

MARITIME TRANSPORT

FIELD SUPPORT

WEBINAR TIME

*the*

# CRYOSTAR MAGAZINE

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# edito

In this issue of the Magazine, we have dedicated one article to taking a look at how our Business Centers around the world have handled the health crisis. This article presents an opportunity to look back at the creation of these entities that are so essential to our strategy, especially with regards to customer service.

All of Cryostar's Business Centers follow the same plan: establish a structure in an area where Cryostar has numerous machines installed, begin by focusing on customer service, then enlarge the scope to include sales and even, in some cases, local production. This method is simple but effective, and is constantly being improved based on past experiences and the skills developed by our business center personnel.

Our first Business Center, Cryostar UK, was created in 1985 to meet the need of the English parent company at the time, BOC, to be able to offer fast, efficient maintenance. In 1990, Cryostar Singapore was established to oversee the maintenance of our many pumps and turbines in Southeast Asia. Cryostar USA made its first

appearance on the East Coast in 1994, then the West Coast in 1997, followed much later by Houston, Texas in 2015 and Chicago, Illinois in 2017.

In 2002, we set off to conquer China with our Hangzhou structure. Our China location has been a great success, demonstrating rapidly growing revenue, and has grown to include production, engineering, purchasing, customer service, and sales departments.

We then established presences in Brazil and India in 2006 and Russia in 2016, bringing us closer to our clients in locations where the air gas and natural gas industry is strong today, and where it shows promise of growing in the future.

Today, these business centers and their hundred-some employees from a wide range of cultural backgrounds contribute to Cryostar's success by offering our clients local customer service, which has been all the more important during the pandemic, with its accompanying travel restrictions.

## Samuel Zouaghi

PRESIDENT

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# ON-SITE CLIENT SUPPORT

Technology is an essential element of everyday life in Cryostar. Many of our employees are, to varying degrees, faced with questions related to the technical nature of the machines we design and manufacture. One job position deals particularly closely with the technical aspects of our machines, from startup to end-of-life: on-site client support, or Field Support (FS) in the context of the Process Business Unit (pumps and turbines.) We spoke to Carole Guillin about her experience in FS, as well as the challenges and rewards of this key position within Cryostar.

## A “generalist” role

The complexity of the technology used in our pumps and turbines means that in some cases, we must call on engineers who are experts in very specific fields. Such is the case for the “Calculations and Structure” department, which we mentioned in the Fall 2019 issue of the magazine.

What makes the FS team different is that in order to respond to the wide range of issues a given machine may encounter during its life cycle, these technicians must have a good level of overall knowledge of our technology. In a way, FS technicians are our “generalists,” as compared to the specialists mentioned above.

When we take a closer look at the number of different tasks that fall to our FS team, we realize the full extent of their responsibility. Their job includes providing support to on-site technicians during installation, maintenance, and troubleshooting, assisting business centers with questions regarding client sites in their

geographic zone, and organizing call-outs with the global service team.

On-site troubleshooting is the most technical, and also the most interesting, part of this job, which requires a multitude of skills: the ability to communicate effectively with others - in particular with clients - in order to avoid misunderstandings or dissatisfaction, the ability to manage teams and lead meetings between all the different parties involved in the troubleshooting process, the ability to analyze and synthesize information, and a certain amount of technical knowledge of our machines, as FS handles the initial analysis of any problem.

Other tasks also fall to the FS team in their role as “generalists,” including keeping track of machine repairs during troubleshooting, answering any technical questions the client may have during the life cycle of a machine (changes to performance, operation, replacement of parts, etc.), providing support when improving a machine, and even passing along flaws

observed on-site in order to help improve the design of our machines.

### Information and problem resolution

When production must come to a halt on a site, it can be very costly for our clients. In these cases, Field Support's role is to manage client pressure and reassure them that Cryostar is doing its best to solve the issue as quickly as possible. We must try to remain calm and provide the facts without giving in to emotion. Internally, as well, it is important that we avoid passing on the pressure from our clients, all while monitoring the problem resolution process in order to find a solution as quickly as possible.

