

THE PERFECT CUBE

New smarter software solutions enable greater optimization of robotic palletizing for food and beverage production lines

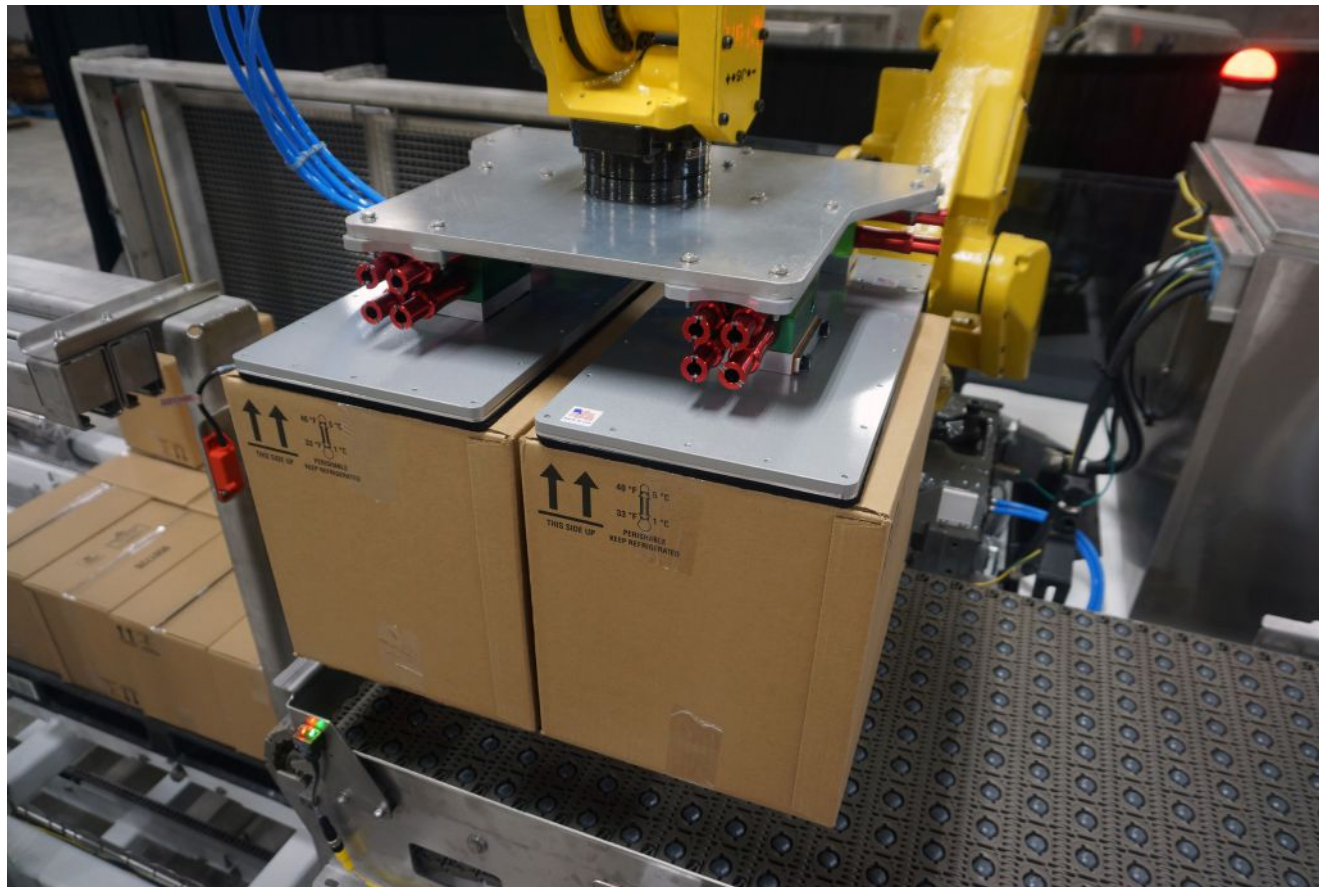
By Erik Grinnell

The continual expansion in the number of SKUs (stock-keeping units) and packaging variations in the food and beverage sectors, combined with the growing need to deliver pallet loads in more store-friendly formats, make it increasingly difficult to build pallets manually and with non-robotic palletizing automation.

Distribution centers need to deliver orders in a diverse range of configurations, with pallets cube-optimized for reduced space and stability during transport, yet within an environment of rising distribution labor costs and stricter safety regulations



Robotic palletizing is quickly becoming a necessity for many manufacturers and distribution centers coping with fast SKU (stock-keeping unit) proliferation and packaging variations across many food and beverage industries.



Equipped with multi-axis articulated servo-driven robots and highly versatile product gripping tools, today's robotic palletizing workcells are capable of building higher, denser and more stable pallets than any other prior methods and systems.

