



Intelligent Process Cooling

Contents

- 2 | About Us
- 4 | Our Milestones
- 6 | Our Numbers
- 8 | Our Philosophy
- 10 | Global Presence
- 12 | Plastic
- 14 | Beverage
- 16 | Die Casting
- 18 | Industry
- 20 | Marine-Oil & Gas-Energy
- 22 | Specialized Engineering
- 24 | Global Production
- 26 | Global Assistance
- 28 | Adiabatic Coolers
- 30 | Process Temperature Control Units
- 32 | Industrial Chillers
- 34 | Digital Controls for Industry 4.0

About us

Process Focused,
Technology Powered



Frigel is much more than a manufacturer of cooling and temperature control systems. We are “technical consultants” with the ability to identify the best solution, in terms of performance, efficiency, environmental impact and to calculate the return on investment for each individual application.

Besides having full knowledge of industrial refrigeration, we also know the various aspects of the production process and, therefore, we are able to provide our customers with unique and optimized solutions for each specific application, with advanced engineering solutions and a fast and efficient technical assistance service.

We offer solutions calibrated to the needs of each customer by studying innovative solutions, carefully designed and fully supported, to obtain the best results which are verifiable in terms of productivity, efficiency, quality and precision.

Duccio Dorin,
CEO



Mission

Ensuring our customers maximum competitiveness through innovative solutions that always guarantee high performance with maximum respect for the environment.

Vision

Become a global market leader developing the latest process cooling and temperature control technologies.

Our Milestones

Since 1960: innovation and internationalization



Tomorrow

We will always believe in innovation

The knowledge acquired over the years and the confrontation with new engineering challenges will be the basis for giving continuity to the research and development of pioneering solutions and for continuing the creation of new industrial standards.

New sectors

Frigel's innovation conquers new industrial sectors

In 2017, the expansion project in the **Beverage** sector is launched, thanks to an innovative evolution of the Ecodyry System called "synchronized cooling".

In 2018, expansion into the metals sector comes to life through a dedicated configuration of the Ecodyry System for the **die-casting** industry.

New challenges

The group is strengthened through the integration of new businesses

In 2012, Frigel Custom Cooling Solutions S.r.l. (FCCS), operating in the production of plants, was established for refrigeration and air conditioning for the **Marine, Oil & Gas and Energy** sectors.

In 2014, **Frigel Intelligent Energy Solutions** was set up, whose object is the offer of integrated services for the realization and management of **energy efficiency** measures.

In 2018, Frigel took over 100% of the Paduan company **Green Box S.r.l.** with the aim of creating an increasingly important reference point in the industrial refrigeration and thermoregulation sector.

Global expansion

Present on all the continents

After the creation of a global commercial network, in 2006 the development plan began with the creation of companies and production plants starting from:

- 2007 New Florence office
- 2008 Frigel North America (USA)
- 2011 Frigel Asia Pacific (Thailand)
- 2012 Frigel Latin America (Brazil)
- 2013 Frigel GmbH (Germany)
- 2017 Frigel Asia Pacific expansion
- 2018 Frigel India

Total covered area 45,000 m² (485,000 ft²)

Innovation

Ecodyry System: the revolutionary plastic cooling system

In the early '90s Frigel, strongly believing in research and development, designs a new integrated cooling system specifically designed for the **Plastics** industry. The Ecodyry System is born, which has created a new state of the art, allowing thousands of users to obtain significant production improvements in quantitative and qualitative terms, as well as huge savings in electricity and water compared to traditional technical solutions.

The foundation

1960 when everything starts

Frigel Firenze is born in a small plant in Sesto Fiorentino (FI), from the beginning dedicated to designing and selling cooling systems for the industry.

In the '80s it was the first company to propose heat-exchanger fluid cooling with ambient air (Ecodyry), thus starting a real revolution in the sector.



In 2011, Frigel purchased the COSFI company, which operated in the cooling sector (air conditioning) and industrial refrigeration since 1987, and relaunched it under the name **Frigel Custom Cooling Solutions**.

The experiences gained by COSFI in the application of the ATEX European standards since their debut in 2002 and with the unique ability to customize products, allowed the company to achieve a solid standing in the Marine sector and laid the foundations for an ideal position in the Oil & Gas sector.

Frigel has promoted the development of the company until reaching a position of global leadership in the sector of machinery for HVAC Oil & Gas. New challenges, aimed at achieving similar goals in the Marine and Energy sectors, now open up to the Marine, Oil & Gas, Energy division, which is based on the technical production structure of Frigel, extending into all the group's commercial and production branches.



