1 year later: From trends to real liquid food applications

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Place: Gavle Sweden

VÄLKOMNA

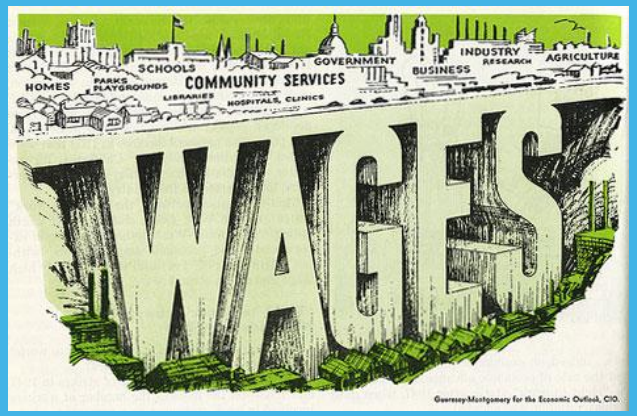
@ M.T.F.

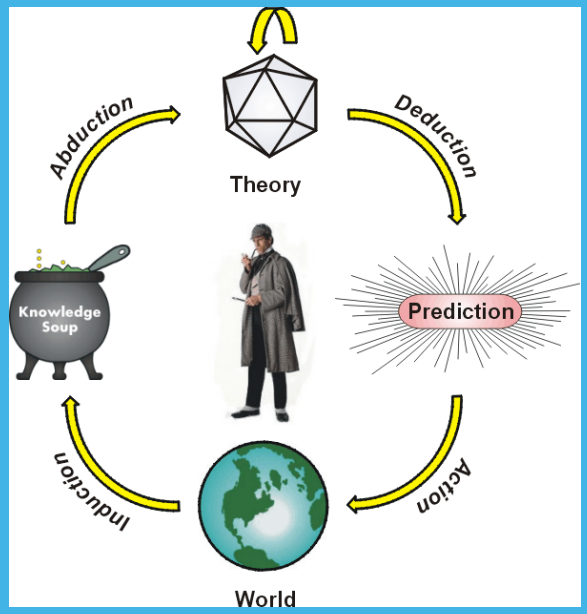
Agenda

- **last year we introduce this trends**
  - Rising cost of energy
  - Carbon foot print
  - Food safety
  - Batch management
  - 7 Billion peoples moving fast to 9 in 2050

- **This year, some real solution examples**
  - CIP & Energy audits
  - Dairy Industrial Process
  - Dryer Advance industrial Process
  - Advance control optimization
  - Energy Monitoring
  - Energy & continuous Optimization

Trends, Implications, Possibilities & Solutions





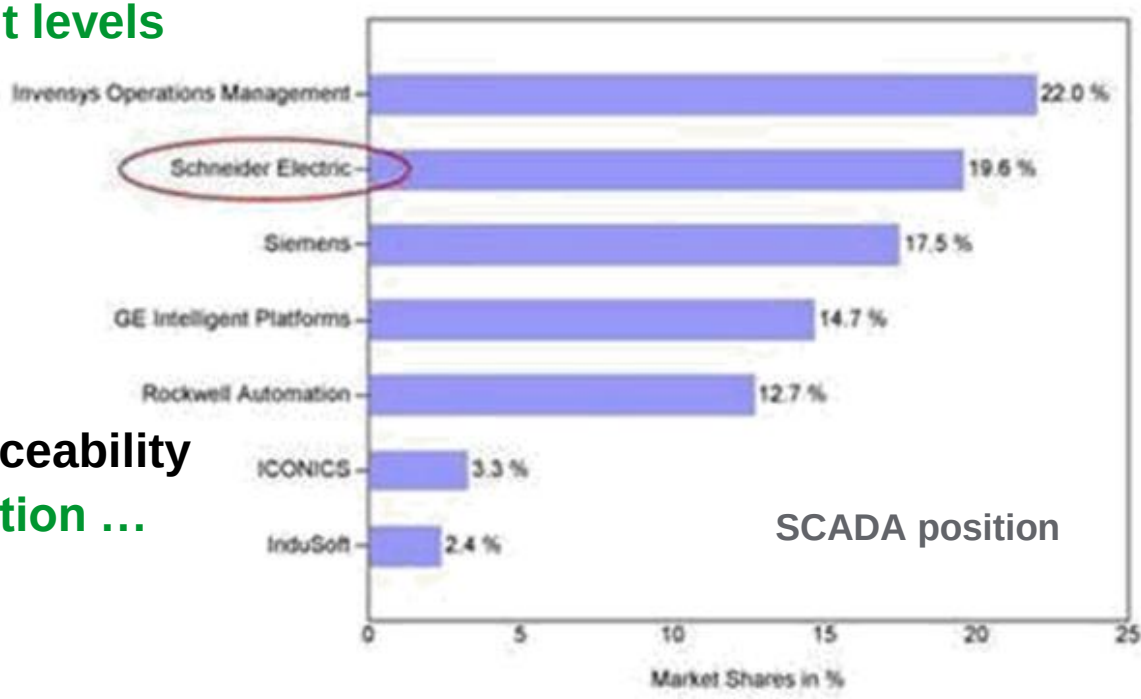
Food safety

- **Food Safety is not negotiable.**
  - **Chinese 5 years plan due by 2015**
  - **Some frequent bad stories in the newspapers …**

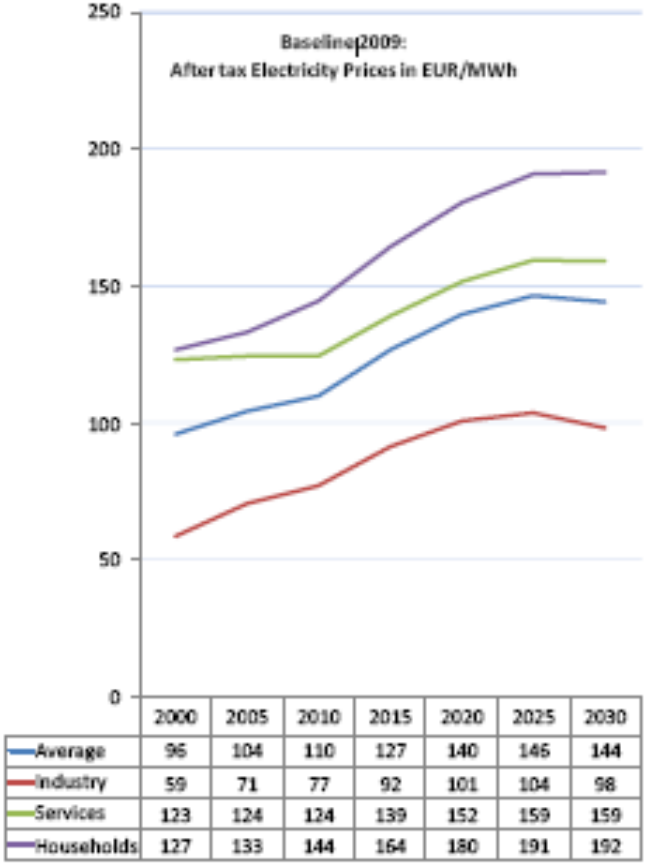
- **No companies is willing to cut corners anymore**
  - **Recipe management is an issue for traceability**
  - **Large companies put on the market 3 to 4 new products every day**
    - **91% will be stopped within 6 months**
    - **The other being copy within 6/9 months**

- **Manage traceability at different levels**
  - **At the supervision level &**
  - **In the core of the process**
  - **Optimize costs**

- **Combine**
  - **SCADA type traceability**
  - **Machine level HMI local traceability**
  - **Data centers, CIP Optimization …**

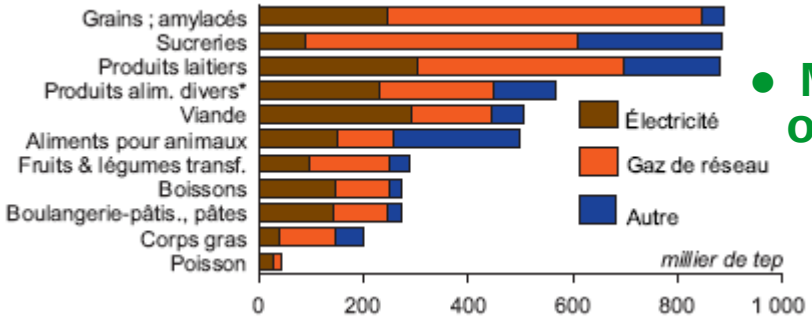


WAGES cost



	2000	2005	2010	2015	2020	2025	2030
Average	96	104	110	127	140	146	144
Industry	59	71	77	92	101	104	98
Services	123	124	124	139	152	159	159
Households	127	133	144	164	180	191	192

- **European Commission state that WAGES cost will increase by 80% from 2000 to 2030**
  - **Green push from consumers through supermarkets, End Users, Process & machine OEMs specialists…**
- **Reduce margin.**
  - **WAGES is the last source of progress**
  - **Green push from consumers force to reduce energies year after years.**
  - **Ernst & Young 2012 report that 76% of the F&Bev companies report on Sustainability & 93% will within 5 years.**
  - **Dairy one of the most energy demanding F&Bev industry**
- **Invest to be continuously sustainable or wait & solve in emergency the profitability erosion**



- **Monitor, analyze vs production, continuously optimize because the only good watt is a Negawatt!**

Pragmatism & risk management

- Reduce CAPEX & TTM to be ready at dairy deregulation date

- Re-use global solutions from leaders.
  - Electrical portion of a typical CAPEX is between 3 & 5%
  - but represent 80% of the risks…

- Use leading partners already familiar with **EcoStruxure**
  - Process OEMs, Packaging / bagging M OEMs, SI
  - Build on other End Users examples

- Act as business partners :
  - Tested Architectures, solution support, Liquid Food library
  - Open network standard, CIP & advance control optimization
  - Open SCADA, global Energy Efficiency solutions (from Financial aspects, dynamic dashboard down to power-meters)
  - First class packaging solutions


• 7 Billion peoples moving to 9Bp in 2050
• 40% to 60% of the raw material is wasted in rich countries

CIP & Energy audits

CIP | Water and Chemical Savings

- **Project Goals:**
  - Double Production in next 4 years
  - Improve Competitiveness + Reduce Energy Bill & flexibility
  - Guarantee Food Safety
  - Be more Sustainable and Green
  - Improve Market Share

Improvements

Flowmeter :

- Potential improvement by setting rinsing volume rather than rinsing time
- Important leaks to fix
- Analog flow meter on outlet lines and replace digital flow switch on inlet lines by an analog flow meter

Improvements

Solutions sorting :

- 2 conductivity meters and one temperature transmitter out of order
- Better respond time of new generation of conductivity meter

Beneficies

> **Reduction in water & chemical consumption**

> **Cleaning efficiency**

> **Better solutions sorting**

Energy and chemical saving

CIP | Savings by optimizing your asset

Improvements

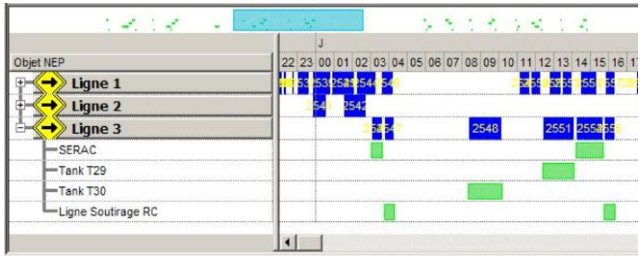
Optimization of cleaning
- Value control and monitoring of trends
- Occurrence of cleaning equipment for monitoring gaps and warning of over-consumption
- Highlighting of dysfunctions

Individualization of washes
- Setting for each line or tank (speed, time, volume)
- Value adjustment
- Overhaul cleaning procedures

Occupancy rate of lines
- Monitoring washes

Traceability & compliance
- Report and database storage

Complementary Energy Monitoring system
•Energy used monitoring (Wages, Chemical,…)



Beneficies

> Optimization & traceability
> Continuous Improvement
> Better chemical sort
> Improve productivity and availability

CIP | Self cleaning & Piping design

Improvements

Self Cleaning :

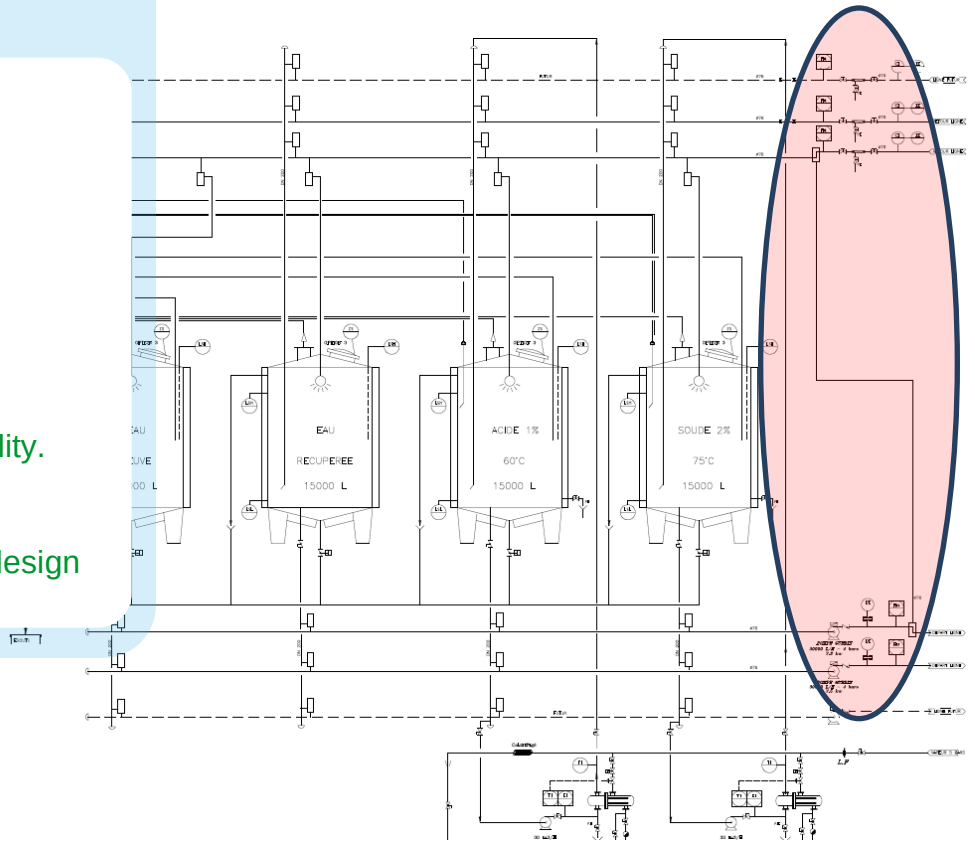
- Food safety
- Compliance to regulation
- Tanks equipped with spray ball ? Must be verified.

Solution 1:

- The design of CIP must be study to allow this functionality.

Reminder:

- Start a CIP line always with water (The line D was not design in such a way).



Beneficies

> **Food Safety**

> **Easier & safer cleanability**

Electricity Savings | VSD in CIP Pumps

Improvements

Adjusting Flow Rates:

- Introduction of variable speed drives (6 potential VSDs - 4 CIP lines pumps and 2 recirculation pumps)
- replacing proportional valves.
- Adjustment of sending flow rates with independent cleaning recipe parameter
- Adjust the flow due to process flow needs.

Pump Power

- VSD Installation

Note : Verification of power of pumps installed. The power must be adapted t flow and pressure required.

