

THE CRYOSTAR magazine



INTERNATIONAL RECOGNITION

Cryostar receives prestigious award

BUSINESS CENTRES

Cryostar expands in to Brazil



PRODUCTS

Pump up the power ... crack down on costs





Cryostar is proud of the service it offers to all its customers, in all its markets around the world. It is our customers, and their continued business, which has allowed our company to grow, and in turn, offer an industry-leading service on a global basis.

Growing our business is of paramount importance to Cryostar. Serving, adding value and forging ever-closer partnerships with our customers has led to a four-fold rise in Cryostar sales since the year 2000.

Cryostar recognises that further growth is fully dependent on our customers, serving them, offering cutting-edge technologies, providing tomorrow's solutions today, and meeting customer needs at any time, in any place.

To meet those needs, Cryostar in the last six years has recruited a further 200 staff and expanded its operations to provide a global footprint – the latest Cryostar operation has just opened in Brazil to cover the South American market (see page 6).

Cryostar is built on the 'can-do' attitude of its people. Our technicians and engineers are driven to take up challenges. They have the enthusiasm to find the solutions to the hardest of problems. They have pride in their work. They are simply the best at what they do for our customers.

And it is serving customers which drives our business forward. It is our customers' future needs which has led Cryostar to expand, among other, into the field of affordable clean energy. Our technology is a passport to low, and even zero, carbon emissions (see page 8).

Cryostar continues to invest for the future, be it in new test stands, new technologies, its people and in its ability to provide only the very best in customer service. At Cryostar, the customer is truly king and we aim to prove this every day, every time a customer calls.

Cryostar's future success is firmly linked to the success of its customers, providing them with a partnership second-to-none. Growth for Cryostar is paramount, and we recognise customer service is the key to that growth.

Daniel MEYER
President



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Cryostar receives prestigious international award

The International Institute of Promotion and Prestige (IIPP) has recognised Cryostar's 40 years of innovation with the presentation of the prestigious Development of Industrial Technologies' Merit for Development Award.

Olivier Giscard d'Estaing, brother of former French president, Valéry, presented the award to Daniel Meyer, president of Cryostar, and his team, in recognition of the company's contribution to the field of cryogenics.

In response, Daniel Meyer said: "The question often asked is: 'why Cryostar is so successful?' The answer is not unique but nor is it an easy one.

"However, if I have to choose one word, which best describes Cryostar, it is 'enthusiasm'. Enthusiasm makes us passionate about our work, our customers; it gives us a 'can-do' mentality and helps us take up challenges, like going forward and reaching €200 million turnover before the year 2010! For Cryostar, the only acceptable strategy is one of growth through innovation and customer service."

The Merit for Development award recognises individuals, institutions, communities and companies, which contribute to the development of an activity field in the economic, industrial, craft industry, cultural and social sectors.

The award ceremony, held at the National Automobile Museum of Mulhouse, was attended by more than 200 guests. These included the Prefect of the Department of Haut Rhin, the President of the Mulhouse Chamber of Commerce, customers, suppliers and partners of Cryostar as well as managers and middle managers of the company.



Olivier Giscard d'Estaing, a member of the French "Comité Economique et Social", said: "Companies like Cryostar are the real wealth creators of the modern world – thanks to their technological contribution and employment creation.

"For me, Cryostar is a young company leading an extraordinary adventure. It is a company of innovative entrepreneurs, going from a European presence to a worldwide business. Companies like Cryostar are a great source of hope for the technological advances we all expect to secure the future."

Daniel Meyer said: "Our history is one of service to industry and our customers. We are proud to have brought to market a number of innovations. Namely, the magnetic bearing turbines which are the standard in the hydrocarbon business.

Also, vertical process pumps, which have replaced a series of compressors allowing substantial savings and significantly improving plant performances. Then there is our turbine technology, coupled to generators to produce clean energy, and the wide range of products that contribute significantly to the LNG ship industry.

"At Cryostar we view the future with great optimism. For a start, Cryostar is ideally positioned in the energy markets with products for almost the whole natural gas and liquefied natural gas production chain.

"Also there is growth potential for the production of clean energy, using waste heat, natural gas pressure let down stations and in geothermal applications.