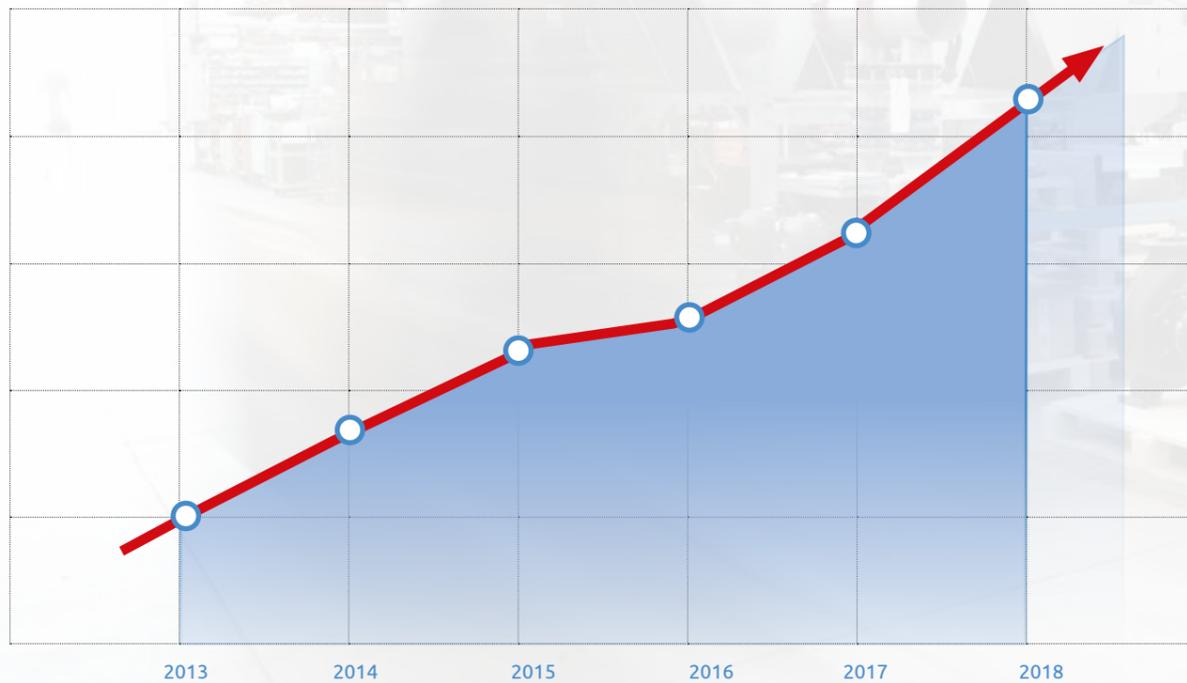
In 2018, Frigel buys the company Green Box of Padua, operating in the industrial refrigeration and thermoregulation sector.

Green Box was founded in 1991 by technicians with a high level of experience in the field of industrial thermodynamic design and created a wide range of chillers and thermoregulators for controlling the temperature of water and fluids in industrial processes.

The fundamental criteria of their designs are energy savings, customization, reliability over time, high efficiency, extreme ease of use, excellent accessibility to all components and modularity. Green Box researches and designs with customers solutions dedicated to their specific needs, with a goal of full and constant satisfaction and with the guarantee of both technical and commercial support services.

Our numbers

 **20%** average annual growth



10,000 customers

The success of the innovative solutions for the Plastic and Beverage sectors, the considerable internationalization efforts pursued on four continents and the recent industrial diversification in the Marine-Oil & Gas-Energy and Metals sectors have allowed us to achieve truly important and, above all, constant growth numbers during the last five years.

The growth in the number of customers and the results obtained by them with the installation of our innovative solutions are a source of pride and great motivation for us, which pushes us to strongly support our vision of the future of industrial refrigeration and thermoregulation.

They are getting the following benefits:

 **30 million m³/year (7 billion gallons)**
of water saved
equal to the annual consumption of **400,000** inhabitants

 **700 million kWh/year**
of electricity saved
amounting to **60,000** TOE (tonnes of oil equivalent)

 **500 million euros/year**
increase in profitability
for the reduction of operating costs and increase in productivity

Our Philosophy

INNOVATION
SUSTAINABILITY PERFORMANCE

In Frigel, we are experts in refrigeration, but also profound connoisseurs of the client's business and, above all, of its industrial processes.

