

# Safety first Quality always



Cement



Grupo  
**THERMOJET**<sup>®</sup>

Thermojet began in the **year 2000**, when the engineer and entrepreneur Ricardo Leite Passos gathered a group of colleagues to acquire the **Special Heating and Cooling Division** of the company **Brasimet**, where they worked. The colleagues became partners. They brought with them a remote history, from the **Lindberg** company, which in **1977** had introduced convective heating in South America, and had been incorporated by Brasimet.

By the time of its foundation, Thermojet primarily served glass and steel industries, offering thermal input at the start-up and shutdown, with a heating characterized by the **equalization of temperatures** over long stretches and **high thermal uniformity**, far superior to that provided by the then known methods.



Born with the excellence of the companies from which it originated, Thermojet grew at a rapid pace, **doubling annually in size** in each of its first 10 years. Meanwhile, it began to carry out major works in plants with a capacity of **tens of millions of tons per year**, which it attends in an agile way with its **more than 250 combustion sets**.

Simultaneously, Thermojet extended its portfolio to offer a variety of **solutions in Thermal Engineering**, such as the preservation of refractories, mobile system for monitored oxyfuel combustion and computer simulation, among others.

In 2005, Thermojet filed its first **patent** application. It thus formalized the innovative vocation that continues to this day, materialized in a **division specially dedicated to the development of technology**, **Aestus**, which has among its products the development of the **software**

**COBRA** for the management of refractory preservation in coking plants, efficient heating and cooling stations, and the consistent patent registration of burners and auxiliary devices, as a result of R&I investments amounting to 2% of revenue.

In 2014, through the incorporation of Brazilian national leader **4Pipe**, Thermojet Group's portfolio integrated products and services for **cleaning and inspection of pipelines**.

At present Thermojet features a vast history of services for industries in various segments throughout **South America, Central America and the Caribbean**, as well as operations in China and the **partnership with Glass Service**, based in the **Czech Republic**, which has developed and used since 1990 a **computational fluid dynamics software**, CFD, refined in the simulation of refractory lined equipment.

## Services

Thermojet has specialized teams in several applications of Thermal Engineering, as well as consultants and **innovation** partners for the development of **tailor-made solutions**:

- Controlled drying and heating
- Accelerated or controlled cooling
- Mobile system for monitored oxyfuel combustion
- Monitored hot-hold
- Expansion and contraction control
- Monitored draining and filling of glass ovens
- Monitored thermal comfort
- Generation of hot gas at specific flow and temperature
- Refractory diagnosis
- COBRA: Management of refractory preservation
- *Jetwelding*<sup>®</sup> ceramic welding
- Heat treatment
- Computational simulation of heat exchange
- Tailor-made special services

## Global presence



Having units in Brazil, Colombia and Argentina, Thermojet serves the whole **South America, Central America and the Caribbean**. It is also based in **China** and represents Glass Service and Flammatec companies based in the **Czech Republic** and global reference in burners, accessories and advanced solutions for the glass industry.

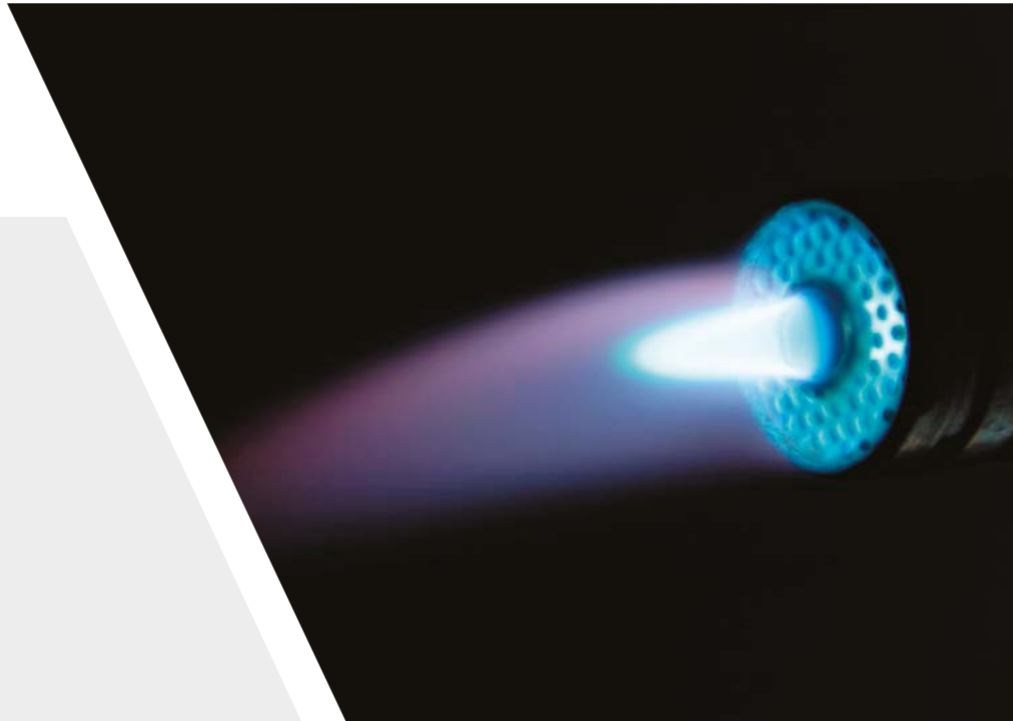
# Cement and lime

## Generation of hot air to produce flour

### Thermal input at starting-up

We supply **hot air at the desired flow rate and temperature** to produce flour at the start of the raw mill.

