

DECEMBER 2010

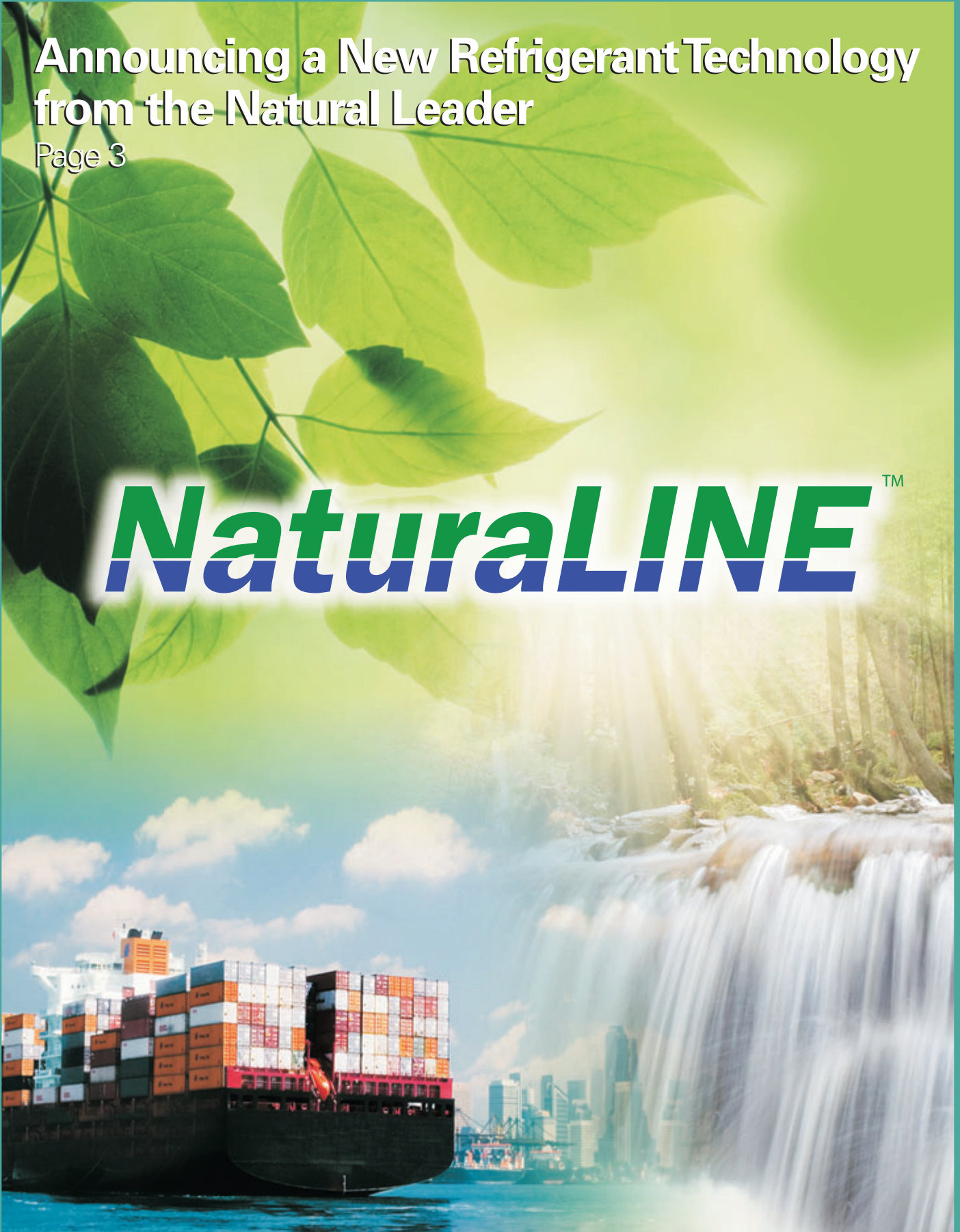

turn to the experts 

ContainerLINE

Announcing a New Refrigerant Technology
from the Natural Leader

Page 3

NaturalLINE™



Natural Leaders



It's been said that the essence of leadership is first having a vision.

The clarity of Carrier's vision for sustainable technologies has been undeniable from our start 108 years ago when Willis Carrier invented modern air-conditioning. Then, it was a mechanical system to remove humidity from a printing plant. The result: by preventing paper from sticking together and jamming presses, waste was reduced and resources preserved ...and yes, it also led to the delivery of more comfortable air in which to work and live.

Carrier is a pioneer in sustainability, being among the first corporations with the discipline to set energy-reduction goals (1988) and environment and safety goals (1992). We've helped transform the markets we serve in sustainable directions. In the 1990s, Carrier led the container industry away from CFCs and HCFCs to R-134a, a non-ozone-depleting refrigerant with a global warming potential (GWP) of 1320, nearly one-third its nearest rival and an 84 percent improvement over the CFCs used before.

