OSIsoft.

REGIONAL SEMINAR 2012

APAC

The Power of Data

INDIA

“ The Success Story of PI System at Our Cement & Power Plant”

Presented by **Lalit Pokharana-- Instrumentation and control, UltraTech Cement Ltd., Kotputli, India**

AGENDA

- WHO WE ARE
- SOLUTION ARCHITECTURE
- PERFORMANCE & MONITORING
- RESULT & BENEFITS
- CONCLUSION & FUTURE PLAN

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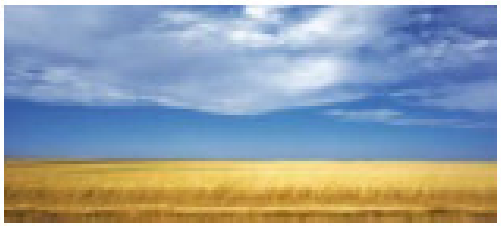
ADITYA BIRLA GROUP

LET'S REACH FOR THE SUN I [illegible] BILLION

Acrylic Fibres

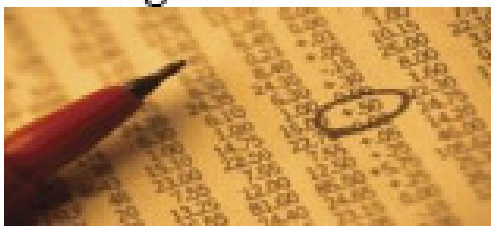


Agri Business

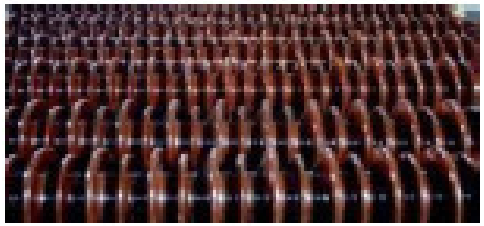
Carbon Black

Cement

Chemicals



Financial Services



Insulators

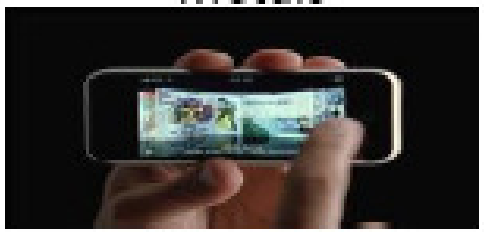
IT / ITES

Metals

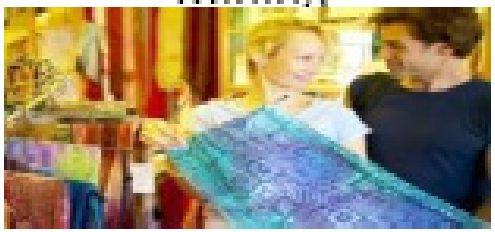
Mining

Pulp & Fibre

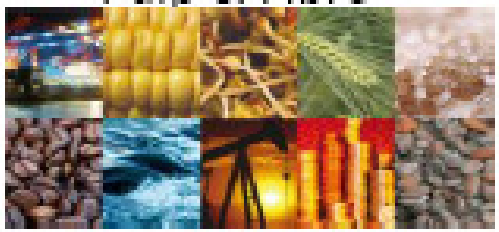
Retail



Telecom



Textiles & Apparels



Trading

WHO WE ARE

Globally

- The world's largest aluminum rolling company.
- World's No.1 in viscose staple fibre.
- Biggest producer of primary aluminum in Asia.
- The No.1 producer of carbon black in the world.
- Fourth-largest producer of insulators in the world.
- Fifth-largest producer of acrylic fibre in the world.
- Among the best energy efficient fertiliser plants.

India

- A premier branded garments player.
- Second largest player in viscose filament yarn.
- Second largest in Chlor – alkali sector.
- Second largest producer of cement.
- Among India's top 4 BPO companies.
- Among the top five mobile telephony players.
- A leading player in Life Insurance.
- Among the top three super-market chains in the retail business.

Australia | Austria | Bangladesh | Brazil | Canada | China I Dubai | Egypt | France | Germany | Hungary | India I Indonesia | Italy I Ivory Coast | Korea | Japan | Laos | Luxembourg I Malaysia | Myanmar | Philippines | Poland I Russia I Singapore I South Africa I Spain I Sri Lanka I Sweden I Switzerland | Tanzania I Thailand | Turkey I UAE I UK | USA | Vietnam

Ultratech Cement Limited

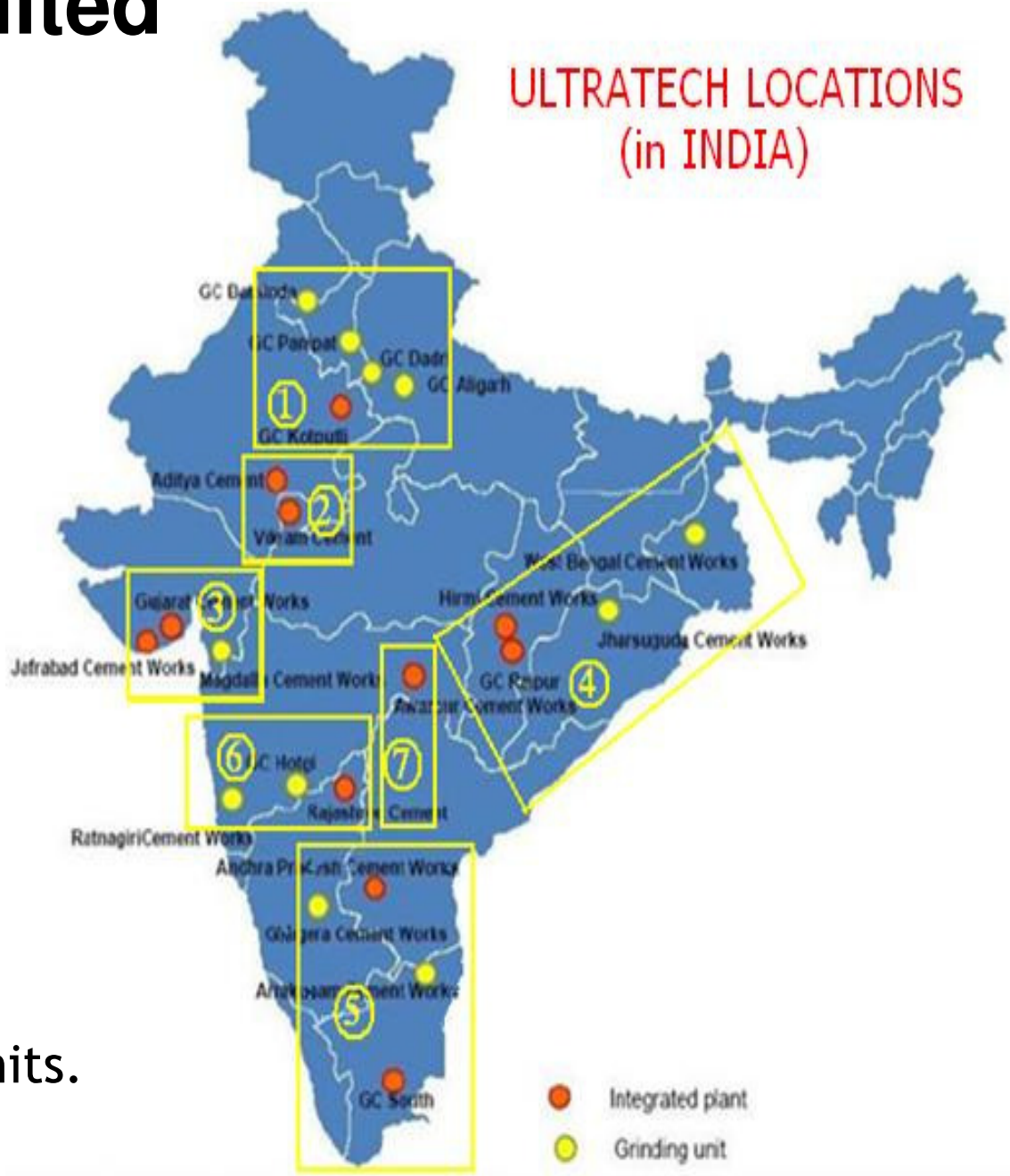
Manufacturing locations

- 12 Integrated Plants.
  11 in India
  1 in UAE

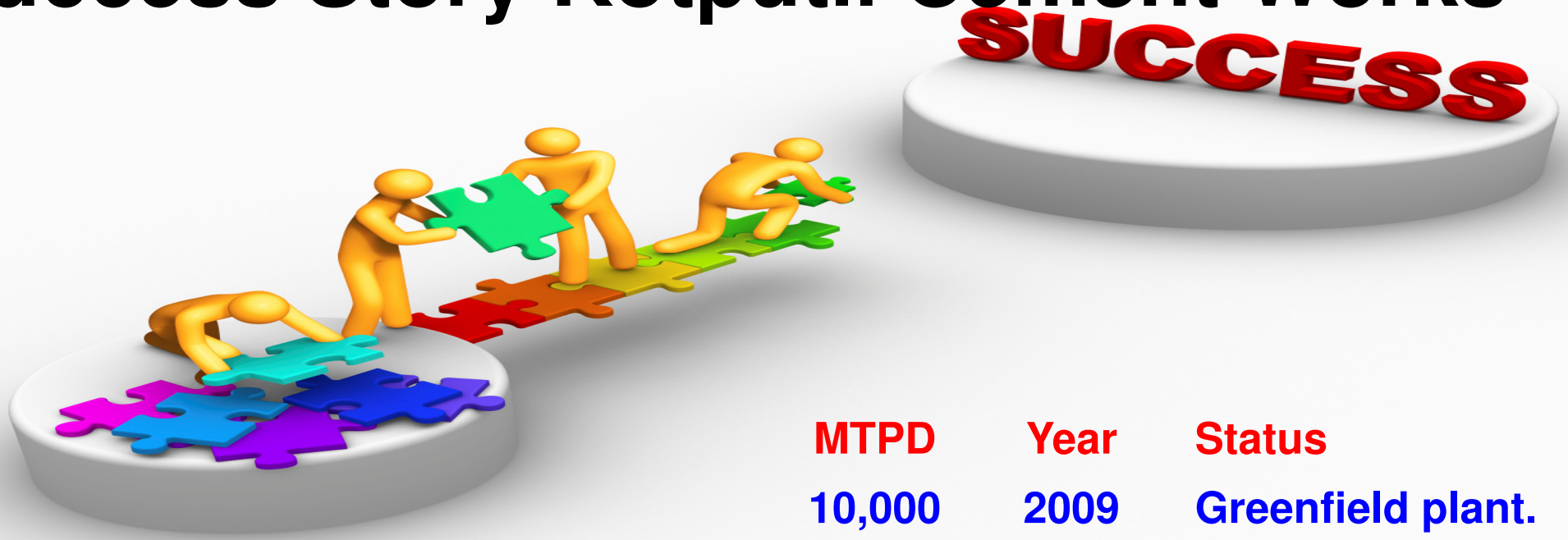
- 15 Grinding Units.
  11 in India
  2 in UAE
  1 in Bahrain
  1 in Bangladesh

- 6 Bulk Terminals.
  5 in India 1 in Sri Lanka.

