PI : Information on hand for Operational Analytics

Presented by:

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TATA POWER

TATA

Lighting up Lives!

- Information Enhancement
  - ABT System.
  - Auto Reports.
  - Enhancement of data.
- Performance Monitoring, Analysis & Improvement
  - Plant Performance Monitoring.
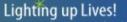 - Plant Performance Improvement.

TATA POWER

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NATIONAL
FOOTPRINT
A Pan India Presence
(As on 24th May, 2010)

Tata Power's concerted focus on renewable sources of energy saw its wind farms almost double their output. The Company's operational geography now bears a distinct green footprint across India.

EXISTING OPERATIONS

Mumbai, Maharashtra	
(Trombay - 1330 MW + Unit 8 - 250 MW + Hydro - 447 MW)	2027 MW
Jojobera, Jharkhand	428 MW
Power House # 6, Jamshedpur	120 MW
Belgaum, Karnataka	81 MW
Haldia, West Bengal	120 MW
Supa, Maharashtra	17 MW
Khandke, Maharashtra	50 MW
Bramanvel, Maharashtra	11 MW
Gadag, Karnataka	50 MW
Samana, Gujarat	50 MW
Sadawaghapur, Maharashtra	18 MW
Visapur, Maharashtra	4 MW
NDPL (Distribution)	1259 MW
Powerlinks (Tata Transmission)	1200 KM

PROJECTS UNDER IMPLEMENTATION
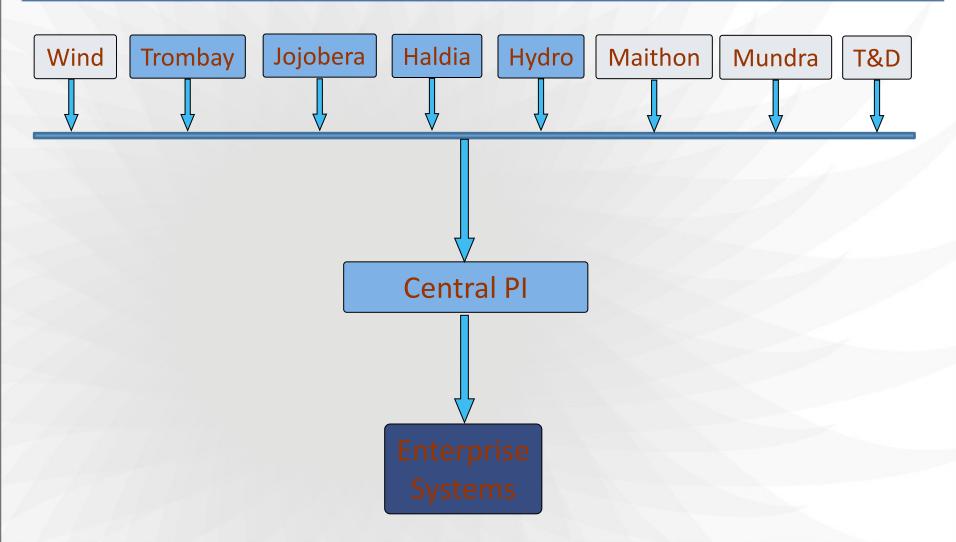
Thermal Projects	
Mundra, Gujarat	4000 MW
Maithon, Jharkhand	1050 MW
Jojobera	120 MW
Lodhivali	40 MW
Renewables	
Visapur, Maharashtra (Wind)	94 MW
Mulshi, Maharashtra (Solar)	3 MW
Hydro Project	
Bhutan	114 MW

EXISTING OPERATIONS

- THERMAL POWER
- HYDRO POWER
- WIND POWER
- TRANSMISSION BUSINESS
- DISTRIBUTION BUSINESS
- STRATEGIC ELECTRONICS DIVISION

PROJECTS UNDER IMPLEMENTATION

- THERMAL POWER
- HYDRO POWER
- WIND POWER
- SOLAR

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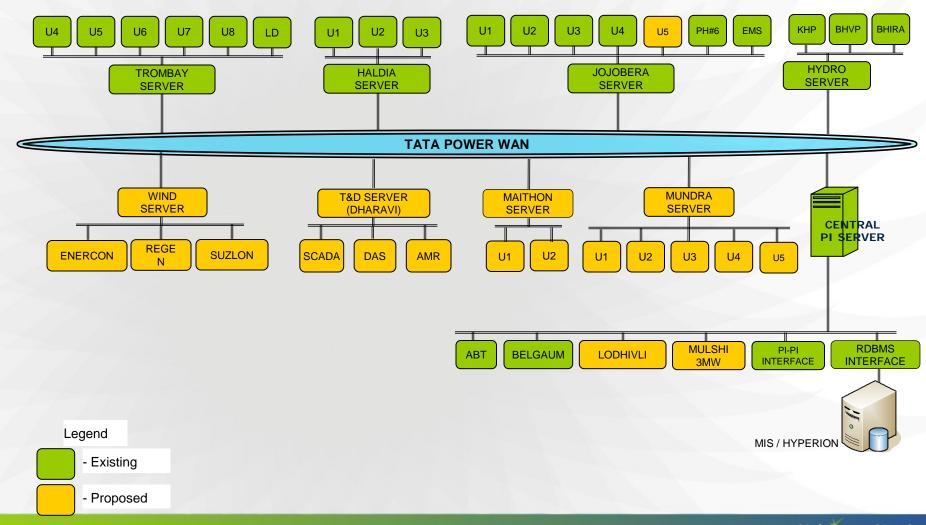
PI System Integration

