



Using BellHawk Construction to Track the Making of Custom Kitchen Cabinets



Introduction

BellHawk Construction is a special version of BellHawk designed specifically for tracking work-in-process, materials, and tools for manufacturers of custom and semi-custom products for the construction industry. What makes BellHawk Construction special is its ability to track materials by length, width, thickness, color and other properties, using a common part number, at multiple geographic locations.

In this document we describe how we use BellHawk Construction to track the manufacture of custom kitchen cabinets. Please recognize, however, that the methods described here are applicable to the manufacture of custom materials for a wide range of construction, architectural, and building projects.

The Tracking Problem

Making custom kitchen cabinets would seem, on the surface, to be very simple. The process starts with designing the cabinets using some computer aided design (CAD) program. Then you purchase some sheets of ply or other board, which may have a laminated plastic surface, and cut these into parts of different size and shape. You then mill, drill, and dowel these component parts, and maybe apply some additional laminate to edges.

Finally you assemble most of the parts that you cut into a set of cabinets, apply hinges and other purchased components, and pack these into cartons along with custom trim components you made and installation parts that you purchased. These cartons then may go onto pallets or into shipping cases before being loaded onto a truck for shipment to the installation site.

Then, having done all of this, hopefully without making a mistake, you will get a call from the installation crew stating that the job is held up because they are missing an end-cap or some other vital component. You think that the part got loaded onto the truck but have no choice but to waste time and money making a replacement custom part and shipping it to site.

Another major problem is keeping track of the large number of different parts that go into a new set of kitchen cabinets, combined with the very short delivery times that you need to promise to customers to win the order. A typical cabinet may have dozens of parts and a kitchen may have hundreds of different parts. These parts have to be tracked through sawing, milling, drilling, doweling, finishing, assembly, and packing, to make sure they all get on the truck at the same time.

Because of short delivery times, and the need for efficient cutting of raw materials, the parts for any one kitchen may be moving separately between all the different N/C machines or through assembly and packing, all intermingled with the parts for dozens of other jobs, at the same time. The parts for any one cabinet may be on several different carts or trolleys, out of hundreds of these carts or trolleys in use in the shop at any one time.

This can all be tracked by people using paper forms and Excel spreadsheets. But this is extremely labor intensive and mistake prone. It also does not give supervisors a real-time view of the status of all the materials for each job so they can ensure that all the materials come together, on-time, ready for loading onto the truck.

In this document, we look at how cabinet makers can use barcode tracking with a system such as BellHawk to solve these problems.

How BellHawk Tracks Cabinet Making

1. Import of Bill of Materials (BOM) for each cabinet and overall job from a CAD system. This is typically done by importing comma delimited files from the CAD system into BellHawk.
2. Generate work orders from the BOM to cut and machine the parts as well as to assemble and pack the cabinets plus needed installation parts. These work orders are related to an overall job/project code so the status of the moving parts of a job can be viewed together.
3. As the parts come off the saw, attach and scan a unique "license-plate" tracking barcode for each part and associate it with the job, cabinet and part (top, bottom, side etc.). Some automated saw machines can generate these tracking barcodes, as they cut parts, or the barcodes can be generated on-demand, at the saw station, by the BellHawk software. They can also be pre-printed from many CAD systems. Alternately tracking labels from rolls of pre-printed license plate tracking barcodes, such as that shown here, can be attached to each part.



4. Each trolley or cart has a permanently attached metal barcode which contains the unique cart or trolley number.
5. As the parts come out of the saw the tracking barcodes on the parts are scanned along with the barcode on the trolley. In that way, we know which parts are on which trolley.
6. At subsequent machining operations, an operation barcode on each machine is scanned along with the barcodes on the boards being processed and the barcode on the cart or trolley on which the parts are placed when the operation is complete. In this way we can see where each part is and the operations it has already completed for each cabinet for each job.
7. When cabinets are assembled, a barcode label is produced from BellHawk with a tracking barcode and human readable information for placing inside the cabinet. Also the tracking barcode on each part is scanned as it is assembled into a cabinet. This enables the system to warn the assembler if they are using the wrong part and to record that those parts have now been used in making the cabinet and are no longer on the carts or trolleys.
8. BellHawk can also track the ordering and receipt into inventory of components such as hinges and knobs. Typically the boxes in which these parts are received also have a tracking barcode attached to each box at time of receipt. These barcodes are then scanned to record the use of these parts in cabinet assemblies and to make sure that the correct knobs and hinges are used.
9. When the cabinets, trim pieces, and installation components are packed into boxes, a barcode label can be attached to the box and scanned. This label can be printed out from BellHawk with a tracking barcode and a list of all the cabinets and parts in the box.
10. If the boxes are placed on a pallet or in a wooden shipping container, then a barcode label with a tracking barcode can be printed out from BellHawk for attachment to the shrink-wrap on the pallet or to the outside of the shipping container.
11. Finally, as the boxes or shipping containers are loaded onto the truck, the barcodes on each container is scanned to record what has been shipped to site. As BellHawk knows exactly what was shipped when, you will have an exact record of the parts shipped to site, and how they were packed, thus minimizing the problem with lost parts or, at least, knowing who is to blame.
12. Knowing when cabinets are due to be delivered, BellHawk can dynamically schedule the work on making and assembling parts such that it provides each machine operator and assembler with an ordered list of the jobs and work orders they should do next. It dynamically adjusts this schedule so that, as far as possible, all the parts arrive when needed at the assembly area and cabinets are assembled and packed in time for shipping together.

