

2021 GCCA Cold Chain Innovation Showcase & Buyers Guide





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GCCA Cold Chain Innovation Showcase & Buyers Guide

GCCA Cold Chain Innovation Showcase & Buyers Guide is published once a year by the Global Cold Chain Alliance (GCCA), an organization that unites partners to be innovative leaders in the temperature-controlled products industry. The GCCA Core Partners are:

The International Association of Refrigerated Warehouses (IARW), which promotes excellence in the global temperature-controlled warehouse and logistics industry.

The World Food Logistics Organization (WFLO), which delivers education and research to the industry and empowers economic development by strengthening the global cold chain.

The International Refrigerated Transportation Association (IRTA), which cultivates, fosters and develops commercial and trade relations between all those engaged in the transportation and logistics of temperature-controlled commodities.

The Controlled Environment Building
Association (CEBA) represents the design
and construction industry specializing in
temperature-controlled facilities that prioritize
product safety best practices. We are the source
for best practices of building and maintaining
the thermal envelope.

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About the Cover: Americold chose Primus Builders, Inc. to construct a new 312,000-square-foot cold storage distribution facility in Savannah, Georgia, United States. It was the recipient of the 2020 CEBA Built by the Best Award. (Photo courtesy of Primus Builders.)

WELCOME

A MESSAGE FROM MATTHEW OTT

HREE YEARS AGO, THE CON-TROLLED ENVIRONMENT BUILDING ASSOCIATION (CEBA), ONE OF THE CORE PARTNERS OF THE GLOBAL COLD CHAIN ALLIANCE, ADOPTED A NEW NAME AND MISSION THAT REFLECTED THE EVOLUTION AND DIVERSIFICATION OF THE SECTOR. CEBA is where anyone looking to build, renovate or modernize a first-rate, innovative temperature-controlled facility would come to find the most experienced designers, contractors, manufacturers and suppliers. CEBA represents the expert builders who specialize in the design and construction of controlled environment buildings, including cold storage warehouses, food processing facilities, clean rooms, pharmaceutical facilities, and foodservice and retail distribution centers.

In the same year, the first Controlled Design and Construction Showcase was launched with a four-page listing of companies. This year's showcase has evolved and grown significantly and now includes 10 pages of companies all positioned to provide the very best solutions for construction or modernization of any facility. This publication continues to highlight the most experienced designers, contractors, manufacturers and suppliers in the controlled environment building industry. You'll still find categories including design and construction services, architecture and engineering, low-charge ammonia systems, automation solutions, floors, doors, panels, insulation, racking, forklifts and more. But this year, to keep pace with industry progression, we have added automation and other cold chain technology providers.

CEBA continues to be committed to elevating the perception of the industry by communicating the need for specialization in designing and building thermal, controlled environment facilities and reinforcing how members provide that. A key program to support this goal is the "Built by the Best Award" competition, which each year recognizes excellence in building controlled environment facilities. I encourage you to read the case studies of the three 2020 Built by the Best Winners beginning on page 10, to see the exciting innovations companies are using to advance the cold chain through building design, construction, and modernization.

I hope you reference this guide throughout the year to find your next temperature-controlled building specialist. Better still, attend in person the 41st CEBA Conference & Expo -- the only event in the world dedicated to best practices in controlled environment facility construction, design and maintenance – this November in Las Vegas, Nevada.

Hope to see you there!



MATTHEW OTT, CAE, CMP PRESIDENT AND CEO, GCCA



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DESIGN/BUILD SPECIALISTS

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Since our inception 30 years ago, ESI Group has been supporting companies that safely feed the world by offering a single-source approach to fresh solutions for your food facility.

Our goal is to improve the way you work today and meet the demands of tomorrow.











41ST CEBA CONFERENCE & EXPO

Live in Las Vegas... the only controlled environment construction event.

he 41st annual CEBA Conference & Expo will return in-person this year November 2-4, 2021, at the Park MGM in Las Vegas, Nevada. This much anticipated event is the only one in the world dedicated to best practices in controlled environment facility construction, design and maintenance. In a year when cold chain is hotter than ever, this event is a must attend for anyone in the controlled environment construction business.

With more than 200 controlled environment facility construction, logistics, and supply chain operations professionals attending from around the world, participants will gain valuable insight for improving their busi-

ness. Throughout the conference's three days, participants will hear presentations from industry thought leaders, have exceptional networking activities, and experience an expo with cutting-edge products and technology.

General Sessions

The general sessions at the CEBA Conference & Expo provide attendees a thorough look at the latest innovations in controlled environment design and building. This year's conference will include presentations from the finalists of the CEBA Built by the Best Award as well as insights from industry experts.

One of the general sessions will be keynoted by Vince Poscente, a powerfully engaging speaker and author who helps business leaders with massive breakthroughs. Poscente knows firsthand the power that attitude, determination and innovation play in your future success — especially when life doesn't go as planned. After more than a year when nothing went according to plan, it will be beneficial to hear Poscente's perspectives.

The Expo

The Expo is an experience not to miss, and features the latest technologies, solutions, products and services from some of the most respected names in the industry. Here's just a small sampling of the products and services that will be featured at this year's expo:

- · Cold Storage Contractors
- Doors
- **Energy Efficiency Solutions**
- Fire Detection Systems
- · Flexible Walls
- Flooring
- **Insulated Panels**
- Insulation
- Lighting
- Materials Handling
- Racking
- **Refrigeration Solutions**
- Roofing

Built by the Best Award

The Built by the Best Award acknowledges association members around the globe for their expertise and innovation in constructing, renovating and/or modernizing controlled environment buildings across the world. The top three finalists will present their projects during the general sessions and the winner will be recognized on stage at the end of the Conference.





present a case study on their projects during the 41st CEBA Conference & Expo being held November 2-4 in Las Vegas.

ARCO Design/Build

Project: Cold storage and food processing facility for MTC Logistics Mobile, AL

ESI Group USA

Project: Greenfield food distribution facility for Performance Food Group (PFG)/Reinhart Foodservice Shawano, WI

Fisher Construction Group

Project: Fully automated warehouse for United States Cold Storage Atlanta, GA

Primus Builders, Inc.

Project: Processing facility expansion for Case Farms Winesburg, OH

Sistemas de Refrigeracion

Project: Distribution center Mexico City, Mexico

Tippmann Innovation

Project: Meat processing and distribution facility for Nor-Am Cold Storage Dodge City, KS

Williams Company

Project: Distribution facility renovation and expansion for Sysco Nashville, TN

Sign up for the event to hear about these innovative and cutting edge facilities at

WWW.GCCA.ORG

Construction Cafes

The CEBA Construction Café creates an exchange of ideas and discussion on critical issues facing the industry. Participants choose from 10 different topics, join the table at which the issue is being discussed and spend 20 minutes sharing ideas. Participants then switch tables to discuss ideas. These roundtable conversations provide attendees a chance to share ideas, ask questions and solve problems with their peers in a small group setting. The moderator will guide the participants through questions they have submitted in advance, diving into the subjects that matter most to attendees and the industry.

Networking Opportunities and Events

Prominent social activities, receptions and the exhibit hall all give members and industry suppliers unparalleled access to build partnerships with construction/design-build, warehousing and food processor decision-makers. Other networking opportunities include a first timer and new member reception, an opening night reception, two afternoons set aside to catch up with peers and vendors for private business meetings, a golf tournament and an after-hours party.

This is the only event in the world dedicated to best practices in controlled environment facility construction, design and maintenance, and serves to further CEBA's vision to be the association where anyone looking to build, renovate or modernize a first-rate, innovative facility comes to find the most experienced designers, contractors, manufacturers and suppliers.

Visit www.gcca.org/conference to learn more about the CEBA Conference & Expo. We can't wait to see you in Las Vegas! **②**



CURRENT EXHIBITORS

- Ahern Fire Protection a division of
- ALBA MFG, Inc
- Albany Entrematic
- All Weather Insulated Panels
- AutoMak Assembly, Inc.
- Calibration Technologies
- · Evapco Inc.
- FCL Builders
- GAF
- · Clobal Inculated Doors Inc
- Green Span Profiles
- Honeywell International Inc.
- Jamison Door Company
- · Johnson Controls
- Kingspan Insulated Panels
- KPS Globa
- Leviat
- M&M Carnot Refrigeration Inc

- Metl-Span
- NORDOCK Inc.
- Protectowire FireSystems
- Quest/Therma-sto
- Republic Refrigeration, Inc.
- RHH Foam Systems Inc.
- Rytec High Performance Doors
- Senneca Holding
- Systems, LLC
- The Raymond Corporation
- Tippmann Engineering (QuickFreeze)
- TrueCore
- Vapor Armour
- WAGNER Fire Safety Consulting GmbH
- Weiland Doors
- · Wiginton Fire System



The Rapid Evolution of the Grocery Industry.

