Leveraging IT in Process and Production Industries

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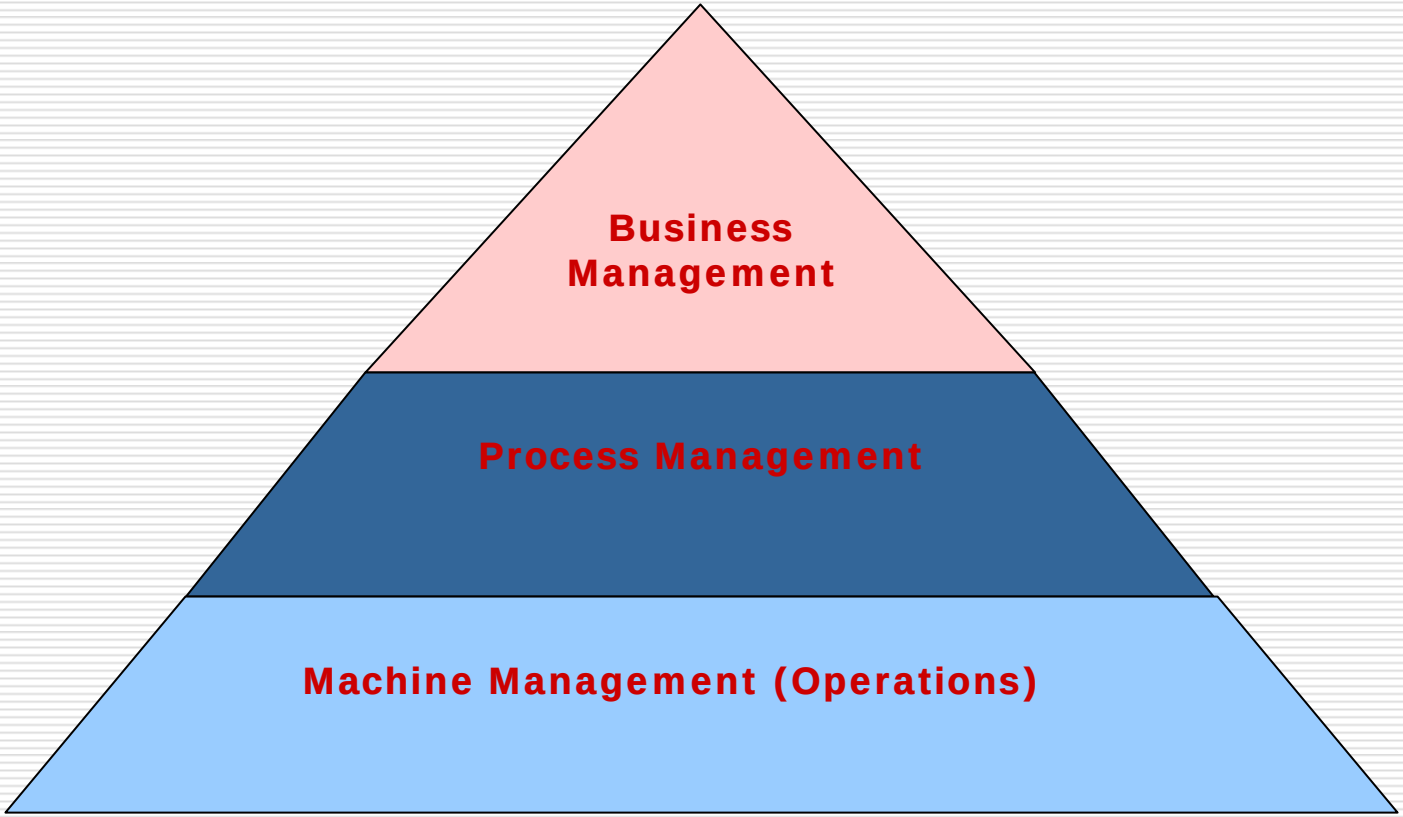
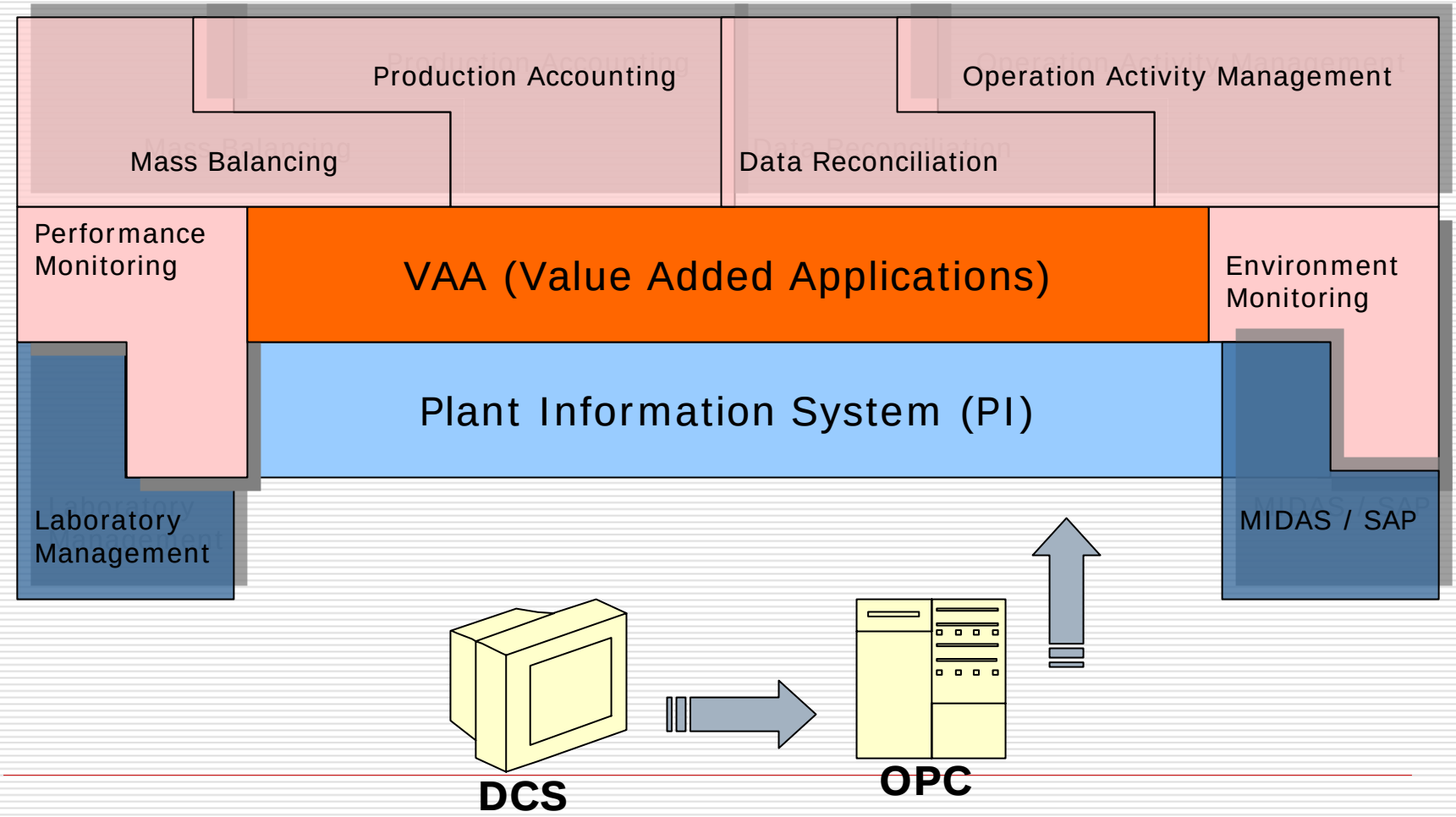
IT in Industries

