



## **W.I.P. Tracking Solution**

**Boost productivity, improve yields in shorter cycle times and run leaner**

Manufacturing organizations are facing the challenge of achieving growth through product innovation and increased customer satisfaction while improving margins through sustained operational efficiency and high manufacturing yields. With increasing competition manufacturing organizations have been continuously seeking new ways to improve performance of their operations.

With multiple manufacturing locations, multiple product lines and complex multi-step processes, the current systems are not capable of responding to real time changes on the factory floor resulting in compromised quality, less than desired yields and longer cycle times.

Limited amount of historical data at the product level is affecting decision making – whether it is for process improvement, inventory management, or responding to product recalls from the market.

KeyTone is responding to these challenges by helping manufacturers improve operational performance. Innovative Work-In-Process tracking solution from KeyTone are helping companies automate their manufacturing, enable traceability at the product level and improve yield and quality. By enabling the plant floor environment with RFID and transforming raw data into actionable intelligence, manufacturers can gain greater visibility into operations and business processes.



## Solution Brief: RFID enabled Work-In-Process Tracking

### Why RFID?

Companies may be inclined to stay with just barcode technology; however they will quickly run into limitations. Only RFID has the inherent capabilities needed to achieve real time manufacturing visibility and factory control, as shown this table.

Key Features	Barcode	RFID
Store full "product DNA" such as specific process and station data for real-time decisions	✗	✓
Support multiple data "writes" to allow for validation at each station	✗	✓
Sustain harsh conditions such as high temperature, chemicals, underwater, and uneven surfaces	✗	✓
Capture "next station" information in real-time to dynamically change the product routing for specific lots	✗	✓
Validate against process or station specific input and output parameters to tighten control	✗	✓
Reusable tags	✗	✓

RFID can help organizations capture and store the unique "product DNA" for each individual product (e.g. serial # 452356 of product X). This contains all the manufacturing attributes such as the material, processes, tools, resources, recipes used to build that particular product.

Type of Data Captured	Business Benefits
Material	Monitor material variations. Track different types of materials
Recipe	Ensure the right recipe is used for manufacturing the product
Labor	Improve labor utilization
Tools	Determine impact of tool variance. Improve tool utilization
Station	Track material location and enforce process validations
Process	Optimize routing
All data collectively	<ul style="list-style-type: none"> <li>- Quickly determine root cause of product failure</li> <li>- Greater product traceability and genealogy</li> </ul>

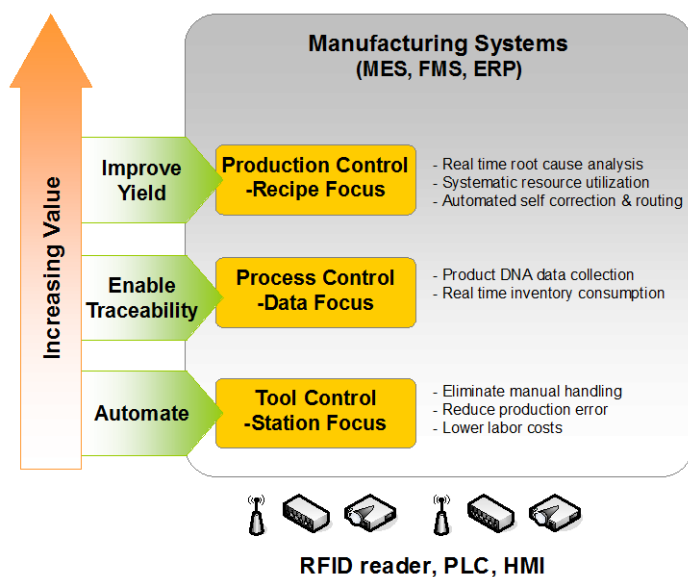
## KeyTone RFID solution for WIP traceability

KeyTone has developed a comprehensive solution for WIP traceability within manufacturing that includes RFID readers, tags and software.

RFID tags are used to uniquely identify a tote or a carrier used in manufacturing. The tag also contains operation history as well as instructions for next operation. As product moves from station to station the tag is read and validations are performed to ensure that it has reached the right stage of the manufacturing process. As these tags are read the status of the manufacturing process for each item is reported back to the MES system to allow for real time recording of status changes.

**KeyTone' W.I.P Solution helps enterprises extend their manufacturing capabilities by benchmarking their production, increase throughput and yields**

These status changes and operations histories may provide granular control and visibility of the plant floor. As work is completed at each station routing information may be written to the tag to send the product to the next station that is appropriate. QC Inspection changes may also be recorded if necessary.