This dual experience allows us to identify opportunities for improvement that lie behind the reduction of the cooling times of the processes, allowing us to design ad-hoc solutions for each process, ensuring a consistent increase in productivity of each application and improving profitability.

But this is not enough for us.

In our technical choices, there is always the premise of combining this improvement in performance with an indispensable reduction of the environmental impact. Sustainability is today a crucial principle of our ability to imagine and innovate. This is in **Frigel's DNA**.

“ The constant search for ever more efficient and sustainable engineering solutions guides our imagination and our every effort. ”

Global Presence



FRIGEL Firenze
Headquarter
Manufacturing, Service, Sales
Firenze - Italy



FRIGEL North America
Manufacturing, Service, Sales
Chicago - USA



FRIGEL Latino America
Manufacturing, Service, Sales
San Paolo - Brasil



FRIGEL Custom Cooling Solution
Manufacturing, Service, Sales
Monza - Italy

GREEN BOX
Manufacturing, Service, Sales
Padova - Italy



FRIGEL Asia Pacific
Manufacturing, Service, Sales
Bangkok - Thailand | Site 1



FRIGEL Asia Pacific
Manufacturing, Service, Sales
Bangkok - Thailand | Site 2



FRIGEL India
Manufacturing, Service, Sales
New Delhi - India



8 Production sites
(Production, Engineering, Service)
for a total of **45,000 m²** (485,000 ft²)
covered area

4 Commercial branches:
Germany, Italy (BS-PR), Poland

51 Distribution/service points in the world

INTELLIGENT PROCESS COOLING PLASTICS

Cooling synchronized with the process.
ECODRY SYSTEM The new paradigm in the plastic industry



PRODUCTION INCREASE UP TO 50%



REDUCED "CARBON FOOTPRINT"



REDUCTION OF OPERATING COSTS



MINIMUM "WATER FOOTPRINT"



TOTAL MODULARITY



REDUCED "EMISSION RISKS"



Today, Frigel is the world leader in process cooling in the plastics industry thanks to the **Ecodry System**. In the last two decades, this system has completely changed the way plastics experts solve **cooling and thermoregulation** needs. From complex injection molded automotive parts to high-speed thin-walled packaging, the **"Intelligent Process Cooling"** approach has demonstrated exceptional results, increasing productivity, drastically reducing operating costs and minimizing the environmental impact of cooling systems. Over **8,000 installations** worldwide have validated these results. Our

constant research and development of innovative engineering solutions have brought today's Ecodry System to a higher level. The new **Ecodry System 4.0** (Process-Synchronized Cooling) is based on the digital connectivity between mold temperature control and the molding machine which, together with numerous engineering improvements, project the cooling and the temperature control of the plastic materials in the future: the **industrial revolution 4.0**. This innovative system is able to further improve performance, further reduce product cooling times and save costs, along with exceptional eco-sustainability.

INTELLIGENT PROCESS COOLING BEVERAGE

Cooling synchronized with the process.
ECODRY SYSTEM The new paradigm in the
beverage industry



PRODUCTION UP TO
INCREASE 50%



REDUCED
"CARBON FOOTPRINT"



REDUCTION OF
OPERATING COSTS



MINIMUM
"WATER FOOTPRINT"



TOTAL MODULARITY



REDUCED
"EMISSION RISKS"



CSD



SOFT DRINKS



BEER



DAIRY

Ecody System is a new **integrated cooling solution** specifically designed for the needs of the **beverage** industry based on an innovative engineering concept that truly represents **a new paradigm** for the beverage industry.

From non-alcoholic beverages to beer, from processing to bottling, this innovative "Intelligent Process Cooling" approach is able to cover all cooling needs, significantly increasing productivity, drastically reducing management costs and minimizing environmental impact compared to traditional solutions.

"Synchronized cooling" with the process: in this revolutionary approach, each cooling unit (Microgel or Multi-Stage) is dedicated to each main processing line, specif-

ically designed for each application **in terms of cooling capacity, flow and cooling water temperature.**

The units can be easily installed and connected to each process, digitally synchronized with the processing lines and automatically managed by them.

To complete the system's innovation, the cooling units installed at each process can be connected to a **central adiabatic cooling system** (Ecody) installed on the outside, capable of extracting the heat generated by the processes.

This central system can also provide **direct cooling** to all processes that require temperatures **higher than environmental**, such as air compressors, cooling tunnels, pasteurisers, etc.

