Industrial Identification

usa.siemens.com/simatic-ident

SIEMENS

Introduction

You want flexible production control, efficient asset management, reliable production and component tracking, or intelligent supply chain synchronization. That is exactly what industrial identification from Siemens delivers. With SIMATIC Ident, Siemens offers you a range of RFID and code-reading systems of unrivaled scope and integration, delivering the perfect identification solution to safeguard your competitive ability and make your business flexible for the future.

Industrial identification for sustainably efficient processes

When you need to know what product or component is where, and its status, SIMATIC Ident will supply the answers quickly and reliably. Machine-readable, automated and contactless identification systems synchronize virtual data streams in IT systems with the actual flow of goods. This ensures maximum transparency – not only in production processes, but also in external logistics processes. Advantages are created along the entire supply chain: quality requirements can be reliably met, production can be more flexibly structured, the number of manual operations reduced, and potential sources of faults recognized and removed instantly. With SIMATIC Ident you will benefit from greater efficiency in logistics, material management, production, and service.

Radio or optical – it depends on the application

Depending on the application in question, one of two main technologies is used in the industrial environment: Radio frequency identification (RFID) based on radio waves, or optical code-reading systems for the recognition of 1D codes (barcodes), 2D codes such as data matrix codes (DMC), and optical character recognition (OCR) of plain text or objects/patterns. These extremely reliable technologies ensure gap-free traceability of products and components along the entire manufacturing, purchasing, or dispatch process. By choosing SIMATIC Ident, you are opting for an integrated portfolio for industrial identification – ranging from code readers and RFID systems up to the integration software.

Industrial identification – the benefits for you at a glance:

- Seamless traceability
- Improved quality
- Compliance with legal requirements
- Faster time-to-market
- More flexible production
- Just-in-time and just-in sequence logistics
- Optimized inventories and thus lower costs
- Fast delivery

Table of Contents

For further information on SIMATIC Ident products like brochures, case studies,application examples as well as sales presentations, please check the following link:

RFID/RTLD Resource Center:
www.usa.siemens.com/beyond-locating

TIA Selection Tool:
www.siemens.com/tia-selection-tool

Automatic Weighing

Definition

In manufacturing facilities that utilize automatic weighing systems, the tracking and managing of the Work in Process (WIP) and container tare weights cannot only reduce loss, but inform and improve the process itself.

Problem / Pain Point

The ability to properly measure the amount of material throughout its process often depends on accuracy at the weigh scale systems. In automatic weighing system, the tare weight of the container must be factored into the equation. Also, material loss must be identified, managed, tracked, and reported in real-time to control/host systems in order to minimize their impact and adapt accordingly.

- Tare weight needs to be factored into calculations
- Material loss must be identified, managed, tracked, and reported in real-time
- Process must adapt accordingly

Product List:

1. PLC Controller
2. Operator Light Stack
3. UHF Stationary Reader
4. UHF Antennas
5. UHF Transponder
6. Host Computer with Relational Database (optional)

How can we apply an enabling technology to assist us in providing an accurate tare weight of the container as well as managing material loss?

Solution

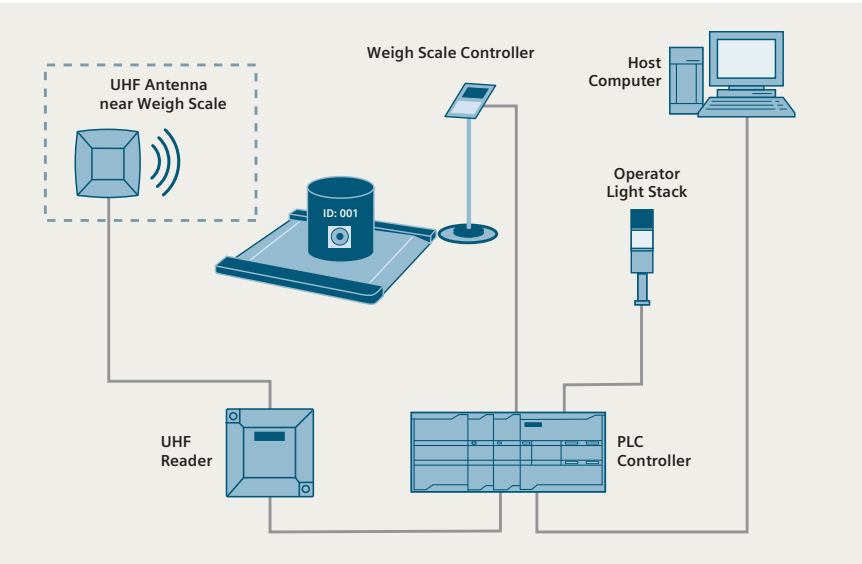
An RFID tag affixed to each container can hold the tare weight value in the RFID memory. This tare weight can be read as the load is being weighed, and fed into the calculation for producing an accurate material weight.