- Agenda
  - Convert raw data into useful information
  - Leveraging IT in
    - Process Industry
    - Production Industry
- Sectors and Solutions
  - Power - iPower™
  - Fertilizer – iFertilizer™
  - Oil and Gas – Reporting, PI-Hysys Integration
  - Utilities – iboiler™, iwater™

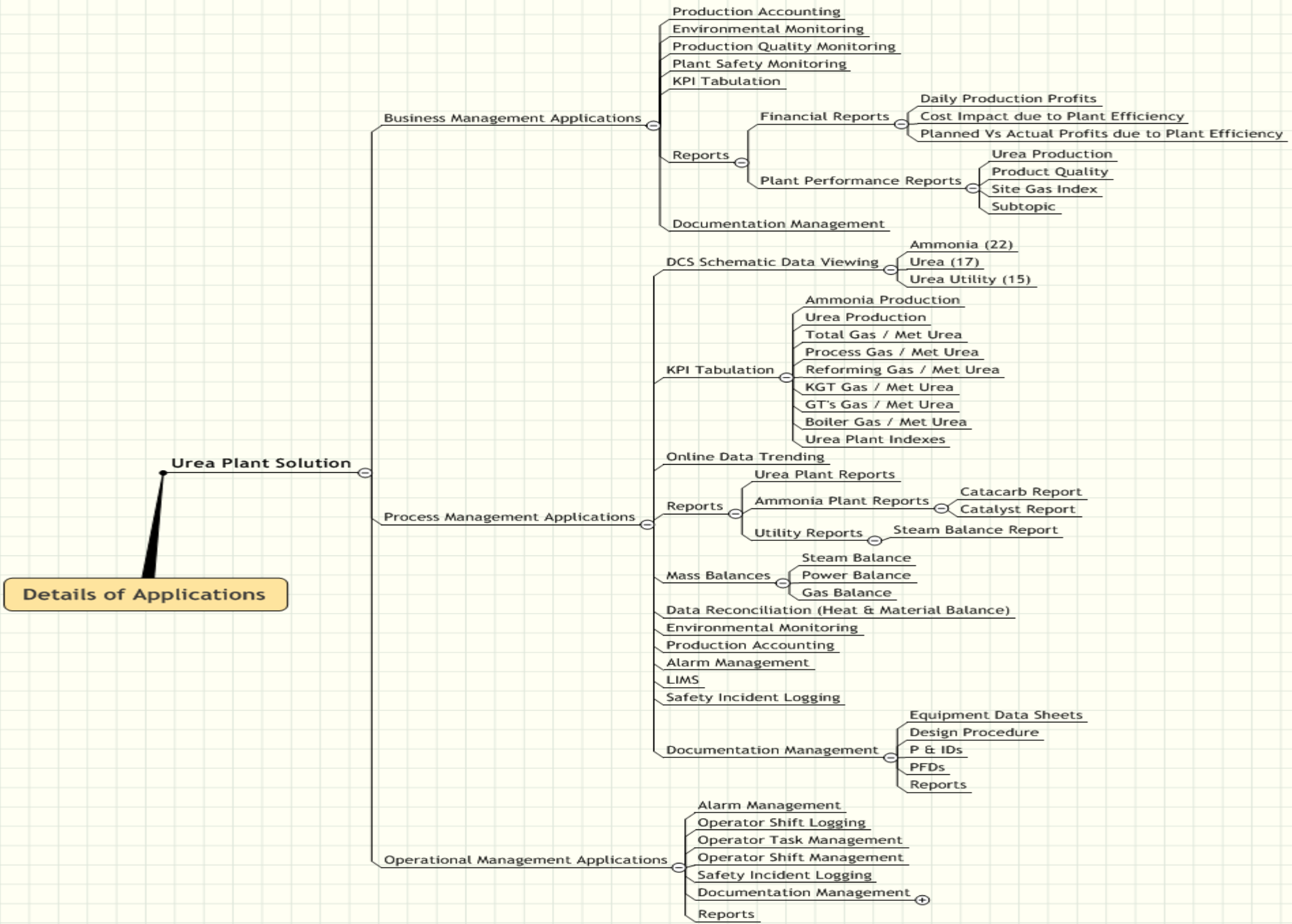
PIMS Application Structure



PIMS Detail Structure

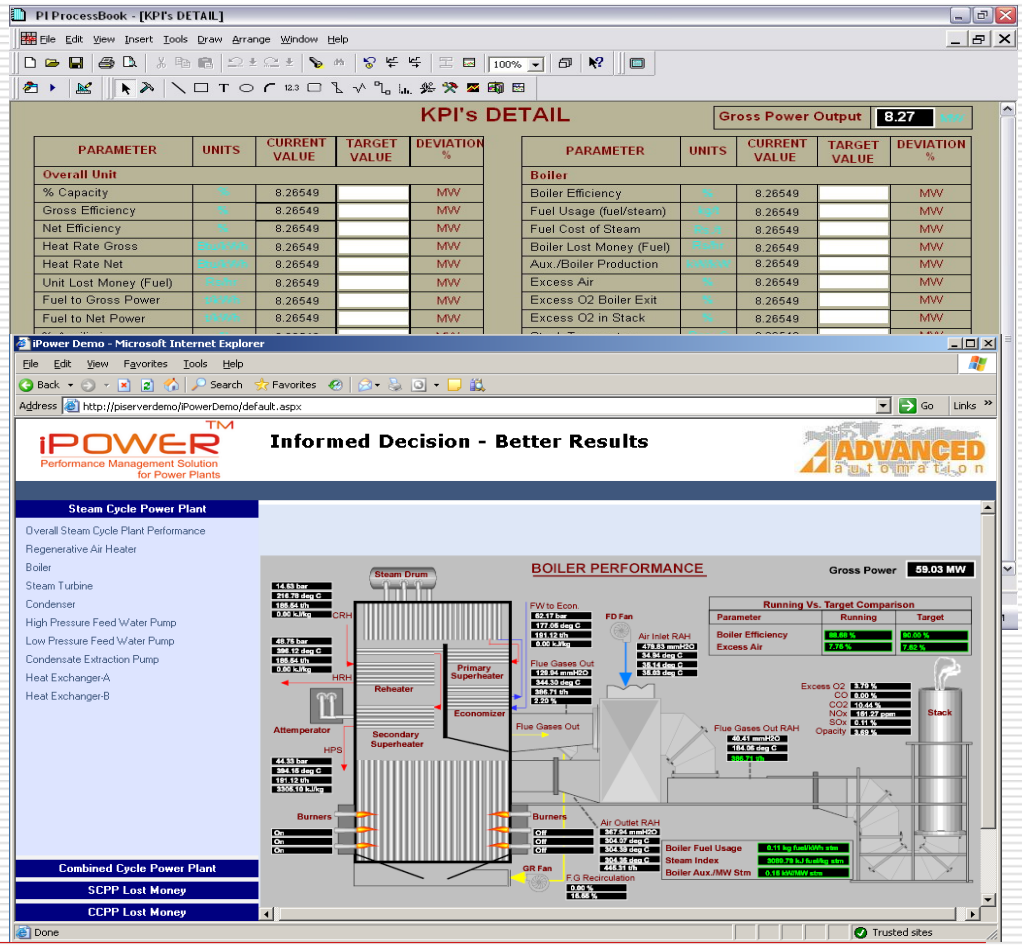


Engro Innovative Automation



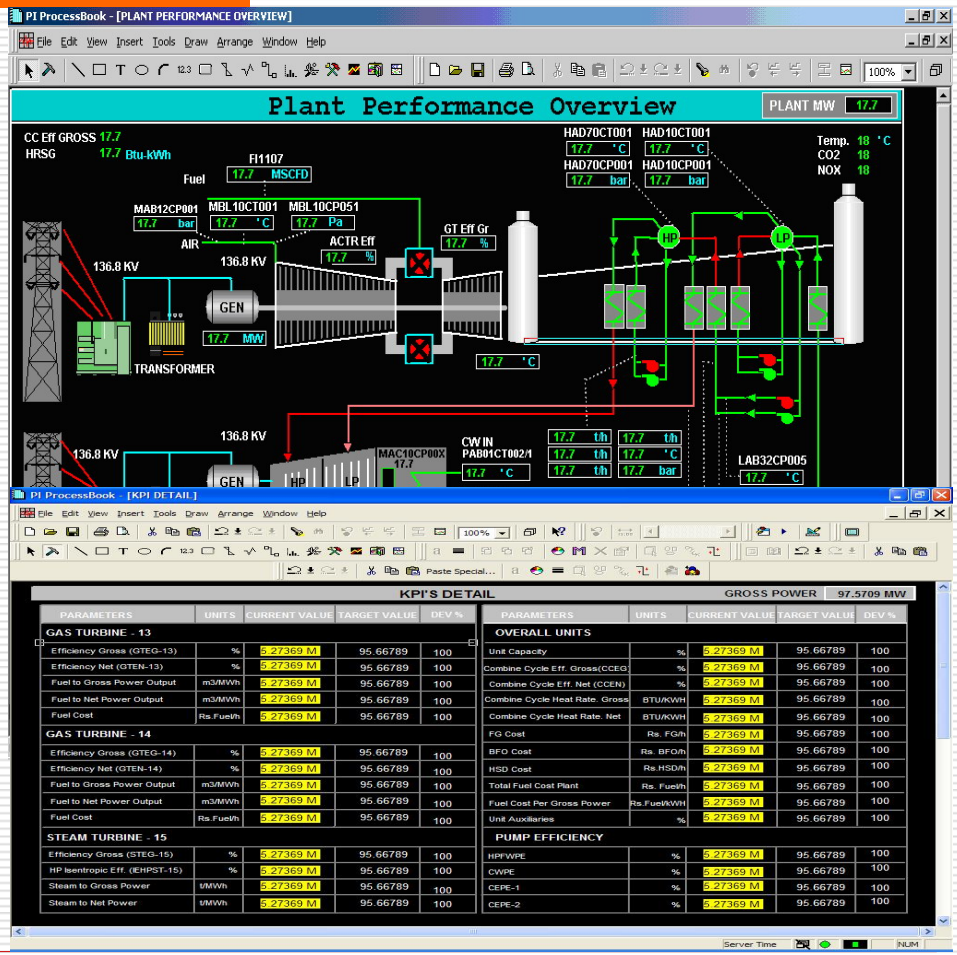
Power - iPower™

- Required for production reporting, process analysis, optimization & efficient decision making.
- Performance engineering calculations for power plant and its equipments.
- Helps in load management for turbines, pumps etc operating in parallel in a circuit.
- Man-hour saving which is currently being wasted in analysis & data searching.
- Compare running vs. design data & running vs. target data.
- Cost & Lost Money Analysis which is of the interest of business people to know the cash in & out flows.
- Giving power to improve business strategy by timely decision making.
- PMS enable individuals within organizations to leverage the information stored in their control systems.