When it comes to problem resolution and the resulting repairs, FS technicians rely on a number of different people, both Cryostar employees and external suppliers. During this phase, communication is essential, especially when it comes to updating clients about dates when parts are to be delivered or repairs are to be completed. The solution to a given problem often depends on the quality and quantity of information we have available to us. If the information we have is incorrect or lacking, it will be that much harder to come up with a solution for the problem.

### More than just a technical job

The FS team also has many different kinds of contact with clients, primarily site managers, project managers, and buyers. We must be very responsive, especially when production is brought to a halt or when installing a new machine, because the financial stakes can be very high: the sites we work with often represent tens of millions of euros of investment. We cannot make the client wait; we must do everything we can to get the site up and running again as quickly as we can. For us, the most satisfying moment is when a client thanks us for our help.

## ON-SITE TROUBLESHOOTING EXPERIENCE

*On a project in India, after numerous DGS (Dry Gas Seal) breaks, we had to undertake a lengthy troubleshooting process to determine what was causing the breakages. During troubleshooting, FS worked with the client, the R&D team, and the DGS supplier to check the operation of the pumps on the site. After several months of investigation, we discovered that the client was operating the pumps in a cavitation zone. This troubleshooting process presented the FS team with an opportunity to learn more about the operation and design of these pumps, which they were not familiar with before.*

Our job is about much more than just the technical aspects of the machines. We are in constant contact with clients and must communicate with them as often as possible in order to update them on progress with troubleshooting and parts delivery, as well as answering any questions they may have. As a result, our job requires good relationship and communication skills, both internally and externally.

### CUSTOMER SATISFACTION EXPERIENCE

*A wheel broke while starting up a machine. The R&D (Mechanics and Structural Calculations) department investigated the incident and pinpointed the cause of the breakage. A new wheel was then designed, manufactured, and sent to the site in record time, earning us the client's most sincere thanks.*

*While starting up a project in Saudi Arabia, the IGV (Inlet Guide Vanes) shaft was distorted by the force exerted on the blades during closure.*

*The Mechanics R&D team quickly came up with a new design. Thanks to the involvement of the on-site FSE (Field Service Engineer,) a quick response from the Mechanics R&D team, and exceptional client communication, we were able to get the machine up and running, for which the client was very grateful.*

### A key internal role

As the FS team deals heavily with the technical aspects of our pumps and turbines, it comes as no surprise that they are in touch with our "technical" departments almost daily. FS technicians often need to call on different specialized teams in order to respond to the client as quickly and knowledgeably as possible:

- The R&D team for questions about various components of our machines and during troubleshooting

### MODIFYING A PART

*Several turbines presented problems with bracing on the blades. We worked together with the Mechanics R&D department to minimize this problem.*

- Production, methods, and testing, in the case of specific procedures such as on-site inspections or maintenance calls, and when we must call on their expertise for balancing or testing a machine during troubleshooting
- Quality assurance, with whom we collaborate in the case of problems with a part

### A QUALITY ISSUE WITH A PART

*Numerous transmitters demonstrated a flaw on a site. We filed an NQR (Non-Quality Report) with the product quality department so that they, in turn, could contact the supplier and ask them to test the part and identify the problem.*



- Purchasing, notably when it comes to negotiating prices and buying replacement parts in order to conduct any necessary repairs on site
- The repair department when fixing a machine or conducting an inspection
- The global service team for organizing call-outs

### Variety, complexity, and training

Our job is fascinating, because the problems we encounter on site vary widely in terms of their complexity and technical nature. Some questions have simple answers, such as a minor flaw in instrumentation or assembly, while others are much more complex, such as a machine breakage. Being able to respond to

our clients quickly is essential.

Having general knowledge of the machines and their auxiliary components is a major advantage, because it enables us to resolve certain issues immediately. This technical knowledge is the result of experience and training over our years with Cryostar and also of the advantage of knowing people, which simplifies communication.