2 x Pumps 9 kW
1 x Pump 7kW
1 x Pump 5kW
2 x Pumps 2kW

Benefits

> **Reduction in Energy Comsumption**

> **Better use of soda and acid in CIP**

> **Energy Savings due to flow control.**

Consumption – 215 MWh/year

Savings up to – **60 MWh/year**

ROI: 1 ~ 5 years.

up to 30% energy saving

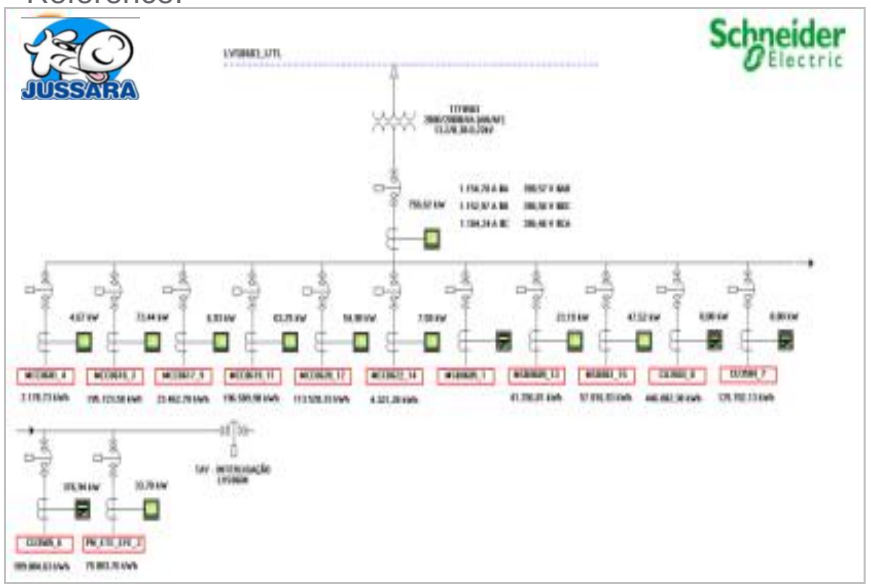
Electricity Savings | EMS

Improvements

Energy Manager System:

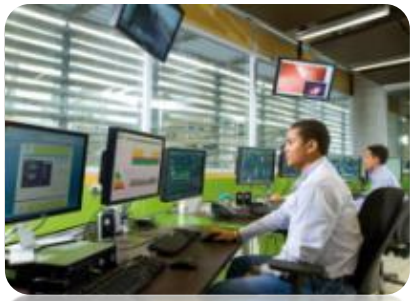
- 01 x Energy Enterprise | SPM7.0;
- 03 x Steam Meters;
- 02 x Water Meters;
- 01 x ION 7550 (electric meter with quality analyses);
- 05 x Power Meters | PM710);
- 01 x Power Meter | Enercept 1600A (Generators Set)

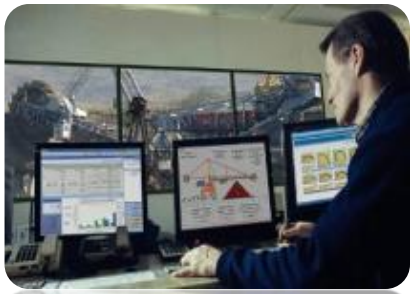
Reference:



Beneficies

> **Control all comsuption utilities** (eletricity, water, steam)
> **Control de quality of the energy offer to the dealer (CPFL)**





Electricity Savings | Cooling Tower System

Improvements

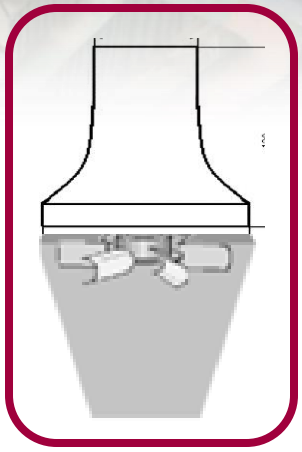
Adjusting Flow Rates:
Introduction of variable speed drives in Colling Towers Fans and Pumps sending flow rates with factory needs.

Pump and Fan Power
•VSD Installation

Exhaust Extension
•Install that to have the exhaust condensantion over the Wall

Grill in the Wall
•Install the Grid in tha Wall to have better air recirculation

•**Note** : Verification of power of pumps installed. The power must be adapted to flow and pressure required.



Benefits

++ Better efficiency of CT System
(The right speed for the equipment)
+ Water Savings
+ Mechanical wear
+++ Reduce Power Consumption
+ lower footprint (ATV32 book form factor

Electricity Savings | NH_3 Compressors

Improvements

Compressors NH3 | HVAC System:

- Apply Variable Speed Drive (VSD) to flow control, balance the operations moduling the VSD function to supply with the real necessity to the process

Beneficies

> **Power factor**
> **Mechanical wear**

up to 15% energy saving

Electricity Savings | Internal Ligthing

Improvements

Internal Lighting | TLD 40W:

- Change the fluorescent (02 x TLD 40W) and ballasts from 02 x T5 25W & Hi efficiency ballasts keeping the same luminance level

Beneficies

> **Life of cicle (> 25.000h)**
> **Hi level quality of reproduction colors**
> **Keeping the fixtures e infrastructure**

Electricity Savings | Internal Ligthing

Improvements

Internal Lighting | TLTRS 110W:

- Change the fluorescent (02 x TLTRS 110W) and ballasts from 02 x T5 73W & Hi efficiency ballasts keeping the same iluminance level

Beneficies

> **Life of cicle (> 25.000h)**
> **Hi level quality of reproduction colors**
> **Keeping the fixtures e infrastructure**

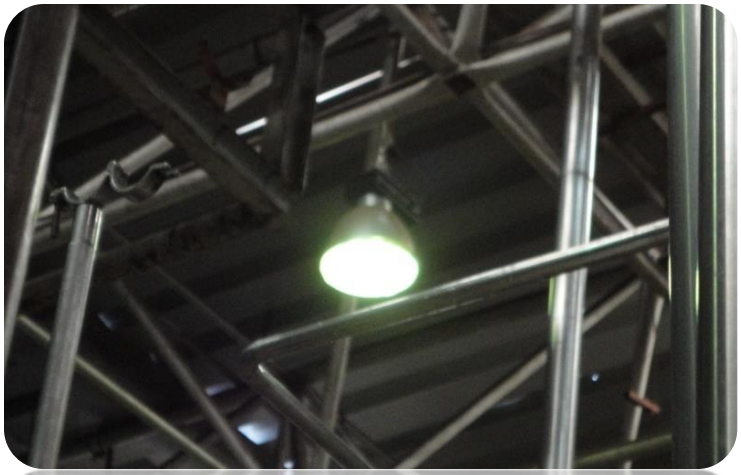
up to 36% energy saving

Electricity Savings | Internal Ligthing (Warehouse)

Improvements

Internal Lighting | Hi Intensity Discharge (HID) | Warehouse:

- Change the fixtures with Metal Halide to LED Schneider fixtures with 127W dimmable , IP 65



Beneficies

> Life of cicle **(> 100.000h L70)**
> Hi level quality of reproduction colors
> Keeping the fixtures e infrastructure

up to 70% energy saving

EcoLEDgy Driven

Electricity Savings | ETA Pumps

Improvements

ETA Pumps:

- Apply Variable Speed Drive (VSD) to control the pumps between the two tanks with 322.000 l and the plant

Beneficies

> Flow control to deliver the factory the real water emand
> Mechanical wear

up to 30% energy saving

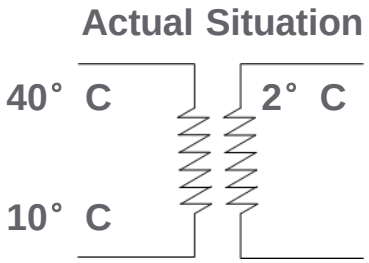
Electricity Savings | Compressed Air Dryer

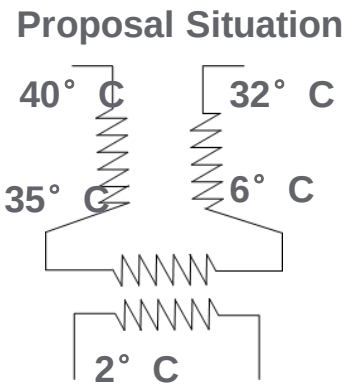
Improvements

- Change the Heat Exchanger design and pipes.
- Better Dryed Air with less losses.
- Savings due to a better use of available temperature
- Heat Recover in the right cycle to make the most with the DEW Point temperature and pression.

Benefits

+++ Energy Savings in Chilled Water Process due to a better use of the DEW point pressure and temperature from the Compressed air.





up to 30% energy saving

Fuel Savings | Whole System

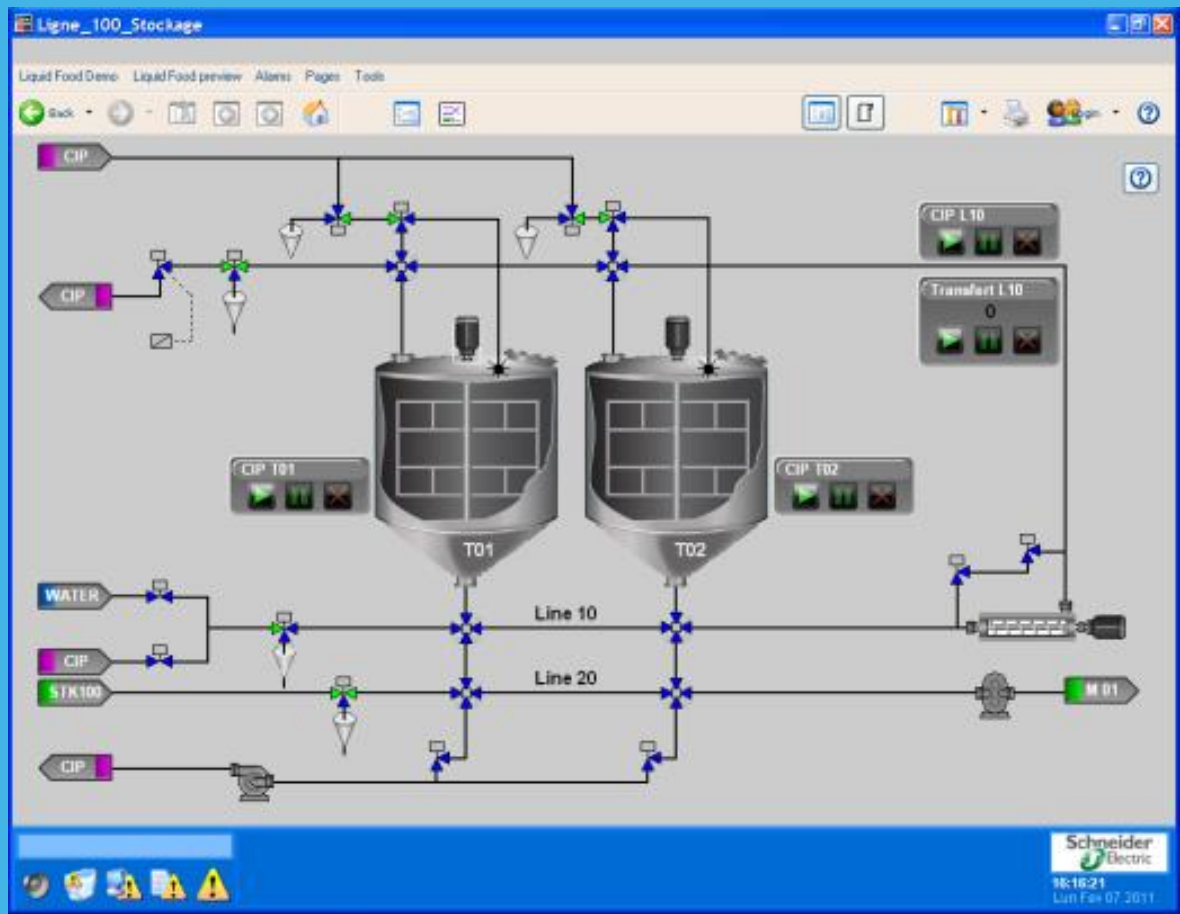
Improvements

- Boiler heat recovery to new central HW system
- Steam leak elimination
- Condensate management
- Insulation
- Use new central hot water system for heating instead of steam for select loads
- Power generation?

Benefits

+++ Safety, comfort, reduced energy and emissions, fuel available for other uses

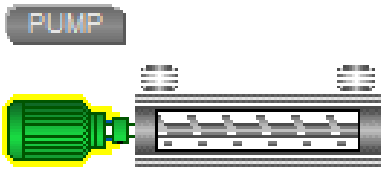
Dairy Industrial Process



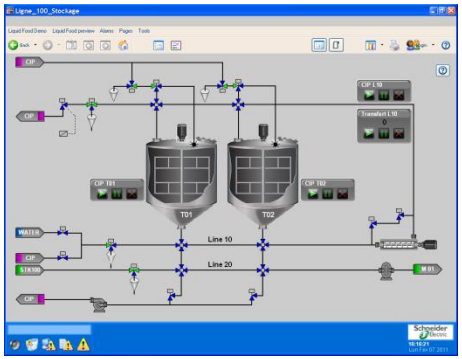
Liquid Food Library

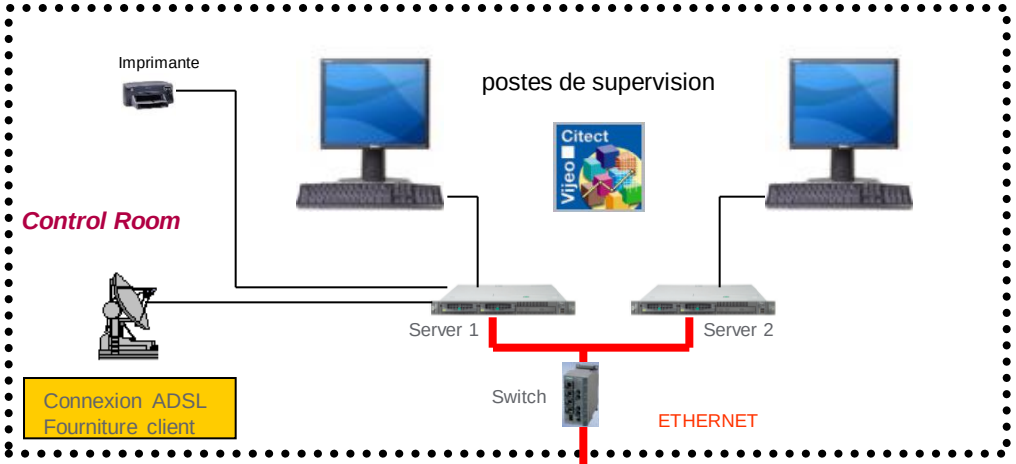
- Add Liquid Food Specific Valves and Motors
- Add process + supervision + fault management blocks
- Add CIP & WAGES related blocks

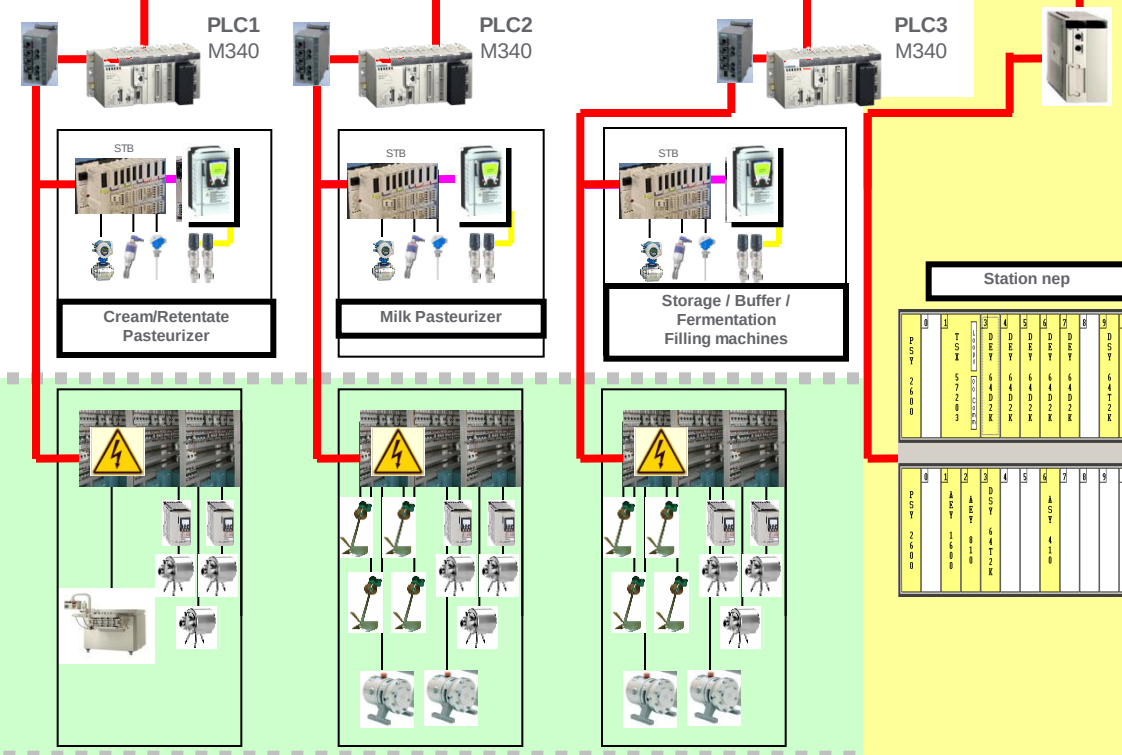
- To:
  - Simplified Butterfly and Shut-off valves
  - Change-Over valves (3 or 4 ways) with indication of fluid direction
  - Mixproof valves (3 or 4 ways) with leakage chamber cleaning
  - Agitator and Pumps with cyclic operation
  - …

