RFID benefits for the manufacturing process

SSMC, a joint venture of NXP Semiconductors N.V. (NXP) and Taiwan Semiconductor Manufacturing Company Ltd (TSMC) implemented RFID inventory and production control to their enterprise resource planning (ERP) systems to improve visibility throughout the manufacturing process and, ultimately, increase productivity.

The production of semiconductor chips is an extremely complex process. A large diversity of types and volumes of wafers, amounting to several billion chips a year, call for workflows that are transparent and reliable. Despite its high-tech nature production lots are typically moved around the production floor from machine to machine manually so it is important to check before the start of each processing step, whether the correct lot is being loaded onto the line, and to show the employee the route to the next station.

Radio Frequency Identification, or RFID, has captured the attention of many leading companies who are making significant investments of money and time to integrate this technology in their operations. The goal is to leverage internal infrastructures to capture and share real-time business information across entire enterprises. RFID technology is an ideal solution to keep track of and monitor the production process, including material handling and storage operations. An RFID system integrated into existing IT infrastructure can monitor and control the processing steps in conjunction with the centralized ERP system.

RFID technology brings a wide range of benefits to the manufacturing process. By enabling full process automation companies have better visibility of the manufacturing flow, can increase operational efficiency, enhance security, and provide higher accuracy resulting in increased added value. All these improvements increase productivity and revenue while reducing capital and labour costs.

**KEY CONSIDERATIONS**

**Why is it used?**
- RFID is an excellent way to record where a wafer lot is used (by serial, lot or batch number).
- RFID allows you to track when a component is assembled, moved into sub-assembly and then into final assembly.
- An RFID reader aids data collection in the manufacturing process resulting in better analysis for production WIP and improved control of wafer lot movements.
- RFID helps facilitate real-time movement of individual production lots from point to point, streamline routing time, therefore, enhancing speed of delivery.

**Where is it used?**
- Production containers or pods, buffer WIP (Work In Progress) or stock shelving, production tool check-in & check-out station
- RFID technology allows the user to track the physical location of the materials in real-time … in the warehouse, in the plant and across the distribution channel.

**How is it used?**
- RFID can provide full product and process traceability in manufacturing floor.
The eRacks that can hold up to 16 pods are equipped with RFID readers. Real-time information of every pod is displayed on a monitor screen.

THE IMPLEMENTATION:
All production pods are embedded with RFID tags.

Gathering and assembling pieces of the manufacturing data into a common place is the first step toward process improvement. Data from RFID readers, ERP, Warehouse Management Systems (WMS) and other software systems in the enterprise is collected in a high speed, temporal data repository. The RFID tag information is combined and cross-referenced with the state of the facility including the added dimension of time. Now product and process of an enterprise may be easily considered with a single real-time view. This enables complex business questions to be answered about problems and productivity in the facility in real-time.

THE RESULTS:

Predictability – The RFID system allows for real-time production line monitoring system and eRack tracking. Information from the 16 pods on the eRack can be seen ‘at a glance’, on a single screen which streamlines the identification process and improves accuracy.

Higher Efficiency & Productivity
- Greater ease of lot tracking
- Centralized control to buffer WIP, maximizing tool utilization
- Increased Stocker efficiency by 18% due to use of eRack

Production Lead-Time Reduction
- Increase stocker (Advanced Material Handling System) Speed
- Optimize the lot dispatching process
- Expected cycle time improvement after full implementation

Summary
RFID is fast becoming a valuable tool for end-to-end tracking of goods in the supply chain through the use of low-cost passive RFID tags. RFID enables more data to be collected and analysed resulting in greater accuracy for real-time decision making on the production floor. The return on investment (ROI) for RFID technology is clear and persuasive. Increased supply chain transparency, labor efficiencies, and inventory loss reductions result in improvements in quality and operational productivity – which ultimately translates to improved cash flow for the operation.