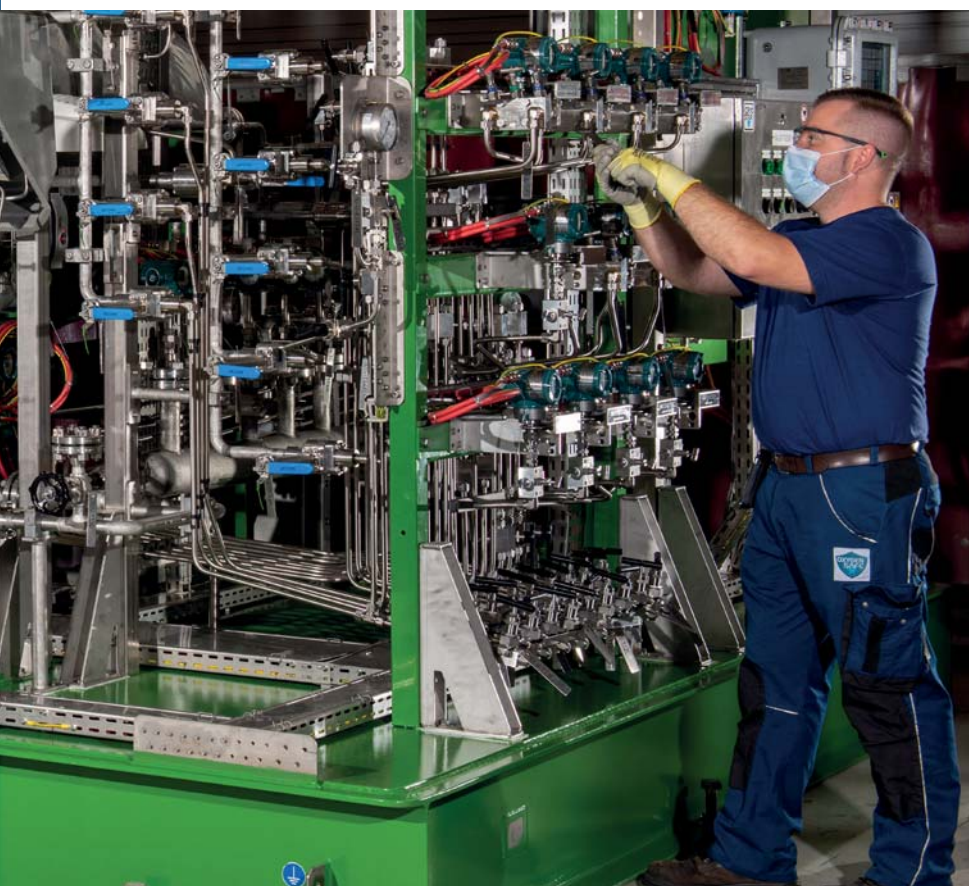
**It is easier to work in FS once you have acquired a certain amount of experience in various technical fields. This experience is reflected in the wide range of skills possessed by our FS team. Thanks to the expertise and experience of our team members (some have previously worked in different**

**on-site positions, while others have worked in the repair shop or in the R&D department, etc.) we are often able to respond to clients based purely on our own knowledge, and thus answer many questions without having to call on Cryostar's experts.**

We are constantly learning, because responding to different problems requires that we know as much as possible about a large number of different machines. Each troubleshooting process becomes an opportunity to master new skills and learn more about a given type of machine, especially when we must collaborate with the R&D department to correct a malfunction.

Some sites are more difficult to manage than others, such as MegaPlants, which are composed of several sites with many different types of machines in a single project. Working on project like these requires excellent organizational skills to keep track of all the different FSEs working on site and understand the relationship between the various machines and progress towards startup.

The "Field Support" team is yet another demonstration of the diversity, complexity, and technical nature of the work done by our employees in nearly every department. This is one of Cryostar's greatest strengths. It enables us to offer our employees interesting, varied work and a constant stream of new opportunities, thanks to the evolution of the company and the market.





# CRYOSTAR has a long history with maritime transport

**It started in the mid-70s, when we introduced our first compressors and exchangers for processing evaporation gases on LNG carriers. It has grown progressively from the 90s to today, to such an extent that these days, nearly every LNG carrier on the water has at least one piece of Cryostar equipment on board, whether it be a compressor, an exchanger, a reliquefaction unit, or a pump to power the engine—and in some cases, all of the above on a single ship!**

Given this history, it seems only natural for us to continue working with the maritime transport sector. This time, Cryostar will be putting its expertise to work for ships other than LNG carriers: LNG-powered ships.