Now, the environmental tides are turning again, with the industry seeking refrigerants with still lower GWPs. And that's why our vision has led us to the natural refrigerant with the lowest GWP possible today: One. You can read more about our experience with natural refrigerants in this issue of ContainerLINE.

Natural refrigerants may be the wave of the future, but energy-efficiency remains the watchword for the present, and momentum for the PrimeLINE® unit continues to grow. Clearly the PrimeLINE unit owes much of its success to a vision to create the most energy efficient container refrigeration unit. As of this writing, orders for 2010 were on pace to surpass all competitive units for the third consecutive year, exceeded only by our ThinLINE® unit, the industry stalwart for three decades.

We are pleased to report that this year Evergreen Line ordered its first 2,000 PrimeLINE units and Chiquita nearly quintupled its PrimeLINE inventory with an additional 4,700 units. Hamburg Süd added 6,500 PrimeLINE units on top of the 3,000 it acquired last year. Dole expanded its PrimeLINE unit commitment as part of a sweeping modernization and sustainability initiative. Significantly, Crowley Maritime's reefer container fleet is now one quarter PrimeLINE, based on purchases made in the second half of 2010. Some of these examples are covered more completely in this issue of ContainerLINE.

Whether our customers' priorities are maximum efficiency or refrigerants that offer the lowest potential environmental impact, Carrier's vision remains clear, and we will continue to invest in development of leading-edge container refrigeration technologies. As we move into the new year, we look forward to partnering with our customers on further natural refrigerant technology trials.

We wish all of you a rewarding 2011 ...*naturally!*

Kartik Kumar, Director of Marketing and Strategic Planning, Global Container Refrigeration

ContainerLINE



Carrier's New Refrigerant Technology

Cools Naturally

NaturaLINE™

It's no longer just a figure of speech to say container refrigeration systems using natural refrigerants are "on the horizon."

Thanks to new, natural refrigerant technology from Carrier, the world's first refrigerated containers using environmentally sustainable natural refrigerants have already circled the globe as part of a comprehensive test program. And for 2011, more will enter service through field trials with shipping lines interested in partnering in the development.

"Natural refrigerant technology responds to the shipping industry's drive for ever more sustainable solutions for refrigerated transport," said Chiou Fun Sin, Carrier vice president, Global Container Refrigeration. "It harnesses our industry-leading expertise in energy-efficient container refrigeration and compressor technologies as well as our engineering leadership in the use of natural refrigerants for other types of energy-efficient refrigeration applications."

When evaluating refrigerants to cool the next generation of container refrigeration units, Carrier made the use of refrigerants with low global warming potential (GWP) ratings and non-ozone depletion potential (ODP) a top priority. Carbon dioxide (CO₂), with a GWP of one and an ODP of zero, is as low as can conceivably be obtained in terms of a pragmatic natural refrigerant. By pursuing a natural refrigerant with a GWP of only one, Carrier set its sights exceptionally high for its new container refrigeration technology. Additionally, the technology had to be energy efficient.

"Improved refrigeration performance and reduced power consumption have been two development drivers in recent years, and Carrier's PrimeLINE® unit is a great example of delivering on both fronts," said Kartik Kumar, director of Marketing and Strategic Planning, Global Container Refrigeration.

"We are now taking it a step further by incorporating environmentally sound natural refrigerant technology, coupled with best-in-class energy efficiency, ensuring we live up to the high standards we've already set."

Engineered for Environmental Sustainability

With strong customer interest in refrigerant alternatives, Carrier chose Intermodal 2010 in Amsterdam, the world's largest container exposition, to announce its natural refrigerant technology and the name of the unit that will use it – NaturaLINE™.

"The name 'NaturaLINE' points to Carrier's 108-year heritage as the 'natural leader' in the industry, as well as making the obvious connection to the first use of natural refrigerant in the container industry, and the extension of our product line," Kumar said.

Carrier's NaturaLINE development program has been active for more than five years, according to Kumar.

"The marketplace has concerns about potential phase-outs of traditional refrigerants in container applications," explained Kumar. "Some of this is based on legislation regarding greenhouse gases in other industry sectors – for instance automobile air conditioning systems in Europe.

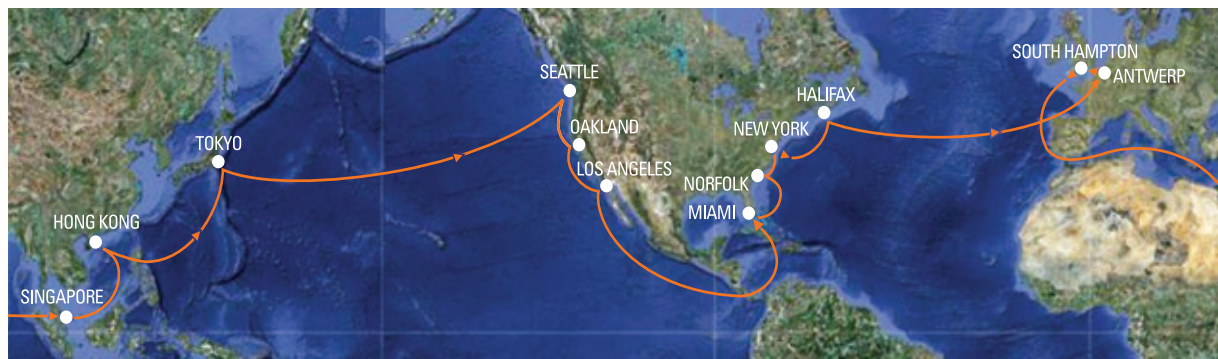
"At the same time, we have customers who are pursuing more sustainable solutions for many facets of their fleets," he continued. "NaturaLINE technology can provide a more sustainable pathway for their refrigerated fleets."