- 92 RMC(Ready Mix Concrete) units.



Success Story Kotputli Cement Works



MTPD	Year	Status
10,000	2009	Greenfield plant.

KCW team is happy to inform you the following key Milestones of 2011-12

- Clinker Production is achieved 24.02 LT against Budget of 23.19 LT
- Clinker TPD achieved 9347 TPD against Budget of 8988 TPD
- Clikerization Sp Power achieved 58.28 KWh against Budget of 63.56 KWh
- Cement Overall Sp Power achieved 79.85 KWh against Budget of 86.07 KWH
- Cement dispatch 21.53 LT against Budget of 16.5 L T

Kotputli Cement Works

Green Belt Development:

Total 52319 Tree planted at Kotputli plant Colony and Mines & survival rate is 94 % in 110.35 Hec Area.

"As a Group we have always operated and continue to operate our businesses as Trustees with a deep rooted obligation to synergies' growth with responsibility."

— Mr. Kumar Mangalam Birla, Chairman, Aditya Birla Group

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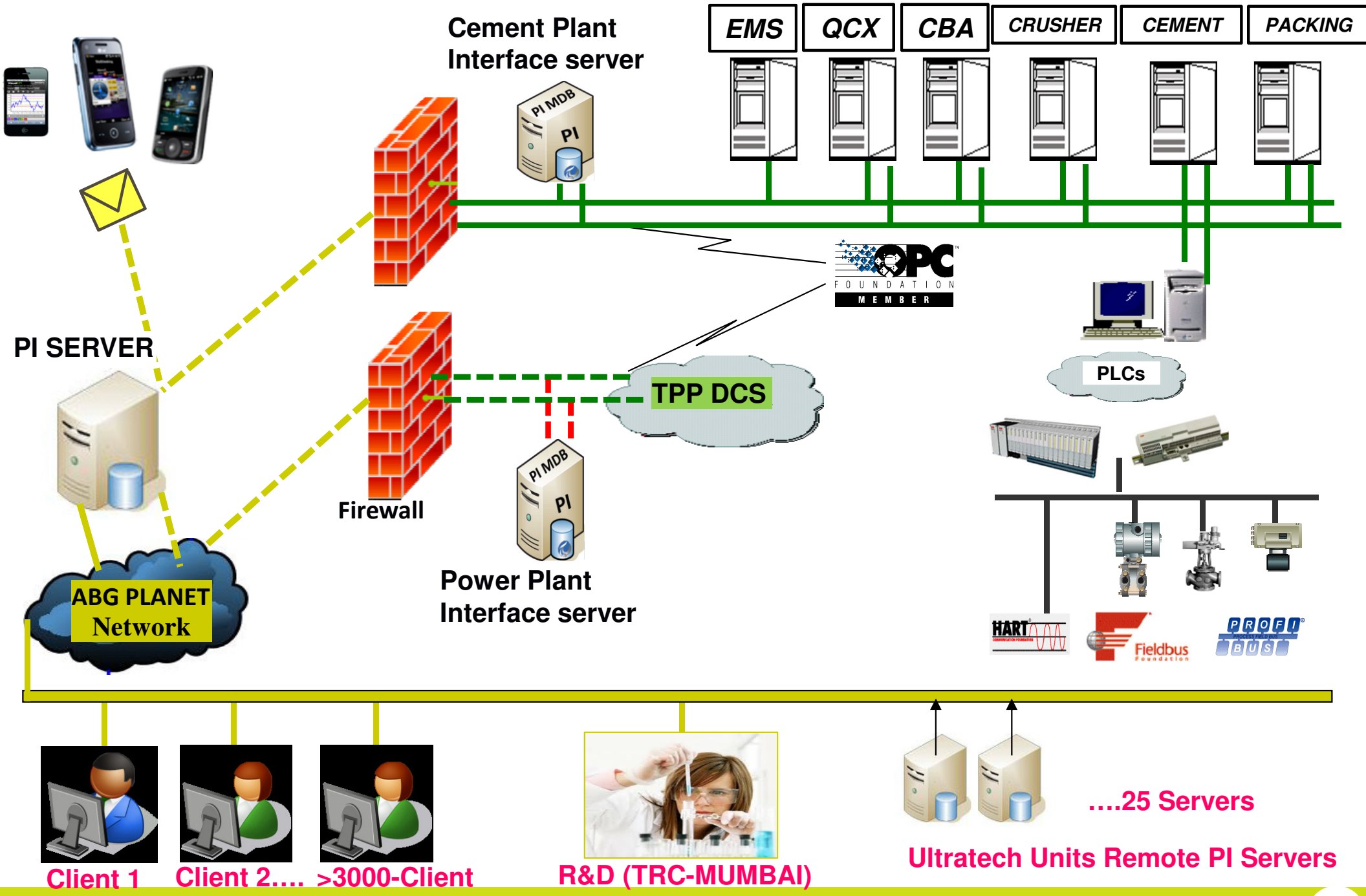
SOLUTION ARCHITECTURE

PERFORMANCE & MONITORING

RESULT & BENEFITS

CONCLUSION & FUTURE PLAN

PI SYSTEM ARCHITECTURE KOTPUTLI



PI System Architecture Main Features

More than 100k tags configured at different site.

More than 3K concurrent users.

Connectivity with different plant system (SCADA or DCS)