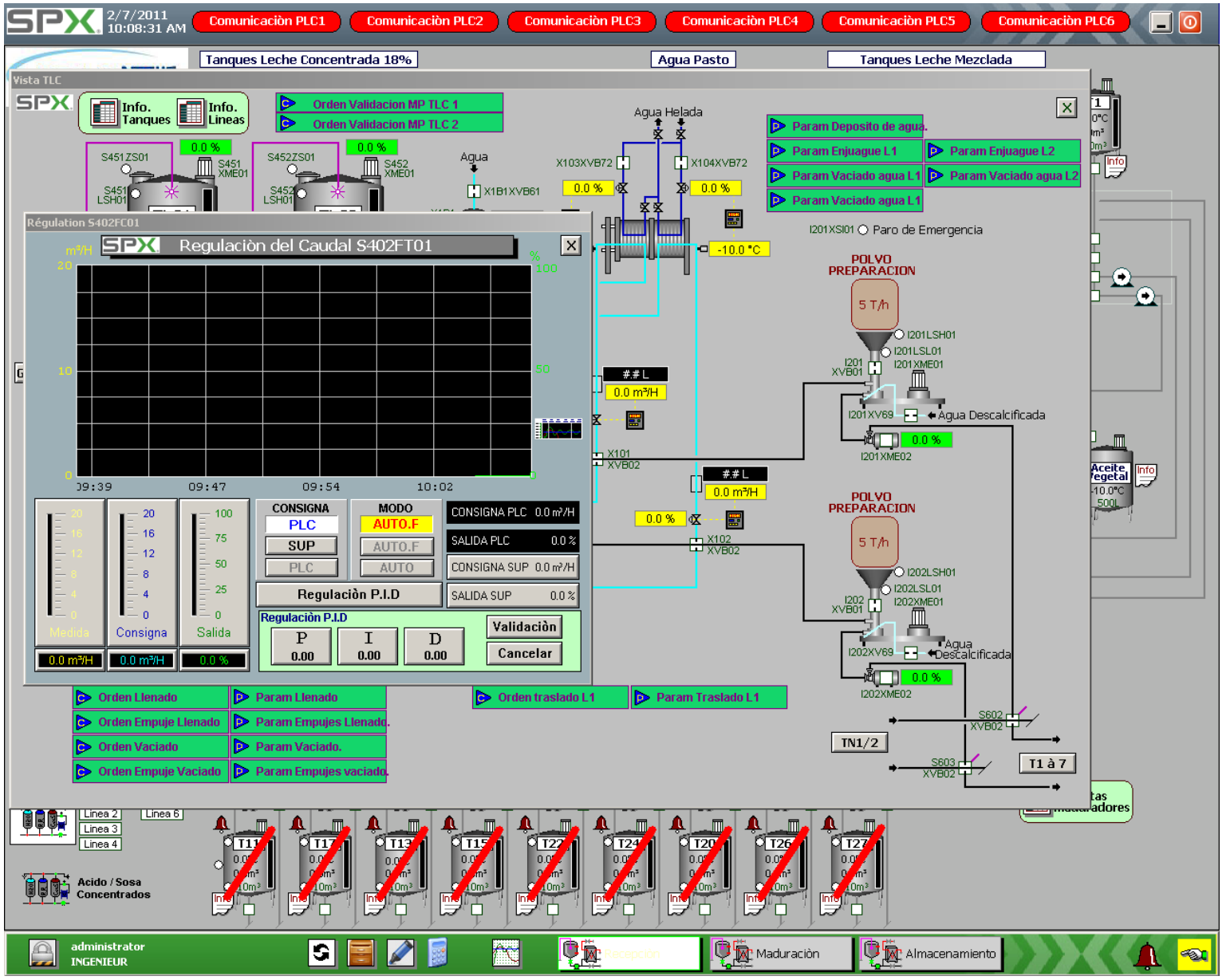


From 60 to 200t/d





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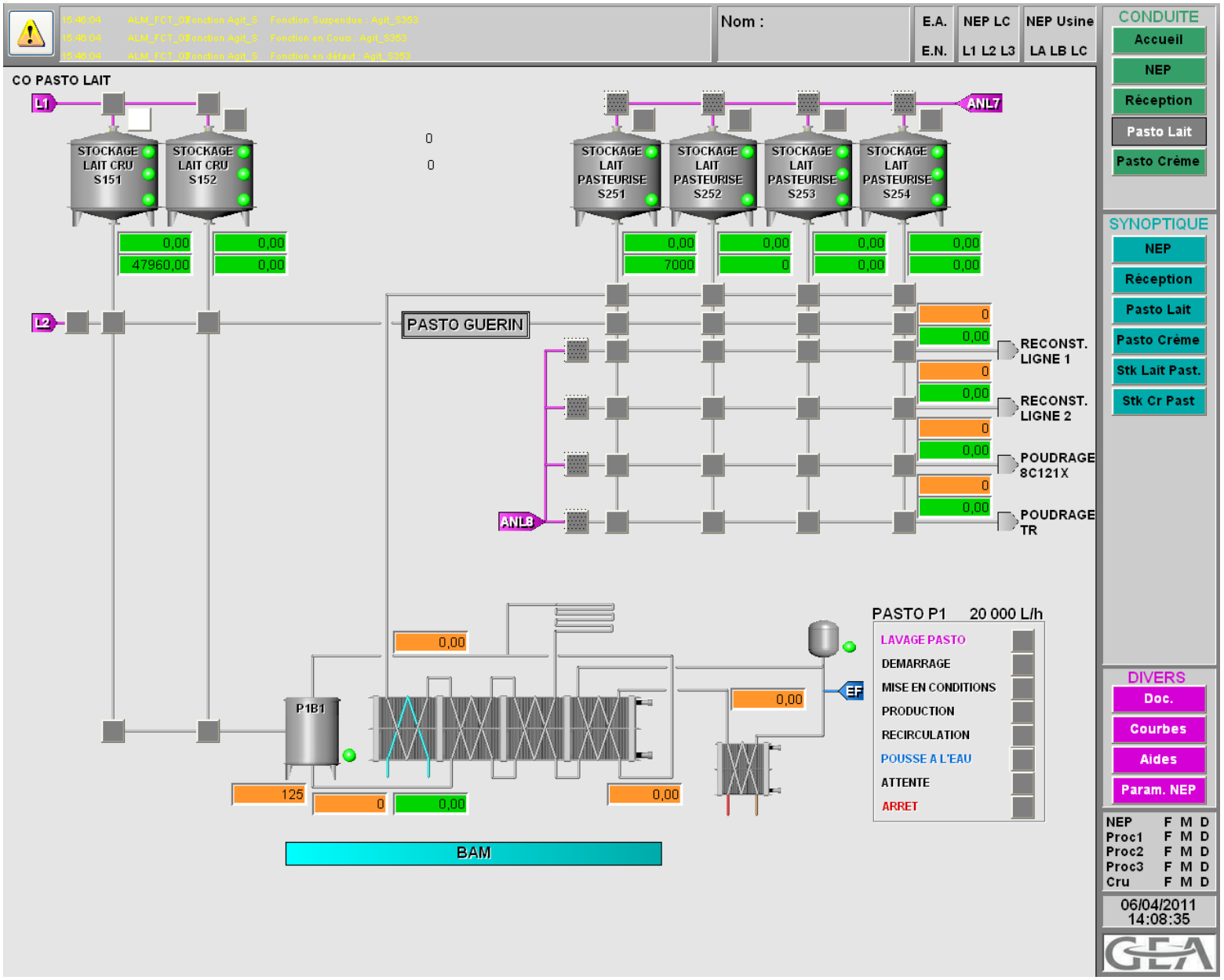
10:08:31 AM
Comunicaciòn PLC1
Comunicaciòn PLC2
Comunicaciòn PLC3
Comunicaciòn PLC4
Comunicaciòn PLC5
Comunicaciòn PLC6
Tanques Leche Concentrada 18%
Agua Pasto
Tanques Leche Mezclada
Vista TLC
Info. Tanques
Info. Lineas
Orden Validacion MP TLC 1
Orden Validacion MP TLC 2
Agua Helada
Param Deposito de agua.
Param Enjuague L1
Param Enjuague L2
Param Vaciado agua L1
Param Vaciado agua L2
Paro de Emergencia
Régulation S402FC01
Regulaciòn del Caudal S402FT01
CONSIGNA
MODO
PLC
SUP
AUTO.F
AUTO
Regulaciòn P.I.D
CONSIGNA PLC
SALIDA PLC
CONSIGNA SUP
SALIDA SUP
Medida
Consigna
Salida
Validaciòn
Cancelar
POLVO PREPARACION
5 T/h
Agua Descalcificada
Orden Llenado
Param Llenado
Orden Empuje Llenado
Param Empujes Llenado.
Orden Vaciado
Param Vaciado.
Orden Empuje Vaciado
Param Empujes vaciado.
Orden traslado L1
Param Traslado L1
TN1/2
T1 à 7
Linea 2
Linea 3
Linea 4
Linea 6
Acido / Sosa Concentrados
administrator
INGENIEUR
Recepciòn
Maduraciòn
Almacenamiento


Nom :
E.A.
E.N.
NEP LC
L1 L2 L3
NEP Usine
LA LB LC
CONDUITE
Accueil
NEP
Réception
Pasto Lait
Pasto Crème
SYNOPTIQUE
NEP
Réception
Pasto Lait
Pasto Crème
Stk Lait Past.
Stk Cr Past
DIVERS
Doc.
Courbes
Aides
Param. NEP
CO PASTO LAIT
L1
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STOCKAGE LAIT CRU S151
STOCKAGE LAIT CRU S152
STOCKAGE LAIT PASTEURISE S251
STOCKAGE LAIT PASTEURISE S252
STOCKAGE LAIT PASTEURISE S253
STOCKAGE LAIT PASTEURISE S254
ANL7
ANL8
PASTO GUERIN
RECONST. LIGNE 1
RECONST. LIGNE 2
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POUDRAGE TR
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PASTO P1 20 000 L/h
LAVAGE PASTO
DEMARRAGE
MISE EN CONDITIONS
PRODUCTION
RECIRCULATION
POUSSE A L'EAU
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Proc2 F M D
Proc3 F M D
Cru F M D
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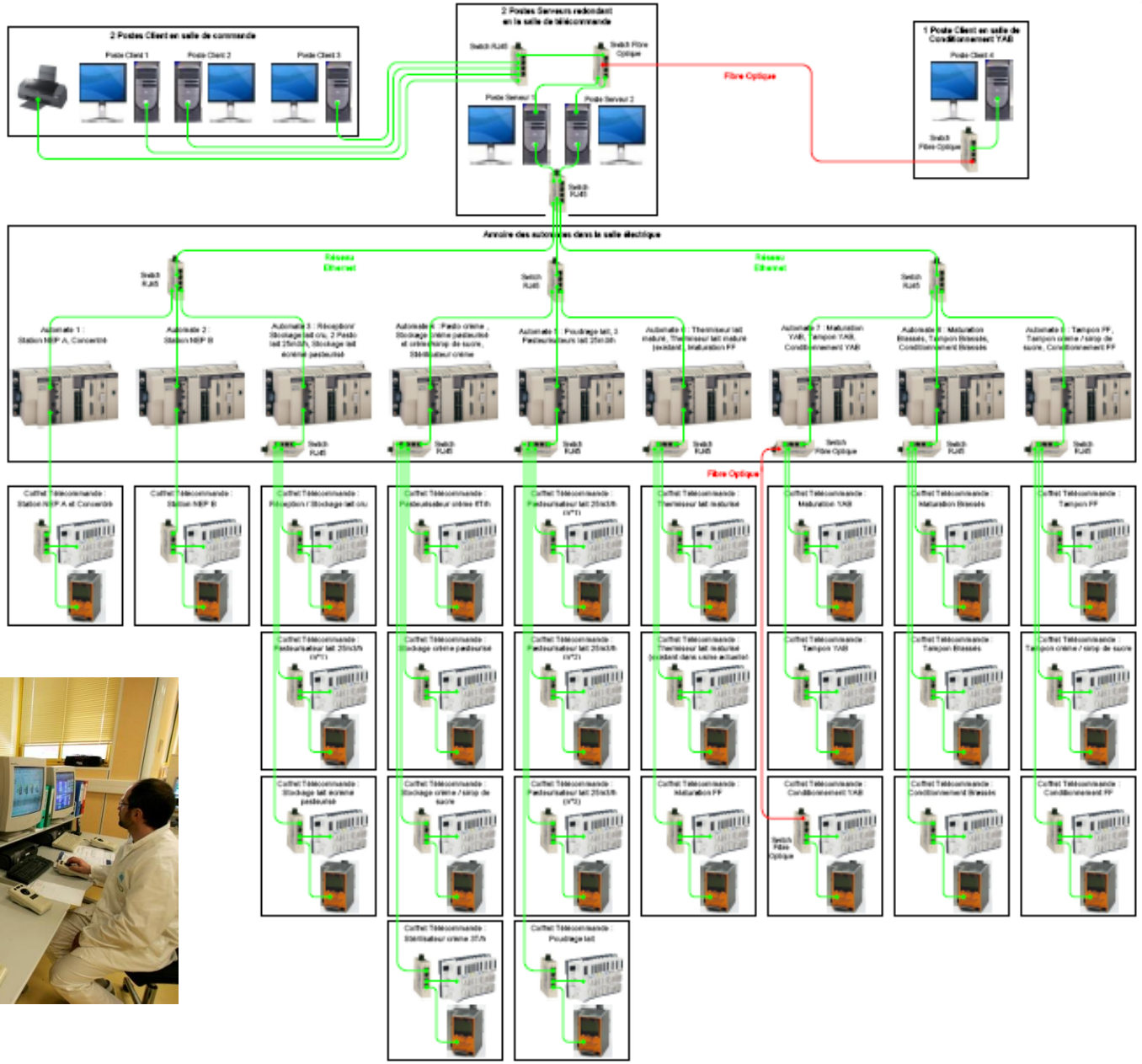

