



Designing Food Facilities for Future Automation

Designing Food Facilities for Future Automation

Why Smart Facility Design Matters More Than Ever

Automation is rapidly reshaping the food and beverage industry. Labor shortages, rising operating costs, tighter delivery windows, and increasing customer expectations are forcing manufacturers and distributors to rethink how their facilities operate. Robotics, autonomous mobile robots (AMRs), automated palletizing systems, and advanced warehouse management software are no longer technologies reserved for massive corporations. Mid-sized food manufacturers and distributors are now investing heavily in automation to remain competitive.

However, many companies make the same mistake when planning for automation: they focus almost entirely on equipment while overlooking the building itself. In reality, the facility is often the foundation that determines whether automation succeeds or fails.

A poorly designed building can limit throughput, create traffic bottlenecks, reduce flexibility, and dramatically increase retrofit costs later. On the other hand, a facility designed with future automation in mind can improve operational efficiency, support scalability, and extend the life of the investment for years to come.

Automation should not be treated as a standalone equipment purchase. It should be viewed as part of a long-term operational strategy that begins with facility design.

Automation Starts with the Building

Food and beverage operations rely on flow. Products move from receiving to processing, packaging, storage, and shipping. The efficiency of that movement directly affects labor costs, throughput, and operational performance.

Modern automation systems are designed to improve those workflows, but they can only operate effectively if the facility supports them.

For example, autonomous mobile robots require clear pathways, reliable floor conditions, and predictable traffic patterns. Conveyor systems need proper routing space and structural coordination. Automated palletizing systems require ceiling clearance, electrical capacity, compressed air, and maintenance access.

When these needs are ignored during initial planning, companies often discover that adding automation later becomes much more difficult and expensive.

The most successful automated facilities are designed around operational flow from the very beginning.

Designing for Robotics and AMRs

Robotics and AMRs are becoming increasingly common throughout food manufacturing and distribution environments. These systems help companies reduce manual labor, improve consistency, and increase throughput.

Unlike traditional forklifts, AMRs navigate facilities using sensors, mapping software, and programmed travel paths. Because of this, building layouts become extremely important.

Facility designers must consider:

- Aisle widths
- Floor flatness
- Traffic flow
- Charging station locations
- Pedestrian safety
- Staging areas
- Dock coordination

Even small layout inefficiencies can reduce the effectiveness of robotic systems.

Production areas also require careful planning. Robotic palletizers and automated packaging systems often operate best when integrated directly into production flow. If adequate space is not reserved during design, future installation can disrupt operations or force companies into inefficient layouts.

Automation works best when the building and equipment are designed together rather than separately.

The Importance of Clear Heights and Column Spacing

One of the most overlooked aspects of future automation planning is building geometry.

Clear height and column spacing have a major impact on operational flexibility. Automated storage systems, high-density racking, and robotic retrieval systems often require taller buildings with wider column spacing than traditional warehouse operations.

A facility designed only for current operations may quickly become obsolete as automation needs evolve.

Higher clear heights can support:

- Automated storage and retrieval systems
- Increased storage density
- Better vertical cube utilization
- Future mezzanine opportunities
- Expanded conveyor systems

Similarly, column spacing affects equipment routing and forklift movement. Poor column placement can create traffic restrictions and limit automation flexibility.

While increasing clear heights or modifying structural grids may slightly increase initial construction costs, those decisions can significantly reduce future retrofit expenses and operational limitations.

Utility Planning for Long-Term Growth

Automation requires utility infrastructure. Electrical systems, compressed air, network connectivity, and data infrastructure all play critical roles in modern food facilities.

Unfortunately, many facilities are designed only to meet immediate operational demands. Years later, companies discover that their electrical service or data systems cannot support expansion.

Planning utilities for future automation does not necessarily mean overbuilding. It means designing intelligently.

Examples of smart utility planning include:

- Reserving electrical capacity for future equipment
- Planning conduit pathways for future expansion
- Allowing space for additional power distribution and control panels
- Designing scalable network infrastructure
- Coordinating utility routing with future conveyor layouts

These decisions may seem minor during construction, but they can dramatically simplify future upgrades.

Retrofitting utilities into active food facilities is often expensive and disruptive. Proper planning during initial design reduces those long-term risks.

Conveyor Systems and WMS Integration

Automation is no longer limited to physical equipment. Software and facility design are becoming increasingly interconnected.

Warehouse Management Systems (WMS) control inventory movement, picking operations, order routing, and automated equipment coordination. Conveyor systems, robotics, and automated storage systems all rely on accurate data flow and communication.

This means facility design must support both physical movement and digital infrastructure.

Conveyor routing, for example, should align with operational workflows and future throughput goals. Poor conveyor placement can create bottlenecks that reduce efficiency across the entire operation.

Likewise, wireless coverage, server space, data cabling, and equipment connectivity must be integrated into the building design early in the process.

Companies that separate software planning from facility planning often experience operational inefficiencies after startup.

The most successful facilities are designed around integrated operational systems rather than isolated equipment purchases.

Future-Proofing Without Overbuilding

One of the biggest challenges in facility planning is balancing future growth with current budgets.

Some companies hesitate to plan for future automation because they fear overbuilding. Others overspend on infrastructure that may never be used.

The goal is not to predict every future technology. The goal is to create flexibility.

Smart future-proofing focuses on scalable decisions that improve adaptability without unnecessary spending.

Examples include:

- Designing flexible production areas
- Allowing expansion space around key operations
- Oversizing certain utility infrastructure strategically

- Using structural designs that support future modifications
- Creating adaptable traffic flow patterns

The most valuable facilities are those that can evolve with the business over time.

Common Retrofit Mistakes

Many companies wait too long to consider automation. As labor pressures increase and production demands grow, they attempt to retrofit older facilities that were never designed for modern systems.

Common retrofit challenges include:

- Insufficient clear heights
- Poor column grid
- Poor floor conditions
- Inadequate electrical capacity
- Limited conveyor routing space
- Congested traffic patterns
- Poor dock layouts
- No available structural capacity

These problems often force companies into temporary solutions that reduce long-term efficiency. In many cases, retrofits cost significantly more than proactive planning during initial construction.

Conclusion

The food and beverage industry is evolving rapidly. Facilities that cannot adapt may struggle to remain competitive. Automation is no longer a future concept in the food and beverage industry. It is becoming a standard part of modern operations.

However, successful automation depends on more than equipment alone. The facility itself plays a critical role in operational efficiency, scalability, and long-term adaptability.

Companies that plan facilities around future automation can reduce operational risk, improve productivity, and position themselves for continued growth. Thoughtful design decisions involving building geometry, utility infrastructure, workflow planning, and system integration create facilities that remain valuable for decades.

GENERAL INQUIRES:

CMC Design Build, Inc
859 Willard Street, STE 300
Quincy, MA 02169

Phone: 888.328.2962

Email: info@cmcdesignbuild.com

Visit us: <https://cmcdesignbuild.com>

SALES INQUIRES

Kent Johnson, *Director of Business Development*

Cell: 678.642.3076

Email: kjohnson@cmcdesignbuild.com



Boston | Minneapolis | Atlanta