Увеличение эффективности операционной деятельности на пищевом производстве за счет MES на примере компании Unifrost, Бельгия

MEScontrol enabling for Operational Excellence at Dujardin Foods

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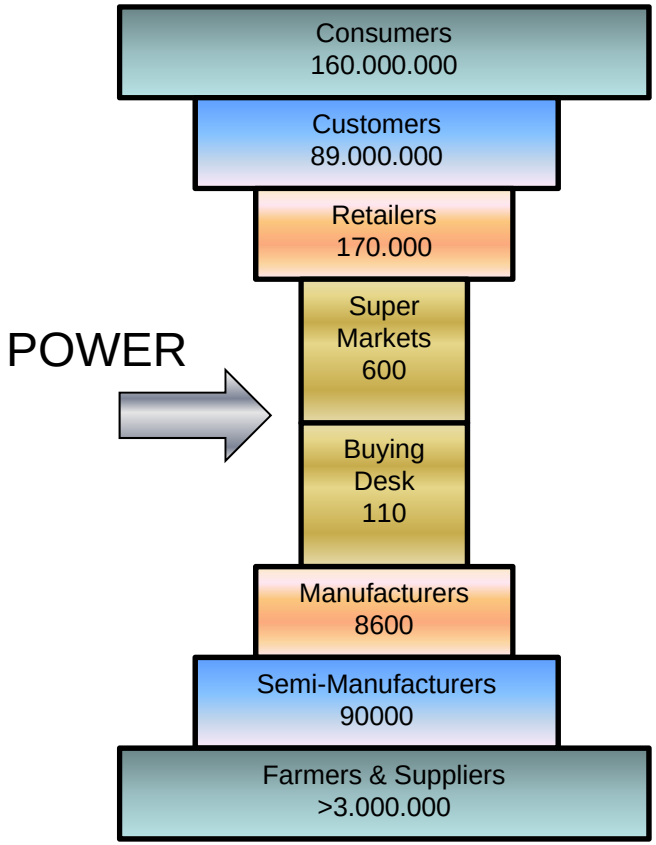
Economic Challenges for a Belgian Food company

- Projection by 2050
  - Growth of world populations x2
  - Food Demand x3
- Serious competition from
  - Globalisation
  - BRIC(*)-Countries
- Public Spending in EU ↓
- Governmental support of market & prices ↓
- € versus $ versus p.
- Product Differentation ↕

(*) BRIC countries : **B**razil, **R**ussia, **I**ndia, **C**hina

Challenges on Company Level

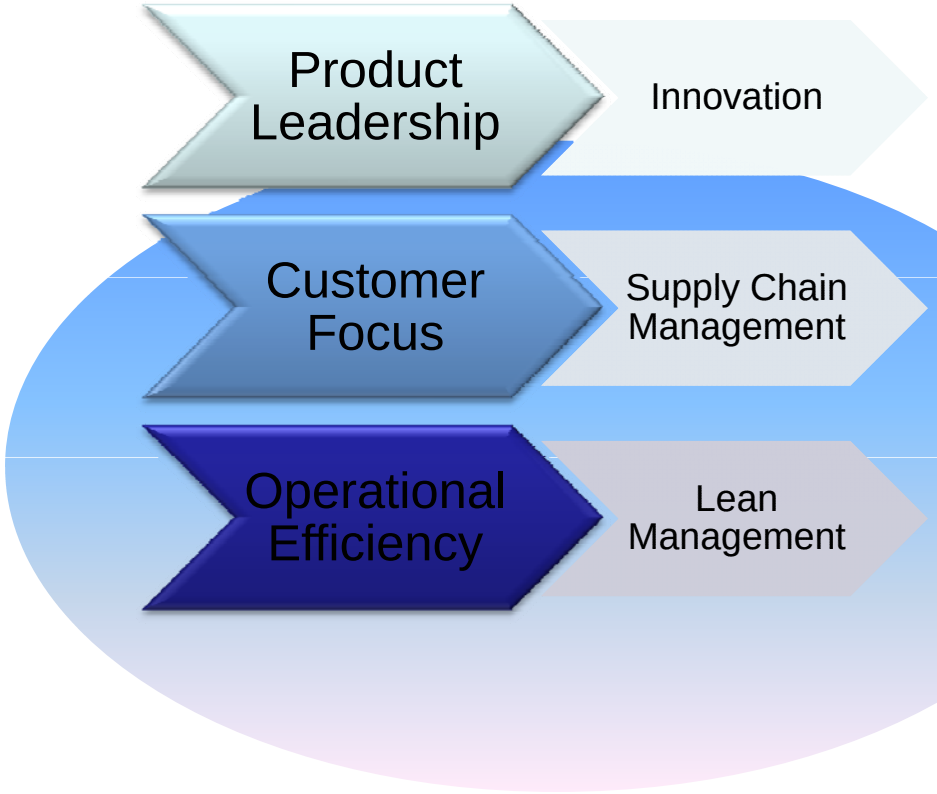
- High Volume – Low Margins
- Bargaining power
  - Retailers / Distribution chains
  - Buying Desks
- The paradigm of agricultural products
  - Unpredictable, seasonal dependent volume and quality of raw materials
  - Consumer expects quality consistent end-product
  - Consumer is used to a large variety in end-products
- ➔ Private Labels are doing well
- ➔ But: Need to structure for growth by better controlling production System