Cryostar has been investing in the new market of pumps for LNG engines for some years now. To date, we have delivered 190 “low-pressure” pumps, which are installed on 53 different merchant ships, including five LNG carriers, two shipping vessels, one ferry, and two cruise ships. We also have 81 high-pressure pumps installed on 45 ships, mostly LNG carriers.

French maritime transport and logistics expert CMA-CGM has decided to add nine large container ships, the largest in the world, to their fleet—all powered by LNG engines. The largest of them, the “Jacques Saadé”,

was recently baptized in the port of Le Havre. This new colossus, which is 26 stories high, is capable of carrying 23,000 containers for delivery between Europe and Asia. Its inaugural voyage began on September 23rd, 2020: a route from Europe to Asia with stopovers in Northern Europe, Spain, Malaysia, China, and South Korea, which will take 84 days.

During its stopover in Singapore, on October 12th 2020, the “Jacques Saadé” beat the world record for the most containers loaded on a single ship, with 20,723 containers on board.

## Why Liquefied Natural Gas?

CGA-CGM, in an effort to comply with the regulations on pollution on the Mediterranean Sea (ECA), has chosen to use liquefied natural gas because this method of propulsion eliminates 99% of fine particles and sulfur oxides and 85% of nitrogen oxide emissions, thereby reducing CO2 emissions by 20%.

The LNG is stored in liquid form in tanks with a capacity of 18,000 m<sup>3</sup>, then regasified to provide power to the ship's engines.



## Seven years of research and development

This container ship is the result of seven years of research and development by CMA-GGM and its expert partners, including the Chinese company that built the main engine, the Shanghai shipyards, and, of course, Cryostar, chosen for our expertise in high-tech cryogenic equipment.

This represents a new challenge for Cryostar, as this particular on-board configuration has never been used before. CMA-CGM needed to be sure that the gas would be available at all times, as the ships are designed to be powered almost exclusively by LNG, and the fuel tank is therefore reduced to the minimum safe size. The equipment we are supplying consists of three

pumps placed at the bottom of the reservoir (Subtran 45-3/35-FP) and a fourth, retractable pump, the Subtran 45-3/35-RP, installed in a dedicated well. As these ships are membrane carriers (with a capacity of approximately 18,000 m<sup>3</sup>) the project also called for an emergency pump to empty the reservoir if necessary: in this case, a Subtran 75-1/230-RP.

The challenge presented to Cryostar was figuring out how to ensure that two pumps of different sizes, the permanent 45-3/35 pump and the 75-1 emergency pump, could be installed alternately in the same well. In addition to developing a new model of a pump, we therefore also had to integrate a special interface that would be shared by the emergency pump and the retractable pump.

For this nine-ship project, Cryostar supplied 36 primary pumps (3 fixed pumps and one 1 retractable pump per ship) as well as an emergency pump installed at the dock.

## Cryostar, a renowned expert

At the beginning of the project, the cryogenic pumps were not necessarily seen as that crucial. But as the project continued, considering the importance of the technical issues that arose, it became evident that they deserved special attention, thus throwing into relief Cryostar's expertise as a supplier in the LNG industry, its customer service department, and its experience and ability to work with Chinese naval shipyards.

These competitive advantages Cryostar has developed over the years make the company a leader in this new market, as well as in other markets where it is present.

Thus, with this project, in addition to past and future projects in this market, Cryostar has demonstrated once again its commitment to the worldwide effort to reduce CO<sub>2</sub> emissions.



# Finding innovative ways to stay in touch with our clients

The unprecedented health crisis that began in 2020 and has unfortunately continued into 2021 has had a major impact on commercial activity, forcing companies to innovate in the face of canceled trips, expos, and professional conferences, and indeed nearly all in-person meetings.

Cryostar is no exception.

