

## KnarrTek Data Sheet Job Tracking System (JTS)

### Overview

KnarrTek Job Tracking System (JTS) is a simple-to-use system that uses barcode scanning to track the progress of jobs, in the form of work orders, through a sequence of operations. JTS also captures the labor expended by individual people or teams on each operation and can assist in scheduling operations to make sure that the most important jobs get priority.



JTS is designed for use in manufacturing, fabrication, engineering, construction, assembly, repair and other industrial organizations.

JTS gives a real-time view of the status of work-in-progress and captures the labor expended for subsequent analysis. Management users can print out reports or download Excel exports giving the status of work-in-progress and showing how long work orders have been held up between operations.

### How JTS Works

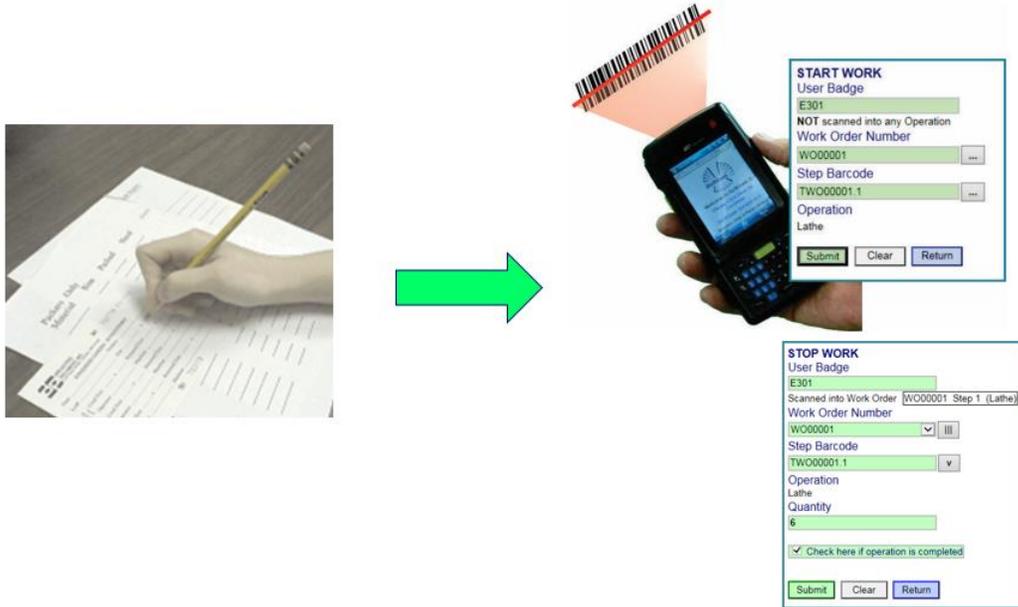
With JTS, users can set up production routes, and then use these to produce barcoded travelers, as shown here. These travelers can be scanned to track batches of material or individual items.

Alternately these work orders can be imported from another system using the JTS DEX or MDEX interface.

Operators can then record the start and end of each operation by scanning the barcodes on these travelers. This includes recording their labor start and end times by scanning a barcode attached to their badge. They can also record the piecework quantity produced or processed during this time.

<i>Work Order</i>		 <i>WO00000101</i>
<i>Importance:</i>	Standard	
<i>Date Wanted:</i>	12/22/2015	
<i>Sales Order #:</i>		
<i>Customer:</i>	CDE Furniture Manufacturers	
<i>Instructions:</i>	Make Stainless Steel Knobs	
	<i>Step # :</i> 1	<i>Operation:</i> Production: Lathe
<i>Step Instructions:</i> Lathe		
	<i>Step # :</i> 2	<i>Operation:</i> Production: Drill and Tap
<i>Step Instructions:</i> Drill and Tap		
	<i>Step # :</i> 3	<i>Operation:</i> Production: Polish and Inspect
<i>Step Instructions:</i> Polish and Inspect		

JTS enables organizations to easily transition from using paper forms and manual keyword data entry to having their employees directly capture work order tracking data on the shop floor. The biggest advantage of this transition is to enable managers to see the status of all their jobs in real-time so they can easily spot jobs that are in trouble or need extra attention. It also enables subsequent analysis of the labor performance of different workers.