Technology



The BellHawk software runs on a Windows Server computer, which is typically in the cabinet manufacturing facility, but can be in the "Cloud". BellHawk consists of a specialized website and a SQL Server database. The website can be accessed by any web-browser based device over the Internet or the shop's local area network.

At the saw and other machining stations, as well as at the assembly and packing stations, there is a tablet computer equipped with a barcode label printer and a "hands-free" Bluetooth barcode scanner that the production workers wear on their fingers. These units can be mounted on a mobile cart with a battery power supply for convenience.

As the scanning and label printing is performed all the tracking data is saved in the BellHawk database. This enables the real-time status of each part of each job to be viewed anywhere, any-time there is an Internet connection, including on smart-phones.

Issues that BellHawk Solves

One of the biggest problems that BellHawk solves is the "part number explosion problem". In one year, a custom cabinet making shop may make tens or even hundreds of thousands of different parts in different lengths, widths, and colors. To set each one of these part numbers up in an accounting system such as QuickBooks or a standard inventory tracking system would be an overwhelming task that could take several people full time.

BellHawk solves this problem by using a small number of "generic" item master part numbers, such as "top", "bottom", "door", "shelf", and "cabinet". BellHawk then tracks each manufactured part by length, width, and depth/thickness, as well as user-defined parameters such as color and laminate used. This eliminates the need to setup a large number of separate part numbers in BellHawk or in a system like QuickBooks, with which it can automatically exchange financial data, such as the value of inventory and work-in-process materials.

The length and width, as well as user defined attributes for each part are shown on job and inventory status screens and reports, with the inventory, for example, listed separately by different attributes, so that the quantity of each different part can be clearly identified, even though many parts are using a common part number.

As a result of this, almost all of the setup data for each job (parts, work orders, BOMs, packing and shipping lists) can be automatically generated from the files imported from the CAD system for the job, thus minimizing the time needed to setup each new job in BellHawk.

Scanning barcodes is made easy through the use of hands-free scanners and errors in label printing are minimized by having BellHawk automatically select the correct label, populate it with the correct information for the job/cabinet/part, and automatically print the label on the correct printer. All other user interaction is through the use of touch screen buttons on the tablet screen. As a result the time taken by machine operators, assemblers, and packers to perform the needed data capture is minimized.

For projects such as this, we highly recommend printing barcode labels on demand, at the point-of-action where they will be applied, so as to avoid mistakes. We also recommend that the labels have a description as to job, cabinet, customer, etc. printed in human readable form on each label to minimize the possibility of making a mistake.

If needed, color inkjet barcode printers can be used to generate color coded barcode labels for part, so that parts for the same job and cabinet have the same color code, thus further reducing potential problems.

Costs and Benefits

The BellHawk Construction software can typically be rented for under \$1,000 per month, with the capabilities described above. It can also be purchased outright. Data collection stations with tablets, hands-free barcode scanners, and barcode printers will typically cost about \$2,000 each to purchase the equipment. Non-recurring support costs for customizing the CAD system import (to match the file format exported from the CAD system), installing and setting up the software, as well as providing training and support in the use of the software typically costs between \$10,000 and \$20,000.

As a result, the total purchase cost of such a system is likely to be in the vicinity of \$50,000 depending on the number of data collection stations, the complexity of the CAD import, and whether automated data exchange with other systems, such as QuickBooks, is required.

Such a system pays for itself in under a year through the labor savings in not having to manually track the status of all the parts or to have someone continually expediting jobs to make sure they get out on time. But the biggest benefit comes from improved customer satisfaction by making sure that customer orders get out on time, do not have any mistakes, and that installations are not held up by missing parts.

For More Information

Please see www.BellHawk.com for more information about the BellHawk software.