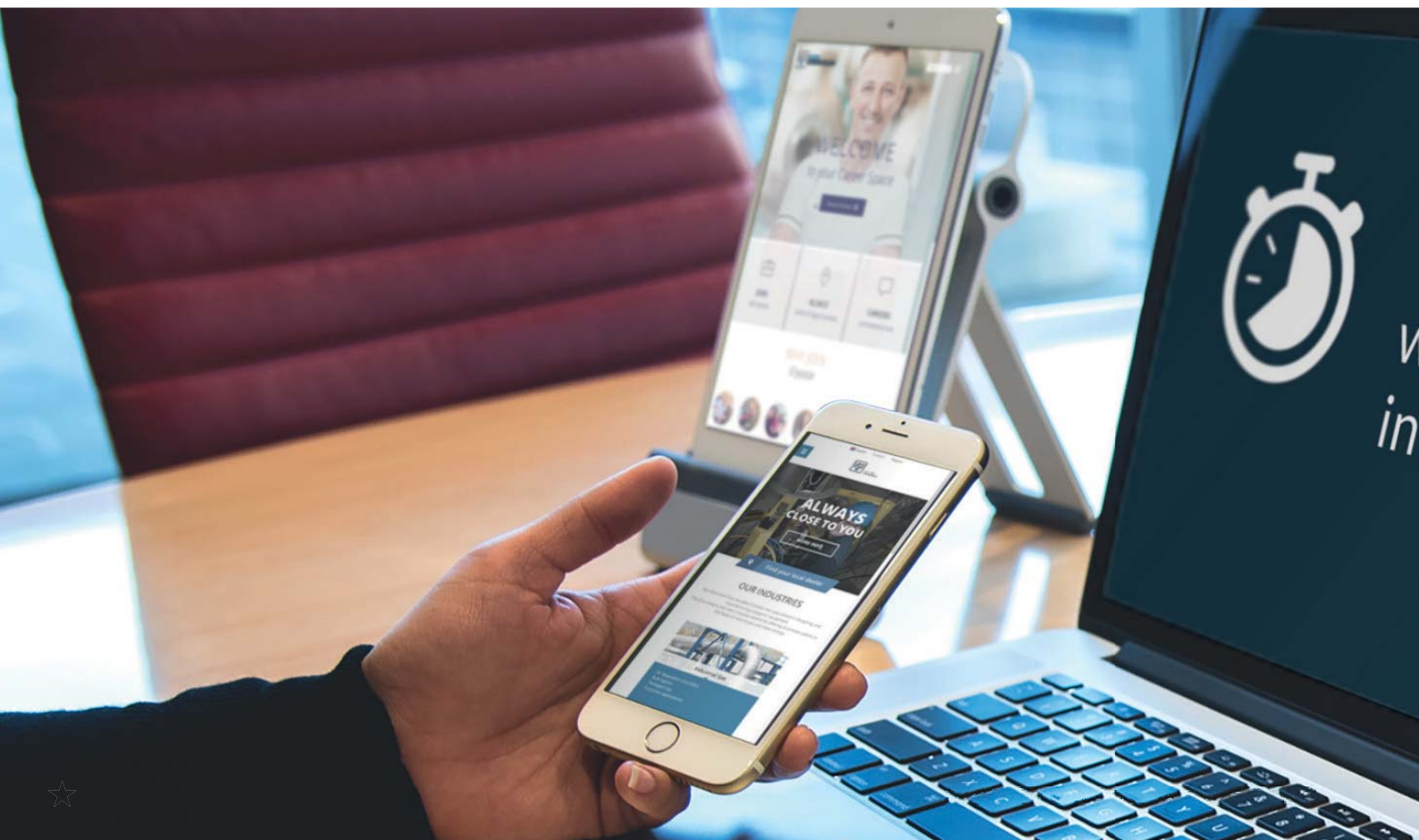
We have adapted successfully, finding and offering new solutions in order for maintaining close ties with our clients and partners. Surfing on the digital wave, the sales teams have been experimenting with new collaborative tools, in particular webinars.

What is a webinar? A common bit of technical jargon, the word “webinar” is a contraction of “web” and “seminar,” and is a sort of collaborative meeting organized and held online.