The resulting material weight can be written back to the RFID tag, allowing for subsequent processes to read it and track material loss. RFID system integration with PC (or networked PLC) host systems can be leveraged to provide notification to operators and management when material loss exceeds defined limits. Along with these notifications, the process may also be automatically adapted in accordance with business rules.

In a real-world example involving tobacco tracking: Containers containing work-in-process tobacco are weighed at multiple stations throughout the process. An IP65-rated EPCgen2 UHF tag affixed to the container contains the tare weight. The tare weight is read and used by the controlling PLC to accurately calculate the material weight. The material weight is written back onto the RFID tag, so that at subsequent weigh stations, material loss can be ascertained.

Benefits

- Reliable verification of container tare weights
- Accurate material weighing
- Material loss tracking and management
- Process flexibility and adaptation possibilities
- Straightforward, feature-rich integration to control systems



Container
Sterilization

Definition

In the case of a typical food and beverage manufacturing facility, containers need to be sterilized on a cyclic basis, and have that data reported to both internal and external user.

Problem / Pain Point

Validation schemes require reliable updating and acquisition of real-time data pertaining to the when and how often the containers need to return to the sterilization process.

- Regulations require cleaning validation
- Manual validation schemes are costly
- Improperly sterilized containers in process are unacceptable and are especially costly

Product List:

1. PLC Controller
2. Operator Light Stack
3. UHF Stationary Reader
4. UHF Antennas
5. UHF Transponder (high-temperature to withstand sterilization process temperatures)
6. Host Computer with Relational Database (optional)

How can we apply an enabling technology to assist us in driving the sterilization process and guaranteeing the integrity of the associated data for reporting purposes?

Solution

By reading the unique EPC ID on an RFID tag affixed to each container, it is possible for a data lookup to occur which informs the control system at each process when the container requires sterilization. For instance, before a handling procedure at a mixer station, sterilization status could be verified. After the mixer process, the control system could check handling count then inform the database if the container needs to be routed to sterilization. In simple cases where a relational database is not required for reporting, the process cycle counts may even be stored directly on the RFID tag. At any given time, notification via an operator light stack can be made to plant personnel regarding the container's sterilization status.

Benefits

- 100% reliable identification and verification of containers
- Unobtrusive technology
- Transponders can be covered in food grade dust and still be read (non-line of sight)
- Straightforward, feature-rich integration to control systems