Working with Hapag-Lloyd, Carrier placed its first demonstration unit into service in 2008. Earlier this year, Carrier put two more advanced demonstration units into service with the Hamburg-based line. Performance was carefully monitored as the pair made around-the-world tours, one starting in Port Elizabeth, New Jersey (USA) and the other in Singapore, operating under the most common ambient conditions and using setpoints for perishable and frozen.

As a member of various working and research groups Hapag-Lloyd has always invested in leading-edge technology. The company cooperates closely with industrial partners like Carrier for the development of environmentally sound technologies. Hapag-Lloyd is traditionally interested in researching and testing new technologies, often making it the first shipping line to deploy environmentally sound technologies in everyday operations.

"We are encouraged by the very promising results to date and are now at a point where we are ready to broaden the trial program," Kumar explained. "Our sense is that many of our customers will be eager to participate in the next stage of our development."

As a next step, Carrier plans to begin extended field trials in early-2011, using NaturaLINE technology for carefully monitored shipment of goods. Trials are expected to begin in the first quarter, with a second stage of trials being considered for later in 2011.



Refrigerated containers using NaturaLINE technology made voyages in 2010 tracing a path around the world.

NaturaLINE™

Why CO₂

Although ozone-depleting refrigerants have been virtually phased out for a number of years, today's concerns focus on the global-warming potential (GWP) of refrigerants.

GWP is an estimate of how much a given mass of a gas will contribute to global warming – also called the greenhouse gas effect. Traditional synthetic refrigerants, when released into the atmosphere, can act as heat-trapping greenhouse gases because of their molecular complexity.

With its GWP of one, CO₂ is, essentially, the baseline against which all other refrigerants are measured. Although there are hundreds of man-made refrigerants, CO₂ is part of a small family of “natural refrigerants,” or refrigerants that occur in nature.

CO₂ refrigerant, also known as R-744, compares favorably against current contemporary hydrofluorocarbon (HFC) container refrigerants R-134a and R-404A, which have GWPs of 1320 and 3260, respectively.

Although other synthetic refrigerants are under development with lower GWPs than current HFCs, none approach CO₂.

Moreover, with CO₂ refrigerant shipping lines don't have the concerns with flammability or high toxicity that they might have with other refrigerants, even some natural refrigerants, such as butane and ammonia.

One challenge CO₂ presents to container refrigeration is the need to use it at high operating pressures in an energy-efficient manner. NaturaLINE™ technology has been developed to address these obstacles. The amount of refrigerant required by systems using NaturaLINE technology is about the same as Carrier's current product offerings. And the energy requirements are targeted to achieve best-in-class performance, all of which makes NaturaLINE technology the natural choice for the next generation of container refrigeration.

Naturally Engineered for

What makes Carrier's natural refrigerant technology different from anything currently on the seas?

Plenty, according to Jim Taeckens, senior product manager, Container Products Group, who explained that the use of CO₂ as a refrigerant presents special challenges to engineers.

“CO₂ offers exceptional benefits,” Taeckens said. “It's naturally occurring, it is non-ozone depleting, has a GWP of one and it is ‘future proof,’ in that it is not subject to environmental taxes or phase-outs.”

As a refrigerant, CO₂ has unique thermodynamic characteristics. Its heat-transfer coefficient – which determines the rate at which it absorbs and sheds heat – is actually higher than conventional synthetic refrigerants. Another aspect of the thermodynamic characteristic is that the system operates at higher pressures – this allows for new and unique component designs that improve system performance in the same compact design envelope while still matching the best-in-class efficiencies and serviceability of Carrier's PrimeLINE® system.

A CO₂-based system also needs to be extra versatile. In a mechanical refrigeration system, conventional refrigerants go through distinct phases of evaporation, compression, condensation and expansion, turning to liquid during the condensation phase. In contrast, CO₂ changes to a liquid in conditions with low ambient temperatures, but at moderate to high ambient temperatures, it goes through what is called a “gas cooling” stage. Since container ships travel through a wide range of ambient conditions, the refrigeration system needs to accommodate CO₂'s various responses to temperature.

Addressing CO₂'s unique challenges, Carrier's natural refrigerant container technology incorporates numerous innovations, some of which are patented and entirely new to container refrigeration applications, Taeckens added.