Prof.X. Gellynck
University of Ghent
Faculty Bioscience Engineering

Challenges of a Food Company

Pathways to face the challenges

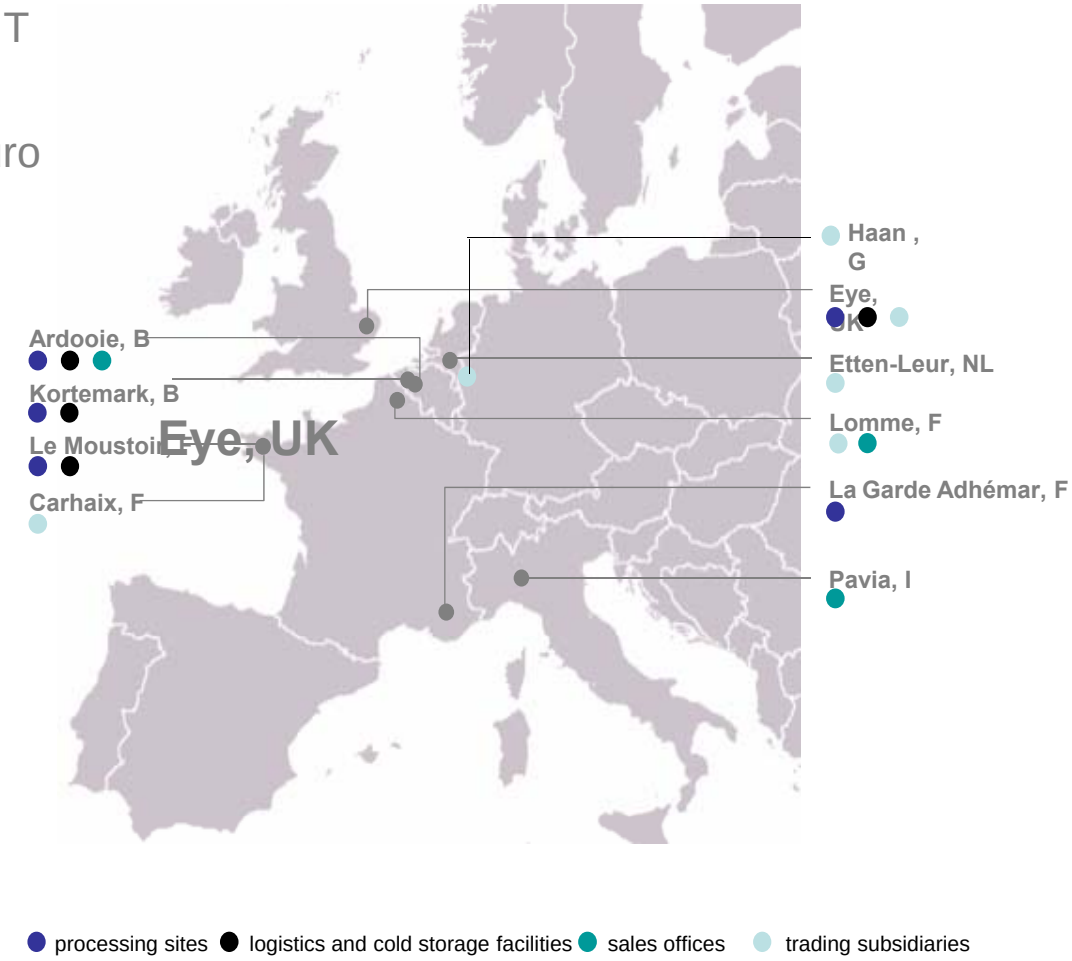


Focus of MEScontrol projects at Dujardin Foods

Prof.X. Gellynck
University of Ghent
Faculty Bioscience Engineering

Dujardin Business Overview

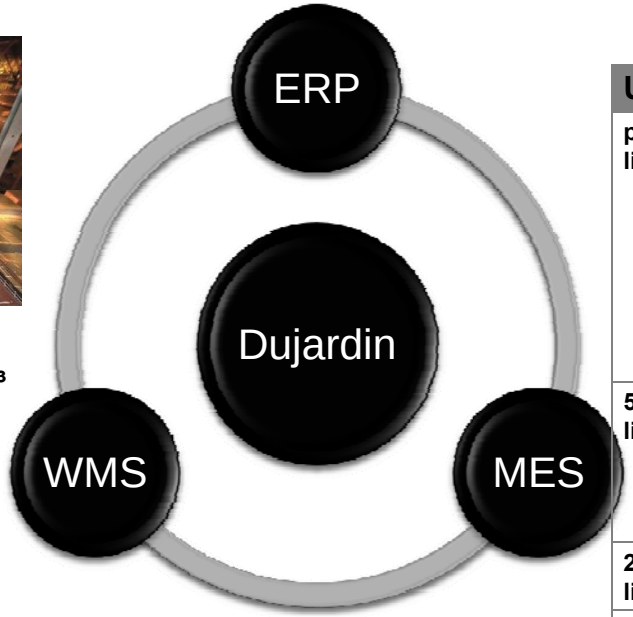
- Founded in 1974 (Unifrost)
- Turnover in Quantity: 178.000 T
  - With 120.000 T own production
- Turnover in Value: 195 Mio Euro
- Employees: 778
- Production Units: 5
- Storage Capacity: 660.000 m³ (73.100 Pallets)



The impact on the Information Management Systems

FY 06/07 Cold storage capacity in M³ and pallet places

	M³	Of which pallet places
Ardooie	320.000	46.300
Le Moustoir	125.000	9.600
Kortemark	120.000	4.800
La Garde Adhémar	40.000	7.270
Eye	5.000	1.700
Total	**610.000**	**69.670**

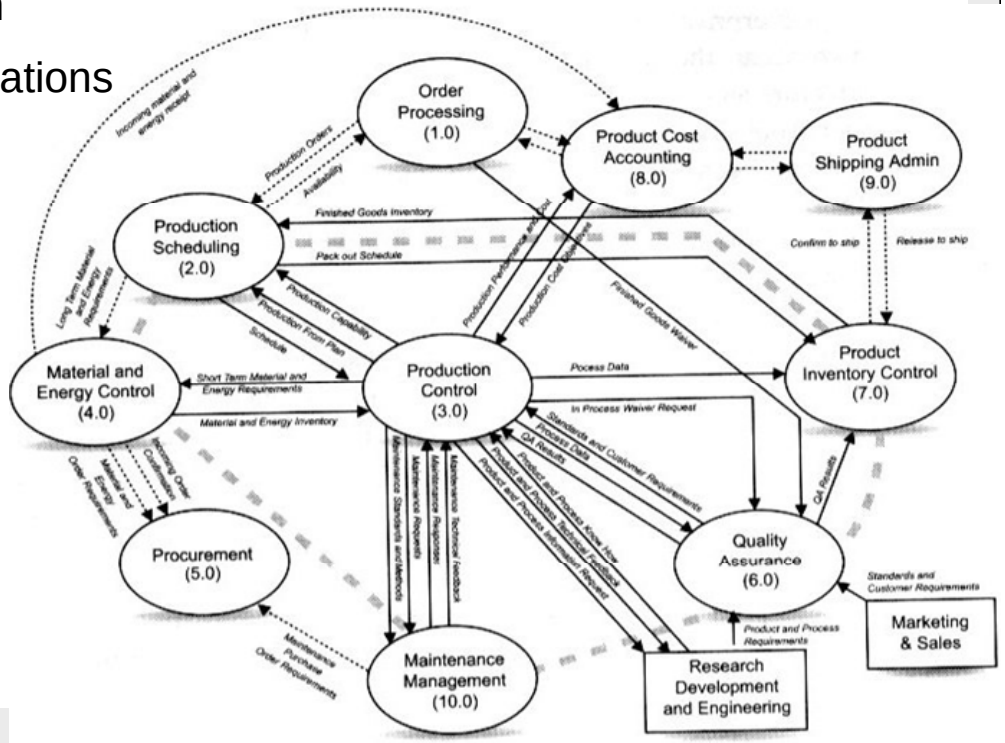


Dujardin Kortemark	
1 coating line	• year capacity of 15.000 tons
2 retail packaging lines	• each of 10.000 tons/year of which one specially equipped for the packaging of small quantities of herbs