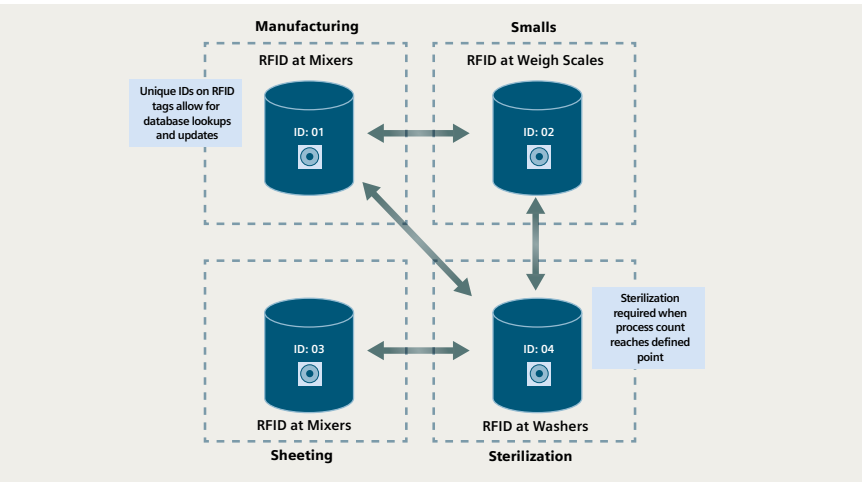


Figure 1 – Process flow diagram involving RFID in sterilization

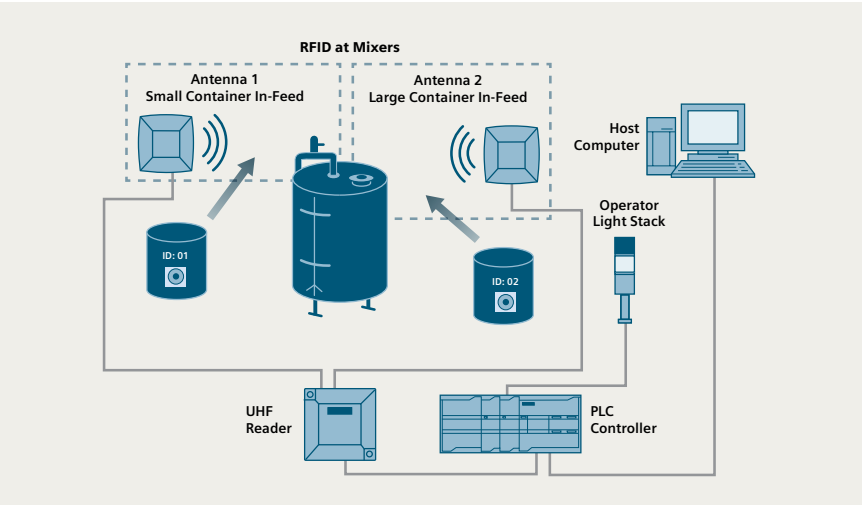


Figure 2 – RFID system at a mixer process

Dunnage
RTI Verification

Definition

In manufacturing facilities that utilize dunnage, or returnable transport items, the tracking and managing of these assets can not only reduce loss, but inform and improve the process itself.

Problem / Pain Point

Work in process (WIP) components can require identification in order to establish the proper machining operations, thus preventing manufacturing errors. This is known as error proofing. In the automotive industry, misidentification of components at machining during assembly operations can result in significant costs.

- Loss and misplacement of dunnage adds significant costs
- Misidentification of components on dunnage can result in major issues
- Manual identification schemes add time and costs

Product List:

1. PLC Controller
2. Operator Light Stack
3. UHF Stationary Reader
4. UHF Antennas
5. UHF Transponder
6. Host Computer with Relational Database (optional)

Solution

By affixing a UHF tag to dunnage, it is possible to identify that dunnage throughout the process, thus eliminating its loss. To further capitalize on this investment, any additional identification methods (ie.high-frequency tags) associated with the components within the dunnage, can be used to marry the dunnage with those individual components. With a multicomponent dunnage rack, this offers the ability to know all of the components that are being worked on, which rack is involved, and provide instructive data to operator.

In a real-world example of an automotive plant: A large rack has multiple transmission housings inside. The housings have a HF tag that is used on the machining and assembly lines. The UHF tag is used to hold the serial numbers of all the HF tags. The rack is used to move the transmission housings from machining operations to assembly. The UHF tag thus allows the tracking of the housings to move along with the parts. Additionally, this system assures that the correct rack is being transported.

Benefits

- Eliminates dunnage loss
- Allows advanced tracking of components utilizing the dunnage
- Can provide instructive data to operator
- Assures correct dunnage is being transported

