



OSIsoft.

REGIONAL SEMINAR

E M E A

2012



PI System in Use in Cement, Chemicals, Pharma

Presented by

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Istanbul Regional Seminar
October 27, 2011



Agenda

- Summary of PI System Infrastructure
- General Benefits of PI System in Manufacturing
- Cement Industry Process and PI System
- Examples of PI System in Cement Industry
- Economic Benefits Reported in Cement Industry by Customers

PI System Infrastructure + Applications Transforms Information into Asset

BUSINESS



Connect

Collect data from hundreds of sources.

Interfaces



Manage

Gather and archive large volumes of data. Scale to meet your growing

Servers



Analyze

Access real-time or historical role-based data for the

Analytics



Present

View data, identify problems, and take corrective action with

Visuals

Facilities

The Real Value is Manufacturing Intelligence

“Manufacturing Intelligence (MI), also known as Enterprise Manufacturing Intelligence (EMI), software **delivers real-time information about manufacturing processes** to help businesses **optimize the performance of these processes** as well as manufacturing yields. MI software **gathers and analyzes production data**, provides **role-based visualization**, and helps manufacturers **reduce waste**. The software also enables the **improvement of manufacturing processes**, **identification of best practices**, and the ability to **respond to exceptions and events**.”

Manufacturing Intelligence:

- Delivers real-time information about manufacturing processes
- Gathers and analyzes production data

Delivered Value:

- Optimize process performance and manufacturing yields
- Reduce waste
- Improve manufacturing processes
- Identification of best practices
- Respond to exceptions and events

Existing PI System Cement Customers

- CEMEX (EA)
- Votorantim
- Italcementi (Essroc)
- Cal Portland
- Lafarge (Blue Circle)
- Heidelberg (Lehigh)
- Ultratech



Votorantim



Italcementi Group



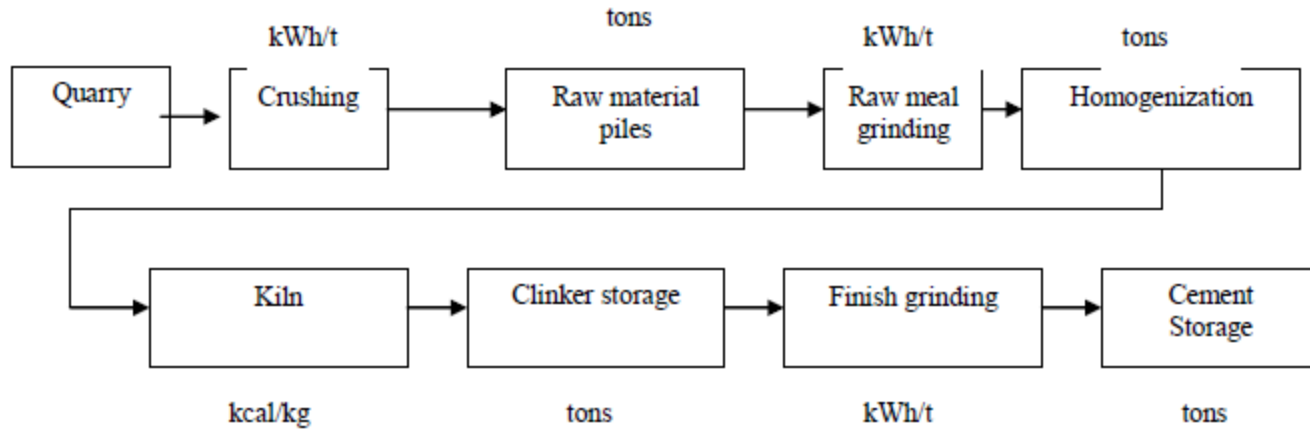
CALPORTLAND



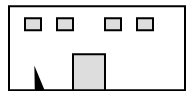
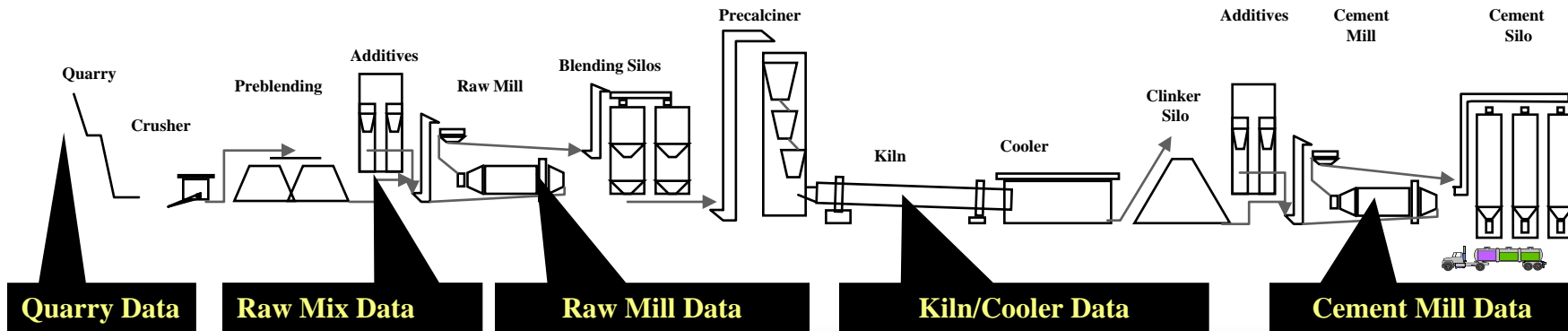
HEIDELBERGCEMENT



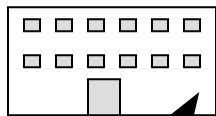
Process Overview of Cement Operations



A single data format for all plant data management, analysis and archival



Lab Data



Enterprise Data

PI will give you value by real-time improvements in

- Energy savings
- Emissions monitoring
- Process data
- Product quality data
- Maintenance scheduling
- KPI measurements

PI can connect all your islands of information

- Process controls systems
- Lab analysis devices
- Motor control centers
- Vibration analysis devices
- Gas analysis systems
- Infrared camera systems



Monitoring and Transforming into Intelligence

- Quarry Operations
- Crushing Operations
- Blending and Raw Material Grinding
- Preheat,
- Kilns
- Clinker Storage and Finish Grinding



Key Performance Indicators

1. Inventory Utilization
2. Energy Consumption
3. Capacity
4. Quality Indicators
5. Fuel Consumption
6. Asset Utilization

