

Lorillard Tobacco Company

Robotic palletizing system from Intelligrated enables track and trace to ensure consistent product quality



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New system design greatly reduces time spent tracking nonconforming product



Lorillard uses 18 robotic palletizing cells to serve 36 production lines.

Pierre Abraham Lorillard founded America's oldest continuously-running tobacco company in 1760. More than 250 years later, Lorillard Tobacco produces approximately 40 billion cigarettes each year, best known for its flagship Newport® brand, the highest-selling menthol cigarette in the U.S.

Lorillard

In 1954, Lorillard built its current corporate headquarters and cigarette manufacturing facility in Greensboro, N.C.

The 1 million-square-foot plant houses 36 packaging lines that produce 41 different product types for the company's five major brands, a lineup that includes Kent®, True®, Maverick®, Old Gold® and Newport®.



Barcode readers scan cases prior to palletizing, associating each with a unique pallet ID to track throughout the plant.

A disciplined commitment to quality

Lorillard prides itself on delivering consistent, high-quality product to its customers. With the advent of industry regulation by the U.S. Food and Drug Administration in 2009, all manufacturers must produce tobacco products according to strict specification to ensure no nonconforming product reaches consumers. The impact of shipping product that does not meet specification carries costs in the form of lost customers and expenses associated with any recall.

Throughout its manufacturing process, Lorillard employs strategically placed sensors and control systems to ensure proper product and packaging integrity, composition and size. In addition, the company conducts constant quality assurance inspections throughout the production cycle to catch any nonconforming product before it leaves the plant. If a quality assurance check discovers any defective product, Lorillard traces it back to the packaging line of origin and quarantines all product manufactured on that line within a set timeframe.

Legacy multiline palletizing system

Lorillard employed a multiline palletizing system at its Greensboro facility for more than 30 years, with all 36 production lines feeding two Intelligrated Alvey® 880 conventional high-speed palletizers.

“All of the lines fed the palletizers through many miles of case conveyor,” said Daniel Walker, staff engineer, Lorillard. “Cases of Newport®, produced on many different packaging lines, were all mixed together on a single pallet.”



Lorillard uses specialized equipment to automate cigarette production, packaging and case packing.

Although the legacy system met all requirements for throughput, reliability and safety, its design caused difficulty when tracing defects and damage back from pallets to production lines. With cases from multiple packaging lines consolidated into a single pallet load, locating the source of flaws such as unsealed or misshapen packs involved a very labor-intensive process.

According to Randy Marshall, senior staff engineer, Lorillard, “If you had a problem on one packaging line but had six others that were producing perfect product, finding the defect required you to search through all of the cases produced during that time period, regardless of packaging line.”

Furthermore, the sheer quantity of conveyor in the old system required a high degree of careful, regular maintenance to ensure smooth production flow and avoid unplanned downtime.

“When you have a lot of conveyor, it has to be constantly repaired, maintained and adjusted,” explains Marshall. “Chains stretch, rollers wear and they have to be replaced.”

The search for an alternative track and trace-ready palletizing solution

In 2008, Lorillard began to investigate an alternative palletizing system to easily trace defective product back to the source and track it throughout the facility. The plant needed a new end-of-line palletizing solution with a direct connection between packaging lines and pallets, and an installation process that would avoid costly extended downtime. In order to meet those requirements, Lorillard needed an entirely different approach to palletizing than its existing multiline system.

“If we installed a new multiline palletizing solution, it had to be completed in a very short amount of time,” explained Marshall. “I couldn’t figure out how to do it, nor was I willing to accept the risk of shutting this factory down.”

CASE STUDY

After an extensive bidding and exploration process that spanned three years, Lorillard decided on a robotic palletizing solution from its long-time material handling partner, Intelligrated.

“We looked at other suppliers, but Intelligrated knows us and what we need,” said Marshall. “We went with what we thought was the most robust solution at the best price.”



End effectors custom-designed and manufactured by Intelligrated move each case into stacking position.

Design collaboration solves unique challenges

Lorillard’s end-of-line operation presented a unique set of challenges. Most importantly, the pallets must be composed exclusively of cases from the same production line to enable easier track and trace capability throughout the plant. Furthermore, the system must accommodate Lorillard’s eight different case sizes, each with its own stacking pattern, and cigarette production rate of approximately 8,800 units per minute.

In order to ensure each pallet only contains cases from the same production line, Intelligrated and Lorillard engineers collaborated to produce an innovative yet straightforward solution - 18 robotic palletizing cells, each serving two of the facility’s 36 production lines, a design that includes significantly less conveyor than before. The compact footprint of the robotic system enables a system design with a direct connection between the palletizing cell and each production line.