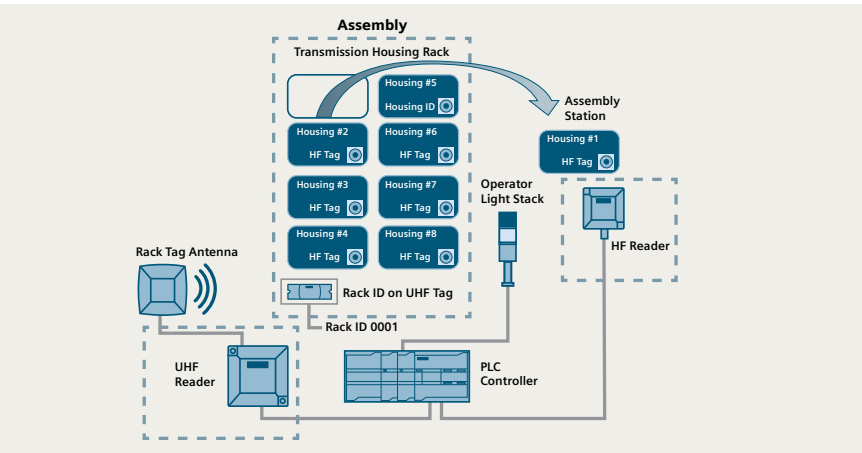


Figure 1 – Process flow diagram

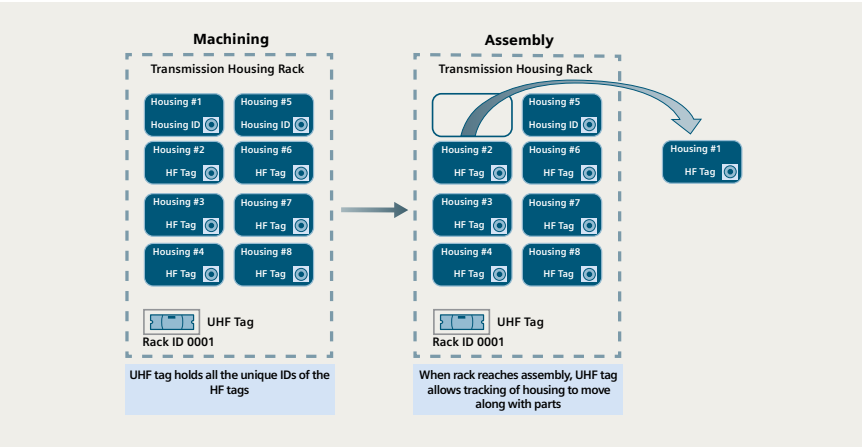


Figure 2 – RFID system at assembly

Ingredient Verification

Definition

Many manufacturing processes involve the mixing or blending of different components/ ingredients. This is applicable in a wide range of industries such as food and beverage, dry goods, pharmaceuticals and chemicals to name a few. In addition, once these ingredients are mixed, they need to be packaged for use.

Problem / Pain Point

Often, the ingredients to be mixed or blended look very similar. Also, the final products may look similar, but have very different properties.

- How can the various ingredients be verified for correctness before being added to the process
- How can the final mixture be identified to ensure it is packaged correctly
- How can the use of paper travelers be eliminated

Product List:

1. PLC Controller
2. Operator Light Stack
3. UHF Stationary Reader
4. UHF Antennas
5. UHF Transponder
6. Host Computer with Relational Database (optional)

How can we apply an enabling technology to assist us in driving the sterilization process and guaranteeing the integrity of the associated data for reporting purposes?

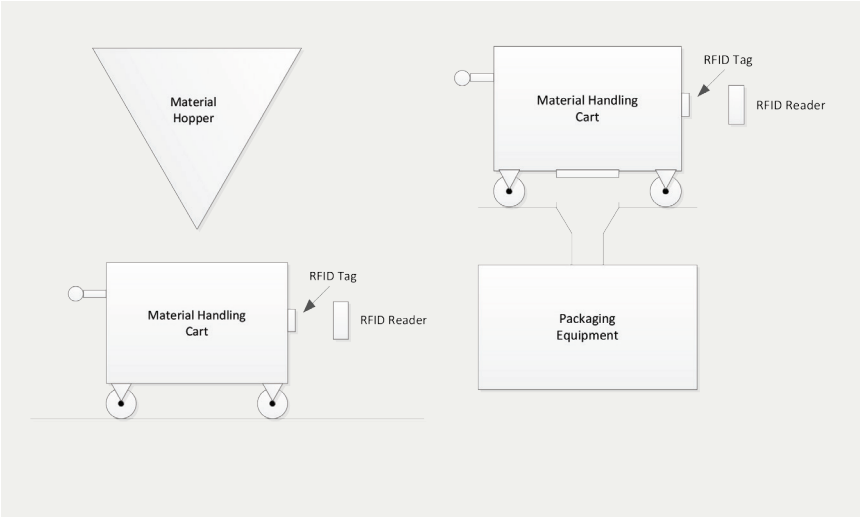
Solution

Placing a RFID tag on the material handling container allows that container, and its contents, to be uniquely identified. The RFID tag can be used as a license plate for the container, or actual ingredient information can be stored on the RFID tag. At the station where the material handling container is filled, a RFID reader will read/write the container's tag and identify the contents. When the material handling container is then moved to the next operation, its RFID tag is read to identify the contents. If the correct container is present, the contents are added to the process.If the correct container is not present, the operator is alerted and/or the process is halted.