Add to this retail just-in-time ordering, which has increased the need for mixed-case pallets and faster fulfillment of orders.

These factors have pushed the envelope for more efficient automated palletizing, and specifically robotic palletizing, for handling the distribution of food and beverage products.

Since the late 1970s, when robotics first began to be em-



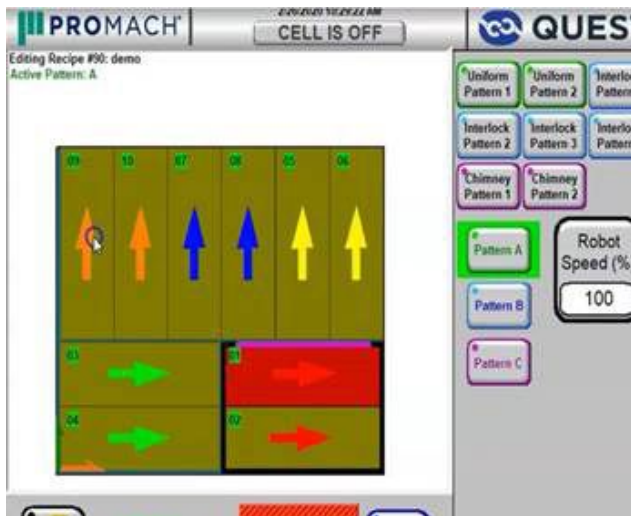
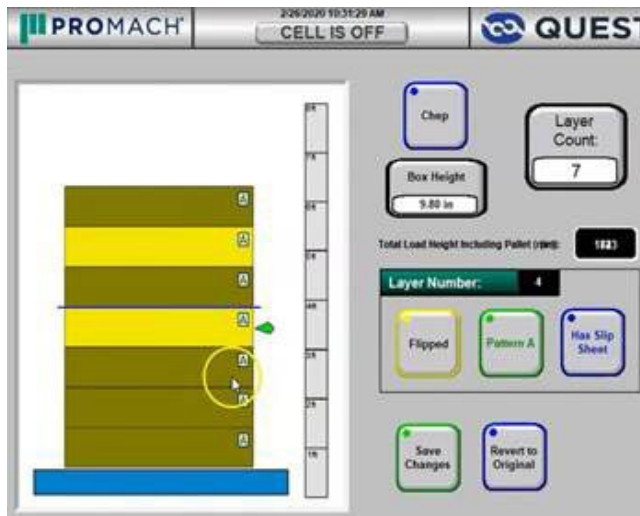
The intuitive QBox palletizing software allows end-users to build cube- and volume-optimized pallets right at the HMI touchscreen.

ployed to increase the flexibility of automated palletizing systems, their speed and performance has consistently improved along with advances in servomotors, PLCs (programmable logic controllers), computing power and software.

Equipped with four-, five- and six-axis articulated, servo-driven robots with versatile product gripping tools, today's robotic palletizers are capable of building a higher, more dense and more stable pallet than prior systems, with great improvements in speed, order accuracy and flexibility.

The execution of these pallet-building functions is controlled by the system's robotic palletizing software, which calculates the case and packaging contact surfaces and determines the layering of the individual packages, which is critical to producing a stable palletizing pattern.

The stacking criteria is modified by a number of factors, including the size and shape of the case or package, crushability,



Custom and auto-created configurations visualized in 3D (left) and customizable box and packaging patterns created by QBox software.

stability factors, volume of cases per layer, number of layers and the layer patterns.

This type of software keeps track of case and package sizes and weights, and pallet sizes, to determine the best way to build a pallet—with larger and heavier cases and packages on the bottom, and smaller and lighter cases on top.

Such software generates ideal pallet patterns, enabling robots to palletize more food and beverage packaging variations quickly and efficiently.

Software determination of the palletizing sequence also increases the pallet density because it builds cube- and volume-optimized pallets with a 90-percent-plus density, compared to the typical 70- to 80-percent density of manually assembled pallets.

The greater cube utilization reduces transportation and warehouse volumes, improving cost efficiencies, while the scalable architecture enables the software to handle single-line and complex multi-line palletizing, as well as single and multiple workcells.

This complexity of capabilities for creating precisely sequenced pallet builds is, for the most part, state-of-the-art functionality in today's robotic palletizing software employed in many food and beverage sectors handling chilled, frozen and ambient-temperature products.

But there is yet another level of robotic palletizing software performance beyond managing precisely sequenced pallet builds—one that gives operators more functionality to design and produce exact robotic palletizing patterns for bags, boxes

and variations of product types.

It's also one that allows for on-the-fly changes to box and package sizes and patterns, permitting easy changeovers from product to product without the need for reprogramming.