The grocery industry is changing. Owners recognize they must move away from a hyper-efficient "zero waste" model in favor of a more flexible supply chain that can adapt to unpredictable circumstances. There is also the transition of purchasing power from Baby Boomers to Gen Xers who value convenience over brand loyalty. Technology is part of our lives and has entered the logistics industry as a result. Automation and software solutions are being implemented to improve efficiency and safety.

Many of Primus' clients are moving toward a more agile and responsive supply chain to meet the demands of an e-commerce and home delivery focused consumer base. To capture the "next dollar spent," grocery logistics teams must evolve and think more like a technology company, embracing intralogistics and the IT infrastructure needed to solve challenges quickly – both expected and unexpected.

Think about your business for a moment. Is it adaptable to current consumer demand? How vulnerable are you to unpredictable disruptions? To thoroughly and accurately answer those questions requires an experienced, outside perspective from a partner you can trust – Primus. Our company has been evolving as well, bringing together people, process, and technology to expand our capabilities and take the benefits of our design-build-automate approach to the next level. Today, our clients are gaining a competitive edge by partnering with us well before they break ground and long after construction ends to gain maximum efficiency and productivity.





Project notable for deep dive pre-planning, tight scheduling and sustainability initiatives.

hen Americold was looking to add a new 312,000-square-foot cold storage distribution facility in Savannah, Georgia, United States, to export poultry, it began a detailed search for the right company to get the job done.

Erik Gunderson, Founding Partner and Executive Vice President at Primus Builders, Inc., recalls hearing of the project when it went out for bids, and he knew this was a job he wanted to win.

"We knew we were going up against two or three other competitors on the job, and it was a project that Primus really wanted," he says. "Americold is a great customer, and we made the decision to outhustle our competitors on the proposal side. In making our plan, we

really developed a deep dive on what it would take to build the job."

Although there was no guarantee the company would be chosen, the Primus team worked hard to understand the jurisdictional restrictions and timelines and invested significant time and effort on the engineering side to ensure it knew what it was delivering.

"We accompanied that with a really strong compliment of design/build partners – our design build electrician, fire protection,

refrigeration - which we knew were huge components of the scope of a job like this," Gunderson says. "So, when you have those partners going in, you know exactly what you're building."

Once all the bids were in, and impressed by its efforts, Americold chose Primus Builders to construct the new poultry import/export facility near the Port of Savannah.

Overcoming Challenges

At 51-feet high, the 312,000-square-foot building was designed to offer Americold maximum flexibility in its cold storage options, which included a -20 degree QFR quick-freeze system, which freezes product faster and more efficiently.

But the project did not come without challenges.





The facility features automated conveyors, wrapping and labeling stations. (Photo courtesy of Primus Builders.)

After Americold awarded the project to Primus, they challenged the company to find ways to cut back on costs.

"Our partner, Fricks, has developed an optimized paving design, and we worked with them to be able to offer really robust exterior paving at some schedule and cost savings," Gunderson says. "We worked with our refrigeration partner, ALTA, to economize and stretch the absolute capacity of their refrigeration system. Owner, subcontractor and contractor all had eyes wide open, recognized there was risk and were willing to give it a go - that's what enabled us to push things to the limit that helped economize the job."

The schedule was another big challenge.

"The urgency was that Americold wanted to be shipping the power in the first quarter of 2020. So we made decisions and sequenced the work and were able to bulletproof the construction pad and deploy stone, putting our sub slab down in the summer and avoiding slowdowns with wet soil conditions," Gunderson says. "And we put a lot of our paving in very rapidly so we had great access to the site."

Michael Cole, Project Manager at Primus, notes an important key to keeping things on track was the use of the Last Planner System. It is a visual, collaborative way to plan, control and produce quality, predictable workflow by eliminating waste, optimizing resources and uncovering and solving problems.

"At first, subcontractors didn't really want to use it, but once they did, they started to realize it really helps," he says. "It's a collaboration between everyone on site and encourages the subcontractors to own the schedule and ultimately holds all the individual subs accountable. Without utilizing that, I don't think we would have hit our dates as well as we did."

The area is known for its high ground water, and the Primus team would often hit water when digging down just two to three feet. Plus, that water had nowhere to go, especially when it rained.

The solution was to lay gravel brought in from another part of the state, as there are no quarries near the site, and continuously pump water offsite. These actions made the ground stable enough for construction activities.

A more substantial problem was with permitting delays. When Primus reached out to the AHJ (authority having jurisdiction) during the design phase to discuss permitting, it learned that the facility previously built on the site was completed with a foundation-only permit and the local authorities originally agreed to the new Americold building having a foundation-only permit as well.

Cole shares that after Primus completed the grading and went to the AHJ seeking the agreed upon foundation-only permit, the AHJ changed its mind and instead required a full permit before any further construction could take place.

"This caused a delay of 19 days, but Last Planner again came to the rescue as it helped keep everyone on schedule," Cole notes.

But then Hurricane Dorian began creeping up the coast and the Georgia governor declared a state of emergency and began evacuations, so the Primus crew was forced to leave the job for about a week.

And just when everything looked to be running smooth as the project neared its completion, the COVID-19 pandemic arrived.

"We gutted it out and we were safe," Gunderson says. "It was all new at this point. People impacted by the virus were quarantined, but we never shut the job down and it didn't stop us from finishing on time."

Sustainability Efforts

When Dustin Norton, Primus' in-house sustainability project manager, learned of Americold's objectives for the project, it was quickly evident that the sustainability goals for the project were strong enough for the warehouse to become LEED certified. This was something Americold had not previously achieved on any of its other buildings.

First, Norton commissioned an energy model that proved the project could reach a 26 to 29% energy savings for a total of 11 to 12 LEED points.

"Although, LEED wasn't necessarily a given going into the project, Americold already had sustainability goals," Norton says. "I presented them with a preliminary scorecard that I created that revealed what it would take to get LEED Certified and potentially get to the LEED Silver level."

With any LEED project, Norton's goal is to get to the highest certification level that he can, given the resources provided to him. He gives a lot of credit to Americold for jumping on board and trusting him to get the project there.

"The fact is, there aren't many buildings of this type that are pursuing LEED and I believe that this project, and Americold, are leading the way by showing what's possible for these buildings," he says. "I also give a lot of credit to my design team, led by Michael Jones, for making the changes when I requested them and my construction project manager, Michael Cole, for being patient when it came to things like material selection."

Energy efficiency was aided by the systems selected and the construction of the envelope (insulation values of walls and roof). Water efficiency was largely aided by the choice of an air-cooled refrigeration system and use of low-flush/flow fixtures.

"Water conservation is very important to the Port of Savannah," Norton says. "The team was able to reduce the building's water consumption by 45%. Additional water savings were achieved by using ALTA Expert units."

Additionally, because the refrigeration system uses air instead of water to cool the building, it created significant water savings



The dock interior. (Photo courtesy of Primus Builders.)

as well. For comparison, a similar-sized watercooled refrigeration system utilizes nearly 10 million gallons of water annually.

"By using an air-cooled system, we are saving essentially all of that water," Norton says. "While LEED assigns more points to savings associated with things like irrigation savings and efficient fixtures in restrooms and break rooms (by using low and no flow fixtures) - which we also did on this project the water savings associated with the refrigeration system choice have a much bigger impact on the way this building saves water. The ALTA Expert units are game changers."

Plus, the overall projected energy savings for the building – the sum of a lot of energy efficient measures - are expected to be 26 to 29%.

"Obviously, the refrigeration system is the biggest energy user for the building, so the increased efficiency of that system weighs heavy on the overall savings," Norton says. "Building envelope characteristics (walls, roof and floor) come in to play by selecting builds that increase the R values."

Choosing to go 100% LED lighting for the building was another choice that helped those energy model numbers.

"Because the warehouse represents around 95% of the overall building's energy use, these were the design choices that had the biggest role in the overall energy savings," Norton says. "However, choices made about efficient HVAC systems in the office, choosing glazing with an improved U-factor and reduced solar heat gain, and improved

building controls, also played a role in getting us to those numbers."

Norton notes it is significant the building is certified under LEED v4, and not the earlier LEED v2009, v4 is much more stringent than the earlier standard. The project incorporated some credit substitutions from LEED v4.1, which is even newer than v4.

"Because the building is a warehouse, we were able to take advantage of several compliance paths in v4 that are strictly for warehouse and distribution centers," Norton says.

Americold was so impressed with the sustainability initiatives incorporated by Primus, it is currently working to achieve LEED Silver certification on two additional projects for which Primus is the design-builder.