PI System - Network

PI System Monitoring

PI SYSTEM OVERVIEW

TROMBAY		HYDRO		JOJOBERA		HALDIA		MAITHON	MUNDRA
PI SERVER1	Primary	PI SERVER1	Primary	PI SERVER1	Primary	PI SERVER1	Primary		
PI SERVER2	Secondary	PI SERVER2	Secondary	PI SERVER2	Secondary	PI SERVER2	Secondary		
COLLECTIVE	🟢	COLLECTIVE	🟢	COLLECTIVE	🟢	COLLECTIVE	🟢		
U4 INTERFACE	🟢	BHIVPURI IF	🟢	PHD IF		U1&2 MAX DNA IF	🟢		
U5 INTERFACE	🟢	BHIRA IF	🟢	PML IF	🟢	U3 MAX DNA IF	🟢		
U6 INTERFACE	🟢	KHOPOLI IF	🔴	PH6 IF	🔴	ROCKWELL IF	🟢		
U7 SIEMENS INTERFACE	🟢								
U7 HONEYWELL INTERFACE	🟢	HYDRO PI-PI IF	🟢	JOJOBERA PI-PI IF	🔴	HALDIA PI-PI IF	🟢		
U8 INTERFACE	🟢	PI-PI IF	Primary IF	PI-PI IF	Primary IF	PI-PI IF	Primary IF		
LD INTERFACE	🟢								
BELGAUM INTERFACE	🟢								
RDBMS INTERFACE	PI Web								

PI System Monitoring

JOJOBERA OVERVIEW
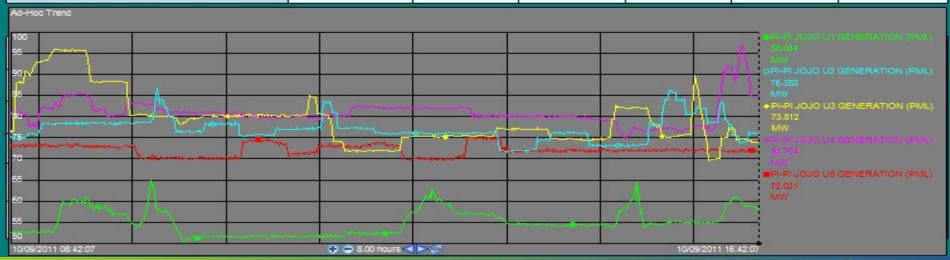
PML I/O RATE 148
PH6 I/O RATE 0

INSTANTANEOUS VALUES   10/09/2011 16:41:30

PARAMETERS	STATION	UNIT 1	UNIT 2	UNIT 3	UNIT 4	UNIT 5
GENERATION (MW)	365	58	76	74	85	72
PLF (%)	67	86	64	62	71	60
REACTIVE POWER (MVAR)	109	26	29	24	21	
AUXILIARY CONSUMPTION (MW)	40.17	6.53	8.42	7.78	8.93	8.27
AUXILIARY CONSUMPTION (%)	11.20	11.06	11.06	10.41	10.54	11.22

Ad-Hoc Trend

PI-PI JOJO U1 GENERATION (PML) 58.044 MW
PI-PI JOJO U2 GENERATION (PML) 76.383 MW
PI-PI JOJO U3 GENERATION (PML) 73.812 MW
PI-PI JOJO U4 GENERATION (PML) 84.764 MW
PI-PI JOJO U5 GENERATION (PML) 72.031 MW

10/09/2011 08:42:07   8.00 hours   10/09/2011 16:42:07

PI System Monitoring

HOME | TROMBAY | BHIVPURI | KHOPOLI | BHIRA | BELGAUM | JOJOBERA | HALDIA

TROMBAY

Instantaneous Values

08/03/2011 11:55:30

PARAMETERS	STATION	UNIT 4	UNIT 5	UNIT 6	UNIT 7 A	UNIT 7 B	UNIT 8
GENERATION (MW)	1220.85	0.11	477.21	403.30	113.84	66.29	156.88
PLF (%)	77.34	0.06	95.31	81.33	94.35	110.49	62.75
HEAT RATE (KCAL/KWH)	2396.99	0.00	2468.01	2390.23	1842.86		2847.29
FUEL COST (RS/KWHR)	3.13	0.00	2.13	5.36	1.50		2.32
COAL FLOW (TONS/HR)	335.86		249.96				88.24
GAS FLOW (TONS/HR)	54.07	0.00	0.00	28.98	25.15		
OIL FLOW (TONS/HR)	56.96	0.00	0.00	56.96			
CO2 EMISSION (TONS/HR)	1034.91	0.00	534.13	253.58	56.02		191.16
SO2 EMISSION (TONS/HR)	0.81	0.00	0.29	0.34			0.18
CW TEMP DIFF	9.54	0.00	11.19	11.45		9.09	6.32
AUX CONSUMPTION (MW)			23.32		3.79		10.69
AUX CONSUMPTION (%)			4.86		2.09		6.92

Previous Day Cumulative Values

ABT SYSTEM

ABT System

* Acquisition of data from ABT System deployed for Mumbai Operations.
* Accurate, reliable and wide acceptance.
* My SQL database in the backend.
* Web client with limited features available for monitoring. No tools for analysis purposes.
* Not possible to import data into excel.
* Report creation facility is not available.

Integration of ABT System with PI

* RDBMS Interface connectivity with PI server

* Immediate and time triggered data collection.

* Easier to import into excel sheet for analysis.

* Displays and trend making with ProcessBook.

* Report creation became error free and less time consuming

* Reports from PI being utilized by Load Control Centre for planning and forecasting.

