



Radio Frequency Identification (RFID) in Wood Product Manufacturing

Executive Summary

RFID (Radio Frequency Identification) provides vision and clarity into manufacturing, sorting, warehousing and shipping of products. Wood product manufacturers struggle with tracking components and orders through their production facilities and throughout the warehousing and shipping process. RFID can eliminate many of the headaches involved in wood product manufacturing. This paper will demonstrate how RFID technology out-performs older methods of component identification, such as production floor travelers and barcode labeling.

Wood Component Manufacturer - The Problem

Today, large wood component and furniture manufacturers offer thousands of custom SKU's, hundreds of stain colors and fabrics, as well as decorative beaded trim and moldings. Due to the large number of choices available, on any given day, hundreds of varieties of components move through a manufacturing plant. Sorting components and keeping an order together during cutting, gluing, sanding, staining and sealing is a very difficult, labor intensive task. With so many different components moving through a facility, a major challenge wood manufacturing companies face is applying a unique identifying mark that will not get stained over, covered with fabric, sanded or cut off during production. This issue is further compounded by the nature of several wood products looking identical during the WIP stage. Companies have attempted to solve the lack of visibility by adding several "documentation" steps like barcode scanning the traveler or filling out paper tickets for their processes, but there are problems with these steps. The major problem with traveler/paperwork tracking is that the label or paperwork is not directly attached to the product, causing misplaced or lost paperwork. This issue leads to both lost

“Somewhere in [our client’s] building, over 250 parts a day ended up on unidentified piles destined for sawdust; a waste of \$3,750 per day!”



labor time and production line inefficiencies. In today's lean manufacturing facilities, keeping an entire order together can quickly become a problem. Losing track of the order could mean that production staff has been unnecessarily deployed to look for the missing pieces, components get made over again by mistake and it increases the risk of components being incorrectly finished. Along with losing track of components, diversion is an unavoidable issue. For example, cabinet manufacturing companies have quality control personnel that pull damaged or unusable pieces out of flow for scrap, touch-up or re-work. There are many areas of diversion and misplaced components in a wood manufacturing facility; in essence, the black holes that reduce profits and add no value to the end customers.

Northern Apex, an RFID Innovator, was engaged by a wood cabinet manufacturer looking for help streamlining their production and finishing lines, as well as optimizing outbound order fulfillment in their facilities. With the enormous number

of component sizes, ever changing colors and species of wood, workers tasked with identifying, sorting, and processing components are prone to making mistakes. Mistakes like incorrectly counting, identifying, and mismeasuring components were happening with regularity.

After an initial visit to their facility, Northern Apex determined that besides the company's known human sorting errors, they had issues keeping their orders together in the finishing and shipping process. The facility's hanging conveyors and flat line conveyors moved the orders down the line at speeds of about 20 to 30 feet per minute with little visibility. Components that were removed from the line for re-work or scrap were not documented



Automatic (left) and semiautomatic (right) RFID tag insertion machines

well and at the end of the day, there were thousands of misidentified or incorrectly marked wood components in random piles, and the orders they belonged to were completely unknown. It was very obvious after Northern Apex's plant visit, that RFID could be the answer to many of the wasteful practices.

What is RFID?

RFID stands for Radio Frequency Identification. There are 4 basic components to an RFID system:

- ▶ RFID Tag - an RFID tag is a small electronic device that consists of a chip and an antenna. These are "passive" tags; they are powered by the radio waves

from the "reader antenna" (there are also "active" tags that have a battery and send out a radio "beacon" - but they are not used in this type of application). These RFID tags serve the same purpose as a barcode label; they Automatic and Semi-Automatic RFID tag insertion machines provide a unique identifier for an object. One very unique difference, however, is that



you can re-write new information to a RFID tag. For example, a wood piece that is classified as "white wood" may have one SKU, but when it is stained, that same wood piece may have a different SKU. RFID allows the new SKU to be written to the tag, without stopping production.

- ▶ RFID Reader - the reader sends and receives information that it gathers from the tag to your existing network.
- ▶ RFID "Reader Antenna" - this antenna is attached to the reader and the electromagnetic energy produced by the antenna (the "radio waves") power up the RFID tag so it can be read.