The End Result

Primus installed a -20° QFR quick-freeze system that pulls cold air into every freezer crevice and freezes product faster and more efficiently. This allows the facility to blast freeze 2 million pounds of chicken per day.



At 51-feet high, the 312,000-square-foot building was designed to offer Americold maximum flexibility in its cold storage options. (Photo courtesy of Primus Builders.)





Because of the area's high groundwater, gavel was laid and water continuously pumped offsite to stabilize the ground for construction activities. (Photo courtesy of Primus Builders.)

The finished project also includes a twostory office, a USDA inspection lab that allows inspectors to test the product for spoilage, employee welfare areas, a Quell fire protection system to ensure maximum coverage for the building height, ALTA Expert refrigeration units and automated conveyors, wrapping and labeling stations.

"There's a lot of pride in this facility from our whole Americold team as well as the Primus team," says John Long, Americold's Senior Engineering Project Manager. "Primus delivered, in the middle of a pandemic and everything."

Gunderson credits the success of the project to a willingness by the owner to allow Primus to deploy smart construction capital.

"We stoned the site, we did our exterior paving very rapidly, our fire roads were installed to provide total perimeter access to the site, we put our sub slab in before we hung our seal - it was a well-thought-out job," Gunderson says.

Cole agrees and adds the team hit a homerun on the procurement process.

"I never had a team like this, we needed them to be rock stars and they were," he says.

2020 BUILT BY THE BEST AWARD-WINNING SUPPLIER PROFILES

These are the companies integral to the success of the winning project.

ALTA Refrigeration, Inc.

ALTA Refrigeration is a full service design/ build constructor of Industrial Refrigeration Systems. For over 30 years, ALTA's reputation for energy conservation, low maintenance costs, unique problem solving, and long term value is verified by the repeat business earned from numerous IARW members and other major companies. In-house designed computer control energy savings systems includes over 27 years experience and hundreds of installations. Our reliable 24-hour service department and well-stocked parts departments are important to your business. Licensed in over 22 states, ALTA is positioned to help companies realize a larger return on investment by reducing operating costs.

Dow Building Solutions

Dow Building Solutions serves the global building, construction and related markets with industry-leading insulation, housewrap, sealant and adhesive products, as well as complete systems. Through its extensive manufacturing, sales and technical support organization, Dow Building Solutions continually creates novel solutions for improved energy efficiency in buildings today, while also addressing the industry's emerging needs and demands.

Fastener Systems, Inc.

Specializing in fasteners for all types of cold storage, food processing & refrigerated warehouses. Stocking stainless, self-drilling, self-tapping, ZACS® and explosion release

fasteners. FABLOKS®, long length teks and roofing screws in stock. Tools, accessories, INSTA-FOAM®, tapes, caulks and butyl. The originators of POLARFAST®, the concealed panel screw. Fast overnight delivery.

The Fricks Company

Industrial concrete floor contractor providing superior workmanship and outstanding customer satisfaction. Fricks specializes in providing the most durable concrete floor in the world through delivering their shrinkage compensating concrete floors which are holistically more durable and virtually eliminate curling and cracking while eliminating up to 90% of joints. The Fricks Company is the recognized leader in premium food facility, manufacturing, and distribution facility floor construction.

Global Insulated Doors Inc.

Global Insulated Doors is a premier manufacturer of cold storage insulated doors. Our specialty is developing custom doors for all projects no matter what the size. Global Insulated Doors is proud to be family owned and operated. Our reputation for manufacturing a complete range of quality insulated doors, from Personnel doors to large Electric sliding doors, is driven by our many years of experience. This experience and knowledge combined with high levels of integrity and professionalism ensures that our clients receive the best value, highest performance and most technologically advanced products and service in the marketplace today.

Green Span Profiles

Our products serve the cold storage, commercial/industrial and architectural market segments. Along with our manufactured products, Green Span Profiles offers a collection of services including technical support, engineering, and drafting. Green Span panels are formed by a continuously poured-in-place, manufacturing process that binds interior and exterior steel facings to a polyisocyanurate, insulating foam core. With exceptional insulating properties, superior spanning capability, accelerated installation times, cost-effective pricing, recycled content, plus a rigid feel and streamlined appearance the applications are limitless. All of our panels are rigorously tested and are FM 4880 and 4881 approved.

Group4 Reps (Gulf Eagle Supply)

Cold Storage Representative for Carlisle-Syntec, manufacturer of TPO, EPDM, PVC single ply roofing systems, and Owens Corning extruded polystyrene for the cold storage, food service and commercial roofing/waterproofing industries.

Johns Manville

Johns Manville manufacture premium-quality insulation, commercial roofing and fibers and nonwovens for commercial, industrial and residential applications. In addition to delivering well-made, reliable products, we are here to provide exceptional customer service and technical assistance to help ensure that your jobs are done right — from start to finish.

Lewis Electrical Contractors, Inc.

Lewis Electrical Contractors is your project's turnkey electrical construction provider. We specialize in commercial and industrial projects. We have established a reputation for quality performance and meeting the demands of challenging projects. Lewis Electrical Contractors, Inc. provides complete electrical services for new construction, existing buildings, modifications / tenant improvements, design-build and special projects in a variety of environments including manufacturing, warehouse distribution, medical, food processing, refrigeration, material handling, packaging and lighting.

Metl-Fab, Inc.

Metl-Fab, Inc. was founded in 2005 and is a cold storage construction contractor specializing in metal panels, cold storage services, truck dock canopies, metal fabrication and materials. We provide installation services across the United States and are well versed in all aspects of cold storage construction.

Metl-Span

Manufacturers of Factory Mutual Class I polyurethane foamed-in-place panels and polystyrene laminated insulated panels for the construction of cold storage, freezer, food processing and meat plants. Metl-Span also supplies panels for ambient buildings for commercial and industrial use. Find out why Metl-Span makes the most thermally efficient panels available today.

RHH Foam Systems Inc.

Manufacturers of VERSI-FOAM portable 2-component, low-pressure spray polyurethane foam systems. Units available in a variety of foam densities and sizes; both disposable and refillable containers. Also VERSI-TITE single component foam sealant and VERSI-BLOCK Fire Block and sealant in aerosol cans. All units compatible with low temperature environments and for a wide variety of insulating, sealing, caulking, and patching applications.

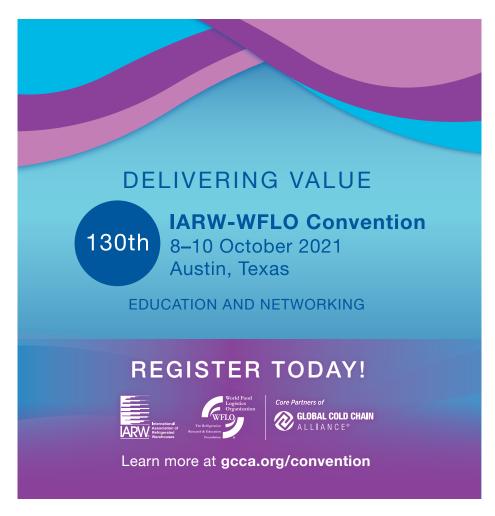
Rytec High Performance Doors

Rytec is a manufacturer of high-performance doors for industrial, commercial,

pharmaceutical and cold-storage environments. Whether rolling, folding, sliding or swinging doors, high-performance doors are our only business. Rytec corporate offices and manufacturing operations are head-quartered in Jackson, Wisconsin, a suburb of Milwaukee. Customer technical support is provided through regional offices and a network of local dealers and installers throughout North America.

Shadco Column Bearing Blocks

Shadco manufactures column bearing blocks, insulated wall panel blocking and pipe support insulation for use in cold storage and food processing building construction. Our column bearing blocks, also known as freezer blocks or thermal isolation blocks, are made from high density, high strength closed cell polyurethane. The blocks are manufactured according to your plans, pre-drilled ready for installation and are available in a variety of densities and compression strengths. Shadco offers short lead times as well as quick turn around on quotes and shop drawings. Contact us for more information and a quote.





NEW HOME FOR SOUTHERN FOODS

A M King transforms a shell into a state-of-the-art processing facility.

hen Southern Foods, a full-service meats, seafood, artisanal cheese and global specialty goods supplier that performs custom processing, decided to expand in Greensboro, North Carolina, it reached out to design-build firm A M King. Their task? Convert an 88,000-square-foot spec shell warehouse into a one-of-a-kind, innovative, modern United States Department of Agriculture (USDA) regulated meat, seafood and cheese processing facility.

Matt Miller, Senior Project Manager for A M King says the project involved separate meat, fish and cheese processing areas, a dry age meat room, separate refrigerated dock and dry dock for inbound and outbound distribution, culinary center with commercial kitchen and first floor and mezzanine office space. And, they had to relocate all of the clients' existing equipment, plus new equipment, into

a much smaller building footprint with room to grow.

