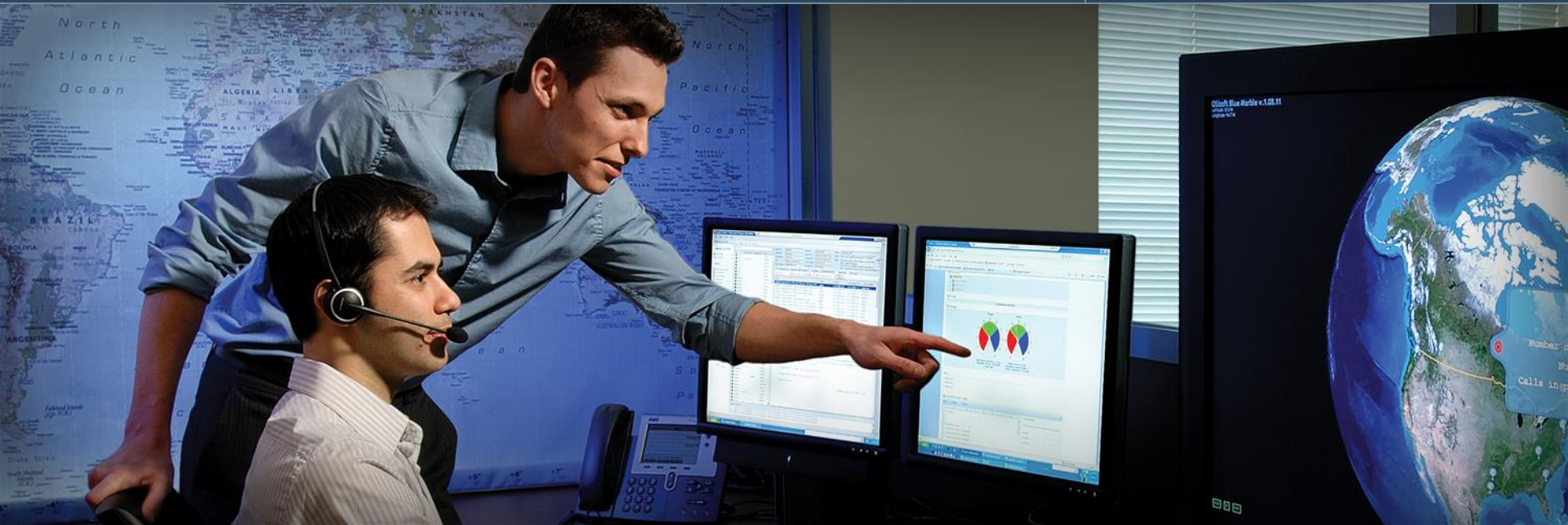




Regional Seminar Series Southern California



Portal Visualization: Using Microsoft SharePoint and
OSIsoft's PI System to See Productivity Data of Refining Plants

Francisco (Frank) J. Chavez
Architect
Chevron

January 21, 2010

About “Chevron”





About “Chevron”



- Industry: Energy
- Our Business
 - Exploration & Transportation
 - Oil
 - Natural Gas
 - Manufacturing, Marketing & Transportation
 - Manufacturing (7 Refineries)
 - Supply & Trading
 - Marketing
 - Pipelines
 - Lubricants
 - Shipping
 - Other
 - Chemicals, Mining, Power, Technology
- Organization / Sites
 - Africa, Asia-Pacific, South America, North America, Europe



Business Challenge/Problem Addressed



Business Intelligence Problem:

- How to provide refinery management and staff a daily refinery performance overview.
- Use real time PI data to improve operational performance and efficiency.
- Use BI aggregated information to make timely informed business decisions.