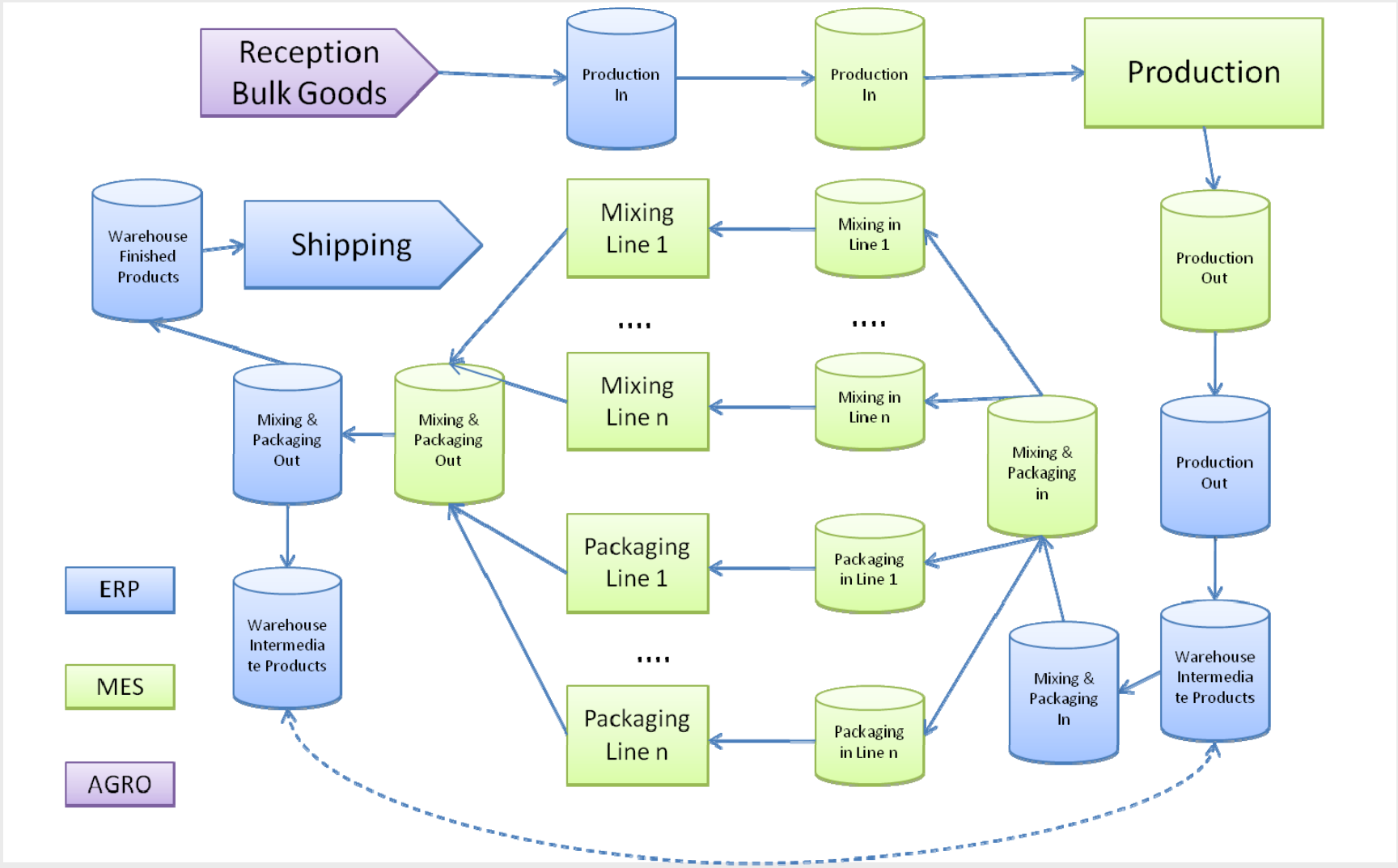
Unifrost Koolskamp	
preparation lines	• 2 preparation lines for peas of 2x20 tons/hour • 2 preparation lines for beans of 2x6 tons/hour • 2 lines for pealing carrots of 1x20 tons/hour and 1x16 tons/hour • 3 preparation lines for spinach of 3x8 tons/hour
5 production lines	• 1x20 tons/hour – all products • 1x12 tons/hour – all products • 2x9 tons/hour – all products • 1x3 tons/hour – leaf vegetables in portion
2 mixing lines	• each of 2x15 tons/hour
packaging lines	• 8 retail packaging lines, each of 12.000 tons/line/year • 1 bulkline (10-20-25 kg cartons of bags) of 15.000 tons/year • 1 packaging line for carton boxes of 8.000 tons/year • 1 outer packaging line for several (different) steambags

The Project

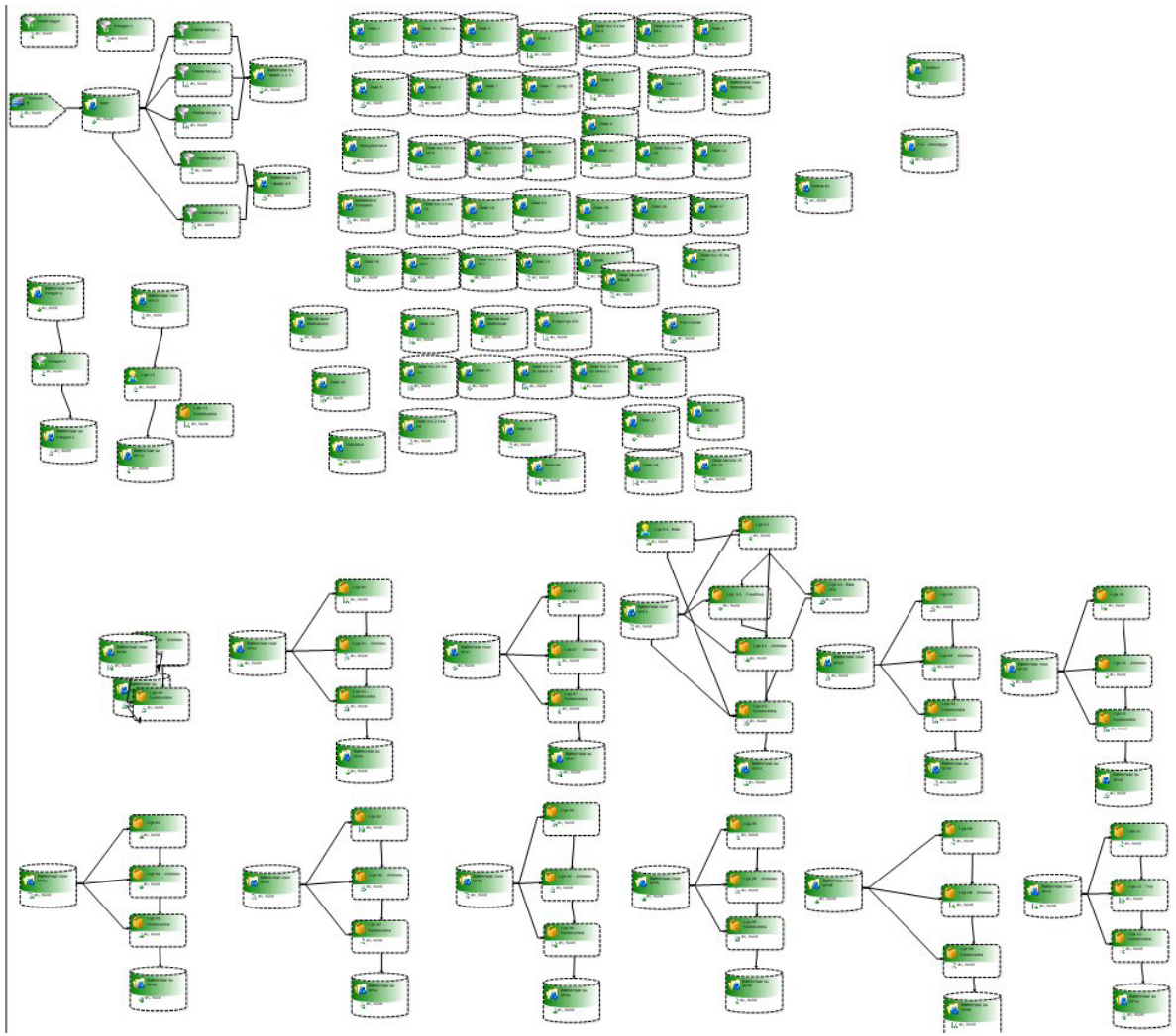
- The Need:
  - Better insight in Production and Logistical processes
  - Traceability
  - Warehousing of Bulk Products
  - Replacement old MES system
  - Take over and unify old applications