**Maximize Asset
Performance**

**Prolong Asset Life and
Increase MTBF**

Optimize Production

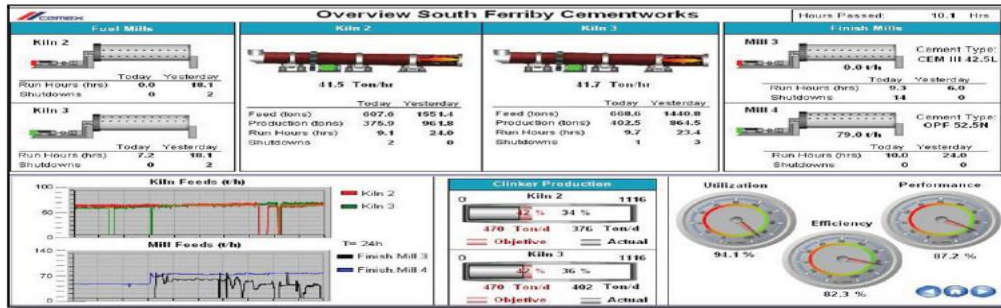
Increase Efficiency

**Dynamic Visibility and
Business Intelligence**

**Flexible End-User
Access**

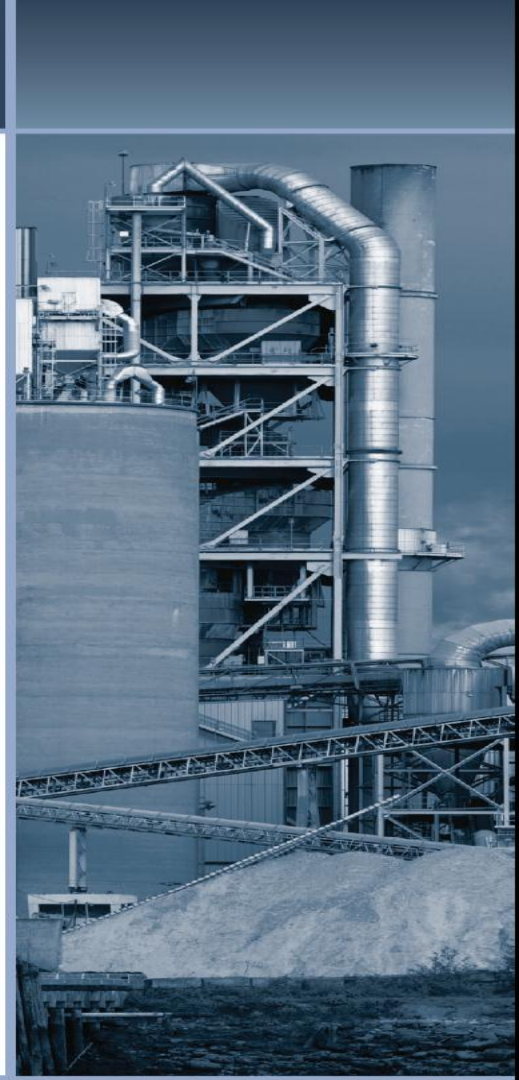
Create Immediate Value

- *Energy Savings*
- *Emissions Monitoring*
- *Process Data*
- *Product Quality Data*
- *Maintenance Scheduling*
- *KPI Measurements*



Own Your Information

- *Process Controls*
- *Lab Analysis*
- *Motor Control*
- *Vibration Analysis*
- *Gas Analysis*



Data Access



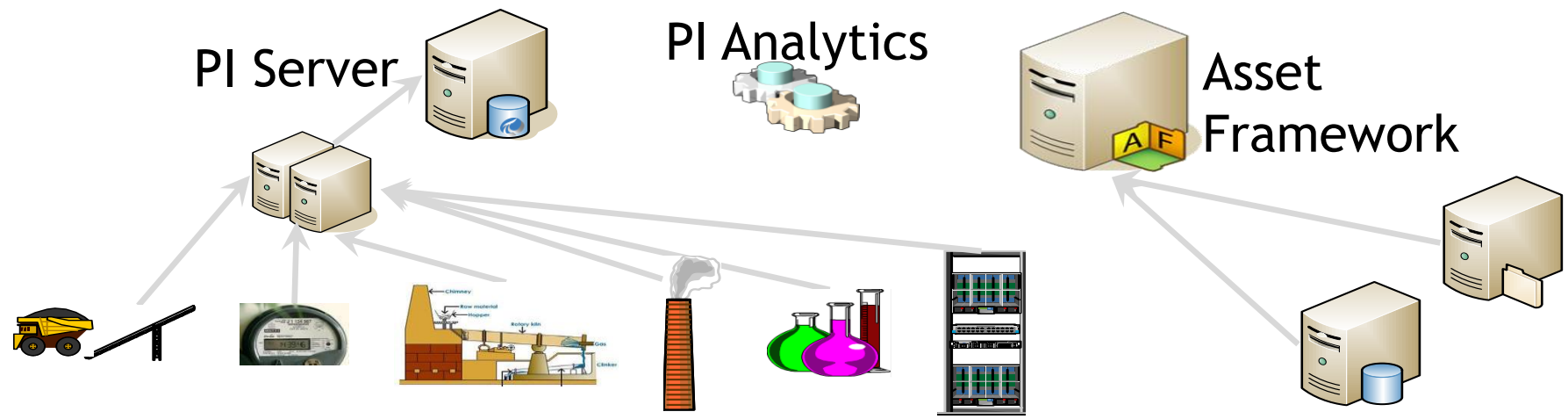
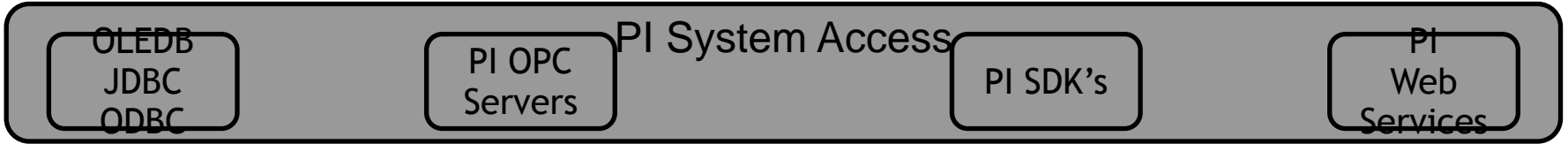
ORACLE

ERP

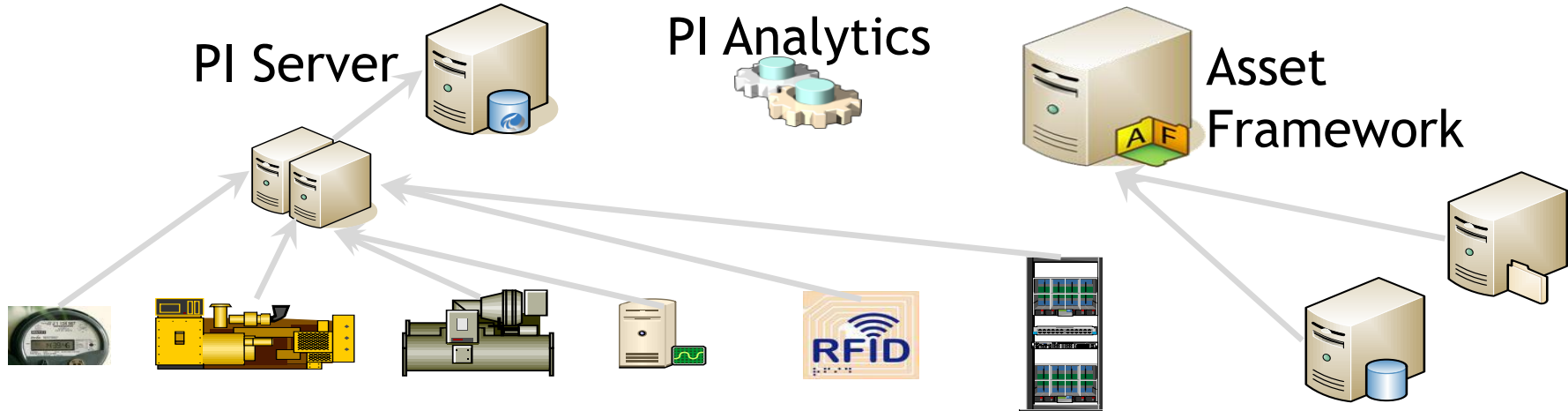
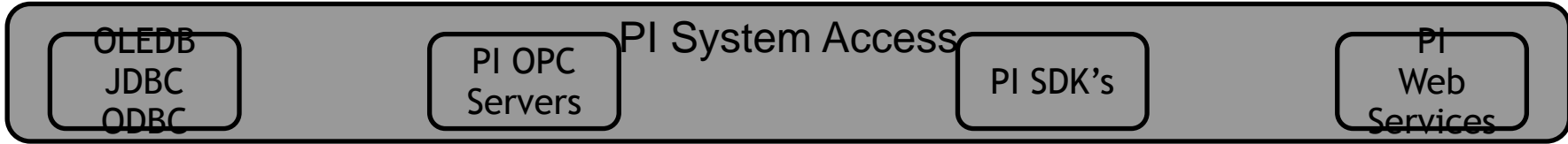
CMMS

