

Evaluating automation for cold storage: key considerations

Automation such as palletizers, automated storage and retrieval systems (ASRS), conveyors, automated picking solutions, automated truck loading/unloading systems, and other types of material handling equipment (MHE) have a reputation for moving large volumes of inventory with high levels of accuracy. These systems can be highly beneficial from labor, safety, food quality, throughput, and traceability standpoints. However, cold storage businesses face challenges that other “dry” warehouses never worry about. These challenges, which we’ll touch on throughout this piece, are critical factors in determining how well automation systems fit within these facilities.

Like any technology, it’s critical to understand the business requirements, strategy, and fit before investing. To properly evaluate automation in your cold storage facilities, it’s best to bring vendors or consultants onsite to discuss your unique parameters.

This includes:

- **Automation and labor**
- **Strategy and fit**
- **Order profiles and logistics**
- **Warehouse design**
- **Cost considerations**

With automation, there are typically large, upfront capital expenses. This puts extra pressure on the business to get automation right. Here we offer a primer to help you understand many of the critical factors to determine the right solution.

Take a look at our complete Master Class Series for more useful insights on some of the biggest topics contributing to supply chain complexity today.



The global cold chain market was valued at nearly \$168 billion in 2018 and is expected to grow at a rate of 15.1% from 2018 to 2025¹



Automation & labor

Across the world, workers are generally choosing less strenuous jobs compared to warehouse work. In the U.S., the shrinking availability of warehouse labor creates a highest-bidder scenario where workers may choose to “warehouse hop” for better wages. In Europe, many businesses use temporary workers and experience high turnover.

Because of the harsh environments, it’s harder to attract warehouse workers in cold storage. Incentivizing with higher wages may level the playing field for recruitment in some cases, but many governments place regulations on cold chain labor that reduce the productivity of these resources. For example, employees in a cold environment are often permitted to work 50 minutes each hour and are given the remaining 10 minutes to warm up. While this is an important practice to maintain worker safety, it often comes with the side effect of hiring more people to make up for the lost work time. The ripple effect of adding people goes beyond wages. More people leads to more equipment such as forklifts and RF scanners. Also, more hands on the floor could increase the chances for data logging errors, mispicks, or damaged products in transit.

Put these conditions on top of the low availability of warehouse labor across all industries, and you begin to understand why it is difficult to sustain manual labor in cold chain. These conditions make automation a great fit. However, there are many other factors to consider.

There is a perception that technology such as automation and robotics take jobs away from the community. Automation doesn’t steal jobs; it changes them. Not many people want to work in -24°C (-11°F) temperatures while moving 50kg (110 lbs.) boxes. By introducing these systems into the warehouse, you automate jobs people generally find undesirable. Meanwhile, automation creates new jobs in management, maintenance, and repair. It’s a shift of employment opportunities that likely appeals to younger generations more interested in managing technology compared to walking 16 km (10 mi) every shift.

Strategy & mindset

In some scenarios, automation delivers ROI in a relatively short window. But for many businesses, you’re playing the long game. The time to value for these investments varies depending on the steel, existing resources, warehouse design, and many other factors. But, over time the productivity gains, higher efficiency, and cost reductions surpass the upfront



costs. As a long-term strategy, the savings over the duration of your technology’s lifespan (after recovering the initial investment) offer pure profit to the business while competitors fight over labor resources to keep up.

Businesses with short-term strategies may need to think differently about automation. Many third-party logistics (3PL) providers operate on one-to-three-year contracts with their customers. This makes automation decisions difficult. Automation investments made for one customer may not work for another customer. This could lead to costly and unjustifiable retrofitting or other workarounds. In these scenarios, and for industries that experience a lot of disruption, robotics such as automated guided vehicles (AGVs) or autonomous mobile robots (AMRs) may be a better option. These technologies can be moved to other buildings and leasing options might work better in terms of the pricing structure.

Fully-automated warehouses tend to see a better ROI than semi-automated warehouses. Even though costs may be higher for full automation upfront, many businesses that choose semi-automated strategies end up spending more on labor — offsetting the reduced steel, electronics, and programming requirements of a semi-automated operation. However, the right solution depends on the unique needs of each business. For example, a goods-to-person model may be ideal for some businesses. Here, automation delivers materials directly to workers for picking, packaging, and shipping. This makes the workers’ jobs easier, increases safety, and reduces damaged goods. This configuration works for cold or ambient buildings.



Order profiles & logistics

Automation is built for speed. High volume throughput is where these systems provide the best ROI. Automation can move more boxes than a full team of workers, but the conditions need to be right. Automation works best when shipments are standardized in terms of their dimensions and weight. The more variability in order profiles, the more expensive an automation system becomes and throughput may slow down.