A real world application is cake mixes. Wheeled carts are manually positioned under an overhead hopper where they are filled with various ingredients such as flour, sugar and cocoa. After cart is filled, the RFID tag on the cart is updated with data that identifies the cart contents. The loaded cart is then manually moved to a packaging machine. Before the cart is unloaded, the RFID tag is read to verify the correct cart with the correct contents is being used at the packaging machine.

Benefits

- Eliminate incorrect ingredient errors
- Eliminate scrap and/or rework
- Automate a manual process



Keg
Identification

Definition

In a brewery kegs are playing a significant role in production and logistics. There is a constant movement of kegs throughout the production, storage, and incoming and outgoing processes.

Keg identification helps maintain transparency and provides a reliable tracking system for breweries to use.

Problem / Pain Point

Tracking and tracing of production batches in the beverage industry requires scalable and reliable RFID components. Some challenges faced by the brewing industry are:

- Steadily increasing cost pressure
- Complex coordination between customer demands, filling orders, and brews
- Increasing variety of products and recipes
- High quality demand
- High seasonal changes
- Do you want to know where your assets (kegs) are and how many are available at any given time?
- Do you want to minimize costs and maximize utilization of your asset fleet?

Product List:

1. PLC Controller
2. Human Machine Interface (HMI)
3. UHF Stationary Reader
4. UHF Antennas
5. UHF Transponder
6. Host Computer with Relational Database (optional)

Solution

The solution is an RFID Portal that consists of one reader and four antennas. When multiple incoming kegs are empty they each contain an RFID tag and can be tracked automatically at once. The kegs are then booked to the empties warehouse and determined ready to use.

Every single keg can be captured automatically when put on the conveyor to the filling line. After the kegs are refilled, they get captured again and production data for every keg to start track&trace can be connected (e.g. batch number). After the filling process, the kegs get dispatched into trade so the product is booked to the fulls warehouse and thus available for sales.

Benefits

- Track, manage, and understand the behavior of your asset fleet
- Information about population and losses of the entire asset fleet
  - Reduce investment into new assets
- Fill to fill cycle time, fill to return cycle time, circulation frequency
  - Optimize utilization of your assets
- Transparency in logistics processes by automatic tracing of the movements
  - Improve transportation processes

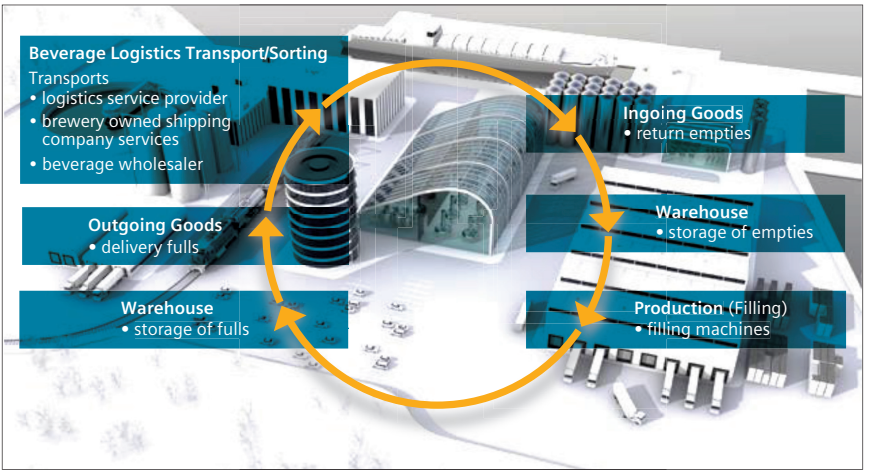


Figure 1: Diagram of the different areas of a brewery. Typical operations and read points in the brewery logistics.