“It’s a very simple way to palletize cases,” Marshall explains. “From an operations standpoint, one packaging line to one stacking position is a simple solution that makes our traceability much easier.”



Each robotic cell serves two production lines and can build two pallets - with separate case sizes and stacking patterns - simultaneously.

System at a glance

Lorillard uses highly-automated processes to roll individual cigarettes, load them into primary and secondary packaging, and then into cases ready for palletizing. Cases travel on Accuglide™ accumulation conveyor, pass a barcode scanner and accumulate next to the robot, ready for palletizing. Integrated with Lorillard's internal database, the scanner reads the code on each case and builds a file of all cases destined for the pallet, creating a pallet ID to track throughout the plant. The system also ensures pallets only contain the right product type.

“There are always two products, one from each packaging line, being fed to the robot at one time,” according to Shannon Spurlock, senior sales engineer, Intelligrated. “If a product is scanned that does not belong to one of the two active loads, an operator is notified to initiate an end-of-run command, and the system releases the partially-built load.”

With accumulated cases in position, the robotic arm picks up a single case using an end effector custom-designed and manufactured by Intelligrated, then deposits each case directly onto the pallet. For the second layer and above, the robot moves the case over a Lock n' Pop® adhesive system – two nozzles spray a light, water-based glue on the bottom of the case before depositing it on the layer below to ensure load stability. Once the robot finishes building the load, specially-designed double-decker chain-driven live roller (CDLR) pallet conveyor moves the full pallet into place for pickup, while transferring an empty pallet into stacking position.



Accuglide accumulation conveyor from Intelligrated carries cases into position for palletizing.

Phased system rollout and training minimizes costly downtime

To avoid costly downtime, Intelligrated instituted a phased implementation process. The installation of each robotic palletizing cell took place over a four-week schedule, which required shutting down two of the production lines for two weeks. After the first robotic palletizing cell finished testing and became operational, the phased rollout process continued until installation of the final robotic cell 22 months later.

Intelligrated also provided extensive training to ensure Lorillard staff could operate and maintain each robot. Lorillard operations staff learned to move the robotic arms using a teach pendant and Intelligrated arranged for advanced maintenance training with Yaskawa Motoman, the system's robotic arm manufacturer. For further system troubleshooting, Lorillard has access to the Intelligrated 24X7 customer support hotline.

According to Marshall, although the robots initially drew curious crowds of employees during installation, facility staff have adapted to the new machines.

"When we installed the first robot, we could have set up bleachers and sold tickets!" said Marshall. "But now the robots are just another piece of equipment, people aren't afraid of them."

CASE STUDY



From left: Randy Marshall, senior staff engineer, Lorillard and Daniel Walker, staff engineer, Lorillard.

Results

The phased system installation process kept the plant's production systems online and the robots easily keep pace with Lorillard's rate of cigarette production. The plant also enjoys reduced maintenance costs thanks to reliable robots and decreased conveyor footage.

With the new robotic system in place, Lorillard can track product down to the single case as it moves through the facility. Staff can easily trace nonstandard product back to the production line in question, pinpoint the cause and locate pallets at risk of defects. Lorillard spends fewer man-hours tracking nonconforming product than ever before, with minimal chance it leaves the facility.

"We now have better tracking of our product, we know when it was produced, where it was produced and its location in the plant," explains Marshall. "I would recommend Intelligrated for future automation projects. It's been a very long project and we've had an excellent working relationship with them."

Lorillard Tobacco system components:

- Intelligrated Accuglide accumulation case conveyor
- Intelligrated Alvey robotic palletizing solution:
 - Custom-designed and manufactured end-of-arm tooling
 - 18 Motoman robotic arms
- Intelligrated double-decker CDLR pallet conveyor
- ITW Company Lock n' Pop adhesive system (pictured right)
- SICK 2D barcode reader



About Intelligrated

Intelligrated is a leading North American-based, single-source provider of intelligent automated material handling solutions that drive distribution and fulfillment productivity for retailers, manufacturers and logistics providers around the world. Through a broad portfolio of automation equipment, software, service and support, Intelligrated solutions optimize processes, increase efficiency and give businesses a competitive edge.

Intelligrated designs, manufactures, integrates and installs complete material handling automation solutions including conveyor systems, sortation systems, palletizers, robotics and order picking technologies – all managed by advanced machine controls and software. Solutions include industry-leading Intelligrated-manufactured Alvey®, RTS™ and IntelliSort brand equipment and Knighted® warehouse management (WMS), warehouse control (WCS) and labor management software.

Every project is backed by Intelligrated's 24X7 multilingual technical support and access to lifecycle service through a network of national, regional and local service centers. From concept to integration to lifecycle support, Intelligrated automation delivers distribution and fulfillment success.

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