- Improve reliability & decrease downtime.



Power – iPower™ contd.

- Better understanding on the plant data/information to grow with multiple competitors.
- Reporting feature adds value to solution; client can send, edit and print reports automatically.
- The access to data, its transformation into role-based information and delivery through web-applications are the core set of functionalities.
- Historizing the data helps in getting previously recorded values so as to easy backtrack when required.
- Property packages are available and incorporated in iPowerTM that performs calculations of physical properties of material streams like air, water, steam, hydrocarbons (h/c), different gases and mixtures.
- There is no change in existing process, it just take the data of the running plant and performs useful analysis.
- No shutdowns are required for iPower connectivity.
- All the critical and performance information is distributed on business, process & operations layers according to their areas if interests.
- Boost production, better forecasting & high revenues.



Microsoft Excel - Plant Availability 2.xls

File Edit View Insert Format Tools Data Window Help

M36

TNB Liberty Power Limited

Plant Avilability

Month	Plant Efficiency	Plant Availability	Derating	Energy Generated (MWh)			
				Scheduled	Forced	PFO	M
	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage	P
September 2004	47.4	99.95	0.05	0	0	0	
October 2004	46.78	94.9	0.93	0	4.16	0	
November 2004	44.21	74.33	1.56	22.61	0.55	0.95	
December 2004	47.32	96.19	0	0	0.67	3.14	
January 2005							
February 2005							
March 2005							
April 2005							
May 2005							
June 2005							
July 2005							
August 2005							
Average	46.4275	91.3425	0.635	5.6525	1.345	1.0225	

Plant Availability Report 2

Ready

TNB Liberty Power Limited

Plant Avilability

Month	Plant Efficiency	Plant Availability	Derating	Energy Generated (MWh)				TOTAL
				Scheduled	Forced	PFO	Maintenance	
	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage
September 2004	47.4	99.95	0.05	0	0	0	0	100
October 2004	46.78	94.9	0.93	0	4.16	0	0	99.99
November 2004	44.21	74.33	1.56	22.61	0.55	0.95	0	100
December 2004	47.32	96.19	0	0	0.67	3.14	0	100
January 2005								0
February 2005								0
March 2005								0
April 2005								0
May 2005								0
June 2005								0
July 2005								0
August 2005								0
Average	46.4275	91.3425	0.635	5.6525	1.345	1.0225	0	33.3325