2 Postes Client en salle de commande
Poste Client 1
Poste Client 2
Poste Client 3
2 Postes Serveurs redondant en la salle de télécommande
Switch RJ45
Switch Fibre Optique
Poste Serveur 1
Poste Serveur 2
Switch RJ45
Fibre Optique
1 Poste Client en salle de Conditionnement YAB
Poste Client 4
Switch Fibre Optique
Armoire des automates dans la salle électrique
Réseau Ethernet
Réseau Ethernet
Switch RJ45
Switch RJ45
Switch RJ45
Automate 1 : Station NEP A, Concentré
Automate 2 : Station NEP B
Automate 3 : Réception/ Stockage lait cru, 2 Pasto lait 25m3/h, Stockage lait crème pasteurisé
Automate 4 : Pasto crème , Stockage crème pasteurisé et crème/sirop de sucre, Standardisateur crème
Automate 5 : Poudrage lait, 3 Pasteurisateurs lait 25m3/h
Automate 6 : Thermiseur lait mature, Thermiseur lait mature (existant), Maturation PF
Automate 7 : Maturation YAB, Tampon YAB, Conditionnement YAB
Automate 8 : Maturation Blossés, Tampon Blossés, Conditionnement Blossés
Automate 9 : Tampon PF, Tampon crème / sirop de sucre, Conditionnement PF
Switch RJ45
Switch RJ45
Switch RJ45
Switch RJ45
Switch RJ45
Switch RJ45
Switch RJ45
Switch RJ45
Switch RJ45
Fibre Optique
Coffret Télécommande : Station NEP A et Concentré
Coffret Télécommande : Station NEP B
Coffret Télécommande : Réception / Stockage lait cru
Coffret Télécommande : Pasteurisateur crème ETA
Coffret Télécommande : Pasteurisateur lait 25m3/h (n°1)
Coffret Télécommande : Thermiseur lait mature
Coffret Télécommande : Maturation YAB
Coffret Télécommande : Maturation Blossés
Coffret Télécommande : Tampon PF
Coffret Télécommande : Pasteurisateur lait 25m3/h (n°2)
Coffret Télécommande : Stockage crème pasteurisé
Coffret Télécommande : Pasteurisateur lait 25m3/h (n°2)
Coffret Télécommande : Thermiseur lait mature (existant dans cuve actuelle)
Coffret Télécommande : Tampon YAB
Coffret Télécommande : Tampon Blossés
Coffret Télécommande : Tampon crème / sirop de sucre
Coffret Télécommande : Stockage lait crème pasteurisé
Coffret Télécommande : Stockage crème / sirop de sucre
Coffret Télécommande : Pasteurisateur lait 25m3/h (n°3)
Coffret Télécommande : Maturation PF
Coffret Télécommande : Conditionnement YAB
Coffret Télécommande : Conditionnement Blossés
Coffret Télécommande : Conditionnement PF
Switch Fibre Optique
Coffret Télécommande : Standardisateur crème 3T/h
Coffret Télécommande : Poudrage lait

Dryer Advance industrial Process

synlait™
making more from milk

First joint TPM application

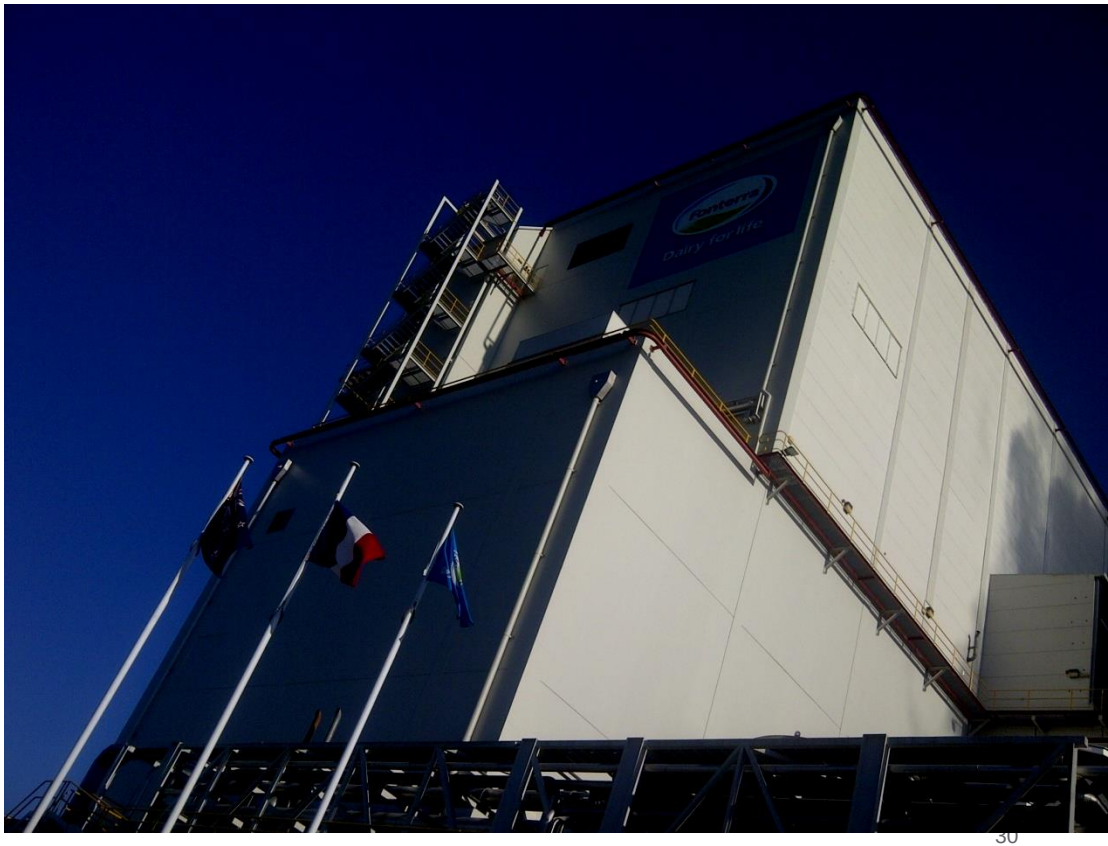
- Produce infant and adult nutritional formulations, functional food ingredients, and other specialized health-focused products.
  - Processes more than 500 million litres of milk each year.
  - Capable of processing 3.2 million litres of raw milk per day
  - From which up to 340 tonnes of milk powder can be produced.

- Tetra Plant Master solution is built on Schneider controllers & system
-
- *Tetra Pak contact Person:*
  - *Mattias Johansson, Mats Hellman,* Steve Griffiths

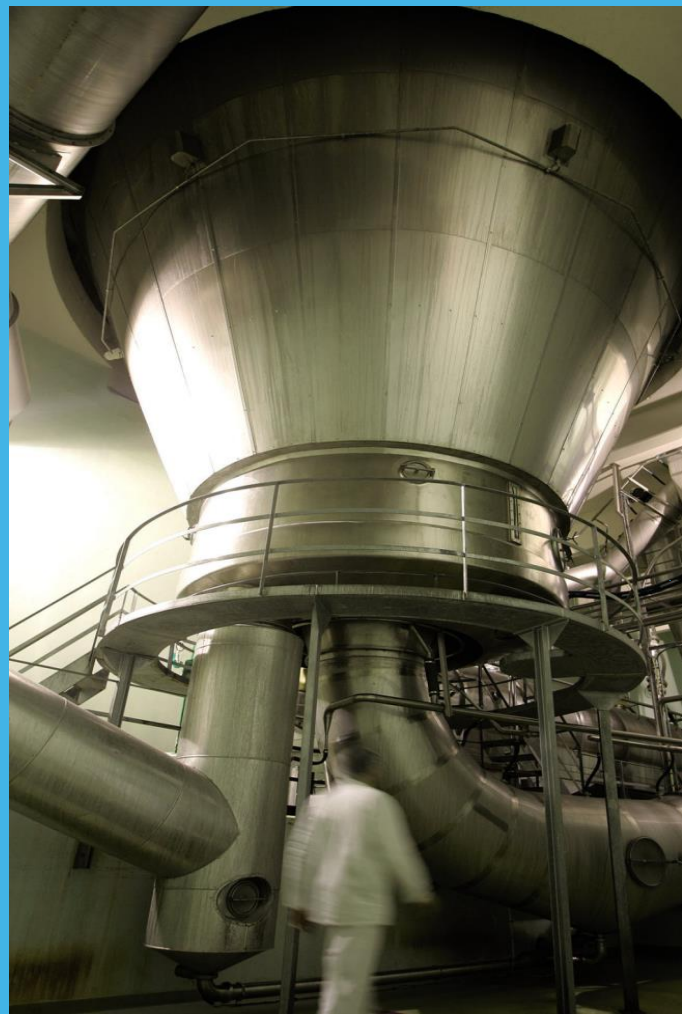
Darfield D1(16t/h) & D2(30t/h)

- The N°1 Dairy cooperative in the world
  - Expending from New Zealand to world wide

- Business & technology partnership
  - Support on Specifications
  - Propose alternative OEMs
  - Increase plant productivity
  - Commissioning capability
  - Install Base services
  - Revamping
  - Energy optimization
  - Form factor correction
  - Energy monitoring….

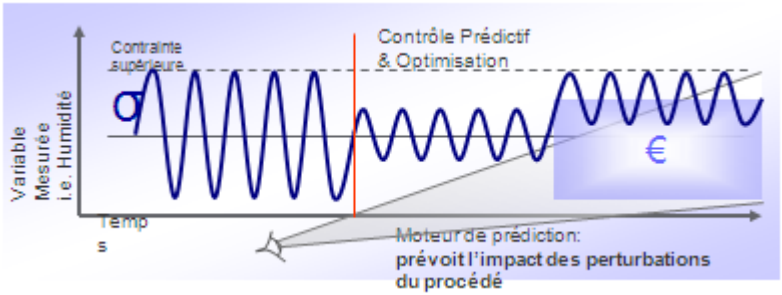


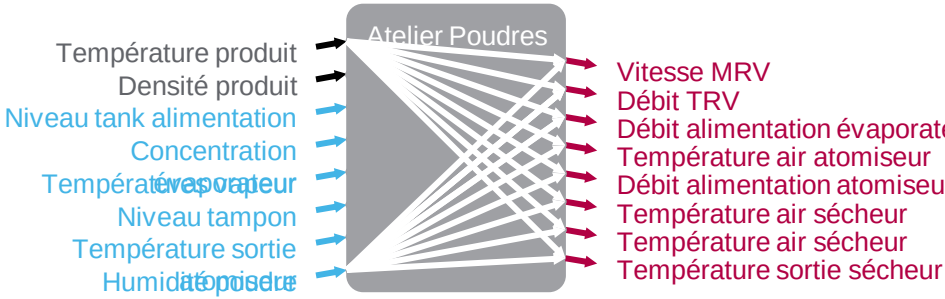
Advance control optimization



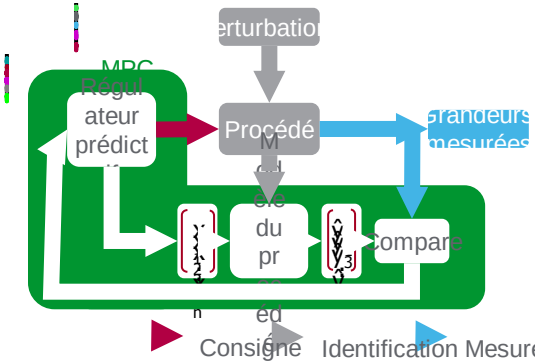
Complex production system

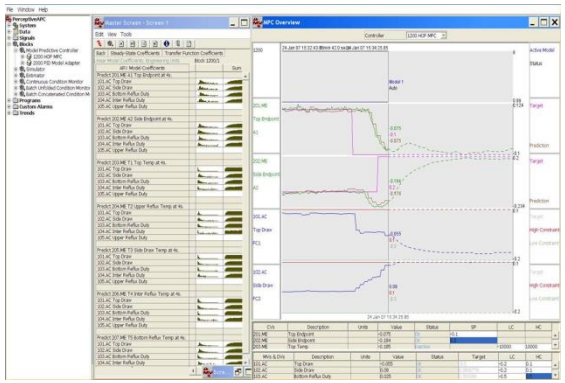
- All system can't be optimized by a succession of PID regulators

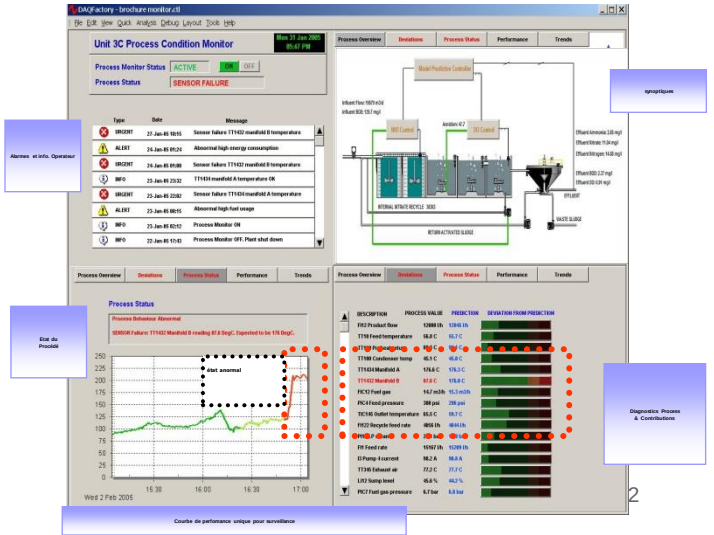




- Advance control is about all the other regulation systems
  - Multi variable control
  - Predictive regulator
  - Internal process model
  - On line diagnostic & optimization
  - …





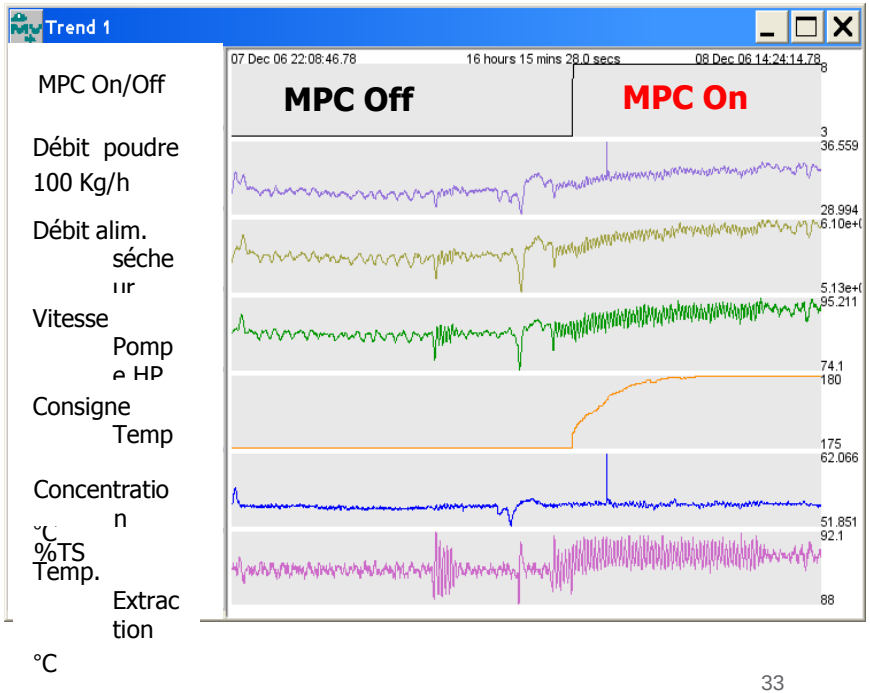


Results (infantil formula)

- Evaporator / Dryer 1
  - Capacity before: 3240 kg/h
  - Capacity after advance control: 3480 - 3530 kg/h
  - Production increased by 7 - 9%
  - Consummation decrease by 7%

- Evaporator / Dryer 2
  - Capacity before: 3900 kg/h
  - Capacity after advance control: 4200 kg/h
  - Production increase by 7.7 %
  - Consummation decrease by 7%

