BellHawk Software Overview Data Sheet

Introduction

BellHawk is data collection software that is used for real-time work-in-process materials tracking by manufacturing and industrial distribution organizations. It is primarily used by mid-sized manufacturing plants that specialize in making semi-custom products, individually or in small batches. It has also been used by food and pharmaceutical processors, construction, engineering, defense, and repair organizations, as well as a wide range of other industrial organizations.

In manufacturing plants, BellHawk tracks the receipt and put-away of raw materials, their conversion into intermediate materials and finished products, as well as the picking, packing, labeling, and shipping of these products. In industrial warehouses, BellHawk tracks operations such as kitting, repacking, and relabeling of products. It also captures data about what materials are packed onto each pallet to facilitate the sending of ASN (Advanced Shipment Notice) data to customers and their distribution warehouses.

BellHawk Benefits

1. Gives real-time visibility of the status of customer orders, and needed materials, to help ensure that orders get shipped, delivered, and/or installed on time. This prevents the expense of lost customer orders due to late delivery or the payment of late delivery fees, as well as unnecessary overtime to ensure orders get shipped on time, or the payment of expedited shipping charges.

2. Saves labor cost and prevents mistakes by replacing the use of paper forms and manual keyboard data entry, for materials tracking data collection, with automated data collection using technologies such as barcode and RFID scanning, as well as mobile computing.

3. Gives ability to capture and view industrial work-in-process materials tracking data anytime, anywhere there is an Internet connection.

4. Captures materials traceability history for rapidly tracking the source of defective products as well as minimizing the scope and cost of recalls.

5. Captures the cost of making products, including the cost of materials, labor, and machine time. Enables comparison of expected and actual costs to improve future bidding.

6. For under a thousand dollars a month to use BellHawk, most manufacturing plants and industrial warehouses can reduce their costs by at least $50,000/year and often many times this amount.

7. BellHawk has the ability to automatically exchange data with a wide range of ERP and accounting systems thereby eliminating duplicate data entry costs and mistakes, as well as increasing operational efficiency.

8. When you add BellHawk to a low-cost accounting system, such as QuickBooks Enterprise, the result is a complete integrated solution for smaller manufacturing organizations which has more capabilities than many high-end ERP systems costing hundreds of thousands or millions of dollars.

BellHawk Data Collection Architecture

The BellHawk data collection software consists of a specialized website and a SQL Server database that run on a Windows Server computer. All user interaction is performed using web-browser based devices thereby avoiding the need to install custom software in each device.

The BellHawk software and database can be installed at a remote data center or on a Windows Server connected to the plant LAN (Local Area Network). Data collection and viewing can take place over the local area network, over an Internet connection, or over a mobile phone data network, anywhere there is an Internet or internal network connection to the server computer, using encrypted data links.

Barcode data collection can be performed using devices such as PCs or Android tablets that have external corded or cordless barcode scanners which are used for data capture. Data capture devices can also include ruggedized PDAs with integral barcode scanners as well gun-style units equipped with long-range scanners, which are suitable for scanning from the seat of a fork-lift truck. Data viewing over a secure Internet link can be done using these same devices as well as by using smart phones.

BellHawk is based on a rules-based expert system concept that enables each organization using BellHawk to rapidly configure BellHawk for their own specific data collection requirements.

This same rules-based concept is used to make it easy for people such as material handlers and machine operators to use BellHawk to capture data, even if they are not very computer literate.

BellHawk uses the same License-Plate-Number (LPN) container tracking methods for tracking work-in-process materials as FedEx, UPS, and Amazon use to track the delivery of their packages. This tracking can be done without needing to use a barcode printer by simply attaching a unique pre-printed tracking barcode, from a roll of pre-printed barcodes, to each container of materials or serialized item being tracked.
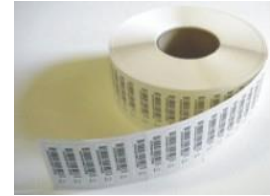
When barcode labels are required, which contain human readable information in addition to a tracking barcode, such as for product, packaging, or shipping labels, then BellHawk has a mechanism to enable custom labels to be printed upon demand in each plant or warehouse.