"The first thing we had to consider was what the existing building had to offer and what we would have to do to get it ready for everything we needed to put in it," Miller says. "An important goal of this project, for both Southern Foods and A M King, was to use as much of the existing building as

possible. We're extremely familiar with the complex nature of food facility design and construction, however, this particular process of adapting existing structures to meet USDA food facility requirements was exceptionally challenging."

Challenges of the Job

Since the original building was designed as a standard dry warehouse, it did not support the level of mechanical and fire protection systems required for a facility where 50 percent of the square footage of space would be refrigerated.

Jami Lloyd, Architectural Designer at A M King, notes in order to keep the existing precast walls, roof and supporting structure, the design needed to isolate the steel members and exterior walls from the interior spaces.

"We were able to do this with a system of insulated metal panel walls, liner panels, baffles and ceilings," she says. "This gave us the proper framework to both physically and thermally maintain the new systems that are



The original dry warehouse was converted to refrigerated storage and processing spaces with a system of insulated metal panel walls, liner panels, baffles and ceilings. (Photo courtesy of A M King.)

required to control refrigeration temperatures for processing and storage of food. In addition, we ensured that the fire suppression system would operate as required in the case of an emergency."

Another challenge was getting the facility ready a month and a half earlier than scheduled, as Southern Foods was required to relocate from its previous facility sooner than initially planned.

"A coordination meeting was scheduled with the subcontractors, and it was determined that in order to achieve this new timeline, the construction team would require overtime for labor to expedite key pieces of equipment and coordinate a plan with the city building officials," Miller said. "Through the consolidated effort of all parties, the new project end date was achieved."

Meeting Safety Requirements

Once the structure was addressed, the design team turned its attention to the food safety and sanitation concerns of the new facility.

Tackling the specialty floor, Lloyd explains the team utilized Stonhard Brand Stonclad UT flooring, a high-strength industrial floor coating with a polyurethane 4 component mortar system that combines a urethane-urea binder, pigments and quartz aggregates.

"This coating is known for its high impact resistance, abrasion, thermal shock and chemical resistance," she says. "We installed this coating over all concrete slabs in the food processing area to provide a protective layer over our slab. Thus, we were able to prevent food particles from absorbing into the concrete slab and minimized the risk of bacterial growth. The aggregate is mixed in to provide a textured slip resistant finish for ensured safety."

Additionally, the team installed numerous trench and floor drains and sloped floor slab to those drains so that when the processing rooms are washed down, the water self-drains until none remains.

Since the room would have to be washed down so often, stainless-steel materials, best for corrosion resistance, were chosen for doors, hardware, equipment and exposed metals.

"Also, because these rooms are cleaned with high-temperature pressured water, we needed to ensure the light fixtures could withstand the extreme temperature changes and force from the pressurized water," Lloyd says. "To solve this problem, we chose fixtures that had an IP65 rating. The 6 means the fixture is dust tight and the 5 means the fixture is protected against water jets from any angle."

With all the equipment in this space, the design team wanted to make sure the conduit, water and refrigeration lines were sealed and off the walls to ensure proper cleaning processes could happen. Their solution was to seal standoffs for conduit and plumbing to assist with easy cleaning.

"One of the most common issues with food safety and sanitation is cross contamination," Lloyd says. "Therefore, gowning rooms were provided as the main point of entry and exit

into and out of the processing areas."

Fulfilling Needs

Bill Mutton, President of Southern Foods, also had another request for A M King. He wanted a space that would encourage client interaction.

"Southern Foods doesn't just sell you a product, we invite you to be a part of the selection process," he says.

To fulfil this goal, Miller says they installed triple-paned viewing windows in the meat, fish and cheese processing rooms, as well as the dry aged meat room.

"These windows are thermally broken so they can withstand the different temperatures on either side, without fogging or condensation," he says. "They allow for easy viewing so clients and guests can see the aged meat and cheeses, as well as the seafood, before the product is cut. The windows also provide a safe barrier between visitors and the raw product."

Mutton championed sustainability measures whenever possible. Miller notes the main sustainability initiative implemented



A distinctive 34-degree, 4,200-square-foot dry beef aging room is fitted with high-tech temperature and humidity controls and large viewing windows for customers. (Photo courtesy of A M King.)



A high-strength industrial floor coating over all concrete slabs in the food processing area prevents food particles from absorbing into the concrete slab and minimizes the risk of bacterial growth. (Photo courtesy of A M King.)

was the use of an existing building in lieu of a greenfield site.

"It was important to all parties to locate an existing project site that could be used and modified to meet the owner's needs," Lloyd says. "With exterior precast walls, minimally insulated roof and structural steel already in place, we were able to meet our goal to design a thermally isolated space within the bounds of an existing structure."

The team lined the inside face of exterior walls with insulated metal wall panels. Insulated metal panel ceilings were suspended below the existing roof structure.

"We layered floor slabs with insulation and underslab glycol piping to create separation from the exterior elements," Miller says. "This separation allowed us to create a thermally sealed interior space that could withstand the required temperatures ranging down to negative 20 degrees."

HVAC systems were used to balance energy efficiency and economic viability. The facility's first floor non-production spaces and the second floor office spaces were configured as a variable air volume (VAV) system comprised of a packaged rooftop air conditioner with modulating natural gas heating and a variable speed supply fan.

Additional green measures included installing LED lighting, adding mechanical DX cooling systems, efficient heat pumps, higher than required R-Values for wall systems in refrigerated areas and implementing a complete occupancy sensor control throughout the building spaces. Also, each rooftop unit had two compressors for staging capability and to reduce energy consumption at lower loads.

One of the biggest challenges the design team faced was organizing the spatial layout. Southern Foods needed to have raw meat and fish remain at the required temperature from arrival, through the cutting/packing process and in storage until ready to be shipped.

"Our challenge was to make sure each space the product passed through met the refrigeration, thermal and finish requirements necessary for maintaining its integrity," Lloyd says.

For example, A M King created easy access from the refrigerated dock to the -20-degree blast freezer and packaging area.

"The blast freezer, which is a vital part of the patty process, had to be centrally located in the building to ensure easy accessibility. However, that meant it had to withstand varying temperatures, sometimes extreme temperature differentials of 70 degrees or more," Lloyd says. "The construction of this freezer had to be carefully considered to ensure that it would perform."

To do this, 5-inch-thick IMP was used for the ceiling and walls, which were extended below the slab to prevent thermal transfer. Additionally, A M King's design-build team installed a glycol piping system to heat the underslab and constructed a baffle ceiling to help direct the air flow from the refrigeration system to the product to help bring down the temperature as quickly as possible.

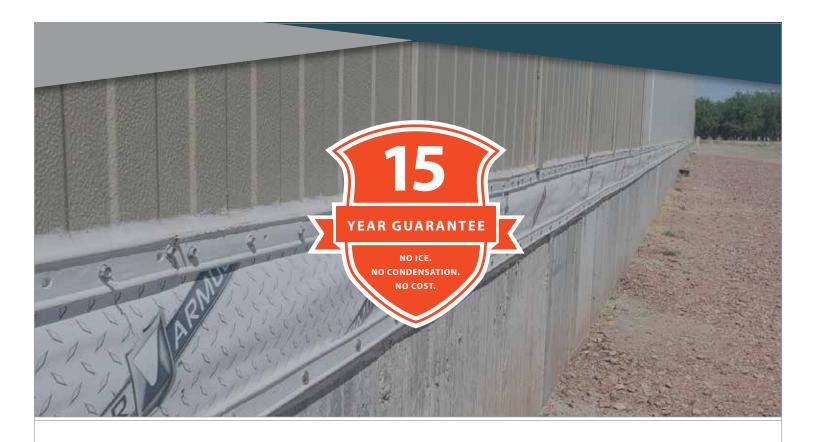
Work Complete

A M King finished the Southern Foods project under budget and on time in just 19 months.

The new facility now houses a 13,500square-foot food processing area with a distinctive 34-degree, 4,200-square-foot dry beef aging room fitted with high-tech temperature and humidity controls and large viewing windows. In total, there are 11,585 square feet of freezers, 11,429 square feet for 32-degree coolers and loading docks, a refrigerated cheese processing area, a 14,250-square-foot space for dry storage and a 12,660-square-foot office mezzanine.

And, with the new fish processing area, cheese processing room and express purchasing for the general public, the company can do more than it ever has.

The project was a finalist in the CEBA Built by the Best Competition in 2020.



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Recognize the cost savings from the reduction in field electrical work because Evapcold units include all necessary starters, controls and are prewired, greatly reducing the site electricians scope and price. This also includes the elimination of costly underground electrical work associated with a central machine room.