INTELLIGENT PROCESS COOLING

DIE CASTING

Innovative cooling and temperature control solutions for the process. ECODRY SYSTEM
The new paradigm in the die casting industry



PRODUCTION INCREASE UP TO **50%**

CO₂

REDUCED "CARBON FOOTPRINT"



REDUCTION OF OPERATING COSTS



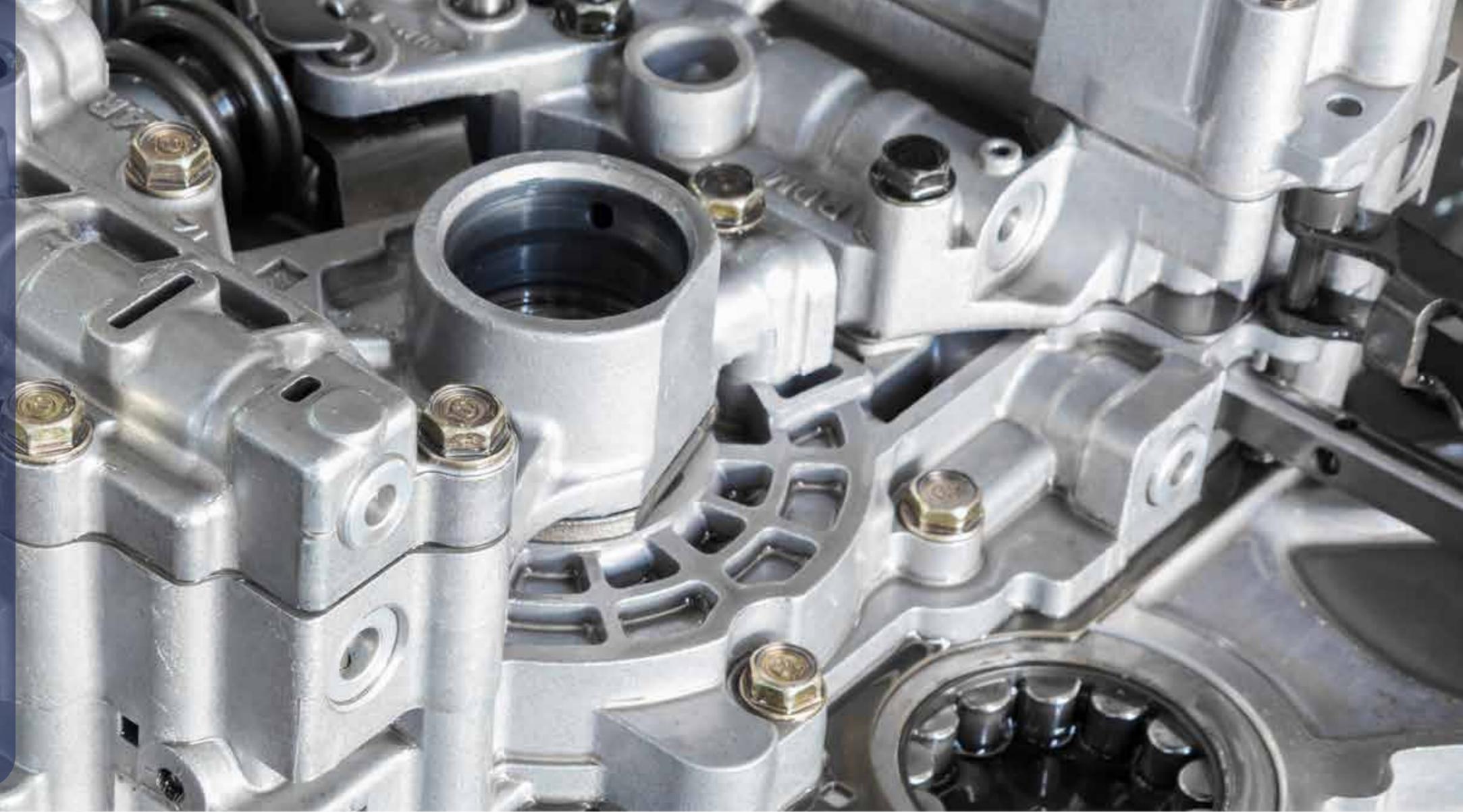
MINIMUM "WATER FOOTPRINT"



TOTAL MODULARITY



REDUCED "EMISSION RISKS"



Powered by
GREEN BOX
more than answers



ALUMINIUM



ZAMAK



MAGNESIUM

The Frigel group, thanks to the experience acquired in the sector by Green Box, deals with the aluminum die-casting sector with patented solutions that provide excellent results in terms of efficiency and sustainability.