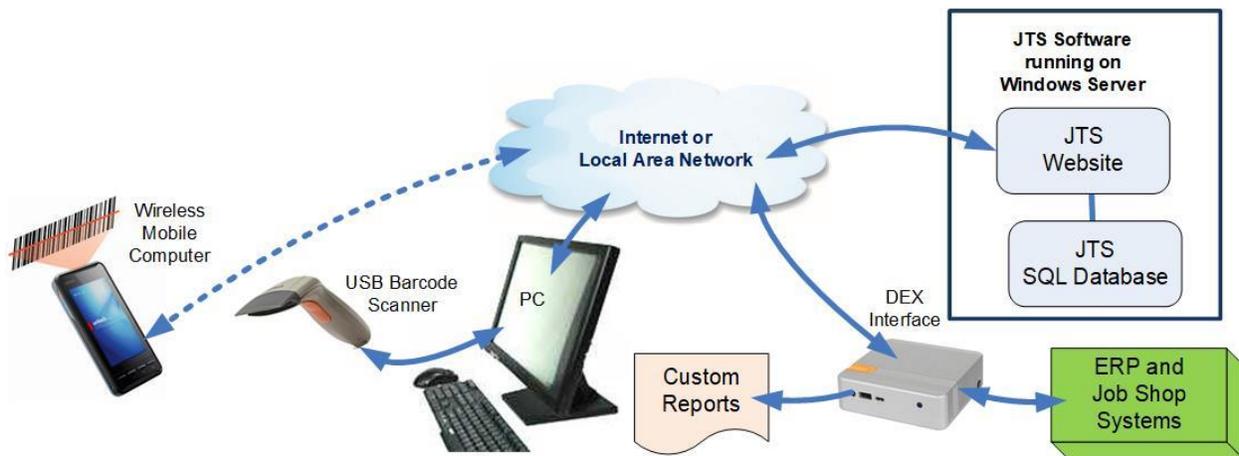
JTS is designed for use by shop-floor workers who have limited computer literacy. By using barcode scanning manual data entry is minimized. Also, JTS warns users if they make a data collection mistake and allows immediate data correction. JTS only captures the minimum data needed for each tracking situation. This minimizes training time and eases the introduction of data collection technology to the shop floor.

JTS enables the recording of time actually worked, as separate from the elapsed time to complete each operation, by enabling users to scan-out when they go on break or their shift ends. JTS can also allocate labor time when someone is working on multiple work orders at the same time.

Managers, supervisors and customer support people, can then see the status of all the work orders in real-time, including how long each work order has taken or has been held-up, since completion of the last operation, waiting for the next operation to begin.

Managers are able to download Excel exports showing the progress of work orders, the elapsed time for each operation and how much labor was required. They are also able to get a labor report by work order or employee showing the amount of labor time, elapsed time, and quantity produced for each operation on the job.

## KnarrTek JTS Technology



The KnarrTek JTS software consists of a specialized website and a SQL server database, which run on a Windows Server computer. This software can be installed at a client's own data center or used on servers managed by KnarrTek at secure data centers in the USA through its BellHawk Online service.

Each organization gets their own private website and database. This ensures privacy of data for long-term users of BellHawk Online. It also enables organizations to quickly start out using JTS on servers managed by KnarrTek "in the Cloud" and then to easily transition to installing the software on their own server.

With JTS, data can be collected using any web-browser based device with an integral or attached barcode scanner. No special software is required, just point the web-browser to the URL of the client's JTS website and start collecting data.