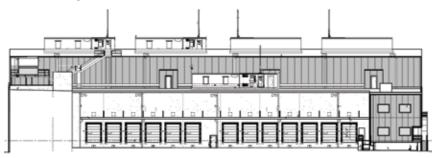
Eliminate the central machine room with Evapcold packages and transform the saved space into revenue generating product storage space or additional dock doors. They are also a great solution for "tight sites" because eliminating the machine room allows your building to be larger.



Evapcold design can Reduce the Building Cost:

The General Contractor & Owner need to be aware that the following items will bring savings to the project:

- ✓ Eliminating or reducing the size of the central machinery room and roof supports for ammonia pipe headers.
- ✓ Planning for the required roof steel will minimize any structural cost impact for the packaged units and recognize savings from no ammonia roof headers.
- ✓ Recognize the cost savings from the reduction in field electrical work because Evapcold units are prewired.
- ✓ Reduction in the GC's monthly "site general conditions" cost because the building construction schedule can be shorter.



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Reduce the construction costs of your cold storage building and provide the end-user with a lower cost of ownership by installing Evapcold Low Charge Ammonia Packages. Eliminate the central machinery room, reduce the field electrical scope, eliminate or reduce roof supported pipe headers, stands and hangers, shorten the project construction schedule

and reduce your risk with the Evapcold solution.



To take advantage of these lower building costs the architectural, structural, electrical and mechanical design team needs to incorporate the packaged solution into the building design early in the project development process. This will guarantee that the material take-offs and subcontractor bids are based on the associated reduction in building scopes and the cost savings are recognized by the General Contractor and passed on to the Owner. The design-build process, common for refrigerated facilities, lends itself to making these new cost saving improvements happen, but if the building is designed "the same old way" then they are harder to achieve.



The Evapcold design can provide a shorter construction schedule:

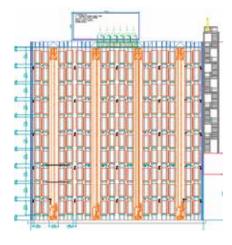
✓ Evapcold units can be manufactured & shipped in parallel with building steel fabrication and erection.

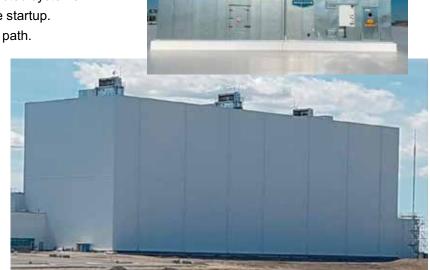
✓ Units have a very short installation time.

✓ Significantly less on-site labor than field erected systems.

✓ Factory testing leads to quick & trouble-free startup.

✓ Refrigeration no longer the project's critical path.







CONNECTING RAIL AND SHIP IN OAKLAND

Fisher Construction Group finds success with Lineage Logistics Cool Port design/build.

ineage Logistics Cool Port in Oakland, California, United States, is a new temperature-controlled transload distribution facility that is a cornerstone project of an economic revitalization plan developed by a public-private partnership between Lineage Logistics, cold storage operator Dreisbach Enterprises and the Port of Oakland.

Fisher Construction Group was hired to design and build the mammoth \$70 million property on 22 acres.

The 276,000-square-foot facility bridges the gap between rail and ship and provides a greatly needed cold storage and transfer hub for importing and exporting protein products between the United States and Pacific Rim nations. Lineage Logistics Cool Port is projected to handle approximately 9,000 rail cars per year and an additional 9,000 containers by truck, transferring up to 1,000,000 tons of perishable product through the Port of Oakland annually.

Ryan Smith, Senior Project Manager for Fisher Construction Group, noted the company became involved in the project when the Port of Oakland issued a request for proposal, and Fisher was selected to team with the Cool Port Group (comprised of Lineage Logistics and Dreisbach Enterprises) as its builder.

Being the first public/private partnership project for the Port of Oakland, Fisher's project management team navigated many "firsts" for the port. Cool Port's ownership group trusted Fisher's management team to navigate and advise them through the process.

"Time and budget were the two biggest driving factors," Smith explains. "Because of reasons to do with the lease, the facility had to be operational by November 2018 - regardless The Lineage Logistics Cool Port, designed and built by Fisher Construction Group, bridges the gap between rail and ship and provides a cold storage and transfer hub for importing/ exporting perishable products between the United States and Pacific Rim nations. (Photo courtesy of Fisher Construction Group.)

of whether it was working or not, they were going to start being charged rent."

In addition, there was a concurrent federally funded project to get rail lines in place, and Fisher needed to meet certain milestones and dates to allow that rail service project to be installed.

"There's also a lot of public involvement working in the Port of Oakland," Smith says. "The Maritime Aviation Port Labor Agreement requires using local unions, so we could hire from five zip codes in the Oakland area. Fisher hired a person to specifically administer the requirements."

Once port staff reviewed and endorsed the project, the port's commissioners still needed to provide final approval of the entirety of the plan including utilities, grading, environmental, trucking haul routes and construction reviewed and approved.

Constructing the Cold Chain

The facility contains a 100,000-square-foot storage zone that represents about one third of the entire space. The rest is comprised of a uniquely winged refrigerated loading dock, allowing for product transloading in optimal conditions.

Smith notes the 108 rail and truck doors in the refrigerated cross-dock were designed with a complex set of interlocks to help maintain the cold chain.

"The rail doors remain locked until the trains are completely aligned with the inflatable dock seals and adjustable rail levelers are in place," Smith says. "The interlocking system allows rail cars to be aligned four-deep with passage bridges fitted between cars. Loads are transloaded to trucks using specially designed truck levelers enabling the trucks to be fully loaded with product via handling trucks, without the need to hand-load the last stack in the area that a conventional loading dock would typically occupy."

Overcoming Challenges

Smith notes jurisdiction issues were the largest challenges the crew faced as working in California, in Oakland specifically and at the port, all had unique issues. Overall, there were about 20 different agencies from which Fisher needed approval.

On the construction side, horrible soils were the problem.

As the site was once an army base located on the tidelands of Oakland Bay, it presented some challenges to Smith and his team. For one, there were unknown sunken hazards and potential contamination in the already soupy tide flats.

Smith explained the poor soils required the facility to be built on 1,800 concrete piles driven 50 feet down to counteract settling and seismic activity, bracing the building's slab foundation.

"If there ever was a seismic event, it was estimated the ground underneath could slip away up to two feet," Smith points out. "We had to design with that in mind, so we built it almost like a bridge deck sitting on top of piers and it's all a structural slab."

That required all utilities coming in to have big joints and flexible connections and all underground utilities (electrical, plumbing) had to be set in concrete with hangers.

Additionally, the land is heavily regulated by the California Department of Toxic Substance Control due to the possibility of ground contamination so specific site permits and approval was required by the DTSC to proceed with the work, such as obtaining groundwater permits for the discharge of construction dewatering efforts from The East Bay Municipal Utility District.

The Fisher team also created a hinge detail for the truck aprons so if the ground erodes, the top would still be connected to the building as the aprons would tilt in the event of settlement. Trucks would have access to the docks via the use of this teeter-totter design counteracting settlement.

Notable Innovation

The Cool Port project adopted a locally driven strategy when devising its long-term international solution and its localized strategy was woven into every aspect of the enterprise.



Two thirds of the entire facility is comprised of a winged refrigerated loading dock, allowing for product transloading in optimal conditions. (Photo courtesy of Fisher Construction Group.)



One hundred and eight rail and truck doors in the refrigerated cross-dock were designed with a complex set of interlocks to help maintain the cold chain. (Photo courtesy of Fisher Construction Group.)

The success of the Lineage Logistics Cool Port project required significant innovation long before the first excavator arrived onsite and throughout the project's entire designbuild process.

Smith notes that innovation is evident in the way the company future-proofed the methane-pocketed and seismic-prone land to a suitable building foundation; how it devised on-demand market adaptability in the form of interchangeable frozen and chilled storage spaces; and how it maximized end-to-end cold chain efficiencies within an intermodal system.

"While the advantages of intermodal transport are well known, less well known is the need for continuous improvement of the cold chain itself," he says. "Every link in the chain carries the risk of breaking the chain and risking safety, quality and value along the way."

The Cool Port design mitigated the likelihood of weak links by creating continuous cold chains capable of safeguarding all goods entering and exiting the building. "Neither loading nor unloading breaks the chain when utilizing inflatable rail dock shelters and internal setback dock pits with cold chain safeguards," Smith says. "Frozen or chilled,

the process remains intact and cargo is never exposed to external temperatures."

Cool Port's continuous cold chain intermodal transport facility is augmented by the structure's innovative cold chain storage capabilities. The structure houses an 80,000-square-foot freezer in tandem with two 10,000-square-foot areas capable of storing goods with a temperature range of -10F to +35F.