The thermoregulation of the molds is made by pressurized water temperature controllers for operation up to 180°C (356°F) and specially designed for the aluminum die-casting process which, interconnected with the molding machine, allows for complete synchronization with the process, resulting in **optimization of the production cycle** (im-

provement of the quality of the molded piece and reduction of cycle time) and **reduction of energy consumption**.

With the innovative Ecodry System, **integrated cooling and cooling solutions** are also specifically designed to meet all the needs of the die-casting sector.

The Ecodry System allows for significant reductions of process water consumption in a closed loop configuration, thus drastically reducing the expensive water treatment chemicals needed compared to a conventional evaporative cooling tower.

INTELLIGENT PROCESS COOLING INDUSTRY

Cooling and temperature control solutions for every industrial application in different market sectors



PRODUCTION INCREASE UP TO 50%

CO₂

REDUCED "CARBON FOOTPRINT"



REDUCTION OF OPERATING COSTS



MINIMUM "WATER FOOTPRINT"



TOTAL MODULARITY



REDUCED "EMISSION RISKS"



Modern **industrial processes** require highly **efficient and sustainable** cooling solutions. For most of them, cooling systems have a significant impact on productivity levels in quantitative and qualitative terms. Moreover, these systems are responsible for high energy consumption, with the consequence of being responsible for a strong environmental impact. Our innovative approach is to provide **integrated cooling** and **temperature control solutions** specifically designed to meet the needs of each

process that can increase productivity by reducing cooling times with **unbeatable energy efficiency** and **high reliability**, with maximum respect for the environment. Furthermore, our **digital integration** platform, coupled with **central HMI** and **dedicated supervision software**, allows for **remote access** to the cooling system and real-time management of all significant parameters, also responding to the growing needs to reach the standards dictated by **Industry 4.0** and **IIOT** (Industrial Internet of Things).

INTELLIGENT PROCESS COOLING

MARINE OIL&GAS ENERGY

Customized cooling solutions in full compliance with project specifications and industry regulations (TR & S) for safe and classified areas at risk of explosion



