Turning **insight** into **action**.

OSIsoft. USERS CONFERENCE 2011

Integrating the PI System with SAP

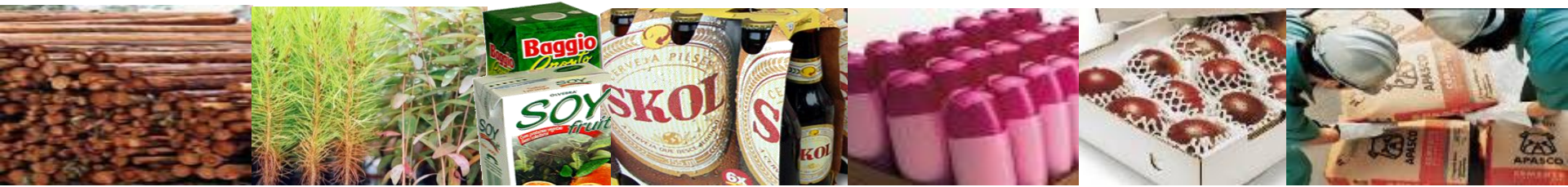
Presented by

Raquel Goulart
Automation Technical
www.klabin.com.br

Flavio Maeda
IT Consultant
www.konitech.com.br

Klabin: A Leader Company

- ✓ 111 years of tradition
- ✓ 10,504 employees
- ✓ Largest producer, exporter and recycler of paper in Brazil
- ✓ Exports 62% of its prodution to over 60 countries
- ✓ Leading producer of packing paper and board, corrugated boxes and industrial sacks
- ✓ Single manufacturer of boards for liquid packings in Latin America
- ✓ In 2010 Klabin was elected the best pulp and paper company in Brazil



Klabin – Company Locations

Florestal
Forestry

Alto Paranapanema (SP)
Planalto Catarinense (SC)
Campos Gerais (PR)
Planalto de Guarapuava (PR)

Papéis para Embalagens
Packaging Paper

Angatuba (SP)
Correia Pinto (SC)
Otacílio Costa (SC)
Telêmaco Borba (PR)

Sacos Industriais
Industrial Sacks

Goiana (PE)
Lages (SC)
Pilar (Argentina)

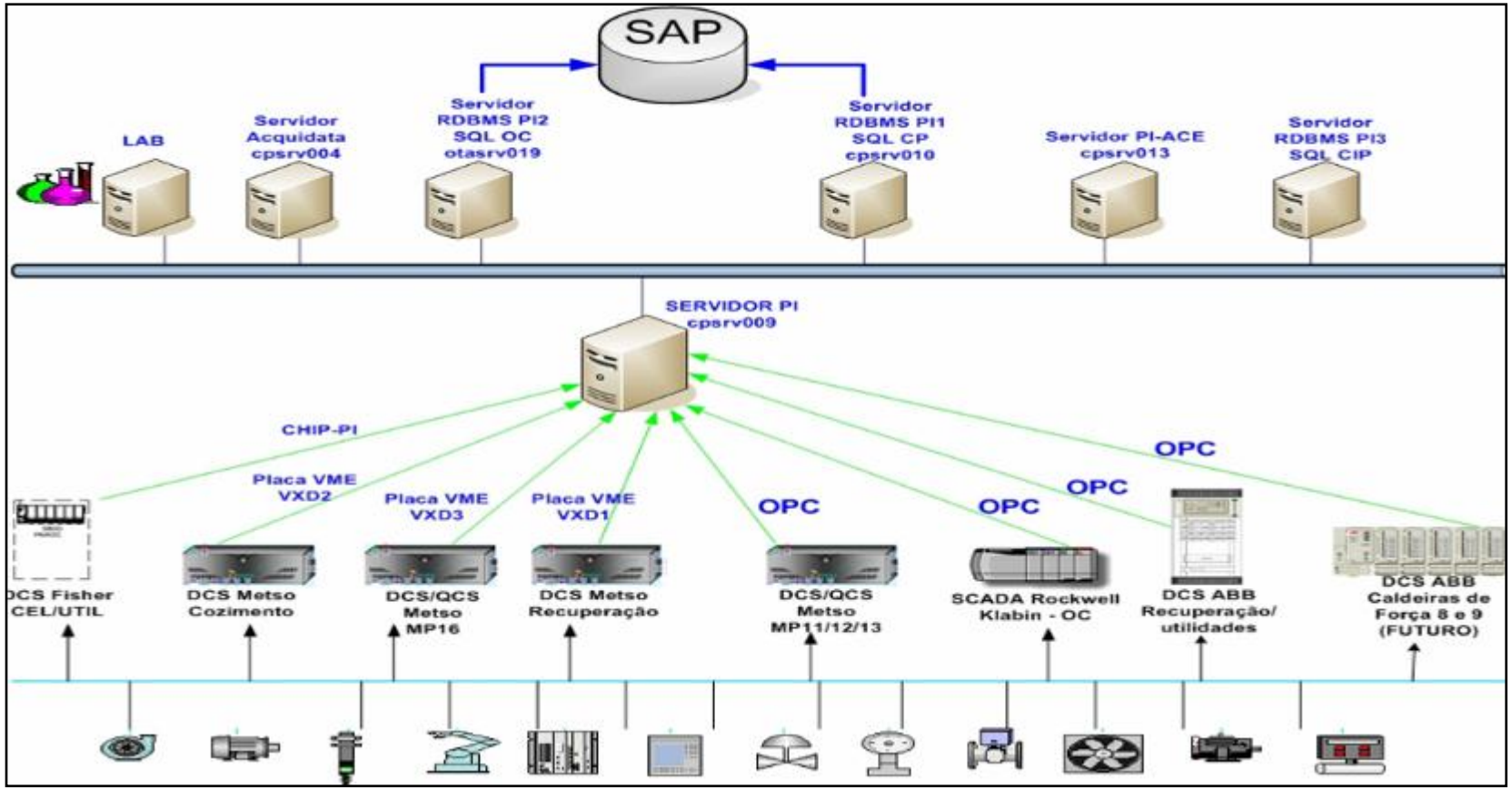
Embalagens de Papelão Ondulado
Corrugated Packaging

Goiana (PE)
Feira de Santana (BA)
Betim (MG)
Del Castilho (RJ)
Jundiaí (SP)
Piracicaba (SP)
Itajaí (SC)
São Leopoldo (RS)
Mossoró (RN)

Papéis Reciclados
Recycled Papers

Goiana (PE)
Guapimirim (RJ)
Ponte Nova (MG)
Piracicaba (SP)