For example, Carrier's natural-refrigerant technology includes a new gas cooler/condenser coil that wraps around the fan and has



Efficient Performance

enhanced surfaces to maximize heat transfer. It also takes advantage of a new multi-stage compressor. New power electronics and an advanced software control system combine to efficiently optimize fan speeds and compressor capacity to match cooling loads and temperature control.

Although natural refrigerant technology differs distinctly from Carrier's other container refrigeration systems, Taeckens said that one point of commonality is the MicroLink™ Control. "A unit with the new natural refrigerant technology will be as familiar to operate as any other Carrier container refrigeration unit."

The natural refrigerant design maximizes capacity and minimizes power consumption, with robust construction that delivers high reliability for demanding container applications in the most sustainable way. That should make it a "natural choice" for many fleets.

Refrigerant Past Refrigerant Future

NaturaLINE™ technology responds to shipping lines' concerns about potential future bans of HFC refrigerants. Presently there are no bans on the use of HFCs in container applications. However, Europe's recent F-gas regulation phases out automotive air conditioning systems with GWP ratings greater than 150 by 2011 for all new vehicle platforms

Use of the natural refrigerant CO₂ adds no new environmental risk, even in the event of a leak. If a leak occurs, essentially CO₂ just returns to the atmosphere.

"Carrier's breakthrough NaturaLINE technology demonstrates how technological innovation can reduce the impact of climate change, continuing Carrier's long-standing leadership in developing and commercializing sustainable products," said John Mandyck, Carrier vice president, Sustainability and Environmental Strategies.

Carrier is no stranger to CO₂ as a refrigerant. In fact, CO₂ is no newcomer to refrigeration applications – it was actually

used in industrial refrigeration systems as early as 130 years ago.

Carrier's expertise in refrigerants and sustainable solutions led to the introduction of the award-winning

CO₂OLtec™ natural refrigerant commercial refrigeration system for food retail customers nearly three years ago.

In Europe, Carrier's CO₂OLtec systems continue to gain in popularity while also reducing the impact from potential greenhouse gas emissions. With more than 150 installations covering all store formats, CO₂OLtec units have accumulated more than 2 million field operating hours. The CO₂ equivalent emission reductions of all Carrier CO₂OLtec installations to date equates to 12,900 cars being removed from the road.

Just as Carrier's CO₂OLtec system rapidly captured the lead in CO₂ commercial refrigeration applications in Europe, Carrier's NaturaLINE technology will soon lead in CO₂ applications for containers.



Dole's Tropical Fruits Set Sail with PrimeLINE® Units

With roots dating back nearly 160 years, Dole Food Company, Inc. is today the world's largest producer and marketer of fresh fruit and vegetables, doing business in more than 90 countries. Founded in Hawaii and now headquartered in California, Dole produces most of its tropical fruits – primarily bananas and, of course, its signature pineapples – in Central and South America.

Among Dole's core competencies is its ability to not only grow and harvest high quality produce, but to transport and deliver it around the world. Care for perishables starts on the farm and continues through a closed-loop refrigerated supply chain, which includes 11 owned and 13 chartered vessels and more than 14,000 refrigerated containers, making it the world's largest dedicated refrigerated containerized fleet, according to Dole.

It's a fleet that has undergone a significant transformation since 2005, when Dole initiated a container modernization program, one in which Carrier EliteLINE® and PrimeLINE® units have played a key role.

Modernization with a Purpose

For Dole, modernization of its container fleet means much more than simply replacing old equipment with new. It's also about curtailing energy needs, minimizing the environmental impact of the refrigerants it uses and significantly reducing its carbon footprint, all while keeping product quality as its highest priority.

It's no small undertaking, yet since starting the modernization program Dole is well along the way to achieving its goals. It has already replaced 11,000 container refrigeration units – some of which were as old as 18 years.

While lowering the average age of its containers from 10.6 years to 3.7 years, Dole committed itself to units with scroll compressor technology for energy efficiency and weight-savings benefits, explains Ben Mathews, Dole's director of equipment operations, based in Costa Rica.

Many of the first purchases in Dole's modernization program were Carrier EliteLINE units, but since 2008, the PrimeLINE container refrigeration unit has played an increasingly influential role. Approximately 3,000 PrimeLINE units are now owned or leased, supporting Dole's Latin America operations serving North America and Europe.

Energy Efficiency Leaps

Dole's results are significant. On average, Dole's newest container units provide a 46 percent energy efficiency improvement over the older units they've replaced.

"As a vertically integrated producer and distributor of fresh fruit, we pay our electric bills at origin and at destination, and the electricity-generation costs on board our vessels, as well," Mathews says.



Dole uses the PrimeLINE unit for a variety of factors, including its combination of efficiency, weight savings and performance.



On ships such as this, Dole transports tropical fruit from 11 ports in Guatemala, Honduras, Costa Rica, Columbia, Ecuador, Peru, Puerto Rico, to five ports in Europe and five in the continental United States.