Powered by



MARINE



OIL&GAS



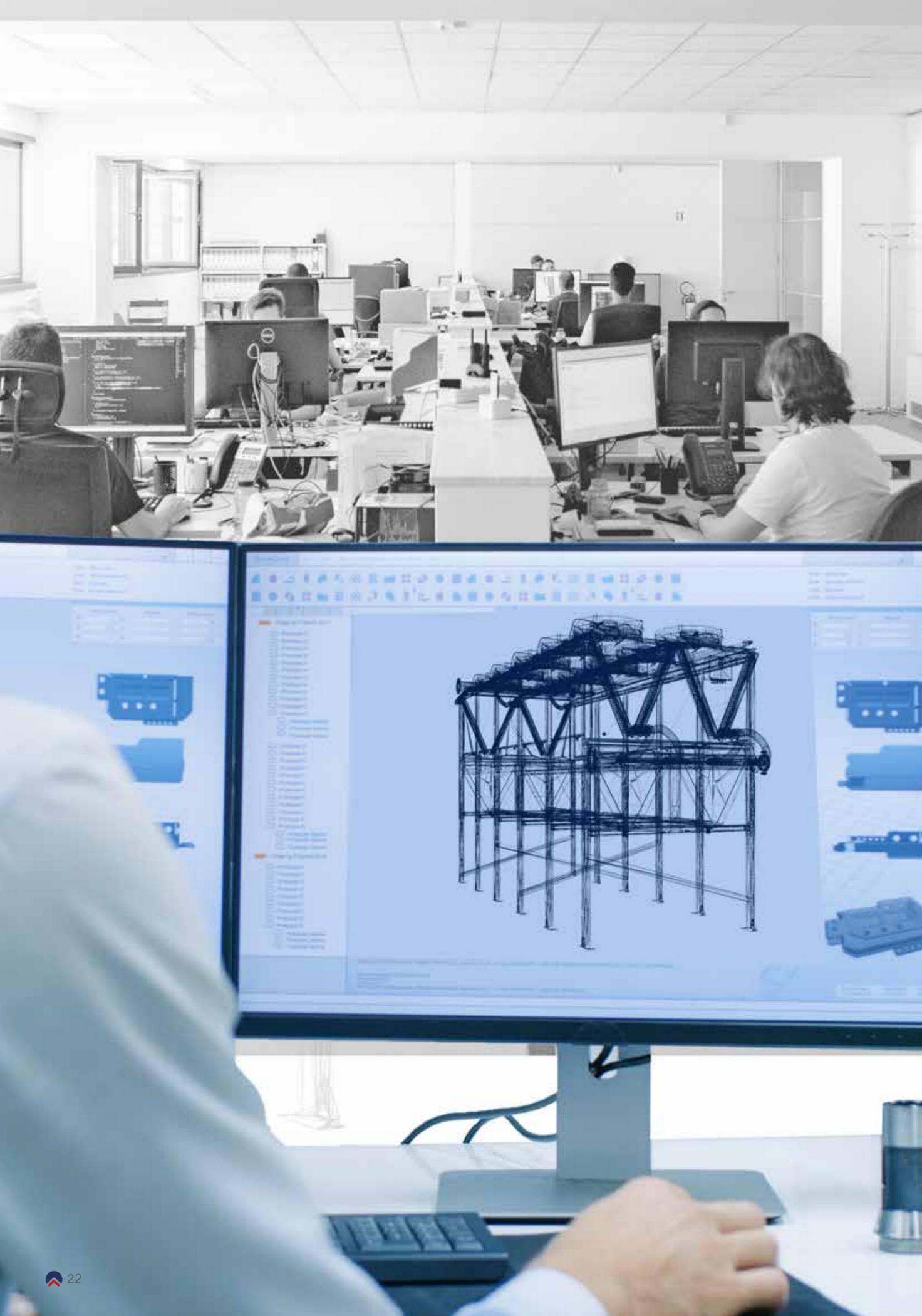
ENERGY

Plant safety, system life span, process efficiency and customization are peculiar characteristics of the reference sectors. Regulations and **project specifications** play a fundamental role in the constant process of raising construction standards. Frigel meets these needs with a proactive business approach that translates into a distinctive element. The method, defined by us as "**FULL CONFORMITY**", a business modus operandi that is applied until the phase of preparation of offers, it guarantees that conformance to all the criteria set forth in the regulations applicable to the territory, to the product and to the project are recognized and effectively applied. The **management**

of each project, also attributable to each single machine, allows our customers to constantly monitor the progress of the supply and the customizations adopted, starting from the first design stages to testing. The company's know-how in terms of streamlining processes and products, also matured in other sectors, is personalized and transferred to the products, systems and services offered in this sector. The continuous transfer of knowledge and experience, transversal to sectors and applications, present in the Frigel group, allows a continuous increase in the skills and internal quality standards, essential to give an adequate response to technically complex markets.

Specialized Engineering

“Process Focused, Technology Powered”



After the careful **analysis** of the specific cooling and thermoregulation needs of each **individual process**, our engineers are able to propose customized solutions, which maximize performance, accompanied by a comparative study with the traditional ones, highlighting the advantages in terms of efficiency energy efficiency and reduction of environmental impact.

Each proposed solution is then accompanied by a total **calculation** of the **operating costs** (TCO - Total Cost of Ownership) and an estimate of the **return on investment** (ROI - Return on Investment).

With an approved project, our pool of experts will be able to support the customer in every aspect, from logistics to installation up to commissioning and, on request, can supply complete systems of hydraulic and electrical (turnkey) systems.

Global Production

Present on every continent

We are present with production facilities on **every continent** to be close to our customers with factories operating in many countries of the world.

Thanks to our local facilities, we are able to guarantee **universal supply** anywhere in the world, with the same production quality in compliance with local regulations, with a fully equipped warehouse and logistics expert in administrative practices in the relevant local languages.



Global assistance

Prepared technicians, present everywhere

We can guarantee **local technical** and language service interventions, thanks to the structures distributed in more than **90 countries**. The specific preparation and the continuous updating of the assistance technicians guarantee competent support for every application need.

Every service center in the world has a **complete spare parts warehouse** able to guarantee the prompt delivery of each component, reducing any time to restore the functionality of the system.



Adiabatic Cooling System



The Most proven Adiabatic Cooler.

>Ecodry (Internationally Patented)

Water conservation is a **MUST**.

In fact, extremely large amounts of fresh water are consumed everyday caused by the “evaporative” heat rejection of common cooling towers.

The growing global scarcity of water had inspire us to design **ECODRY**: the most efficient Adiabatic Cooler available today. The use of this new technology may save up to **95% of it**.