General Process Overview

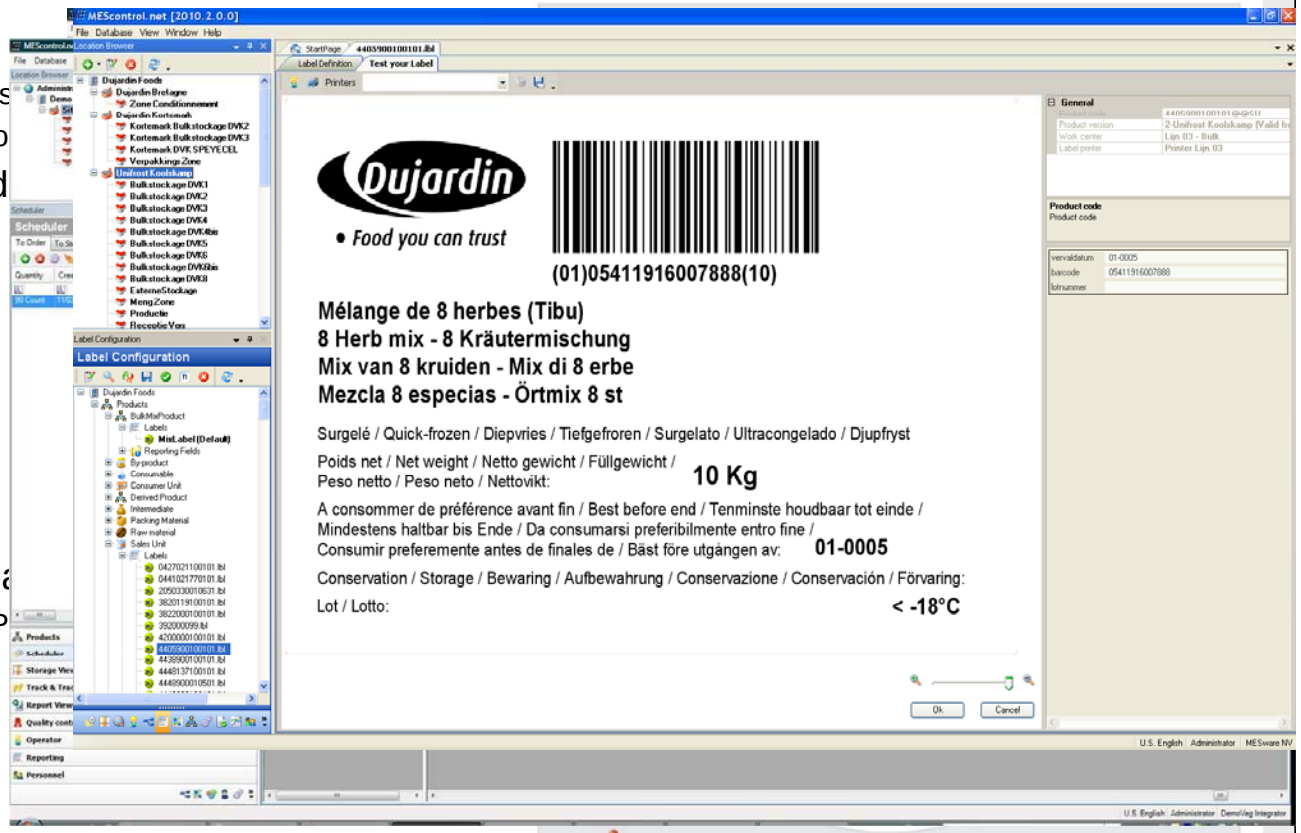


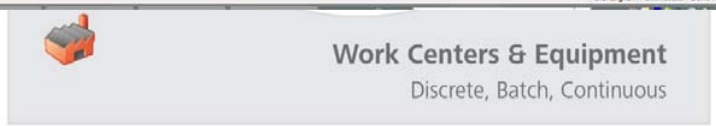
Plant Layout in MEScontrol



Major Steps

- Setting up and configuring MEScontrol for Line Control
  - Packaging lines
  - Mixing Processes
  - Production Processes
  - Personnel Registratio
- Modules implemented
  - MEScontrol base
  - Scheduling
  - Track & Trace
  - Label Management
  - Personnel
  - Operator
  - OEE
  - WMS
- Integration with other a
  - IS-Food (current ERP
  - Penta
  - Weighing bridge
  - PLC / Scada
  - ...
- OEE implementation
  - Static OEE (first step)
  - Improved OEE based upon Machine Learning