- ROI < 3 months



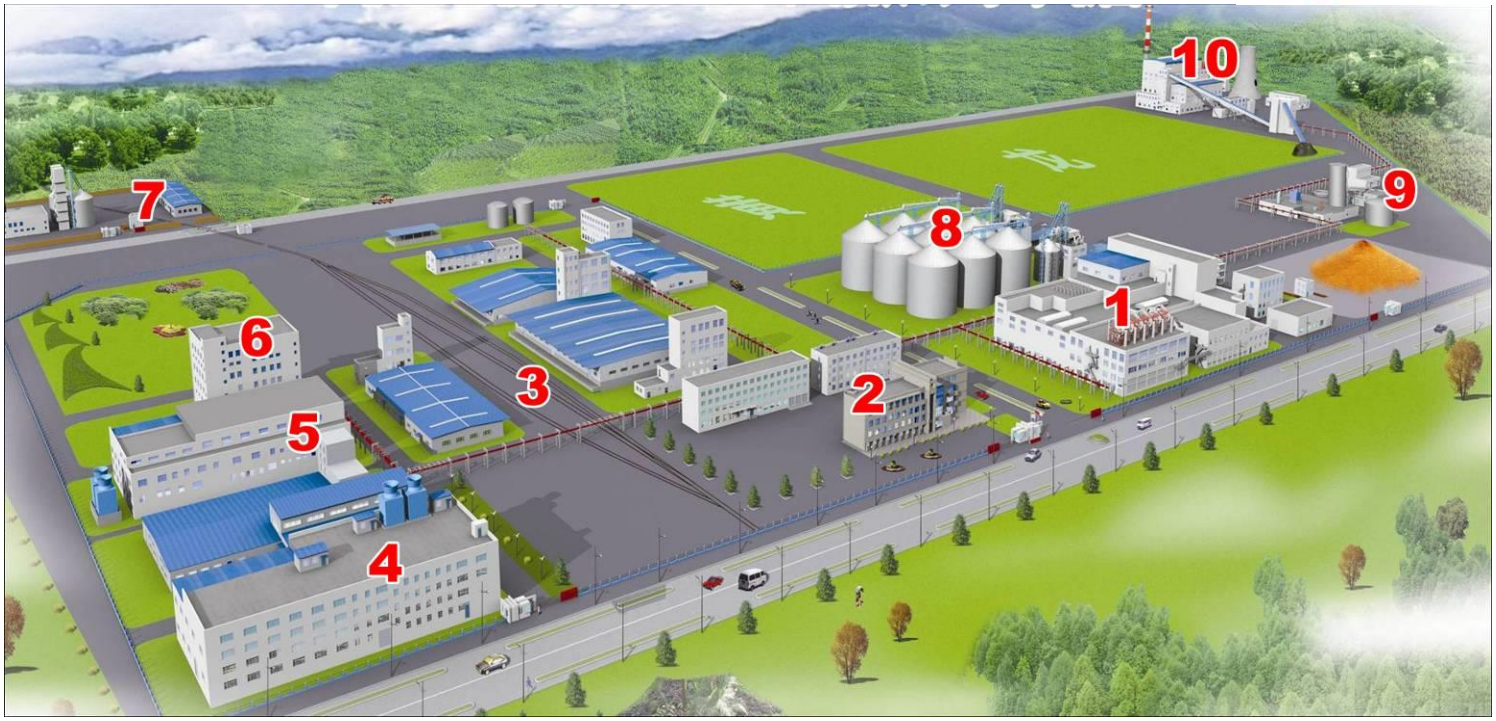
Some other few references

- Dairy pastorizators, dryers, …:
  - Abbott (Ireland, Spain, Netherlands, USA, Singapore)
  - Arla Foods (Denmark)
  - Nutricia, DairyGold, Glanbia (Ireland)
  - Nestlé, Murray Goulburn (Australia)
  - LAÏTA (France)
  - Fonterra (Nouvelle Zealand)
  - Meadow Foods (UK)
  - Saint Père (France)
  - Lactalis (France)
  - …

- Other
  - Boilers (Xstrata, RWE, ANL, Drax)
  - Water treatment (United Utilities, Thames, Anglian)
  - …

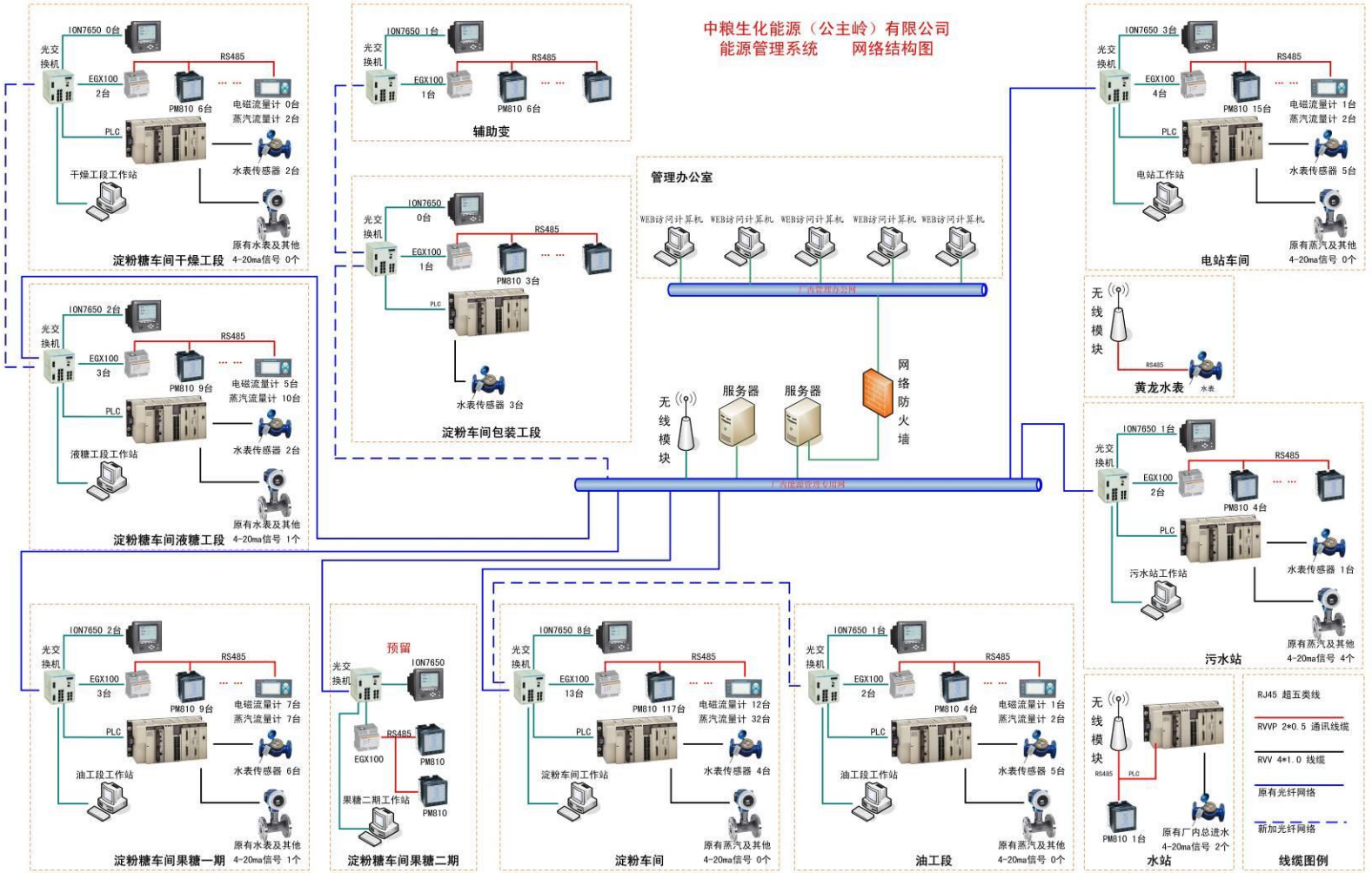
Energy Monitoring

EMS Introduction



1、 Corn starch workshop
2、 Office building
3、 Railway
4、 Malt sugar workshop
5、 Liquid sugar workshop
6、 Dextrin workshop
7、 Corn drying workshop
8、 Corn silo
9、 Waste water treatment
10、 Power plant

Schneider EMS introduction



EMS solution scope

- Software Platform: EOS, PLS, ION-E
- Hardware: ION7650 18
  PM810MG 190
  EGX100 32
  PLC 9
- Collecting data: Power, water, steam, raw material, coal.
- KPI calculation and analysis
- Dashboard for operator
- Dashboard for manager

Energy & continuous Optimization

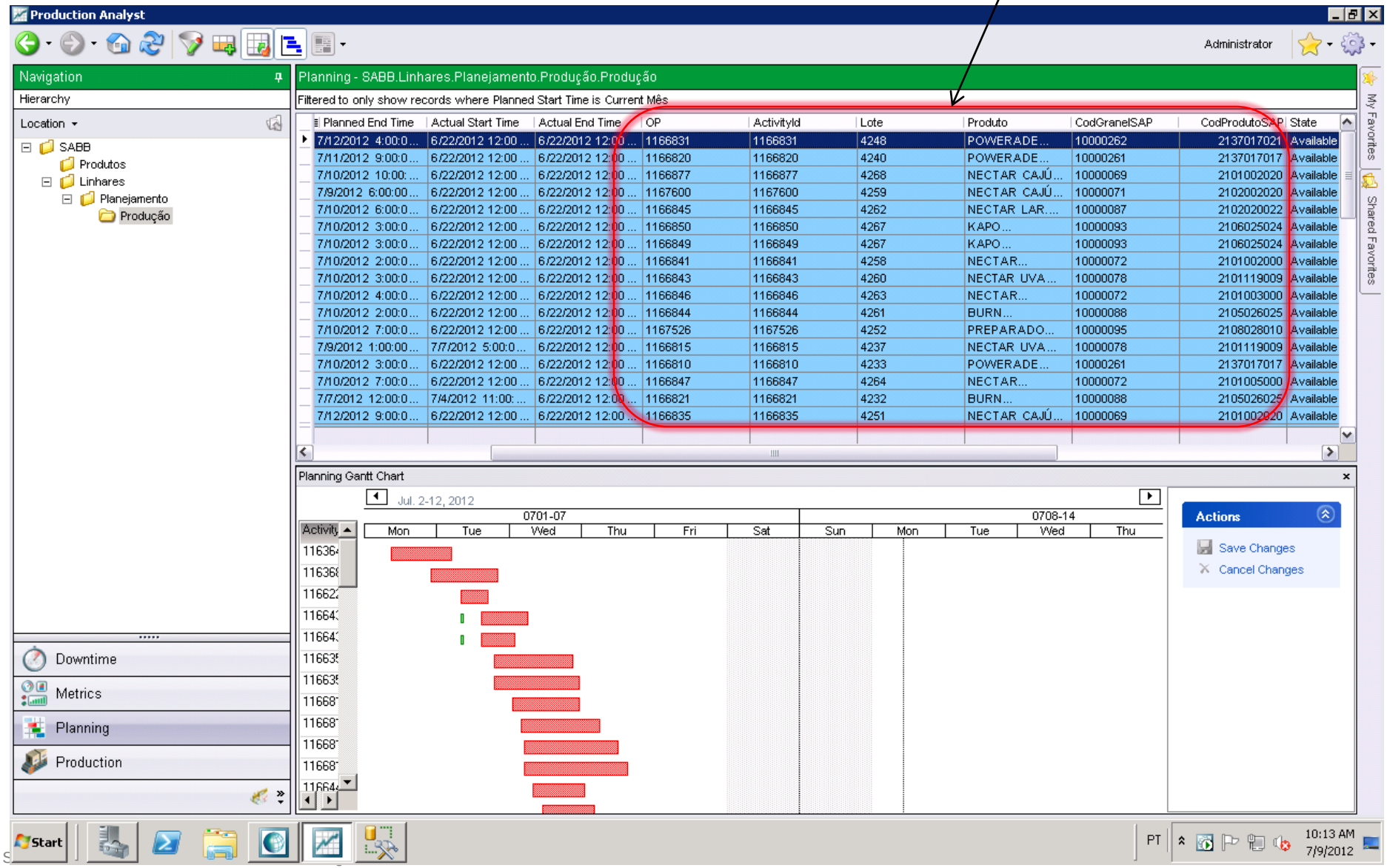
Project´s Different Aspects

- SAP, Lots, Product Id and Threshold limits relationship
- Reporting Point with multiple data sources
- Lot traceability
- Dynamic Threshold and Limits
- CIP Traceability with Gantt Chart

The Linhares´s Site is responsible for the production of 400 millions liters / year

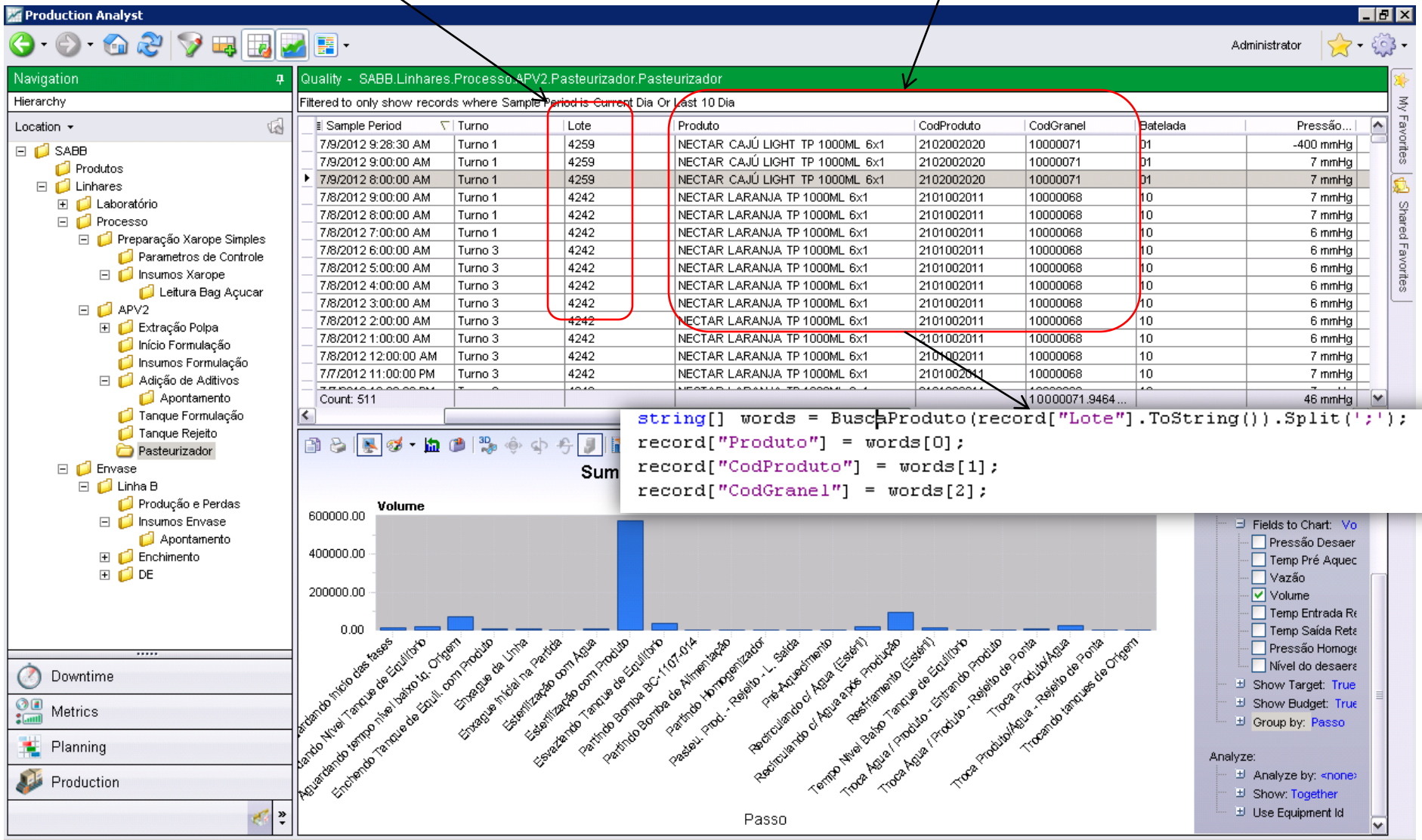
SAP transfer all Lot information to the process planning module

Production Order (PO), Product Description, Lot, Product Id (Cod Granel SAP) and Product Code. Here is the source information to most of the Reporting Points.