"Such convertible storage spaces accommodate the dynamic realities of market demand," Smith says. "This innovation reduces the facility's limitations, thus increasing its functionality in an evolving market."

Being a freezer and a cooler, Smith notes there is always a bigger demand for water. Originally faced with a \$2 million connection price, Fisher was able to negotiate to get it down to a manageable cost. That was a battle that took six months, Smith adds.

Sustainable Efforts

The design, construction, and operations of Cool Port met all of CALGreen's codes - the statewide standard for reducing the environmental impact of construction by minimizing waste and setting a high standard of energy

efficiency for new buildings.

"The building is certainly very efficient thermally," Smith says. "We used all the latest technologies for the thermal envelope."

The whole building is also solar-ready if solar was to become available. There are dedicated dead loads for solar panels on the building, extra room in the electrical gear, and extra conduits for other solar provisions.

Smith notes that given cold storage facilities are intensive energy users, it was in everyone's interest to increase the efficiency of the facility through smart use of materials and technologies. Therefore, the steel-supported 48-foot, 7-inch-tall cold storage facility is totally clad in energy efficient 6-inch IMP panels offering an R44 value, making it possible to maintain the freezer/convertible cooler with less than 2-degree fluctuation in energy consumption. Similarly, the cross-loading docks are clad in 4-inch insulated metal panels.

The facility's state-of-the-art industrial ammonia refrigeration system utilizes lowcharge direct expansion for all cooling loads, which significantly reduces the ammonia charge required on site. It provides additional benefits including the elimination of recirculation pumps, effective operation at multiple

temperature levels, reduced defrost times and frequency, excellent response to changes in load, fast restart after a power failure, and simplified maintenance and operation.

Propylene glycol, circulating through compressor oil coolers, provides the heat for sub-floor warming under the storage areas, preventing ground frost formation. Meanwhile, Cool Port's control system manages all room temperatures and defrost cycles, providing a floating suction and discharge pressures that maximize electrical efficiency.

Final Thoughts

At the conclusion of the build, a formerly brown site riddled with challenges was transformed into a continuous blue-sky operation. Just as important, both temporary and

evergreen opportunities were introduced into an economically distressed community.

"The Mayor of Oakland was at the grand opening, and multiple people in Congress came through, the Port commissioner was there, and everyone was happy with what they saw," Smith says. "It's a one-of-a-kind project. To have a facility where you can get fresh produce, meats and anything that needs to be refrigerated off a boat and put directly on to rail is unique."

Smith was pleased that the project met or exceeded all MAPLA goals as the first port/ public/private partnership in Oakland. He credits the joint effort from the beginning of the project as making it a smooth process for all involved.

"We came away having a very successful project with all those parties," he says. "It was a very clear goal and we designed what was needed and what they wanted. We were on time and on budget and had the facility running when we had to."

The project was a finalist in the CEBA Built by the Best Competition in 2020.

FOOD SAFETY IS ALWAYS IMPORTANT ... BUT EVEN MORE SO IN A PANDEMIC.



COLD CHAIN BUYERS GUIDE

GCCA COLD CHAIN INNOVATION SHOWCASE & BUYERS GUIDE

The 2021 GCCA Cold Chain Innovation Showcase & Buyers Guide includes companies that are members of the Controlled Environment Building Association (CEBA), associate members of the International Association of Refrigerated Warehouses, and members of the International Refrigerated Transportation Association, Core Partners of the Global Cold Chain Alliance (GCCA).

For a listing of warehousing, logistics and transportation providers, please refer to the Warehousing & Logistics Showcase. To access listings that contain full company details for all GCCA Members, please visit the online GCCA Directory & Buyers Guide at gcca.org/directory/all.

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Gartner Refrigeration Inc.

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www.gartner-refrig.com

Graycor Construction Company

Charlotte, NC United States

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Hansen Cold Storage Construction

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www.hansen-rice.com

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Heritage Hygienic Environments Ltd.

Wirral, United Kingdom

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www.hil-installations.com

Industrial Refrigeration Service Inc. Baltimore, MD United States

www.industrialrefrigserv.com

Industrial Refrigeration Services (division of the Waldinger Corp)

Des Moines, IA United States

www.waldinger.com/expertise/service/ industrial-refrigeration-ammonia

Innovative Refrigeration Systems, Inc.

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www.R717.net

InterCool USA LLC

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Ryan Companies US, Inc.

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www.sprinkmannsonscorp.com

Stancold plc Bristol, BST United Kingdom

www.stancold.co.uk

Jacksonville, FL United States www.stellar.net

SubZero Constructors, Inc.

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www.gouldgrp.com

Holden Installations Ltd. Cork, Ireland www.holden.ie

KPS Global

Fort Worth, TX United States www.kpsglobal.com

MT Cold Storage Solutions Ltd Leigh Sinton, WOR United Kingdom

PowerSecure Wake Forest, NC United States www.powersecure.com

Maintenance or Repair Services

Ahern Fire Protection a division of J. F. Ahern Co.
Fond du Lac, WI United States

www.jfahern.com

ALTA Refrigeration, Inc.
Peachtree City, GA United States
www.cold4u.com

Anis Ahmed & Brothers Karachi, Pakistan www.aabros.com.pk

Black Hawk Roof of Nebraska Inc. Omaha, NE United States

Cold Clad Ltd.

Gloucestershire, United Kingdom www.coldclad.com

Controlled Environments Construction Inc.

Tustin, CA United States
www.controlledenvironments.com

Darren Edwards Construction & Maintenance LTD (DECM UK)
Buckden, St Neots, CAM United Kingdom www.decmuk.com

GPL Construction (UK) Ltd. Norfolk, United Kingdom www.gplconstruction.co.uk

Griffco Design/Build, Inc. Kennesaw, GA United States www.griffcodesignbuild.com

H.A. Davie Ltd. Tyne & Wear, United Kingdom www.hadavie.co.uk

Hansen-Rice, Inc. Nampa, ID United States www.hansen-rice.com

HIL Installations Ltd. Merseyside, United Kingdom www.hil-installations.com

Holden Installations Ltd. Cork, Ireland www.holden.ie

ISD Solutions Gloucester Gloucestershire, United Kingdom www.isd-solutions.co.uk

JAX Refrigeration
Jacksonville Beach, FL United States
www.jaxrefrigeration.com

KPS Global Fort Worth, TX United States www.kpsglobal.com

M&M Carnot Refrigeration Inc. Federalsburg, MD United States www.mmrefrigeration.com

Mac Rak Inc. Lockport, IL United States www.macrak.com

O'Connor Construction Group Poolville, TX United States www.ocgbuild.com

Proform Thermal Systems, Inc. North Branch, MN United States www.proformthermal.com

Refrigeracion Linca SA de CV Mexico, Mexico www.refrigeracionlinca.com

Republic Refrigeration, Inc. Monroe, NC United States www.republicrefrigeration.com

Stellar

Jacksonville, FL United States www.stellar.net

Tracy Cold Storage Construction, Inc. Point Lookout, NY United States www.tracycoldstorage.com

Material Handling Equipment

Adapt-A-Lift Rentals & Sales (Vic) Springvale, Victoria Australia www.adapt-a-lift.com.au

Advance Storage Products Huntington Beach, CA United States www.advancestorage.com

ALBA MFG, Inc. Fairfield, OH United States www.albamfg.com

ANCRA Systems Bingham Farms, MI United States www.ancra.nl

AutoMak Assembly, Inc. Crown Point, IN United States www.cladboyusa.com

Cascade Australia Pty Ltd. Rocklea, Queensland Australia www.cascorp.com

Cherry's Industrial Equipment Corp. Roselle, IL United States www.cherrysind.com

Crown Equipment Pty Ltd. (NSW) Smithfield, New South Wales Australia

Dematic Corp. Grand Rapids, MI United States www.dematic.us

Dematic Pty Ltd. Belrose, New South Wales Australia

Frazier Industrial Company Long Valley, NJ United States www.frazier.com

Hyster-Yale Group Milperra, New South Wales Australia

KEITH Manufacturing Co Madras, OR United States www.keithwalkingfloor.com

Körber Supply Chain Automation GmbH Leingarten, Germany www.koerber-supplychain.com

Körber Supply Chain, NA Minneapolis, MN United States www.koerber-supplychain.com

Linde Material Handling Huntingwood, New South Wales Australia www.lindemh.com.au

Box Hill, Victoria Australia LTW Intralogistics, Inc.

Loscam Limited

Emigsville, PA United States www.LTWUSA.com

Mac Rak Inc. Lockport, IL United States www.macrak.com

NORDOCK Inc. Westerville, OH United States

www.nordockinc.com
NTP Forklifts

Huntingwood, New South Wales Australia www.ntpforklifts.com.au Rack Builders Inc.