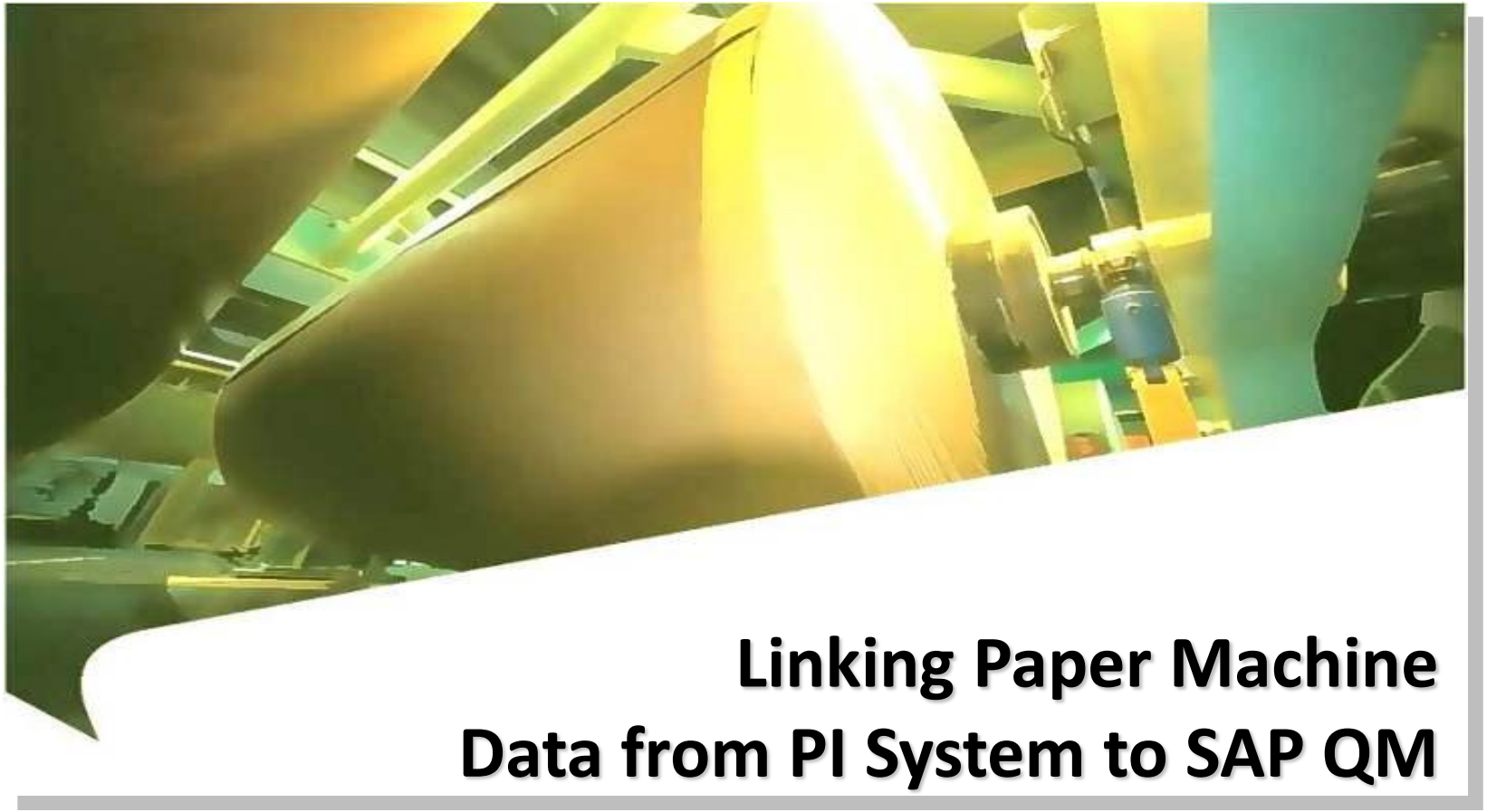
PI System Architecture in Santa Catarina Plants



Optimization Projects at Klabin SC

In 2005, Klabin began to use PI System to derive better operational performance through Process Optimization in various areas of the mill. Below are some samples of projects done for process improvements and ROI obtained with the PI System:

- ☑ **2005** – Recovery Boilers and Evaporators optimization linking PI System to Metso
- ☑ **2008** – Paper Test Labs– Acquidata and PI System integration to SAP QM via MII
- ☑ **2009** – Installed Metso AQC #16 Paper Machine
- ☑ **2010** – Implemented Br@incube on #13 Paper Machine
- ☑ **2010** – Began the implementation of the link between the PI System and SAP PM for condition-based maintenance

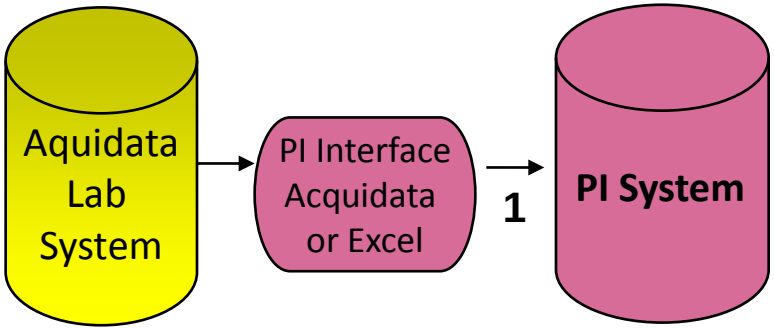


Linking Paper Machine Data from PI System to SAP QM

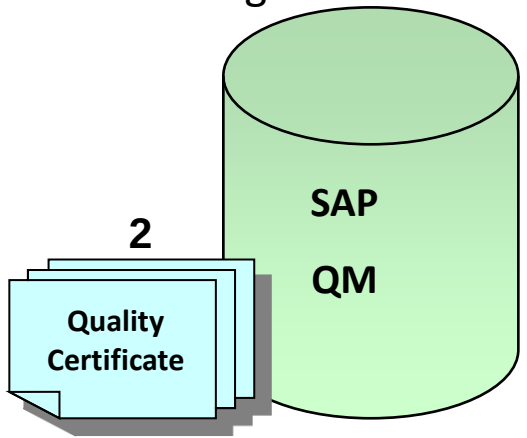
Previous Situation before PI System Integration to SAP QM

Objective: Needed an efficient way to integrate the PI System and SAP QM by sending quality data about the Jumbo roll (physical tests) from PI System to SAP QM, avoiding manual data entry of Lab data.

Test data was sent to the PI System via: Acquidata/Autoline/Excel interface



Jumbo roll lab tests were then **entered manually** into SAP-QM where COA's are generated



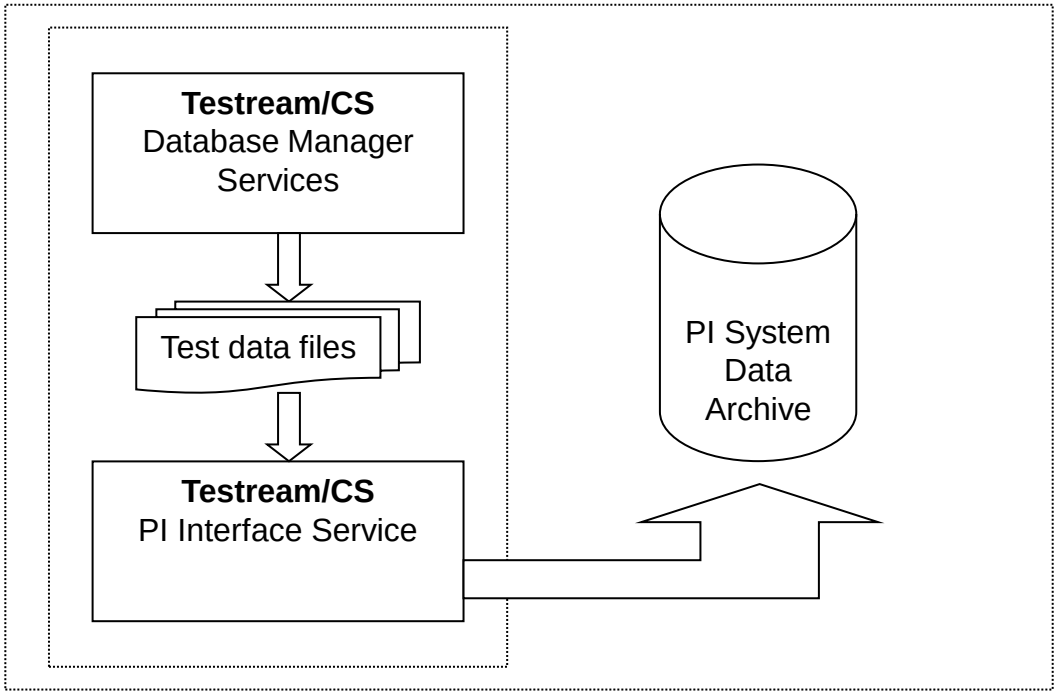
AcquiData – Quality System for Paper Lab

- ✓ Automatic acquisition of the lab tests directly from the testing equipment
- ✓ Ability to Import the Paper Roll numbers from PI System
- ✓ Ability to Export the test results by roll back to PI System
- ✓ Validation of the results by product specification / limits
- ✓ Statistical calculations
- ✓ Track/Calibrate lab instrumentation
- ✓ Manage Lab Data specification targets and limits

Integration AcquiData – PI System

Lab results via AcquiData

- Air Permeation
- Bursting strength
- Tensile strength
- Thickness
- Roughness
- Tearing
- …
- …

