



OSIsoft®

Regional Seminar Series Johannesburg, South Africa



MOPANI



Making PI Mopani's key tool in Production and Management

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Plant Metallurgist & PI System Administrator
Mopani Copper Mines Plc

24th February 2011



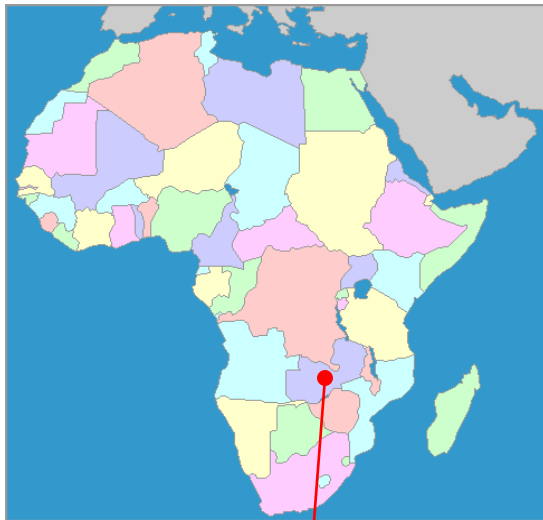
Real Time Information - Currency of the New Decade

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About “Mopani Copper Mines Plc”



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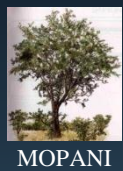
- **Industry**
 - Mining
- **Our Business**
 - Copper and Cobalt metals
- **Organization / Sites**
 - Country: Zambia
 - Province: Copperbelt
 - Town: Kitwe & Mufulira
 - Sites: Nkana in Kitwe (Underground Mine, Concentrator & Cobalt Plant)
Mufulira (Underground Mine, Concentrator, Smelter & Refinery)



Mufulira Smelter Upgrade Project (MSUP) Phase 1



- Commissioned in September 2006 - Isasmelt Furnace, Matte Settling Electric Furnace (MSEF), Sulphuric Acid Plant & Oxygen Plant
- Plant Wide Process Control System (Yokogawa CENTUM CS 3000 System)
- OSIsoft PI System



Challenges before PI introduction



- No easy way for **production** staff to monitor the plant
- No easy way for **maintenance** staff to monitor critical instruments
- No easy way for **management** staff to monitor the plant overall performance & aggregate data into meaningful business information
- **Manually** entered log sheets were the only source of plant information
- Excel was the analysis tool of choice leading to data silos and multiple versions of the truth
- **How do we monitor the highly automated new plants (Isasmelt, Oxygen & Acid Plants)?**



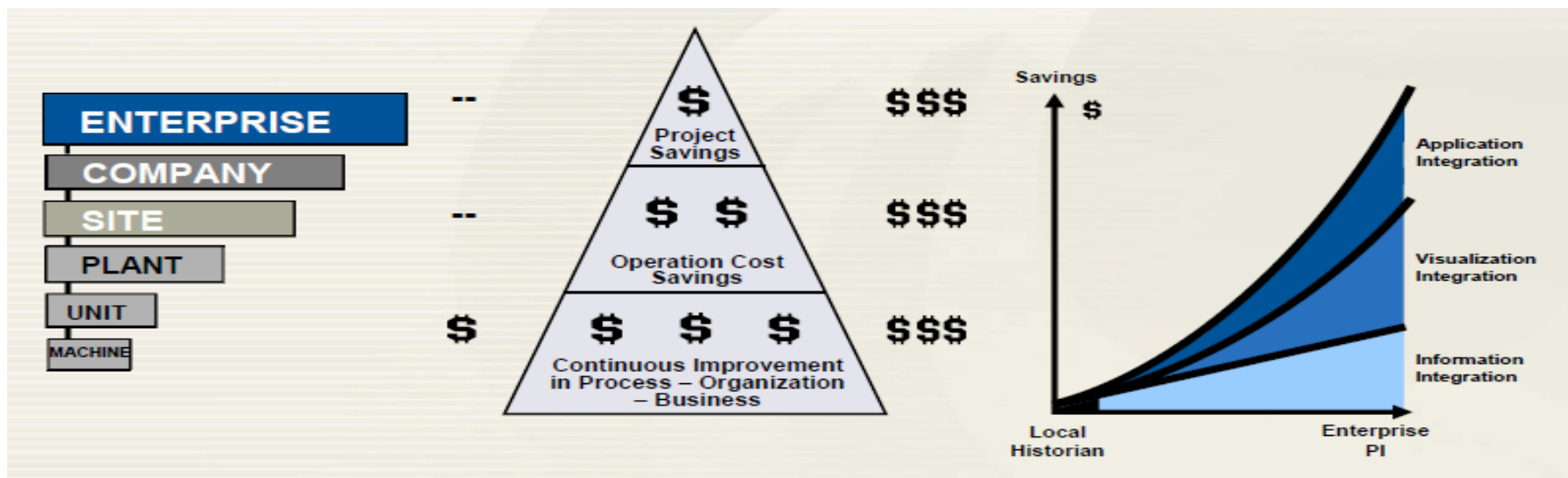
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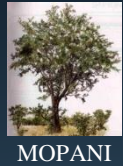
Solution