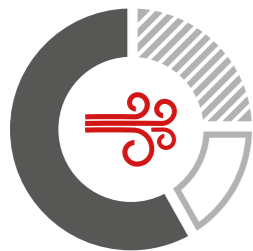
The operation is performed with portable burners, through which we adjust a **stream of high temperature combustion products** to the **air flow inflated by the process fans**, providing the mill with the heat transfer rate sized for the initial production of raw flour.



### Cement plant

We carried out the **initial heating**, with **generation of hot air to produce flour**.

Plant with a capacity of **2 million** tons per year



HOT AIR AT THE  
DESIRED FLOW  
RATE AND  
TEMPERATURE

Heat transfer rate sized for initial production



# Cement and lime

## Drying of the refractory lining

### Uniform heating with agility.

We have extensive experience in the execution of activities in the main cement plants in South America. Applying technology and knowledge, we successfully executed the **drying of the largest silo in Latin America**, as well as of the **largest mass of shotcreted refractory** in the world.

For excellence in our services delivery, we have developed **innovative and tailor-made solutions** with high-speed burners that transfer heat through forced convection. The characteristics of our system allow us to **accurately follow the programmed heating cycle** and provide **heat in a much more uniform way** than with conventional systems. The result is the removal of moisture in a gradual and safe manner, with consequent **preservation of the integrity of the refractory**.

The **portability of our burners** allows them to be distributed **through the various vessels of the unit**, enabling virtually any desired **thermal uniformity** and **agility** in the **heating operations**.

**Our burners are designed to operate on both LPG and NG**

Contact us to check the feasibility of using other fuels in tailor-made projects.



We also offer the services of **hot gas generation for the production of flour, drying, cooling, thermal comfort, dedusting** and **hot-hold** of heads, coolers, discharge nozzles, process burners body, cyclone tower, calciners, smoke boxes, silos, among others.

**Drying of the largest silo in Latin America**

### Cement plant

We performed the **initial heating**.

Largest cement plant in Brazil

Plant with capacity of **3,6 million** tons per year

# Cement and lime Supervisory system

## Control and optimization of production

Fulfilling our mission to provide **sustainable solutions for high-performance and innovative** products and services in Thermal Engineering, we provide the cement industry a tool for the **optimization of production and thermal efficiency** of calciners.



**Control of the operation of calciners** with *ES III*<sup>TM</sup> results in the following benefits:

- **Operation stabilization**
- Control of **free lime** content in clinker
- Required total heat level **with minimal costs**, for fuel mix
- **Fast response** in case of addition of new fuel current
- **Full control** of operation without intervention

**Stable operation and high efficiency**



PREDICTIVE  
CONTROL TO  
STABILIZE THE  
OPERATION



The solution, developed by the partner company **Glass Service**, consists of the supervisory system **Expert System ES III**<sup>TM</sup>, which applies a **predictive control** model to **stabilize the operation according** to the predefined values of a set of key variables.

## Rotary kiln

Optimization of the operation in  
cement plant in Slovakia

Calcliner with

**5,5 m and 180 m length**

Burner with possibility of injection of up to

**9 types of fuel**

# Thermal comfort



## Regulatory compliance and productivity

To meet strict regulation of working conditions, our technology division, Æstus, developed **Mobile Units for Thermal Comfort (MUTCs)** with high capacity of directed cooling.

Our equipment is presented in portable modules, directing high flows of fresh and cooled air to the work fronts, with streams that reach **long distances**, deepening in closed environments.

As a result, we provide adequate **health, safety and productivity** conditions to operational teams.



Fresh and cooled air at long distances



As a result, we provide adequate **health, safety and productivity** conditions to operational teams.



Health



Safety



Productivity

## Reheating furnaces

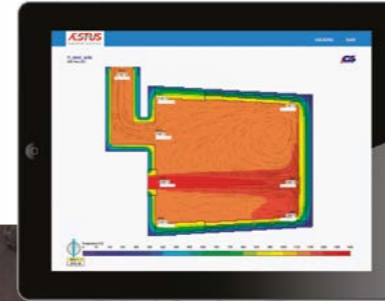
We performed **thermal comfort services at the Rolling Hot Strip**, passing to the modality of contract given the success of the operations

Rolling Hot Strip with capacity of

**4 million**  
tons of hot rolled coils  
per year



# Computational simulation of heat exchange



## Refinement of processes and equipment

We offer the **detailed assessment** of thermal processes by modelling and simulation of industrial equipment.