In this mechanism, a mobile device user typically sends a label printing request to the server, as part of their normal data entry. Rules set up in BellHawk then gather the needed data for the label from the BellHawk database and the label printing request is placed in a print queue on the server.
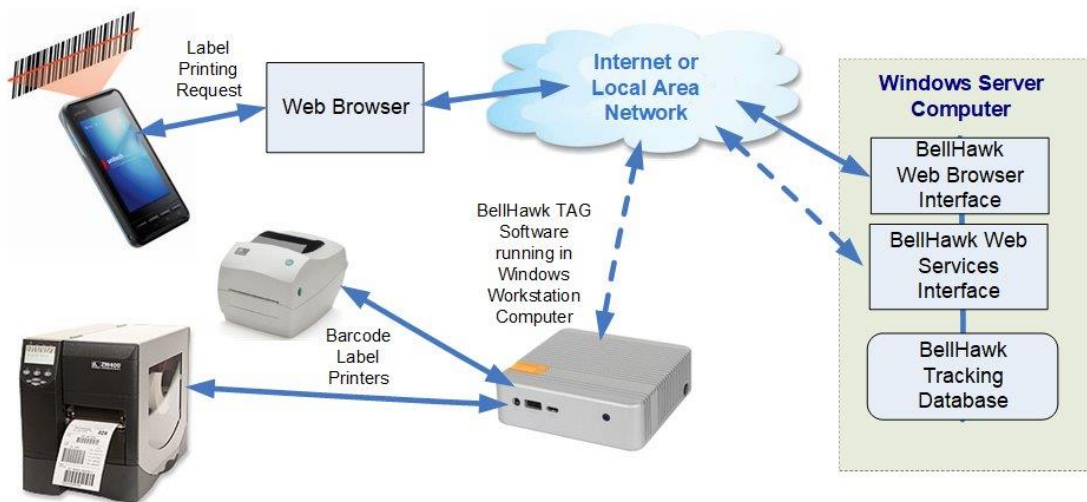

This label printing request is then picked up by software running on a Windows IIOT (Industrial Internet of Things) or Workstation computer in the designated facility and printed out at high speed on a barcode label printer located near to where the label printing request was made (which can be to a wireless connected printer mounted on the requesting user's belt).

The selection of the label format, data to be printed, and the printer on which the label is to be printed are made by a rules-based expert system, to avoid users needing to select the format or printer or manually enter the data, which can help prevent many costly mistakes.

Using optional software, available with BellHawk, Windows IIOT or Workstation computers in the local plant can also be used to capture data from weighing scales and RFID portals and forward these to the server. These same IIOT devices can be used to exchange data with test-stands and with process-control lines. This can be useful in passing test or process parameters to the test stand or process line as well as capturing test results and process conditions in the BellHawk tracking data base.

Because BellHawk is typically run in a remote data center there is typically no way to directly access the BellHawk database. The BellHawk DEX interface, however, provides a convenient way of creating custom reports as well as exchanging data between software running in a local plant or warehouse and BellHawk running in the Cloud.
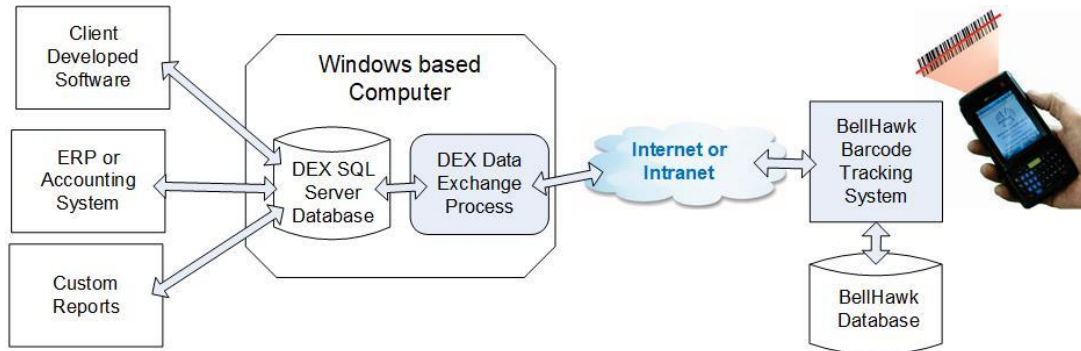
The DEX interface consists of a SQL Server database and a DEX data exchange process.