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AUTOMATED REPORTS

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Automated Reports

Daily operational and maintenance report on E-mail

❖ Created Visual Basic application which utilizes PI DataLink to generate reports.

❖ Reports are in MS Excel format. The values are available as static. Hence, no need of PI DataLink on the recipients computer.

❖ Reports saved on a network drive.

❖ E-mail the report using PI notifications to a list of recipients by setting time based triggers.

Automated Reports

THE TATA POWER COMPANY LTD BELGAUM						
DAILY - REPORT						
					Report for the Day	**04/05/2011**
DESCRIPTION	**TODAY**			**MTD**	**YTD FY 10-11**	**YTD FY 09-10**
GROSS GENERATION (MU)	0.588			1.774	35.628	
NET GENERATION (MU)	0.582			1.753	34.873	
AUX. CONSUMPTION (MU)	0.007	1.126		0.020	0.174	
TOTAL GEN. TARGET (MU)						
F.O. CONSUMPTION (MT)	121.688			347.530	7321.521	
L.O. CONSUMPTION (MU)	0			0.000	0.000	
PLANT LOAD FACTOR (%)	30.157			18.746	53.017	
AVAILABILITY FACTOR (%)	92.91999817					
EXCESS AVAILABILITY (MU)						
WATER CONSUMPTION (M3)	1523				1472371.875	
WATER STOCK (M3)						
OPPORTUNITY LOST (MU)						
DG SET RUNNING HOURS DETAILS						
DG NUMBER	**RUN HRS**	**RUN HOUR DETAILS FOR THE DAY**				
	(CUMULATIVE	**RUN HRS**	**STOP HRS**	**STANDBY HRS**	**REMARKS**	
DG#1	43530	8				
DG#2	40874	8				
DG#3	40243	8				
DG#4	40000	8				
DG#5	42966	8				

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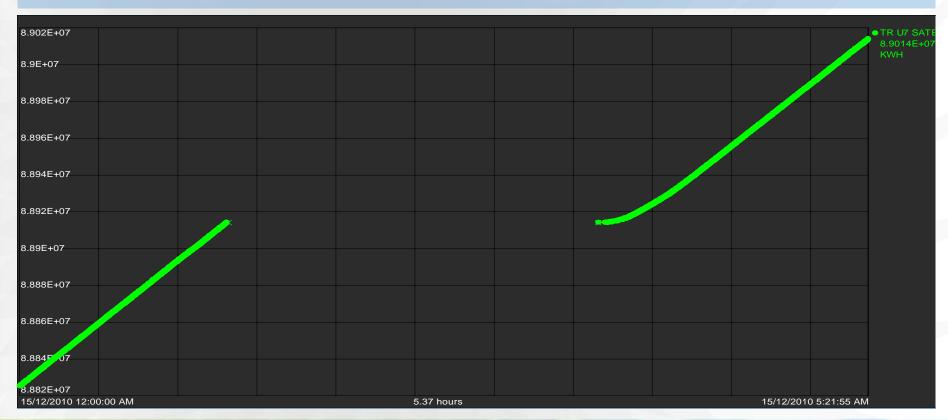
ENHANCEMENT OF DATA QUALITY

Solution to Energy Meter commn. error

Before

❖ Energy meter communication problems during shutdown which results in error of the source data affecting calculations .
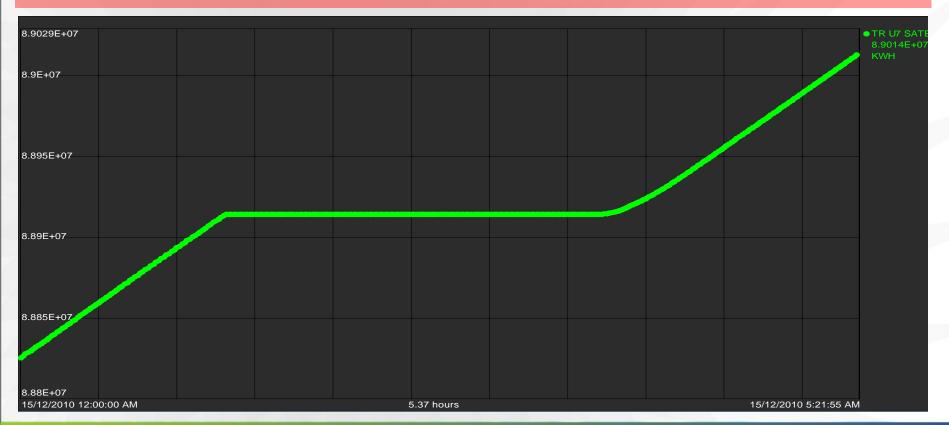
Solution to Energy Meter commn. error

After

❖ Created a performance equation for storing the last reading of the energy meter and the same tag used for energy calculations.
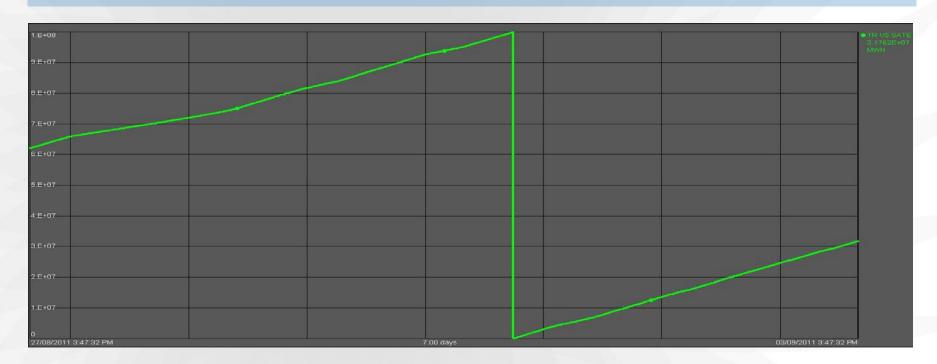
Energy Meter reset

Before

❖Energy meter resets to zero after reaching the maximum of cumulative reading which affects energy calculations.