d

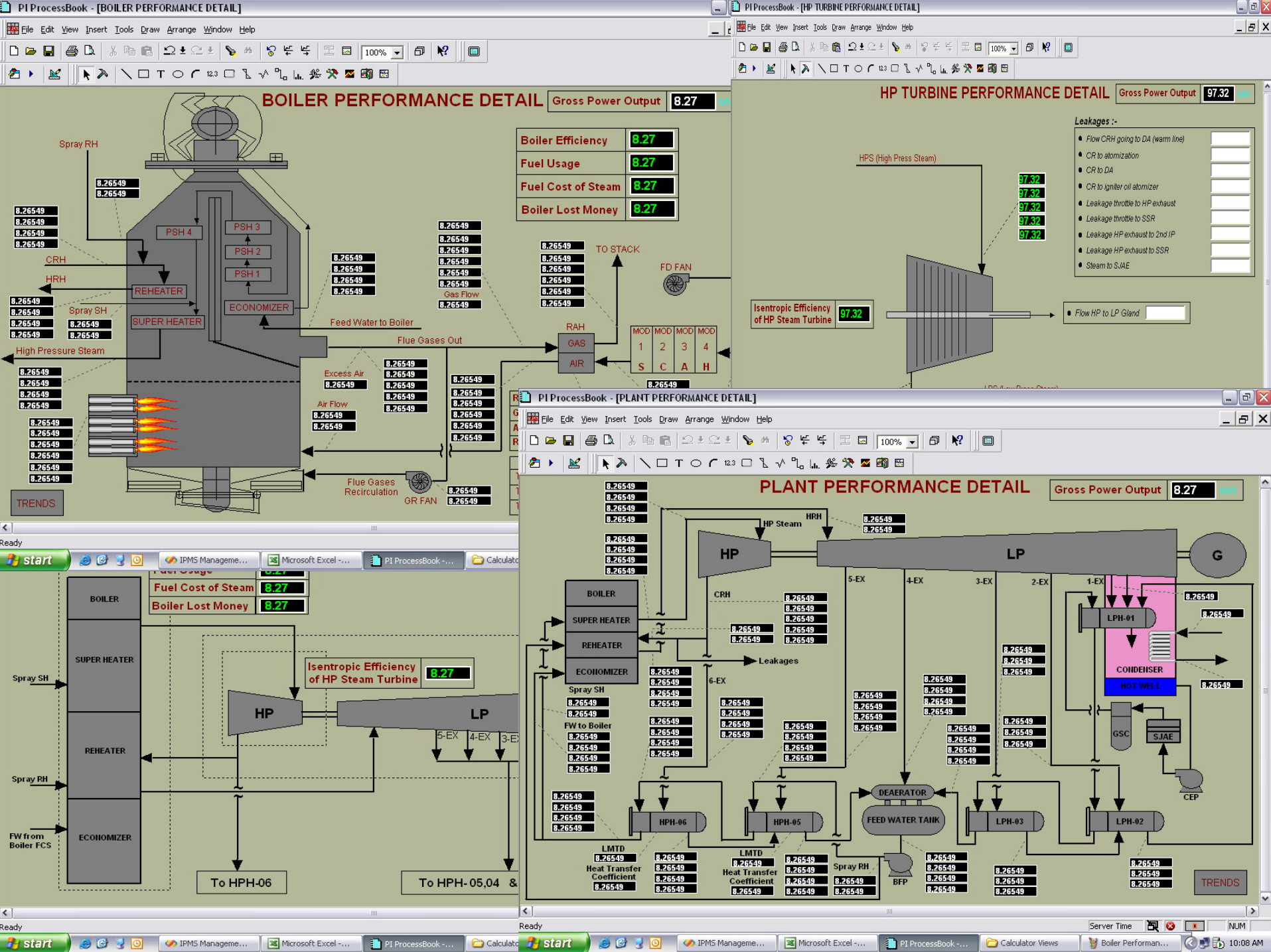
ance

-05	Feb-05	Mar-05	Apr-05
6,996.00	106,155.00	125,331.00	107,093.00
1,390.00	73,048.00	86,965.00	72,132.00
5,606.00	33,107.00	38,366.00	34,961.00
4,284.22	3,489.61	3,797.39	3,606.43
392.28	361.69	381.31	381.77
49.50	12.30	136.70	55.20
1,623.00	109,994.00	129,373.00	111,026.00
4,000.00	937,035,000.00	1,085,608,000.00	940,960,000.00
860.00	860.00	860.00	860.00
5,390.82	139,891.07	155,004.15	149,804.91
1,003.73	136,390.46	151,003.73	146,132.64
7,462.85	135,962.21	143,339.88	143,512.40
0	0	0	0
0	0	0	0
17.45	2.11	37.76	12.91
726.55	669.89	706.24	707.09
744	672	744	720
726.554	669.89	706.24	707.09
5.90	5.21	5.38	5.10

Outage Reasons Entry

Date & Time	Outage Hours	Reason
4/11/2006 2:54:01 PM	4.2	Maintenance Outage
4/10/2006 2:54:02 PM	3	Forced Outage
4/9/2006 2:54:02 PM	2	
4/8/2006 2:54:02 PM	1	Scheduled Outage
		Maintenance Outage
		Forced Outage
		Partial Forced Outage

Cancel Save


PI ProcessBook - [BOILER PERFORMANCE DETAIL]
BOILER PERFORMANCE DETAIL
Gross Power Output 8.27
Boiler Efficiency 8.27
Fuel Usage 8.27
Fuel Cost of Steam 8.27
Boiler Lost Money 8.27
Spray RH
PSH 4
PSH 3
PSH 2
PSH 1
CRH
HRH
REHEATER
ECONOMIZER
Spray SH
SUPER HEATER
High Pressure Steam
Feed Water to Boiler
Flue Gases Out
TO STACK
FD FAN
Gas Flow
RAH
GAS
AIR
MOD 1 S
MOD 2 C
MOD 3 A
MOD 4 H
Excess Air
Air Flow
Flue Gases Recirculation
GR FAN
TRENDS
PI ProcessBook - [HP TURBINE PERFORMANCE DETAIL]
HP TURBINE PERFORMANCE DETAIL
Gross Power Output 97.32
Leakages :-
Flow CRH going to DA (warm line)
CR to atomization
CR to DA
CR to igniter oil atomizer
Leakage throttle to HP exhaust
Leakage throttle to SSR
Leakage HP exhaust to 2nd IP
Leakage HP exhaust to SSR
Steam to SJAE
HPS (High Press Steam)
Isentropic Efficiency of HP Steam Turbine 97.32
Flow HP to LP Gland
PI ProcessBook - [PLANT PERFORMANCE DETAIL]
PLANT PERFORMANCE DETAIL
Gross Power Output 8.27
HP Steam
HRH
HP
LP
G
BOILER
SUPER HEATER
REHEATER
ECONOMIZER
CRH
Leakages
5-EX
4-EX
3-EX
2-EX
1-EX
6-EX
LPH-01
CONDENSER
HOT WELL
GSC
SJAE
CEP
Spray SH
FW to Boiler
DEAERATOR
FEED WATER TANK
HPH-06
HPH-05
LPH-03
LPH-02
LMTD Heat Transfer Coefficient
Spray RH
BFP
TRENDS
Fuel Cost of Steam 8.27
Boiler Lost Money 8.27
Isentropic Efficiency of HP Steam Turbine 8.27
FW from Boiler FCS
To HPH-06
To HPH- 05,04 &
Ready
start
IPMS Manageme...
Microsoft Excel -...
PI ProcessBook -...
Calculator Views
Boiler Performan...
Server Time
NUM
10:08 AM

