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Putting RFID to Work

May 3, 2006



Ingenuity in Manufacturing

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Agenda

- Key Manufacturing Factors
- RFID & Manufacturing Examples
- John Deere's Implementation



Manufacturing Drivers

World Class Manufacturers Are:

- **Efficient/Lean**...Continuously improving productivity and asset utilization
- **Innovative**...Applying mobility and technology to gain a competitive edge
- **Global**... Using the best resources, technology, and suppliers to remain competitive in a global environment

6 Sigma

MEQ

ISO 2000

Total Quality Management

CRM

MRE

JIT

ERP

P.O.N.C.

But there is a catch...



“We’ve found the key to productivity, It’s Fred, down in the shop. He makes the stuff.”

Centralized Systems..

Edge Decisions

- Even the best system is at the mercy of the employees who utilize it.
- More and more manufacturers are seeing the value of enabling workers to make real time decisions
- Edge processing and material visibility become increasingly important

RFID Provides

- **Material Visibility**
 - Reduces downtime due to shrink
 - Improves on-hand inventory accuracy
 - Reduces inventory reconciliation time
 - Improves shipping accuracy
- **Edge Processing**
 - Real time decisions
 - Faster problem detection & resolution
 - Detects shrink as it occurs
 - Provides host systems with more accurate data

Impact of RFID on Manufacturing

Challenges	Before	After	Impact
Complete Shipments	97 – 98%	100%	Customer Satisfaction
Accurate Shipments	90 – 95%	100%	
Order to Cash	Weeks	Days	
Accurate Inventory	85 – 90%	99.9%	Working Capital
Product Quality (Scrap)	95% Yield	98% Yield	
Physical Inventory	4 days	JIT Level	
Labor Costs	20 – 30% Reduction		Cost vs. Revenue Imbalance
Labor Productivity	10 – 20% Increase		
Operating Costs	10 – 15% Reduction		

Early trials are confirming these numbers

Feeding Business Processes

Materials Management

- Improves Employee Productivity estimated 15 - 30 %
- Inventory Accuracy, drives a reduction in stock of an estimated 20 %
- Inventory Transparency allows regulatory Compliance

Industrial CRM

- Improves Employee Productivity by an estimated 10 - 20%
- Accurate & Clean Invoicing reduces DSO days, estimated @ 15%
- Improves Customer Experience for Delivery & Service increases customer retention

Enterprise Asset Management

- Improves productivity of Employees by an estimated 5 – 15 %
- Increases availability of plant directly by an estimated 5 %
- Audit ready tools calibration allows compliance and increases quality

Shop Floor Data Capture

- Improves productivity of Employees by an estimated 5 - 10%
- Vendor Manage Inventory @ the point of manufacture increase stock turns by 20%
- Drives trace ability compliance to 100%

Mobile Quality

- Improves productivity of Employees by an estimated 5 – 10 %
- Real Time KPI's Increase product yield by estimated 2 %
- Drives product quality and TQM philosophies to the shop floor