Data written into tables in the DEX database are automatically transferred to the corresponding tables in the BellHawk database by the DEX data exchange process. Similarly, data entered into BellHawk is automatically transferred to corresponding tables in the DEX database.

The tables in the DEX database are structured in a well-documented tabular format (think Excel spreadsheet), with a set of self-contained records and no indirect references. This makes it easy for users to develop their own custom reports, using the contents of the DEX database. It also makes the development of interfaces to exchange data with ERP, accounting, CAD, and other systems very straightforward.

This is in contrast to the BellHawk database itself, which is designed for rapid transactional processing of barcode scanning data from a large number of mobile computers. This requires a complex database organization with many indirect references, which makes using the BellHawk database itself for reporting or data exchange interfaces much more complex than using the DEX interface.

DEX comes in two versions:

1. A computer program (DEX2) which can be installed by end users on their Windows PCs, along with a copy of the Microsoft SQL Server Express database. This enables users to extract data from BellHawk and send data to BellHawk under user control

2. A version of DEX (MDEX)which uses the MilramX automated data exchange software. This runs as a service on a Windows Server or Workstation and is designed to run unattended and reliably exchange data 24x7 for long periods of time. It has a web-browser interface for remote monitoring and control.

Users can start out using DEX2 to develop custom reports and/or interfaces and then transition to using MDEX for operational use. This is especially valuable when implementing shared reports using software such as SSRS (SQL Server Reporting Service) which require the DEX database to be continuously updated without human intervention. It is also essential when implementing automated data exchange interfaces with ERP, accounting, CAD and other systems.

Both versions of DEX can communicate with BellHawk over the Internet, using the BellHawk web-services interface. This enables the DEX database to be located in a manufacturing plant or warehouse that can be thousands of miles away from the data center in which the BellHawk software and database is running.

MDEX can be run on a Windows Server in the same data center as BellHawk along with the ERP or other system with which BellHawk will automatically exchange data. In this case MDEX will exchange data directly with the BellHawk database, which is more efficient than communication over the Internet.

Multiple versions of MDEX and DEX2 can be in operation at the same time. This enables data exchange and reporting to be taking place simultaneously with a single version of BellHawk at multiple different geographic locations.

One major advantage of the DEX interface is that it isolates and protects the BellHawk database from possible damage from reporting and data exchange software which would be possible if they directly interacted with the BellHawk database. This also helps ensure compliance with requirements such as CFR 21 Part 11, which require that users not be able to modify data once it is captured without an audit trail being present.