"On the international side, we export from France

more than 90 per cent of our production, employ people from 20 different countries and continue to expand globally, with our next step being to target India's markets."

Today, Cryostar sells more products in Asia than in Europe, with South Korea as a leading market, said Daniel Meyer.

He added: "But let us not forget that a company is only as good as its people. Much of Cryostar's success is directly attributable to its personnel and their highly innovative spirit.

"All of us are responsible, proud and passionate about providing only the very best solutions and services to customers around the world. And let us not forget that our customers are also our partners and that the IIPP award is a reflection of their trust in Cryostar, our technologies and our commitment to their businesses."

At the presentation Daniel Meyer especially thanked Kurt Schwarz, former Managing Director, and Josef Pozivil, Director of Technology, as "two people key to the Cryostar innovation process".

**The International Institute for Promotion and Prestige was founded in 1963 in Geneva and is active in 75 countries, with members drawn from political, diplomatic, scientific, cultural and economic circles. The Institute's goal is to identify people, institutions, groups and companies whose activities, accomplishments and work deserve to be brought to the attention of a global audience through the award of an international distinction.*



Congratulations

Michel Guillot, Prefect of the Haut Rhin Department and representing French Minister of Industry, François Loos, congratulated Cryostar on its success.

He underlined five main strengths of the company as being:

- A totally international culture with a “world village” vision
- The ability to anticipate the innovation process
- A wide and diversified range of products
- An exemplary customer partnership ethos, involving safety, performance and product cost optimisation; and
- The high calibre of its staff of which 30 per cent are engineers.

Professor Denis Breton, member of the New York Academy of Science and father of French Minister of Finance, Thierry Breton, then highlighted some of the main characteristics of Cryostar as being:

- An international company present on four continents, capable of meeting customers needs anywhere in the world on a 24/7 basis
- A company which is not only a manufacturer, but also a provider of solutions through partnerships with its customers
- A leader in development, testing, innovation, reliability and execution; and
- A preferred supplier to many gas companies and shipyards in the world.

Professor Breton emphasised that “the growth of the company underscores its dynamism”. He added: “I like the vision of the future of Cryostar. It is innovative, takes up challenges and is passionate about what it does.

“My only regret is that I very seldom come across companies like Cryostar!”





CRYOSTAR BRAZIL

Cyostar has expanded its service offerings and customer services in the Americas by opening a new business centre in São Paulo, Brazil. The Latin American region has continued to show significant growth and Cryostar Brazil is an important element in the company's global growth strategy.

With two US offices and established agents in Colombia, the São Paulo business centre is a key step to building a robust infrastructure to serve the Americas.

The new business centre offers sales support, engineering workshop facilities and spare parts stock. This means Cryostar can extend its unique and high levels of service to local customers in terms of responsiveness, global expertise available locally and quick delivery of spare parts.

Cryostar Brazil is now looking to meet the needs of several markets through its wide range of pump and turbine technologies. Cryostar's traditional centrifugal and reciprocating pumps will continue to meet the needs of the industrial gases market, but where this market was previously served by Cryostar's US office, it will now have a fully functioning service infrastructure in the region.

The new São Paulo centre will also bring Cryostar's natural gas refuelling stations expertise to the South America market. This region, especially Brazil and Argentina, has for many years been at the forefront of the natural gas vehicle evolution with one of the highest adoption rates in the world.

Claire Rivollier, Cryostar Brazil business manager, said: "Already, we are involved in building vehicle

refuelling stations in Brazil but will be looking to expand activities to supplying fully integrated LCNG (liquid and compressed natural gas) facilities. Cryostar has also been involved in the chain of LNG delivery in supplying its transfer pumps mounted onto LNG trucks.

"In addition, for more than 20 years, we have supplied turbines for use in energy recovery solutions in Europe. Now, we are able to extend this expertise and Cryostar's technologies to Latin America where the energy recovery market is highly developed.

"Finally, customers working in the oil and natural gas industry in Latin America will be able to exploit our latest HPP pump technology. This reciprocating pump was introduced to the market in early 2006 and has been especially designed for well stimulation applications where high pressure and high flow are critical."