PI OPC Interface, PI Modbus Interface,…

More than 5k calculated tags using PI Performance Equation, PI Totalizer

Power full use of PI Process Book and PI Data Link by users

Web Portal .NET developed, integrated with PI System via PI SDK

Auto SMS and E-mail Notifications

Process Scope At Kotputli

CRUSHER

RAW MILL

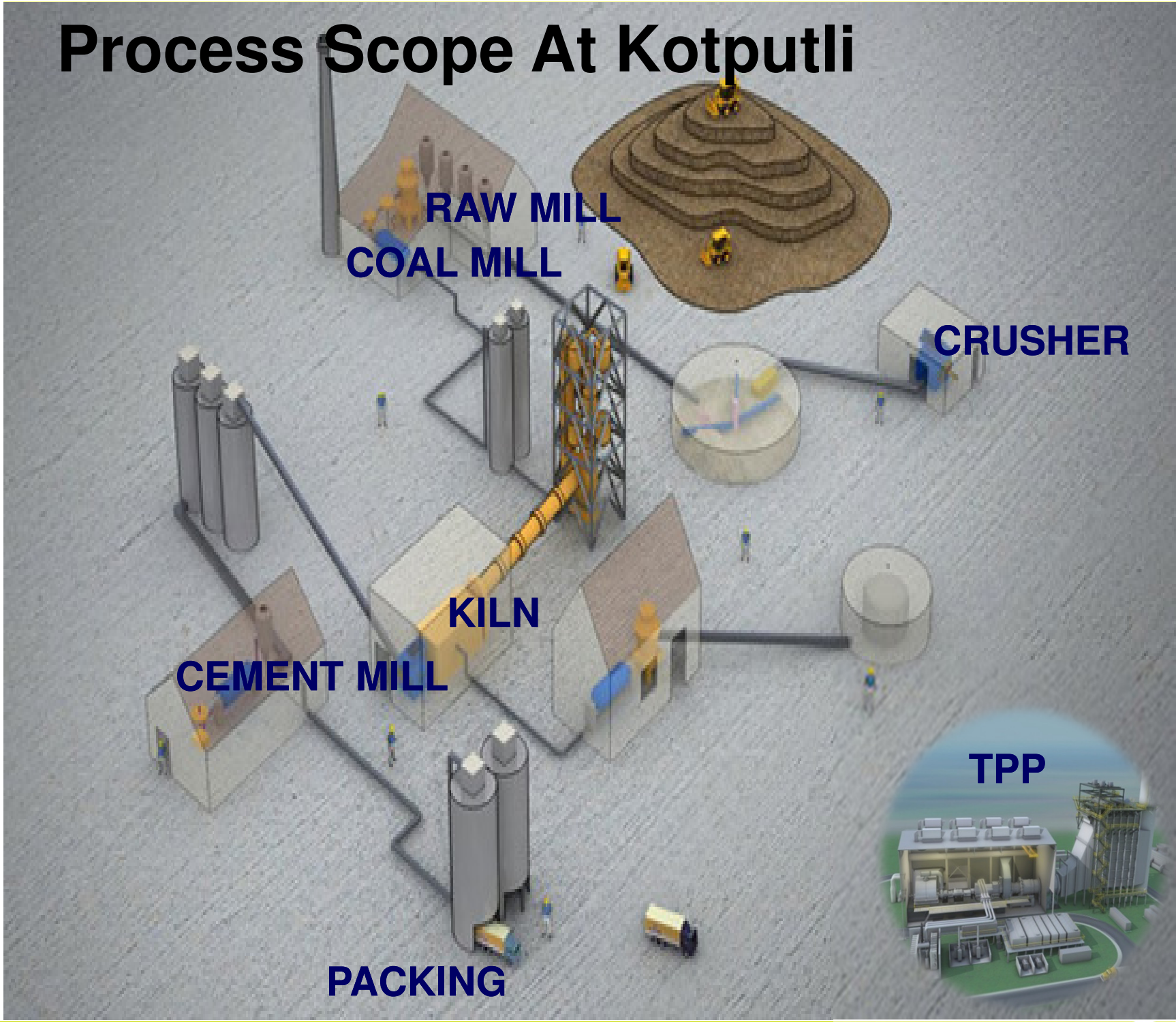
COAL MILL

KILN

CEMENT MILL

PACKING

TPP



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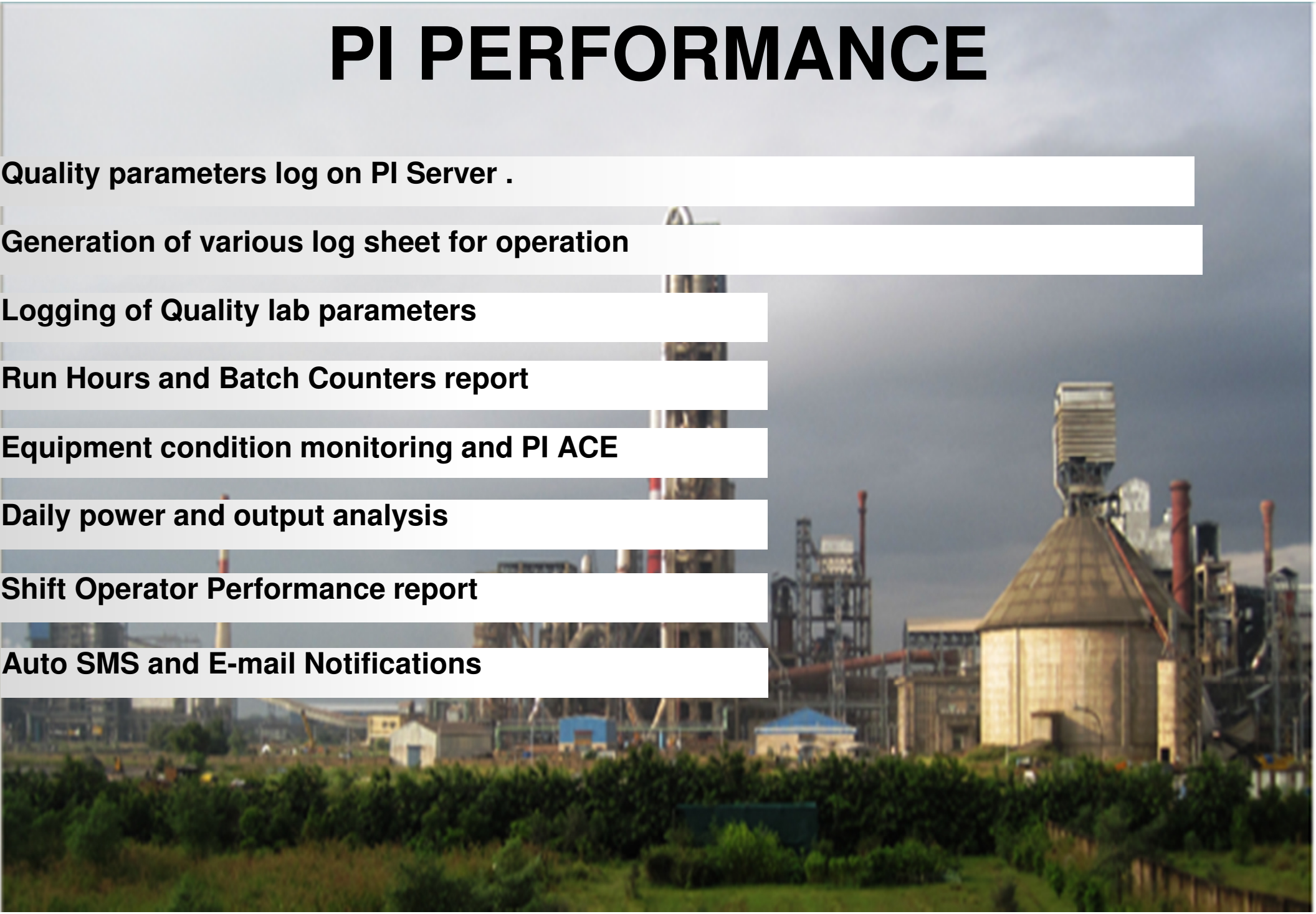
PI PERFORMANCE



- Quality parameters log on PI Server .
- Generation of various log sheet for operation
- Logging of Quality lab parameters
- Run Hours and Batch Counters report
- Equipment condition monitoring and PI ACE
- Daily power and output analysis
- Shift Operator Performance report
- Auto SMS and E-mail Notifications

Kiln Feed Consistency Reports

Reports generated used for necessary action & improvement.

07 Production Report [Compatibility Mode] - Microsoft Excel

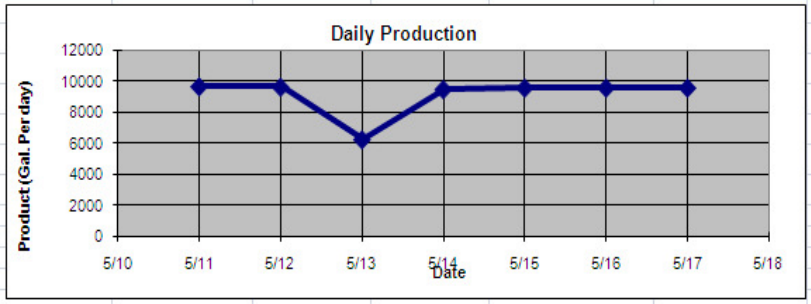
Home | Insert | Page Layout | Formulas | Data | Review | View | Add-Ins | PI

A10

Kotputli Clinker Production Report

Tag Name: KCW PI KNFEED
Start time: 11-May-2012 00:00:00
End time: 18-May-2012 00:00:00

Time interval: 24h
Units TONN/HOUR



Weekly total

Daily Production (Ton)	Average (TPH)	STD (TPH)	Minimum (TPH)	Maximum (TPH)	Range (TPH)	Pct Good (%)
63933.44687	608.8899702	127.7559215	0	655.3005981	655.3005981	100

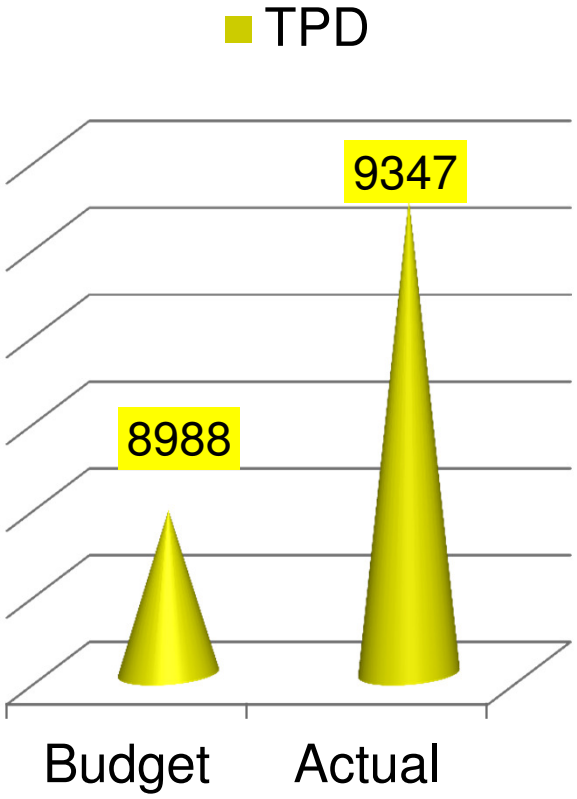
Daily production

Time Stamp	Daily Production (Ton)	Average (TPH)	STD (TPH)	Minimum (TPH)	Maximum (TPH)	Range (TPH)	Pct Good (%)
11-May-12 00:00:00	9691.382422	646.0921615	3.499820246	634.1633301	655.3005981	21.13726807	100
12-May-12 00:00:00	9657.109612	643.8073075	2.962147632	634.8260498	650.8730469	16.04699707	100
13-May-12 00:00:00	6262.276541	417.4851027	267.1598185	0	650.4200439	650.4200439	100
14-May-12 00:00:00	9509.249956	633.9499971	4.875609945	624.3223877	645.2550049	20.93261719	100
15-May-12 00:00:00	9605.005932	640.3337288	1.377697209	634.9552612	645.8895264	10.93426514	100
16-May-12 00:00:00	9604.575706	640.305047	1.325691069	631.9921875	645.6699219	13.67773438	100
17-May-12 00:00:00	9603.846704	640.2564469	1.298089565	632.9592285	644.8400879	11.88085938	100