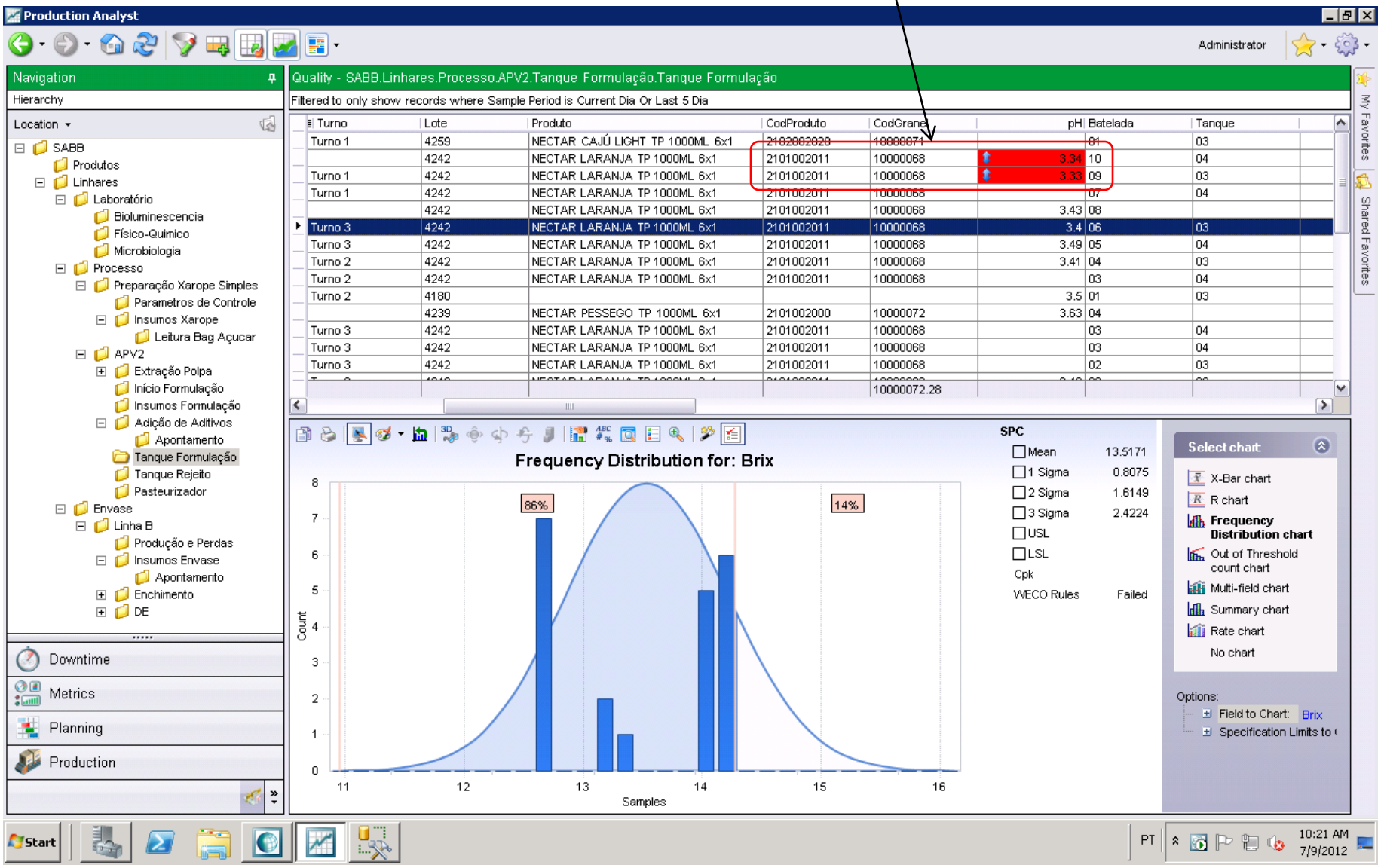


Lot comes from automation system

Product Description, Product Id (CodGranel) and Product Cod SAP are filled up by Code Item. The code item looks on the Planning Module to find those information base on the Lot.



Each Threshold Values and limits depends on the Product Id, therefore depends on SAP information.

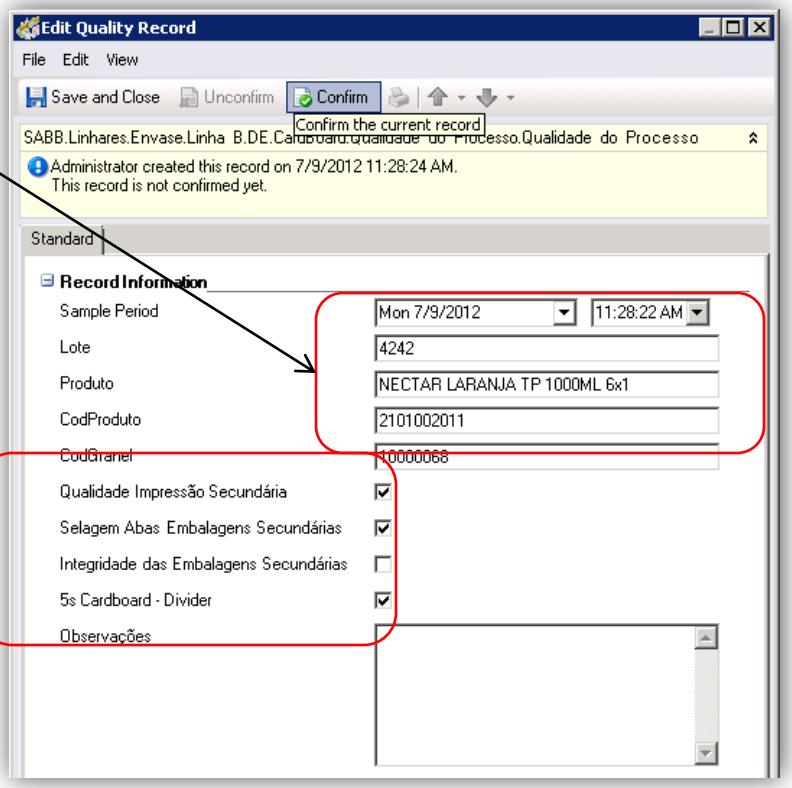


Customer needs - Traceability in less than 2 hours

- There is many quality checks on each production step
  - such as: bottle integrity, leak on tap...
- Most of checks are done by the operators
  - Manual samplings on the production line & check consistency
  - On each check, they manually enter information (checkbox).
- Before this automated process, those checks where recorded in paper forms.

Automatic Information from process system and SAP – Code Item.

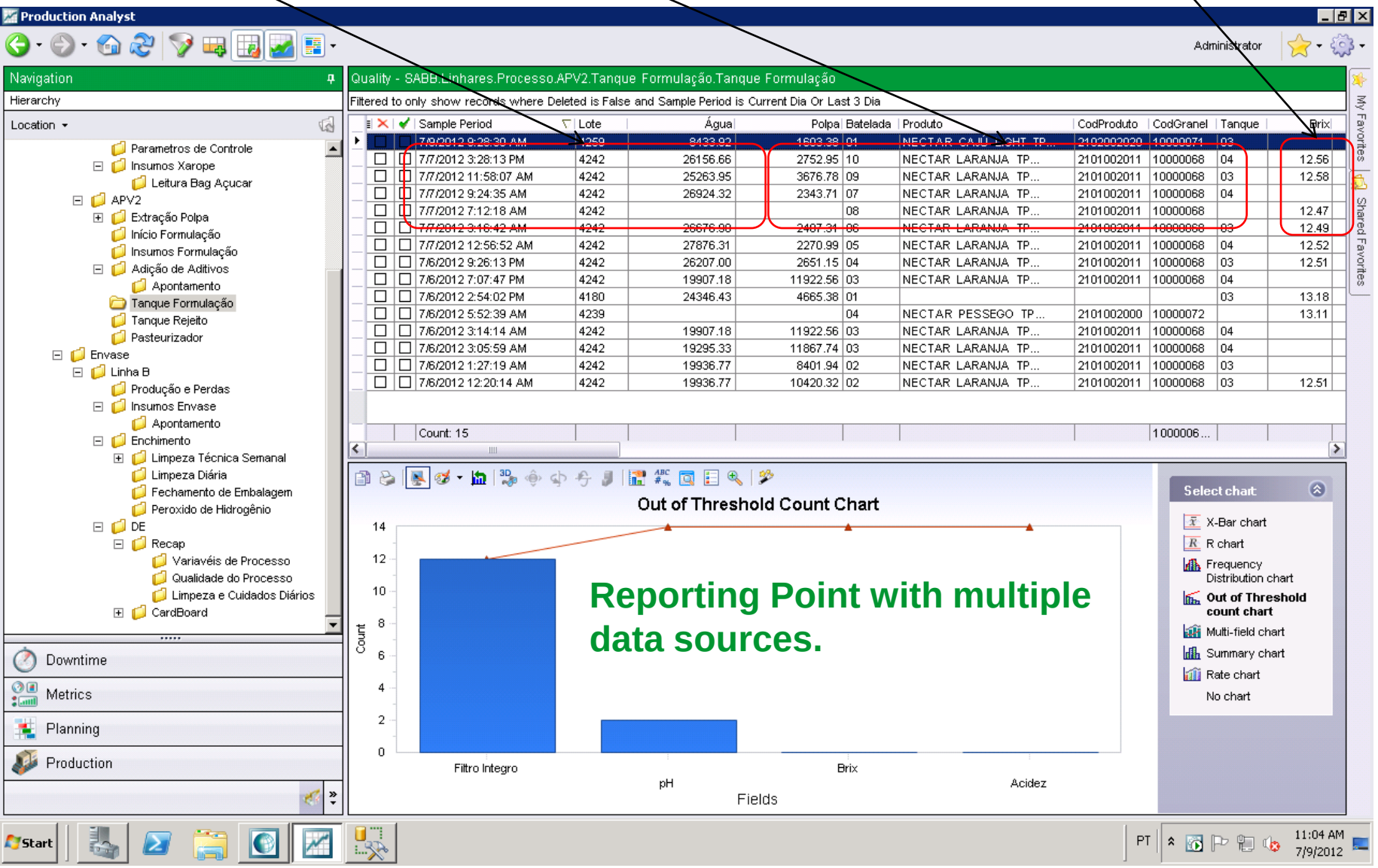
Manual Check:
Quality of Bottle label (printed);
Sealing of secondary box;
Integrity of secondary box;
5s on cardboard and divider check



DataSource: Process control

DataSource: SAP (Planning + Code Item) – Defines the Product Id for Thresholds

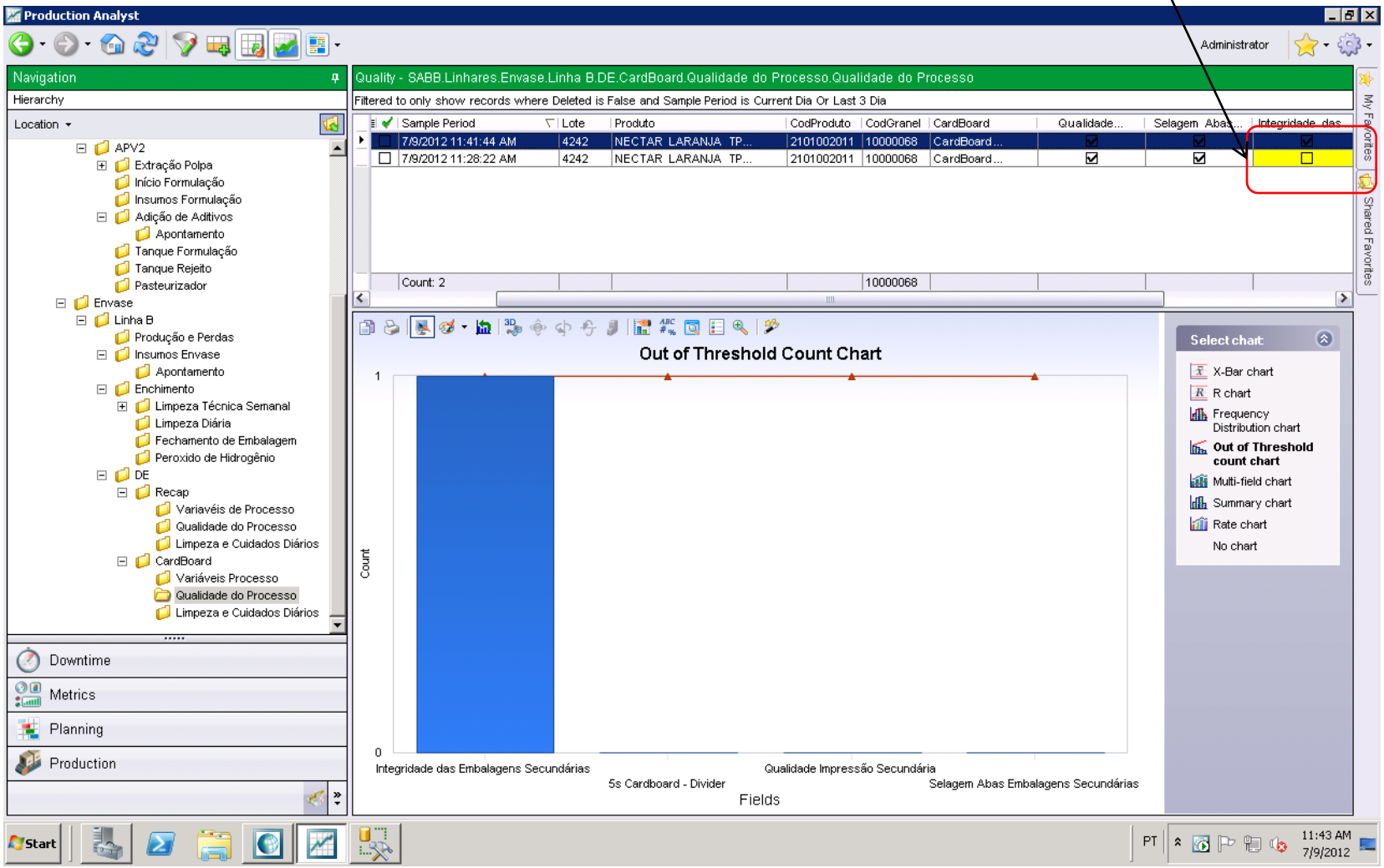
DataSource: qLims System quality system Lot and Batch Filter Fields



Easy & automatic quality issue detection

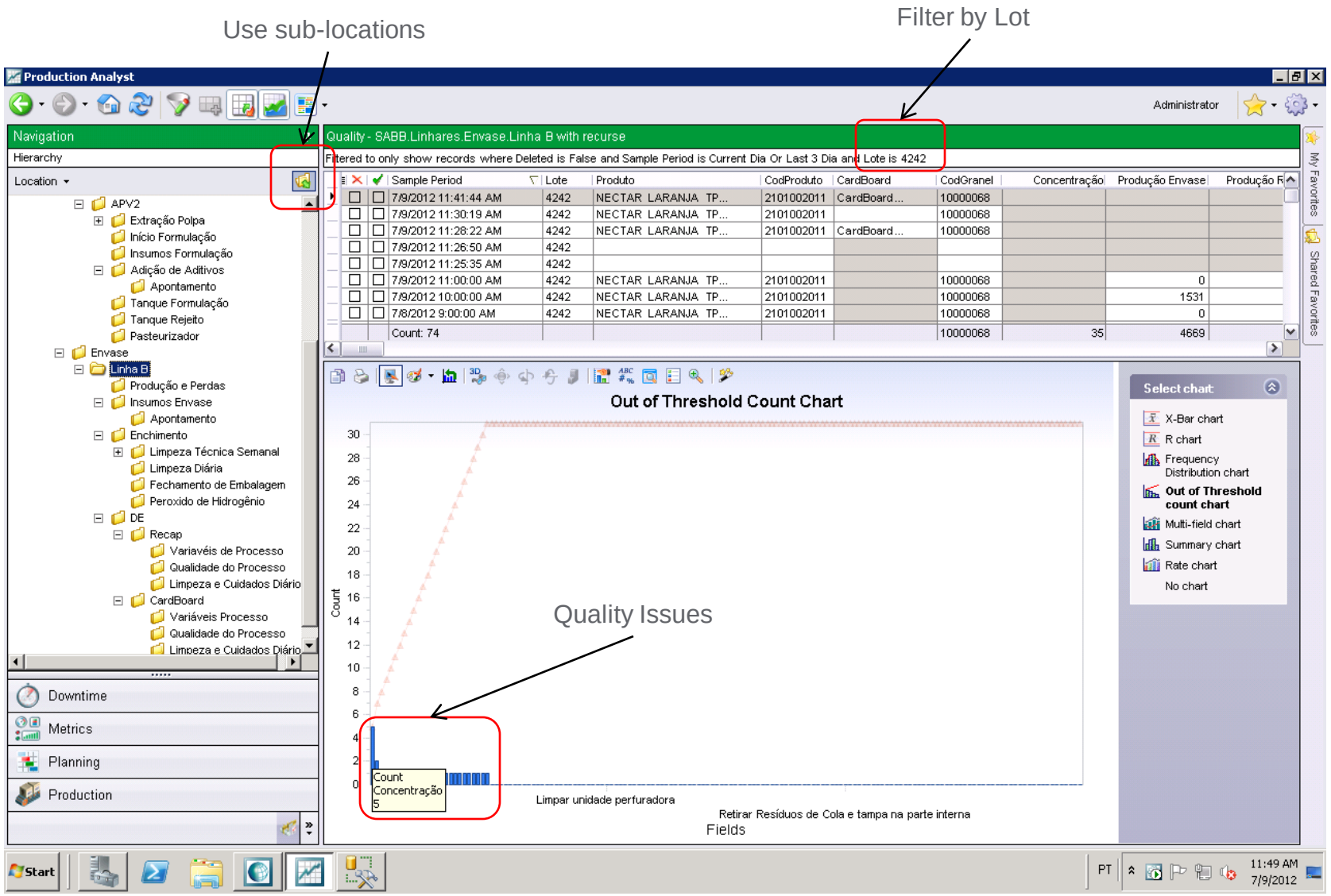
- Acceptance by management via a check box with access control