Result : Negative

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Energy Meter reset

After

❖ Added a condition in performance equations to check for a meter reset for the entire day and provided two methods of calculation using an IF clause.

Modified PE

IF (TAGVAL('TR U7 SATEC STG KWH NO ERROR','T')-TAGVAL('TR U7 SATEC STG KWH NO ERROR','Y'))<0 THEN (TAGMAX('TR U7 SATEC STG KWH NO ERROR','Y','T')-TAGVAL('TR U7 SATEC STG KWH NO ERROR','Y')+TAGVAL('TR U7 SATEC STG KWH NO ERROR','T'))/1000000 ELSE (TAGVAL('TR U7 SATEC STG KWH NO ERROR','T')-TAGVAL('TR U7 SATEC STG KWH NO ERROR','Y'))/1000000

Result : Accurate
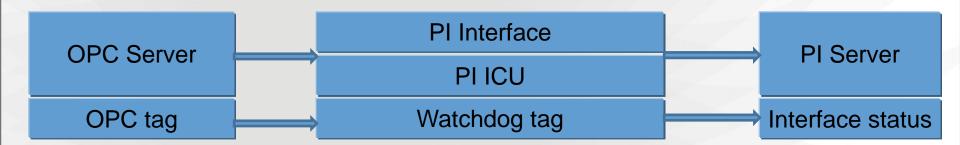
Multiple interface status

Before

❖ Single tag for OPC interface status based on a particular watchdog. No direct monitoring over the data received from various functional areas.

OPC Server	PI Interface	PI Server
	PI ICU	
OPC tag	Watchdog tag	Interface status
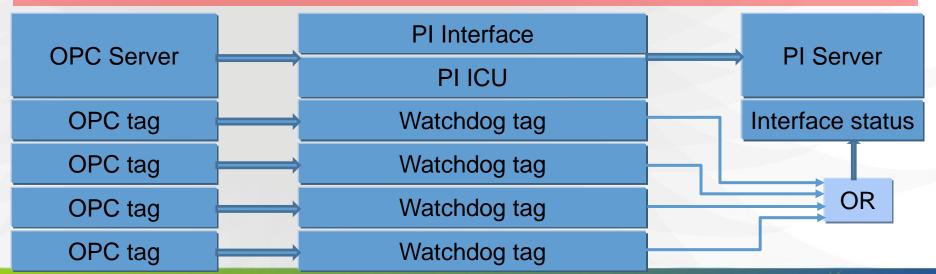
Multiple interface status

After

- ❖ Introduced the concept of multiple interface status tags using multiple watchdog from different functional areas.
- ❖ Better monitoring over the plant.
- ❖ Improved the availability of plant data.
- ❖ Helps the plant engineers for immediate identification of the affected area.

OPC Server	PI Interface	PI Server
	PI ICU	
OPC tag	Watchdog tag	Interface status
OPC tag	Watchdog tag	
OPC tag	Watchdog tag	OR
OPC tag	Watchdog tag	

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Trigger based PE

Before

> ❖ Performance equations was clock scheduled and it was consuming more computing power and memory.
>
> ❖ It was not possible to output results at a pre defined time.

After

> ❖ Created Triggers for the desired time.
>
> ❖ Used triggers for event triggering of the calculated tags.
>
> ❖ Calculations are performed only onetime in a day which greatly reduced the system load and made the results accurate.

THERMAL POWER PLANT PERFORMANCE MONITORING

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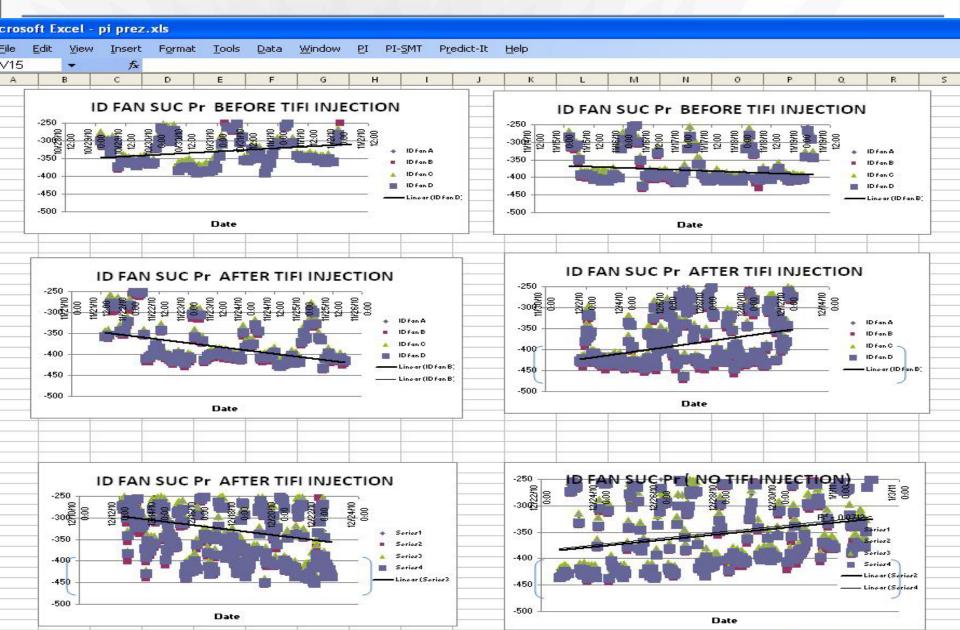
Performance Monitoring

- ❖ PI Data used for Monitoring Plant Performance
- ❖ "Before & After" Performance Analysis
- ❖ Boiler & Turbine Efficiency Monitoring
- ❖ Monitoring of Design vs. Actual Performance
- ❖ Performance Analysis at different operating conditions
- ❖ Dashboard / Report having Last Hour, Today, Last Day & Monthly data.