Essentially it's the one that makes robotic palletizing more versatile, intuitive and easier to configure to accommodate the diverse ranges of packaging types being used in food and beverage industries.

Clearly exhibiting these capabilities to provide an excellent example of this prowess, the **QBox** robotic palletizing software from **Quest Industrial** (www.questindustrial.com), a leading robotic equipment manufacturer specializing in automation solutions, covers all the aforementioned attributes to the tee.

Although **QBox** was designed to meet the demanding temperature and regulatory requirements of the food and beverage industries, it already maintains a broad installed base of robotic palletizing solutions throughout many other diverse industries. Here are five features that make this palletizing software 'smarter' than others:

1. FLEXIBLE OPERATOR PROGRAMMABILITY

One of the most unique aspects of this software is the high-level of flexibility it provides operators. Changes in packaging sizes and sequencing patterns can be easily programmed on-the-fly, in real time, by the operator on the palletizer's touchscreen HMI (human-machine interface) panel.

The **QBox** is quite different from conventional robotic palletizing software, which often requires a specialist trained in programming robotic pallet-tool software or the use of a PC to make a change in pallet patterns.

If a new product is scheduled to come down the line with a different box or size, the operator can easily adjust the program for a new pallet pattern without the need for programming support.

2. WHAT YOU SEE IS WHAT YOU GET

The app-like interface of the HMI screen is designed for simple, clear and easy-to-use access to all aspects of the palletizer functionality, including automatic and custom manual operations, pattern selection and programming, back-up, recovery operations, safety status, and maintenance logs.

It is so easy to use and understand that training takes an average of 15 minutes.

The *QBox* intuitive touchscreen is designed to display exceptional real-time visibility of the functions being executed. Essentially, it is ‘What you see is what you get.’

3. ULTRA-CUSTOMIZABLE PALLETS

In a word, this new evolution of palletizing software is highly flexible for creating extremely customized pallets—precisely what is needed for handling the varying types of packaging being used for food and beverage products.

The software makes it easy to drag-and-drop to change box or packaging patterns (such as chimney, interlock and uniform) and sizes; select, rotate or flip layers; change box length, width and height; adjust pallet sizes or types; account for label-out or label-in orientations; and box/packaging rotation.

Specific boxes or packages can be selected and slightly moved into more exact positions, or their order changed, to position them tightly up against adjoining boxes and packages, while custom edge detection allows for maximum stacking efficiency.

4. AUTO-OPTIMIZED PALLET CONFIGURATIONS

Alternately, the *QBox* software can be directed to create its own, most efficient pallet usage patterns based on the specific dimensions of a planned production run.

The software can completely build, debug and test palletizing applications. It can create a workcell layout, integrating infeed and pallet stations, and slip-sheet and pallet dispensers.

“This software technology sets a new benchmark for improving the efficiency of end-of-line robotic palletizing.”

As with customized pallets, these auto-created configurations can be visualized in 3D.

The software will automatically determine the most intelligent way of making a pallet pattern simply based on the box or package size.

It then will give 10 different options of pallet patterns that it calculates automatically. It will group these boxes and packages in the least number of picks possible.

If the palletizer is equipped with a two-pick gripper, for example, it will automatically know to pick up two cases at a time, and then place two cases at a time.

Conversely, if indicated by the operator, it can pick up two cases and place one case in a location on the pallet, and place the other case in a different location on the pallet.

5. PALLET PATTERN LIBRARY

Utilizing a pallet pattern library within the software, all the customized and auto-optimized pallet configurations, as well as the industry-standard patterns, can be saved and then brought up almost immediately to run when needed.

Once pallet configurations are established and stored in the library, maintaining these parameters can be better secured by limiting access to qualified operators with password protection.

This provides an added level of quality control by eliminating pallet build inconsistencies caused by operator-to-operator variability.

These initiatives support food safety by maintaining pallet integrity and facilitating track-and-trace initiatives throughout the supply chain.

Integrating versatile and intuitive software, like *QBox*, with high-rate robotic palletizing has enabled a new threshold of flexibility and efficiency above and beyond the capabilities of conventional robotic palletizing functionality.

The benefits of this intuitive robotic software for food and beverage industries are considerable, including:

- More options for customized pallet configurations;
- Faster changeovers for different packaging runs;
- Tighter and more cubically-optimized pallet loads for
- reduced shipping costs and less risk of product damage;
- Reduced labor hours;
- Reduced downtime, with more consistent end-of-line throughput.

All in all, there is no question that this powerful software technology sets a new benchmark for improving the efficiency of end-of-line robotic palletizing operations throughout the food and beverage supply chain.

ERIK GRINNELL is vice-president of automation at **Quest Industrial**, Alexandria, Minn.-based **ProMach** subsidiary specializing in turnkey robotics-based industrial automation equipment for applications in food, beverage, dairy, and other industries.