- PI System implementation

- to monitor the performance of the new plants away from the control rooms
- to have one version of the truth about plant data
- to enhance continuous process improvement
- to reduce operational costs



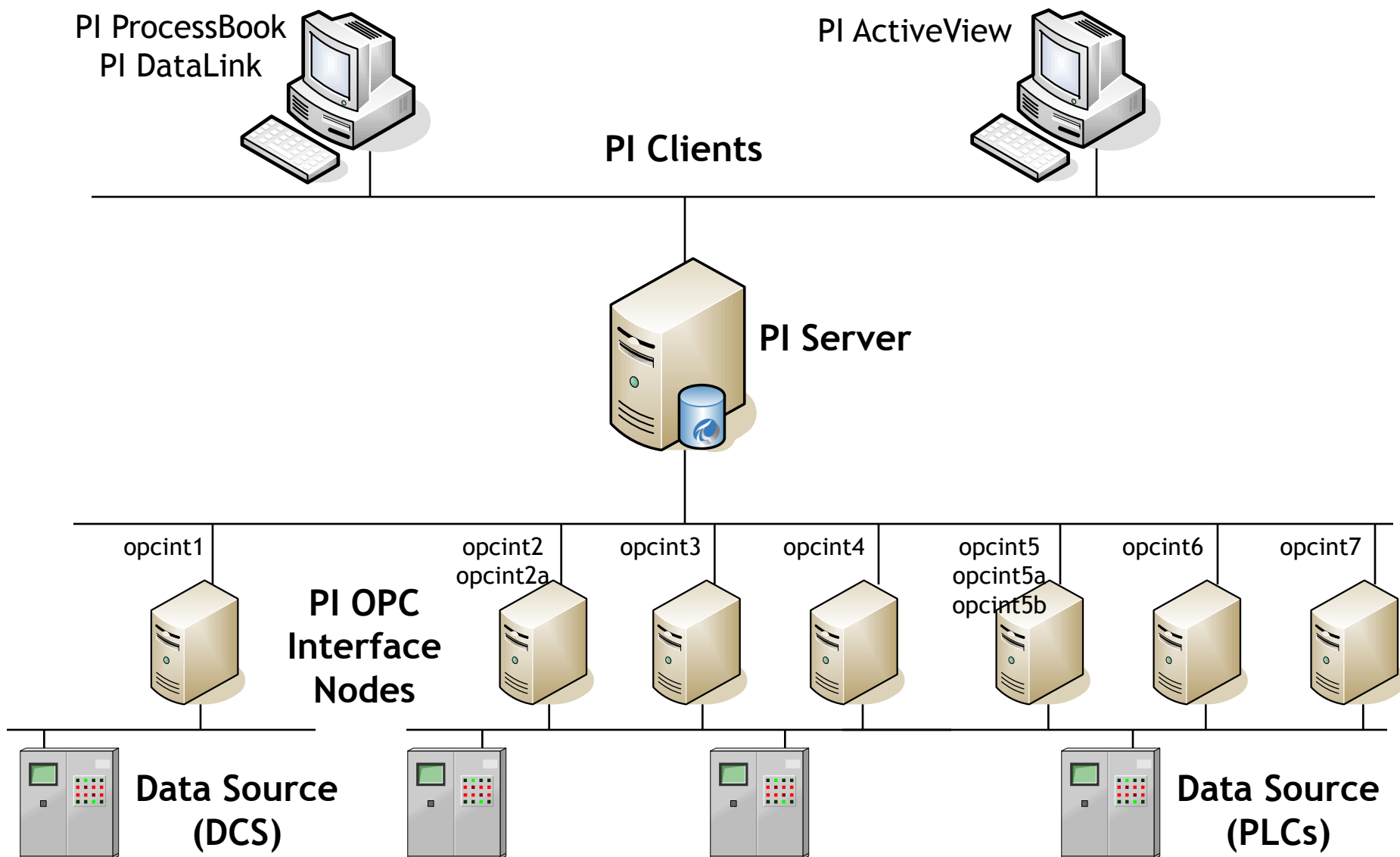


- PI Server (6000 Tags)
 - PI Interface Configuration Utility
 - PI-Interface Status Utility
- PI OPC DA Interfaces (Server License - 7 OPC Interface Nodes)
 - PI_OPCCClient
 - PI Interface Configuration Utility
 - PI-OPC Tag Configuration Utility
- PI Clients
 - PI ProcessBook
 - PI DataLink
 - PI ActiveView
 - PI System Management Tools
- Software Reliance Program (SRP) Services