As product is completed the tags may be reclaimed or totes reassigned to new assemblies or products at the beginning of their manufacturing cycle.

The RFID WIP solution delivers unmatched real-time product and process data within the WIP environment. Leveraging the inherent capabilities of RFID technology, the KeyTone solution helps enterprises gain real-time visibility into their Work-In-Progress material at specific product and work order levels. Moreover, it extends current MES implementations to incorporate RFID data collection as well as integrate new RFID centric WIP applications within the manufacturing process.

## Key Solution Features

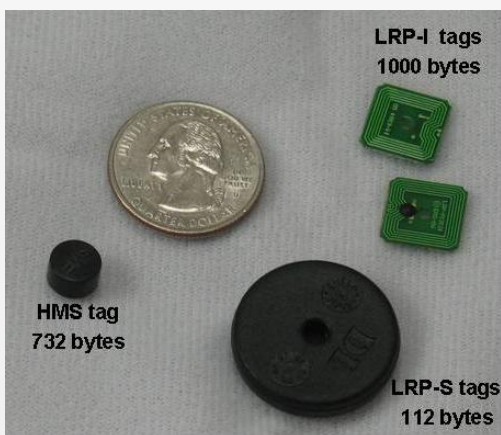
- **Product validation** – setup verifications and alerts to manage the production process ensuring that products are automatically routed to the next manufacturing process
- **Product containment** – setup entry/exits within the manufacturing process to contain lots and batches based on anticipated production plans
- **Lot history** – verify and archive RFID data to ensure virtual real-time visibility on product movement through work cells
- **Detailed Historical Process Data for any given work order** - provide long term analytic data for determining the root cause of defects as well as detailed information for product containment
- **Product consumption** – monitor product movement within the manufacturing process to determine lot processing speeds and material availability
- **Real-Time Manufacturing Process Data** - provide baseline information on the current process and alerts on potential deviances from the process

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### RFID Tags

Choosing a right RFID tag is critical to the overall solution. The choices depend on various factors like:

- Data size of the product information to be stored on the tag
- Read/Write distance requirements
- Form factor of the product or the product carrier to which the tag will be applied
- Manufacturing environment
- Cost of the tag



Today, there are many tag vendors who provide tags suited for various W.I.P applications

### RFID Readers

Choosing an industrial RFID reader boils down to 5 decisions:

- Does the reader support industrial communication protocols?
- Can it integrate seamlessly with other control devices like PLCs and sensors?
- Can the reader form factor fit the tool mount needs?
- Does the reader support multiple tag types?
- How easy it is to integrate the reader to the application?



Reader vendors are targeting their products to specific industry vertical such hi-tech manufacturing, food processing, pharma and others.

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### Payback

KeyTone WIP solution increases the ROI and expedites payback from RFID technology investment within manufacturing environments. Whether the business driver is process automation, better WIP traceability, increased throughput and yields, enterprises can improve production forecasting, quickly adjust processes, and improve overall production yield. In addition, enterprises benefit from the following:

- **Real time product level traceability**
  - Know what is going on anytime at a work order or product level across the entire supply chain
- **Reduced material variances**
  - Source of the variance is immediately visible with shorter reconciliation times
- **Tighter genealogy**
  - Tying specific material lots to production orders to determine cost immediately
  - Defect exposure reduction to exact impact areas
- **Significant reduction in labor retraining and management**
  - Improve processes with process modeling that identifies the most effective and automated routing of events and activities with minimal impact to labor
  - Enhanced employee productivity with employees freed from manual product-tracking tasks to focus on value-added manufacturing activities

### Critical WIP Information

Data Reports	Production Reports	WIP Reports
Lot History Detail	Lot Hold Report	Yield Report
Defect List	Reject Report	Daily Activity Report (by tool, by time, by lot etc.)
Lot Receipt Detail	Equipment utilization report	Route Sequence Detail Report
		Production Step Cycle Time Report
		Lot Report by equipment
		Real time equipment status
		Daily WIP report

#### An end-to-end solution by KeyTone will help organizations

- Increase profitability and supply chain efficiency
- Driving to improved production yields in a high-volume, mixed product manufacturing shop floor
- Sharing of real-time demand and production data to synchronize multiple production facilities
- Improve quality
- 6 Sigma quality control capability with measurable metrics



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