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Charlotte, NC United States www.ssi-schaefer.us

SSI Schaefer

Giebelstadt, Germany www.ssi-schaefer.com

Steel King Industries Inc. Stevens Point, WI United States www.steelking.com

Stoecklin Logistics, Inc. Roswell, GA United States www.stoecklin.com

Stow International NV Spiere-Helkijn, Belgium www.stow-group.com/en

Newport News, VA United States www.swisslog.com

Swisslog Australia PTY Ltd. Sydney Ölympic Park, New South Wales Australia

www.swisslog.com

TGW Systems, Inc. Grand Rapids, MI United States www.tgw-group.com

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Toyota Material Handling Australia Moorebank, New South Wales Australia www.toyotamaterialhandling.com.au

Twinlode Automation South Bend, IN United States www.twinlodeautomation.com

Viastore Systems, Inc. Grand Rapids, MI United States www.us.viastore.com

Wood's Powr-Grip Co., Inc. Laurel, MT United States www.wpg.com

Other Products and Services

ABAD Exports Private Limited Kerala, India

Albany Entrematic Mundelein, IL United States www.albanydoors.us

Apex

Visakhapatnam, India

Cherry's Industrial Equipment Corp. Roselle, IL United States www.cherrysind.com

CipherLab Australia Pty Ltd. Kings Park, Sydney New South Wales Australia www.cipherlab.com.au

Danbee Investigations Midland Park, NJ United States www.danbeeinvestigations.com

Gamma Graphics Services (GGS) Colorado Springs, CO United States www.inspectpipe.com

GMH Infrastructure Private Limited New Delhi, Delhi India www.gmhdomain.com

Impelpro SCM Solutions Pvt. Ltd. Thane, Maharashtra, India www.impelpro.in

M/S Svarn Telecom Ltd Faridabad, Haryana, India www.svarn.com

M/S Yamuna Industries Ltd. Greater Noida, Uttar Pradesh India www.coolmagic.in

Polyguard Products Ennis, TX United States www.polyguardproducts.com

Singhal Industries Pvt. Ltd. Gandhinagar, Gujarat India www.singhalgroup.in

Tanner Industries Inc. Southampton, PA United States www.tannerind.com

Valfilm Indústria de Embalagens São Paulo, Brazil www.valgroup.com.br/valfilm

Viking Cold Solutions, Inc. Houston, TX United States www.vikingcold.com

Pallets

Automha Americas Automation Corp Oakville, ON Canada www.automha.com

CHEP Australia North Ryde, New South Wales Australia www.chep.com

Cherry's Industrial Equipment Corp. Roselle, IL United States www.cherrysind.com

SSI Schaefer Giebelstadt, Germany www.ssi-schaefer.com

Steel King Industries Inc. Stevens Point, WI United States www.steelking.com

Racking

Advance Storage Products Huntington Beach, CA United States www.advancestorage.com

Automha Americas Automation Corp Oakville, ON Canada www.automha.com

Barpro Storage SA (Pty) Ltd. Cape Town, Western Cape South Africa www.barprostorage.co.za

Bertolini Sistemas De Armazenagem Bairro Vila Nova, Rio Grande do Sul Brazil

Better Storage Systems Darra, Queensland Australia www.betterstorage.com.au

Charleston, SC United States www.flexspace360.com

Frazier Industrial Company Long Valley, NJ United States www.frazier.com

Jungheinrich South Africa (Pty) Ltd. Pomona AH, Kempton Park, South Africa www.jungheinrich.co.za

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Steel King Industries Inc. Stevens Point, WI United States www.steelking.com

Stoecklin Logistics, Inc. Roswell, GA United States www.stoecklin.com

Storax Racking Systems Bromsgrove, United Kingdom www.storaxsystems.com

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Fremont Realty Capital San Francisco, CA United States www.fremontgroup.com

JG Petrucci Company Asbury, NJ United States www.jgpetrucci.com

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Karis Cold Storage Schaumburg, IL United States www.kariscold.com

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Ryan Companies US, Inc. Minneapolis, MN United States www.ryancompanies.com

Stanker & Galetto Inc. Vineland, NJ United States www.stankergaletto.com

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Williams Industrial Group of Marcus & Millichap San Diego, CA United States www.marcusmillichap.com

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Commercial Engineers & Body Builders Co. Ltd. Jabalpur, India www.cebbco.com

Grupo Frio Integral Santo Domingo, Dominican Republic www.gfriointegral.com

HLM India Pvt Ltd. Chakan, Pune, India

Thermo King do Brasil Ltda. Barueri, São Paulo Brazil www.thermoking.com.br/latin-america/br/ pt.html

Utility Trailer Manufacturing Co. Scottsdale, AZ United States www.utilitytrailer.com

Volvo Truck & Bus Chullora, New South Wales Australia

Reefer Units

AB Tehnic Profesional srl Bucharest, Romania www.abtehnic.ro

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Grupo Frio Integral Santo Domingo, Dominican Republic www.gfriointegral.com

Refrigeration Machinery

AB Tehnic Profesional srl Bucharest, Romania www.abtehnic.ro

Advanced Energy Control, Inc. Randolph, WI United States www.advancedenergycontrol.com

AIR Consulting Global Ltd.
Northern Ireland, United Kingdom
www.airconsulting.eu.com

Aislamientos Constructivos, S.A. de C.V. Monterrey, Nuevo Leon Mexico www.grupoaislacon.com.mx

ALTA Refrigeration, Inc. Peachtree City, GA United States www.cold4u.com

Anis Ahmed & Brothers Karachi, Pakistan www.aabros.com.pk

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Carrier Commercial Refrigeration Europe

Culemborg, Netherlands www.carrier.com/carrier/en/worldwide

Cimco Refrigeration Toronto, ON Canada www.cimcorefrigeration.com

Colmac Coil Manufacturing Inc. Colville, WA United States www.colmaccoil.com

CryoLogistics Refrigeration Technologies Ltd. Victoria, BC Canada www.cryologistics.ca

Danfoss Baltimore, MD United States

www.Danfoss.us

Dawsongroup Tongwell, MIK United Kingdom www.dgglobal.org

DD Cooling Ltd. Preston, LAN United Kingdom www.ddcooling.co.uk

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Evapco Inc.Westminster, MD United States
www.evapco.com

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Jacksonville, FL United States
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Minneapolis, MN United States www.gartner-refrig.com

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GEA Refrigeration Components Australia

Carrum Downs, Victoria Australia

Gordon Brothers Industries Pty Ltd. Victoria Park, Western Australia Australia

Guntner U.S. LLC Rolling Meadows, IL United States www.guntnerus.com

H.A. Davie Ltd. Tyne & Wear, United Kingdom www.hadavie.co.uk

HB Products A/S Hasselager, Danmark, Denmark www.hbproducts.dk

Heatcraft Refrigeration Products Div. Stone Mountain, GA United States www.heatcraftrpd.com

Hill Phoenix Conyers, GA United States www.hillphoenix.com

Innovative Refrigeration Systems, Inc. Lyndhurst, VA United States www.R717.net

InspiraFarms London, United Kingdom www.inspirafarms.com InterCool USA LLC Carrollton, TX United States www.intercoolusa.com

Klinge Corporation York, PA United States www.klingecorp.com

Logix Refrigeration Controls Kirkland, WA United States www.logix-controls.com

LUVATA New Delhi, India www.luvata.com

M&M Carnot Refrigeration Inc. Federalsburg, MD United States www.mmrefrigeration.com

Mayekawa Australia Matraville, New South Wales Australia www.mayekawa.com.au

Mayekawa do Brasil e Equipamentos Industriais São Paulo, Brazil www.mayekawa.com.br

Mayekawa U.S.A., Inc. Lebanon, TN United States www.mayekawausa.com

Mollenberg-Betz, Inc.
Buffalo, NY United States
www.mollenbergbetz.com

MT Cold Storage Solutions Ltd. Leigh Sinton, WOR United Kingdom

NXTCOLD LLC Los Angeles, CA United States www.nxtcold.com

Officine Mario Dorin SPA Fiesole, Firenze, Italy www.dorin.com/en

Parker Hannifin Corporation Broadview, IL United States www.parker.com/refspec

Patton Refrigeration New Delhi, India www.pattonrefrigeration.co.in

PED Consultants Ltd. Armagh, United Kingdom www.pedconsult.com

Quest/Therma-stor Madison, WI United States www.thermastor.com

Rebound Technologies Inc. Commerce City, CO United States www.rebound-tech.com

Republic Refrigeration, Inc. Monroe, NC United States www.republicrefrigeration.com

RINAC India Limited Bangalore, India www.rinac.com

Scantec Refrigeration Technologies Pty Ltd Murarrie, Brisbane Queensland Australia www.scantec.com.au