Business Intelligence

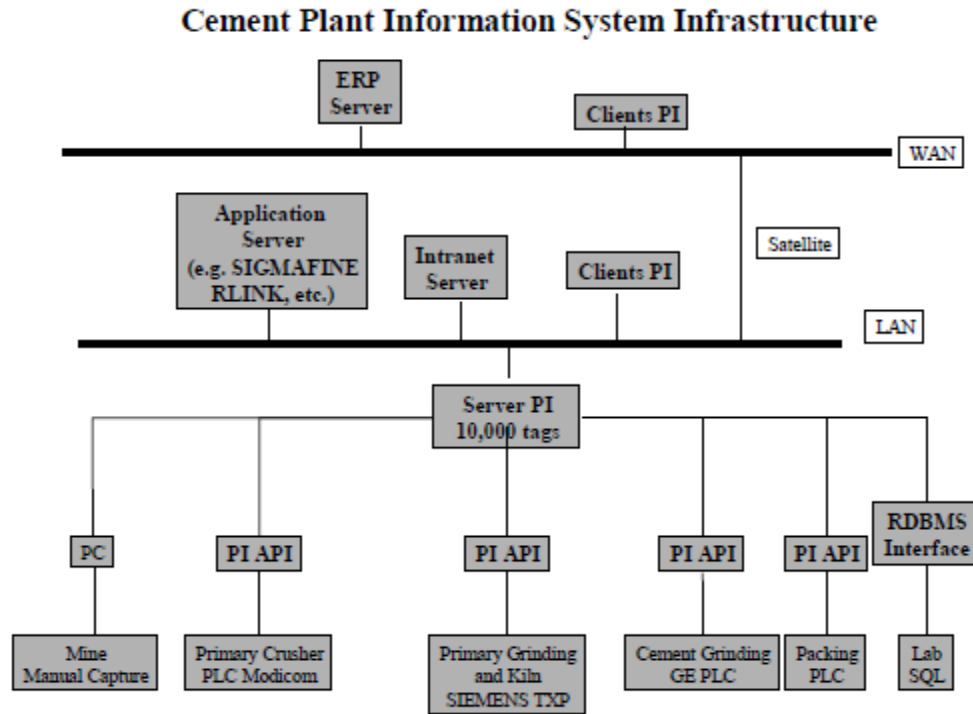
Web Servers



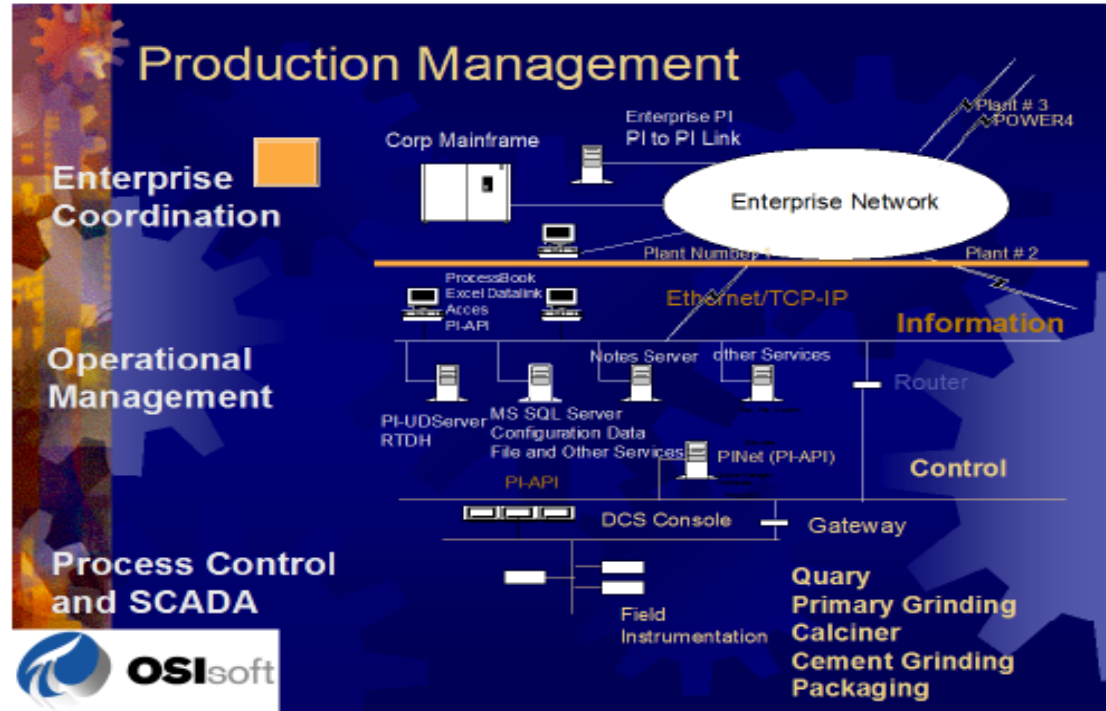
Single data source for cement applications



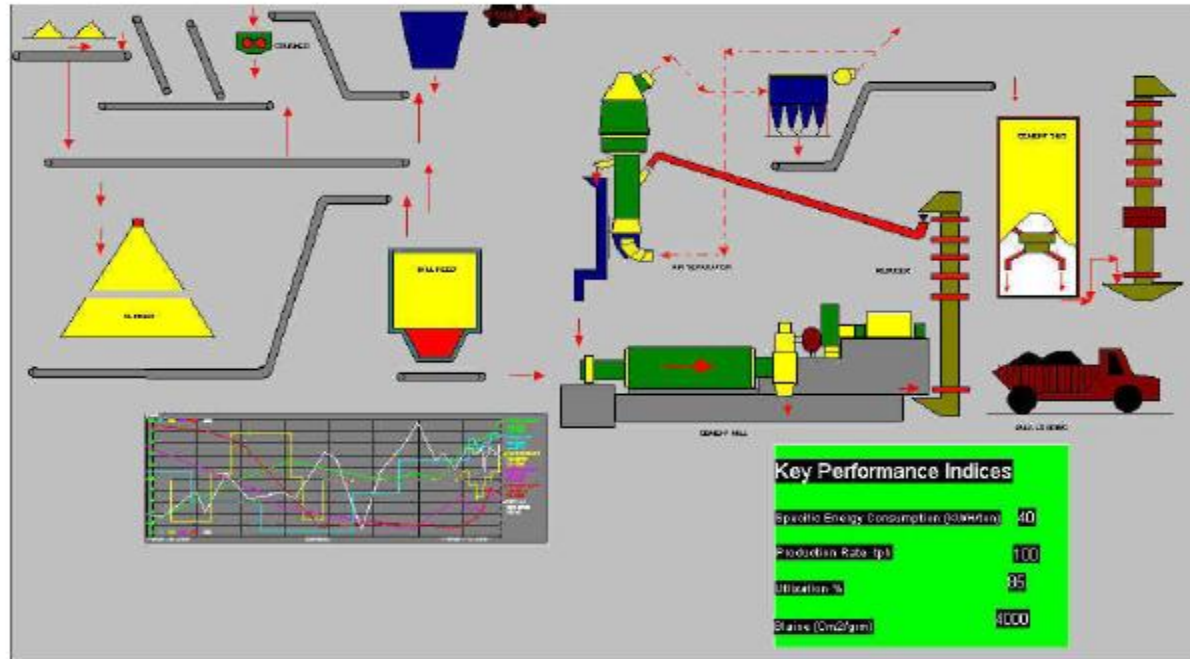
PI System Infrastructure Diagram in a Cement Plant