Sheet1 | Sheet2 | Sheet3

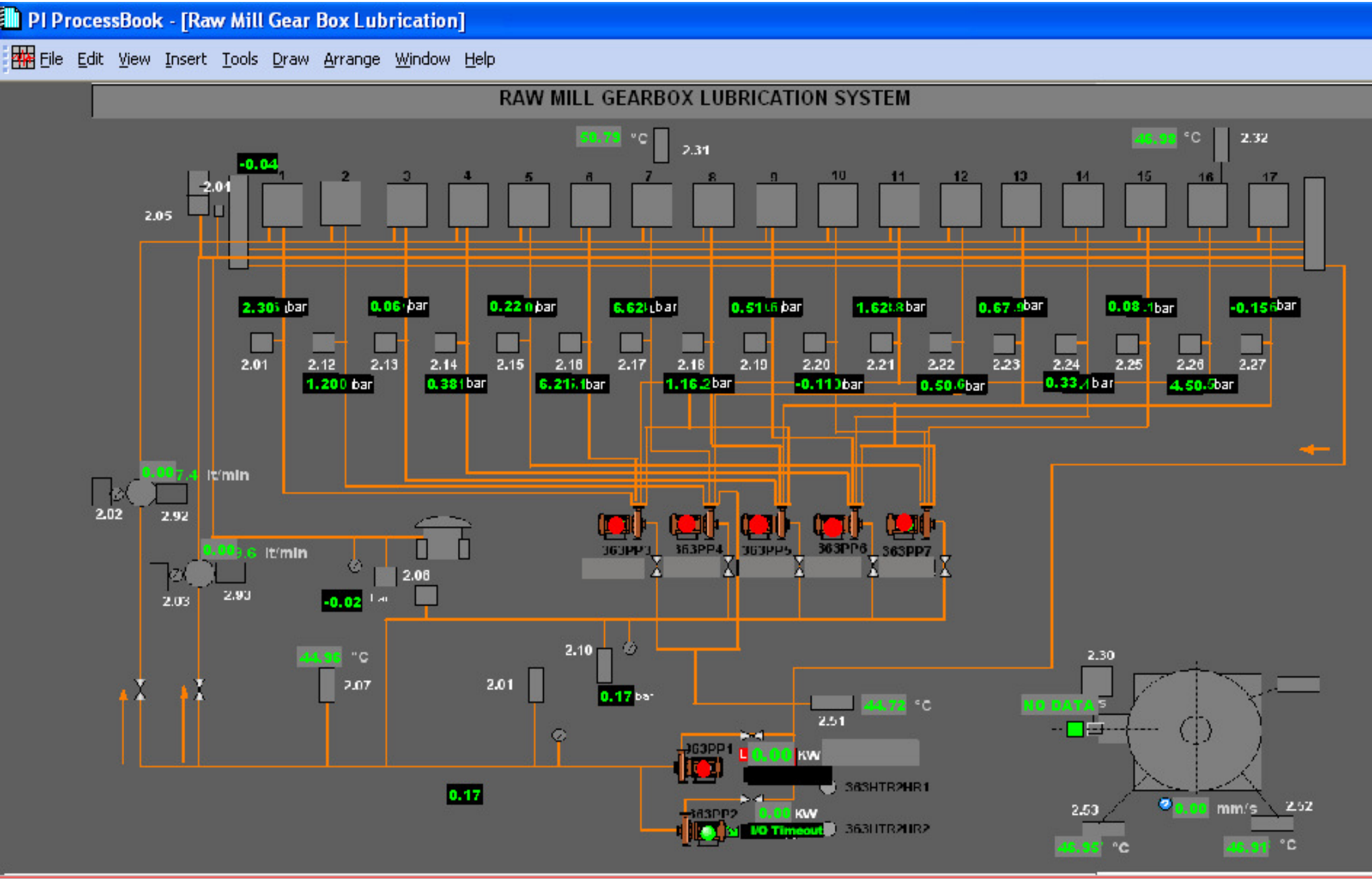
Ready | 100%

CLINKER PRODUCTION 2011-2012

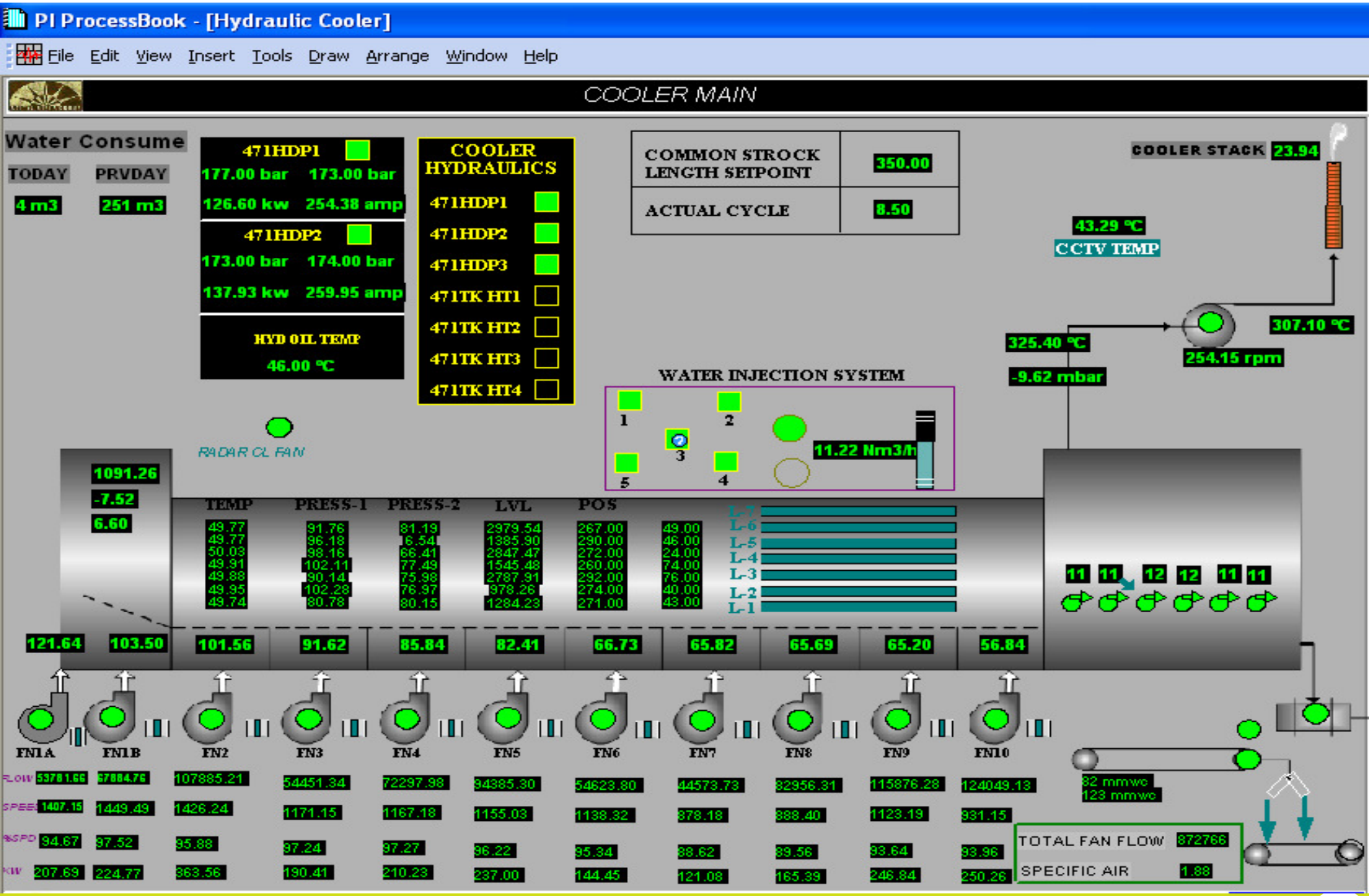


Production increased from 9200 TPD to 10,000TPD with consistent stability.

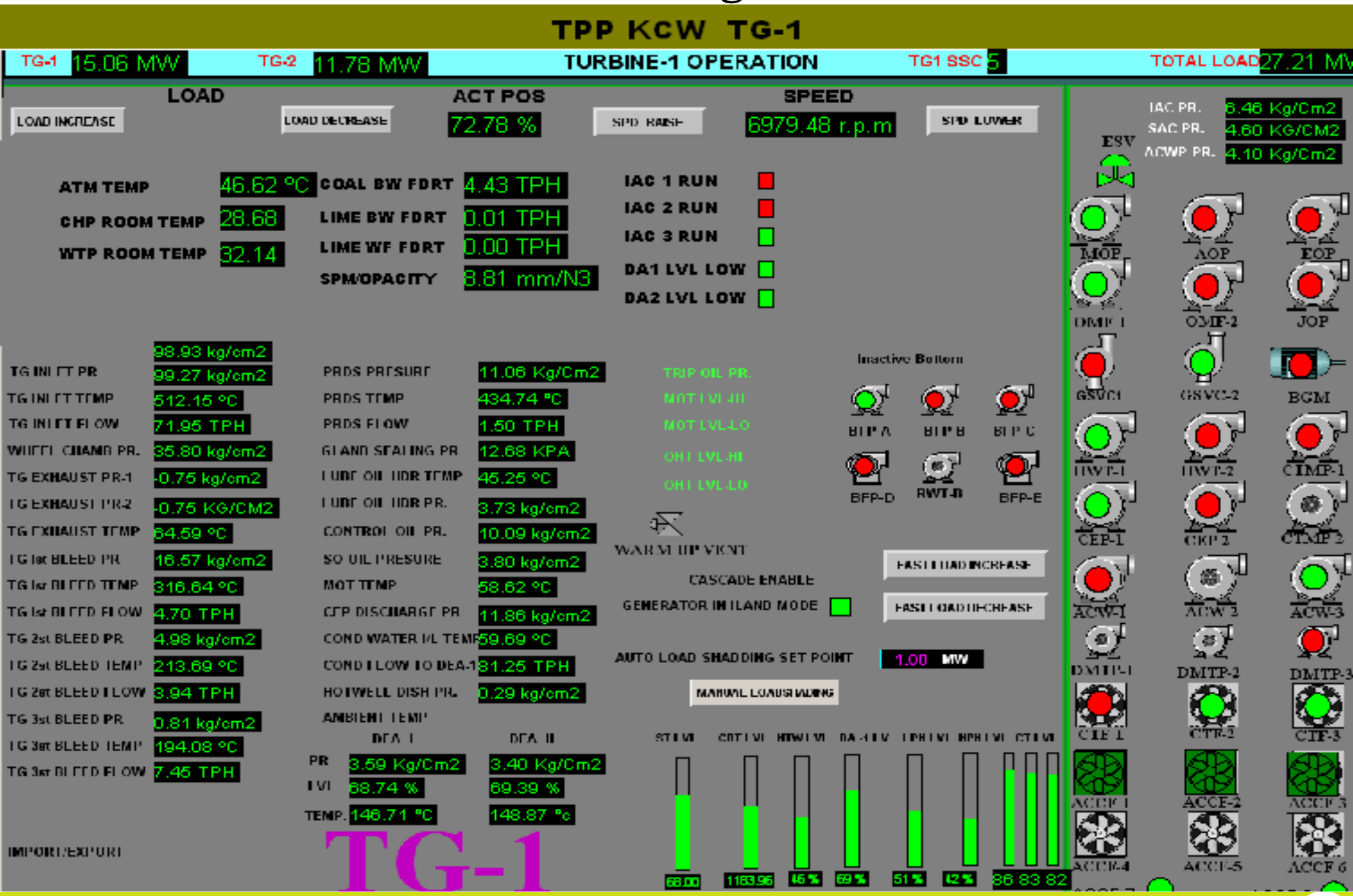
LOESCHE Mill Gear Box Condition Monitoring