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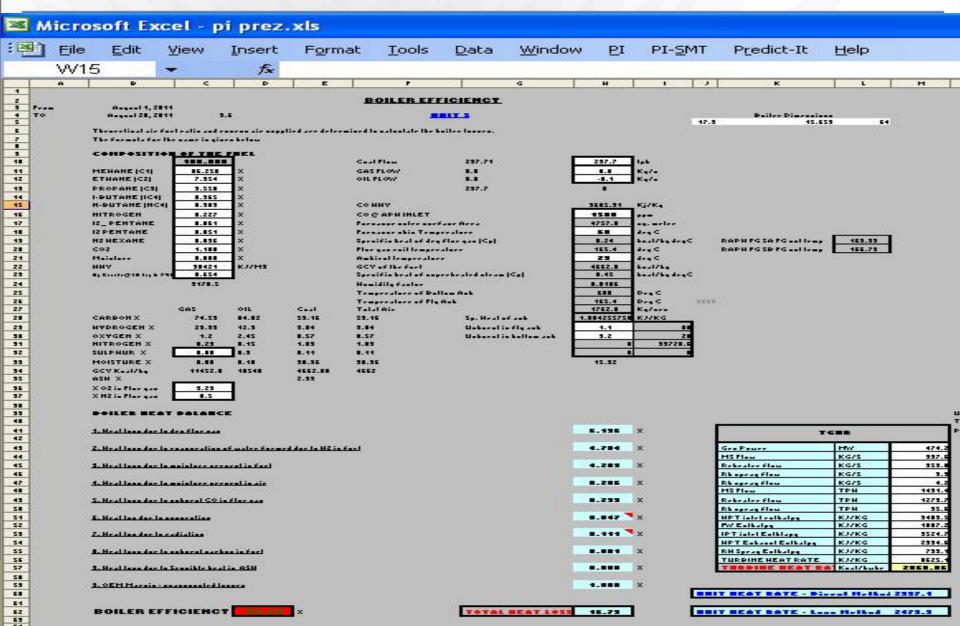
Performance Monitoring - "Before & After" Analysis