Functional Layers for Production Management in Cement Plants



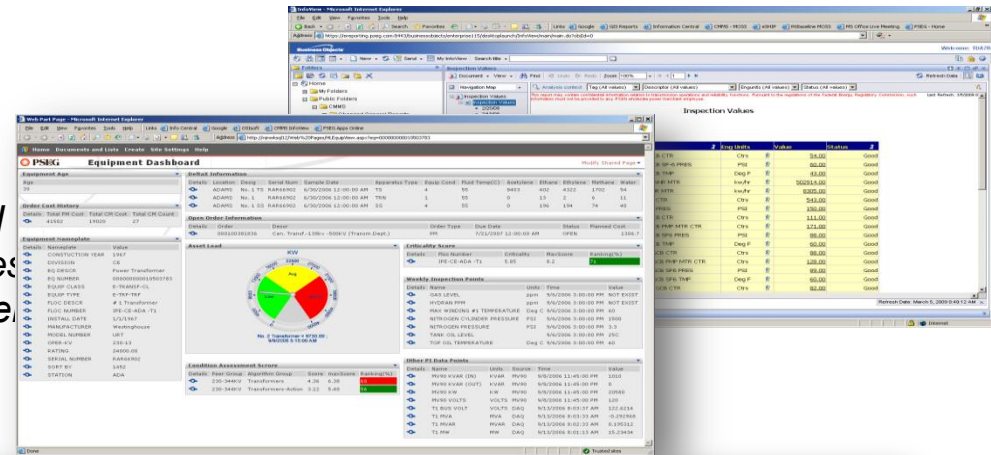
Dashboard of KPI's for Each Plant Area



Intranet and web real time reporting of key performance indicators by plant or specific area.

Operational Data Protected

“Cement producers need to develop their KPIs, share it with key support groups, this provides the PI System, it would have taken them several



Customer Business Challenge

- Providing key process indicators for increased quality and production
- Closer monitoring of electrical and fuel usage
- Developing long term historical data for improved maintenance

Solution

- Implemented PI system to provide connections to plant wide systems
- Provided focused view and data analysis of MTC's and emission controls.
- Provides monitoring and analysis of all equipment history

Customer Results / Benefits

- Strong positive real-time composite audit for all major plant areas
- Reduced energy costs and real-time indicators for energy management
- Focused maintenance data to aid in seeing problem areas before failures occur

Sharing Information World Wide

“Cement Production companies need to interact around the world. Consolidating and sur management. Web Parts is a tool that in



Customer Business Challenge

- Collect accurate process information from all facilities located globally.
- Provide a single source for viewing many locations and processes to employees in non centralized locations.

Solution

- Implemented a single PI server with interfaces to manufacturing facilities world wide.
- Implemented MS SharePoint with PI web parts to expose process information.
- Implemented notifications tied to

Customer Results / Benefits

- Dashboards and process analysis are driving continuous improvement ; lowering product costs improving performance.
- Integration of information from multiple data sources.
- Timely, reliable, communication for

ROI CASE #1

ACTUAL CEMEX LAB CONSOLIDATION SAVINGS

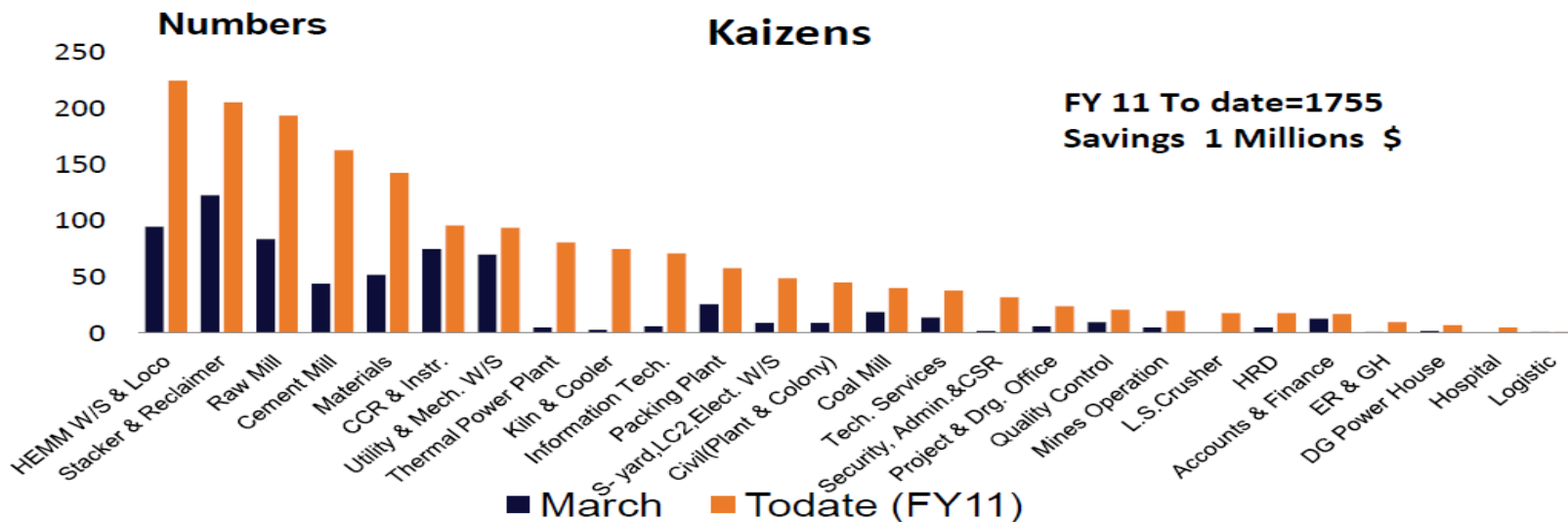
Tangible Benefits

- Reduce TCO per plant of previous in-house system by USD \$ 800 k/year approx.
- Calculated ROI is 6 months
- No extra cost for OSIsoft licenses, all are included in the Enterprise Agreement
- Elimination of multiple vendor licenses



ROI CASE #2

ACTUAL ONE YEAR SAVINGS AFTER INSTALLING PI Improvement Cases at Aditya Cement



ROI CASE #2 Improved

Results and Performance Data Via the PI System

**KILN I Ever Highest Clinker
TPD 5079 in July 10, Previous best
was 5018 in the month
July '07(with 100% Pet Coke).**

**KILN I Lowest Power
Consumption 24.20 Kwh/Mat,
Previous best was 27.06
Kwh/Mat in the month
July '07(with 100% Pet Coke).**