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Westport fuels Cryostar's share of LNG pumps market

Cryostar has signed a deal to develop, manufacture and supply LNG fuel pumps based on Westport Innovations Inc. cryogenic technology. Under the agreement Cryostar has the exclusive, worldwide, rights to Westport's LNG pump technology for use in the heavy-duty automotive market.



In turn, Westport has agreed to source any high-pressure, direct injection (HPDI) LNG fuel pumps it requires for the heavy-duty automotive market from Cryostar. Cryostar will also have the right to manufacture and sell pumps incorporating Westport's LNG pump technology, to other customers.

Daniel Meyer, Cryostar president, said: "Cryostar brings 40 years of cryogenic design, engineering, testing and manufacturing expertise which we will apply to the Westport HPDI programme.

"Along with Westport, we also see the opportunity to establish LNG as a major transportation fuel for heavy-duty vehicles in key markets around the world.

"We also look forward to developing additional collaborative opportunities with Westport, as LNG continues to emerge as a significant component of the world's energy system."

With 10 years of development and several million miles of on-road testing, the Westport LNG fuel pump and related systems is the only automotive LNG supply module available in the world today.

The Cryostar HPDI pump module will deliver the performance and reliability demanded in heavy-duty on and off-highway applications. The pump is fully integrated with vehicle computer control systems and is capable of delivering up to 100 kg/hr of warm, compressed natural gas to the engine at pressures up to 5,000 psi.

Michael Gallagher, Westport president and chief operating officer, said: "This agreement is an important step in building a reliable and scalable supply chain to support large-scale commercial deployment of our HPDI heavy-duty LNG trucks.

"The off-engine LNG fuel system, consisting of the LNG fuel pump and LNG tank, is a critical component of the overall HPDI vehicle solution."

Cryostar has the resources, LNG technical expertise, and market experience to meet commercial product cost and quality standards for the LNG pump, as well as to scale up volume to meet prospective demand, acknowledged Michael Gallagher.

He added: "We are very excited to be establishing this new strategic partnership with a world-class company like Cryostar, which we believe is a strong endorsement both for our technology and our heavy-duty LNG truck business."



Pump up the power...

crack down on costs

A new heavy-duty HPP pump can significantly increase the cost efficiency and ROI of large fleet refueling stations. Combining liquid and compressed natural gas (LCNG) within a single refueling facility holds the key...

New Cryostar pump technology enables large fleet owners to combine liquid and natural gas (LCNG) refueling facilities into a single station and thereby realise significant cost savings in terms of electricity consumption, installation, investment and maintenance.

Cryostar automation has already proven itself in refueling trials with UK haulage company the Hardstaff Group. Not only was it the first time that a UK firm invested in a twin LCNG filling station, but the project was the first to receive funding from the UK Government's PowerShift programme designed to kick start the market for alternative fuels.

The result of that partnership is a technologically advanced, yet easy to operate gas refuelling station. Put simply, on one side of the station are nozzles for LNG and on the other are the nozzles for CNG. The interconnecting technology, supplied and installed by Cryostar automation, includes pressuriser pumps and a vaporiser that converts the LNG into CNG as well as cryogenic transfer equipment for LNG refueling.

This is good news for the growing number of operators of large vehicles, such as buses and trucks, utilising natural gas as fuel. There are presently 120,000 natural gas-powered buses in the world, 45,000 in Europe alone.

Due to their large tank sizes, these vehicles have special fuelling needs, which until now have mainly have been supplied through CNG refueling stations. These stations' main component is a compressor which is expensive in terms of power consumption, maintenance and capital investment.

Large dual refueling stations, based on heavy-duty pumping technologies, present advantages such as low overall power consumption, reduced dimensions, easy installation, and lower maintenance costs. They also offer a lower initial investment price tag, increased efficiency, better fuel quality and easier installation. This kind of refueling station is able to provide flows of up to 8'316 Nm³/h (316550 SCF/h) at 320 bars (4620 psi) pressure – and this with just one Cryostar HPP pump.

LCNG stations are designed to deliver both CNG and LNG depending on vehicle type. The LCNG station



pulls LNG from the storage tank through a LCNG pump, which pressurizes the LNG up to 400 bar if needed and then sends it to a vaporiser. This turns the liquid into gas by ambient heat exchange. The natural gas is then odorised before being sent to the high-pressure storage capacities which deliver CNG to the vehicles during the pump cool down time.