El Segundo Refinery

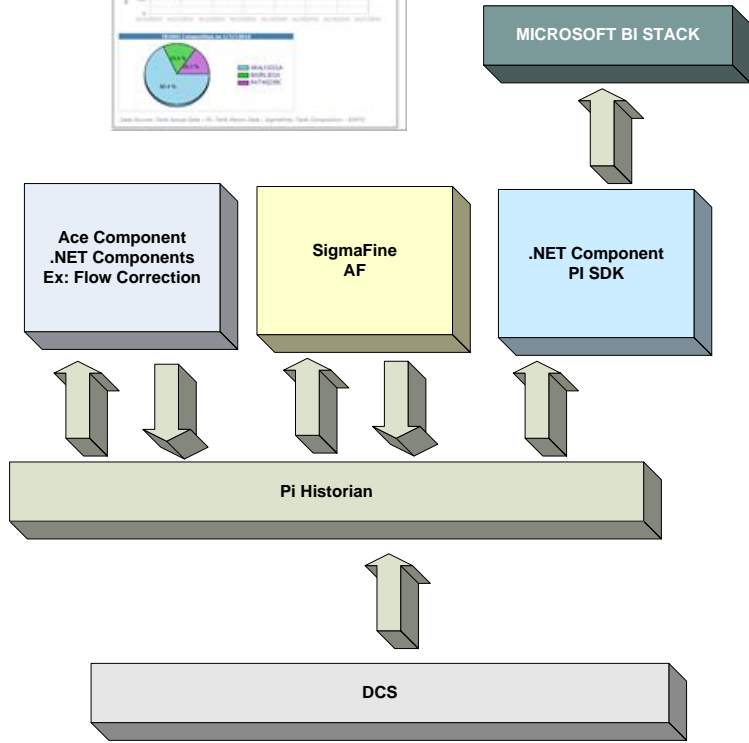
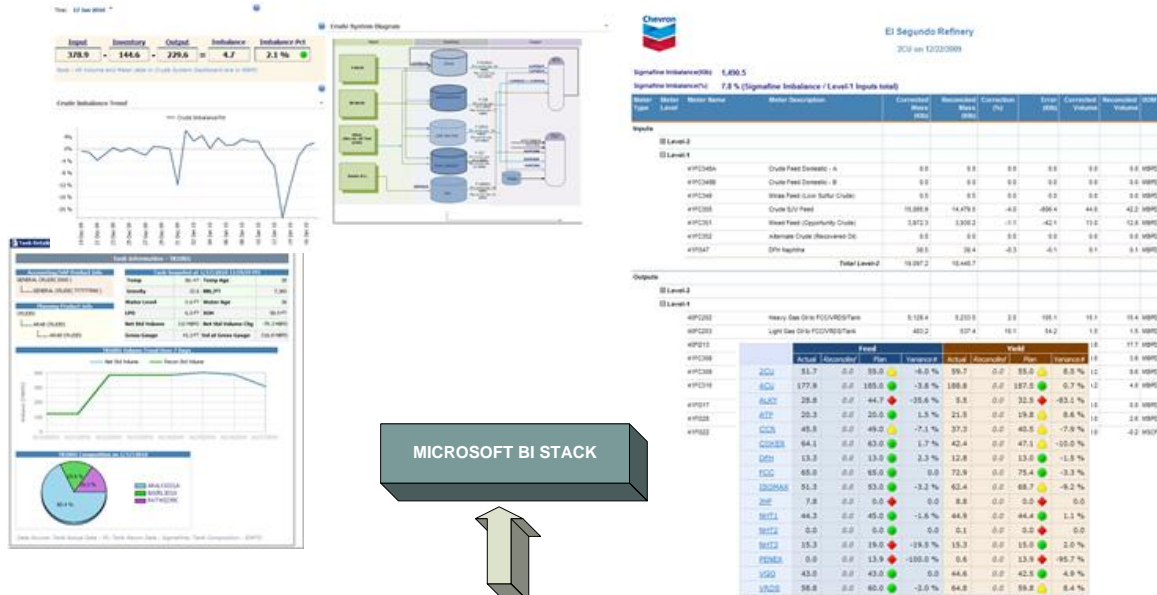
- 270,000+ barrels of crude per day.
- Refined products include gasoline, jet, diesel, LPG.
- Over 16 operating units.
- 2,500 + meters measuring flow, temp, pressure, gravity, levels.
- Each meter collects 1440 data points per day (1 minute scan).