Aditya Cement


**KILN II Highest TPD 9657 with
>10000 TPD for 17 days. Jan11
(OEM Guarantee 8000 TPD)**

**RAW MILL-II Ever Highest
Monthly TPH: 581.8, Previous
best was 572.83 TPH n the
month June '10**

**RAW MILL-II Ever Lowest
Power Consumption
19.56 Kwh/T of Material**

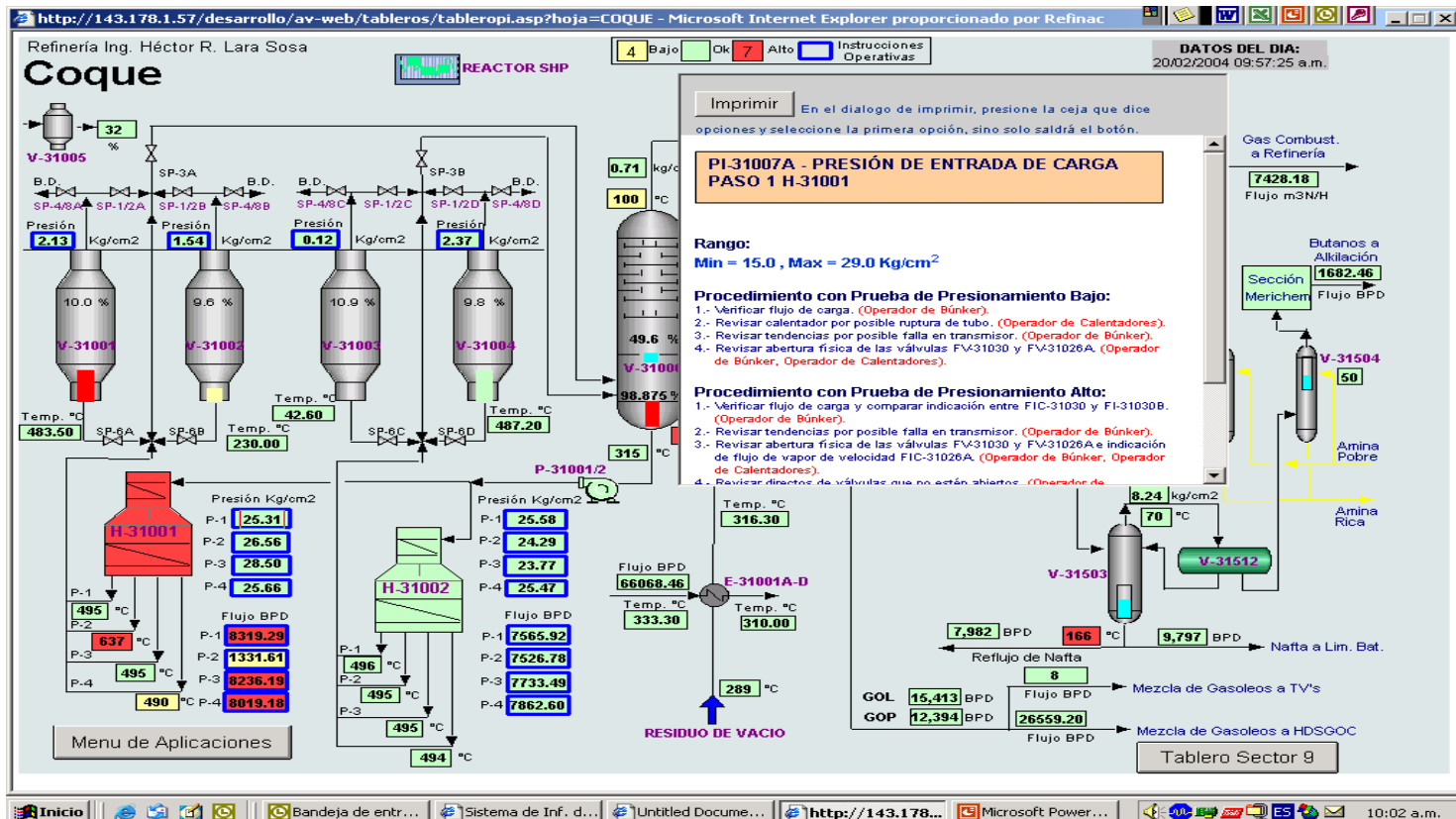


Petrochemical Examples

- Process Monitoring and Investigation
 - KPI and Performance Calculations
 - Plan Execution \ Performance to Targets
 - Environmental Compliance
 - Equipment Health and Maintenance
 - Control System Effectiveness
 - Data Reconciliation
 - Analyzer Validation
 - Model Integration for Decision Making
- 

Process Monitoring – Pemex

Alerting and Operating Instructions



Process Monitoring Lab Data Browser

SELECT AN AREA

DESULF. FEED GC

Folder Items

- HPD South
 - ABSORBER OFF-GAS
 - CRUDE
 - DEPROP OVHD
 - DESULF FEED DISTILLATI
 - DESULF. FEED GC
 - FUEL GAS
 - N2C CONDENSATE
 - N2C FRACT 2SS

Version: 19700101 0 0 1.0Z158

LABORATORY RESULTS

PIAlias Name	Tag Name	Server	Snapshot Value	Snapshot Time
TOTAL C4 OLEFINS	FEEDC40.L	slcuds	0	11/2/2004 5:01:00 AM
TOTAL C5 OLEFINS	FEEDC50.L	slcuds	0	11/2/2004 5:01:00 AM
TOTAL C4S	AL030641.T4	slcuds	0	11/2/2004 5:01:00 AM
TOTAL C5S	AL030641.T5	slcuds	0.22	11/2/2004 5:01:00 AM
TOTAL C6S	AL030641.T6	slcuds	7.71	11/2/2004 5:01:00 AM
TOTAL C7S	AL030641.T7	slcuds	39.07	11/2/2004 5:01:00 AM
TOTAL C8S	AL030641.T8	slcuds	39.79	11/2/2004 5:01:00 AM
TOTAL C9S	AL030641.T9	slcuds	5.43	11/2/2004 5:01:00 AM
TOTAL C10S	AL030641.T0	slcuds	2.4	11/2/2004 5:01:00 AM
TOTAL AROMATICS	AL030641.TA	slcuds	17.68	11/2/2004 5:01:00 AM
TOTAL NAPHTHA	AL030641.TN	slcuds	30.52	11/2/2004 5:01:00 AM
TOTAL OLEFINS	AL030641.TO	slcuds	0	11/2/2004 5:01:00 AM

