



Advances in Bulk Palletizing Technology Provide Breakthrough Precision and Efficiency for Hard-to-Handle Package Applications

Currie by Brenton's new MasterPal robotic bulk palletizer brings precision to the bulk handling of unstable packages and building square-and-true pallets. The solution significantly reduces end-of-line downtime and boosts productivity in a flexible, cost-effective, compact system.

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Currie by Brenton, Powered by Pro Mach

It's hard to keep some packages from falling down on the job, literally, when subject to the constant motion of conveyors, bumpy rides over rollers, and the push-and-pull mechanics of current-day palletizers and depalletizers. Consider these critical needs and the difficulty in practice of achieving them:

- Gentle handling of unstable packages such as blow-molded containers with imperfect bases, tall cans, and other rigid containers prone to tipping as well as irregularly shaped products and packages,
- A single machine to provide the flexibility necessary to palletize, or depalletize, primary and secondary packaging of different sizes and formats as well as layer builds for customers requiring pallets of mixed products, and
- Bulk palletizers to precisely control layer builds to produce square-and-true pallets that are stable and efficient for loading, and will prevent package or product damage during transport, whether inside a facility or between locations across the supply chain.

Persistent issues

Due to the diverse applications and mechanical complexities inherent in end-of-line palletizing for a range of hard-to-handle package types, a solution has been slow in coming. In contrast to upstream material handling solutions such as buffering and accumulation conveyors, which are relatively adept at managing package back-pressure, traffic jams,

shingling, and toppling of unstable packages, palletizers have had some issues in terms of bottlenecks, stoppages, downtime, and lost line productivity. This has become more of a concern as packaging line speeds have increased, the number of different packages on the same line has risen, and the need for greater flexibility in pack patterns has intensified.

Trouble points may occur during the palletizing process when the system builds layers by pushing or shoving containers from one operation to the next; by using rollers to convey containers, causing them to tip; or by dropping containers by an inch or more onto the next layer. All of these operations may cause packages to tip or be slightly out of place. And when packages are imprecisely placed, they contribute to unstable layers which in turn may create out-of-square pallet loads, a major problem during shipment.

A special design team from Currie by Brenton worked in close collaboration with Fanuc Robotics to utilize a robotic solution to increase flexibility and create stable pallets of potentially unstable packages. This effort involved the convergence of a number of different disciplines and resulted in the MasterPal patented system that, for the first time, solved the problems associated with palletizing bulk loads of hard-to-handle packaging.

MasterPal, the new solution

It's important to note that MasterPal is greater than the sum of its parts. Thousands of hours of design, testing, and application experience have created a palletizer that, instead of pushing and dropping rows of packages, lifts and places whole layers weighing up to 500 lbs in a single, gentle movement. And it does so at significantly greater speeds than the tipping-prone vacuum pick-and-roller solutions used by many other systems.

The key breakthrough is found in MasterPal's custom end-of-arm tool (EOAT), which uses a servo-operated retractable rotary apron system. In simple terms, its operation

resembles that of an overhead garage door, but instead of moving vertically, the apron slides and retracts horizontally and gently beneath a full pallet layer of packaging. A smooth, uniform and low-friction surface is created by the use of advanced carbon fiber technology. The EOAT with apron achieves levels of precision previously unseen.

Furthermore, during the course of development, it became clear that this new robotic solution showed the same kinds of speed and accuracy benefits for any type of primary or secondary packaging and that its benefits extended beyond hard-to-handle packaging. On average the new system has a throughput of from three to nine layers per minute, depending on the type of package and pack pattern. And each layer is perfectly square. One customer reports that the MasterPal cost about the same as the palletizing system previously in use, but the accuracy, speed, flexibility, and savings from stable pallets far exceeded expectations. This customer has ordered a second system.

