

QUALITY ENGINEERING AND RELIABLE REFRIGERATION FOR A DISTRIBUTION CENTER

CLIENT

Our client is a multinational technology company engaged in e-commerce, cloud computing, online advertising, digital streaming, and artificial intelligence. Located in New York, this facility needed 14,000 ft² of refrigerated space.

REQUIREMENTS

- Maintain a precise temperature of 34°F to preserve food and protect robotics
- Operate in a humid subtropical climate
 - Hot, humid summers
 - Cold, damp winters

CHALLENGES

Cold storage warehouses are switching to automation for redundant tasks. It's not labor costs these warehouses are trying to save; it's energy costs. Humans and forklifts generate heat that the refrigeration system must remove, causing it to run more often. Automation also reduces the risk of injury from cold and human error in warehouses.

Automation and refrigeration systems are similar in the fact that there is no one-size-fits-all application. Each installation is tailored to its specific requirements and customer needs. Automation is designed to operate at a specific temperature and humidity. If the temperature is too cold, the controls will freeze, and if the temperature or humidity is too high, they will overheat, causing a malfunction. The 34°F needs to be maintained year-round to prevent damage to the automation system and protect food integrity.



New York has a humid subtropical climate, with hot, humid summers and cold, snowy winters. During the summer, condensation from humid air can turn to ice on the coils, necessitating a defrost option. This off-cycle defrost can result in longer coil downtime, allowing the temperature and humidity to rise in the facility. This rise in temperature leads to food not being kept at a safe temperature and results in the loss of product.



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SOLUTIONS



Our client built this cold storage facility to expand their services in this area. They chose a Zero Zone Genesys™ refrigeration system for its reliability and design precision. Partial redundancy has been built into this Genesys™ Natural Refrigeration Solution to ensure that the temperature inside remains at 34°F when one of the two systems needs servicing. Each rack is also equipped with dual high-pressure expansion and dual flash gas bypass valves. If one component fails, the remaining functional component has the capacity to support the continued operation of the system. The forward-cycle hot

gas defrost allows the evaporator coils to defrost faster, more efficiently, and evenly. This reduces the system's heat input and enhances efficiency.

SYSTEM COMPONENTS

- The **Compressors** are a Bitzer semi-hermetic reciprocating type. These compressors have a variable frequency drive for capacity control on the lead compressor of each suction group.
- **8 Cooler Evaporator Coils** cycle 80 tons of refrigerant designed as 2 redundant 40 ton systems to quickly cool the warehouse space.
- **Dual High Pressure Expansion Valves** and **Dual Flash Gas Bypass Valves** create redundancy in the system to ensure an accurate temperature can be maintained if a fault occurs. They are controlled by Copeland E3 controls.
- **Stainless Steel Piping** is able to handle the high pressures of CO₂. In the event of a shutdown, the stainless steel piping will prevent the need to blow a charge when the pressure increases, saving refrigerant.
- **Oversized Suction Accumulators** for system protection during startup and rack failure.



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SYSTEM FEATURES

- **120/90 bar rating** prevents refrigerant loss due to the high standstill pressure of CO₂
- **Forward Cycling Hot-Gas** provides a faster defrost by running high pressure discharge gas through the evaporator coil.
- **Custom Field Installed Evaporator Control Panels** built and wired by Zero Zone.
- **Normally Closed Bypass Valves** to facilitate the servicing of components.

CO₂ IS A GROWING TREND

Our client is among many that are switching from traditional refrigerants like HFCs to natural refrigerants like CO₂. Our client's sustainability goals demand a future-proof refrigerant for their new applications. Zero Zone Genesys™ Natural Refrigeration Solutions use the latest in electronic controls and CO₂ compression to maximize efficiency and precision. Zero Zone Genesys™ CO₂ systems are adaptable to a wide variety of applications and specifically designed for optimal temperature and humidity control, as well as efficiency. Partner with Zero Zone to if you want to build a reliable and sustainable refrigeration system.

For more information about this Case Study, contact:

Zero Zone, Inc.

zz_sales@zero-zone.com

800-247-4496



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