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PI System Architecture





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Making PI the key tool



- September 2006 to October 2007
 - Limited PI usage
- April - June 2008
 - PI client training
- July 2008 to-date
 - PI ProcessBook displays developed
 - PI DataLink used to analyze PI data
 - PI ActiveView usage introduced
 - PI OPC Interface Nodes increased (Server License)
 - PI Server upgraded from 5000 to 6000 tags



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PI ProcessBooks



PI ProcessBook - [Smelter PI [Read Only]]

File Edit View Insert Tools Draw Arrange Window Help

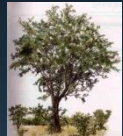
Smelter PI Displays

- Overall Smelter Graphic
- Isasmelt Furnace
- MSEF Level
- MSEF Electrodes
- WHB - Steam Drum & Feed Water Tank
- WHB Heat Surfaces
- Gas Handling - WHB, ESP & Stacks
- Gas Cooling and Cleaning
- Gas Oxidation
- Gas Contact
- Acid Plant Cooling Water
- Emergency Systems
- Emergency Power Distribution
- Converters - Air Flow, Temperature & Availability
- AF5 West Furnace
- AF6 East Furnace
- AF5 Burner System
- AF6 Burner System
- Ladle
- Casting Wheels Overview

Smelter PI Displays General Isasmelt MSEF Services Acid Plant Open Plant Inverters Electric Furnace