S & S Refrigeration Company Jersey City, NJ United States www.ssrefrig.com

Sistemas de Refrigeracion Totales SA de CV Estado de Mexico, México Mexico www.srtmexico.com.mx

SPX Cooling Technologies, Inc. Overland Park, KS United States www.spxcooling.com Super Radiator Coils Richmond, VA United States www.superradiatorcoils.com

Termosoluciones, S.A. Guatemala City, Guatemala www.termosoluciones.com

Therm Tech Refrigeracao Industrial Caxias do Sul Estado, RS Brazil

Tippmann Construction Fort Wayne, IN United States www.tippmanngroup.com

Tippmann Engineering (QuickFreeze) Fort Wayne, IN United States www.QuickFreeze.com

Tippmann Innovation Fort Wayne, IN United States www.ticold.com

Tolsma Techniek Emmeloord B.V. 8304 AT Emmeloord, Netherlands www.tolsmagrisnich.com

Tri Tech Refrigeration Australia Pty Wetherill Park, New South Wales Australia www.trichaustralia.com.au

Vilter Manufacturing LLC Cudahy, WI United States www.vilter.com

Voltas Limited Mumbai, India www.voltas.com

Refrigeration Engineering **Services and Support**

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www.therefrigerationalliance.com

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Bridge Industrial Partners Rosemont, IL United States www.bridgedev.com

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Climate Changers Technology Solutions Pvt Ltd

Bangalore, Karnataka India www.climatechangersindia.com

Dalkia Energy Solutions, LLC Beverly, MA United States www.groomenergy.com

DGridEnergy, LLC Potomac, MD United States www.dgridenergy.com

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M/S Svarn Telecom Ltd Faridabad, Haryana, India www.svarn.com

Mayekawa do Brasil e Equipamentos Industriais

São Paulo, Brazil www.mayekawa.com.br

Mayekawa U.S.A., Inc. Lebanon, TN United States www.mayekawausa.com

NXTCOLD LLC Los Angeles, CA United States www.nxtcold.com

Primus Builders, Inc. Woodstock, GA United States www.primusbuilders.com

Rebound Technologies Inc. Commerce City, CO United States www.rebound-tech.com

Republic Refrigeration, Inc. Monroe, NC United States www.republicrefrigeration.com

Scantec Refrigeration Technologies

Murarrie, Brisbane Queensland Australia www.scantec.com.au

SPX Cooling Technologies, Inc. Overland Park, KS United States www.spxcooling.com

Termosoluciones, S.A. Guatemala City, Guatemala www.termosoluciones.com

Therma

San Francisco, CA United States www.hellotherma.com

Thermal Technologies, Inc. Blythewood, SC United States www.thermaltechnologies.com

VaCom Technologies La Verne, CA United States www.vacomtech.com

Viking Cold Solutions, Inc. Houston, TX United States www.vikingcold.com

Roofing and Roofing Products

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Black Hawk Roof of Nebraska Inc Omaha, NE United States www.blackhawkroofne.com

Dallas, TX United States www.gaf.com

Green Span Profiles Waller, TX United States www.greenspanprofiles.com

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O'Connor Construction Group Poolville, TX United States www.ocgbuild.com

Royalty Roofing Seymour, IN United States www.royaltyroofing.com

Sun Commercial Roofs Dallas, TX United States www.suncoroofs.com

Thermal Construction Specialists Saint Paul, MN United States www.tcscold.com

Warrior Roofing Inc. LeMars, IA United States

Solar/Alternative Energy Solutions

DGridEnergy, LLC Potomac, MD United States www.dgridenergy.com

Elgin HDB Refrigeração Ltda. São José dos Campos, SP Brazil www.elgin.com.br

EP Hvac&R (Pty) Ltd t/a Energy Partners Refrigeration

Centurion, Gauteng South Africa www.energypartners.co.za

Flow Power Sydney, New South Wales Australia www.flowpower.com.au

Gould Group Westerville, OH United States www.gouldgrp.com

 ${\sf GridBeyond}$ Watford, United Kingdom www.girdbeyond.com

GridMarket New York, NY United States www.gridmarket.com

IGS Energy Dublin, OH United States www.igs.com

Madison Energy Investments New York, NY United States www.madisonei.com

ndustrial Raleigh, NC United States www.ndustrial.io

PED Consultants Ltd. Armagh, United Kingdom www.pedconsult.com

Stanker & Galetto Inc. Vineland, NJ United States www.stankergaletto.com

Madison, WI United States www.sunpeakpower.com

Testo Do Brazil Campinas, São Paulo Brazil

Viking Cold Solutions, Inc. Houston, TX United States www.vikingcold.com

Thermal Envelope Services

FK Construction Limited Altrincham, United Kingdom www.fkgroup.co.uk

FREEZ Construction Frisco, TX, TX United States www.freezconstruction.com

JAX Refrigeration Jacksonville Beach, FL United States www.jaxrefrigeration.com

Puga Thermal Services Marietta, GA United States www.pugathermalservices.com

Vapor Armour Clackamas, OR United States www.vaporarmour.com

Tracking & Monitoring Equipment or Services

Airspace Technologies Inc. Carlsbad, CA United States www.airspace.com

Controlant Kopavogur, Iceland www.controlant.com

CryoLogistics Refrigeration Technologies Ltd. Victoria, BC Canada www.cryologistics.ca

Cryopak Edison, NJ United States www.cryopak.com

Elitech Technology, Inc. Milpitas, CA United States www.elitechus.com

Emerson Cargo Solutions Boise, ID United States www.paksense.com

Integron Rochester, NY United States www.integron.com

Sensitech Inc. Beverly, MA United States www.sensitech.com

SGS North America Inc. Rutherford, NJ United States www.sgs.com

Sunlight Batteries USA, Inc. Greensboro, NC United States www.systems-sunlight.com

Systems, LLC Germantown, WI United States www.docksystemsinc.com

Therma San Francisco, CA United States www.hellotherma.com

Bondi Junction, New South Wales Australia www.tive.co

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Cimco Refrigeration Toronto, ON Canada www.cimcorefrigeration.com

Baltimore, MD United States

www.Danfoss.us Evapco Inc.

Danfoss

Westminster, MD United States www.evapco.com

HB Products A/S Hasselager, Danmark, Denmark www.hbproducts.dk

Mollenberg-Betz, Inc. Buffalo, NY United States www.mollenbergbetz.com

Parker Hannifin Corporation Broadview, IL United States www.parker.com/refspec

Republic Refrigeration, Inc. Monroe, NC United States www.republicrefrigeration.com

Saarthak Refrigeration Delhi, India www.coltfreeze.com

Sant Industrial Control Pvt. Ltd. New Delhi, India www.sant.co.in

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Boltrics Ede, GE Netherlands www boltrics nl

Camelot 3PL Software Charlotte, NC United States www.3PLsoftware.com

Datex Corporation Clearwater, FL United States www.datexcorp.com

Dematic Corp. Grand Rapids, MI United States www.dematic.us

Integron Rochester, NY United States www.integron.com

Kaup Australia Narangba, Queensland Australia www.kaup.com

Körber Supply Chain Automation GmbH Leingarten, Germany www.koerber-supplychain.com

Körber Supply Chain, NA Minneapolis, MN United States www.koerber-supplychain.com

Lisa Line Life Science Technologies Pvt., Ltd.

Mumbai, India www.lisalineasia.com

Mantis Informatics Grand Haven, MI United States www.mantis.group/index.html

Maves International Software Corp. Richmond Hill, ON Canada www.maves.com

Microlistics Warehouse Management Systems

Schaumburg, IL United States www.microlistics.com

Raleigh, NC United States www.ndustrial.io

Ramp Systems, Inc. Philadelphia, PA United States www.rampsystems.com

Royal 4 Systems, Inc. Long Beach, CA United States www.royal4.com

Charlotte, NC United States www.ssi-schaefer.us

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Stoecklin Logistics, Inc. Roswell, GA United States www.stoecklin.com

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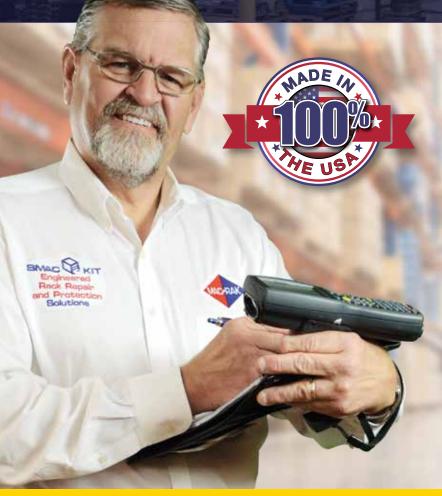








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