Out of Specification quality check



Traceability tree management

- Track all issues within the Specific Lot in less than 1 minute

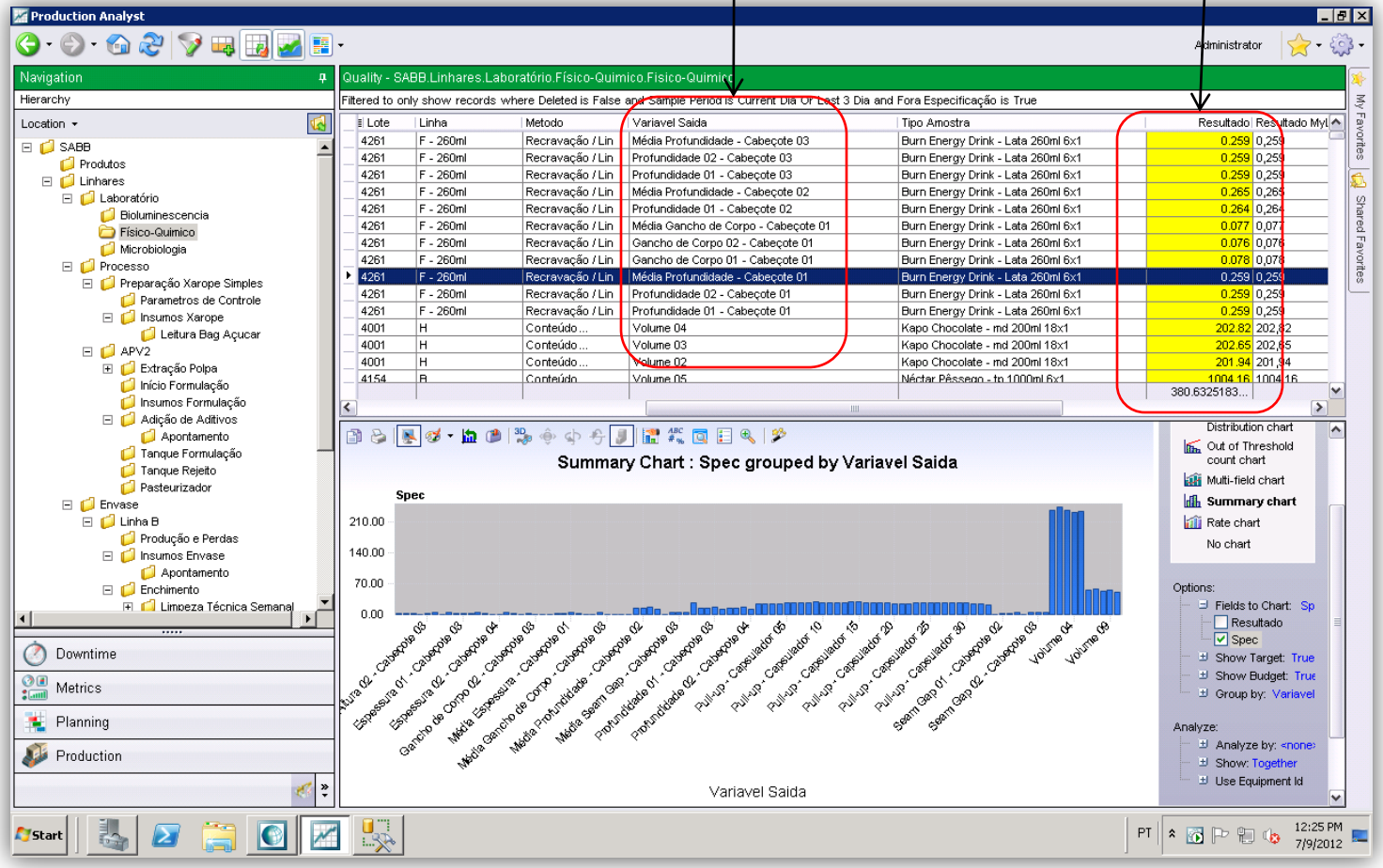


A systems including a large number of different analysis.

- Automatic import into the tool to save time & increase data quality
- Consistent data sorting (Pivoted table) no matter what is the batch & recipe

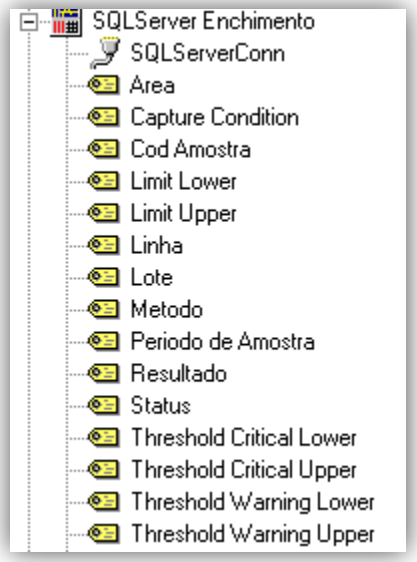
Analysys Type. Ex:
Bottle Volumn, pH

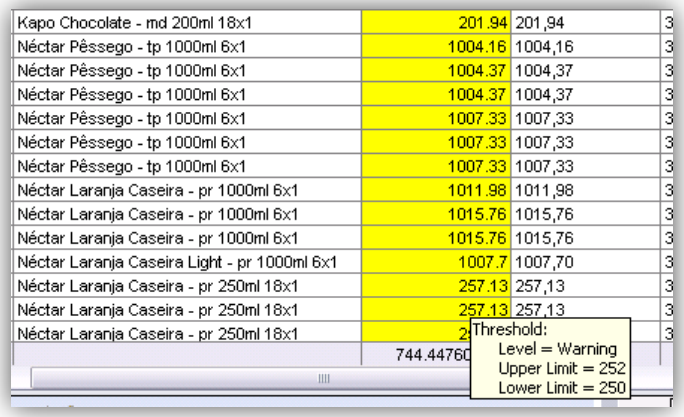
Results in single column

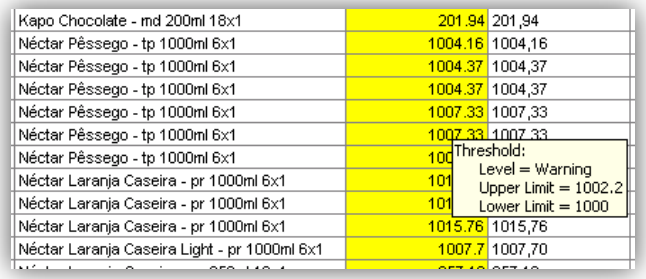


Type of analysis & specific threshold values

- Automated integration & storage procedures every 20s
- Guaranty threshold consistency before saving into the database
- If a new recipe / threshold is added, no changes into the process & display system

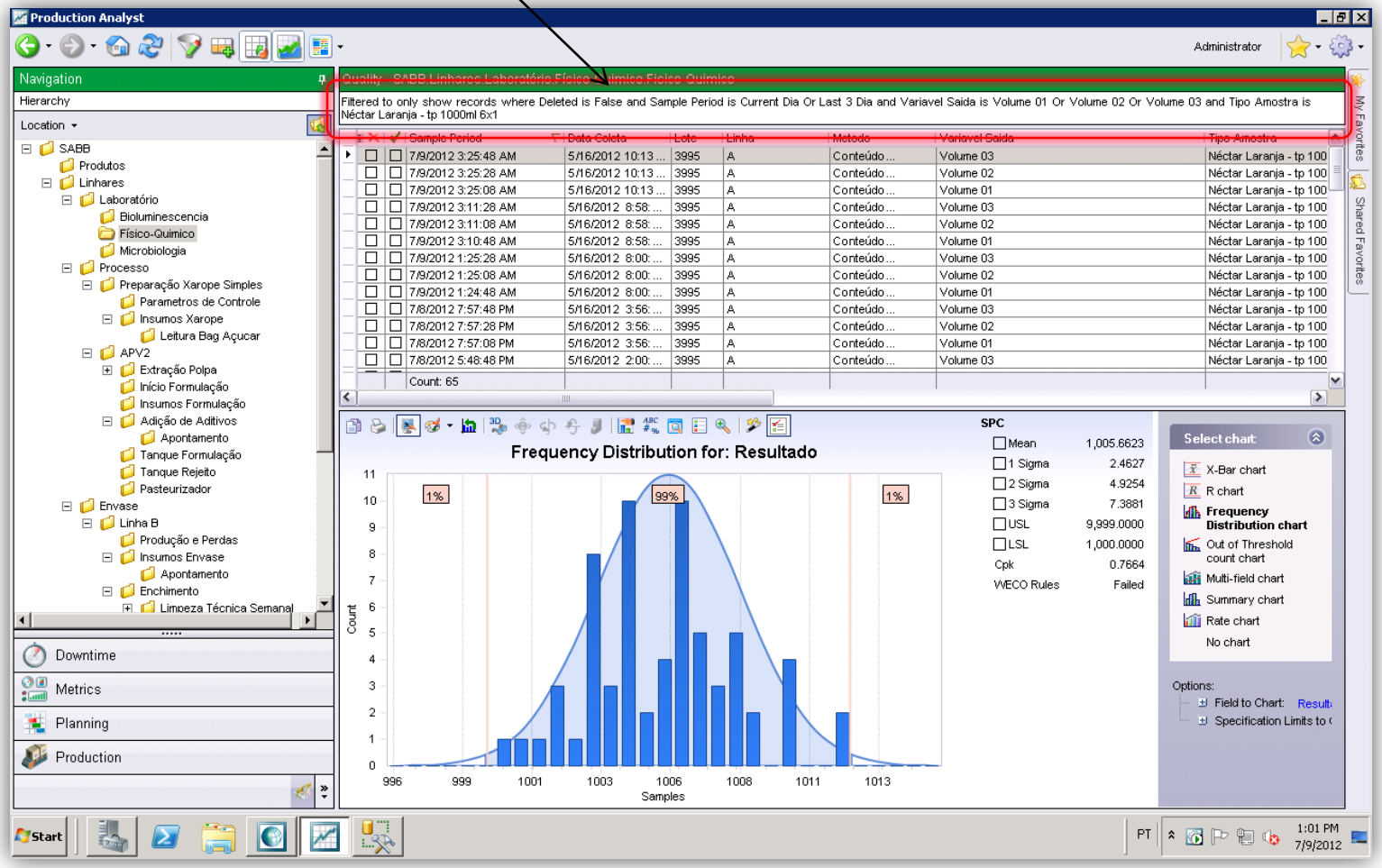




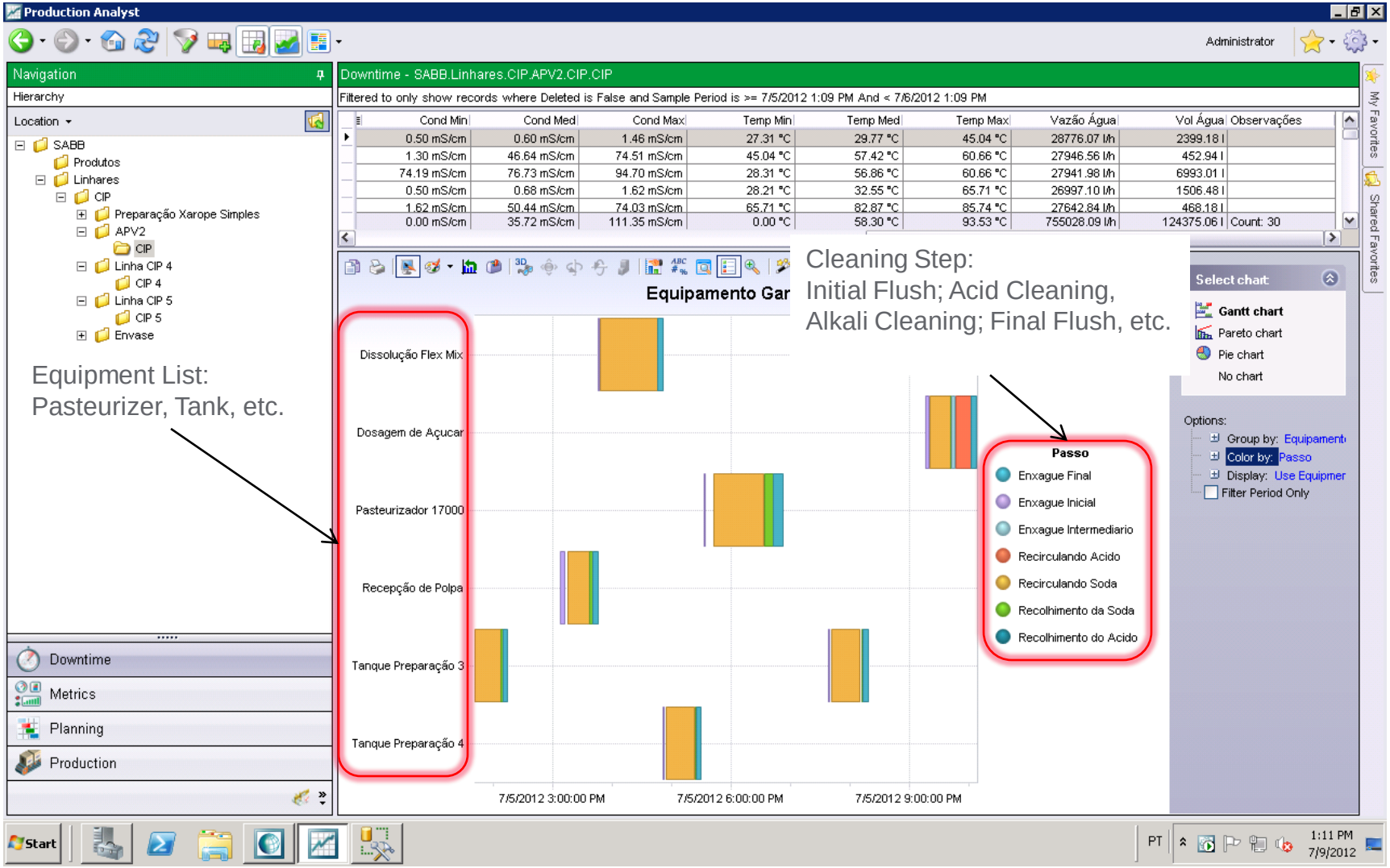


Complete quality analysis capability via data filtering feature.