Water cost is also increasingly becoming an important economic factor when operating a cooling tower, but is not the only one. A large list of advantages makes this new technology an unbeatable

alternative to them, achieving:

- Better cooling performance with increased heat transfer efficiency
- Outstanding operating cost savings, resulting in a low Total Cost of Ownership
- New standards in terms of Environmental Impact, from both water footprint and total emissions.

With **more than 8,000 systems installed** and running in all climate conditions and in a vast range of process applications, Ecodry is, by far, the most proven Adiabatic Cooler worldwide.

CO₂

REDUCED
“CARBON FOOTPRINT”



REDUCED
“EMISSION RISKS”



MINIMUM
“WATER FOOTPRINT”



TOTAL MODULARITY



Process Temperature Control Units



Units dedicated for cooling and controlled heating of industrial processes

>Microgel

Microgel is one of the products that identifies Frigel and arises from the need to have controlled cooling of every single industrial process in contraposition with traditional centralized systems. This is an ultra-compact cooling unit specially designed for "cooling time reduction": It combines a water-cooled chiller with one or two temperature controllers with a high-flow pump

and heater per zone and a free-cooling valve. The enormous success of this technology, especially in the plastics market, allows us to have more than 40,000 units installed. Microgel is also offered in other sectors such as metals, beverage processing and chemical & pharmaceutical processes, with operating temperatures of -5 to 90°C (23 to 194°F).

>Turbogel >Thermogel

These are pressurized water/oil thermoregulation units that control the temperature of the process fluid, guaranteeing operational working stability with an improvement in the characteristics of the finished product, increased productivity and reduced initial

scrap. They are mainly used in the sectors of processing plastic materials (such as injection and extrusion), rubber, metals and industrial thermoregulation processes in general, with operating temperatures up to 250°C (482°F).

>GreenCasting

The GreenCasting units (industrial patent) have been designed to totally control the mold conditioning in a synchronized way with the aluminum die casting

machine, drastically reducing the consumption of electrical energy.

>GreenJet

The GreenJet units have been designed to cool down particular points in the mold. Working with a maximum pressure of 35 bar (508 psi) and allowing to cool plugs

with a diameter of 1.2 mm (0.05 in). The process control, in this case, happens through the GreenJet synchronization - die casting machine.

Dedicated Air Coolers and Dryers

>CapCooler

The system performs post-cooling of caps, improving the quality of the pieces produced and drastically reducing waste with a consequent increase in production.

>MoldDryer

Systems that reduce the problems caused by condensation on molds created by humid environmental conditions and to optimize productivity and product quality.



Industrial Chillers



Chillers for Industrial Applications

>IndustrialChiller

These are pre-assembled and tested single zone cooling units made in numerous configurations, guaranteeing maximum functional efficiency even in the worst environmental conditions.

These chillers are the most requested solution in many industrial sectors including plastics, beverage, food, chemical, pharmaceutical, metallurgy, ceramics, electroplating, data centers, etc.



Modular Chillers

>ModularChiller

They are super-compact and water-cooled or air-cooled refrigeration modules equipped with a single refrigeration circuit with rotary compressors -with optional high-efficiency inverters.

These units have been specifically designed to build complete systems with multiple chillers, either by connecting them in series or in parallel and allows easy building of "plug & play" systems, even large ones, with cooling capacities from 100 up to 3,500 kW (30 up to 1,000 tons). There are two main system configurations:

Modular centralized cooling systems: units connect-

ed in parallel designed to increase capacity with increasing thermal loads.

MultiStage cascade cooling systems: units connected in series designed for cascade cooling of thermal loads with high thermal output, typical of the food industry, and offer in these conditions energy efficiency levels unattainable with single-stage refrigeration systems (As an option, both configurations can be used as heat pumps, capable of recovering 100% of the heat extracted from the processes, producing hot water up to 60 °C (140°F).



Customized Cooling Systems for Marine – Oil&Gas - Energy

>CustomizedChillerSystems

Customized Chiller

Condenser & chillers cooled with fresh or sea water built in compliance with local, industry and project specifications. Suitable for onshore and offshore installation in safe or classified areas at risk of explosion due to the presence of gas and dust

Customized Conditioners & Air Treatment

Packaged and split automatic air conditioners in vertical and horizontal configuration constructed in compliance with local, industry and project specifications. Suitable for onshore and offshore installation in a safe or classified area at risk of explosion due to the presence of gas and dust.



