Oracle MES
vs
Oracle ERP with 3rd party MES

(László Orosz, István Ring)
Manufacturing Performance/Integration

Marginal
- retroactive transactions
- limited collaboration
- disconnected from production lines

Stable
- on-line transactions
- paper based internal process
- data integration
- barcode (saved time in data entry, reduced human error)

Advanced
- on-line transactions
- paperless work instructions/SOPs
- device integration
- improvements based on qa results
MES – Manufacturing Execution System

Definition:

„Computerized system used in real time documenting, controlling, and management of an entire manufacturing process that includes machines, personnel, and support services. MES applications track activities and resources, link administration to the shop-floor activities, and are often integrated with other applications (such as MRP II) used in purchasing, shipping-receiving, inventory control, and maintenance and scheduling.”*

*http://www.businessdictionary.com/definition/manufacturing-execution-system-MES.html
MES Features

✓ **Measures** materials, time, human and machine resources directly spent on a work order or production batch
✓ Provides bulk, lot and serial number *traceability*
✓ **Integration** between business applications (ERP) and real-time operational plant control systems
✓ Electronic system to **collect production data**
✓ **Error proof, flawless** recording
✓ **Paperless** execution
✓ Routing sheet/technical instructions needs **graphical substitute**
✓ **Supports productivity** of shop floor operators / supervisors
✓ **Drives operator**
✓ **Dispatches** work order /production batch
✓ Captures and display **QA** data
✓ Provides real time **KPIs** for shop floor operations (waste tracking, shortage, downtimes, etc.)
✓ Analytical **reporting** / graphical tool
Production Line

Feeder Line(s)

Start

Schedule

Plan

MES terminal

Production Line

End

Actuals

Control Layer 0-2

Automated (Interfaced): Production counts, Machine cycles, Automated inspections

Manual (GUI) counts, inspections

MES (layer 3)

ERP (Oracle) (layer 4)

PDM / PLM /CAD (layer 5)
Barcode and scanner technology

1949 – (USA) Bernard Silver, George Laurer, Norman Woodland patented the barcode idea

1966 – National Association of Food Chains asked equipment manufacturers for a solution to speed up the checkout process (Universal Product Code: UPC)

1969 – David Collins installed the first scanning system (HeNE laser) at GM

1973 – Uniform Grocery Code Council recommended the adoption of UPC symbol. Foundation of GS1 organization (global standards for business communication)

1974 – First product with a bar code: a 10 pack Wringley’s Juicy Fruit chewing gum

1982 – US Postal Services adopted the POSTNET barcode


2004 – USA FDA mandated the pharmaceutical companies to barcode their medicines

2006 – Japan 3D barcode invented, 1.6 Mb, color as 3rd dimension
PLC / SCADA (DCS)

• **1968**: First PLC by General Motors for automatic transmission production line (Richard „Dick” Morley): Modicon

• **SCADA** (Supervisory Control and Data Acquisition):
  – Supervisory computer with user GUI
  – RTU (remote terminal units) connect to sensors and actuators
  – Communication infrastructure (networked data)
  – Programmable Logic Controllers (PLC/PIDs)
  – New generation: cloud computing with IoTs
IoT - Internet of Things

- Decreasing equipment costs
- Enhanced data exchange speed
- Advanced computing capabilities
No silver bullet

There is no „silver bullet” to implement MES; it is industry and enterprise specific.

Key success factors:

- Strong upper management **vision** and leadership (future enhancement options)
- Skill set of implementation **core team**
- Predefining: „What goes where and why?” (detailed **process definitions**)
- Understand business requirement and then start project (**no vanilla option**)
- Implementing most **effective** and well-scaled technology at any given time
- **Consolidated MES** - no island solutions - as a potential target (reducing maintenance cost)
Decision Points

- High importance of Safety and Reliability
- Actively intervene with production line (stop/re-start)
- Machine specific data management

- High transactions (granularity, volume)
- Real time decisions required
- Detail knowledge of facility’s operations

- Low transactions (granularity, volume)
- No real time decisions required
- Enterprise level other facility’s operations
- Business unit/Country specific data