TRENDING ALIASES

● AL030641.TN
30.52

30.00 Day(s)

TREND TIME CONFIGURATION

Start Time End Time

Process Monitoring

Unit Performance Report – Economics

FCC LP vs ACTUAL DATA

		16-Sep-98					
	Tag	LP Planned MBPD	Actual MBPD	Delta	Tag	Feed/Product value \$/MBBL	Feed/Product value \$
<u>FCC FEED RATES</u>							
Total FCC Feed	FFRTCF .LP	95.0	97.0	2.0	FFSVTCF .LP	-16.69	-1619.60
Coker Gas	FFRDC2 .LP	1.0	2.1	1.1	FFSVDC2 .LP	-12.08	-25.89
Coker Propylene	FFRDU3 .LP	0.2	0.0	-0.2	FFSVDU3 .LP	-8.92	0.00
Coker Propane	FFRDC3 .LP	0.4	0.4	-0.1	FFSVDC3 .LP	-8.37	-3.12
Coker Isobutane	FFRDI4 .LP	0.1	0.1	0.0	FFSVDI4 .LP	-13.85	-1.22
Coker Butylene	FFRDU4 .LP	0.2	0.0	-0.2	FFSVDU4 .LP	-13.63	0.00
Coker Normal Butane	FFRDN4 .LP	0.3	0.3	0.0	FFSVDN4 .LP	-12.19	-3.81
Coker C5's	FFRDC5 .LP	0.7	0.0	-0.6	FFSVDC5 .LP	-15.96	-0.69
<u>FCC PRODUCT RATES</u>							
Refinery Fuel	FPRGAS .LP	7.2	5	-1.9	FPSVGAS .LP	12.08	63.00
FCC Propylene	FPRUC3 .LP	7.8	7.5	-0.3	FPSVUC3 .LP	9.09	67.76
FCC Propane	FPRFC3 .LP	3.0	3.1	0.2	FPSVFC3 .LP	8.43	26.54
FCC Isobutane	FPRFI4 .LP	6.3	0.2	-6.1	FPSVFI4 .LP	14.44	2.91
FCC Butylene	FPRUC4 .LP	7.3	3.0	-4.2	FPSVUC4 .LP	13.72	41.46
FCC Normal Butane	FPRFN4 .LP	1.7	0.1	-1.6	FPSVFN4 .LP	12.19	0.61
FCC Mixed Amylene	FPRAMX .LP	0.1	0.0E+00	-0.1	FPSVAMX .LP	15.96	0.00
Light FCC Gasoline	FPRLCD .LP	36.5	33.2	-3.3	FPSVLCD .LP	16.42	545.00
Heavy FCC Gasoline	FPRHCD .LP	19.0	25.5	6.5	FPSVHCD .LP	17.38	442.47
Light Cycle Oil	FPRFLC .LP	15.8	17.1	1.3	FPSVFLC .LP	17.57	301.28
CBFS	FPRDEC .LP	4.9	3.8	-1.0	FPSVDEC .LP	10.25	39.35
Coke on Catalyst	FPRCCK .LP	5.7	5.0	-0.7	FPSVCCK .LP	6.04	29.95
Product Value		2168.84					1560.33
Feed Cost		(1869.82)					-1654.34
Gross Margin		299.02					-94.01
Gross Margin per Barrel	FPRGMB .LP	2.82					-0.97

Process Monitoring

Unit Performance Report – Energy Use

Unit Targets

FEED QUALITY

	<u>Units</u>	<u>Current Value</u>
LT FEED CONCARB	wt%	0.34
LT FEED BASIC N2	ppm	240
LT FEED NICKEL		0.70
-		0.30
HVY FEED CONCARB	wt%	0.52
HVY FEED BASIC N2	ppm	451
HVY FEED NICKEL		1.70
HVY FEED VANADIUM		0.30

CONVERSION

77.6

PRODUCT QUALITY

	<u>Units</u>	<u>Actual</u>	<u>Target</u>
DEPENT. OH LIQUID C5=		0.00	5 % MAX
FCC LT GAS MON		80.9	
FCC LT GAS RON		93.1	
FCC LT GAS ROAD		87.0	86.5 MIN
FCC LT GAS MSULFUR	PPM	1.6	
FCC LT GAS RVP	PSIA	13.9	9.0-9.4 PSIA
FCC HVY GAS D86/90	F	397	
FCC HVY GAS D86/EP	F	430	430-440 F
FCC HVY GAS MON		80.4	
FCC HVY GAS RON		92.8	
FCC HVY GAS ROAD		86.6	86.5 MIN
LCGO D86/90	F	669	
LCGO D86/EP	F	692	705 MAX
LCGO COLOR		2	2.5 MAX
CBFS API		1.5	5 Max.
ASHD	%	0.10	0.1
CBFS FLASH	F	186	160 min

Energy Usage

STEAM

			<u>Current Value</u>	<u>30 day Avg.</u>
50# Steam - 1291	OFI-725	KLBH	34.6	33.5
250# Steam - 1291	OFI-724	KLBH	45.2	43.3
600# Steam (1291-KN-1)	OFI-57	KLBH	7.1	16.3
600# Steam (1291-KN-2)	OFI-153	KLBH	139.6	151.4
250# Steam (From 1291)	OFI-760	KLBH	202.0	180.6

FUEL GAS

			<u>Current Value</u>	<u>30 day Avg.</u>
Fired Fuel (1291-H-2)	OFC-21	MCFH	41.9	37.8
H-2 Excess O2	OAC-910	%	0.9	3.6
Fired Fuel (1291-H-3)	OFC-22	MCFH	104.5	101.2
H-3 Excess O2	OAC-911	%	5.0	6.0

ELECTRICITY (1291 Usage)

		<u>Current Value</u>	<u>30 day Avg.</u>
	YWI3B24	612.4	565.9
	YWI3B17	595.9	619.7
	YWI3B32	859.1	1332.8
	YWI3C18	367.9	367.4
	YWI3C15	485.4	597.1
	YWI3C13	900.4	980.9
	YWI3C24	523.7	565.0
	YWI3C34	1441.6	1269.2
	YWI3C38	668.8	663.6
Total electricity Usage		6455.1	6961.6

Process Monitoring

Real-time Web Access

Home - Process Monitoring - Microsoft Internet Explorer

Address: http://bbsp/sites/PROCESSMONITORING/default.aspx

Home Documents and Lists Create Site Settings Up to Plant Applications Help

Up to BP eRTIS

Process Monitoring Home

Documents: Process Monitoring, Doc Lib

Pictures

Lists

Discussions

Surveys

BP Operations Tree

- BP Operations
 - Regions
 - Australia
 - Europe
 - Bavernoil
 - Catellon
 - Coryton
 - Gelsenkirchen
 - Starymoutou
 - Cracking
 - Fuels
 - Go to Plant Detail
 - Lubes
 - Prod Move
 - Services
 - Utilities
 - Lavera
 - Lingen
 - Mersin
 - Nerefco
 - Neuhof
 - Reichstett
 - Schwedt
 - North America

Process Diagram

Process Schematic

RtAlarms

Sev	Time	Description	Status	Value
1	1/21/2004 2:49:30 PM	Numeric alarm	.	0
1	1/19/2004 12:43:30 PM	Numeric alarm with reference	High	1.9
1	1/21/2004 2:49:00 PM	Alarm digital states	.	0
1	1/21/2004 2:49:30 PM	Test by condition	.	0