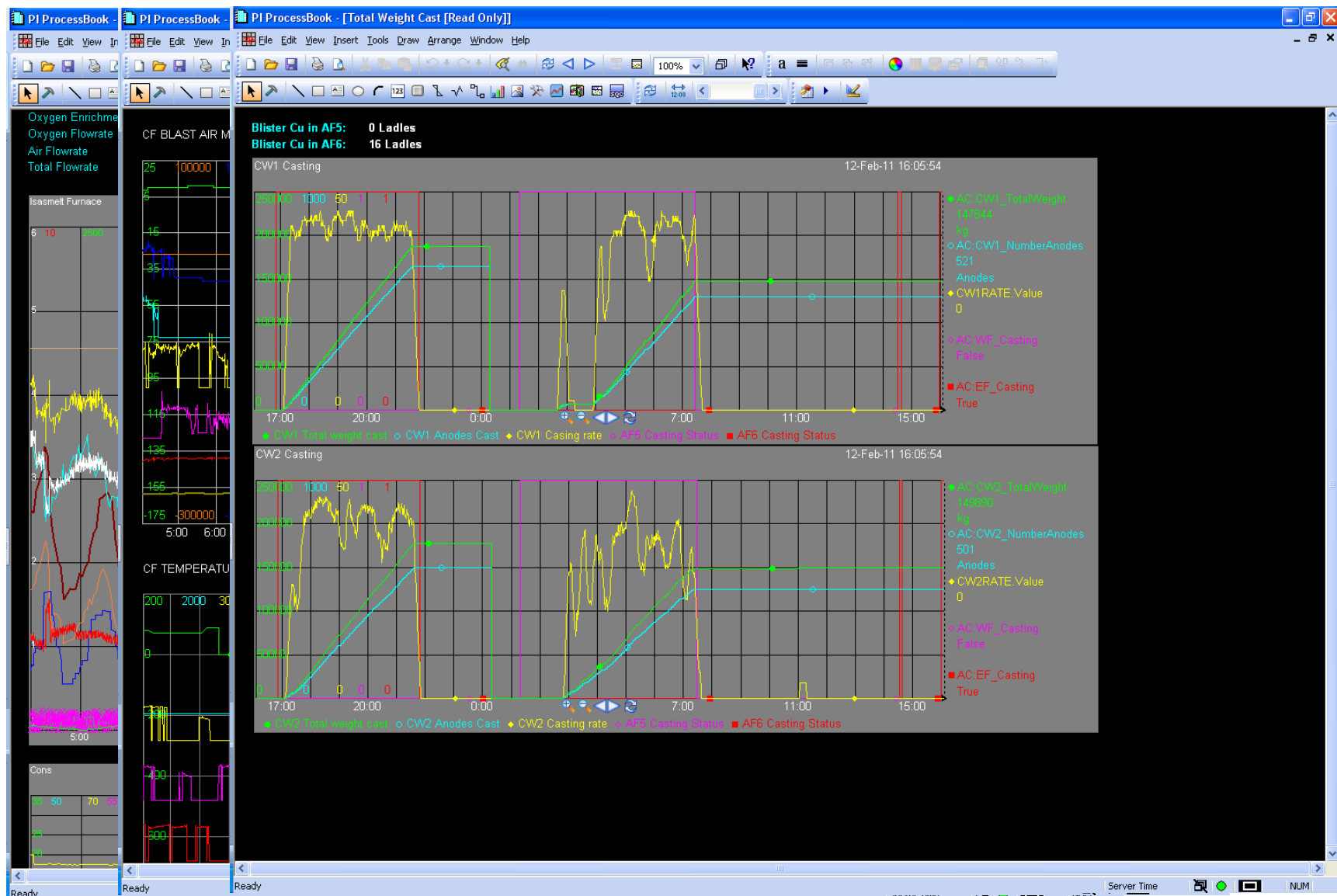
New Open

Ready



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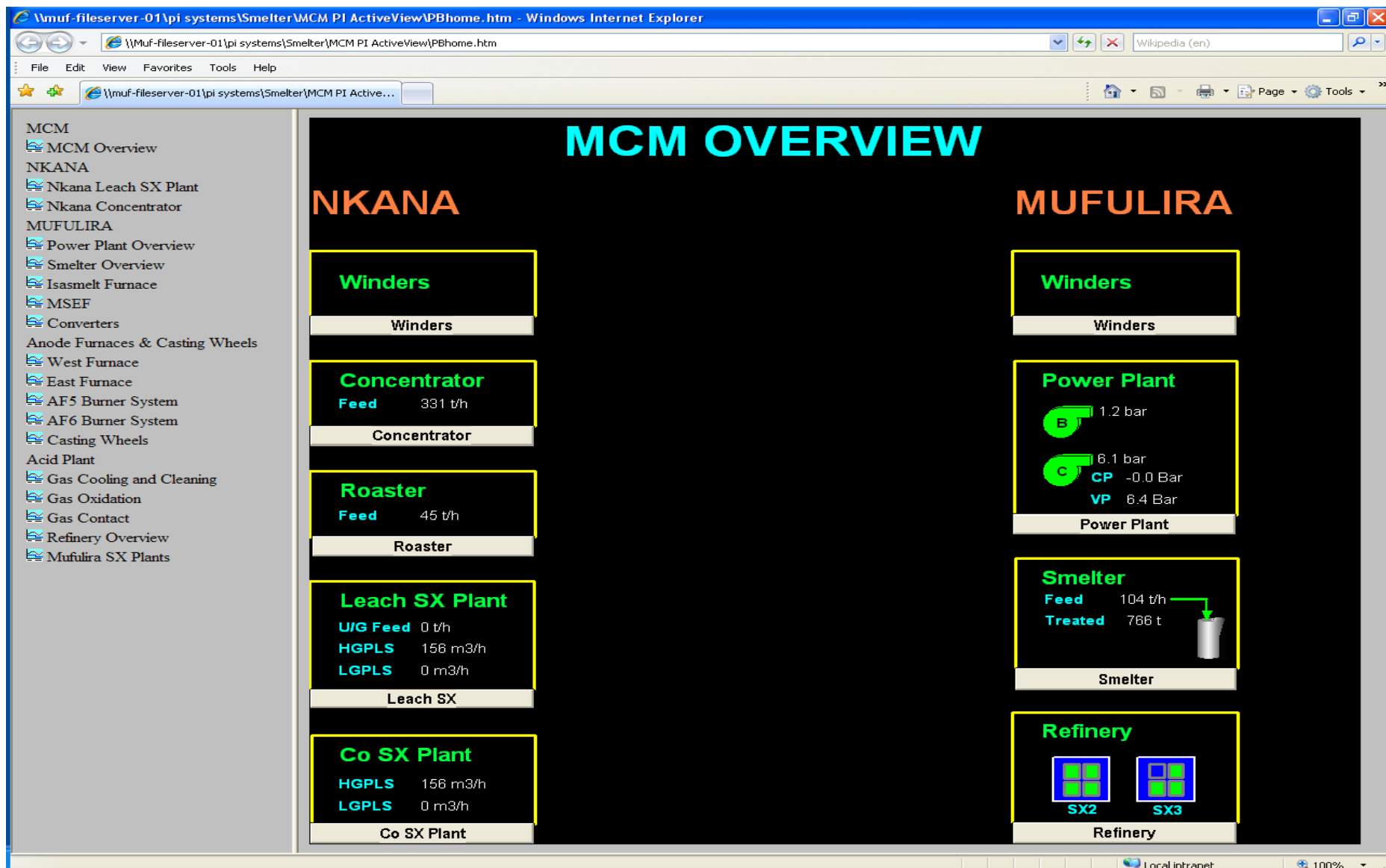
PI ProcessBook Trend Displays