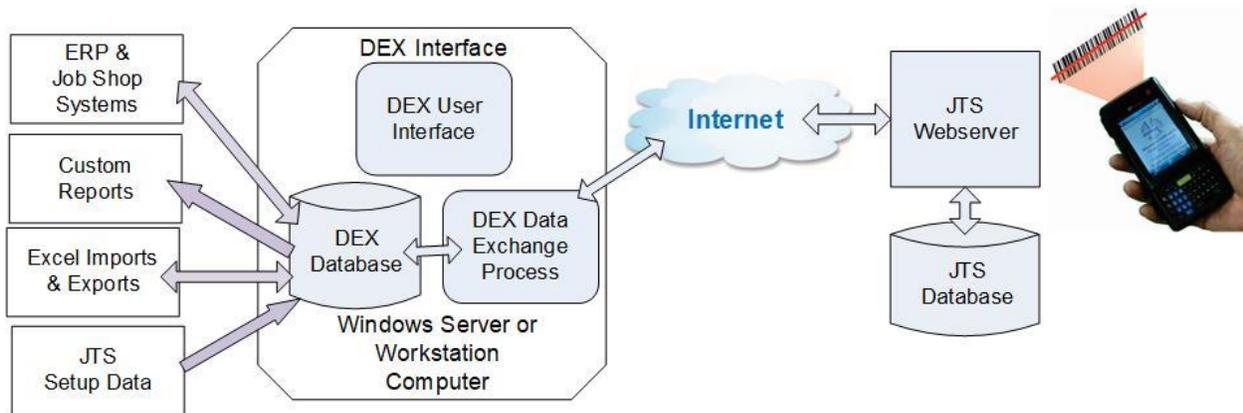
As KnarrTek JTS uses a standard web-browser, it works on a wide-range of computing devices, including Android, PC, and Apple devices and does not need any custom software to be loaded on any devices used for collecting or viewing data. JTS can also generate standard reports and Excel exports to all these devices.

Information collected in the SQL Server database can then be viewed from any web-browser based device, including mobile phones, over a secure encrypted data link, anywhere a user has an Internet or Intranet connection.

JTS is based on a rules-based expert-systems engine that enables the JTS system to be readily configured and customized for a wide-variety of applications by clients importing rules in the form of Excel spreadsheets.

JTS does not need the use of a barcode label printer as barcoded work orders can be printed out using an office laser printer.

The optional DEX interface provides a local "mirror" of the JTS database. Writing data to tables in this local database automatically causes the corresponding tables in the JMTS database, which may be running at a remote data center, to be automatically updated. Also, all the transactional data captured by JMTS is automatically mirrored into the local DEX database.

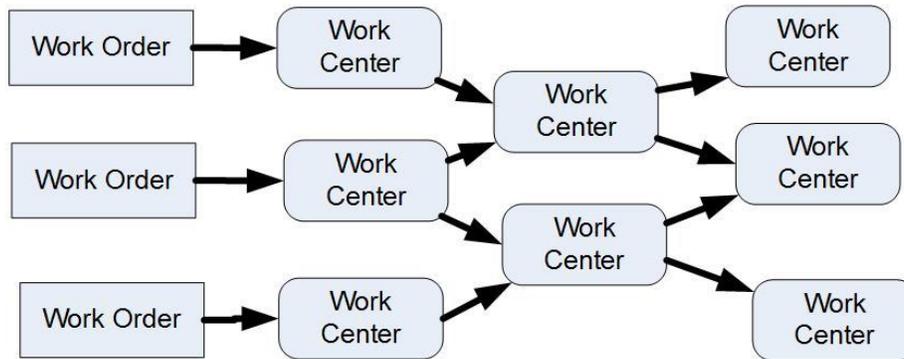


Clients can use the DEX interface to implement automated data exchange data with their ERP, accounting, and CAD systems. Also, software, such as Access and Excel, or other report generation software, can be linked to the DEX database and used to produce custom reports.

DEX comes in two versions:

1. DEX2 – which is a computer program which can be installed on a user's PC to exchange data between a local SQL Server Express DEX database and JMTS. This can be used to send data to JMTS and to create ad-hoc reports and Excel exports.
2. MDEX – which runs as a service on a client's Windows Server and has a web-browser user interface. This is used for implementing automated interfaces with ERP, accounting, and other systems, as well as creating custom reports that will be used repeatedly.

## Work Center Scheduling



The Work Center Scheduling (WCS) feature of JTS helps manufacturing and other industrial organizations ensure that customer orders get shipped on time by dynamically prioritizing work-orders through multiple work-centers. In performing this real-time scheduling, the BellHawk software takes into account the real-time status of each job, when each operation is supposed to be completed, when the order is planned to be delivered, and the importance of the customer order.