Hydraulic Cooler Condition Monitoring



Turbine Condition Monitoring



Process Optimization Report

Year	2012
Month	May
Date	28

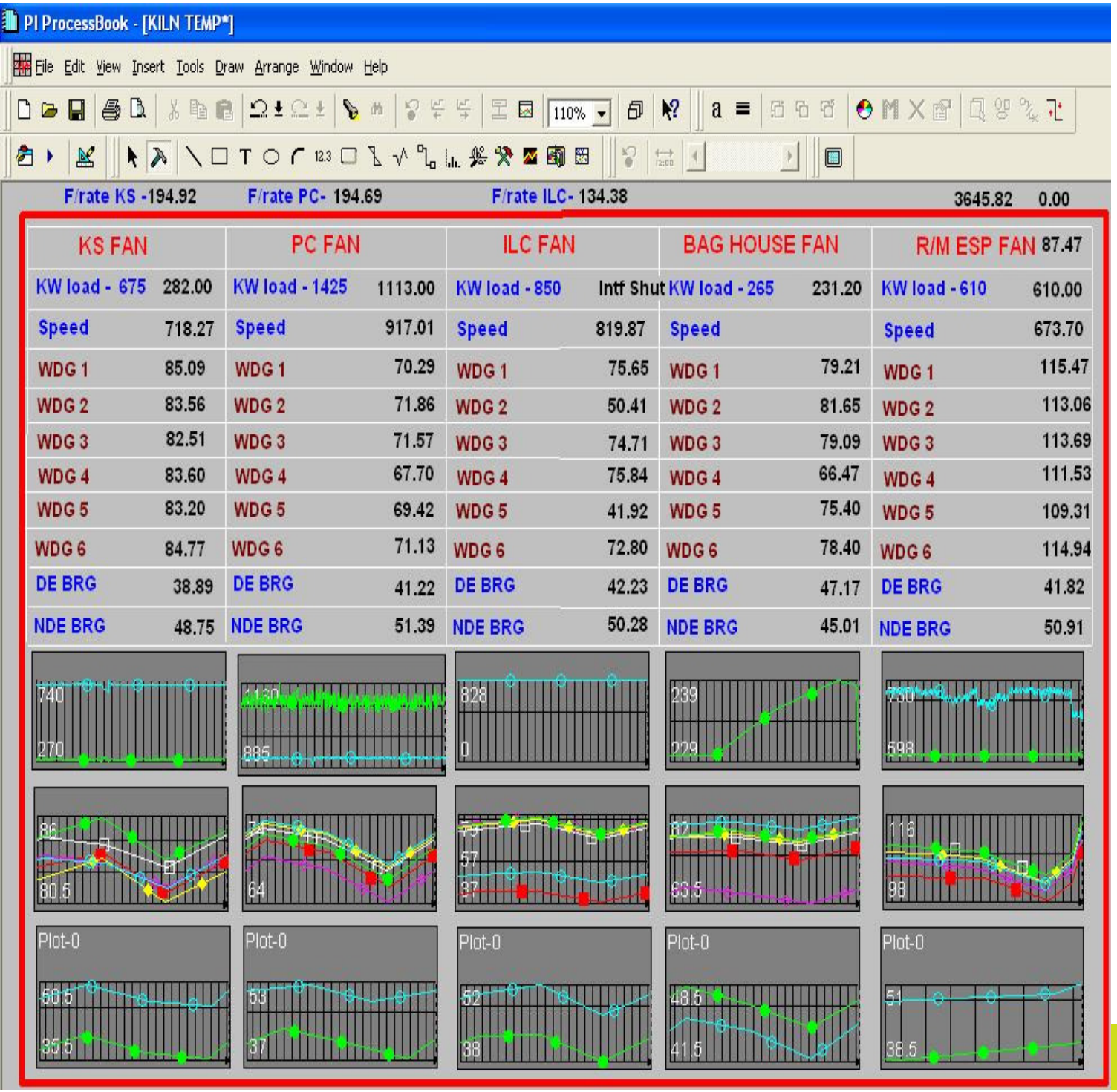
ADITYA BIRLA GROUP

KOTPUTLI C E M E N T WORKS
(DAILY LOG SHEET)
KILN

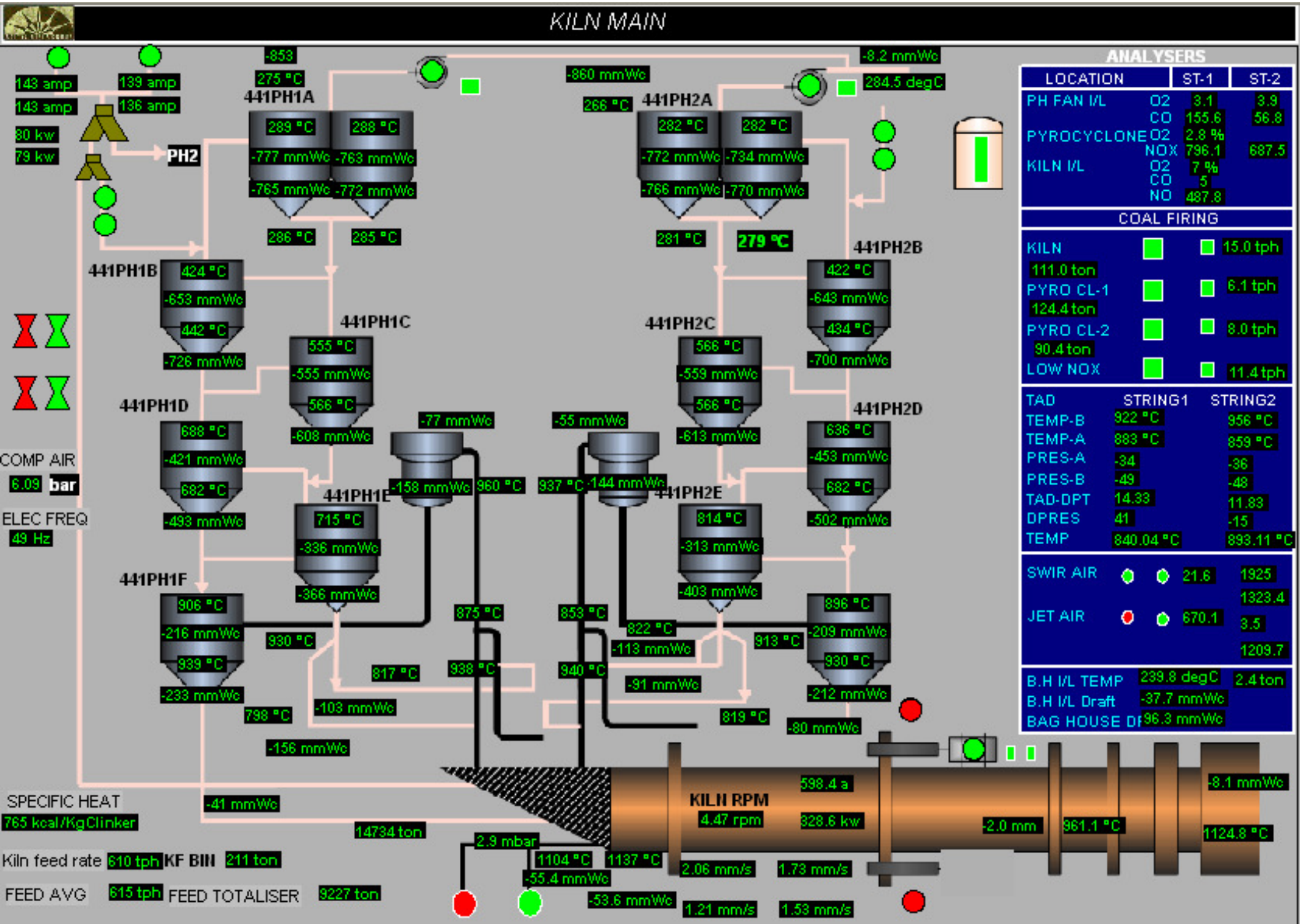
Time (Hours)	KILN					COOLER									GAS ANALYSER						
	BZ	IL	MAIN DRIV	MAIN DRIVE	KILN	CPM	STRK LNGHT	BD HEIGHT IN MM							KILN		PCO/L		PHO/L1		PHO
	TEMP	TEMP	AMP	AMP	RPM	NOS	MM	1	2	3	4	5	6	7	O2%	CO	O2%	CO	O2%	CO	O2%
1	960.2	1103.2	601.0	601.0	4.5	8.4	350.0	1348.2	956.3	2472.7	1422.9	2943.0	1385.1	2947.0	7.8	7.3	3.3	68.7	3.9	280.4	4.3
2	949.4	1103.0	594.2	594.2	4.5	7.9	350.0	1331.4	947.8	2625.9	1523.3	2941.9	1384.9	2976.3	8.1	8.7	2.9	37.9	3.3	272.7	4.9
3	942.0	1117.6	594.4	594.4	4.5	6.6	350.0	1390.3	945.5	2742.8	1473.7	2940.8	1384.3	2977.3	6.5	9.9	1.6	17.6	2.9	268.9	3.6
4	993.1	1094.4	611.3	611.3	4.5	9.0	350.0	1145.7	978.0	2193.9	1567.2	2939.7	1391.2	2999.2	8.4	11.4	2.1	21.6	3.6	268.9	4.3
5	1007.8	1085.9	605.9	605.9	4.5	8.5	350.0	1174.5	906.1	2785.2	1434.4	2938.6	1394.7	2999.0	6.9	9.9	2.8	70.8	3.5	282.6	3.9
6	998.7	1095.5	587.3	587.3	4.5	8.4	350.0	1158.3	953.5	2726.4	1613.9	2937.6	1394.6	3000.0	7.9	8.0	2.0	72.4	3.3	291.1	4.6
7	940.6	1125.8	608.8	608.8	4.5	8.4	350.0	1681.4	928.2	2796.3	1593.7	2936.5	1395.6	2984.3	6.6	6.5	2.6	13.7	4.0	264.7	4.0
8	981.7	1113.5	607.9	607.9	4.5	8.4	350.0	1253.0	934.3	2789.5	1322.7	2935.4	1396.3	2997.6	6.7	6.2	2.1	29.2	3.6	271.8	4.1
9	934.3	1092.5	590.1	590.1	4.5	8.5	350.0	1178.2	941.5	2734.9	1434.5	2934.3	1395.8	2999.1	7.4	5.3	3.2	65.0	4.1	268.9	3.7
10	945.0	1096.3	607.2	607.2	4.5	6.7	350.0	1238.3	1011.0	2763.6	1553.2	2933.2	1395.4	2992.0	7.9	7.4	1.1	57.6	3.7	276.3	4.1
11	926.4	1104.0	613.5	613.5	4.5	7.8	350.0	1117.1	1051.8	2761.3	1232.0	2932.1	1396.5	2973.2	8.5	7.7	2.3	90.6	4.0	270.7	3.5
12	994.6	1086.4	617.0	617.0	4.5	8.4	350.0	1635.1	1108.2	2795.0	1501.5	2931.0	1390.6	2939.8	7.7	6.9	3.1	24.3	4.4	283.4	3.7
13	956.4	1111.8	623.2	623.2	4.5	6.6	350.0	1211.2	1107.1	2785.9	1620.8	2929.9	1390.2	2969.1	7.1	4.9	4.2	108.5	4.6	286.3	3.6
14	978.8	1123.6	604.8	604.8	4.5	8.5	350.0	1361.7	1108.2	2631.1	1551.7	2928.9	1387.7	2993.4	6.5	8.4	3.0	76.6	4.4	268.9	3.4
15	981.7	1103.2	588.7	588.7	4.5	8.2	350.0	1268.5	1101.1	2786.7	1554.4	2927.8	1385.0	2969.8	6.9	10.6	2.2	47.9	3.3	262.3	3.3
16	978.9	1122.3	618.0	618.0	4.5	8.5	350.0	1380.0	905.1	2643.0	1603.8	2926.7	1387.4	2967.1	6.6	7.0	3.8	34.9	3.9	269.4	3.3
17	936.8	1131.2	596.1	596.1	4.5	7.0	350.0	1422.4	888.0	2671.6	1397.6	2925.6	1384.4	2978.4	14.1	8.7	3.3	71.8	4.3	278.6	4.3
18	957.0	1100.8	572.2	572.2	4.5	8.4	350.0	1328.2	888.0	1722.2	1621.4	2924.5	1385.0	2971.0	11.5	10.9	2.4	43.0	4.1	279.1	4.4
19	934.6	1131.5	594.9	594.9	4.5	7.1	350.0	1246.1	917.2	2759.6	1631.0	2923.4	1387.2	2968.4	12.2	4.9	3.8	19.1	4.3	270.9	4.2