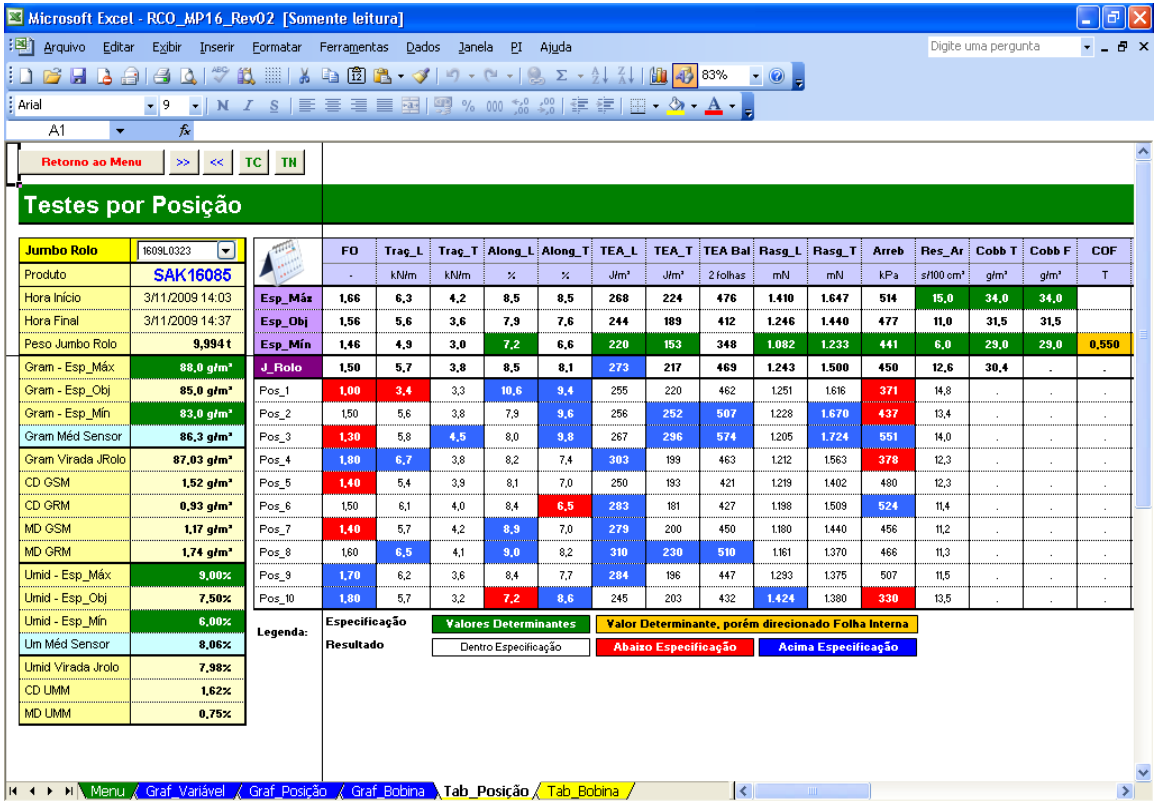


Solution Architecture

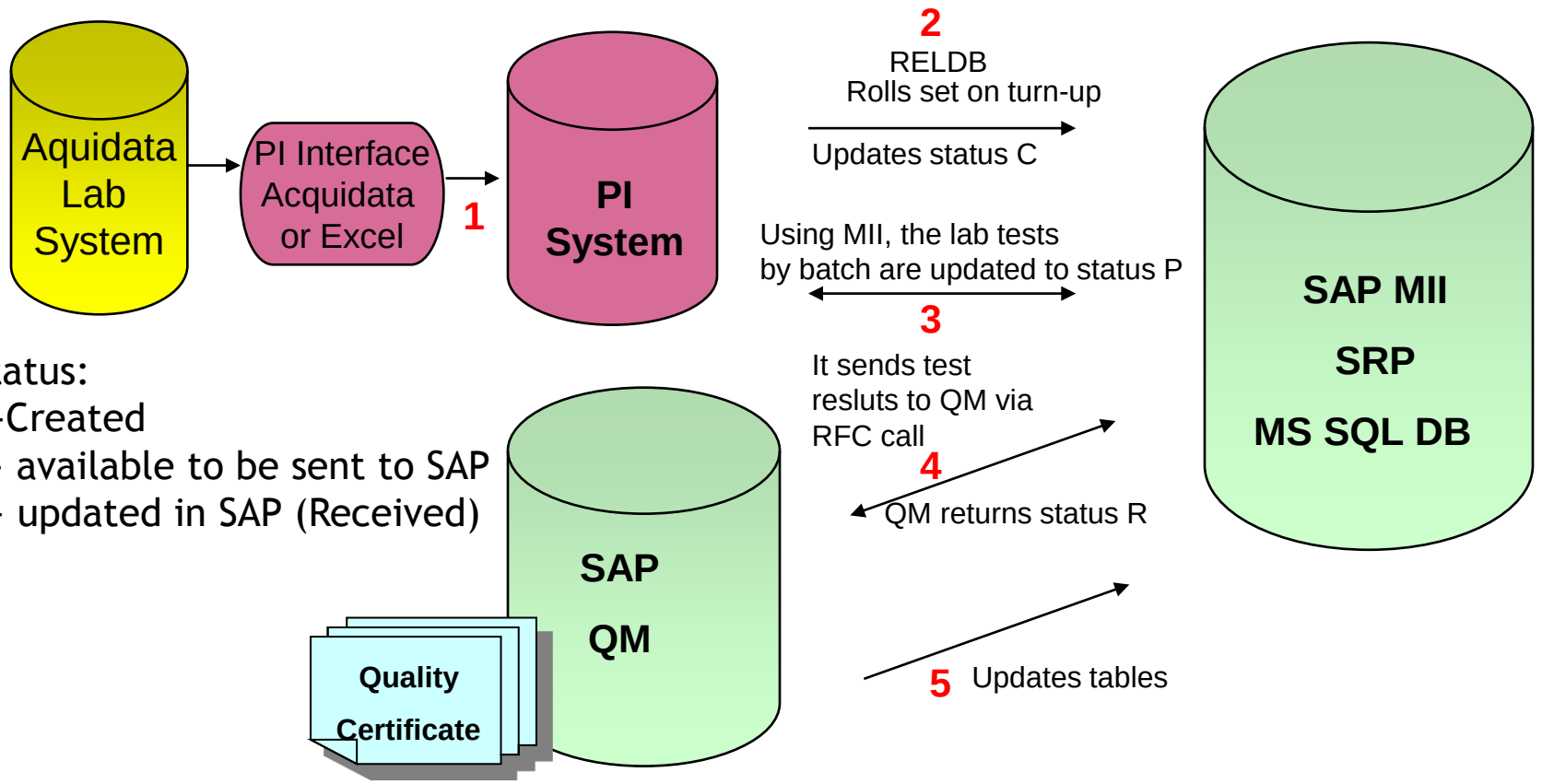
This is how it looks in Excel with PI System Data

After collecting the data, the values are sent to PI System.

The tests are stored so that if the users enters production plan: RCO_MP16_Rev02, the accompanying tests by Jumbo and position can be displayed.