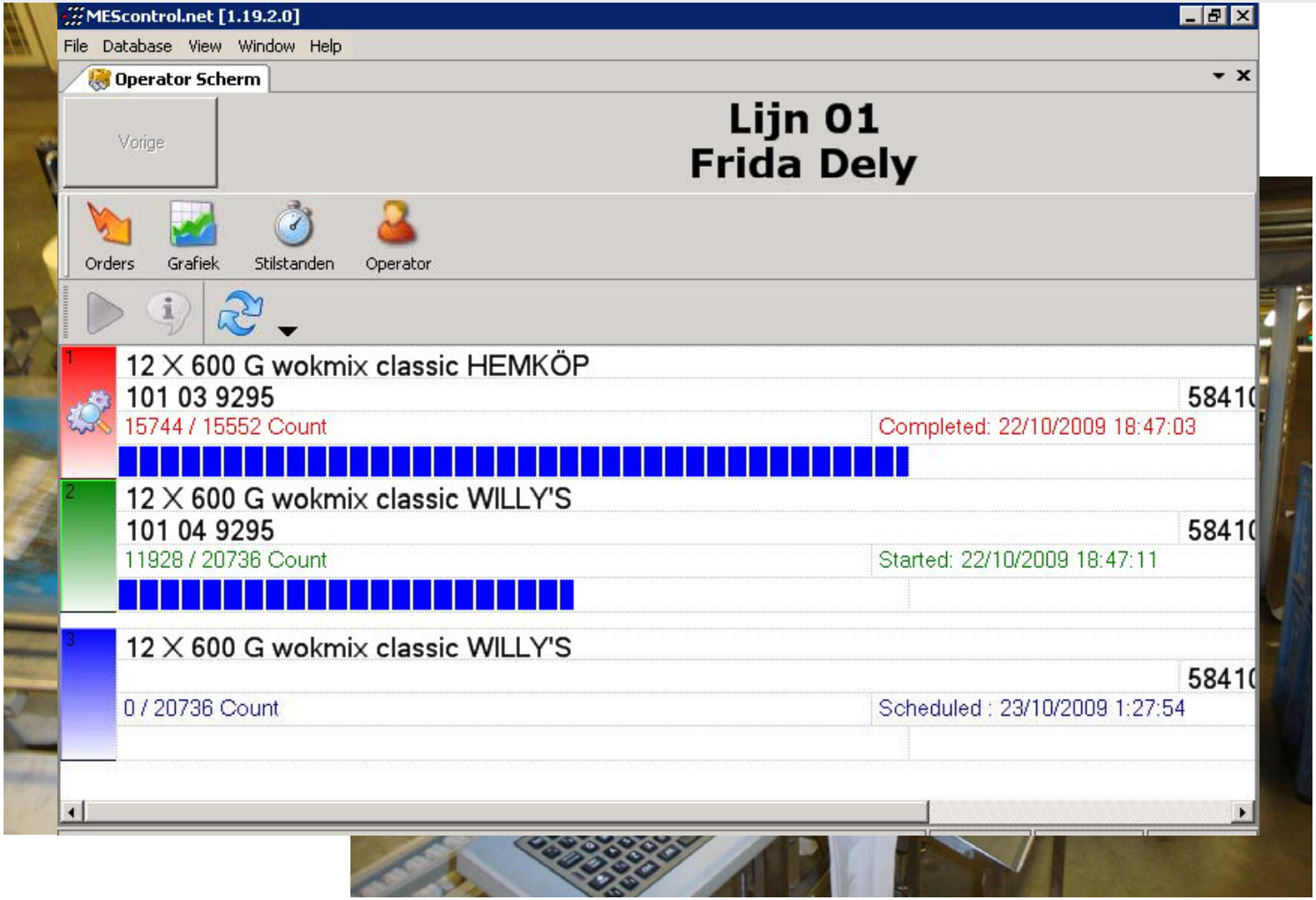




The current Implementation

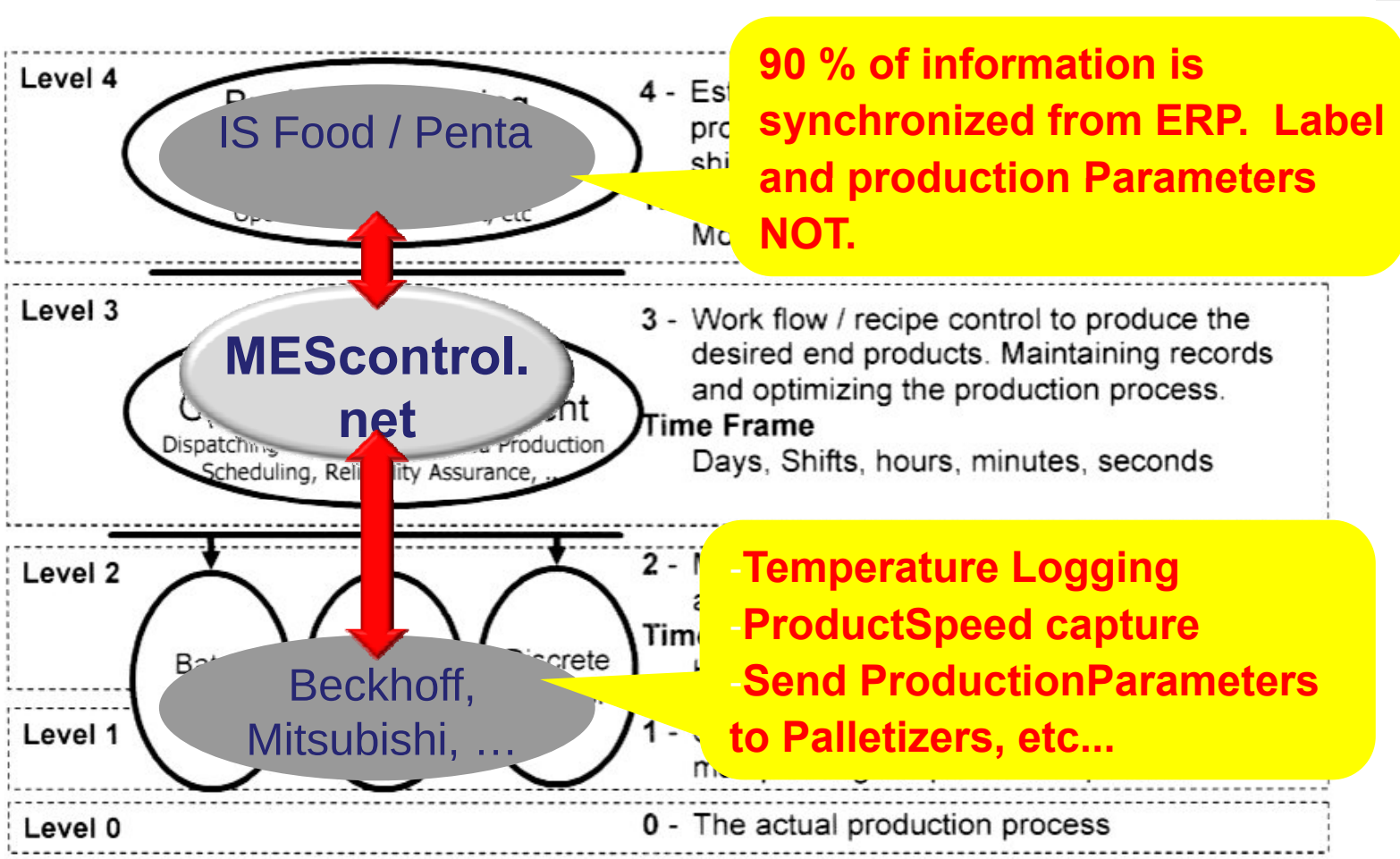
- 3 Sites that can be controlled from 1 single user environment
  - Unifrost Ardooie (B)
  - Unifrost Kortemark (B)
  - Dujardin Bretagne (FR)
- 20000 products in MEScontrol
- 80 Users defined
- 74 WorkCenters
- 115 StorageZones
- 9 Custom Reports
- > 900 Labels controlled and inline applied
- > 100 ReportingPoints

Some examples



Operator Input

Integration with Level 2 and Level 4



90 % of information is synchronized from ERP. Label and production Parameters NOT.