- For example: frequency distribution of Net Content in a Bottles of a specific product

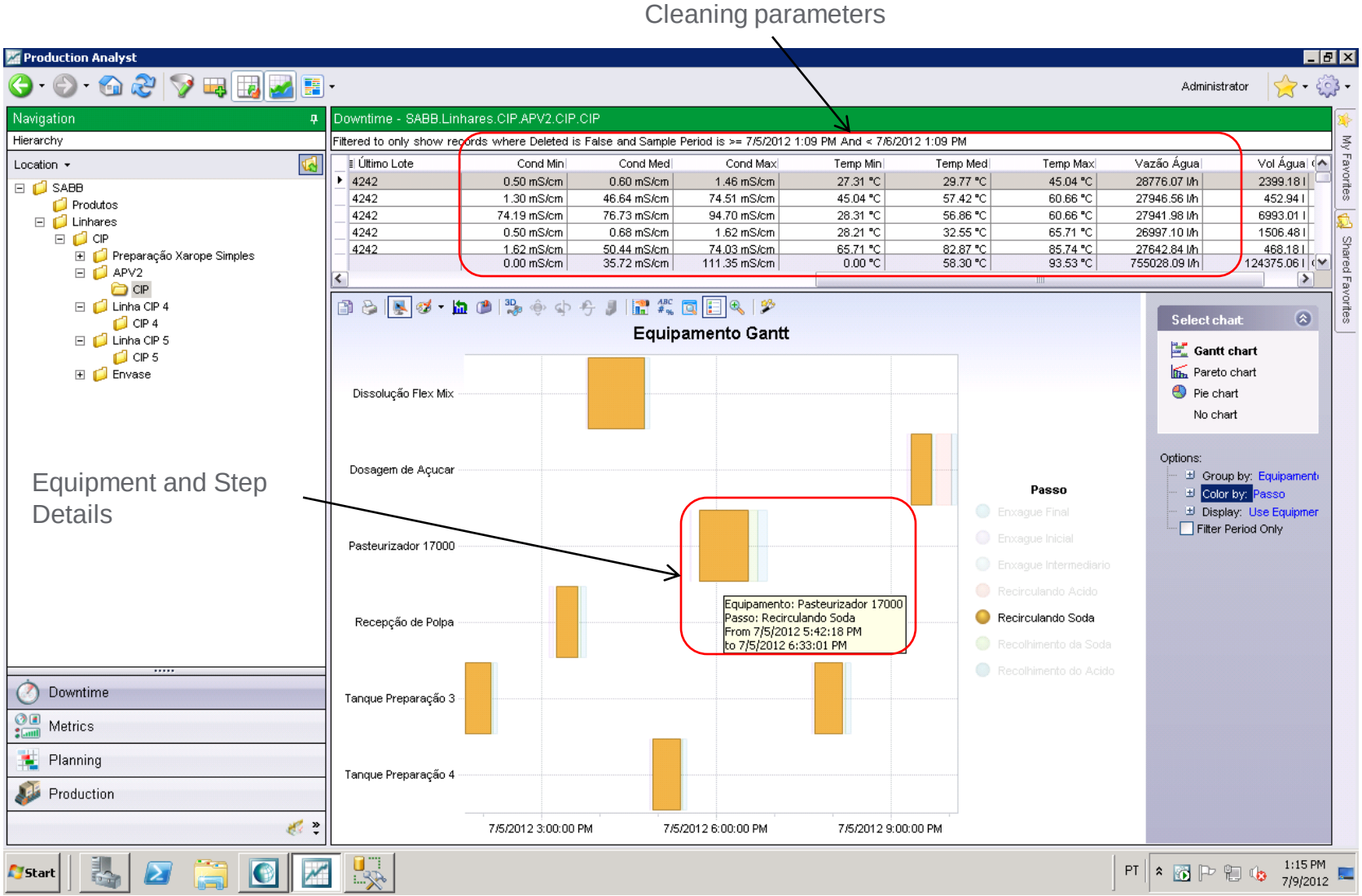


CIP & downtime modules are used to trace information on equipment's cleaning.

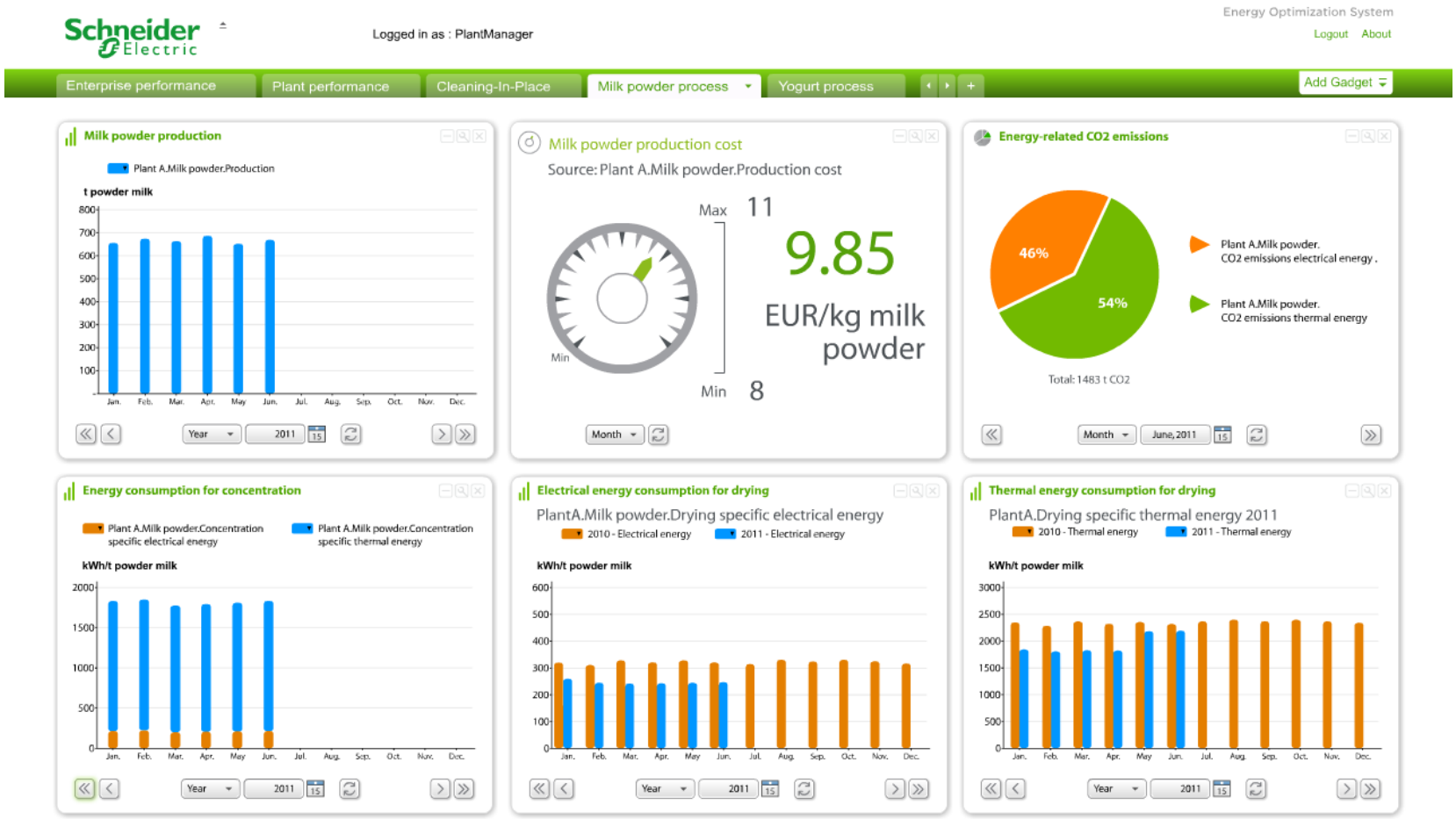


Easily check of the CIP process & status

- All steps where applied on the cleaning
- Correct parameters (4Ts) used on each steps and equipments



EOS dashboard for Dairy



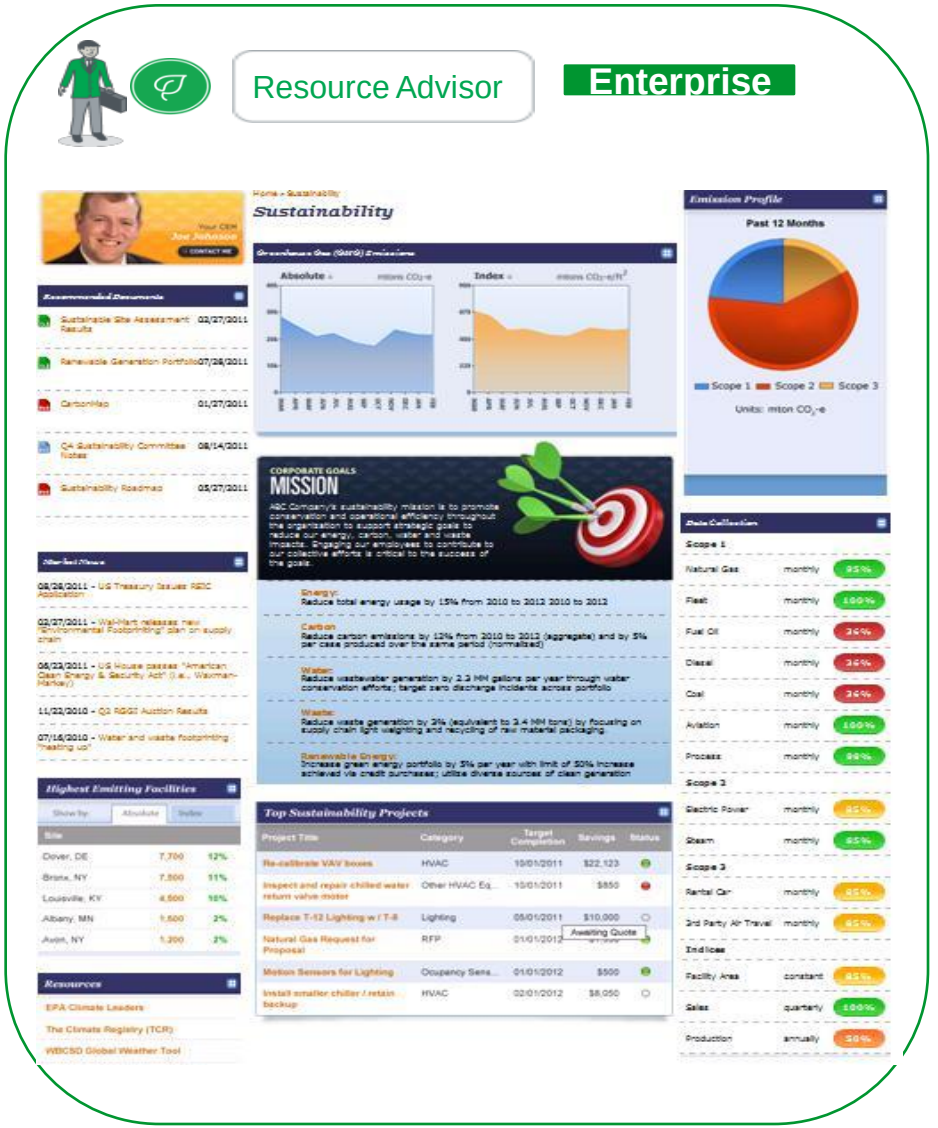
We can also:

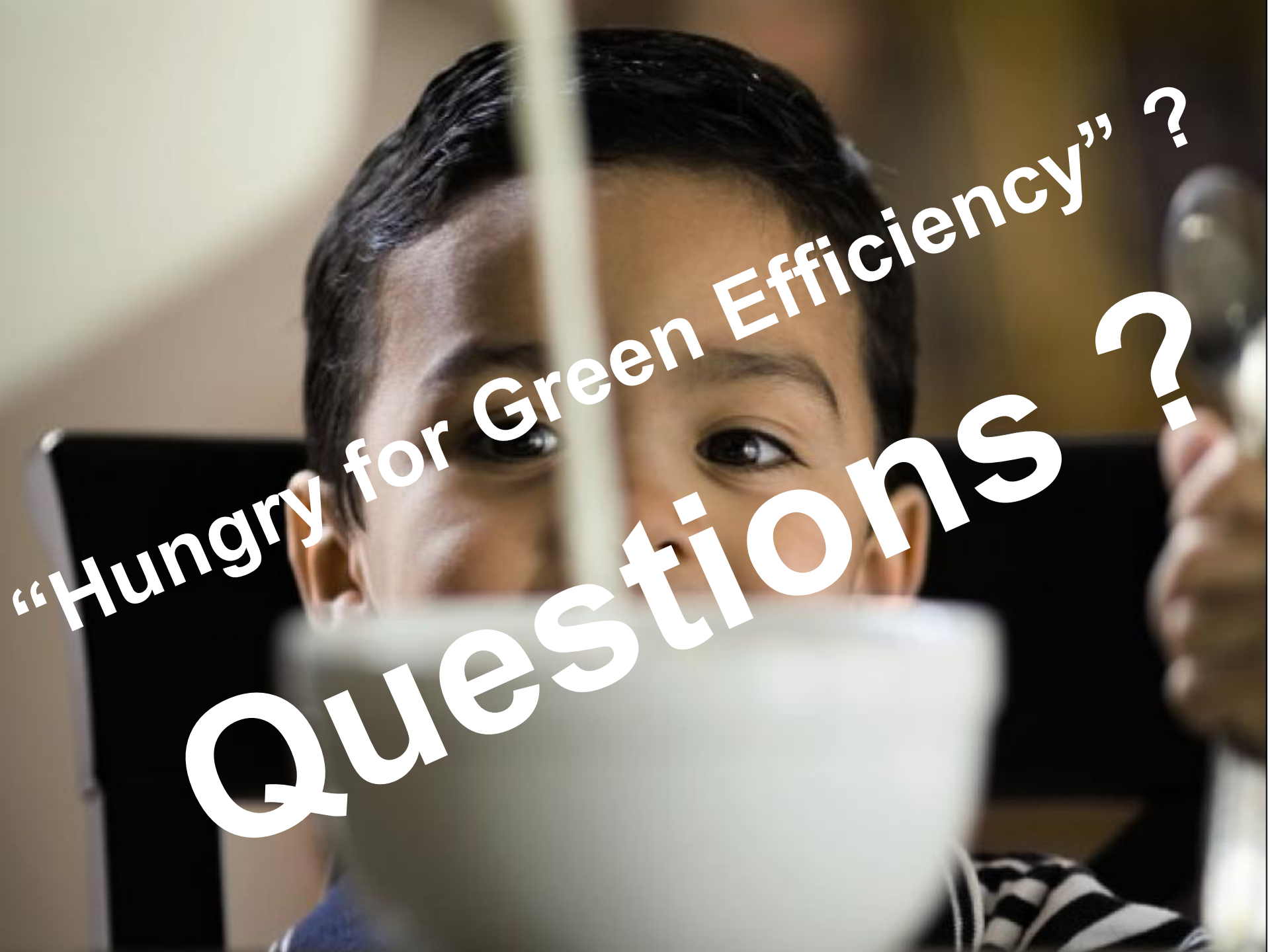
Optimize your energy procurement policy

- Get exclusive recommendations from our specialists
- Identify the best suppliers and the best tariff
- Manage the risk and detect opportunities
- Manage the smart grid impact

Track the performance of your Energy and Sustainability program…

- Communicate mission, goals & program achievements
- Aggregate emissions (scope 1,2 and 3), water, waste, etc. for the enterprise
- Access emission factor data and methodologies for verification
- Share key documents and information resources
- Report and manage status of projects with archives




“Hungry for Green Efficiency” ?
Questions ?

Conclusion

- **EcoStruxure is a scalable global solution**
- **Partnership is part of our DNA**

- **Our greatest reward:**

The satisfaction of our F&Bev customers

“Better Food for More People Using Less Energy”

Tack så mycket !

Schneider Electric