Situation after integrating PI System to SAP QM



Status:
C-Created
P- available to be sent to SAP
R- updated in SAP (Received)

Data Flow

1. Laboratory informs the finish of all quality tests of a roll and updates a PI Tag

2. This tag triggers a RelDB interface that posts the roll data in a table of the SAP MII SQL Server database;

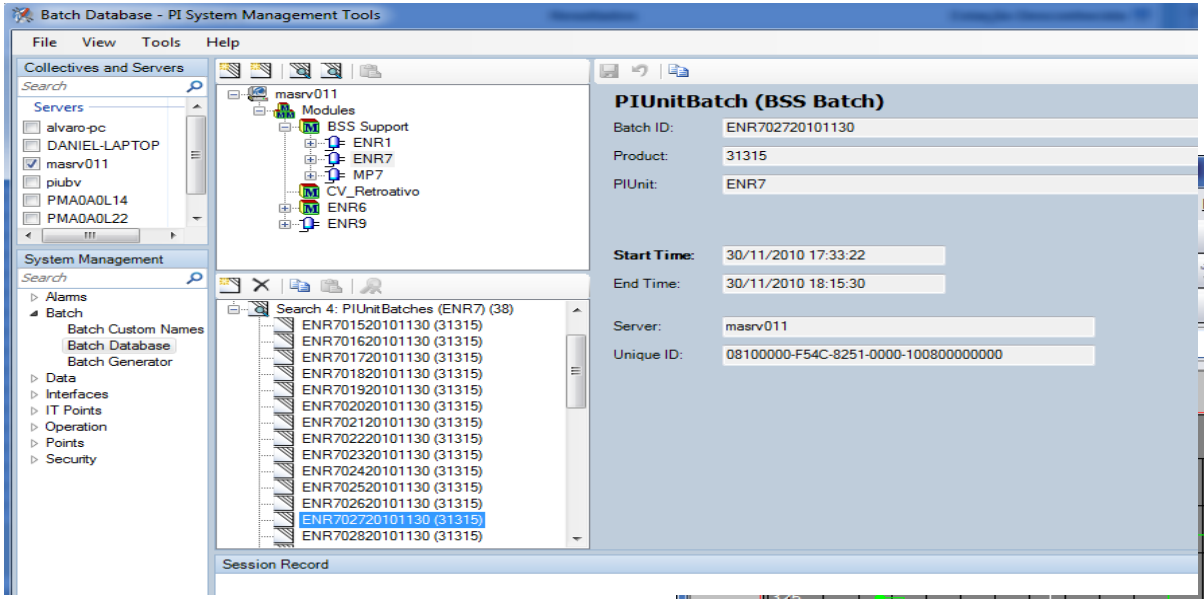
3. A MII job recovers the test results data from PI System and store the results at another table called RESULTADO. The same jobs updates a flag on this table indicating that the data is ready to be sent to SAP QM

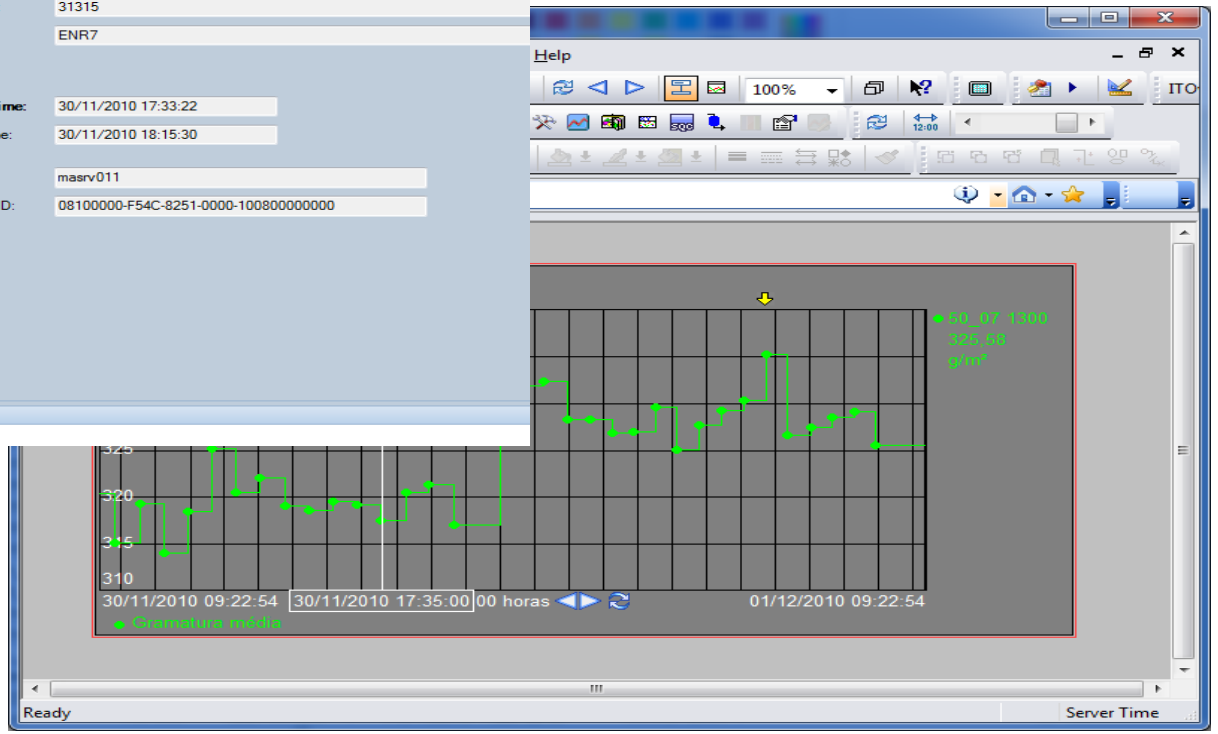
4. Another scheduled job reads all the data on this table and sends to SAP through a RFC call. The status of the records are updated to “R” = Received by SAP

5. In the other way, a third MII job downloads SAP master data to update in the MII database tables used for the mapping between the SAP objects and PI System objects.