Done

Trusted sites

Plan Execution \ Inventory Report

Microsoft Excel - TSCOM001.XLS

File Edit View Insert Format Tools Data Window PI PI-SMT Help

Type a question for help

Arial 8

P23

1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2	DATE: 10/14/1998 0:00															
3	Product Code	Product Description	Tank #'s	Gauge	Temp.	Today	Yesterday	Change	Today	Yesterday	Change	Working Capacity	Avail. Capacity	Below Suction	Avail. to Ship	
6	1610	80 AVIA	392	14.85	60	5198	5200	(2)	5200	5202	(2)	10,151	4950	1051	4149	
7	1610	80 AVIA	3093			0	0	0	0	0	0	4,166	4166		-1	
8	Totals For Product Code #1610					5,198	5,200	(2)	5,200	5,202	(2)	14,317	9,117	1,051	4,148	
10	1604	108AVIAL	393	26.21	67	9146	9598	(458)	9175	9646	(472)	10,151	976	1051	8123	
11	Totals For Product Code #1604					9,140	9,598	(458)	9,175	9,646	(472)	10,151	976	1,051	8,123	
13	1645	UNBLND C	130	28.41	65	25045	34169	(9,124)	25107	34369	(9,262)	40,102	14996	5943	19164	
14	1645	UNBLND C	131	35.54	66	31246	31276	(30)	31347	31414	(67)	39,971	8626	5353	26151	
15	Totals For Product Code #1645					56,291	65,445	(9,154)	56,454	65,782	(9,329)	80,074	23,620	11,297	45,315	
17	1650	REGUNL C	99	19.28	69	38224	19156	29,068	38410	18210	20,200	68,232	49822	10132	28593	
18	1650	REGUNL C	120	12.76	72	10837	33439	(22,601)	10907	33717	(22,811)	38,869	27962	3056	7844	
19	1650	REGUNL C	121	13.34	66	11525	24931	(13,406)	11562	25030	(13,468)	39,045	27483	3209	8353	
20	Totals For Product Code #1650					60,587	76,526	(15,939)	60,879	76,958	(16,079)	166,146	105,267	16,397	44,790	
22	1661	PREM93 C	122	30.24	63	26546	26851	(311)	26585	26913	(329)	38,911	12327	3063	29522	
23	1661	PREM93 C	123	42.18	68	37231	3454	33,777	37402	3456	33,946	39,029	1627	3295	34167	
24	Totals For Product Code #1661					63,771	30,395	33,466	63,986	3,456	33,617	77,940	13,954	6,298	57,689	
26	171	IC4	662	38.71	59	22962	15548	7,014	22539	16516	7,023	28,952	6413	3087	19498	
27	Totals For Product Code #171					22,562	15,548	7,014	22,539	16,516	7,023	28,952	6,413	3,087	19,498	
29	175	ALKYFEED	663	15.44	69	9505	11265	(1,761)	9549	11330	(1,782)	28,989	19,440	3,512	6,127	
30	Totals For Product Code #175					9,505	11,265	(1,761)	9,549	11,330	(1,782)	28,989	19,440	3,512	6,127	
32	830	NC4	664	18.04	69	10430	13129	(2,699)	10499	13192	(2,692)	27,995	17495	1570	8919	
33	830	NC4	665	38.99	66	16508	17479	(971)	16583	17551	(969)	23,638	7055	1632	16576	
34	8888	OFFLINE	666	0.00	75	0	0	0	0	0	0	N/A		0	0	
35	Totals For Product Code #8888					26,938	30,608	(3,670)	27,082	30,743	(3,661)	51,642	24,460	3,202	25,489	
37	8888	OFFLINE	189	0.00	0	36	36	0	33	33	0	39,035	39002	33	-1	
38	810	L ALKY	237	12.42	48	1095	691	404	1084	685	400	1,273	189	178	907	
39	Totals For Product Code #8888					1,131	727	404	1,118	718	400	40,308	39,191	211	906	
41	925	LIC	158	29.14	67	54005	47793	6,212	54311	48070	6,241	119,764	65452	13155	41262	
42	Totals For Product Code #925					54,005	47,793	6,212	54,311	48,070	6,241	119,764	65,452	13,155	41,262	

Ready Calculate NUM

Control System Effectiveness

Multivariable Control Collaboration

PI - ProcessBook - [Fractionator APC [Read Only]]

File Edit View Insert Tools Draw Arrange Window Help

113%

APC STATUS: OPEN LOOP
MAIN FRAC MONTH-TO-DATE % ONLINE: 0.0

CONTROLLED VARIABLES

TAG	DESCRIPTION	UNITS	STATUS	TARGET	MEAS	LO LIM	HI LIM
01 A007AB2112A	PRD C2 BTM 90%PT	DEGF	ON	0.0	319.5	320.0	320.0
02 A001AY2890	HCO 90%PT INFER	DEGF	ON	0.0	730.6	50.0	750.0
03 A001LI2345	FRAC BTM LVL	% LVL	ON	0.00	46.48	45.00	45.00
04 A001TI2254	FRAC BTM TEMP	DEGF	ON	0.0	678.5	0.0	690.0
05 A001FINETSRV	TOT SLURRY FLW	MBPD	ON	0.0	82.0	80.0	170.0
06 A001FY1408	SLRY>STLR VLV	% OPN	ON	0.0	50.9	5.0	95.0
07 A001PDC2411	LCO DRAW VLV	% OPN	ON	0.0	58.6	0.0	100.0
08 A001FC1408SP	SLRY>STLR FLW SP	MBPD	ON	0.00	1.90	1.60	8.00
09 A001LC2346	HCO STRP LVL VLV	% OPN	ON	0.0	37.2	25.0	85.0
10 A007FY2099	C9 RBLR STM OP	% OPN	ON	0.0	45.0	14.5	70.0
11 A007FC1810	C2 RBLR STM OP	% OPN	ON	0.0	38.1	37.0	99.0
12 A007FY2681	C315 RBLR STM OP	% OPN	ON	0.0	48.6	41.0	70.0
13 A001FH1736	HCO WASH>FRAC	MBPD	ON	0.00	5.42	6.00	10.00
14 A001PDI2400	FRAC DIST ZN DP	IN H2O	ON	0.0	2.1	0.0	6.7
15 A001PDI2412	FRAC HCO ZN DP	IN H2O	ON	0.0	4.4	0.0	13.0
16 A001PDI2401	FRAC L/HCO ZN DP	IN H2O	ON	0.0	6.4	0.0	23.0
17 A001PDI2402	FRAC WASH ZN DP	IN H2O	ON	0.0	0.9	0.0	10.0
18 A001PDI2387	FRAC TOTAL DP	IN H2O	ON	0.0	18.4	0.0	48.0