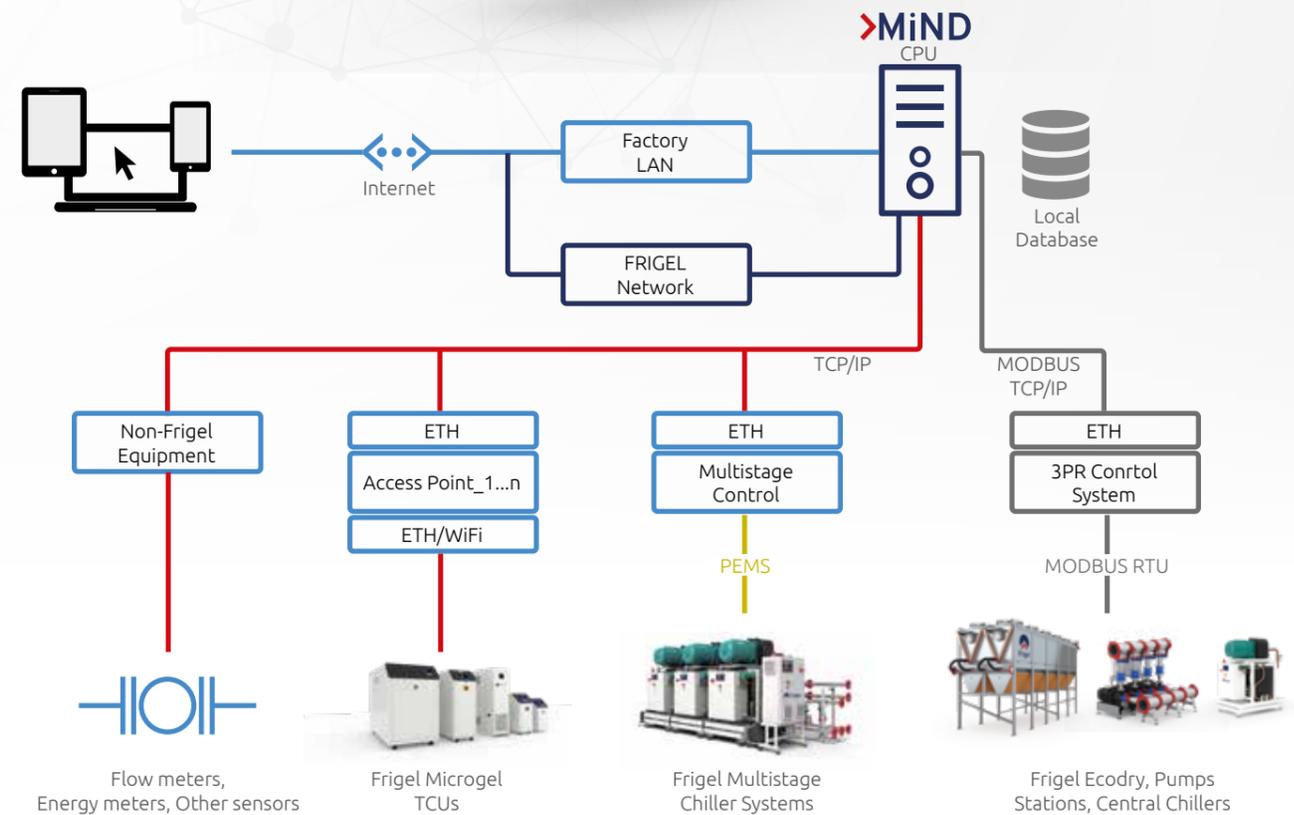
Digital Controls for Industry 4.0

>MiND[®]

Machine Interactive Database

Our digital integration platform, coupled with central HMI and dedicated supervision software, allows remote access to the cooling system and the temporal management of all significant parameters, simplifying maintenance and optimizing performance in a

proactive way. In addition, the MiND[®] system is an innovative digital solution developed by Frigel to meet the growing needs of modern companies to reach the standards set by Industry 4.0 and IIOT (Industrial Internet Of Things).



Certifications



CERTIFICATE N° 25214/12/S
FRIGEL FIRENZE S.P.A.
Via Pisana, 316 - 50018 Scandicci (FI), Italy



CERTIFICATE N° 25214/12/S
FRIGEL FIRENZE S.P.A.
Via Pisana, 316 - 50018 Scandicci (FI), Italy



CERTIFICATE N° 25214/12/S
FRIGEL FIRENZE S.P.A.
Via Pisana, 316 - 50018 Scandicci (FI), Italy





Generalvertretung für Österreich und Ungarn



Wipfinger Strasse 23
A-3433 Königstetten
www.buechler.at
Email: office@buechler.at
Tel.: +43 2273 2177-0