Performance Monitoring - Design vs. Actual

Performance Monitoring – Diff. operating conditions

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

K30

	A	B	C	D (PI Tag name)	E Sunday, June 12, 2011 / Min. Load	F Monday, June 13, 2011 / Unit on full oil	G Tuesday, June 14, 2011 / Unit at 50% load	H Wednesday, June 15, 2011 / Unit at 70% Load	I Thursday, June 16, 2011 / Unit at 75% Load	J Friday, June 17, 2011 / Unit at 50% Load
3	LOAD			TR U5 SATEC GEN MW	No Data	No Data	No Data	No Data	No Data	No Data
4				TR U5 EB009 U5 GENERATOR MW	207.39	480.86	249.58	346.72	383.64	265.13
5				TR U5 TFL2 TOTAL COAL FLOW	69.00	0.21	142.31	214.74	221.81	164.07
6	Coal flow			TR U5 CJ023 NET LC OIL FLOW	7.21	31.34	-0.10	-0.09	-0.09	-0.09
7	oil flow			TR U5 AA009 U#5 FD FAN5A MTR CURRENT	67.54	93.53	66.52	88.74	77.51	76.97
8		Current	A	TR U5 AB009 U5 FD 5B MTR CURRENT	65.33	84.38	64.83	78.06	73.18	71.50
9			B	TR U5 AA014 U5 FD FAN 5A DISCH PRES	53.47	209.28	47.72	185.58	130.10	131.24
10		Discharge pr.	A	TR U5 AB014 U5 FD FAN 5B DISCH PRES	77.17	224.44	65.78	205.80	156.29	153.18
11	FD fan		B	TR U5 AA016 U5 FD FAN 5A IN FLOW	449.35	776.01	400.76	749.49	638.52	620.93
12		Suction flow	A	TR U5 AB016 U5 FD FAN 5B IN FLOW	411.32	702.13	382.98	651.27	587.14	546.80
13			B	TR U5 AE018 RAPH 5A OXYGEN IN FG-A1	7.04	0.79	4.42	6.17	5.22	6.65
14		O2	A	TR U5 AF018 RAPH 5B OXYGEN IN FG-B1	5.66	1.15	4.20	7.21	5.01	6.92
15			B	TR U5 AE015 RAPH 5A OUT SA TEMP	311.66	344.50	331.70	368.95	357.73	332.20
16		Air o/l temp.	A	TR U5 AF015 RAPH 5B OUT SA TEMP	305.35	345.47	324.70	370.74	360.73	330.09
17			B	TR U5 AE014 U5 RAPH 5A OUT SA PRES	23.19	95.23	22.59	78.13	68.54	76.84
18		Air o/l pr.	A	TR U5 AF014 U5 RAPH 5B OUT SA PRESS	14.49	112.25	21.33	95.75	62.75	71.56
19			B	TR U5 AE004 U5 RAPH 5A FG DIF PRES	79.59	135.20	87.25	165.95	152.11	117.63
20	RAPH	Gas side DP	A	TR U5 AF004 U5 RAPH 5B FG DIF PRES	71.37	123.88	74.98	161.98	149.73	111.40
21			B	TR U5 AE017 U5 RAPH 5A SA DIF PRESS	35.20	89.72	30.20	87.10	71.41	60.14
22		Air side DP	A	TR U5 AF017 U5 RAPH 5B SA DIF PRES	66.24	119.21	65.39	113.84	98.05	87.40
23			B	TR U5 FGET5AAVG FLUE GAS EXIT TEMP RAPH	157.36	183.53	176.92	185.27	189.46	159.87
24		FGET	A	TR U5 FGET5BAVG FLUE GAS EXIT TEMP RAPH	152.83	199.37	176.81	191.19	195.57	165.13
25				TR U5 FG009 CONV SHTR OUT FLUE GAS TEMP	419.38	460.36	439.46	490.11	468.31	445.18
26	Economiser	Flue gas i/l temp		TR U5 FG014 ECONOMISER OUT FLUE GAS TEM	298.90	335.10	312.42	351.17	345.02	318.41
27		Flue gas o/l temp.		TR U5 BOILER OUTPUT - FRH PART	268.90	305.10	282.42	321.17	315.02	288.41
28				TR U5 GA009 ID FAN 5A MTR CURRENT	142.85	142.99	0.33	165.45	151.64	0.24
29		Current	A	TR U5 GB009 ID FAN 5B MTR CURRENT	159.43	144.01	148.23	161.76	152.89	175.51
30			B	TR U5 GC009 ID FAN 5C MTR CURRENT	0.73	141.10	143.58	153.43	145.23	162.94
31			C	TR U5 GE001 U5 ESP A OUT FG PRESSURE	-152.65	-255.71	-169.40	-288.45	-272.55	-212.18
32			A	TR U5 GE002 U5 ESP B OUT FG PRESSURE	-150.39	-251.34	-167.37	-288.54	-266.54	-217.73
33		Suction pr	B	TR U5 GE003 U5 ESP C OUT FG PRESSURE	-160.20	-258.12	-178.90	-299.06	-285.03	-229.66
34	ID fan		C	TR U5 GE004 U5 ESP D OUT FG PRESSURE	-173.69	-273.97	-195.79	-308.86	-289.17	-240.44
35			D	TR U5 GA016 ID FAN 5A OUT FG TEMP	130.65	155.24	45.31	157.96	150.98	110.42
36			A	TR U5 GB016 ID FAN 5B OUT FG TEMP	130.43	170.10	150.09	184.36	177.12	135.16
37		O/L temp.	B	TR U5 GC016 ID FAN 5C OUT FG TEMP	129.69	169.36	149.35	183.62	176.38	134.42
38			C	TR U5 GD016 ID FAN 5D OUT FG TEMP	125.48	164.66	155.01	165.16	159.30	140.16
39			D	TR U5 FA005 U5 FURNACE DRAFT NARROW	-22.18	-23.25	-19.20	-13.69	-20.61	-19.49
40		Furnace draft		TR U5 AISF01N SH SPR FLOW (N)	15.10	2.79	14.36	13.61	8.47	7.42
41	Spray	SH spray		TR U5 AIRF01N RH SPR FLOW (N)	3.62	1.96	11.28	7.51	7.72	5.90
42		RH spray		TR U5 AIBG03 BURNER TILT POSITION 3	50.09	42.76	3.08	0.07	30.11	4.06

Performance Monitoring - Dashboard

	Design Value	Current Value	Deviation	KCAL/KWH	ALERT (KCAL/KWH)	Last Hour	Today	Yesterday	This month
Parameters									
TR U5 SATEC GEN MW		479.24				438.0	488.6	479.2	431.4
TR U5 HEAT RATE	2489	2450.82	38.18			2447.0	2348.3	1709.6	1993.9
TR U5 RA001 U5 CONDENCER PRESSURE	-0.91	-0.93	-0.02	-17.61	OK	-0.930	-0.926	-0.926	-0.932
TR U5 BD008 SHRT OUT 1 STM TEMP	541	550.73	-9.73	-9.69	OK	544.5	545.1	545.2	536.1
TR U5 BD009 SHRT OUT 2 IN STM TEMP	541	531.67	9.33	9.29	9.29	531.6	531.3	534.1	529.8
TR U5 BE009 RH OUT STM TEMP(EAST)	541	542.32	-1.32	-0.90	OK	539.4	541.0	542.2	533.6
TR U5 BE010 RH OUT STM TEMP(WEST)	541	549.23	-8.23	-5.63	OK	547.8	547.3	546.4	539.4
TR U5 BE001 U5 RH OUT STM PRES	35	35.26	-0.26	0.00	OK	32.2	36.2	35.5	31.8
TR U5 HP HEATER 6 TTD	0.1	0.32	0.22	0.31	0.31	0.2	0.0	0.0	-1.0
TR U5 HP HEATER 5 TTD	0.3	6.84	6.54	3.26	3.26	6.5	6.8	6.5	5.2
TR U5 LP HEATER 3 TTD	2.9	-0.93	-3.83	-1.91	OK	-1.0	-0.9	-0.9	-0.4
TR U5 LP HEATER 2 TTD	3	-0.51	-3.51	-1.75	OK	-0.4	-0.5	-0.5	1.1
TR U5 SA003 U5 THROTTLE STEAM PRESS	148	149.40	-1.40		OK	145.6	151.6	149.9	137.1
TR U5 PE003 U5 BFPT 5C IN STM FLOW	11.53	11.93	3.43	2.39	2.39	11.3	12.5	12.3	11.1
TR U5 PD003 U5 BFPT 5B IN STM FLOW	11.53	11.32	-1.82	-1.27	OK	10.6	11.6	11.5	10.4
TR U5 RA007 U5 MAKE UP WATER FLOW	1	0.00	1.00		OK	5.7	6.4	6.7	8.8
TR U5 AISF01N SH SPR FLOW (N)	0	0.00	0.00	0.00	OK	0.2	3.9	3.3	4.5
TR U5 AIRF01N RH SPR FLOW (N)	0	11.24	11.24	21.25	21.25	8.5	12.4	11.8	9.1
TR U5 FGET5AAVG FLUE GAS EXIT TEMP RAPH 5A	144	161.11	17.11	21.29	21.29	166.2	164.0	161.7	152.0
TR U5 FGET5BAVG FLUE GAS EXIT TEMP RAPH 5B	144	160.17	16.17	20.12	20.12	165.2	164.1	162.4	152.4
TR U5 CEAIRP EXCESS AIR	12.5	0.00	-12.50	-5.91	OK	0.0	0.0	0.0	0.0