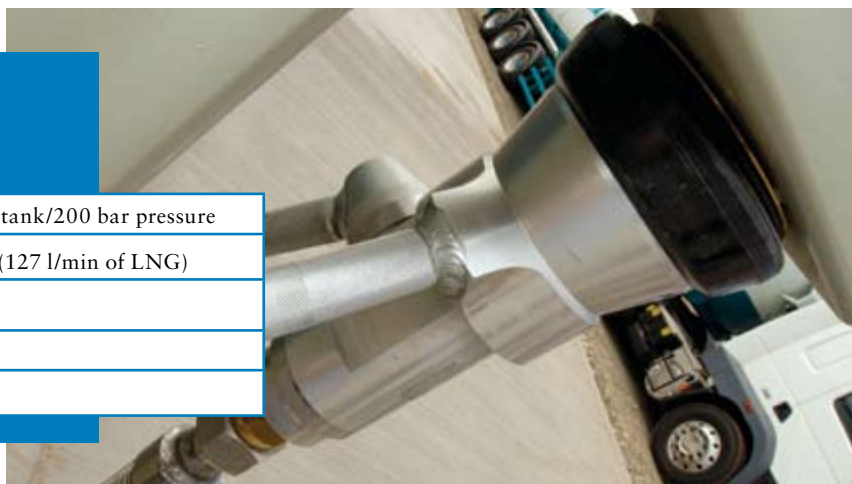
The benefits of coupling Cryostar’s HPP pumps with an LCNG station are clear. Compared to a CNG station, fleet operators can expect:

- Lower requirement in term of power (150KW vs 1,000KW)
- High purity gas source, indeed LNG is already purified at liquefaction stage
- Cost efficiency - compressor vs liquid pump (pressurizing liquid which takes 630 times less space than gas needs less power)
- The possibility to fill the vehicles at the required flow directly with the pump flow
- Lower initial Investment (30 per cent less) and lower maintenance costs (three times less) than a compressor solution; and
- The possibility to fill both in LNG and in CNG from the same source of gas.

Example

Filling 4 buses at the same time in 10 minutes.
 Operating 12 hours a day / 365 days per year.
 Electrical power cost of € 0.23 per KWH.

Vehicle Tank Capacity	1000 L water tank/200 bar pressure
Required maximum flow	4800 Nm ³ /h (127 l/min of LNG)
Pump max liquid flow	150 l/min
Pump max required power	160 KW
Compressor equivalent power	1000 KW



News

Demand rises for power recovery units

Cryostar has secured a number of new orders for its newly released Magnetic bearings Turboexpander Generator (MTG) for the recovery electricity recovery in natural gas pressure reducing stations.

Stadtwerke BREMERHAVEN (Germany), an important city utility company, has ordered one MTG unit which will deliver 200 kW electrical power to the grid.

Gasverbund Mittelland (Switzerland), a gas distributor, has confirmed its faith in Cryostar technology – it first purchased a Turbo expander Generator model TG2 200/45 Ex delivering 1.9MW in 2002 – with a second order of two MTG in a serial arrangement that would deliver a total of 400kW electrical power.

Plus, Cryostar has received a North American order for a 1MWe unit from a large gas distribution company.

On the geothermal front, Siemens has confirmed a second order for a TG500/110 unit delivering 3.3MW of CO₂-free electrical power. This large Turbo expander Generator unit (30 tonnes with the generator) will be installed inside a Kalina binary geothermal plant located in Unterhaching (Bavaria/ Germany).

Daewoo and Samsung choose Cryostar

Cryostar has made a major breakthrough in the LNG on-board reliquefaction market with a multi-million euro order to supply Daewoo and Samsung in Korea with seven Ecorel units. “This is a major order for Cryostar and a solid endorsement of our technology. Cryostar looks forward to working closely with Samsung and Daewoo now and in the future,” said Cryostar President Daniel Meyer

Training leads to ‘tangible results’

The Cryostar Training Centre is a global resource staffed by highly qualified Cryostar engineers. The team is available to travel to customer sites or Cryostar business centres anywhere in the world to train equipment users on how to get the most out of Cryostar technologies.