This feature enables production workers to easily select the next job to work on:

Work Order Selection													
User Badge E303													
Work Center: Production													
Scheduled Date	Importance	WO Number	Step Number	Operation	Machine	Item	Quantity on WO	Quantity Complete	Customer	Order Number	Date Release	Wanted Date	Status
Apr 19 2017	Rush	BWRK00000008	1	Slit Coated Rolls		SGR6	1000	0	BellHawk		Apr 19, 2017	Apr 19, 2017	Ready
Apr 24 2017	Rush	BWRK00000001	1	Slit Coated Rolls		SGR6	100	50	Smithfield Printing	SO1002	Mar 09, 2017	Apr 19, 2017	In-Progress
Apr 25 2017	Rush	BWRK00000006	1	Coat Rolls of Paper		GCR12	15	0	Smithfield Printing		Apr 19, 2017	Apr 25, 2017	Ready
Apr 26 2017	Standard	BWRK00000003	1	Slit Coated Rolls		SGR6	12	0	Smithfield Printing		Apr 19, 2017	Apr 19, 2017	Ready
Apr 27 2017	Standard	BWRK00000005	1	Coat Rolls of Paper		GCR12	15	0	NH Printing		Apr 19, 2017	Apr 28, 2017	Ready
May 1 2017	Standard	BWRK00000007	1	Slit Coated Rolls		SGR6	4	0	BellHawk		Apr 19, 2017	May 03, 2017	Ready
Apr 17 2017	Low	BWRK00000002	1	Slit Coated Rolls		SGR6	20000	0	Smithfield Printing	SO1002	Mar 09, 2017	Apr 24, 2017	Ready
--- Any ---    --- Any Operation ---    --- Any Machine ---    --- Any Item ---    --- Any Customer ---													
<input type="button" value="Filter"/> <input type="button" value="Return"/>													

Instead of directly recording when they start work on an operation, employees can scan their badge barcode, select the work center they are assigned to, and get a prioritized list of jobs to work on. They can then select the most important job from the list and start work. This can be much more efficient than going to their supervisor and asking which job is the most important

This rules-based scheduling takes place dynamically, in real-time, advising employees in each work center what is the highest priority task for them to work on, without needing invention from managers or supervisors.

This form of scheduling allows dynamically for new orders to enter the system, machines that break down, people that get sick, and materials that are late arriving. It is ideal for short-run, quick-turn make-to-order manufacturers who do not have the benefit of long run planning or scheduling visibility.

The JTS work-center-scheduling comes with a standard set of rules that work for many organizations. More complex rules and algorithms can, however, be added, if needed. Such custom rules can take into account employee skills and equipment capabilities as well as materials availability.

When an employee in a work center finishes work on one task, they are given a prioritized list of other tasks they can work on. In this way the employee can use over-ride the system's recommendation based on their knowledge of a situation that would preclude them from doing the highest priority task. This over-ride is, however, recorded for subsequent review by the employee's supervisor to prevent "cherry-picking" of easy jobs by employees.

Planning and scheduling systems, typically found in ERP systems, that schedule work orders through work centers based on a sales and operations plan, and the predicted availability of people and equipment, require a substantial amount of work by one or more people to keep the database of available resources current. They also require a forecast of future demand from the sales department, which is often hard to get and is frequently inaccurate.

JTS, by contrast, simply uses the data captured as a standard part of real-time tracking of jobs, together with previously entered work-order data. As a result, JTS does not need a person or team dedicated to planning and scheduling operations.

In a long-run manufacturing operation, the JTS scheduling algorithm is not as optimal in its scheduling as running a resource-limited scheduler to plan operations. But, in a dynamic short-run, make-to-order, manufacturing operation, this work-center scheduling algorithm makes much better use of whatever resources are available to process whatever orders come in and to get them out on time, if at all possible.

This mode of scheduling is based on prior work on systems to provide advice to fighter pilots. Here it was quickly learned that it was much better to give good advice quickly, to keep pilots out of harm's way, than to recommend an optimized plan after they had been shot down.

The same applies to scheduling jobs through a quick-turn manufacturing plant. A sequence of good scheduling recommendations, made in real-time, as the operational status of the plant changes dynamically, is far better than a fixed schedule made with great precision days or weeks ahead of time.

## **Commentary**

The KnarrTek JTS Job Tracking System is based on the BellHawk® real-time work-in-process, job and material tracking software platform, which is licensed by KnarrTek from Milramco LLC. For more details about the BellHawk Software Platform, please see the "BellHawk Software Handbook", which describes this software in great detail. The DEX interface is based on the MilramX™ automated information exchange software platform, which is also licensed by KnarrTek from Milramco LLC.

## **For more information**

Please send an Email to [Sales@KnarrTek.com](mailto:Sales@KnarrTek.com) or see [www.KnarrTek.com](http://www.KnarrTek.com) for more details.