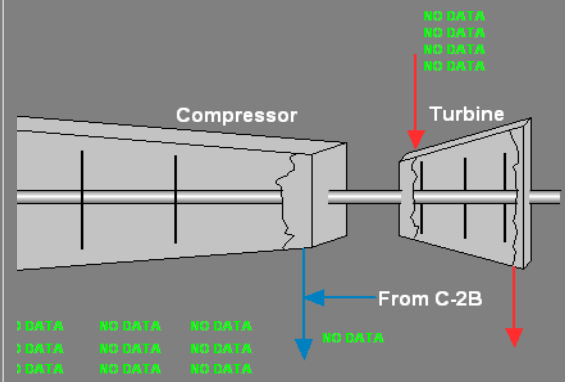
Urea 1 Key Performance Indicators Detail

Parameters	Units	Value
CO2 Compressor C-2A		
Specific Speed	RPM/KPPH	NO DATA
1st Stage Comp Ratio	---	NO DATA
2nd Stage Comp Ratio	---	NO DATA
3rd Stage Comp Ratio	---	NO DATA
4th Stage Comp Ratio	---	NO DATA
5th Stage Comp Ratio	---	NO DATA
1st Stage Cooler Approach:	Deg F	NO DATA
2nd Stage Cooler Approach:	Deg F	NO DATA
3rd Stage Cooler Approach:	Deg F	NO DATA
4th Stage Cooler Approach:	Deg F	NO DATA
CO2 Compressor		
Corrected Flow	KSCFH	NO DATA
CO2 to Urea(Melt flow based ratio)	MTPD /KSCFH	NO DATA
Key Performance Indicators		
Amm / CO2 Flow:	GPM / KSCFH	NO DATA
Carbamate flow	GPM	NO DATA
Carbamate flow / CO2 Flow:	GPM /KSCFH	NO DATA

Parameters	Units	Value
CO2 Compressor C-2B		
Specific Speed	RPM/KPPH	NO DATA
1st Stage Comp Ratio	---	NO DATA
2nd Stage Comp Ratio	---	NO DATA
3rd Stage Comp Ratio	---	NO DATA
4th Stage Comp Ratio	---	NO DATA
5th Stage Comp Ratio	---	NO DATA
1st Stage Cooler Approach:	Deg F	NO DATA
2nd Stage Cooler Approach:	Deg F	NO DATA
3rd Stage Cooler Approach:	Deg F	NO DATA
4th Stage Cooler Approach:	Deg F	NO DATA
Urea Production		
D-141 O/L Soln Conc	%	NO DATA
D-141 O/L Soln Sp. Gravity	---	NO DATA
Corr. Factor Urea Melt Flow	---	NO DATA
Melt Flow	GPM	NO DATA
UR1 Prod. Melt Flow Based	MTPH	NO DATA
Urea Prod. NH3 Flow Based	MTPD	NO DATA

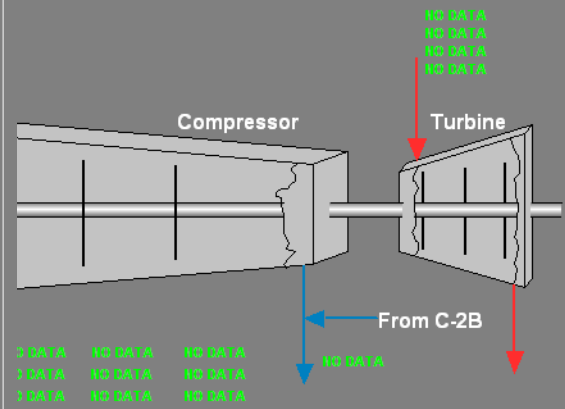
Parameters	Units	Value
NH3 Exchangers		
E-164A Approach	Deg F	NO DATA
E-164B Approach	Deg F	NO DATA
E-164C Approach	Deg F	NO DATA
E-164D Approach	Deg F	NO DATA