MANIPULATED VARIABLES

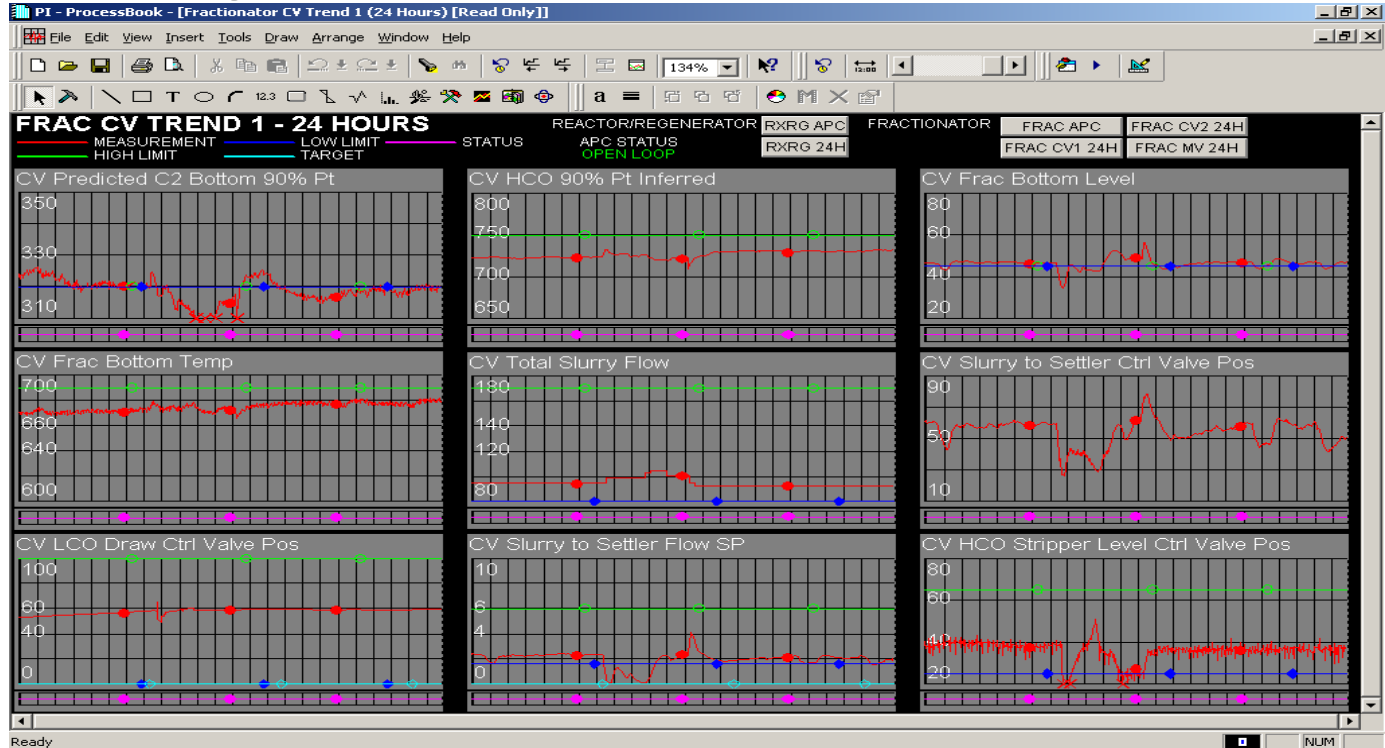
TAG	DESCRIPTION	UNITS	STATUS	TARGET	SP	MEAS	OUT	LO LIM	HI LIM	MOVE
01 A001FC0013	TOP REFLUX	MBPD	ON	0.0	17.8	17.8	39.9	24.0	34.0	-0.026
02 A007FC0308	LCO PUMPAROUND	MBPD	ON	0.0	12.0	12.0	78.7	15.0	17.5	-0.003
03 A001FC1404	HCO PRODUCT	MBPD	ON	0.00	4.65	4.68	30.56	1.28	3.00	0.036
04 A007FC2682	HCO PA TO SPLTR	MBPD	ON	0.0	19.0	19.0	42.9	19.5	20.5	0.003
05 A001FC2279	HCO PA TO C2 DBT	MBPD	ON	0.0	21.0	20.9	46.4	31.0	35.0	0.000
06 A001FC1410	SLRY #1 FLOW	MBPD	ON	0.0	46.0	46.0	32.1	88.0	85.0	-0.025
07 A001FC2395	SLRY #2 FLOW	MBPD	ON	0.0	46.0	46.2	25.8	88.0	85.0	-0.025
08 A001FY1402	RG0 FLOW VLV	% OPN	ON	0.0	N/A	51.0	51.0	66.0	73.0	0.003
09 A001FC1408	SLRY>STLR FLW	MBPD	ON	0.00	1.88	1.87	50.95	1.00	3.00	0.000

RXR0 APC
RXR0 24H
FRAC APC
FRAC CV1 24H
FRAC CV2 24H
FRAC MV 24H
HCO 90% PT
DELTA BIAS:
0.0000

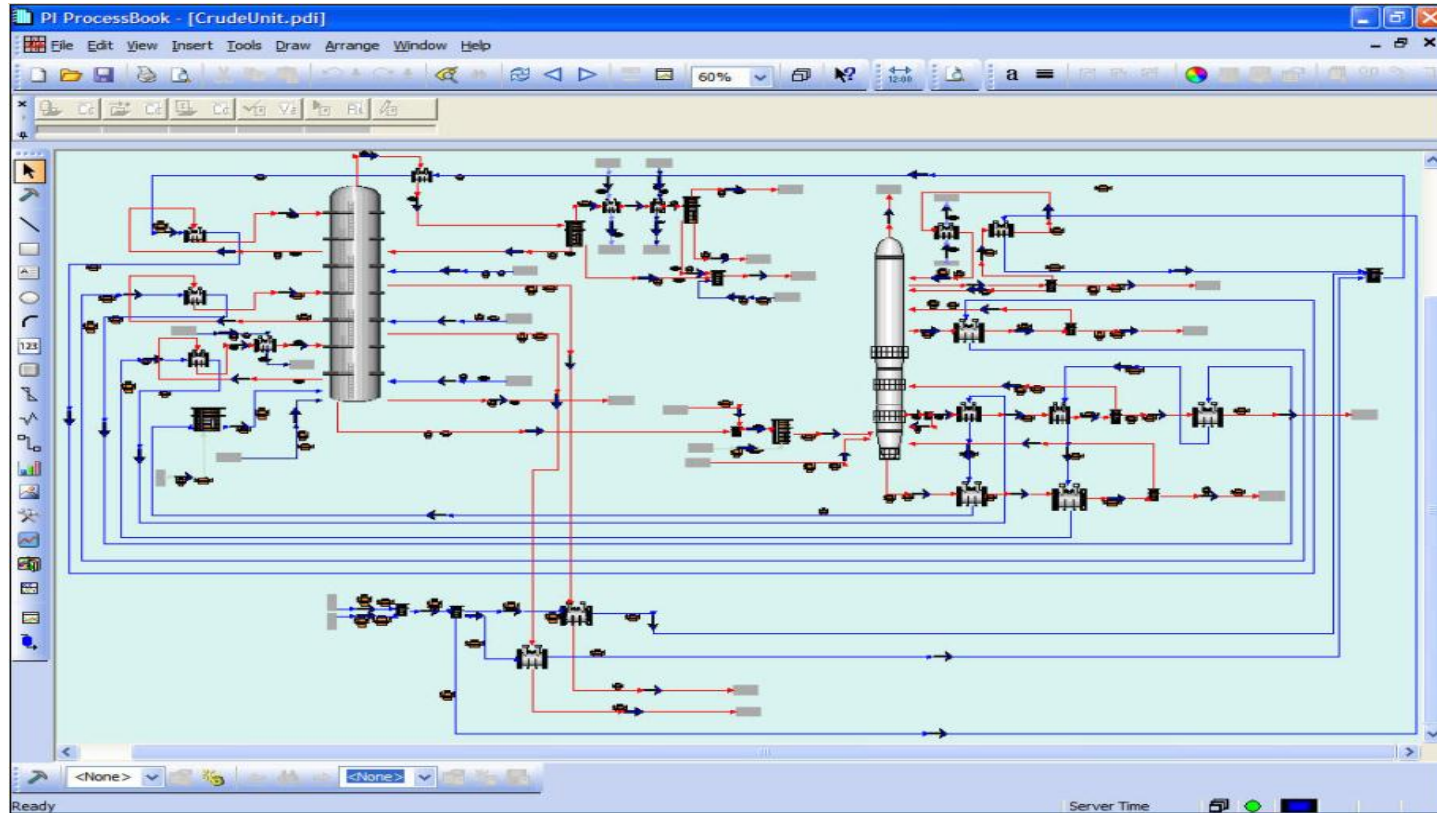
Ready NUM

Control System Effectiveness

Constraint Analysis



Data Reconciliation





Any Questions?

- Questions
- 