6. The user decision is done by the Laboratory operator by analyzing the Lab data.

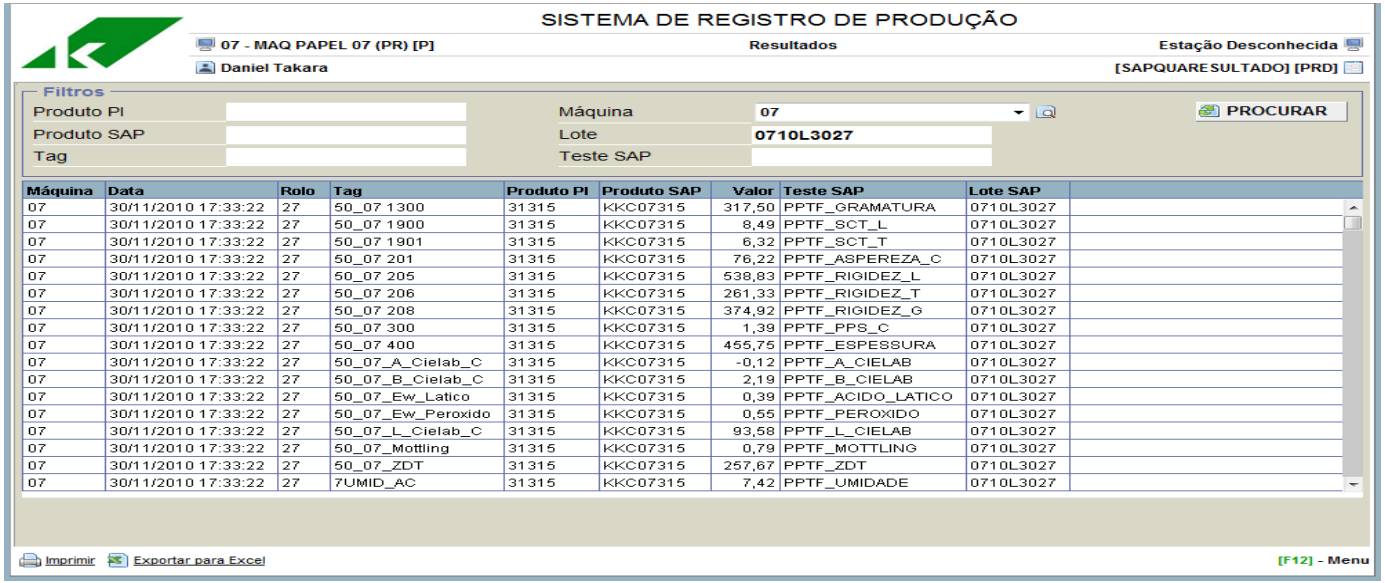
Jumbo Roll Data in PI System





- PI BatchView
- PI ProcessBook

Jumbo Roll Production data in SAP MII

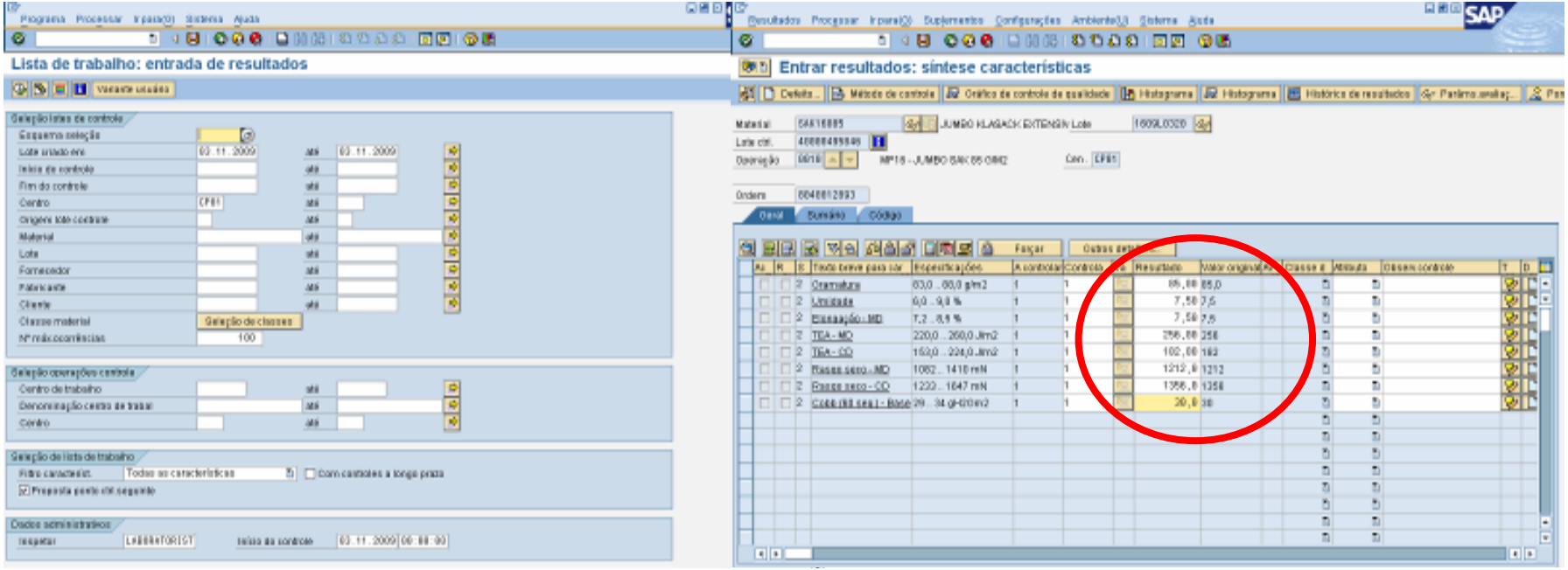


Máquina	Data	Rolo	Tag	Produto PI	Produto SAP	Valor	Teste SAP	Lote SAP
07	30/11/2010 17:33:22	27	50_07 1300	31315	KKC07315	317,50	PPTF_GRAMATURA	0710L3027
07	30/11/2010 17:33:22	27	50_07 1900	31315	KKC07315	8,49	PPTF_SCT_L	0710L3027
07	30/11/2010 17:33:22	27	50_07 1901	31315	KKC07315	6,32	PPTF_SCT_T	0710L3027
07	30/11/2010 17:33:22	27	50_07 201	31315	KKC07315	76,22	PPTF_ASPEREZA_C	0710L3027
07	30/11/2010 17:33:22	27	50_07 205	31315	KKC07315	538,83	PPTF_RIGIDEZ_L	0710L3027
07	30/11/2010 17:33:22	27	50_07 206	31315	KKC07315	261,33	PPTF_RIGIDEZ_T	0710L3027
07	30/11/2010 17:33:22	27	50_07 208	31315	KKC07315	374,92	PPTF_RIGIDEZ_G	0710L3027
07	30/11/2010 17:33:22	27	50_07 300	31315	KKC07315	1,39	PPTF_PPS_C	0710L3027
07	30/11/2010 17:33:22	27	50_07 400	31315	KKC07315	455,75	PPTF_ESPESSURA	0710L3027
07	30/11/2010 17:33:22	27	50_07_A_Cielab_C	31315	KKC07315	-0,12	PPTF_A_CIELAB	0710L3027
07	30/11/2010 17:33:22	27	50_07_B_Cielab_C	31315	KKC07315	2,19	PPTF_B_CIELAB	0710L3027
07	30/11/2010 17:33:22	27	50_07_Ew_Latico	31315	KKC07315	0,39	PPTF_ACIDO_LATICO	0710L3027
07	30/11/2010 17:33:22	27	50_07_Ew_Peroxido	31315	KKC07315	0,55	PPTF_PEROXIDO	0710L3027
07	30/11/2010 17:33:22	27	50_07_L_Cielab_C	31315	KKC07315	93,58	PPTF_L_CIELAB	0710L3027
07	30/11/2010 17:33:22	27	50_07_Mottling	31315	KKC07315	0,79	PPTF_MOTTLING	0710L3027
07	30/11/2010 17:33:22	27	50_07_ZDT	31315	KKC07315	257,67	PPTF_ZDT	0710L3027
07	30/11/2010 17:33:22	27	7UMID_AC	31315	KKC07315	7,42	PPTF_UMIDADE	0710L3027

- Monitoring screen in SAP MII showing the mapping between the PI System Product Code and the SAP Product Code with the Test Results for each batch (Jumbo Roll)

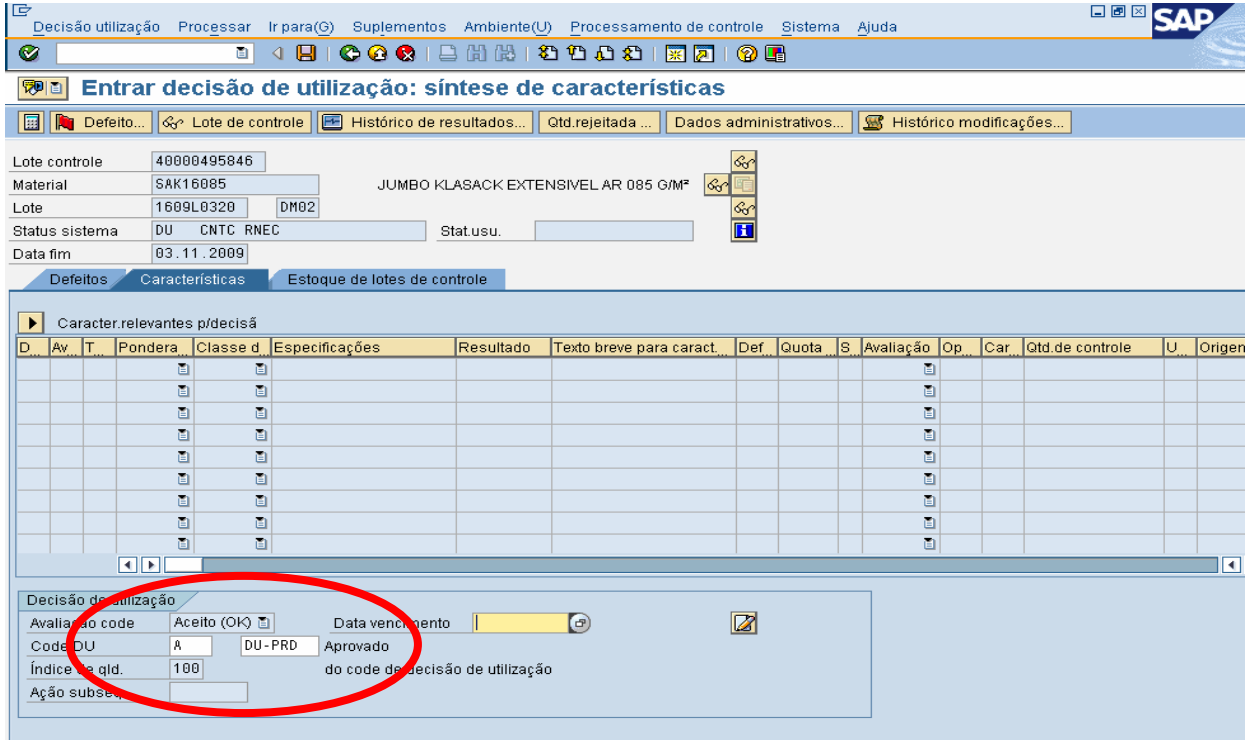
SAP QM – Test results

The transaction, QE51, was used to validate the tests received in QM from MII/PI System so that a Certificate of Analysis can be created for the customer.