PERFORMANCE IMPROVEMENT INITIATIVE - SANKALP

SANKALP

- Structured, Time bound, Team based program with top management support & bottom up approach to impact the company's bottom line with minimal investment in shortest possible time.

- Uses the creativity and energy of the people of Tata Power and all its stakeholders

- Utilizes Online Data from PI System to take informed decisions.

Online Data for 500 MW Coal Fired Unit

Microsoft Excel - u 5 (3).xls

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

Type a question for help

G4   {=PITimeDat("TR U5 CB003 MILL 5B COAL AIR TEMP",A1,"trombaypi","interpolated")}

	A	B	C	D	E	F	G	H	I	J	K	L
1	09-Sep-11 11:38:49		482.02								Design Coal CV	51
2	Load MW	Coal TPH	Steam flow Kg/Sec	Coal Flow TPH	CM status	Current Amps	Coal Air Temp	PA In temp	PA Flow	Bowl DP (Bar)	Coal CV	42
3	486.69	222.05	446.52	0.00	OFF	0.00	Bad	Bad	0.00	9	Oil CV	105
4	Plant Load Factor	FG flow TPH	HRH Steam Flow	37.66	ON	40.59	Bad	198.18	0	166	FG CV	130
5	97.23%	0.00	362.65	37.87	ON	44.37	58.20	234.68	0.00	160	Unit 5 Heat Rate	2483.70
6	Air Flow	LC Oil	Deaerator Pr	37.86	ON	41.78	64.25	244.52	22.7776413	152	Drum Pr.	173.
7	1772.32	4.05	6.30	37.96	ON	45.28	Bad	245.28	17.5363369	166	Boiler out Pr	163.
8	Ratio of Air / load	Makeup	Total Flue Gas	32.84	ON	45.66	64.28	236.60	1.972032309	150	Throttle Pr.	151.
9	3.64	53.02	717.79	38.07	ON	43.18	64.30	249.05	21.52795601	206	MS Pr. Bef SV	149.
10	Sp Steam cons	3.60		0.25	ON	30.05	59.43	69.65	35.00	55	HP Drum Stage Pr.	147.
11	3.30	MS temp	RH Temp			In Service LRSB No		0		128	HP Exhaust Pr.	38.
12	North	550.45	538.01	ESP O/L Pr.	BFP flow		Soot Blowing	Pressure	22.95		HP Exhaust Temp.	334.
13	South	531.96	548.96	-352.40	7.73	4.56	Steam	Flow	0.77		RH in Steam Pr	
14	Spray	0.00	12.78	-343.36	264.02	18.01		CW Inlet Temp	28.96		RH Out Steam Pr	35.
15	Sp Coal Cons	0.456		-339.97	264.26	16.80					RH Steam aft SV	34.
16	Design Mkcal	1199	2.398	-357.69	536.02			CW Outlet Temp	41.17		RH Steam aft CV	31.
17	Actual Mkcal	1097	2.254		FG	SA	Temp				Vacuum	-0.9
18	Expected Coal TPH	282		RAPH 5A	197.01	71.22	158.2	Diss. O2	52.74		HP CV 1 Position	90.
19	Oil Equivalent to Coal TPH	36		RAPH 5B	194.94	102.85	159.2	Condensor Conductivity	2.54		HP CV 2 Position	94.
20	Gas Equivalent to Coal TPH	0		Economiser FG temp			158.7				HP CV 3 Position	100.
21	Excess Air	2.8	3.3	IN	OUT	DT					HP CV 4 Position	86.
22		3.8		419.69	335.02	84.67					Vac Pump status	ON
23				250.39	294.08	43.69						N_ON
24	FD Fan Current	79.90	78.44	177.84	Water In	Water Out	Ext Pr	Ext Temp	Drain Temp	TTD	DCA	
25	FD Fan Flow Kg/S	649.86	655.94	H P Heater 6	208.1	250.4	39.0	333.2	214.4	-0.33	5.78	#NAME
26	PA Fan Current	187.28	183.66	H P Heater 5	171.6	208.1	16.9	442.0	175.9	6.27	3.46	#NAME
27	PA Fan Flow M³/S	118.68	119.52	Dearator	132.8	167.2	5.9	330.1				#NAME