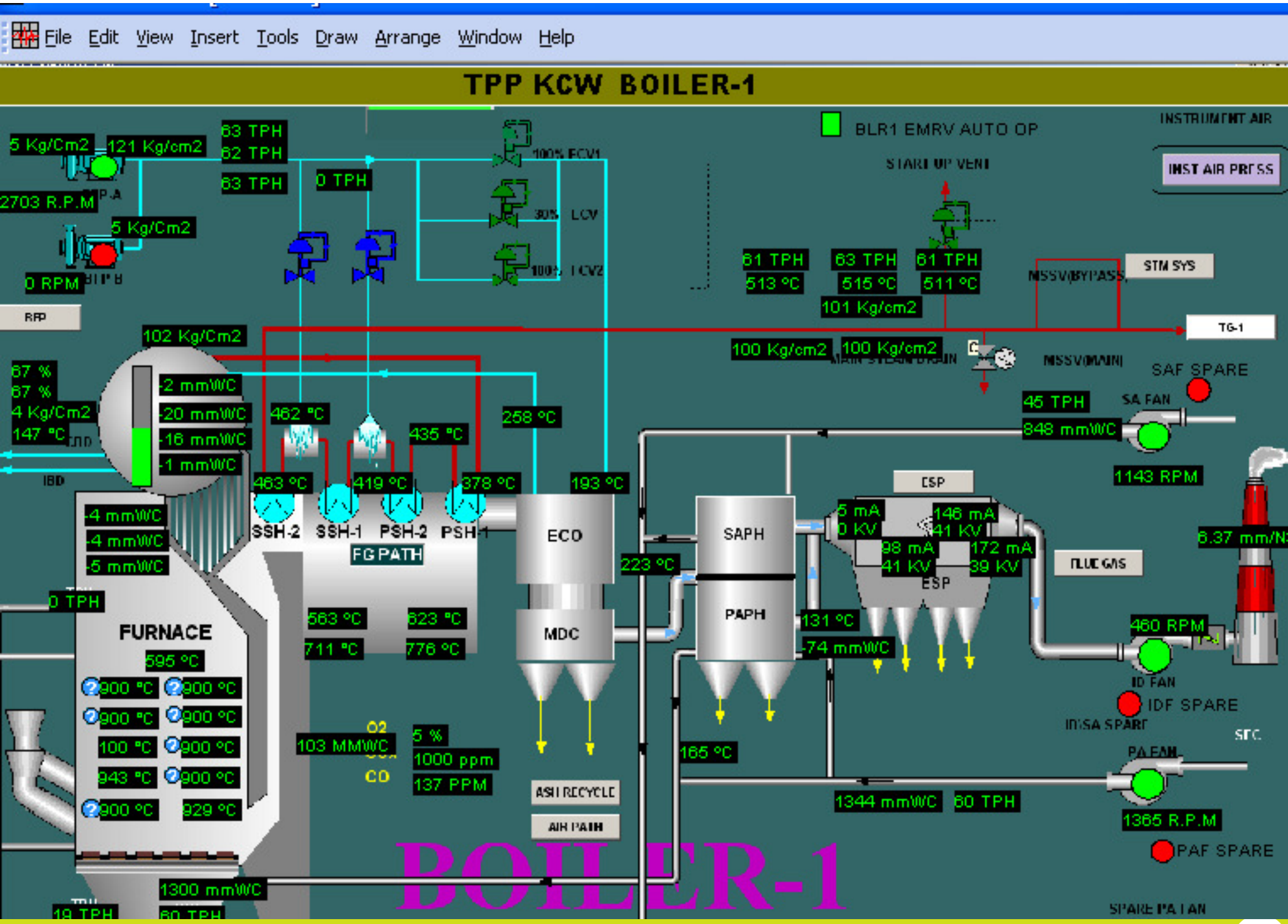
KILN

Process Optimization Case Study



- Communication with Central Control room minimized.
- PI Data link Helps in breakdown analysis.
- PI Process Books helps is real time data monitoring.
- Effective equipment health monitoring.
- Huge Databank for analyzing plant behavior in different process conditions.





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BENEFITS

Cross business visibility in internal units of Ultratech Cement has made information available at one click to users.

Real-time quality measurement results ensure high-quality cement/clinker production.

Production and quality data correlation .

Automatically generated notifications on mail & mobile(SMS) to all maintenance People .

Validated production information; verified data quality; monitoring and reporting of exactly where losses occurred; calculation of monthly reconciled recovery.

Facilitate the data availability between the various regional offices of the company and the corporate office along with the main plant.

Use of online data to speed up the information flow of the organization and facilitate quick decision-making.