SAP QM – Usage Decision

Also, Usage Decision is made by the operator on this screen.



Results from integrating Acquidata – PI System to SAP QM

- ✓ Eliminated manual data entry into SAP
- ✓ Eliminated the human errors associated with the same;
- ✓ Decreased decision-making time for disposition of rolls;
- ✓ Increased overall operational performance on PM #16;
- ✓ Increase overall paper laboratory efficiencies;

Condition-based Maintenance
Linking PI System to SAP PM

Project Overview and Goals

Problem: Equipment downtime

Example:

> Paper Machine #16 – High Consistency Refining Failures
103 hours (US$ 750,000)

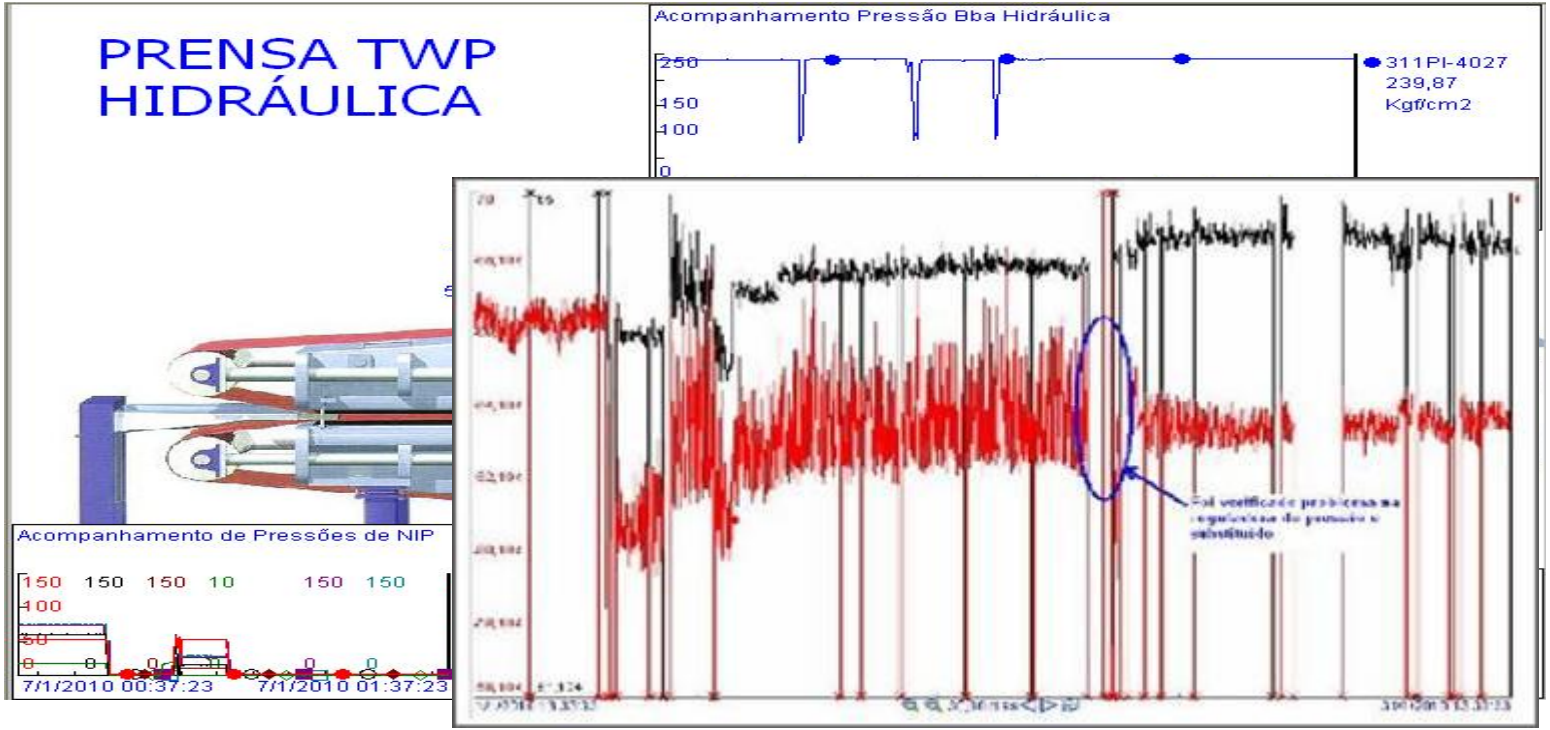
Solution:

> Use PI System data for monitoring various process areas and machines

> Catch failures BEFORE they happen using alarms

> Integrate alarms from PI System to SAP PM

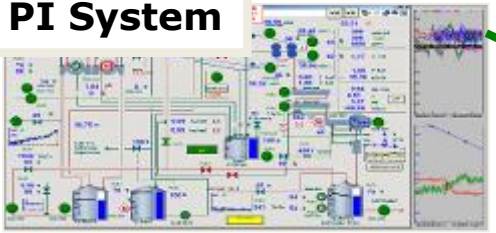
Example of equipment failure



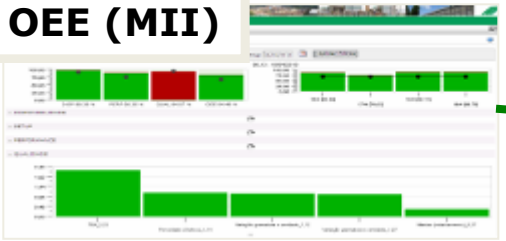
Data sources for alarm definition

Systems used to collect data

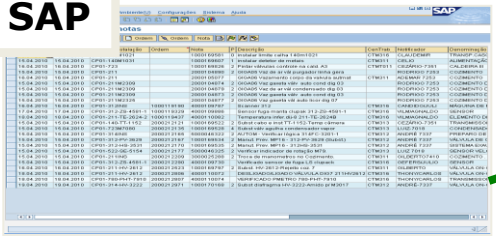
PI System



OEE (MII)