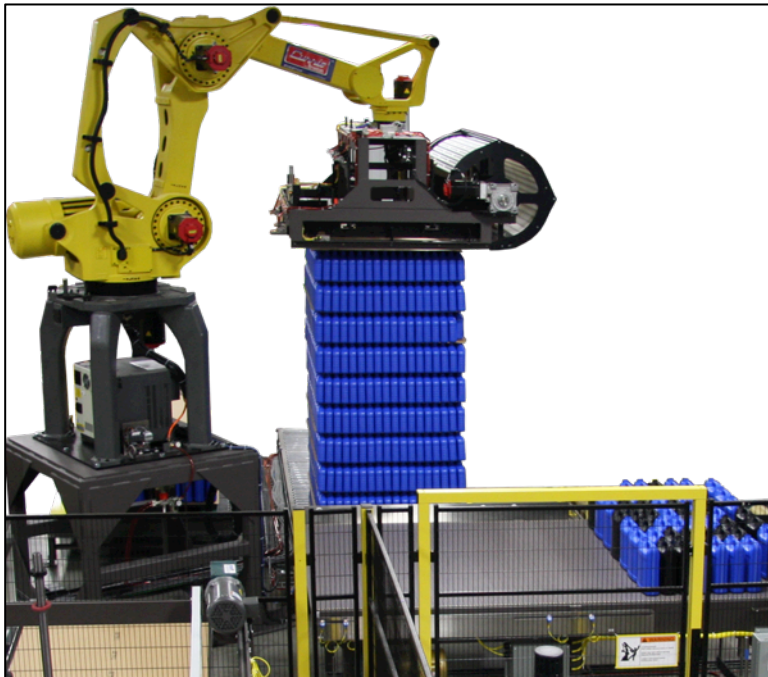


Key elements of the MasterPal robotic solution include:

- **Custom tooling:** Employs a unique design that uses a rotary apron that gently slides out from underneath packages to solve the problem of gentle handling. The tooling maximizes uptime and makes it possible for greater machine-controlled accuracy.
- **Proven robotics:** A Fanuc Robotics model M-410iB/140H is among the fastest palletizing robots in its class. The platform-mounted, four-axis FANUC M-410 robot is designed for material handling and palletizing and functions as the system's mechanical workhorse. MasterPal integrates mechanical and electrical control units to reduce the potential for collisions and decrease cabling issues.
- **Safety compliance:** A Category 3 virtual safety fence, framed guard door package, CAT II safety circuits, and muting light curtain not only assist in safety compliance, but do so in a way that minimizes floor space in the plant. Additionally, the robot and controls share constant feedback with the onboard vision system to prevent collisions.
- **Machine vision:** Fanuc Robotics' iRVision package incorporates vision guidance based on X, Y, and rotation parameters in a streamlined package that eliminates complex sensors and customized solutions. For added simplicity, the camera is

integrated with the robot controller's CPU, eliminating the need for an additional PC workstation.

- **Controls:** Robot controls from Fanuc Robotics provide features to improve application and motion performance and feature an open architecture that eased system integration with a Rockwell Automation PLC and ControlLogix operator and supervisory control software. Creating a library of packaging and layer configurations is fast and straightforward.
- **Remote, wireless hand-held control:** For operators on the plant floor, a touch-based Teach Pendant serves as a user-friendly alternative to the PC-based interface. This is not a "pendant" in the layman sense, but a remote robot controller that communicates with MasterPal using wireless Bluetooth. The Teach Pendant can not only control the palletizer, it also allows authorized operators to run the machine, modify parameters, create and save new layer builds, and initiate fast and accurate servo-assisted changeover.
- **Additional software tools:** For the OEM as well as technical staff at the packager's site, Fanuc Robotics offerings include Random Order PalletTool control software to automate mixed unit load palletizing, and PalletPRO for simulating and automatically generating entire palletizing processes, including multiple infeeds, pallet locations, time, collision avoidance, and other factors vital to optimal palletizing operations.



Future developments

At present, the system has met application challenges involving cases and other secondary packages as well as extremely challenging primary packages, including cans of whipped cream, blow-molded motor oil containers, and narrow, oblong deodorant packs. In each case, the

Currie by Brenton Master Pal system showed results superior to traditional non-robotic as well as conventional robotic palletizers.

The need for manufacturing agility — the flexibility to handle increasing package types and palletizing configurations — is likely to become more critical as leading brands and their packaging partners face the demands of new packaging formats and supply chain efficiency initiatives.

While the tooling is fundamental to solving critical physical package-handling problems, controls and software add significant benefits, especially the touch-based Teach Pendant's ability to cut changeover time. The single touch of a button can switch between packages, layer patterns, and recurring (or revised) customer order specifications.

With continual advances in the MasterPal system, customers can expect even greater productivity, throughput, and flexibility in such industries as food and beverage, pharmaceuticals, cosmetics, household chemicals, and automotive products.

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