Sheet1 \ Sheet2 \ Sheet3 \ Sheet4 \ Sheet5 \ Sheet6 \ Sheet7
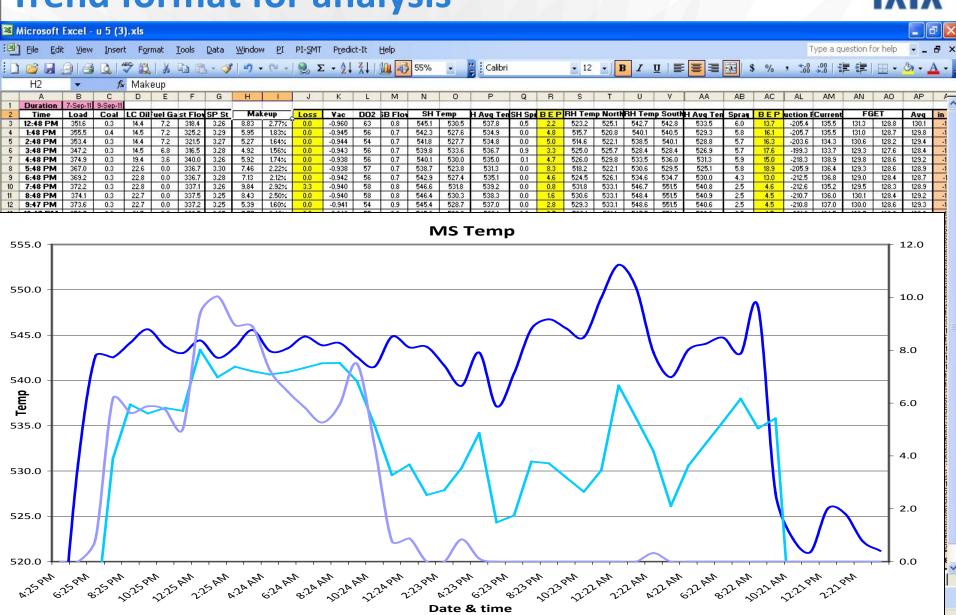
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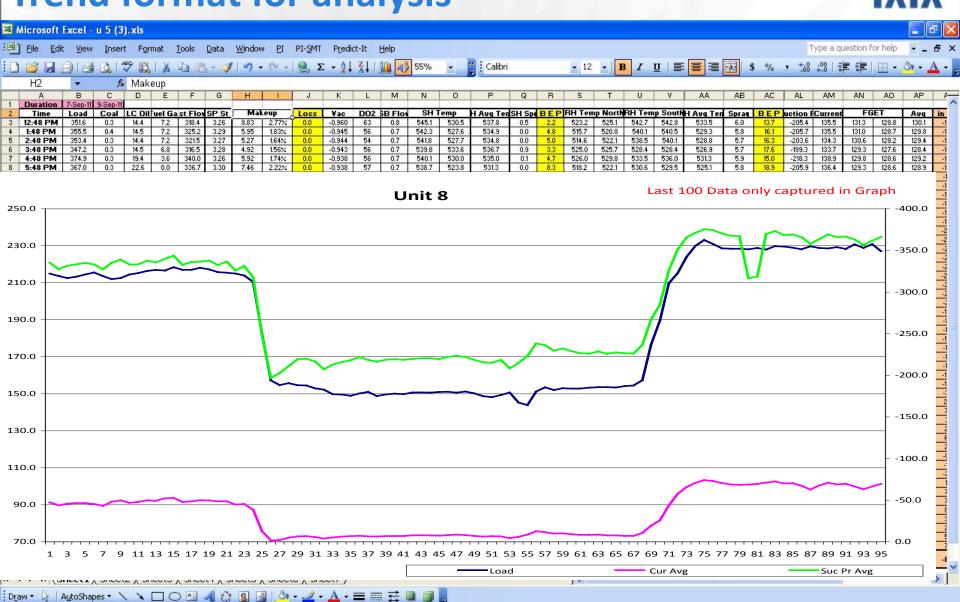
Ready

History Data for analysis
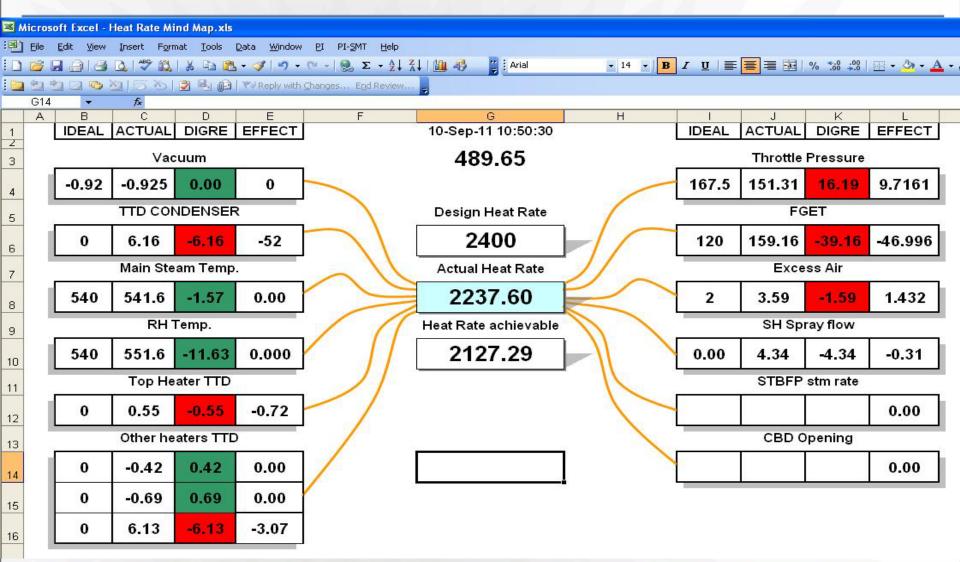
Trend format for analysis

Trend format for analysis

Predictive Analysis

Thank you

We take pride in Lighting up Lives!