No one knows better how to maintain and exploit Cryostar’s massive range of equipment and auxiliary products than our engineers – and as part of the company’s commitment to partnership and service, the Cryostar Training Centre resource is here to increase the skills of customers’ operators, with tangible results.

Be it cryogenic pumps or turbo machinery, whatever the application is, through specialist and tailored workshops, Cryostar Training Centre aims to add value to customer partnerships.

The 2007 target is to set a full-year training schedule, with regular sessions, at Cryostar’s headquarters in Héringue, France, and at select Cryostar business centres and customer sites, globally.

Customer service expands global reach



Customer service is a key pillar in Cryostar's growing global reach and to underscore this commitment the company has strengthened its position in Eastern Europe and the Middle East.

Here, Cryostar has teamed up with well-known Qatar-based company, Petrotec, and appointed it as a Service Partner for the Gulf area. Petrotec, with its well-maintained Service and Technology Centre and specialist engineers and technicians, will provide support to Cryostar and their clients in the region.

"The confidence our customers place in us is directly reflected in the appointment of Petrotec," said Didier Walch, Cryostar Customer Service Director. "Through this partnership, customers will benefit from improved responsiveness as well as LOCAL Cryostar product knowledge and expertise."

Joseph O'Neil, Petrotec Service Centre Manager, said: "The Petrotec service business is expanding in line with the rapid growth in the region. Our partnership with Cryostar gives us access to the latest technology and places us at the forefront to provide a full range of services to industry."

For more than 30 years, Cryostar has been innovating new ranges of pumps, turbines and expanding its range of services to meet customers' needs. The company is always looking to improve partnerships with customers and find solutions to allow both parties to work together. This extension of services includes setting up new services facilities all around the world, including Eastern Europe. To that end, Cryostar has built a workshop in Poland and has put in place technologies and services facilities in conjunction with long-term agent CRYOPOLSKA. This facility includes an office and a service engineer based in Kedzierzyn.

Cryostar is now able to do pumps and turbines repairs on customer sites and in the workshop. Services in Poland are also underpinned by Cryostar's global expertise and knowledge-base which can be tapped at any time to meet customers' needs.

"Our objective is to offer to customers better response times and quicker access to our service teams," said Didier Walch. "For many years Cryostar has considered superior service as a paramount objective of the company. This latest round of expansion is further proof of Cryostar's commitment to improve customer relationship management."

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Events

★ October 14-18, 2006

GAWDA 62nd Annual Convention, Location Walt Disney World Dolphin, Orlando, FL, USA.

More details : www.gawda.org

★ October 31- November 2, 2006

AWS/Fabtech Show, Location Atlanta, GA, USA.

★ November 4-8, 2006

International Oxygen Manufacturers Association (IOMA), Los Cabos, Mexico.

★ November 14-17, 2006

Cryogen-Expo, The 5th International Specialized Exhibition, Moscow, Russia.

★ December 4-7, 2006

GASTECH 2006, Abu Dhabi, United Arab Emirates

★ April 30 -May 3, 2007

OTC .07, Houston, Texas, USA.

More details : www.otcnet.org



Tools and datas:

Densities at various saturation pressures

Saturation Pressure PSIG	OXYGEN		NITROGEN		ARGON	
	Liquid density Lbs/Ft ³	Gas Density SCF/Gal	Liquid density Lbs/Ft ³	Gas Density SCF/Gal	Liquid density Lbs/Ft ³	Gas Density SCF/Gal
0	71.17	115.10	50.44	93.11	87.51	112.50
5	70.42	113.72	49.62	91.55	85.77	110.89
10	69.80	112.73	49.00	90.40	84.77	109.60
25	67.86	109.59	47.50	87.63	82.46	106.61
50	65.55	105.86	45.69	84.18	79.90	103.31
75	63.76	102.97	44.19	81.53	77.90	100.71
100	62.43	100.82	42.88	79.12	76.15	98.45
150	59.80	96.57	40.70	75.08	73.16	94.59
200	57.62	93.05	38.76	71.51	70.28	90.87
250	55.60	89.79	36.83	67.95	67.79	87.67

Note: Density of water at 60°F = 62.30 lbs/cu ft



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