Challenge/Problem

- No easy way to monitor meter, unit & overall refinery performance.
- No easy way to aggregate data into meaningful business information.
- Data lacked analysis rigor to ensure precision & accuracy.
- Excel was the analysis tool of choice leading to data silos and multiple versions of the truth.

- Sigmafine implementation to perform unit and plant mass balance.
- Implementation of OSI soft components to perform automation:
 - Ace is used to automate calculations and write values to PI
 - SDK, AF and .net tools to automate data integration
- Implementation of Business Intelligence from Microsoft to deliver information to users.

- Pi
- ACE
- PI SDK
- Sigmafine
- AF
- ProcessBook
- Enterprise Agreement (EA)



Results: Refinery & Plant Daily Scorecards



Refinery Scorecard

Time: 01 Dec 2009*

Mass Balance Scorecard

[Process Flow Diagram](#)

	Actual	Target
Overall Imbalance	2.4 %	●
Reconciled Mass Correction	1.8 %	●

Mass Imbalance and Bad Meters Summar...

Feed and Yield Summary

Filter Mode

	Mass Imbalance Pct		Bad Meters
	Actual	Status	Actual
2CU	-0.1	●	2.0
4CU	-1.0	●	2.0
ALKY	1.9	●	
ATP	0.0	●	
CCR	0.0	●	
COKER	1.5	●	
DFH	-4.8	●	1.0
FCC	-0.5	●	1.0
ISOMAX	0.0	●	
JHP	0.0	●	1.0
NHT1	0.5	●	1.0
NHT2	-3.7	●	
NHT3	5.3	▲	
PENEX	-4.1	●	
VGO	-1.0	●	
VRDS	2.4	●	

Filter Mode

	Feed				Yield			
	Actual	Reconciled	Plan	Variance#	Actual	Reconciled	Plan	Variance#
2CU	83.9	35.5	0.0	◆ 0.0	17.5	32.2	0.0	◆ 0.0
4CU	162.0	159.6	210.0	◆ -22.9 %	174.2	176.2	212.5	◆ -18.0 %
ALKY	33.5	34.6	35.9	▲ -6.7 %	7.0	7.4	25.7	◆ -72.8 %
ATP	0.0	0.0	0.0	● 0.0	0.9	0.0	0.0	◆ 0.0
CCR	0.1	0.0	0.0	◆ 0.0	0.5	0.0	0.0	◆ 0.0
COKER	50.0	49.6	55.8	◆ -10.4 %	34.4	36.1	41.9	◆ -17.9 %
DFH	13.9	14.6	14.0	● -0.7 %	13.1	14.7	14.0	▲ -6.4 %
FCC	59.3	59.2	56.0	▲ 5.9 %	65.4	66.4	68.0	● -3.8 %
ISOMAX	34.1	0.0	31.8	▲ 7.2 %	2.2	0.0	37.7	◆ -94.2 %
JHP	0.0	0.0	0.0	● 0.0	1.8	0.0	0.0	◆ 0.0
NHT1	40.7	40.9	30.0	◆ 35.7 %	41.3	41.3	30.1	◆ 37.2 %
NHT2	10.6	11.7	8.8	◆ 20.5 %	8.6	10.2	2.2	◆ 290.9 %
NHT3	15.5	16.9	14.5	▲ 6.9 %	15.6	16.4	14.5	▲ 7.6 %
PENEX	10.9	11.4	17.0	◆ -35.9 %	10.9	11.1	16.8	◆ -35.1 %
VGO	38.4	39.0	40.0	● -4.0 %	39.7	39.9	39.5	● 0.5 %
VRDS	56.5	53.2	57.0	● -0.9 %	58.5	56.6	56.7	● 3.2 %