Portal in
Production and Logistics

Definition

The need for RFID portals can be found not only in warehouses. RFID portals can also be used in intra- and production logistics processes. So in most manufacturing facilities wherever goods come in and go out, you can track and trace them as well as during the actual production process. Using RFID, manual processes can be automated by fully automatic detection of tagged parts by moving through the gates, e.g. in the goods-in / goods-out area.

Problem / Pain Point

Many customers still track their goods in the supply chain manually with bar codes, which is time consuming and complex, especially when there are a lot of parts. So it might happen that you get incorrect deliveries or loading.

- How can outgoing and incoming goods be tracked and traced?
- How can it be ensured that the right material is in the right work station to fulfill the manufacturing process?

Product List:

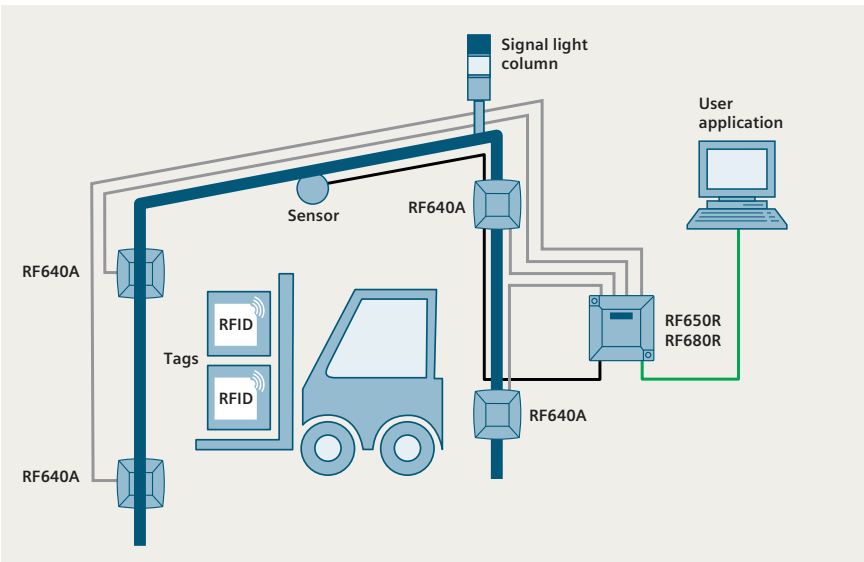
1. PLC Controller/PC
2. UHF Stationary Reader
3. UHF Antennas
4. UHF Transponder
5. Host Computer with Relational Database (optional)

Solution

RFID tags are attached to material and products for identification but also to monitor the processes throughout the entire supply chain from the raw material (incoming goods), through the production process, until the end customer (outgoing goods). An RFID portal contains a reader (PC or PLC integrated) and four antennas. The goods get automatically detected while crossing the portal and the MES and ERP systems are automatically updated. A real world application is a Tier 1 supplier that has to ship the right material at the right time to the manufacturer otherwise high fees get charged.

Benefits

- Automation of manual processes by fully automatic detection of tagged parts by moving through the gate, e.g. in the goods-in / goods-out area
- Significant reduction of incorrect deliveries
- Production and Supply just-in-time/just-in-sequence
- Avoidance of supply bottlenecks and downtimes
- Optimization of inventory



Tool
Identification

Definition

CNC machine tools are used in a wide array of industries for machining metal and plastic parts. These machines can use a variety of tools such as drill bits. For machines with automatic tool changers, it is important to verify that the correct tool has been loaded. For high volume operations, minimizing down time through the use of offline tool setters is common.

Problem / Pain Point

Using an incorrect tool for a machining operation can generate scrap or create a part that does not meet specifications. Using an incorrect tool can damage the tool as well as the CNC.

- How can offline tool setter data be stored with the tool?
- How can tool usage time be tracked?
- How can a tool be verified before it is placed into the machine tool chuck?