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PI ActiveView Displays





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PI DataLink



MS. Daily stats3 [Compatibility Mode] - Microsoft Excel

Home

Home

Home

Home

Insert

Page Layout

Formulas

Data

Review

View

PI

Current Archive Value Single Value

Current Archive Value Single Value

Current Archive Value Single Value

Current Archive Value Single Value

Compressed Data Multiple Value

Sampled Data Multiple Value

Timed Data Multiple Value

Calculated Data Calculation

Time Filtered Calculation

Insert Trend

Tag Search

Connections

Point ID to Tag

Attribute Mask to Tag

Tag Attributes

Module Browse Alias to Tag

Property to Value

Module Database

Update

Settings

About

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Resources

A8		A10		A6																							
A	A	A	A	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S					
1	Isasme	1	Isasme	1	Day ending	12-Feb-2011	Update (inc Date)																				
2		2		2																							
3	Sen	3	Sen	3	Start time																						
4		4		4																							
5		5		5																							
6	Sample	6	Send	6	IsaMa	12-Feb-11	Reverts	Coal	Silica	LimeS	Bin 109	Bin 108	Bin 116	Bin 115	Con	Run time	Ave Feed	Reverts	Coal	Silica	Lime	Oxygen	GasC Flow				
7		7		7	12-Feb-11	12-Feb-11	t	t	t	t	t	t	t	t	t	%	t/hr	t/hr	t/hr	t/hr	t/hr	Nm3	m3				
8		8		8	12-Feb-11	12-Feb-11	0	43	127	0	403	233	1277	400	2313	97	99	0.0	1.8	5.5	0.0	345,832	494	61.3			
9		9		9	12-Feb-11	12-Feb-11	0	26	134	0	168	205	1068	667	2107	88	100	0.0	1.2	6.4	0.0	332,886	476	59.1			
10		10		10	12-Feb-11	12-Feb-11	0	38	131	0	159	202	1070	764	2195	87	105	0.0	1.8	6.3	0.0	352,954	504	77.2			
11		11		11	12-Feb-11	12-Feb-11	0	31	124	11	158	203	1129	766	2256	89	105	0.0	1.5	5.8	0.5	362,505	518	75.2			
12		12		12	12-Feb-11	12-Feb-11	0	20	78	13	124	152	934	454	1664	69	100	0.0	1.2	4.7	0.8	263,832	377	61.1			
13		13		13	12-Feb-11	12-Feb-11	0	36	86	21	150	181	1158	510	1998	80	105	0.0	1.9	4.5	1.1	321,491	459	76.2			
14		14		14	12-Feb-11	12-Feb-11	0	35	101	14	216	214	1309	378	2118	90	98	0.0	1.6	4.7	0.7	331,598	474	64.5			
15		15		15	12-Feb-11	12-Feb-11	0	28	131	18	208	343	1259	397	2207	93	99	0.0	1.3	5.9	0.8	358,092	512	70.8			
16		16		16	12-Feb-11	12-Feb-11	0	13	170	19	176	364	1062	352	1953	87	93	0.0	0.6	8.1	0.9	336,297	480	52.9			
17		17		17	12-Feb-11	12-Feb-11	0	26	131	6	293	123	1153	384	1954	87	94	0.0	1.3	6.3	0.3	317,417	453	52.9			
18		18		18	12-Feb-11	12-Feb-11	0	23	129	1	302	139	1237	519	2196	85	107	0.0	1.1	6.3	0.0	348,346	498	57.9			
19		19		19	12-Feb-11	12-Feb-11	0	25	113	0	213	164	1143	387	1907	78	101	0.0	1.3	6.0	0.0	294,655	421	48.6			
20		20		20	12-Feb-11	12-Feb-11	0	28	83	0	217	256	958	333	1763	74	99	0.0	1.6	4.7	0.0	270,569	387	55.6			
21		21		21	12-Feb-11	12-Feb-11	0	27	128	0	315	244	1356	509	2425	98	103	0.0	1.1	5.4	0.0	375,432	536	72.7			
