SE02
Balluff RFID
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Related Topics

- SE09 Track and Track Solutions
- NI 19 IO Link Capabilities
- Solution Area 5 (Motion & Mechatronics)
What is Traceability?

Documenting every step in a process chain. It will record the history, location, or use of an item by means of recorded identification.

Traceability Enables…
- enhanced quality
- achieve JIT (Just-In-Time)
- lean manufacturing
- regulatory compliance
A Traceability program improves the following areas…

- Comply with regulatory and quality standards
- Proactively manage product recalls with near-real-time corrective action
- Improve customer safety, customer satisfaction, and profit margin
- Manage product quality and reduce the cost of nonconformance
Areas benefiting from Traceability…

- Plastics
- Machining
- Forming
- Material Flow (Kanban)
- Automated Assembly
- Shipping & Sequencing
- Tool Room
Plant Functions requiring Traceability:

- Asset Tracking – plant-based assets
- Electronic Kanban – plant-based material flow
- Production control (WIP) – assembly processes
- Intra Logistic – material flow between plants
Asset Tracking – plant-based assets

• Goal is to reduce non-productive time and asset losses while increasing overall productivity and utilization by accurately tracking assets.

• Bar code and RFID technologies track changes to an asset's location, condition, conformity status, and availability.
Key ROI Elements – Asset Tracking

- Increase asset utilization
- Ensure correct asset is used
- Increase overall asset productivity
- Reduce asset losses
- Reduce asset's non-productive time
Commonly Tracked Assets:

**Machine tools**: Offset measurements (from presetter), setup parameters, usage, and tool pocket matching.
Commonly Tracked Assets:

Molds and dies: Set-up parameters, usage, maintenance, and part matching.
Commonly Tracked Assets:

Modular automation sub-systems:
Set-up parameters, usage, maintenance and part matching.
Commonly Tracked Assets:

**Totes/containers:** Contents, location, usage, and part matching.
Trick is getting the Tag on the Asset

Custom tags are common practice
Plant Functions requiring Traceability:

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Key ROI Elements – Electronic Kanban

- Reduce levels of in-process inventory
- Maintain tight control of in-process inventory levels
- Implement Just-in-Time inventory flow with outside vendors
Kanban Systems – Plant based material flow

System to provide just-in-time (JIT) delivery
Key points: Manage workflow & limit WIP
Electronic Kanban – plant-based material flow

Moving to eKanban to eliminate:
- manual entry
- lost cards

Tracked by RFID and Barcode
Kanban Material Flow

How it looks in the manufacturing plant
Plant Functions requiring Traceability:

- **Asset Tracking** – plant-based assets
- **Electronic Kanban** – plant-based material flow
- **Production control (WIP)** – assembly processes
- **Intra Logistic** – material flow between plants
• Used to control automation processes and track work through entire process
• Key for flexible manufacturing
Build Data

Key component in a *Flexible Manufacturing Environment*
Process Data

Drives rework and Statistical Process Control (SPC)
Tracing all components to their source
Critical for:
- Recall information
- Liability claims
- Regulatory compliance
Lineage Concept

Data from multiple locations into one location
Tracking Options

RFID Tag on **Pallet**
Ideal for palletized assembly

RFID Tag on **Part**
Ideal when there is no pallet or part leaves the pallet
Plant Functions requiring Traceability:

- **Asset Tracking** – plant-based assets
- **Electronic Kanban** – plant-based material flow
- **Production control (WIP)** – assembly processes
- **Intra Logistic** – material flow between plants
Key ROI Elements – Intra Logistics

- Maintain tight flow control with multiple sub suppliers
- Reduce time and potential errors when receiving components
- Maintain high level of visibility and traceability from sub suppliers to finished products
- Maintain regulatory compliance
Intra Logistic – material flow between plants
Closed loop intra plant part flow

Also called Product Logistics
Tracking the flow between plants
Tracking Technologies
Customer's Choice

Preferably RFID

The Physical Data Container
**The Actual Data Container**

**Decentralized Data – Read/Write**
When using a decentralized approach, the tracking system typically uses RFID that supports both read and write functions. All tracking data is held on the RFID tag and travels with the product or asset through its process. This is an ideal method to share tracking information in a non-networked environment. Basically, it will interconnect islands of automation.

