User interface technologies for Manufacturing Execution Systems

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- Manufacturing Execution Systems (MES)
- MES User Interfaces
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Function levels of a manufacturing company

Corporate Management
"ERP Level"

Production Management
"MES Level"

The Production Level
"Automation level"
Function levels of a manufacturing company

- Corporate Management
  - "ERP Level"

- Production Management
  - "MES Level"

- The Production Level
  - "Automation level"
ISA-95 functional hierarchy

Level 0
0 - The actual production process

Level 1
1 - Sensing the production process, manipulating the production process

Level 2
Batch Control
Continuous Control
Discrete Control

Level 3
Manufacturing Operations Management
Dispatching Production, Detailed Production Scheduling, Reliability Assurance,

Level 4
Business Planning & Logistics
Plant Production Scheduling, Operational Management, etc.

4 - Establishing the basic plant schedule - production, material use, delivery, and shipping. Determining inventory levels.

Time Frame
Months, weeks, days

3 - Work flow / recipe control to produce the desired end products. Maintaining records and optimizing the production process.

Time Frame
Days, shifts, hours, minutes, seconds

2 - Monitoring, supervisory control and automated control of the production process

Time Frame
Hours, minutes, seconds, subseconds

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ISA-95 functional hierarchy

Level 4
- Business Planning & Logistics
  - Plant Production Scheduling, Operational Management, etc.
  - Time Frame: Months, weeks, days
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Level 3
- Manufacturing Operations Management
  - Dispatching Production, Detailed Production Scheduling, Reliability Assurance, ...
  - Time Frame: Days, shifts, hours, minutes, seconds
  - 3 - Work flow / recipe control to produce the desired end products. Maintaining records and optimizing the production process.

Level 2
- Batch Control
- Continuous Control
- Discrete Control
  - Time Frame: Hours, minutes, seconds, subseconds
  - 2 - Monitoring, supervisory control and automated control of the production process

Level 1
  - Sensing the production process, manipulating the production process
  - Level 0: The actual production process
ISA-95 Control model
ISA-95 Control model
MES UI Requirements

- Good UI customization
- Flexible reporting
- Easy to access
MES Application Platform
MES GUI Technologies

**Thick Client**
- Good use of local machine resources
- Easy to realize complex applications
- High administrative cost
MES GUI Technologies

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**Thin Client**
- Majority of processing is server side
- Low administrative cost
- Complex application development
- Inferior user experience
# MES GUI Technologies

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- All processing done on server
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- Requires a remote desktop application
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- Desktop like user experience for the web
- Today more or less considered to be part of standard web applications
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Reporting

- Tailored to maximize value for end user
- Reports need to be flexible
- Types of reports
  - Standard reports
  - Ad Hoc

http://www.sbainc.com/WIPtrac/Images/Rejects.png
Conclusions

- MES systems enable production process transparency
  - A way to increase the capability of the process
- The MES GUI seems to be best realized through a RIA
- Flexible, purposeful reports are an essential part of the MES system