- ▶ **RFID Software** - sometimes referred to as “middleware” - drives the data exchange between the RFID equipment and your existing ERP/MRP/SAP (software) systems.

While barcode technology improves production in many cases, a barcode reader has to be able to have a clear “view” of the barcode in order to read the unique identifier.

RFID does not require “line of sight” and can be read from a distance, making it the perfect choice for the sanding, staining, upholstery, and finishing processes



RFID Conveyor Readers

in cabinet, window and door, casegoods, and furniture manufacturing plants. By placing “RFID readers and antennas” at strategic places along the production process, components are tracked, giving you better visibility into the manufacturing process - from receiving to shipping!

The Solution

The first step in implementing RFID into the facility, was finding a way to conceal a tag in the wood. With research, Northern Apex developed a patent-pending method of concealing the tag, allowing it to survive the production process and still function perfectly. After tag placement was established, RFID reader systems were positioned around the plant to determine trouble spots where parts

RFID Dock Door Readers/ Antennas



continually fell out of flow. At the end of the pilot, Northern Apex learned that approximately 20% of a manufacturer’s wood components were diverted or needed extra attention during



RFID Inspection Station

production. Out of the twenty percent diverted, half of those did not make it back into the groupings promptly and 10% of those were completely lost or considered MIA (missing in action). For every 1000 parts made, 50 were totally lost at a cost of approximately \$15 dollars each. The dollar value of those 50 MIA parts added up to \$750 dollars each production day. At their height of production, they made over 5000 parts a day. Somewhere in their building, over 250 parts a day ended up on unidentified piles destined for sawdust; a waste of \$3,750 per day!



Since RFID tagged component movement information is processed and forwarded to the production database with little or zero worker involvement, Northern Apex was able to fully integrate RFID scan data into their facility's shop floor part tracking system and provide total visibility of the part movement and all of the diversion. Their daily "missing in action" log ceased to exist, along with needless part hunting and part re-orders. Now, as a cabinet door makes its way through the production cycle, it can be tracked, providing valuable visibility into the production process. Some of this manufacturing facility's visibility points:

- ▶ The RFID tag is scanned as the door enters the stain booth. The data on the tag is used to make sure the stain machine is set up with the proper finish. If the machine is not set properly, a variety of solutions are implemented, including an automatic shut-down of the process before a component is ruined. RFID Conveyor Readers RFID Inspection Station
- ▶ When the door needs hinge holes drilled, the RFID tag is scanned to make sure the proper holes are drilled in the correct location, reducing costly mistakes.
- ▶ If a door is removed from the line for re-work, it is tracked and noted. The workers in the assembly area will not waste time looking for a door that is not there.

RFID also resolved many of the wood manufacturer's outbound order fulfillment issues as well. Several of this company's manufacturing plants not only had problems tracking their components in production, but also had issues keeping their orders together for shipping and

sequencing them properly onto the delivery trucks. These types of errors can lead to misdeliveries. RFID readers were installed to "read" RFID tags as they entered the warehouse/shipping areas and exited through the dock doors. This enabled workers to identify the products and orders to which they belonged, allowed orders to be grouped together for shipping, and allowed orders to be sequenced properly for the delivery trucks. If a worker attempted to load the incorrect part on a truck or the correct part in the wrong sequence, a notification would be sent via a warning light, so that the correction(s) could be made.

Conclusion

RFID provides a quick ROI and is a straightforward solution for wood component manufacturing companies for many reasons. RFID gathers data automatically; if a component is removed from the line or placed back on the line, RFID will automatically feed component location information to the production database, making manual documentation and data entry obsolete. Rather than being stuck on a traveler or written on a paper that regularly becomes detached, the smart inlay is able to be concealed within the wood component. The solution enables automatic identification of product for grouping/packaging and shipping purposes. Finally, RFID is a proven technology that has saved countless wood component manufacturing companies time and money by enabling faster, more accurate production of their components. RFID Dock Door Readers/Antennas