*Mass Balance date

Feed and Yield Values are in MBPD

Variance calculated as Actual Vs Plan

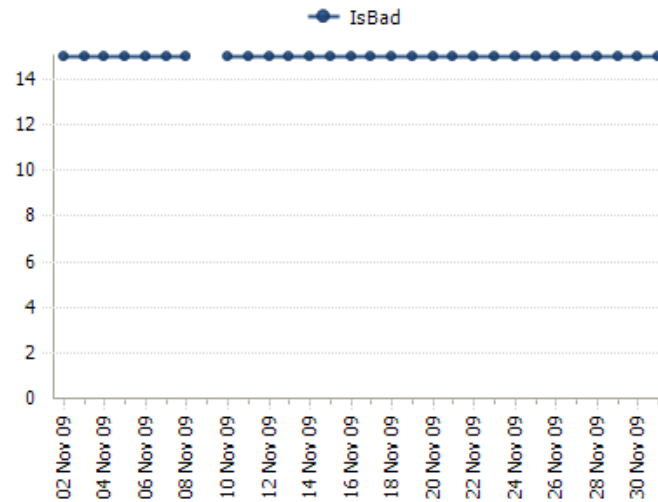
Comments by Mass Balance Engineer

No comment exist for this date

Results: Meter Performance Monitoring



Plant Bad Meters Graph



List of Bad Meters (SSRS)

	40FI213	1
	41FC350	1
<input type="checkbox"/> 4CU		2
	11FC017	1
	11FI036	1
<input checked="" type="checkbox"/> Butamer		1
<input checked="" type="checkbox"/> C780		1
<input checked="" type="checkbox"/> CTM (Crude)		1
<input checked="" type="checkbox"/> DFH		1
<input checked="" type="checkbox"/> FCC		1
<input checked="" type="checkbox"/> JET_BLENDED		1
<input checked="" type="checkbox"/> JHP		1
<input checked="" type="checkbox"/> NHT1		1
<input checked="" type="checkbox"/> ULSD_BLENDED		1
<input checked="" type="checkbox"/> YARD_DIB		2

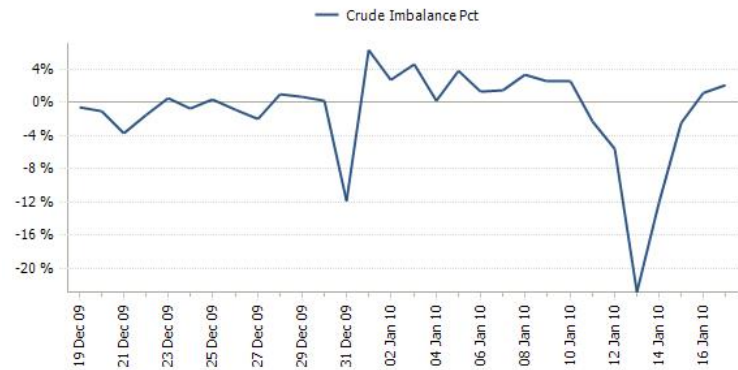
Results: Better Product & Raw Material Management



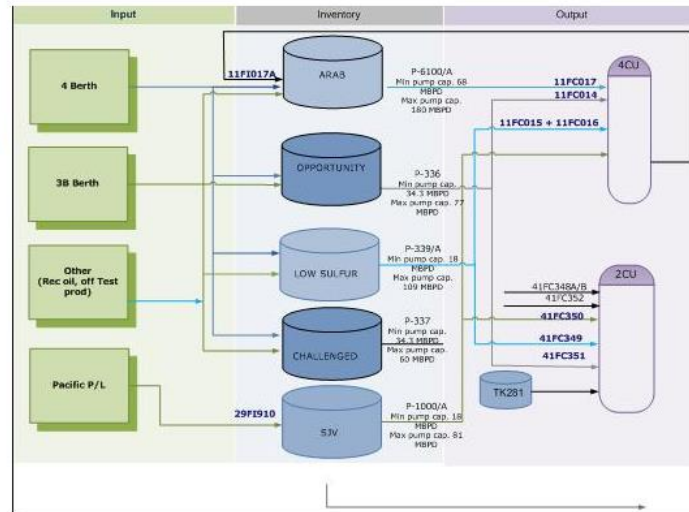
Input	Inventory	Output	Imbalance	Imbalance Pct
378.9	- 144.6	- 229.6	= 4.7	2.1 % ●