Top Achievers Recognized In EMEA Region



“Carrier has always provided equipment that meets our requirements in terms of pulldown capacity, but the PrimeLINE unit was really a ‘step up’ in energy conservation. That’s where the real performance kick came in. It’s one of the most competitive units in the market when it comes to energy efficiency.”

Noting that most of the industry has moved on from aluminum containers to heavier muffler-grade stainless steel containers, Mathews explains, “The other critical factor we look at in a refrigeration system is its tare weight, and that was something that favored the new scroll units from Carrier.

“Every 10 or 20 kilograms (22 or 44 lbs.) you can shave off the weight of the refrigeration system can be added back to the box design, and every opportunity you have to make the box stronger and more damage resistant adds significant value. If you want a container to last 15 years, then you want to be sure you are designing longevity into the box.”

Dole’s modernization has also resulted in a significant reduction in its use of refrigerants, and the company reports its container fleet has been HCFC-free since May of this year. The PrimeLINE unit, like others from Carrier, uses R-134a, a non-ozone-depleting refrigerant with the lowest global warming potential of traditional container refrigerants.

It’s About the Quality

“When Dole is selecting equipment, we don’t just look at any one factor. We have to look at all the factors related to the ownership and operation of that equipment,” Mathews says.

“Reliability and service network are two factors that are critical,” he adds. “Here in Central America, it’s safe to say Carrier has one of the strongest service networks of any of the major refrigeration suppliers.

“Dole is all about the quality and integrity of the product,” Mathews says. “Our first priority above anything else is on the quality of the fresh fruit that we ship and deliver. The PrimeLINE units are excellent in terms of temperature control and reliability. We’re very pleased with their performance.”

Carrier’s PrimeLINE unit is helping Dole deliver on all fronts.

“Everything we’ve done in our refrigerated container fleet for the last five years has been geared around reliability, energy efficiency and the environment,” Mathews adds. “When you look at the equipment and what we’ve done with the modernization program, it’s clear that reliability in transit has improved dramatically, energy efficiency has improved dramatically and our carbon footprint has reduced dramatically.”



Tamer Hamid, left, manager of ATEB, receives the EMEA Top Performer award from Carrier’s Arnold Stout and Shaun Bretherton.

ATEB, based in Alexandria, Egypt, was recognized earlier this year with the Carrier Transicold Top Performer Award for the Europe/Middle East/Africa (EMEA) region.

The award was presented during the EMEA 2010 Service Center Meeting held within the seaside resort district of Scheveningen, The Hague, attended by representatives of 66 service centers.

High honors went to four other Service Centers: Marine Containers, Ltd. of Ashdod, Israel, Best Business Development; Container Care, Copenhagen, Denmark, Best Workshop Practices; International Container Terminal, St. Petersburg, Russia, Best Service Innovation; Smith-Holland, Rotterdam, the Netherlands, Best Support in Service Programs.

The meeting provided product and service updates, a review of Performance Parts Group offerings and discussion of aftermarket sales. Team building was also on the agenda, according to Shaun Bretherton, EMEA regional service manager. Holding the meeting in the Netherlands, not far from Carrier’s Rotterdam operations, provided opportunities for many Carrier staff members and Service Center personnel to meet for the first time.



Representatives from Carrier’s EMEA Service Center network gather during their 2010 meeting and recognition event at Scheveningen, The Hague.

PrimeLINE® Supports Evergreen's Environmental Endeavors

When “green” is in the company name, it’s natural to expect environmental responsibility to be part of the corporate culture. Such is the case with Evergreen Line, which has been recognized time and again with honors for its efforts to safeguard the environment.

Environmental leadership comes from anticipating needs and taking initiative. As Evergreen Group founder and Chairman, Y. F. Chang, Ph.D., articulates in the company’s environmental vision statement, “We will not wait for legislation to be introduced. We will use the latest technology as soon as it is available so as to minimize the impact of container shipping operations both on marine life, on port communities and on humanity worldwide.”

Demonstrating this commitment, Evergreen surpassed environmental standards through the commissioning of its S-Type Greenships with low-sulfur fuel systems seven years prior to the enforcement of conventions on maritime pollution and safety requiring ships to have double-skinned hulls.

This year, Evergreen took another major step in improving the environmental impact and energy efficiency of its operations, purchasing its first 2,000 Carrier PrimeLINE® refrigeration units for its refrigerated container fleet.

Greener Performance

Evergreen Line is the unified common trade name for the shipping companies of the Taiwan-headquartered Evergreen Group, which is now in its 42nd year in the shipping business. Today, Evergreen Line operates more than 160 ships with a total capacity of approximately 600,000 TEU.

Evergreen Line selected the PrimeLINE units based on anticipated power savings and reduced carbon emissions, coupled with its best-in-class pulldown and cooling capacity for high-respiration perishables.

“The industry’s most energy-efficient container refrigeration unit, PrimeLINE, was designed especially for shipping lines, such as Evergreen, that are seeking the most sustainable solutions for their operations,” said Chiou Fun Sin, Carrier vice president, Global Container Refrigeration. “We are pleased that we can support Evergreen’s environmental strategies in this way.”

