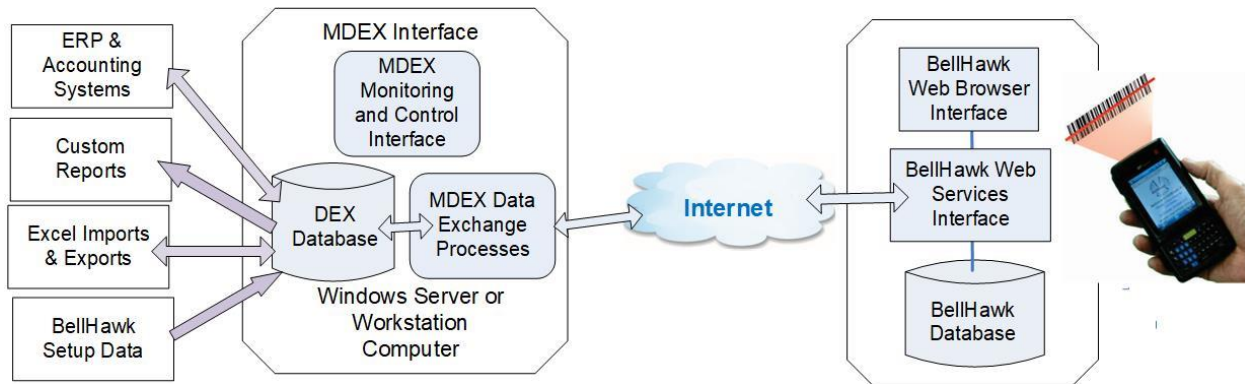## Data Sheet for the MDEX Interface to BellHawk

1. Introduction

The BellHawk MDEX (Data Exchange) interface is now the standard interface to the BellHawk Materials and Operations Tracking software. It replaces all prior interfaces, which directly communicated with the BellHawk database, as well as the use of the BellHawk web-services interface. These are now reserved for use of the BellHawk software development team.

By using a store-and-forward interface through the DEX database, the MDEX data exchange process is able to exchange data with BellHawk, with minimal interference with barcode scanning activities, which require rapid response (typically under 2 seconds per scan). It does this by only exchanging the latest updates to the DEX and BellHawk databases with each other on a record-by-record basis, interleaved with processing barcode scanning.

This enables, for example, large Excel exports and reports to be made from the DEX database, at high speed, without interfering with data capture in the warehouse or on the factory floor.

The DEX database is structured as a set of simple tables, in the manner of an Access database, or Excel tables, to make reporting, as well as data exchange with other systems, as simple as possible. This is in contrast to the BellHawk database, which is structured for maximum speed in data capture and verification and is, as a result, not at all user-friendly in its format.

A simplified version of the DEX interface is available as the BellHawk Remote Desktop Interface (RDI), which enables users to export data from the BellHawk database into a local SQL Server Express database from which they can produce reports locally. The RDI can also be used to manually exchange data in the form of Excel spreadsheets with BellHawk.

2. The MDEX Interface

The MDEX interface is based on the MilramX automated data exchange platform and is intended for installation on a Windows Server computer. It is intended for unattended 24x7 operation under remote control through a web-browser interface. Please see the "MilramX Information Integration Software Platform – Technical Overview" for details of MilramX and the "MilramX User Manual" for how to use the Data Transfer Object (DTO) scheduling interface".

The MDEX interface consists of about 120 DTOs written in VB.Net which are incorporated into two Transfer Functions, one for inbound and one for outbound data. These DTOs and the DEX database are detailed in the "MDEX Interface User Manual".

3. Data Exchange Overview

The data that can be exchanged consists of the following groups:

- Current status data. This includes the status of work orders and the contents of the containers table. These DEX tables are updated as changes occur in the BellHawk database.

- Data for transfer to ERP and accounting systems. These include aggregated shipments and receipts, as well as nightly inventory snapshots. These are periodically transferred from BellHawk at intervals set by the DEX user.

- Transaction history data. This DEX data includes containers of material received and picked, material moved, material consumed and produced on work orders, containers of material shipped, labor and machine time consumed against work orders, and the change in quality control status of containers of material. New records are added whenever a transaction is recorded in BellHawk.

- Setup data for BellHawk - this is the same data as that which can be imported in HLDO (High Level Data Object) format through the Excel Setup data interface into BellHawk. The primary function of these transfers is to enable setup data to be transferred from ERP and accounting systems into BellHawk but this can also be a convenient way of manually transferring setup data into BellHawk.

- Setup Data from BellHawk. This includes the same set of data objects as can be transferred to BellHawk but they are transferred from BellHawk into a separate set of DEX tables, which are updated automatically as changes are made in BellHawk. These are useful for including in reports, especially when the setup data is imported directly into BellHawk or is automatically updated in BellHawk from another system.

- Orders for BellHawk. These are the same Purchase Orders, Pick Orders, Work Orders, and Ship Orders, which can be directly entered into BellHawk. They enable orders to be automatically sent to BellHawk directly from ERP and other systems.

- Orders from BellHawk. These are copies of the Purchase Orders, Pick Orders, Work Orders, and Ship Orders directly entered into BellHawk or imported into BellHawk from another system. These are written into a separate set of tables from the DEX tables used for sending orders to BellHawk and are automatically updated whenever changes are made in the BellHawk database. These are intended for reporting but are also useful for transferring order data to other systems, such as operational parameters for process control systems.

4. Benefits of MDEX

The BellHawk database is structured for rapid response to many users doing barcode scanning at the same time. This structure, while good for rapid data capture, is not very user friendly for interface or report generation.

Also, because transfers between the DEX database and BellHawk are throttled, there is minimal interference with the speed of barcode scanning, which could otherwise be significantly slowed by directly accessing the BellHawk database.

The DEX approach also avoids the possibility of users inadvertently damaging the BellHawk database and ending up with a non-working BellHawk system, as a result. Please note that KnarrTek makes no warranty as to the accuracy or speed of data capture if a client is directly accessing the BellHawk database.

Also, the DEX interface is well documented whereas the structure of the BellHawk database is only documented in a manner usable by knowledgeable software developers.

Some uses of the MDEX interface include:

1. Automatically exchanging data with an ERP or accounting system.
2. Generating custom reports using software such as Python, Access, Excel, Crystal Reports, or a Business Intelligence software platform based on data extracted from the BellHawk database.
3. Exchanging data with EDI and shipping systems.
4. Transferring data from CAD or other engineering design systems into BellHawk.

There can be multiple copies of the MDEX interface communicating with BellHawk from different plants, warehouses, and data centers. This enables BellHawk to be interfaced to a variety of systems and used by people doing custom reporting from multiple geographically separated locations.

As previously stated, 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.

For More Information

Please contact client-support@KnarrTek.com or see www.KnarrTek.com.