The advantage of webinars is the level of interaction they offer between organizers and participants. Participants can respond directly to the presenters’ speech by sharing comments on the “chat” tool in the webinar, asking questions just as they would during an in-person meeting.

The organizer, in turn, can practice active listening with participants by inviting them to respond, ask questions, and share their thoughts in polls throughout the webinar. Finally, the ability to record the webinar enables the sales team to show the presentation again at a later date. For all these reasons and more, webinars are an excellent way to maintain high quality customer relationships, much like in-person meetings.

The first sales team to experiment with webinars was the LNG Cluster, which oversees the sales of filling stations for





LNG-powered vehicles at Cryostar. Always open to new possibilities and enthusiastic about experimenting with new solutions, Philippe Heisch and his team were instrumental in the implementation of webinars at Cryostar, with the support of the communication department.

Philippe Heisch explains, "The idea of the webinar came from a team discussion about a loss of visibility due to the introduction of travel restrictions and therefore the cancellation of client visits. Indeed, a large portion of our travel time is dedicated to prospective visits, during which we are able to promote our products, answer client questions, and gather market intelligence. We realized we had to come up with a solution, a new way to "visit" our clients virtually in order to present our products, share important news, and answer questions. A webinar seemed like a perfect solution. The results were very positive, as this online event allowed us to stay in touch with clients and maintain visibility. The webinar also gave us a chance to get immediate feedback, which helped us improve how we present our products."

Encouraged by the enthusiasm and interest demonstrated by clients during their first sales presentation, the LNG Cluster team organized two more webinars over the course of 2020.

The Process Machinery BU sales team, who were unable to hold any events in our facilities during the health crisis, have

also found webinars to be a valuable tool. They also seized the opportunity of the commercial launch of the NeoVP pump, the latest in our line of cryogenic pumps, to do some promotion, sharing with some of their most loyal customers an exclusive video filmed in our factory, along with an in-depth technical presentation of the pump.

Marianne Samuel, Purchasing Director, and Samuel Zouaghi, President, also managed to hold their usual annual meetings with partners thanks to a series of webinars held in November 2020, to which more than 300 partners were invited. Here is what the attendees had to say:

*"Thank you for keeping in touch with your suppliers. Your company is entirely unique from this point of view, and beyond our purely commercial relationship, it makes us want to work with you. You should be proud of yourselves!"*

Although this period of crisis has generated some uncertainty, it has also given us an opportunity to take a closer look at how we work, promoting healthy competition among Cryostar employees, who are all motivated to offer our clients new, innovative solutions that will undoubtedly continue to evolve over time.

After all, it is of the utmost importance to us that we maintain our customer relationships, at any cost.



# HEALTH CRISIS IN OUR business centers



**At the end of 2019, news began to emerge from China about a virus outbreak centered around Wuhan. At first this seemed to be an isolated issue, but within a few weeks it became clear that a serious threat to human health had appeared. Effective countermeasures had to be taken...and quickly.**

As the COVID-19 outbreak spread and took hold around the world, Cryostar global operations, including those in our seven international Business Centers, faced exceptional challenges.

At such times, the commitment and spirit of our people is tested. Across all regions, our teams showed determination to find solutions to keep the business operating and support our diverse customer base.

In coordination with our central HSE team in France, written rules were quickly developed, specific to each Business Center and complying with local regulations in each country.

As the situation developed, different arrangements had to be implemented and then adapted.

Our team in China was, of course, the first location to feel the impacts. A strict lockdown was put in place preventing staff from going into the office and workshop. One field service engineer, working on a customer site, was locked down in Wuhan for many weeks.

This period included the Chinese New Year, so other staff were locked down with their families far from home and office. However, the team quickly responded by setting up remote working

arrangements. Once it was evident that the lockdown would be extended, Cryostar got approval from local authorities to re-open the workshop in order to support customers operating essential services. As the virus continued to spread, each Business Center had to adjust its operations.