Evergreen’s new 40-foot containers equipped with PrimeLINE units will replace some of the oldest units in Evergreen’s 55,000-TEU capacity refrigerated fleet, and will complement Evergreen’s existing units, which are predominantly Carrier EliteLINE® scroll



compressor refrigeration units. The EliteLINE units share commonalities with the digital-scroll compressor PrimeLINE units, providing advantages for Evergreen in terms of operation and maintenance.

Greener Technology

The high-performance PrimeLINE units were developed specifically to reduce lifecycle costs and environmental impact of refrigerated containers. With reduced energy needs, PrimeLINE units help shipping lines conserve fuel while also reducing emissions related to shipboard power generation.

“Evergreen’s PrimeLINE units are expected to save enough energy over their life of operation to eliminate nearly 43,600 tons of carbon emissions, relative to the industry average,” said John Mandyck, Carrier vice president for Sustainability and Environmental Strategies. “That’s the equivalent to removing more than 650 cars from the road over the same period.”

The PrimeLINE unit has the highest deep-frozen capacity of any unit using non-ozone-depleting R-134a, the refrigerant most widely used by the container industry, recognized for its low global warming potential.

Evergreen Line chose the PrimeLINE unit following analysis and competitive comparisons. The ability of the PrimeLINE units to reduce carbon emissions and energy costs was especially important in consideration of Evergreen Line’s plans to expand its refrigerated service in the year ahead.

Evergreen Line and Carrier take pride in the environmental legacies they are creating.

Turn to the Experts Refrigeration Boot Camp



Arnold Stout (l), and Dean Bouch (r) with Sergeant First Class Shane AhNee of the 43rd Sustainment Brigade Food Service, who arranged the training session.

For two veteran container refrigeration field sales and service engineers, “basic training” took on a whole new meaning this past year.

In September, Dean Bouch and Arnold Stout were enlisted by Carrier to provide instructional support for an unconventional container refrigeration application: the United States government’s use of ThinLINE® units for stationary service in Middle East military operations.

The men readily accepted the assignment. Rotterdam-based Stout does a considerable amount of training in his job as a sales engineer, and Cape Town-based Bouch, who is Carrier’s sales and service manager for Africa, served in the South African military’s refrigeration and air conditioning technical group.



Soldiers destined for duty in Afghanistan receive basic training in container refrigeration.

Their recent tour of duty comprised three days in Kuwait at Camp Arifjan, the main staging base for U.S. operations in the Middle East. The Camp is a city unto itself, also accommodating elements of the U.S. Air Force, Navy, Marine Corps and Coast Guard, as well as military personnel from U.S. allies.

The Carrier duo’s mission was to conduct technical training for soldiers from forward bases in Afghanistan, which use refrigerated containers for on-site cold storage. The use of containers by the military is not entirely new, nor exclusive to the U.S., although containers deployed to support military activities in the Middle East may be the most extensive ever, based on the scale of operations there.

For the U.S. Army, refrigeration units are typically installed on 20-foot containers. Many are equipped with PowerLINE®

RG “clip on” generator sets, which are required for back up or when bases have limited or no power supply.

“Using reefer containers gives the military the ability to quickly move in cooling equipment without putting down a fixed asset,” explained Bouch. “It’s 100 percent mobile, it’s reliable, it’s durable and it’s built for a rugged marine environment.”



Standing in front of a ThinLINE unit, Dean Bouch (white shirt) along with soldiers and representatives from Universal Marine Company, the Carrier Transicold service center in Kuwait.

But the application and the demands placed on the refrigeration units is nothing like typical shipping applications, where containers run undisturbed for a limited-duration voyage, some in direct sunlight, others not.

In Afghanistan, the stationary units are exposed to scorching 49°C (120°F) daytime desert heat, dust and sand, and doors are opened multiple times throughout the day. Frequent door openings, combined with container temperatures of -20°C (4°F) and humid air, can quickly frost an evaporator.

“The maintenance of this equipment is totally different from any other place in the world,” Stout said. “Everything needs to be properly cleaned to ensure sufficient airflows. Every little bit of sand and dirt takes away from the unit’s efficiency, especially with the high ambient temperatures.”

That’s something you can’t afford when contents of the containers includes food, pharmaceuticals, medical supplies and other provisions needed to ensure the survival of a military unit.

Just as they would any training class, Stout and Bouch customized their material to the audience and application. The students’ experience ranged from no refrigeration equipment knowledge to some who were knowledgeable about generators and air-conditioning. “You’ve got to understand the equipment design and airflows, and know how to load the container and work with it under extreme conditions to get what you need out of it,” Bouch said.

Having drilled-in the basics of container operation, both Stout and Bouch have offered to return to teach an advanced repair class that would further ensure the protection of provisions for troops on the front lines. As the adage goes, “An army marches on its stomach.” And today’s refrigerated containers are essential for a modern military to sally forth.

Keep Dry with Enhanced PrimeLINE® Control

The PrimeLINE container unit's latest enhancement may be a "dry subject," but it's anything but dull.