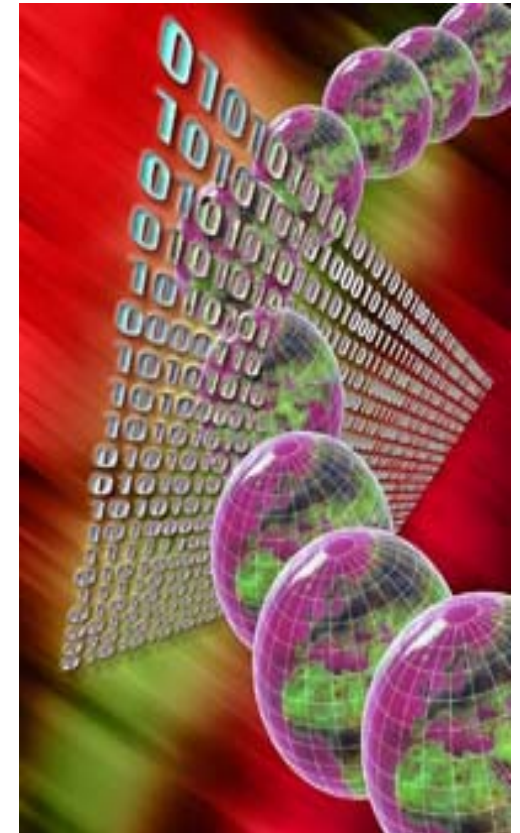
Conclusions / Projections

- RFID enables existing quality and production programs by providing them more timely and accurate data.
- Material Visibility will become a key metric in gauging a manufacturer's effectiveness.
- Edge Processing will allow for greater control of design variables on the shop floor

RFID in Manufacturing...Today

What If...

- ... you could **uniquely identify and track** every package?
- ... your **assets could notify you**?
- ... your products were **self monitoring**?
- ... the **products and tools** of your business **could “speak”** to each other?
- ... you could collect **Volumes of Accurate and Timely** data?



Without Human Intervention

Common Early Stage Use Cases

- Material Receiving
- Work In Process
- Quality Control
- Fixed Asset Tracking
- Document Tracking
- Tool Tracking
- Material Movement
- Plant Maintenance
- Shipping/Receiving
- KPI Measurement

Use Case – Automate material movement transaction

- Problem Statement
 - Every order picked up must be scanned with handheld to register “move transaction”
 - Process was slow, error prone, awkward & tedious
 - Solution
 - Install vehicle mount RFID reader with touch screen to eliminate need for manual barcode scan
 - Results
 - Saved 3 sec/order
 - 800 orders/day
 - 12 vehicles working
- Saved 8 hours a day in labor**
- Quality study still on going, expect good results**
- Eliminated need for handhelds**

Use Case – Paint & bake part matching

- Problem Statement
 - Paperwork and part get separated at chemical baths and paint stations
 - Difficulty in pairing up correct paperwork with part
- Solution
 - Place RFID tag in paperwork AND encapsulated tag on part
- Results
 - Mismatching errors eliminated
 - Additional benefits:
 - Clocking of parts automated
 - Validation for specialty parts/processes

Use Case – Tool tracking

- Problem Statement
 - Large metal forming tools difficult to track location
 - When tool is requested for multiple uses, complexity increases due to queuing
 - Good intending folks move tools to “help”
- Solution
 - Place RFID tag on tooling and RFID portals at key doors
 - Update tooling system with more granular visibility
- Results
 - Tooling visibility increased significantly
 - One FTE reduced (all they did was look for tools!!!)

Conclusion

- Build a matrix to evaluate use cases
 - Rate complexity: physics, commercial hardware availability, software integration, process changes, hardware integration, etc
- Start with the “sweet spots”
- Leverage experience of partners
- Think Different

Traditional John Deere RFID

- Manufacturing Execution Systems
 - Operator-specific work instructions
 - Smart tools
 - Line and component sequencing/re-sequencing
- Paint Matchup
- Torque Wrench Calibration System

Future RFID: Think Asset Visibility

- Before, During, and After Manufacturing
 - Suppliers
 - Carriers
 - Inbound / outbound warehouses
 - More visibility on the line
- Part of a Comprehensive Auto-ID Strategy
 - Also include bar codes, RTLS, and GPS

Finding ROI

- **Technical Assessment**
 - Find a single champion
 - Show people what works
 - Promote the technology - generate interest and support
 - Identify pilot
 - Secure resources to build business case for pilot
- **Pilot**
 - Small scale, high-value, asset visibility problem
 - Get outside help to ensure success
 - Pilot the technology and the process
 - Promote success, generate interest
 - Additional business value will come from those involved in the pilot
- **Expand Scope of Stakeholders**
 - Executive sponsorship
 - Secure additional resources
 - Research larger-scale business cases for pilots and implementations