22		22		22	12-Feb-11	12-Feb-11	0	33	119	0	307	244	1365	479	2395	96	104	0.0	1.4	5.2	0.0	370,633	529	36.1			
23		23		23	12-Feb-11	12-Feb-11	0	30	109	0	207	282	1196	378	2064	83	104	0.0	1.5	5.5	0.0	322,995	461	35.8			
24		24		24	12-Feb-11	12-Feb-11	0	28	107	0	231	345	1382	353	2310	94	102	0.0	1.3	4.7	0.0	341,718	488	46.0			
25		25		25	12-Feb-11	12-Feb-11	0	22	78	0	233	351	1239	514	2337	93	105	0.0	1.0	3.5	0.0	347,024	496	45.2			
26		26		26	12-Feb-11	12-Feb-11	0	17	57	0	203	303	1177	341	2024	81	104	0.0	0.9	2.9	0.0	297,570	425	33.9			
27		27		27	12-Feb-11	12-Feb-11	0	28	57	0	249	373	1243	622	2487	99	104	0.0	1.2	2.4	0.0	368,655	527	56.6			
28		28		28	12-Feb-11	12-Feb-11	0	31	64	0	191	286	955	478	1910	78	102	0.0	1.6	3.4	0.0	286,924	410	55.1			
29		29		29	12-Feb-11	12-Feb-11	0	33	74	0	229	295	1101	524	2148	87	102	0.0	1.6	3.5	0.0	320,382	458	48.5			
30		30		30	12-Feb-11	12-Feb-11	0	26	103	0	205	216	1127	511	2059	90	95	0.0	1.2	4.8	0.0	318,926	456	44.3			
31		31		31	12-Feb-11	12-Feb-11	0	23	131	0	218	226	881	823	2147	89	100	0.0	1.1	6.1	0.0	343,400	491	49.7			
32		32		32	12-Feb-11	12-Feb-11	0	27	101	0	224	117	955	442	1739	81	90	0.0	1.4	5.2	0.0	269,112	384	45.6			
33		33		33	12-Feb-11	12-Feb-11	0	26	104	0	318	223	1165	424	2129	92	96	0.0	1.2	4.7	0.0	321,973	460	44.8			
34		34		34	12-Feb-11	12-Feb-11	0	21	41	0	112	170	660	313	1256	54	97	0.0	1.6	3.2	0.0	191,880	274	27.2			
35		35		35	12-Feb-11	12-Feb-11	0	22	41	0	191	259	902	504	1855	76	102	0.0	1.2	2.3	0.0	283,018	404	48.5			
36		36		36	12-Feb-11	12-Feb-11	0	33	54	0	261	164	1167	539	2130	94	94	0.0	1.5	2.4	0.0	319,400	456	56.1			
37		37		37	12-Feb-11	12-Feb-11	0	33	80	0	298	96	1129	472	1995	80	104	0.0	1.7	4.2	0.0	305,603	437	51.7			
38		38		38	12-Feb-11	12-Feb-11	0	34	105	0	325	275	920	791	2310	94	102	0.0	1.5	4.6	0.0	372,442	532	59.5			
39		39		39	12-Feb-11	12-Feb-11	0	21	119	0	331	223	1206	453	2213	89	103	0.0	1.0	5.5	0.0	352,563	504	68.8			
40		40		40	12-Feb-11	12-Feb-11	0	21	87	0	340	236	1377	382	2334	88	110	0.0	1.0	4.1	0.0	358,462	512	67.5			
41		41		41	12-Feb-11	12-Feb-11	0	35	57	0	237	242	1147	636	2263	88	107	0.0	1.7	2.7	0.0	357,977	511	63.8			
42		42		42	12-Feb-11	12-Feb-11	0	43	70	0	370	268	1111	620	2369	58	171	0.0	3.1	5.0	0.0	361,502	516	72.3			
43		43		43	12-Feb-11	12-Feb-11	0	38	54	0	305	264	997	456	2022	83	102	0.0	1.9	2.7	0.0	294,704	421	51.1			
44		44		44	12-Feb-11	12-Feb-11	0	40	32	0	306	421	958	421	2107	83	106	0.0	2.0	1.6	0.0	293,924	420	57.5			
45		45		45	12-Feb-11	12-Feb-11	0	52	40	0	314	499	1185	499	2497	90	116	0.0	2.4	1.9	0.0	353,212	505	61.5			
46		46		46	12-Feb-11	12-Feb-11	0	50	40	0	305	408	897	437	2047	92	92	0.0	2.3	1.8	0.0	275,802	394	47.4			
47		47		47	12-Feb-11	12-Feb-11	0	33	25	0	165	225	443	300	1133	59	80	0.0	2.3	1.8	0.0	148,155	212	24.9			
48		48		48	12-Feb-11	12-Feb-11	0	36	44	0	320	427	960	427	2135	91	97	0.0	1.6	2.0	0.0	295,664	422	54.5			

ReadyReadyReadyReady

IsasmeBoilerMatIsasmeltchtConsSmeltedchtWHBchtDieselchtConsSmelted (month)