Product List:

1. PLC Controller
2. HF Stationary Reader
3. HF Antennas
4. HF Transponder
5. Host Computer with Relational Database (optional)

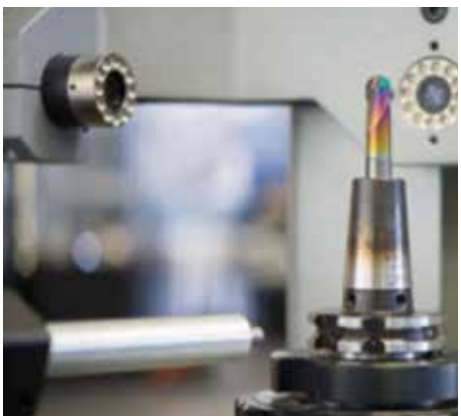
Solution

Placing a small HF RFID tag on the tool holder is the first step in a Tool Identification application. This RFID tag will allow the tool to be identified as well as provide a means to store tool setter data. When tools are placed into the automatic tool changer, the RFID tag is read and the CNC controller knows the ID of all the tools in the various tool changer positions. This ensures the correct tool is used. When offline tool setting is used, the tool setter data is written to the RFID tag. When the tool is loaded into the CNC machine, the tool setter data is read from the RFID tag and loaded into the CNC controller. This eliminates the need for determining offsets via touch probing and thus increases machine availability and throughput.

A real world application is automotive transmission gear machining. Maximizing machine tool up time is critical. Due to the high volume of parts that must be produced, most machines utilize offline tool setting and automated tool changers. The RFID tag allows tool setter data to be stored on the tool holder and quickly loaded into the CNC controller. This minimizes changeover time. The RFID tag on the tool holder also allows verification that the correct tool has been loaded. As an additional benefit, tool usage can be tracked based on cycles of machining time.

Benefits

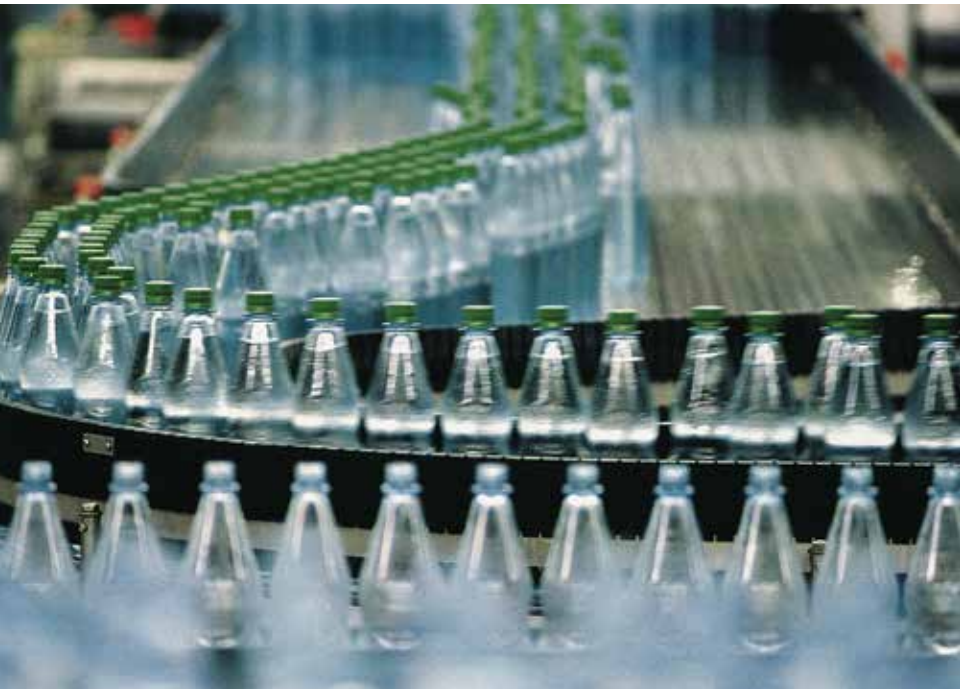
- Maximize machine availability
- Eliminate scrap and damage due to using incorrect tools
- Automate tool usage data collection



Tool holder with RFID tag in tool setter

Tool holder with RFID tag in tool changer

Work-in-Process
Improvements in F&B using RFID



Definition

Standardized manufacturing and logistics processes within F&B organizations are significantly informed by the current best practice(s) of those processes. Of great interest to an organization is the potential for continuous improvement, through the utilization of the work-in-process (WIP) data itself to inform decisions at all levels including engineering, production control, and business management.

Problem / Pain Point

As a rule, F&B organizations need to understand the full impact of the decisions made when designing the manufacturing and logistics process.