A new control enhancement now provides the lowest relative humidity (RH) level ever achieved by a Carrier Transicold container unit – 50 percent. Better yet, this was accomplished with no compromise in the PrimeLINE unit's industry-leading energy efficiency.

Low RH is important for shipping certain types of produce, such as ginger and other root crops, onions, garlic and flower bulbs. Too much moisture, and bulbs can sprout prematurely. Keeping things dry can also be helpful when shipping paper products, artwork, pharmaceuticals, electronics and even certain metals that may be subject to surface staining.

The new control enhancement also expands the PrimeLINE unit's dehumidification capabilities over a wider range of operating temperatures.

"Already best-in-class in so many ways, the PrimeLINE unit now offers this extended dehumidification range as a standard feature," says Jim Taeckens, senior product manager. "This enhancement can be made to existing PrimeLINE models when users upgrade to the latest control software."

Dehumidification functionality also requires a humidity sensor, an option that can be factory installed or added in the field.

A Software-Based Solution

Thanks to the PrimeLINE unit's electronic expansion valve, the dehumidification enhancement was done entirely through sophisticated software algorithms. No change to the mechanical design was required, and the upper end of the dehumidification range remains 95 percent RH.

"Carrier's control software engineers were able to achieve exceptionally consistent humidity levels, even at 50 percent RH," Taeckens adds. "This was achieved without consuming any more energy than was needed to achieve the previous low-humidity threshold of 65 percent."

That is a stark contrast to the approach taken by some competitive units to achieve low humidity levels. Competitive offerings with add-on heat exchangers require greater energy consumption without providing the same consistent humidity and temperature tolerances offered by PrimeLINE units.

This was demonstrated in recent field tests conducted by two shipping lines. In one test, a competitive unit required 37 percent more energy to achieve 72 percent RH at 5°C (41°F) than a PrimeLINE unit with enhanced dehumidification control. In other tests, competitive units could not even reach specified humidity at setpoints of 50 percent RH at 5°C (41°F) and 75 percent RH at 15°C (59°F), even though the PrimeLINE unit easily could.

"Relative humidity is a challenge to control because so many variables affect it," explains Taeckens.

Now, the PrimeLINE unit handily tackles the greatest dehumidification challenges without breaking a sweat.



Bulbs

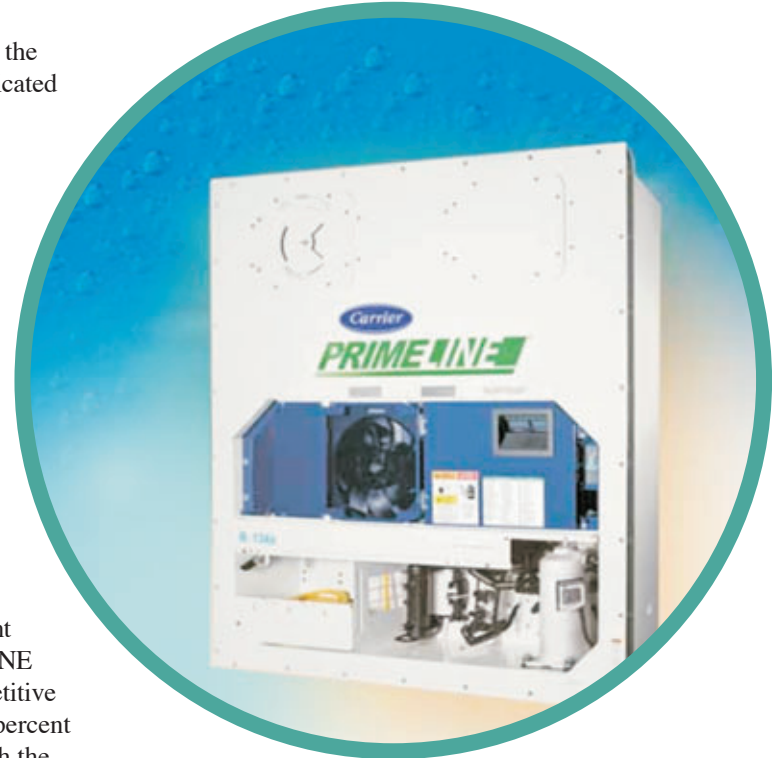


Metals



Root Crops

Fine Art



Moisture Repellant? For a wide variety of applications, no other container refrigeration unit provides dehumidification capability lower than the PrimeLINE unit. And none achieve 50 percent relative humidity as efficiently.

Container Efficiency and Cold-Chain Analysis Hot Topics For Cool Logistics

When it comes to improving the cold chain for marine shipping, the industry turns to the experts at Carrier Transicold.

That was especially evident at the 2010 Cool Logistics Conference in Hamburg, Germany. There, Jim Taeckens, Container Products Group senior product manager, participated in a panel discussion entitled “Improving Reefer Unit Reliability and Efficiency,” and Jesus Ponce, International Program Manager for Carrier subsidiary Sensitech Inc, was among seven panelists to address “Data Capture and the Cold Chain of Custody.”