Note : All Volume and Meter data in Crude System Dashboard are in MBPD

Crude Imbalance Trend



Crude System Diagram



Results: Timely and Accessible Accurate Data



El Segundo Refinery

2CU on 12/22/2009

Sigmafine Imbalance(Klb) 1,490.5

Sigmafine Imbalance(%) 7.8 % (Sigmafine Imbalance / Level-1 Inputs total)

Meter Type	Meter Level	Meter Name	Meter Description	Corrected Mass (Klb)	Reconciled Mass (Klb)	Correction (%)	Error (Klb)	Corrected Volume	Reconciled Volume	UOM
Inputs										
		<input type="checkbox"/> Level-2								
		<input type="checkbox"/> Level-1								
		41FC348A	Crude Feed Domestic - A	0.0	0.0	0.0	0.0	0.0	0.0	MBPD
		41FC348B	Crude Feed Domestic - B	0.0	0.0	0.0	0.0	0.0	0.0	MBPD
		41FC349	Minas Feed (Low Sulfur Crude)	0.5	0.5	0.0	0.0	0.0	0.0	MBPD
		41FC350	Crude SJV Feed	15,085.9	14,479.5	-4.0	-606.4	44.0	42.2	MBPD
		41FC351	Mixed Feed (Opportunity Crude)	3,972.3	3,930.2	-1.1	-42.1	13.0	12.8	MBPD
		41FC352	Alternate Crude (Recovered Oil)	0.0	0.0	0.0	0.0	0.0	0.0	MBPD
		41FI347	DFH Naphtha	38.5	38.4	-0.3	-0.1	0.1	0.1	MBPD
		Total Level-2		19,097.2	18,448.7					
Outputs										
		<input type="checkbox"/> Level-2								
		<input type="checkbox"/> Level-1								
		40FC202	Heavy Gas Oil to FCC/VRDS/Tank	5,128.4	5,233.5	2.0	105.1	15.1	15.4	MBPD
		40FC203	Light Gas Oil to FCC/VRDS/Tank	483.2	537.4	10.1	54.2	1.5	1.5	MBPD
		40FI213	Resid to Delayed Coker	11,893.2	6,411.3	-46.1	-5,481.9	32.8	17.7	MBPD
		41FC308	No. 2 Sidecut Heavy Jet to Storage	1,161.8	1,171.0	0.8	9.2	4.0	3.6	MBPD
		41FC309	No. 3 Sidecut Diesel to Storage	2,888.9	2,900.2	0.4	11.3	9.2	8.6	MBPD
		41FC310	No. 4 Sidecut to Isomax, FCC, VGO, or VRDS	1,356.3	1,381.9	1.9	25.6	4.2	4.0	MBPD
		41FI317	LPG (C3-C4) to NHT2	3.0	3.0	0.0	0.0	0.0	0.0	MBPD
		41FI320	C-308 Bottoms to Storage	754.2	752.5	-0.2	-1.7	3.0	2.6	MBPD
		41FI322	V-306 Waste Gas to H2S Plant	0.0	0.0	0.0	0.0	0.0	-0.2	MSCFD
		41FI340	V-302 Waste Gas	68.1	57.6	-15.4	-10.5	0.7	0.6	MMSCFD
		40FI221	Vacuum Waste Gas from V-210	0.3	0.3	0.0	0.0	0.1	0.1	MSCFH
		40FI451	TOTAL WASTE GAS	55.3	57.9	4.5	2.6	0.6	0.7	MMSCFD
		Total Level-1		23,792.6	18,506.6					