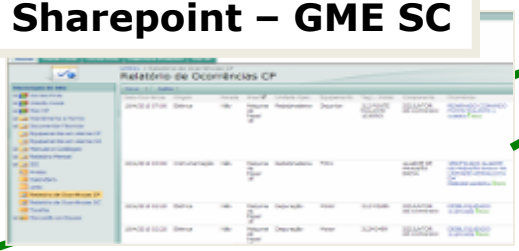


SAP

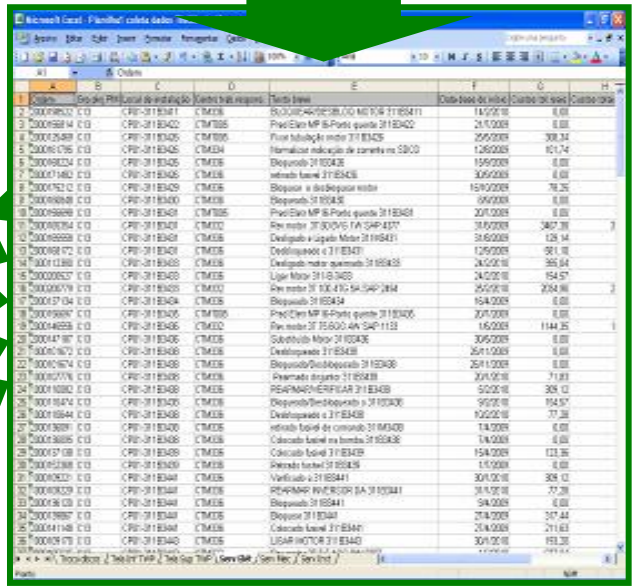


Operational Occurrences

Sharepoint – GME SC



Spreadsheet created by the improvement team



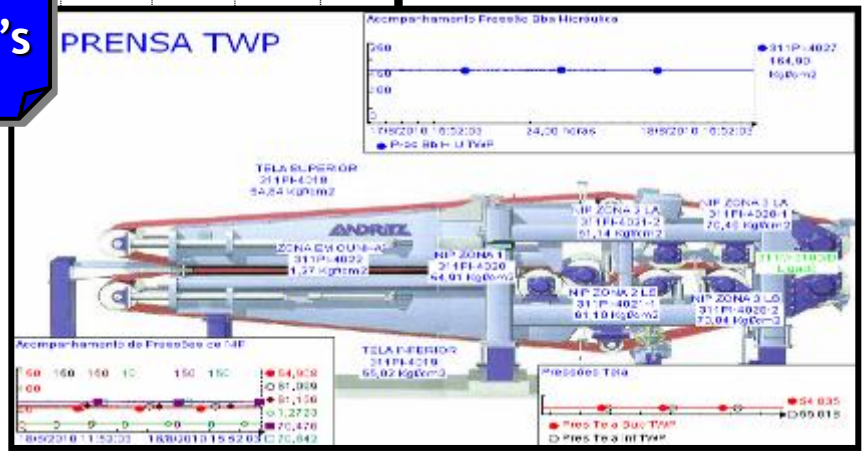
Group of Alarms by Area

Grouping of tags

TAG'S TWP

STATUS		IDENTIFICAÇÃO										
CONTROLE	MANUT / TEMPO CONT.AUTO	Área	TAG	Descrição	Valor atual	Valor ideal	Limite mín.	Limite máx.	Última Manut.	Período Manut.	Manut. Prev.	Tempo func.
Dentro Faixa	OK	311	311LC-3009	Nivel Tq 1	74,6	75,0	70,0	80,0	14/11/2009	365	14/11/2010	277
Fora Faixa	OK		311LCV-3009	Valv Nivel Tq 1	45,5	54,0	47,0	61,0	14/11/2009	365	14/11/2010	277
Dentro Faixa	NA		311LC-3009/SP	SP Nivel Tq 1	75,0	75,0	70,0	80,0	NA	NA	NA	NA
Auto	OK		311LC-3009/MD	Nivel Tq 1	Auto	Auto	97,0	NA	NA	NA	NA	100
Normal	NA		311LC-3009/LL	Nivel Baixo Tq Massa 1	N				NA	NA	NA	NA
Dentro Faixa	OK	311	311CC-3080	Consist Entr Engrossadores								
Dentro Faixa	OK	311	311FI-3005	Vazao Massa Dep p/ Filt Engros	52							

117 TAG's



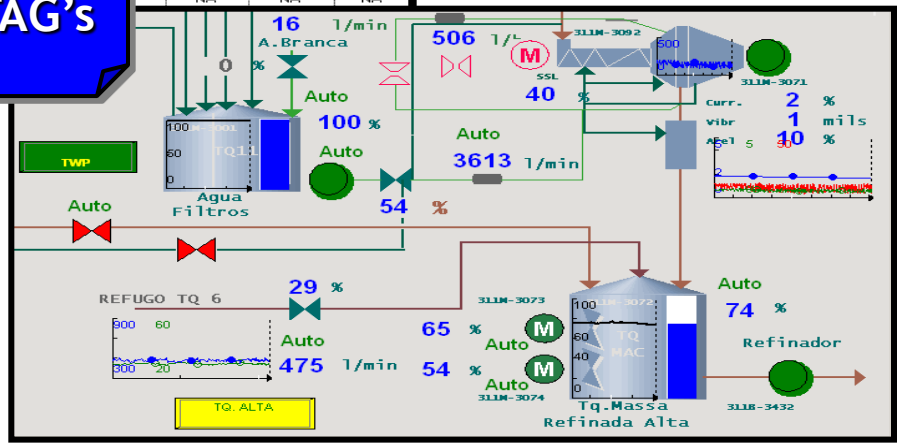
Group of Alarms by Area

Grouping of tags

TAG'S TQ7

STATUS		IDENTIFICAÇÃO										
CONTROLE	MANUT / TEMPO CONT.AUTO	Área	TAG	Descrição	Valor atual	Valor ideal	Limite mín.	Limite máx.	Última Manut.	Período Manut.	Manut. Prev.	Tempo func.
Dentro Faixa	OK	311	311LC-3009	Nivel Tq 1	74,6	75,0	70,0	80,0	14/11/2009	365	14/11/2010	277
Fora Faixa	OK		311LCV-3009	Valv Nivel Tq 1	45,5	54,0	47,0	61,0	14/11/2009	365	14/11/2010	277
Dentro Faixa	NA		311LC-3009/SP	SP Nivel Tq 1	75,0	75,0	70,0	80,0	NA	NA	NA	NA
Auto	OK		311LC-3009/MD	Nivel Tq 1	Auto					NA	NA	100
Normal	NA		311LC-3009/LL	Nivel Baixo Tq Massa 1	Normal					NA	NA	NA
Dentro Faixa	OK	311	311CC-3080	Consist Entr Engrossadores	3,80							
Dentro Faixa	OK	311	311FI-3005	Vazao Massa Dep p/ Filt Engros	5296,21							

77 TAG's



Spreadsheet for Alarm monitoring

Microsoft Excel - Monitoramento Equipamentos RAC

Arquivo Editar Exibir Inserir Formatar Ferramentas Dados Janela PI Ajuda

STATUS

Status Manut.		Área	TAG	CCM	Descrição	Valor atual	Valor ideal	Limite mín.	Limite máx.
Dentro Faixa	NA	311	311M-3005I	CD 71.04.13	Corrente Agit Tq 1	48,6	50	45	55
Normal	NA		311M-3005I		Valores alarmes sobrecarga Agi Tq 1	0	0	NA	10
Subcarga	NA		311M-3005I		Valores alarmes subcarga Agi Tq 1	30	0	NA	10
Preditiva	Preventiva		311M-3005/D		Motor Agit Tq 1 - Elétrica	NA	NA	NA	NA
Preditiva	Preventiva		311M-3005/D						
Auto	OK		311M-3005/MD						
Normal	NA		311M-3005/CCM						
Fora Faixa	NA		311M-3026I						
Normal	NA		311M-3026I						
Normal	NA		311M-3026I						
Preditiva	OK		311M-3026/D						