**Centralized Data – Read Only**
This method only requires reading a unique identifier, or license plate, to be carried on the product or asset. All relevant tracking information is actually stored in a central database. When tracking information is required, it is accessed only in the central database. The unique identifier is stored in the form of a barcode or an RFID tag. RFID is preferred in harsh environments where barcode reliability would be problematic due to debris build up. RFID also provides user defined identifiers.
**Example of Decentralized data control:** No license value required. All information is read and written to the RFID tag. Central database is not required. Data can be shared between work cells using the RFID tag.

### Decentralized Data Map Example

<table>
<thead>
<tr>
<th>Manufacture</th>
<th>Quality Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Tuscaloosa</td>
</tr>
<tr>
<td>Date</td>
<td>June 2012</td>
</tr>
<tr>
<td>Lot</td>
<td>87</td>
</tr>
<tr>
<td>Sequence</td>
<td>902</td>
</tr>
<tr>
<td>Options</td>
<td>1LRT</td>
</tr>
<tr>
<td>Color</td>
<td>Neutral</td>
</tr>
<tr>
<td>Current</td>
<td>2.23</td>
</tr>
<tr>
<td>Load Test</td>
<td>89.5</td>
</tr>
<tr>
<td>Color Match</td>
<td>Pass</td>
</tr>
<tr>
<td>Part Status</td>
<td>Pass</td>
</tr>
</tbody>
</table>

**Example of Centralized data control:** License number is the only information read from barcode or RFID tag. License value is used to point to location of actual data in the centralized database. All reading and writing of actual data is done in the database.

### Centralized Data Map Example

<table>
<thead>
<tr>
<th>License No.</th>
<th>123456</th>
</tr>
</thead>
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- Data from RFID tag
- Data map labels
- Data read from Barcode or RFID tag
- Data held in central database – referenced by License No.
- Data map labels
The Actual Data Container and the Handheld

Typically Template Software

Typically Portal Software
Tracking Systems

Two options for scanning points:

Fixed:
- Preferred method
- Most economical
- Aligns intended data with correct tag

Handheld:
- Offers great flexibility
- Care must be taken that the user connects with the appropriate tag
RFID – LF & HF: Ideal for harsh environments, even during read zones. Requires line of sight.

Read/Write: Data can be stored locally on the asset.
Read Only: Requires centralized database
Balluff LF & HF Solutions

Handheld
Class leading unit with advanced software and many options

Fixed Mount
Two complete systems (L & M) to cover wide range of applications
Read/Write RFID – UHF: Ideal for many environments based on the tag. Data can be stored locally or centrally. Does not require line of sight, offers long range, and can read multiple assets at once.
Balluff UHF Solutions

**Handheld**
Class leading unit with advanced software and many options

**Fixed Mount**
Read/write antennas comparable with most UHF tags
Balluff Product Architecture

Modular Expandable Architecture with Dedicated RFID

Dedicated RFID

Modular Expandable Architecture

Read-Only RFID

Long-range UHF

Vision Sensor
Barcode
Mobile Handheld Read/Write

POWERED BY WERNER ELECTRIC
Low Frequency (LF)  
BIS L, BIS V

Technical characteristics
- 125 kHz
- up to 100 mm read range
- 192 byte user memory

Advantages
- best metal tolerance
- read-only and read/write tags available
- common bus interfaces available
- I/O-Link (with BIS V)

Typical applications
- production control
- assembly line
- tool identification
High Frequency (HF)  

Technical characteristics

13.56 MHz

**up to 400 mm read range**

2000 byte user memory

Advantages

- worldwide standardized: ISO 15693, 14443A
- high data rate
- high memory tags available (FRAM)
- high temperature tags available
- common bus interfaces available
- IO-Link (with BIS V)
- various read/write heads available
- various transponder form factors available

Typical applications

- production control
- life-cycle management
- intralogistics
- anti-counterfeiting
- tool identification
- assembly line
Ultra High Frequency (UHF)

Technical Characteristics
- 865 / 915 MHz
- up to 6000 mm read range
- 512 bit user memory

Advantages
- worldwide EPC gen 2 standard, ISO 18000-6C
- highest data rate
- multi-tagging
- high temperature tags available
- Ethernet TCP/IP

Typical applications
- container tracking
- supply chain management
- production control
- asset tracking
Related Topics

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• NI 19 IO Link Capabilities

• Solution Area 5 (Motion & Mechatronics)