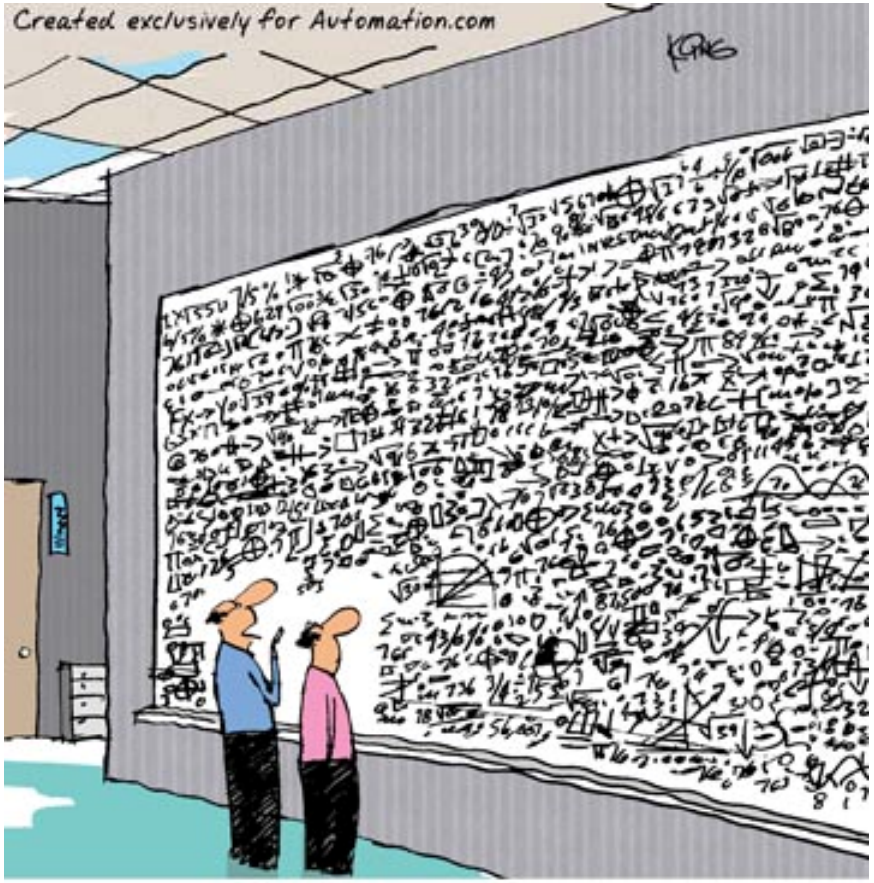
-Temperature Logging
-ProductSpeed capture
-Send ProductionParameters to Palletizers, etc...

Figure 2 - Multi-level functional hierarchy of activities

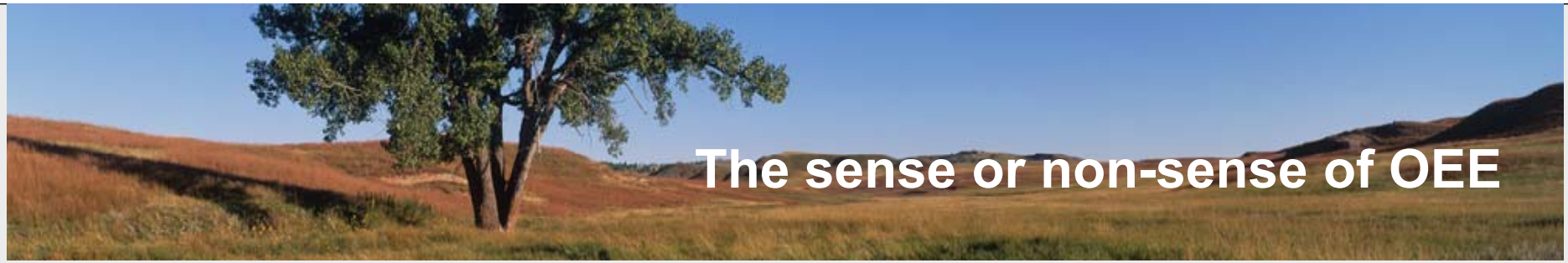
Business Objective for doing these investments

- Reduce Downtime and Rate Loss
- Reduce Running Costs
- Reduce Operating Costs
- Improve Overall Equipment Effectiveness (OEE)

  OEE = relation between scheduled & actual production
- Improve Efficiency / Reliability
- **Improve Profitability**



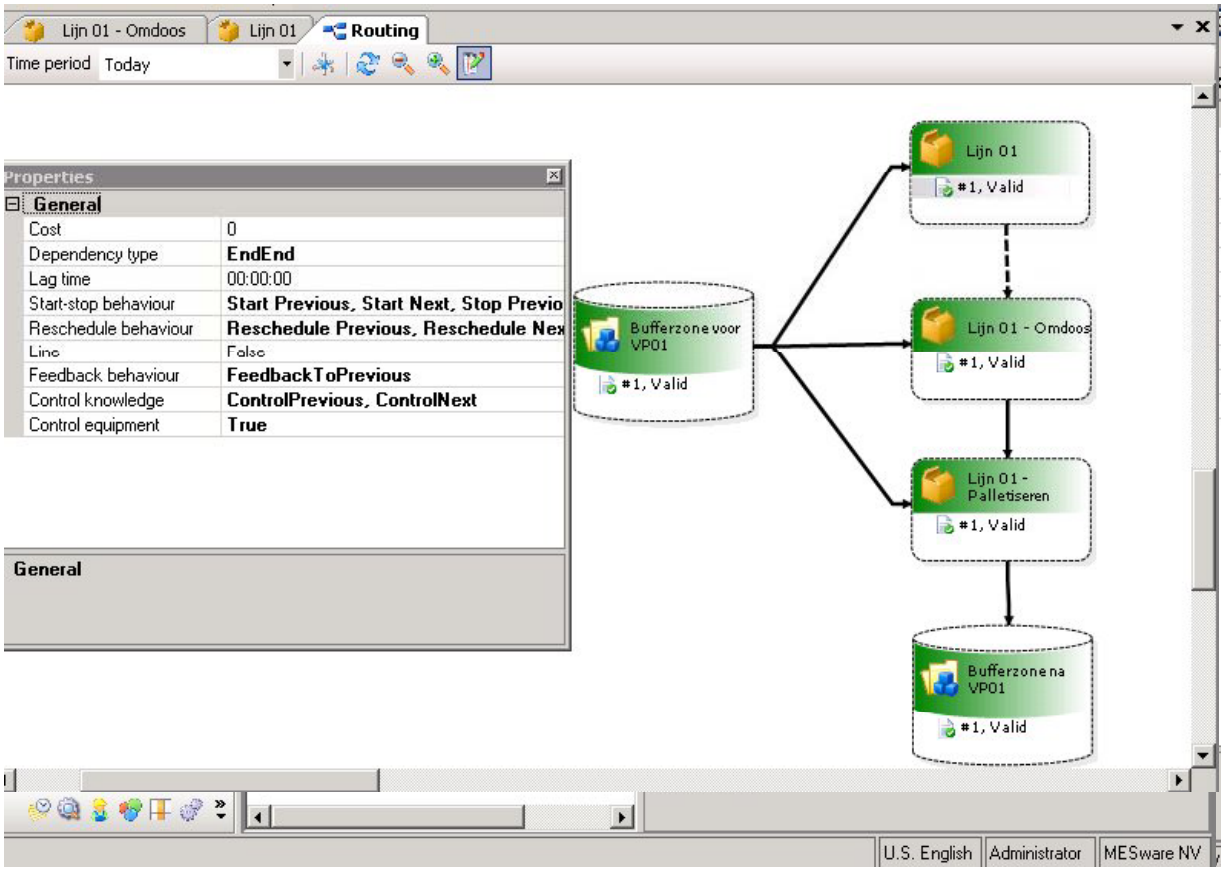
"...and that, in simple terms, is my idea on how to increase factory optimization. any questions?"