Results: Timely and Accessible Accurate Data

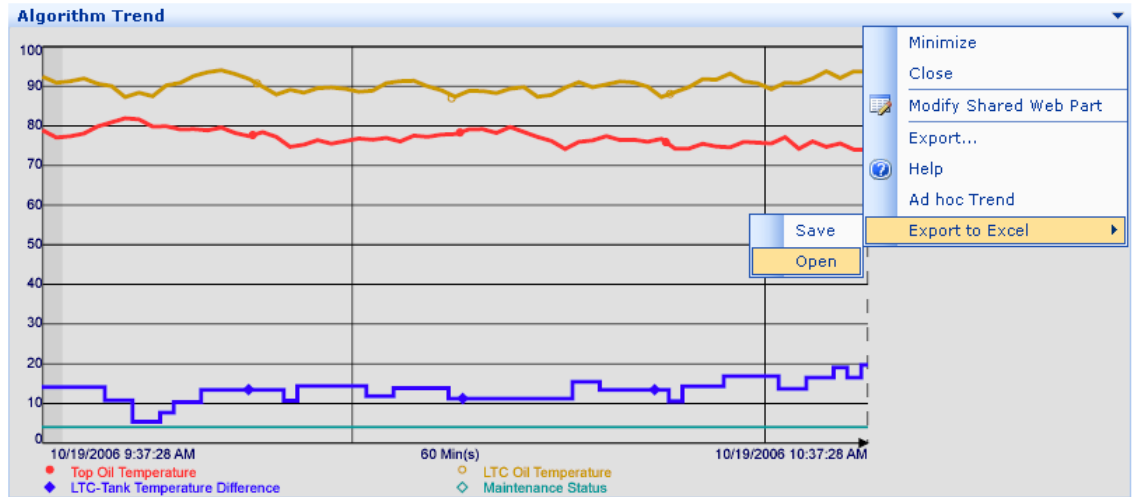


Microsoft Excel - c853b13a-4e9f-46c2-bc8e-314124ae584e.xml

File Edit View Insert Format Tools Data Window PI

A1 Dataset

	C	E	F
1	Dataset.Tag	Time	Value
2	Top Oil Temp	10/19/2006 9:38:31 AM	77.08754
3	Top Oil Temp	10/19/2006 9:39:28 AM	77.39222
4	Top Oil Temp	10/19/2006 9:40:28 AM	78.0821
5	Top Oil Temp	10/19/2006 9:41:28 AM	79.87462
6	Top Oil Temp	10/19/2006 9:43:28 AM	81.92795
7	Top Oil Temp	10/19/2006 9:44:28 AM	81.66101
8	Top Oil Temp	10/19/2006 9:45:28 AM	79.84138
9	Top Oil Temp	10/19/2006 9:46:28 AM	79.90166
10	Top Oil Temp	10/19/2006 9:47:28 AM	79.11847
11	Top Oil Temp	10/19/2006 9:48:28 AM	79.19083
12	Top Oil Temp	10/19/2006 9:49:28 AM	78.89484
13	Top Oil Temp	10/19/2006 9:50:28 AM	79.55455
14	Top Oil Temp	10/19/2006 9:51:28 AM	78.21992
15	Top Oil Temp	10/19/2006 9:52:28 AM	77.42281
16	Top Oil Temp	10/19/2006 9:53:28 AM	78.42816
17	Top Oil Temp	10/19/2006 9:54:28 AM	77.22202
18	Top Oil Temp	10/19/2006 9:55:28 AM	74.72326
19	Top Oil Temp	10/19/2006 9:56:28 AM	75.26884
20	Top Oil Temp	10/19/2006 9:57:28 AM	76.41129
21	Top Oil Temp	10/19/2006 9:58:28 AM	75.52154
22	Top Oil Temp	10/19/2006 10:00:28 AM	76.8249
23	Top Oil Temp	10/19/2006 10:01:28 AM	76.51852
24	Top Oil Temp	10/19/2006 10:02:28 AM	76.9783
25	Top Oil Temp	10/19/2006 10:03:28 AM	76.07957
26	Top Oil Temp	10/19/2006 10:04:28 AM	77.54868



- Accurate & Timely information about how the business is performing
- Ability to monitor meter, unit & overall refinery performance on a daily basis.
- Automated aggregation of data into meaningful business information.
- Sigmafine/Mass Balance rigor has increased data precision & accuracy.
- Reduce data silos and implemented a one-version of the truth.
- Improved workflows and collaboration.
- Reduction of stock losses and improved accounting.



Thank you

© Copyright 2010, OSIsoft, LLC.

777 Davis St., Suite 250 San Leandro, CA 94577