- Are the processes themselves efficient?
- Can they be made more profitable and flexible?
- How can best practices be refined using real-time data from the processes themselves?
- Can the real-time data inform automatic adjustments in the process thus supporting continuous improvement as well more flexible for JIT (Just-In-Time) manufacturing requirements?

Product List:

1. PLC Controller
2. Human-Machine Interface (HMI)
3. UHF Stationary Reader
4. UHF Antennas
5. UHF Transponder
6. Host Computer with Relational Database (optional)

Solution

RFID tags affixed to the carrier/vessel or manufactured component itself can contain structured memory regions holding any manner of complex data. An RFID system thus can serve as a powerful mechanism for gathering decision-making data. This data upon receipt in the organization's host application becomes valuable grist for a venerable mill of work-in-process (WIP) improvement decisions.

In a real-world example involving a beverage WIP tracking: Containers containing a WIP beverage enter in from the warehouse and are directed to a specific process line (1 or 2). These full containers are automatically identified via RFID and weighed (and compared to previous value stored on RFID tag) and emptied according to the amount specified on the RFID tag. Material loss is also accounted for. If the container is damaged, the RFID data is updated and consequently triggers a Reject. At the filling station, the RFID data automatically informs the JIT recipe management system of the required beverage, then after filling, consequently updates the weight data on the RFID tag and informs the forklift driver where to store it in the warehouse.

Benefits

- Reliable accounting of material loss
- Automatic informing of process control and recipe parameters
- Process flexibility and adaptation possibilities
- Straightforward, feature-rich integration to control systems

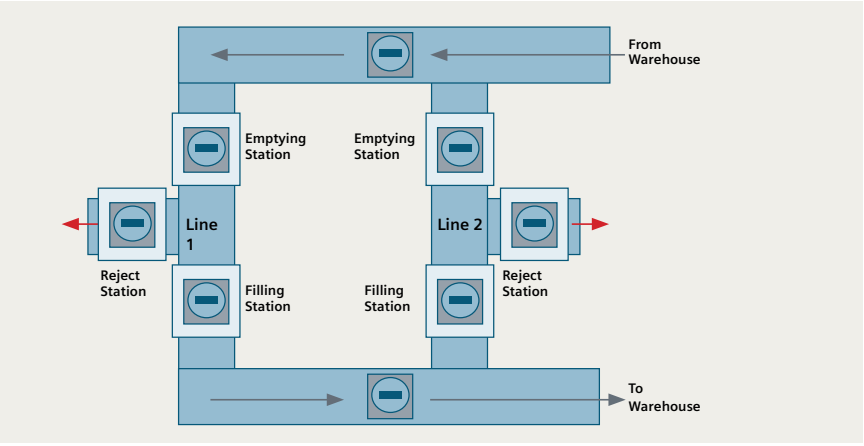


Figure 1 – RFID-enabled pallets of work-in-process beverages

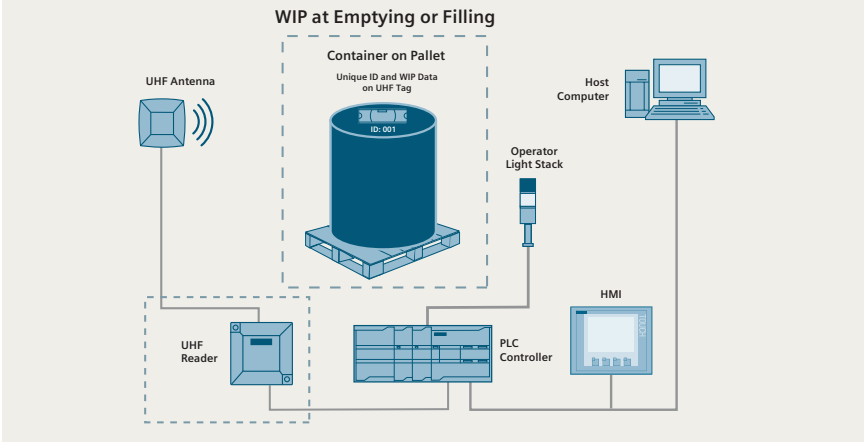


Figure 2 – RFID system at emptying or filling station

Published by
Siemens Industry, Inc. 2021

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Order No.: FSBK-IDENT-0121
Printed in U.S.A.