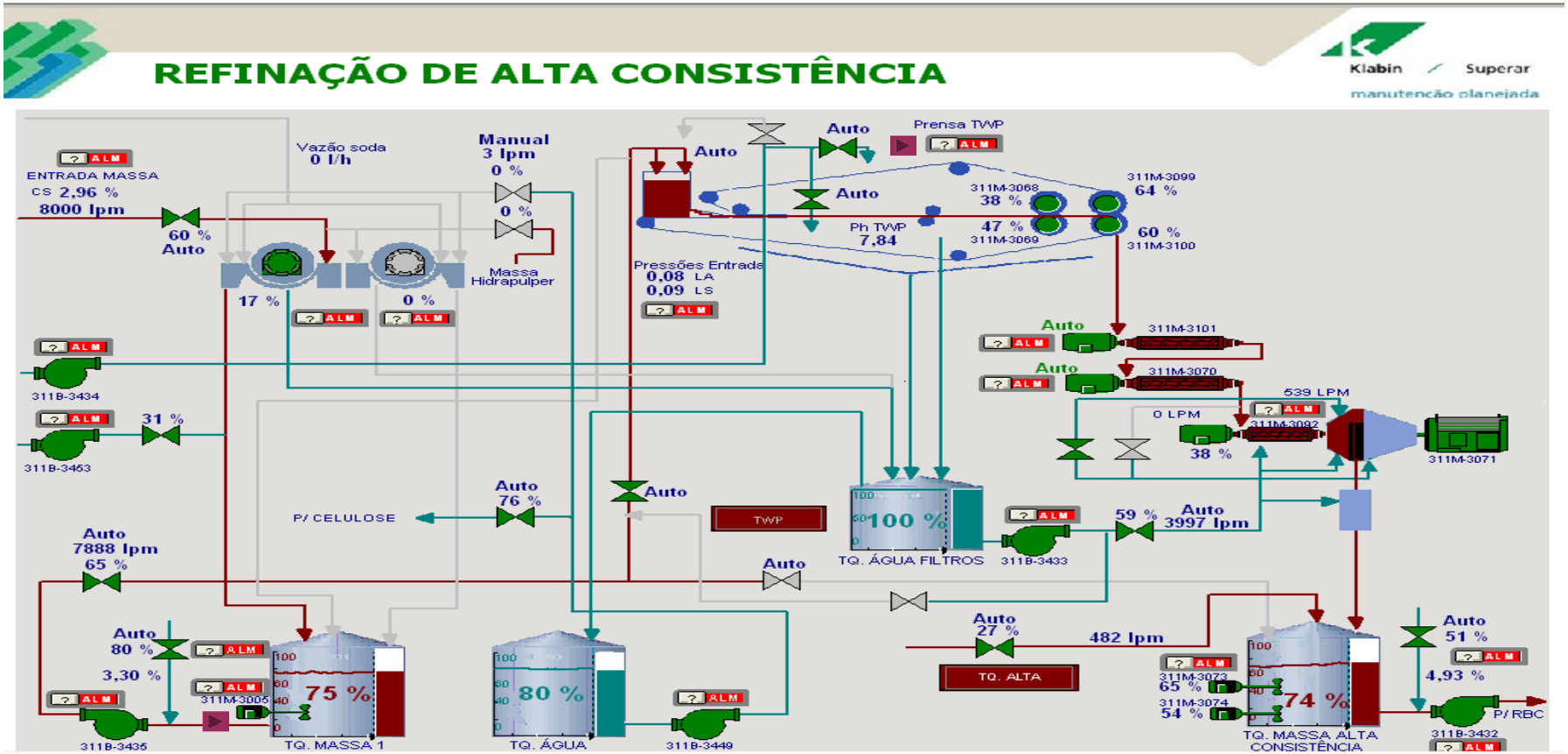
Preditiva				Preventiva			
Última Manut.	Período Manut.	Manut Pred.	Tempo func.	Última Manut.	Período Manut.	Manut Prev.	Tempo func.
NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA
1/8/2010	90	vencido	NA	1/8/2010	90	vencido	100
5/8/2010	30	vencido	NA	1/8/2010	90	vencido	183
NA	NA	NA	100	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA
1/8/2010	90	vencido	NA	1/8/2010	365	1/8/2011	NA

ALM CNT MOT

Pronto Calcula

Iniciar Monitoramento RAC

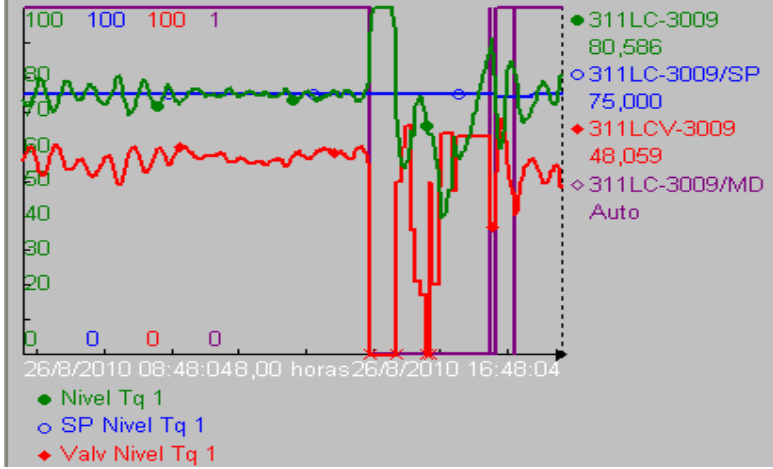
Monitoring, analysis, and a better mapping of assets

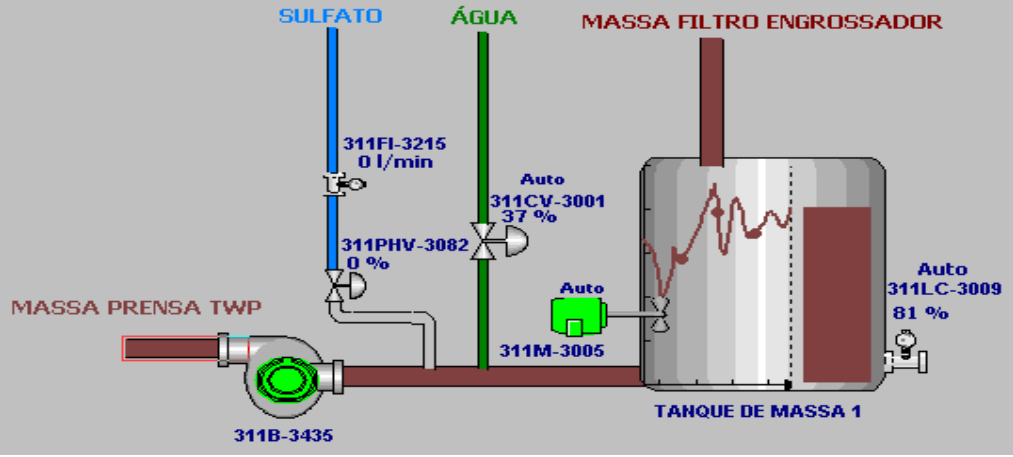


Monitoring detail display

311LC-3009 - NÍVEL TANQUE DE MASSA 1

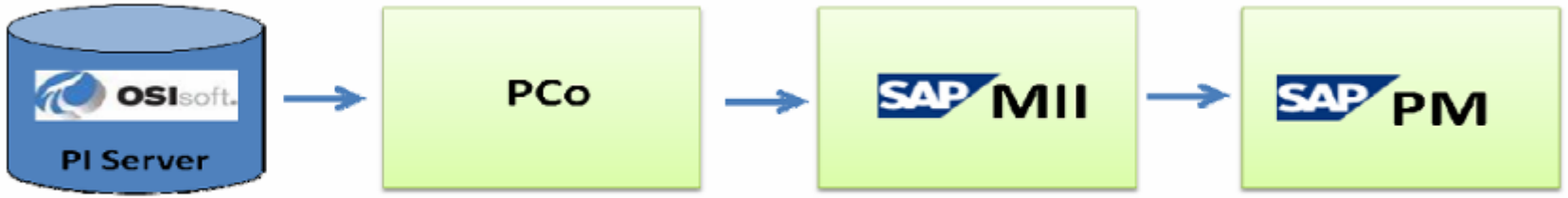
CONTROLE	MANUT / TEMPO CONT.AUTO	Área	TAG	Descrição	Valor atual	Valor ideal	Limite mín.	Limite máx.	Última Manut.	Período Manut.	Manut. Prev.	Tempo func.
Dentro Faixa	OK	311	311LC-3009	Nivel Tq 1	72,4	75,0	70,0	80,0	14/11/2009	365	14/11/2010	285
Dentro Faixa	OK		311LCV-3009	Valv Nivel Tq 1	53,8	54,0	47,0	61,0	14/11/2009	365	14/11/2010	285
Dentro Faixa	NA		311LC-3009/SP	SP Nivel Tq 1	75,0	75,0	70,0	80,0	NA	NA	NA	NA
Auto	Abaixo do limite		311LC-3009/MD	Nivel Tq 1	Auto	Auto	97,0	NA	NA	NA	NA	91
Normal	NA		311LC-3009/LL	Nivel Baixo Tq Massa 1	Normal	Normal	NA	NA	NA	NA	NA	NA





Integration of the PI System to SAP PM

Objective: Implement the integration between the PI System and SAP PM through SAP MII 11.5, for automatically creating maintenance notifications based upon on-line monitoring of about 150 PI Tags.



Nota: PCo – Plant Connector

Next Steps with the SAP PM interface

- Installation and Configuration of PCo (Plant Connectivity) 2.0
- Definition of the 150 PI Tags to be monitored (with limits)
- Tests with the SAP RFC for notification creation in PM
- Deployment in the Production environment in one Paper Plant (pilot)

Summary of Results

- Availability of High Consistency Refining of PM #16 was increased
- Maintainers and operators had their skills to use the PI System developed
- Improved system security
- Online monitoring of process and equipment.
- Fast diagnosis of problems
- Total savings of 750,000 USD per year

Thank you

Turning **insight** into **action**.