C - 2A



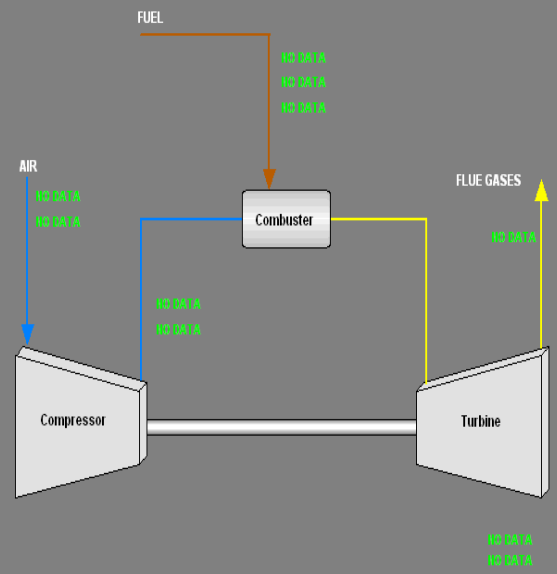
Key Performance Indicators		
Parameter	**Units**	**Value**
Specific Speed	RPM/KPPH	NO DATA
1st Stage Comp Radio	---	NO DATA
2nd Stage Comp Radio	---	NO DATA
3rd Stage Comp Radio	---	NO DATA
4th Stage Comp Radio	---	NO DATA
5th Stage Comp Radio	---	NO DATA
1st Stage Cooler Approach	F	NO DATA
2nd Stage Cooler Approach	F	NO DATA
3rd Stage Cooler Approach	F	NO DATA
4th Stage Cooler Approach	F	NO DATA

C - 2B



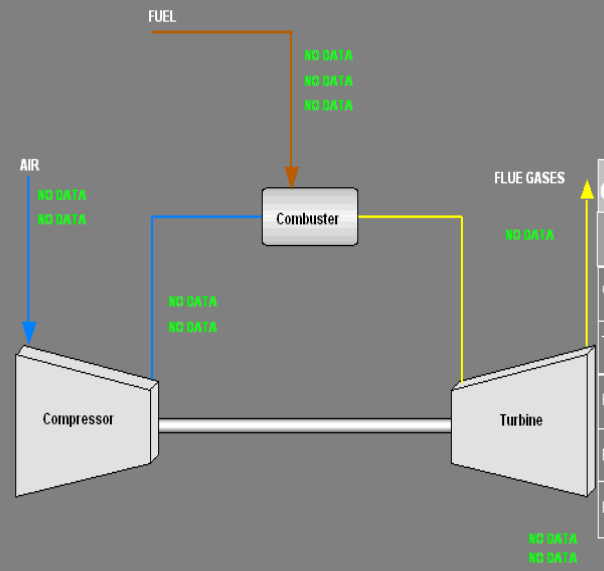
Key Performance Indicators		
Parameter	**Units**	**Value**
Specific Speed	RPM/KPPH	NO DATA
1st Stage Comp Radio	---	NO DATA
2nd Stage Comp Radio	---	NO DATA
3rd Stage Comp Radio	---	NO DATA
4th Stage Comp Radio	---	NO DATA
5th Stage Comp Radio	---	NO DATA
1st Stage Cooler Approach	F	NO DATA
2nd Stage Cooler Approach	F	NO DATA
3rd Stage Cooler Approach	F	NO DATA
4th Stage Cooler Approach	F	NO DATA

GT - 602



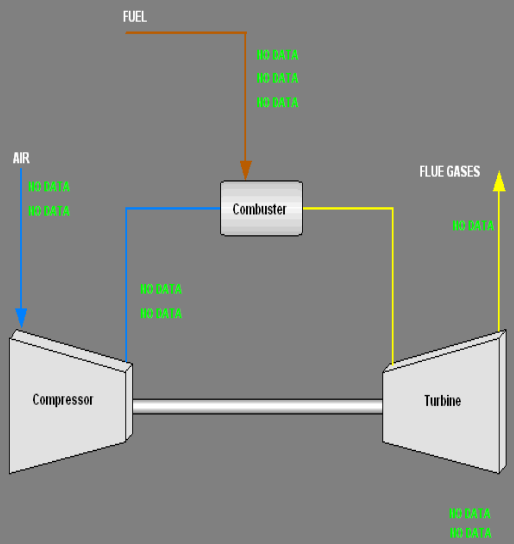
GT- 601 Key Performance Indicators		
Parameters	Units	Value
GT 601 Corrected fuel Flow	KSCFH	NO DATA
Temperature Rise Efficiency	%	NO DATA
Heat Rate	Btu/Kwh	NO DATA
Energy Index	Btu/Kwh	NO DATA
Fuel Cost	Btu/Kwh	NO DATA

GT - 603



GT- 601 Key Performance Indicators		
Parameters	Units	Value
GT 601 Corrected fuel Flow	KSCFH	NO DATA
Temperature Rise Efficiency	%	NO DATA
Heat Rate	Btu/Kwh	NO DATA
Energy Index	Btu/Kwh	NO DATA
Fuel Cost	Btu/Kwh	NO DATA

GT - 601



GT- 601 Key Performance Indicators		
Parameters	Units	Value
GT 601 Corrected fuel Flow	KSCFH	NO DATA
Temperature Rise Efficiency	%	NO DATA
Heat Rate	Btu/Kwh	NO DATA
Energy Index	Btu/Kwh	NO DATA
Fuel Cost	Btu/Kwh	NO DATA

Utilities Key Performance Indicators Detail

Parameters	Units	Value
Gas Turbine 601		
GT-601 corrected fuel flow	KSCFH	NO DATA
Temperature Rise efficiency	%	NO DATA
Heat rate	Btu / kWh	NO DATA
Energy index	Btu / kWh	NO DATA
Fuel cost	Rs. / kWh	NO DATA
Gas Turbine 602		
GT-602 corrected fuel flow	KSCFH	NO DATA
Temperature Rise efficiency	%	NO DATA
Heat rate	Btu / kWh	NO DATA
Energy index	Btu / kWh	NO DATA
Fuel cost	Rs. / kWh	NO DATA
Gas Turbine 603		
GT-603 corrected fuel flow	KSCFH	NO DATA
Temperature Rise efficiency	%	NO DATA
Heat rate	Btu / kWh	NO DATA
Energy index	Btu / kWh	NO DATA
Fuel cost	Rs. / kWh	NO DATA