- Continuous improvements
- Complex CAD design
- Active PDM, Work instruction mgt

Controls
- Machine Interlocks
- Machine Execution

MES
- Operation Scheduling
- Process Mgt.
- Maintenance Mgt.
- Lot/Serial Geneology
- Warehouseing
- Labour Mgt.
- Document Control

ERP
- Planning
- Quality
- Product Mgt (BOM/Recepies)

PLM
- Controls
- MES
- ERP
- PLM
3rd Party MES Integration

1. Items (Docs, Specs)
2. Routing
3. BOM
4. ECO
5. Production Plan
6. Material Transactions
7. Move transactions
8. Resource transactions
9. Job completion
10. Lot / serial generation
11. Control & QA Data Protocols

PLM / PDM / CAD
1. 
2. 
3. 
4. 

Oracle ERP
5. 
6. 
7. 
8. 
9. 
10. 

3rd Party MES(s)
11. 
11. 
11. 
11. 
11. 

SCADA
DSC/PLC
Oracle MES Integration

1. Items (Docs, Specs)
2. Routing
3. BOM
4. ECO
5. Mfg Schedule with SN
6. Move transactions
7. Resource transactions
8. Component / Assy trx with SN/Lots
9. QA results

PLM / PDM / CAD
1. Items (Docs, Specs)
2. Routing
3. BOM
4. ECO

Oracle ERP
Oracle MES (scheduling, QA, labor mgt)

Kepware (130+ mfg protocols)

SCADA
DSC/PLC

Business Planning, Logistics, Mfg Operation & Control

Production Lines
Oracle MES (Discrete)

✓ Configurable dispatch list driven execution (filter, sorting etc.)
✓ Configurable work content, on-line and sequential display of work instructions/SOPs
✓ Shift in/out, clock in/out for actual time capture (no need for manual resource transaction)
✓ Enhanced shop floor transaction reporting (perform multiple transactions at one instance, using one single screen: scrap + reject, record QA result, etc.)
✓ Support for serialized and non-serialized jobs tracking (SSO = start serial operation in routing, using predefined, pre-assigned serial numbers)
✓ ERES support – 21 CFR part 11 regulatory compliant
✓ ISO skill validation of operator, badge ID control
✓ Shop floor data acquisition
✓ Integration (DCs, SCADA, PLCs) via Kepware direct device connectivity
✓ Prints Label / Job Traveler (configurable XML)
✓ Supervisory Dashboard (graphical UI), pre-built shop floor metrics (capacities, shortage, material availability, etc.)
✓ Supervisor Workbench: expediting job, reorder dispatch list, configurable dispatch list
✓ Pointing device (mouse) based user interfaces
Oracle MES (Process)

✓ **Dispensing**: managing controlled ingredient preweigh process, identifying dispensing areas and booths

✓ **Dispensing plan** by dispensing supervisor (priorities, booth level)

✓ **Dispensing QA** nonconformance recording (batch quantity changes, material or resource substitution, observations)

✓ Pharmaceutical (FDA), food and beverage **regulatory compliance** by MBC (Master Batch Record) and CBR (Control Batch Record)

✓ **Direct device integration** (for preweigh and dispensing processes)

✓ **Label integration** (configurable triggering points, dispensing, sampling etc., configurable label content, electronic signature)

✓ Control of **operator certification** (skills, training)

✓ **Eliminate paper** (electronic instructions)

✓ **Touch screen** based user GUI interfaces
Analysis Tools in Oracle

- MOC: Manufacturing Operations Center
- OBIA: Manufacturing Analytics
- ENDECA
Oracle MES Look & Feel

Badge and Shift Control:

[Image of Oracle MES Workstation interface]

- Oracle MES Look & Feel
- Badge and Shift Control:
Oracle MES Look & Feel
Oracle MES Look & Feel

1. Detect exceptions (ENDECA – Oracle MES integration)

2. Impact analysis

3. Resolve issue (finding substitute component) and communicate it to shopfloor operator
Q&A