Using a computational fluid dynamics (CFD) software developed and implemented since **1990** by our partners of Glass Service, based in the **Czech Republic**, we carry out scenario studies for heating or hot-hold activities, in search of the **optimal operational parameters** that result in the desired outputs for each process, whether contributing to the **reduction in fuel consumption** or to obtaining a **high level of thermal soak**, for example.



Computational Fluid Dynamics

CFD

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The studies also allow the evaluation of the **design of furnaces and regenerators** to **select the most efficient scenario**.



Detailed assessment

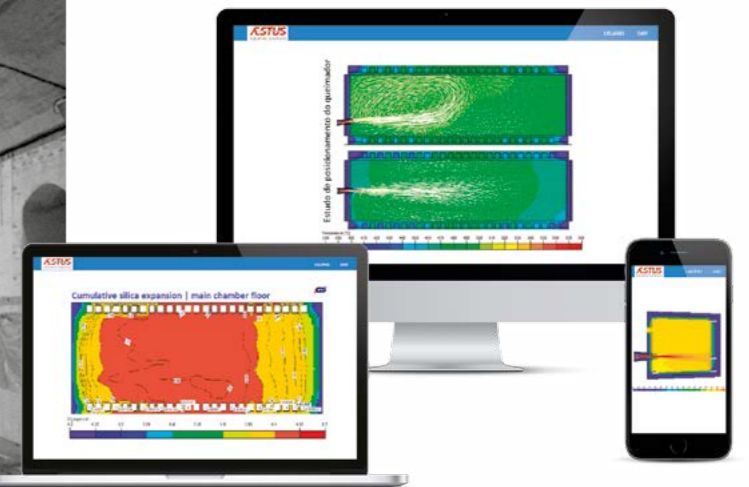
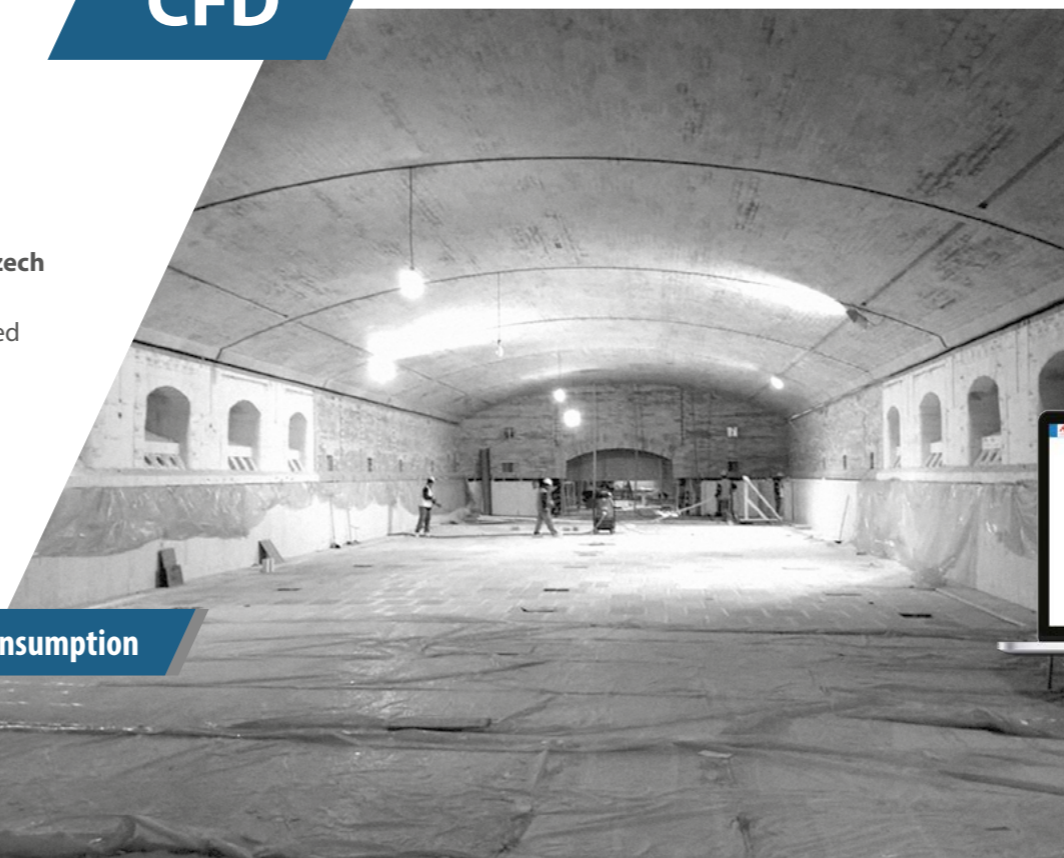
Reduction in fuel consumption



## CFD simulation of heating up a float furnace

We developed a study to determine the most efficient **burner configuration** resulting in **uniformity of temperatures** in the melting zone, with **reduced fuel consumption**.

Furnace capacity **900** tons/day





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Quality always

Global presence

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