The sense or non-sense of OEE

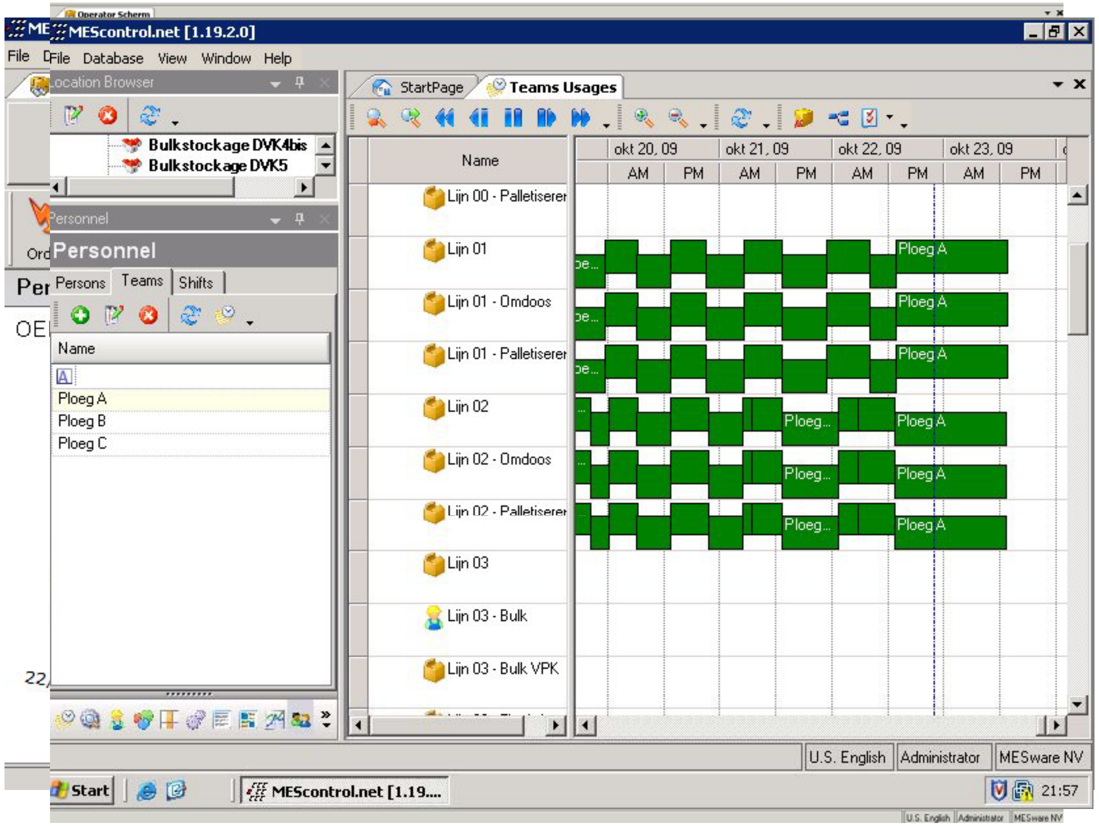
- What is OEE
  - Availability x Performance x Quality
- Measuring OEE is only as good as your measurements of the above 3 mentioned parameters
  - Availability:
    - Manual registration Vs. Inline, automatic registration
  - Performance
    - Do you know the real performance of your equipment?
    - Do you know the real performance of your equipment related to the product you are producing?
    - Is your performance of your equipment a static or dynamic known fact?
  - Quality:
    - How do you measure your quality
    - How does quality affect your routing in your production process?
    - ...

Implementation of OEE at Dujardin



Config[illegible] version

Impact on Operator



When downtime occurs, operator selects reason

Analyzing downtime

MEScontrol.net [1.19.2.0]

File Database View Window Help

Location Browser

- Bulkstockage DVK4bis
- Bulkstockage DVK5
- Bulkstockage DVK6
- Bulkstockage DVK6bis
- Bulkstockage DVK8
- ExterneStockage
- MengZone
- Productie

KPI

KPI

- Verpakkings Zone
  - Lijn 00
  - Lijn 00 - Omdoos
  - Lijn 00 - Palletiseren
  - Lijn 01
  - Lijn 01 - Omdoos
  - Lijn 01 - Palletiseren
  - Lijn 02
  - Lijn 02 - Omdoos
  - Lijn 02 - Palletiseren
  - Lijn 03
  - Lijn 03 - Bulk
  - Lijn 03 - Bulk VPK
  - Lijn 03 - FlowWrap
  - Lijn 03 - Omdoos
  - Lijn 03 - Palletiseren
  - Lijn 04
  - Lijn 04 - Omdoos
  - Lijn 04 - Palletiseren
  - Lijn 05
  - Lijn 05 - Omdoos
  - Lijn 05 - Palletiseren
  - Lijn 06
  - Lijn 06 - Omdoos
  - Lijn 06 - Palletiseren
  - Lijn 07
  - Lijn 07 - Omdoos
  - Lijn 07 - Palletiseren
  - Lijn 08
  - Lijn 08 - Omdoos
  - Lijn 08 - Palletiseren
  - Lijn 09
  - Lijn 09 - Omdoos
  - Lijn 09 - Palletiseren
  - Lijn 10
  - Lijn 10 - Omdoos
  - Lijn 10 - Palletiseren
  - Lijn 12

OEE of Lijn 01 | Loss chart 1

Compare by Count With Previous Week Product: all Team: none Exclude reason: none

Resource: Lijn 01

Filter: .