**FIRST, SANITARY RULES** were put in place in line with local and national guidelines, taking into account rules published by our parent company and HQ in France, including :

- Home working for staff where possible
- Restricting the number of people in offices and workshops
- Organizing into groups to contain any outbreak
- Regular sanitization of building and equipment
- Mandatory mask wearing and social distancing

But our Business Centers faced additional challenges to their daily operations :

**SHORTAGE OF SAFETY** equipment like masks. Our Chinese office was able to assist here, sending supplies to other offices as needed.

**BUSINESS CENTERS** are focused on service (spare parts, repair, on site service, technical support..), so those operations are critical to our customers. Consequently, as lockdowns were announced, many Business Centers received letters from customers who provide essential services, strongly requesting that Cryostar Business Centers maintain operational support. Anticipating this, teams in our Business

Centers had already taken actions to ensure continuity of support. In all locations, office staff were set up to work from home and workshop staff organized into teams with protective equipment and social distancing as mentioned earlier.

**WHERE POSSIBLE** (e.g. in India), on-site activities like pre-commissioning were conducted remotely.

**SINGAPORE** (with high on site workload) coped with 14 day quarantine periods for field service technicians arriving in overseas countries and again upon return to Singapore.

**IN THE UK**, where on site support is the major activity, there was a decrease in workload with jobs cancelled or postponed. The Business Center therefore participated in a government furlough program to match resources to demand, whilst keeping essential services available.

**IN RUSSIA**, pro-active actions, taken in anticipation of the virus spread, ensured continuity of operations including on-site support for a major customer project.

During this challenging period, Cryostar demonstrated (and continues to demonstrate) its adaptability and innovative culture by adjusting operations to ensure continuous support to customers, whilst complying with all local sanitary rules and global best practices. Finally, we take this opportunity to thank all our customers for their continued trust and partnership with Cryostar during this challenging period.

# NEWS

## Extension of the CAPDENAC facility

The year is off to a good start for Cryostar Automation, based in southwestern France, with regards to the office extension project.

The first step has already been accomplished: the installation of a temporary building that will house its offices for the duration of the renovations and construction, which are scheduled to last around one year.

## TG 900 turbine

The largest turbine Cryostar has ever made will be installed in China in 2021!

**The project has just reached an important milestone!** The TG 900 successfully passed all the necessary tests, which were conducted in our workshop in the presence of an inspector sent by our Japanese client "IHI Corporation".

Over more than four hours of testing, we were able to confirm that the machine runs properly.

This turbine, which has a nominal power of 4.5 MW, provides power to a generator and is equipped with a wheel with a diameter of 900 mm. In the next few months, it will be installed on a liquefied natural gas reception terminal in the region of Shanghai, as part of a setup that regenerates heat through a Rankine cycle.

## PROJECT PHENIX: a 15 million euro investment!

Cryostar invests 15 million euro in a new project dedicated primarily to a new test and assembly building, which will boost our operational capacity considerably by adding to our existing test benches.

With a surface area of approximately 1600 m<sup>2</sup>, the building will

double our test capacity for 4- and 6-stage compressors and hydrocarbon turbines.

This is the largest investment in Cryostar's history. It is proof of our confidence in the future and in our opportunities for development and growth.

This investment will allow Cryostar to continue to grow by building on its strengths, namely our flexibility and agility, and thereby improve client satisfaction with quality and timing.

The construction will take place over the next 18 months. The building should be finished by Fall 2022.

## CRYOSTAR EMPLOYEES RETIRED

Recently, our following colleagues have retired.

We thank them for their contribution and wish them a long and peaceful retirement.

NAME	RETIREMENT DATE	JOB TITLE	SENIORITY / YEARS	
PLOUVIET	JEAN-LUC	31/12/2020	Draftsman	9y 4m



*more than*  
**CRYOGENICS**

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**BRAZIL**

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**CHINA**

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**FRANCE**

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**INDIA**

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**RUSSIA**

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**SINGAPORE**

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**UNITED KINGDOM**

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**UNITED STATES**

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CRYOSTAR worldwide:  
[www.cryostar.com/locations](http://www.cryostar.com/locations)

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Contact: [magazine@CRYOSTAR.com](mailto:magazine@CRYOSTAR.com)