Parameters	Units	Value
Steam Generator 621		
Continuous Blowdown	KPPH	NO DATA
Continuous Blowdown	%	NO DATA
SG-621 thermal efficiency	%	NO DATA
SG-621 energy index	Btu / lb	NO DATA
SG-621 fuel cost	Rs. / lb	NO DATA
Steam Generator 631		
Continuous Blowdown	KPPH	NO DATA
Continuous Blowdown	%	NO DATA
SG-631 thermal efficiency	%	NO DATA
SG-631 energy index	Btu / lb	NO DATA
SG-631 fuel cost	Rs. / lb	NO DATA
Steam Generator 641		
Continuous Blowdown	KPPH	NO DATA
Continuous Blowdown	%	NO DATA
SG-641 thermal efficiency	%	NO DATA
SG-641 energy index	Btu / lb	NO DATA
SG-641 fuel cost	Rs. / lb	NO DATA

Parameters	Units	Value
Heat Recovery Steam Generator		
Total Heat Input / Heat Output 651	---	NO DATA
Total Heat Input / Heat Output 661	---	NO DATA
Total Heat Input / Heat Output 691/691A	---	NO DATA

iWater™

iWater™ – A unique concept through which we offers process optimization solutions with guaranteed energy savings in the

- Chilled Water
- Cooling Water
- Boiler Feed Water
- Condenser Water
- Effluent and Raw Water Circuits.

These solutions include turnkey installation of additional or replacement of existing equipment with guaranteed payback in terms of energy savings to the customer. Client pays us only for the savings achieved certified through an energy test report mutually signed by both the parties.

iboiler™

iboiler™ is a web-based boiler management system that is highly customizable, flexible and a robust product. It provides secure role based real-time access to relevant operational and corporate steam generation and distribution information that helps not only the technical staff but also the engineers and plant management to evaluate and improve their process efficiency. It also generates economic load allocation strategy for multi boiler operation for overall optimum system efficiency.

iFertilizer™

iFertilizer™ is an plant wide real-time information and performance management solution specially developed for the fertilizer industry.

- It gathers raw data from
  - Urea
  - Ammonia
  - Utility and
  - Laboratory Information Systems
- Converts that raw data into performance, cost and loss parameters using dedicated material and equipment property packages.
- Provides real-time plant and individual equipment performance parameter in the following information distribution layers:
  - Business Management
  - Process Management
  - Operations Management

Urea 1 & Urea 2 Graph Parameters

Parameters	Units	Value
Graph Parameters for UREA-1		
K Value H2O	Deg F	NO DATA
K Value CO2	KSCFH	NO DATA
K Value NH3	KSCFH	NO DATA
Graph Parameters for UREA-2		
Air Enthalpy	kCal/kg	NO DATA
Ammonium Carbamate Heat Decom	kCal/kg-carb	NO DATA

Urea 2 Key Performance Indicators Details 1

Parameters	Units	Value
CO2 Compressor C-2A		
Cooling Water Approach to Co2 Temp	Deg F	NO DATA
C-2C CO2 Corrected Flow	KSCFH	NO DATA
C-2D CO2 Corrected Flow	KSCFH	NO DATA
C-2E CO2 Corrected Flow	KSCFH	NO DATA
ACES		
T-1101 Tube Sheet top & Btm Temp diff	Deg F	NO DATA
CC-2 Shell side Temp difference	Deg F	NO DATA
NH3 Flow to R-1101		
Carbamate Flow to ACES		
T-1101 Steam Consumption		
Stripper LMTD		
Stipper Duty		
Stripper OHTU		

Parameters	Units	Value
Miscellaneous		
Steam A Header Corr. Flow Corrected Flow	KPPH	NO DATA
Steam B Header Corr. Flow Corrected Flow	KPPH	NO DATA
Urea conc	---	NO DATA
Urea Sp. Gravity	---	NO DATA
Total Steam Consumption	MTPH	NO DATA
Steam Consumption E-245A	PPH	NO DATA
Steam Consumption E-245B	PPH	NO DATA

Urea 2 Key Performance Indicators Details 2

Parameters	Units	Value
MP Loop		
E-264A Approach	Deg F	NO DATA
E-264B Approach	Deg F	NO DATA
E-264C Approach	Deg F	NO DATA
E-264D Approach	Deg F	NO DATA
E-264E Approach	Deg F	NO DATA
E-264F Approach	Deg F	NO DATA
E-265A Approach	Deg F	NO DATA
Temp Diff	Deg F	NO DATA
Evaporators		
UR2 Melt Flow	GPM	NO DATA
UR2 Production Based on Melt Flow	MTPH	NO DATA

Parameters	Units	Value
LIMS Calculations		
Avg MW	%	NO DATA
Avg MW	%	NO DATA
T-1101 Efficiency	%	NO DATA
8+10 retention	%	NO DATA
8+10 retention	%	NO DATA
8+10 retention	%	NO DATA
8+10 retention	%	NO DATA
8+10 retention	%	NO DATA
Reactor Efficency	%	NO DATA
Reactor H2O/CO2 ratio	%	NO DATA
Reactor NH3/CO2 ratio	%	NO DATA

Summary

- Convert real-time data into information for informed decisions
- Make use of the plant data to further develop value additions to the plants e.g iPower, iBoiler, iWater, iFertlizer etc