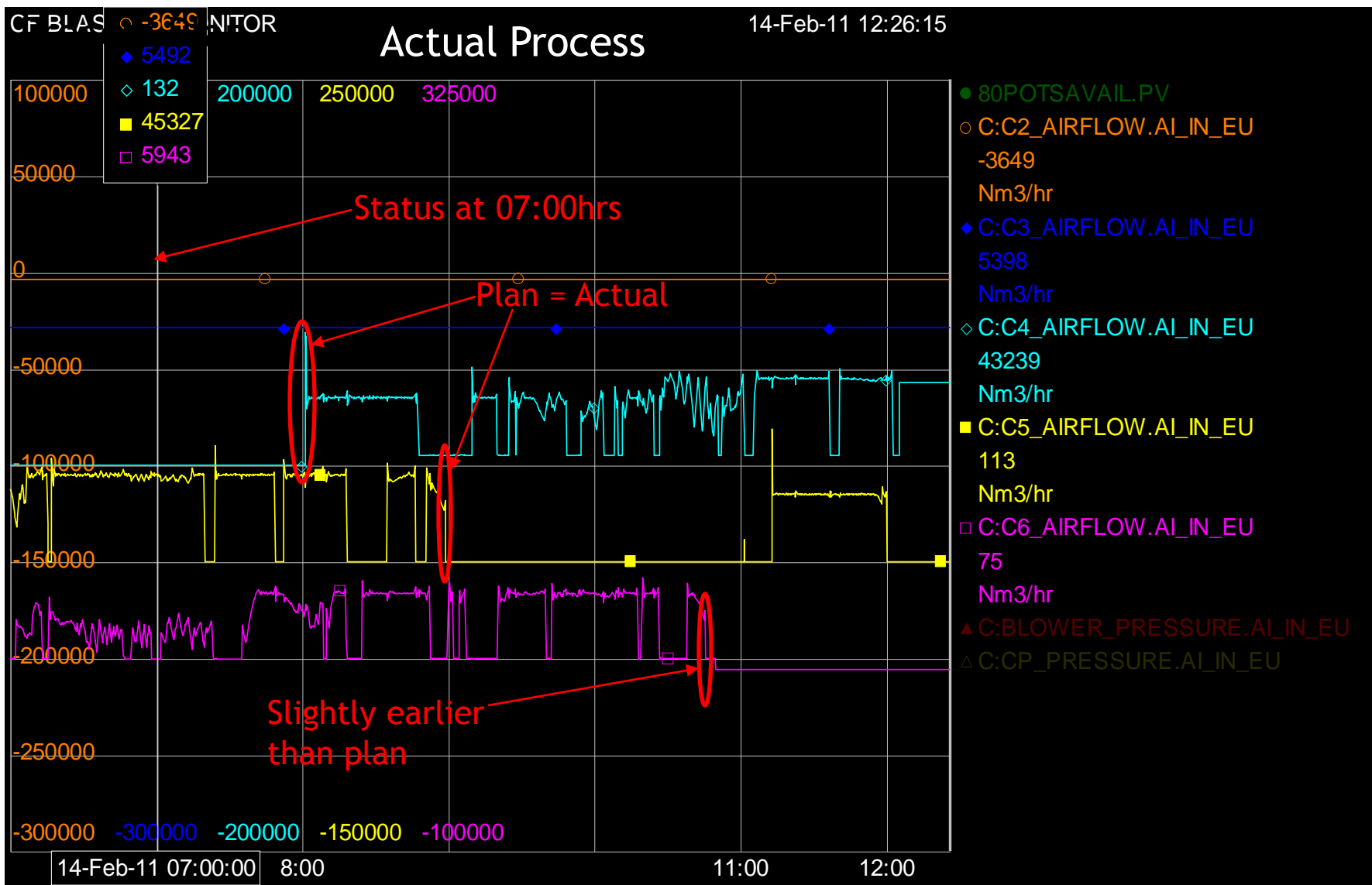
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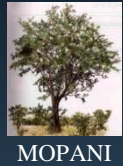