Warehouse design

It's cheaper to build up than build out. In Europe, this is key as space is very limited and expensive, especially in highly populated urban areas. This is especially important in cold chain where products can only be exposed to non-freezing temperatures for so long before they're considered lost. And you can only build up to 15 m (50 ft.) for manually-operated warehouses. With automation, the sky is the limit.

In terms of building a blueprint and implementing automation, greenfield sites are ideal. However, it's possible to retrofit warehouses for automation. It's most beneficial to retrofit if the existing infrastructure and operational model is falling behind competitors, creating pricing or productivity gaps in the market. Retrofitting is also a valuable solution in the case of warehouse expansions, or when a business experiences steep changes in volume.



When retrofitting, it's important to consider how existing systems and personnel will fit with new automation systems brought in. How will you continue to run your operations during the retrofit project? How much downtime can your business afford? Often, without a solid strategy that factors all the variables, you could be introducing new challenges. To reduce the risk of retrofitting, finding a partner with experience in automation retrofitting pays off.

The cold chain and eCommerce

The growth of eCommerce has a direct impact on the operations of traditional retail stores. As eCommerce orders grow, retail orders shrink. As a consequence, warehouses are seeing more unit picking than ever before. Before deciding on automation, it's critical to consider the changing dynamics of consumer behavior and order profiles overall. These trends have been growing for a long time, but COVID-19 may have deepened consumer reliance on online shopping. Navigating this question could be the key difference in making a smart technology investment for the future.

Examining the costs of automation

The costs of warehouse automation vary widely depending on the size of the business. But, while evaluating automation, costs should be viewed in five parameters:

- **Land:** Manual processes can't accommodate tall shelving. Automation can help businesses save money on property costs by building up rather than out.
- **Construction:** If you already purchased the land or are retrofitting, this will be the largest expense. How much steel do you need? Do you have existing materials such as racks that need to be considered in the costs of your automation?
- **Labor:** This is where automation creates cost savings over time. How much productivity does automation need to provide over five years to show positive ROI? Answering this question is key to determining the viability of automation for your facility.
- **Equipment:** Which MHE is best for your operations? How will it fit with existing systems? What software needs to support and integrate with your MHE? Building the right tech stack takes into account all the factors above, and will be the determining factor in the success of your strategy.
- **IT:** How are you supporting your automation systems? Do you need dedicated resources to manage the new technology?





Why invest in automation?

If it's the right fit, automation offers key benefits that can reduce costs, improve material flow, increase accuracy, and streamline your operations.

Throughput: As we mentioned earlier, automation is built for velocity. If your business moves a lot of inventory, automation is a great way to churn the orders. Also, automation scales well. Typically, these systems are designed for high throughput based on your operation's peak averages. So, barring a tidal wave of volume that overwhelms your resources, your systems will be built to manage unexpected peaks. No need to scramble to hire temporary workers or add extra shifts – automation will be ready.

Traceability: End-to-end visibility is key to pleasing customers and meeting regulations in all regions. However, when it comes to food and pharmaceuticals stored in freezers, the spotlight on foul and lost product is brighter. While traceability is possible with manual operations, it's more prone to blind spots or errors in your records.

Labor costs: Over time, labor costs exceed the investments businesses make in automation. A slow drip can eventually dry a business out. Sometimes, it's better to invest upfront, while competitors play the labor recruitment and retention game. This mindset also applies to warehouse robotics, but the applications are different.

Long-term benefits: If your industry is fairly stable and your order profiles have little variability, making a one-time investment that sets you up for years, even decades, of high-volume throughput sounds appealing. It's important to build solid business requirements and get buy-in from your leaders, but if the business case is there this can be a strategic move that overcomes volume and labor challenges for decades.

Choosing an automation partner

When it comes to implementing automation, choosing the right vendor is key. The right partner will devote the time and resources to look closely at the unique requirements of each business to provide a personalized solution.

To ensure they're choosing the right vendor, businesses should make sure that their partnership checks off a few important boxes.

- **Portfolio:** The more systems integrated, the easier it is to manage your tech stack and optimize your environment for maximum effect. Integrating disparate systems is often complex, and can lead to issues down the road. Also, reducing your number of partners makes it easier to manage your relationships, allowing you to focus on actual work.
- **Implementation windows:** Many cold storage facilities run 24/7. Can your partner work on the weekends? Over holidays? How will they minimize disruption to your business while building your automation systems?
- **Availability:** Is your partner able to start within an acceptable window for your needs? Does it have a presence in the regions where you're operating in order to be on-site for quick consultations and hands-on work?
- **A true partnership:** Can your vendor not just implement, but offer key insights to help you build the best automation system and enhance overall cold chain operations?

Learn more about automation technologies and how they benefit your cold chain.

References

- ¹ <https://www.grandviewresearch.com/industry-analysis/cold-chain-market>
- ² <https://www.cargo-wise.co.uk/blog/is-reflectivity-or-insulation-more-important-for-temperature-control-when-shipping-goods-by-air>
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