In the first session, the audience of nearly 100 container and logistics industry professionals was polled to select two questions for robust discussion. To no one’s surprise, they wanted to hear about energy management – the true cost of managing temperature inside the box – and temperature and humidity control.

Concerning energy management, Taeckens noted that efficient operation must take a systems approach to optimize compression, fan and heat exchanger design, pressure balancing and superheat control.



“Rules of thumb used in the past have to be challenged,” said Carrier’s Jim Taeckens at the 2010 Cool Logistics Technical Workshop.

“Carrier’s PrimeLINE® container unit is the most efficient reefer unit available today, using a proven set of technologies to minimize not only energy cost but total cost of ownership (TCO),” he said. “Coupled with QUEST software, Carrier reefer units can reduce energy requirements

in some cases by up to 50 percent for new and existing equipment in container fleets.”

When it comes to compressor technology, Taeckens said, “New technology must be evaluated for the benefits derived, not just for the sake of technology. The goal should always be to meet efficiency and reliability requirements with the lowest complexity possible to minimize overall TCO.”

Reality Check

The panel was asked to address energy-wasting practices that shipping lines can avoid. While refrigeration unit OEMs have little control over what happens to perishable cargo before loading into the container, Taeckens pointed out that the refrigeration unit that most efficiently provides fastest pull-down and greatest airflow will maintain better product quality and reach perishable mode faster, thus decreasing energy requirements.

On the issue of temperature management and humidity control, the panel was asked whether accurate control was being

sacrificed at the expense of cargo quality. Specifically, is the industry still carrying perishable cargo at -18°C (0°F) or lower when it could be safely carried at -16°C (3°F)?



“Our goal is to be able to provide customers with the means to achieve operational excellence through cold chain management,” Sensitech’s Jesus Ponce said.

“We need to balance the realities of today – higher fuel costs and carbon emissions – with getting quality produce to market,” Taeckens told the audience. “Rules of thumb used in the past have to be challenged to meet an increasingly demanding and sometimes contradictory set of requirements. At Carrier we strive to improve overall operating costs, developing solutions based on thorough analysis, testing and knowledge backed by science for all points of the cold chain.”

On the subject of humidity, Taeckens said that for many commodities higher humidity is actually more beneficial to produce in general. “At the same time, we see an increasing demand in dehumidification technology for commodities such as flower and onion bulbs, as well as metals,” Taeckens said. “In response to this, we recently introduced software to improve the dehumidification performance of the PrimeLINE unit to bring RH down to 50 percent, at no extra cost.”

Efficiency Analysis

The “Data Capture and the Cold Chain of Custody” discussion panel focused on the importance of measuring the supply chain from beginning to end, extracting the real value from the data to better determine return on investment, and technology selection and adoption trends.

Sensitech’s Jesus Ponce talked about the importance of not only capturing data, but analyzing it to better understand the overall cold chain performance, and to identify problems and their root causes, so appropriate corrective actions can be taken. This approach involves analyzing data aggregated often from hundreds or thousands of shipments, allowing the user to monitor not just individual shipments, but to use temperature monitoring to continuously improve the cold chain.

“Sensitech’s integration of hardware, software and expert analysis gives customers the ability to continuously monitor their shipments and identify weaknesses before they become major problems,” Ponce said. “Our goal is to be able to provide customers with the means to achieve operational excellence through cold chain management.”



Director of Sales – The Americas

Peter Kang has been named director of sales – The Americas. In his new role, Kang is responsible for providing strategic direction and leadership for all Container Products Group sales activities in the Americas and strengthening Carrier's market position.

Kang brings more than 18 years of engineering and sales experience to his current assignment, having served most recently as sales account manager, North/South Americas. He remains based in New Jersey.

Peter Kang

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Business Manager – Generator Sets

Adding overall responsibility for Carrier's generator set business to her previous responsibilities as a senior product manager, Charu Mahajan has been named business manager, Generator Sets. Based at Carrier's world headquarters in Farmington, Conn., she is now responsible for running and developing Carrier's generator set business, including financial oversight, production coordination, market and product development.

Mahajan joined Carrier Transicold in 2006 as senior product manager, Generator Sets, following a term with Carrier Corp's Global Product Strategy group.

Charu Mahajan

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Senior Product Manager – Global Container Refrigeration

Suresh Duraisamy has been named senior product manager – Global Container Refrigeration, bringing to the position more than 21 years experience in the transport refrigeration and air conditioning businesses. In his 17 years with Carrier, he has served Transicold in a variety of technical capacities, both in the U.S. and in India, in truck and trailer refrigeration, bus air conditioning and container products. Most recently he was an engineer with the Container Products Group in Syracuse, N.Y.

In his new position, Duraisamy is responsible for managing the existing container product portfolio, working closely with the engineering group to prioritize engineering projects according to customer and business requirements. He also supports the sales team and will lead container product marketing's Achieving Competitive Excellence (ACE) initiatives.

Suresh Duraisamy

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