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Case Study 1

Improved Process Monitoring





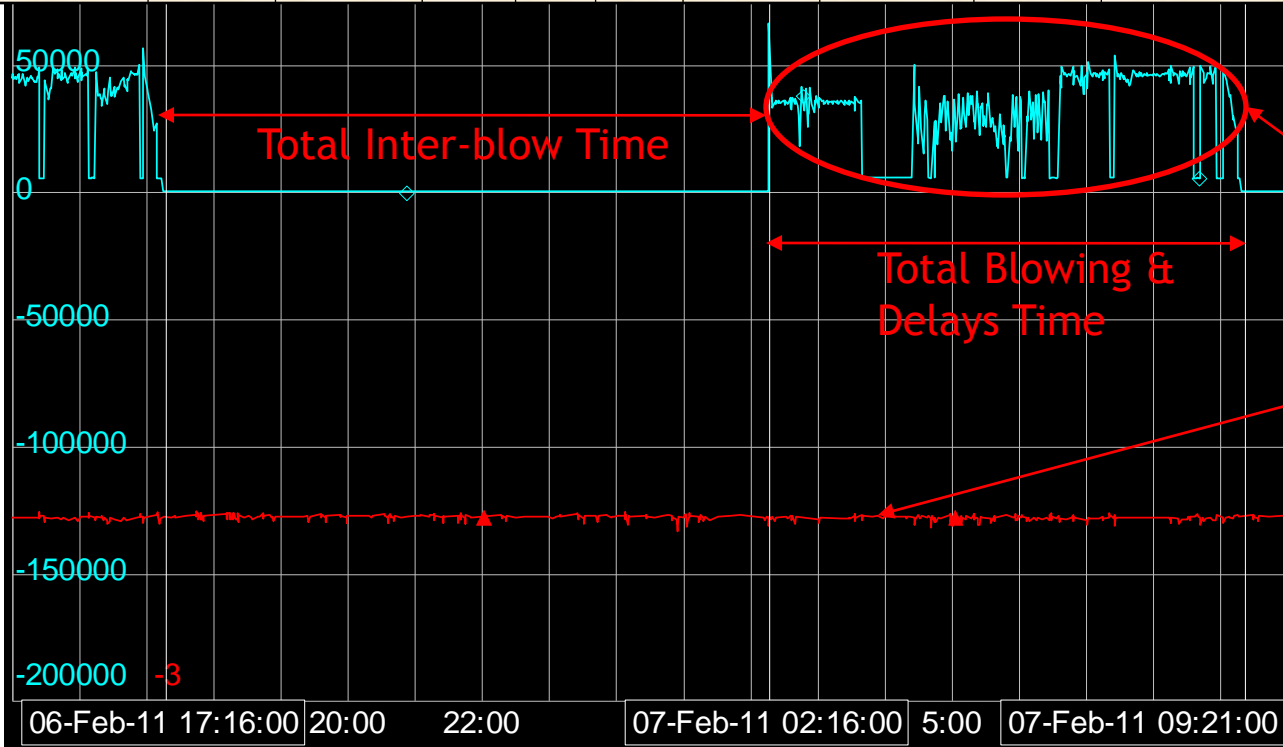
Case Study 2

Reliable Source of Data in Real Time



CF BL	◇ 5360 ▲ 1.15	MONITOR	◇ 132 ▲ 1.14	07-Feb-11	◇ 5379 ▲ 1.17
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CONVERTER		SLAG BLOW	COPPER BLOW		BLOW	SUM	AVG	IN-STOCK	OUT-OF-STOCK
NO.	BLOW No.	start/end	START	STOP	TIME	AIR FLOW	AIR FLOW	TIME (hrs)	TIME (hrs)
4	64	2:16		9:21	7:05	214005.59	37114.38	5.55	1.54



- PI-Datalink
- 80POTSAVAIL.PV
 - C:C2_AIRFLOW.AI_IN_EU
 - ◆ C:C3_AIRFLOW.AI_IN_EU
 - ◇ C:C4_AIRFLOW.AI_IN_EU
 - 132
 - Nm3/hr
 - C:C5_AIRFLOW.AI_IN_EU
 - C:C6_AIRFLOW.AI_IN_EU
 - ▲ C:BLOWER_PRESSURE.AI_IN_EU
 - 1.17
 - bar
 - △ C:CP_PRESSURE.AI_IN_EU

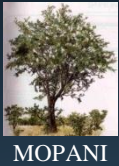


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Benefits



- Improved process monitoring
- Ability to monitor performance on a daily basis
- One reliable source of data in real time and archived
- Less time spent in process analysis due to readily available process data and statistical analysis tools
- Trouble-shooting time reduced
- Management has accurate & timely information about process areas needing their attention hence timely business decisions are being made too



- Nkana Site
 - Nkana Concentrator
 - Leach Plant
 - Mindola Compressor House
 - Copper Tank House
 - Cobalt Tank House
 - South Ore Body (SOB) Compressors
 - Winders
 - Power monitoring
- Mufulira Site
 - Refinery SX Plants
 - Refinery Tank Houses
 - Power Monitoring
 - Winders



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QUESTIONS



Making PI Mopani's key tool in production and management



THANK YOU!!!



Thank you

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