Down time loss
114

Click on chart region to see details

Top 100 loss reasons (sorted by loss count)

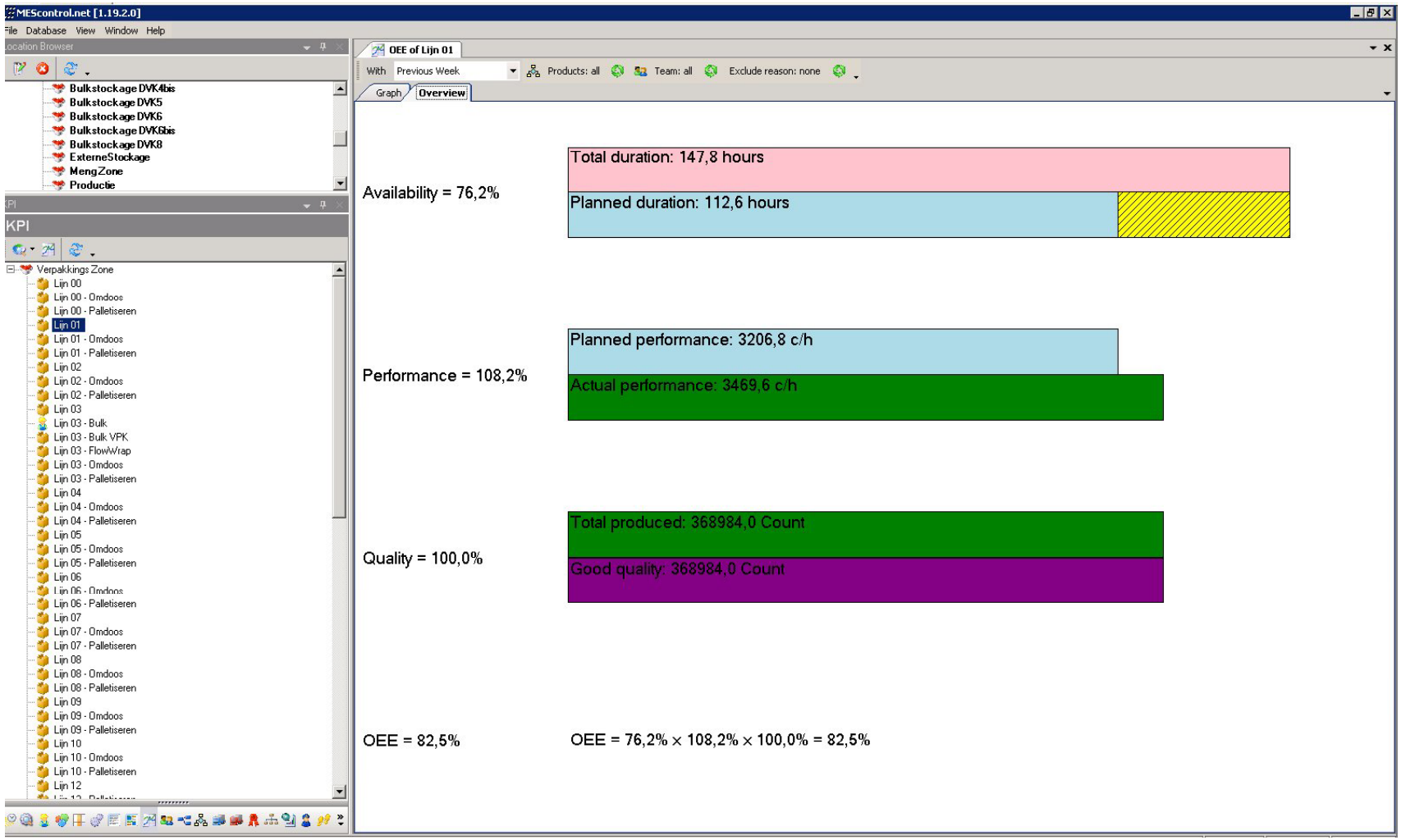
Loss reason	Count	Duration
32.01 Verpakkingsmachine.foliewissel	21	00:54:59.8451250
11.03 Kipper (s).geen product	19	00:47:59.3468750
00.03 Ombouw.standaard ombouw zonder reinigen	8	02:36:00.8028125
32.03 Verpakkingsmachine.dwarsnaad.lasbek herstellen	6	00:29:00.0258125
11.04 Kipper (s).harde kisten	3	00:04:59.9687500
40.05 Eindverpakker.doosopzet.dozen probleem	2	00:30:59.7968750
32.06 Verpakkingsmachine.dwarsnaad.andere	2	00:39:00.0010000
00.04 Ombouw.ombouw + reinigen		
33.01 Codeerapparaat.lintwissel	1	00:01:59.9843750
32.10 Verpakkingsmachine.gaatjesprikken	1	00:02:59.9531250
30.02 Weger.weegbakjes reinigen	1	00:14:59.9531250
32.11 Verpakkingsmachine.afregeling	1	00:00:59.9843750
33.04 Codeerapparaat.andere	1	00:03:59.9843750
32.05 Verpakkingsmachine.dwarsnaad.parametrage	1	00:05:59.9675000
32.13 Verpakkingsmachine.andere	1	00:11:00
00.00 Lijn op non-actief	1	20:20:52.4381250
40.01 Eindverpakker.metaaldetector	1	00:01:00
40.11 Eindverpakker.doossluiter + hotmelt of tape	1	00:00:59.9687500
30.03 Weger.weegbakjes storing	1	00:03:00.0468750
31.02 Vulsysteem (VP12).elektrisch	1	00:07:59.9687500

Top 100 validation loss reasons (sorted by loss count)

Loss reason	Count	Duration

U.S. English | Administrator | MESware NV

Analyzing OEE in Operator View



What changed since first implementation?

- The standard OEE calculation doesn’t always make sense
  - The absolute performance capacity of Equipment is often not known
  - The real performance capacity of Equipment related to a certain product version is certainly not known
  - Result:
    - OEE can be > 100%, due to incorrect knowledge about the performance capacity
    - So what does the number really say?
- How did we solve this?
  - Joint R&D between Dujardin and MESware to define correct OEE
  - Internal MESware R&D project around machine learning, based upon historical master data

The Solution

- Main objective:
  - Correcting the performance capacity (product / equipment) by means of historical data
- Steps
  - Collecting of historical performance data for each line, shift and operation related to a product version running on the line / workcenter.
  - For each shift, teamleader can validate and/or change the information. In case of a change, a reason has to be entered
  - The historical data will then be used in MEScontrol.net through our machine learning algorithms to calculate best fit performance capacity for product / equipement
  - This will be used as input for setting the corrected values in MEScontrol
- The outcome
  - Correct OEE calculations
  - Improved scheduling possibility based upon real capacity

What did we learn

- Improving your production efficiency is a continuous process. Consequently, implementing MES is too.
- Implementing MES should start from your business processes, not from your tool. Rubbish in = Rubbish out
- Define upfront your boundaries ERP – WMS – MES. Tools overlap, make sure you have a clear view on the overlap, and make the decisions convenient for your business.
- Success depends on commitment and involvement from
  - Management
  - IT-team (if present)
  - Key users on shopfloor
- Improving company efficiency is more than calculating OEE.

Next Steps

- Short Term:
  - Implementation and integration of a new ERP system in first site at Ardooie - Belgium
- Middle Long Term
  - Roll-out of ERP – MES environment to all applicable production environment
  - Enhanced Reporting and Management Dashboards for better insight in production efficiency

Questions ???

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