carbon regeneration
- Oxidation of VOC's, carbon dust, halogens, S-components
- **Capacity**
- 5 MW
- 3500 Nm³/h
- **Design**
- High dust Tulip Vortex Venturi Burner
- 2-Chamber vertical incinerator
- SNCR deNOx System
- **Contract:**
- EPC
- **Commissioned:**



NRL, Assam, India



- **Client:**
- Numaligarch Refinery Ltd and Engineers of India Ltd
- **Project:**
- Plant upgrading to Euro 6 standard
- SRU Tailgas incinerator
- **Combustibles**
- H₂S sour gas with ammonia
- Support fuel: fuel gas
- **Capacity**
- 3 MW
- **Design**
- 2-chamber incinerator
- Burner system
- Heat Recovery Boiler



Blue Paper, Strassbourg, France



- **Combustibles**
- RDF, Reject, Packaging Waste
- Support fuel: natural gas
- **Capacity**
- 24 MW
- 6 TPH
- 30 TPH Steam at 16 barg
- **Design**
- Rotary kiln gasifier,
- HT Water Tube Boiler,
- Dry Flue Gas Cleaning, SCR deNOx,
- LT Smoke Boiler with ECO
- **Commissioned**
- Summer 2018'



Cairn, Aishwariya, Rajasthan, India



- **Combustibles**
- CO₂ rich production gas
- Support fuel: fuel gas
- **Capacity**
- 15 MW
- 6.9 TPH waste gases
- 368 m³/h crude oil @ 23 bar
- **Design**
- Thermal Oxidizer
- Bath Heater (duplex)
- **Commissioned:**
- March 2013



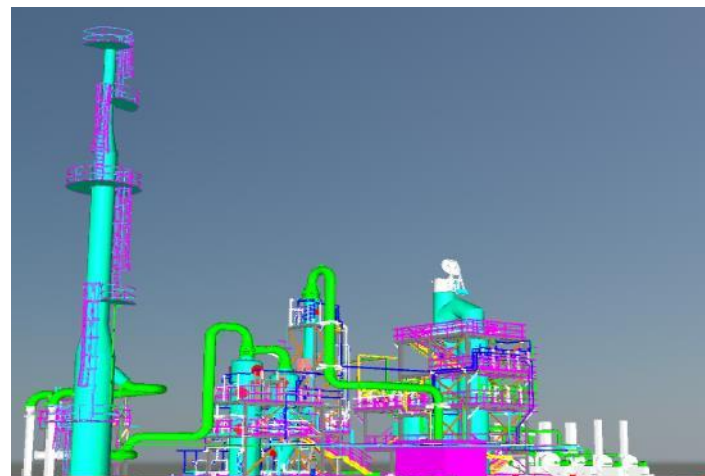
Crude Oil Bath Heater
168 to 368 m³/h @ 23 bar, 80° C.



Reliance Sibur Elastomers, Jamnagar, India



- **Combustibles**
- Waste liquids and gases from rubber plant
- **Capacity**
- 5 MW
- 1 TPH waste gasses & liquids
- **Design**
- 2-Chamber Vertical Incinerator
- Evaporative Cooler
- 2-Stage Wet Scrubber
- **Project Team**
- Europem HQ: basic design
- Europem India: EPC, PM
- Tialoc: basic & detailed design scrubbers
- **Schedule**



BASF, Chongqing, PR China



Combustibles

- Waste gases from 100 % inert to 80 % H₂, 11 % CH₄ and N-bounded components
- Support fuel: natural gas

Capacity

- 300 kg/h of waste gases
- Hot water 300 ° C heat exchanger
- Waste gas preheater to 150 ° C

Design

- Incinerator
- Water tube boiler
- SCR deNO_x

Commissioned:

- Sept. 2013



Thank you !