MilramX is a software platform, which can also be used to implement high reliability data exchange interfaces that run 24x7 with a wide-range of accounting and ERP systems. In this case, instead of communicating through an intermediate DEX database with the ERP system, MilramX communicates directly with the ERP or accounting system. This is especially useful if the ERP system is itself running in the Cloud and data exchange has to be performed through its web-services interface.
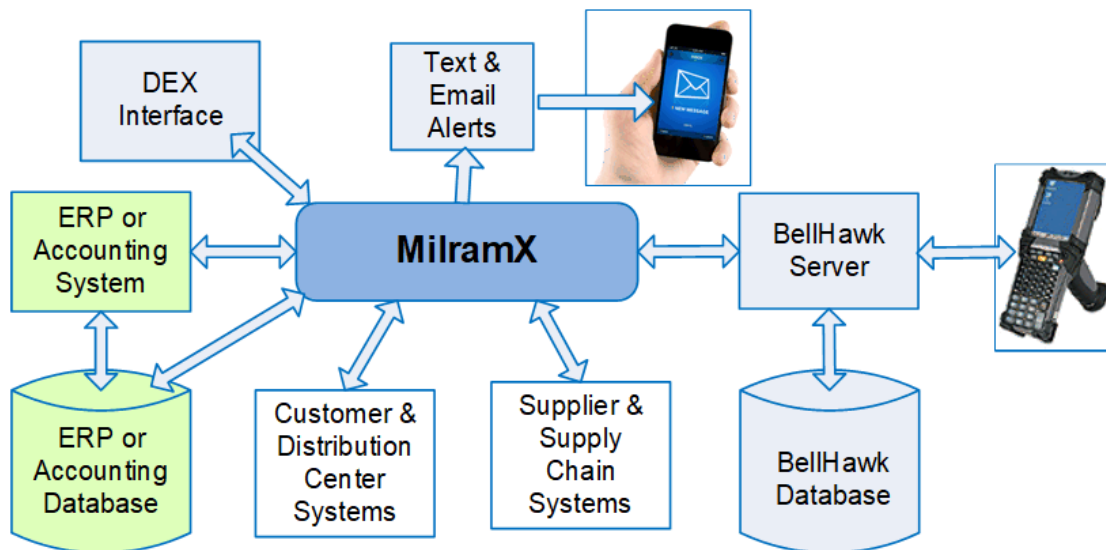
MilramX is typically run on the same Windows Server as BellHawk so that it can directly interact with the BellHawk database for efficiency. But, typically, the ERP or accounting system with which it communicates runs in the Cloud, at another data center.

MilramX is also used to exchange data between upstream and downstream supply chain systems, as well as to generate text and Email alerts to specified users when events occur that they need to pay attention to.

In this role, MilramX examines data as it is captured by BellHawk, as well as possibly by an ERP or accounting system, and automatically analyzes this data looking for operational situations that are potentially problematic. If a potential problem is detected then MilramX sends an alert Email or Text Message to a designated list of recipients, for that event.

This can avoid the need for managers to "walk the production floor" looking for problems or for staff members to sit glued to a computer screen or wading through reports looking for problems which have already occurred. Instead, MilramX can often predict future problems and enable managers to head off the problems before they occur.

The BellHawk Product Line

BellHawk is comprised of three base systems plus a number of optional modules. The base systems are:

- BellHawk Materials Tracking System (MTS) - tracks raw, intermediate and finished materials at all stages of manufacture and distribution using license-plate-number (LPN) container tracking methods but does not track the conversion of materials.

- BellHawk Simple Production Tracking System (SPTS) - tracks batches of materials through a sequence of work-order operations. It can optionally capture the labor required for each operation as well as the piecework quantity produced.

- BellHawk Real-Time Operations Tracking System (RTOPS) which combines the features of SPTS and MTS and adds in the ability to track the materials consumed and produced by each work order operation. RTOPS also includes the ability to track WIP materials as they move from one operation to another.

Both SPTS and RTOPS support the import or creation of work orders, whereas MTS does not.

In addition, RTOPS supports the use of BOMs (Bills of Materials) to prevent mistakes by warning operators if they attempt to use the wrong materials. RTOPS can also capture the cost of making products as well as capturing materials traceability history data.

Where warehousing operations are involved then the BellHawk WMS option is used with MTS and RTOPS to track receiving, picking, packing, and shipping operations as well as tracking the loading of trucks/trailers at loading docks. This option also enables periodic cycle counting and auditing of materials without shutting down the warehouse.

Other options are available to support special applications without the need for customization. This includes the ability to turn on features to make BellHawk compliant with the requirements of CFR 21 Part 11, which is required for certain FDA compliant applications such as the manufacture of pharmaceuticals and medical devices..