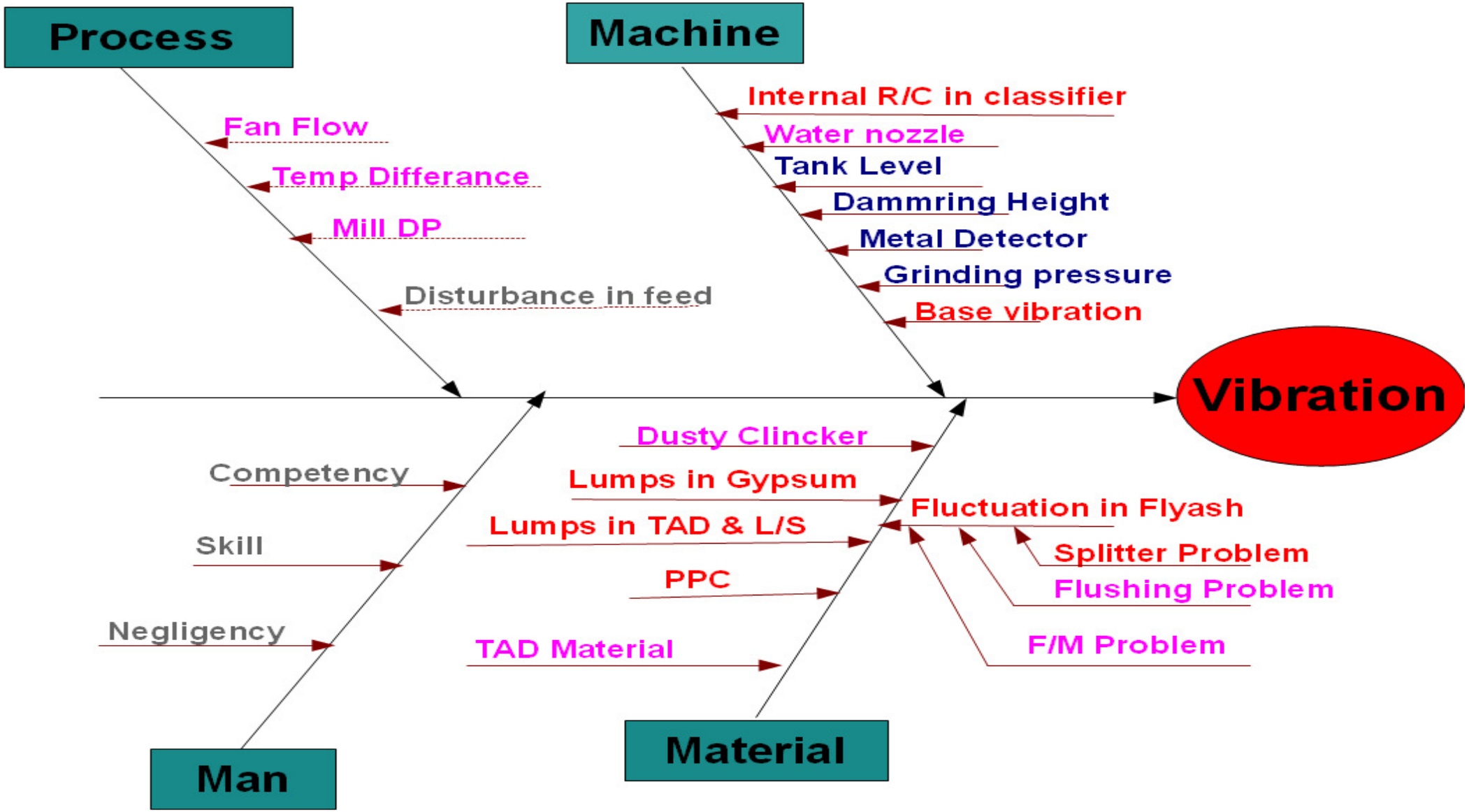
PI System has led to take better decisions and ongoing improvements in terms of Kaizens.

Replace existing legacy systems with a single standardized manufacturing system.

Case Study-1 Cement Mill Stoppages

Reduction of Cement Mill Stoppages due to Vibration

Cause & Effect diagram



Case Study-1 Cement Mill Stoppages

After PI History Data Analysis, following contributory reason came out are given as under :-

- Fluctuation in Flyash Flow (PI flow rate Data analysis)

Solution : Flyash Bin V/S Bin Weight PID provided.

- Water Spray Problem & Wear of nozzles(PI Water flow rate & valve position analysis)

Solution : Optimised water spray by using one pump instead of two.

- High difference in mill Inlet Temperatures(PI calculation reports for temperature)

Solution : Diverter plate modified to decrease the inlet temp. difference.

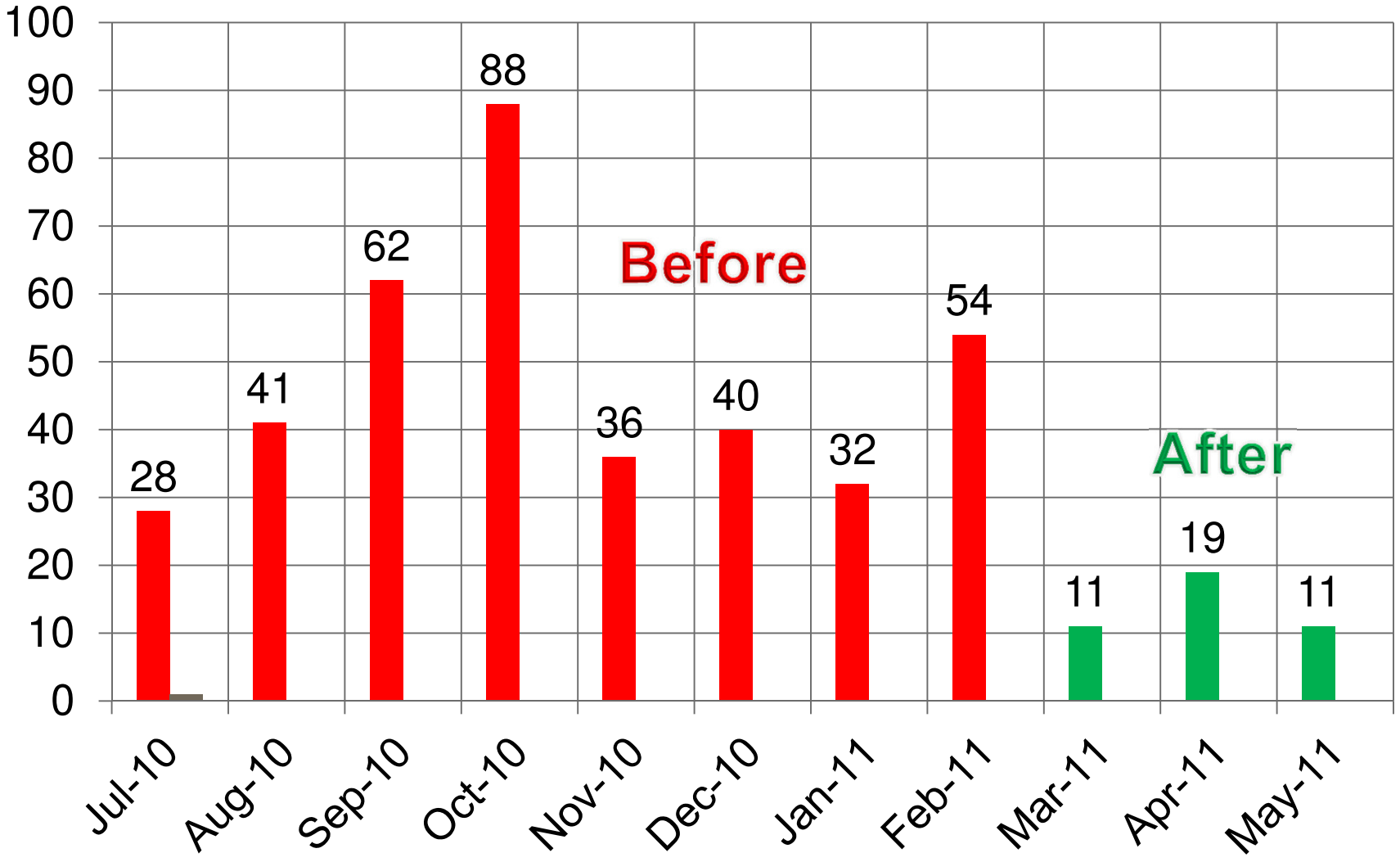
- Lumps in Gypsum (TAD) .(PI Load data variation analysis)

Solution : Gypsum size restricted to 50 mm.

Attacking small things can give big results and we have reduced mill vibration drastically.

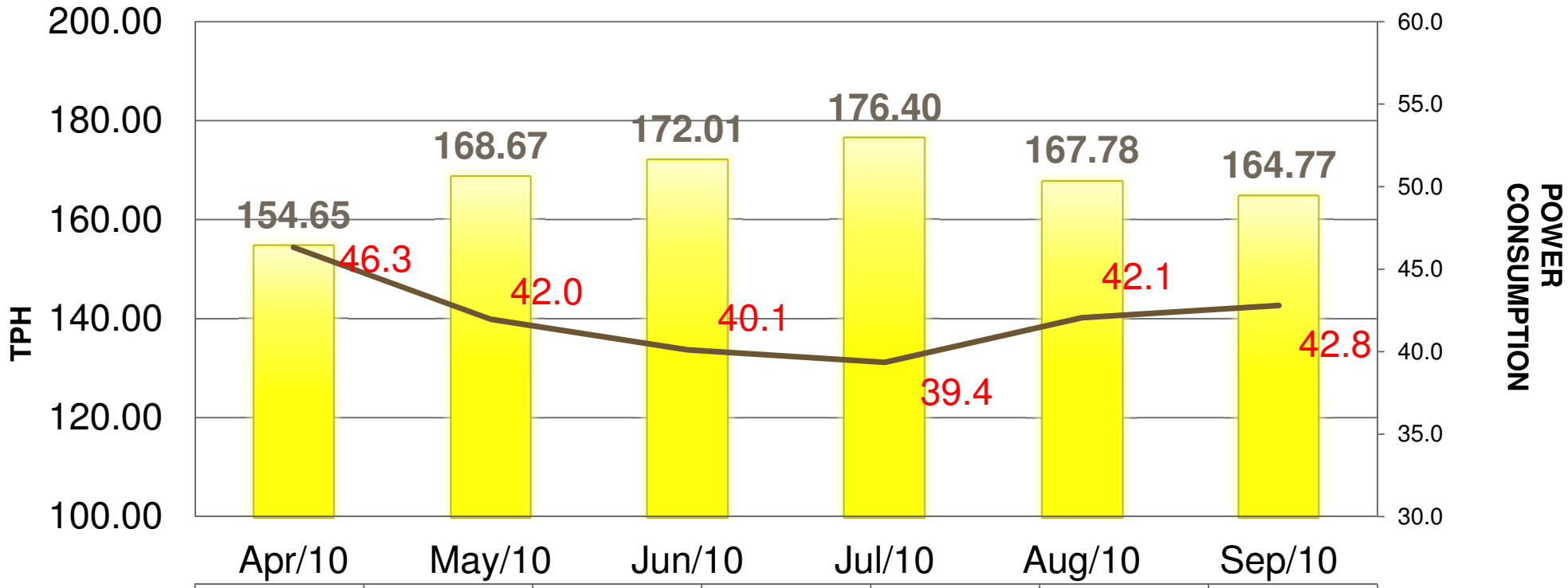
Case Study-1 Cement Mill Stoppages

MILL TRIPPINGS DUE TO VIBRATION:



Case Study-1 Cement Mill Stoppages

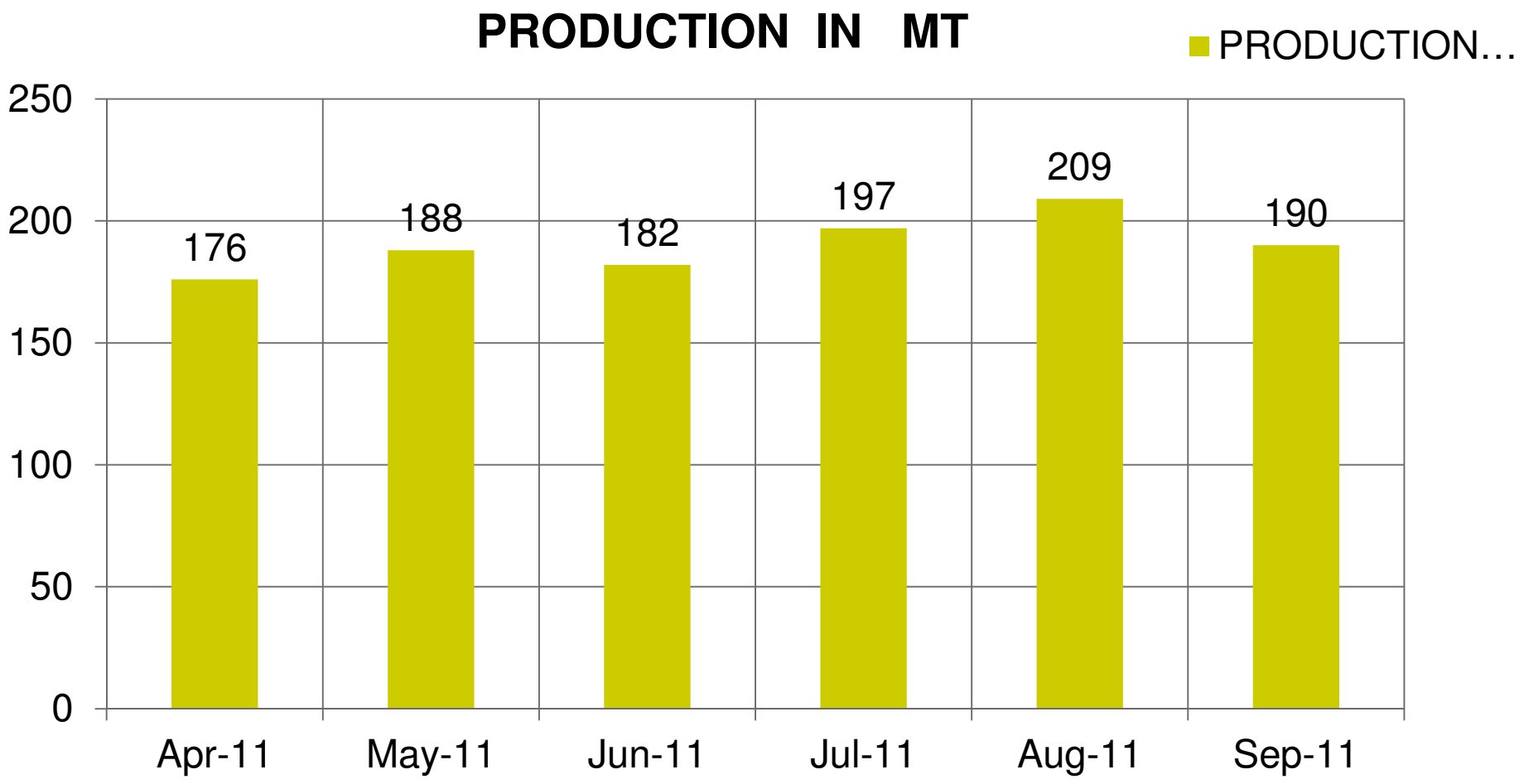
MILL TPH & POWER CONSUMPTION BEFORE



	Apr/10	May/10	Jun/10	Jul/10	Aug/10	Sep/10	
TPH	154.65	168.67	172.01	176.40	167.78	164.77	
POWER	46.3	42.0	40.1	39.4	42.1	42.8	

Case Study-1 Cement Mill Stoppages

MILL TPH AFTER



Case Study-1 Cement Mill Stoppages

Cost saving analysis

1. Energy Saving

During Mill tripping for vibration loss of electrical energy is as under

Mill auxiliary	1050 KWH
Mill fan	800 KWH
Mill Classifier	150 KWH

Tripping of mill vibration minimized after action plan	10 Tripping /month
Avg. Time of mill stoppage	10 Min/tripping
Mill stoppage saved after action plan	100 min/month
Power idle due to mill stoppage	2000 KWH
Energy saved after action plan implement	3300 kwh/month
Energy saving (INR) cost @ 4.81 RS./KWH	16033 Rs./Month
	192400 Rs./Anum

2. Production Saving

Increased average mill TPH by 10 TPH in PPC means 220 Tones per day .
Saving due to increase in production = 220 * 750 = 1,65,000 Rs per day.
1980000 Rs./Anum

Total Saving=2172400 Rs./Anum (43448 $ / Anum)

Case Study-2 Process Optimization

Analysis of Pre-heater Cone draft Variation on different days gives an idea about jamming which enables operator to take corrective action prior to occurrences of jamming & optimizing fuel consumption.

Over Range

04 Solution_Feed pipe Draft due to petcock [Compatibility Mode] - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Add-Ins PI

N8

Cone Draft Variation Case Study

Tag Name	/ PH 441PH1F PT2
Today's Start Time	12/2/11 12:00 AM
Yesterday's Start Time	12/1/11 12:00 AM
Number of values	30.0

Note:- We can find out the variation in cone draft due to Petcock use in kiln in Dec.2011

Yesterday's Start	Value	Today's Start	Value	Deviation %	Comparison
01-Dec-11 00:00:07	-205.1	02-Dec-11 00:00:01	-243.2	1.19	over range
01-Dec-11 00:00:13	-212.8	02-Dec-11 00:00:07	-240.9	1.13	over range
01-Dec-11 00:00:23	-209.8	02-Dec-11 00:00:11	-229.5	1.09	nominal
01-Dec-11 00:00:28	-203.6	02-Dec-11 00:00:22	-240.9	1.18	over range
01-Dec-11 00:00:32	-213.1	02-Dec-11 00:00:26	-225.5	1.06	nominal
01-Dec-11 00:00:43	-200.9	02-Dec-11 00:00:37	-247.9	1.23	over range
01-Dec-11 00:00:47	-210.7	02-Dec-11 00:00:41	-233.1	1.11	over range
01-Dec-11 00:00:58	-213.3	02-Dec-11 00:00:46	-245.2	1.15	over range
01-Dec-11 00:01:02	-207.2	02-Dec-11 00:00:56	-229.3	1.11	over range
01-Dec-11 00:01:07	-209.0	02-Dec-11 00:01:01	-235.1	1.12	over range
01-Dec-11 00:01:17	-210.9	02-Dec-11 00:01:11	-232.9	1.10	over range
01-Dec-11 00:01:22	-204.5	02-Dec-11 00:01:17	-231.3	1.13	over range
01-Dec-11 00:01:32	-210.8	02-Dec-11 00:01:22	-246.2	1.17	over range
01-Dec-11 00:01:37	-207.0	02-Dec-11 00:01:31	-234.1	1.13	over range

Sheet1

Select destination and press ENTER or choose Paste

130%

Case Study-3 Business solution for Miners

QCX

Mining

Crushing

CBA

Stacking & Reclaiming

Raw Meal Milling

CBA

XRF

Q

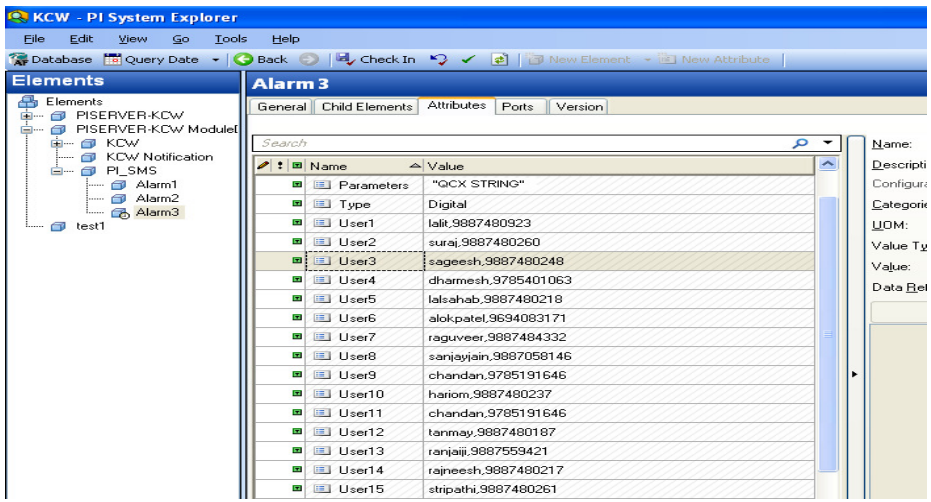
XRD

Q

SIO2 CAO MGO

Mines engineers take corrective action without information from QC.

PI SMS ALART



SiO2=30.66 ,CaO=29.83, MgO=30.34 K2O =15.20,LSF=29.13,Na2O=29.67

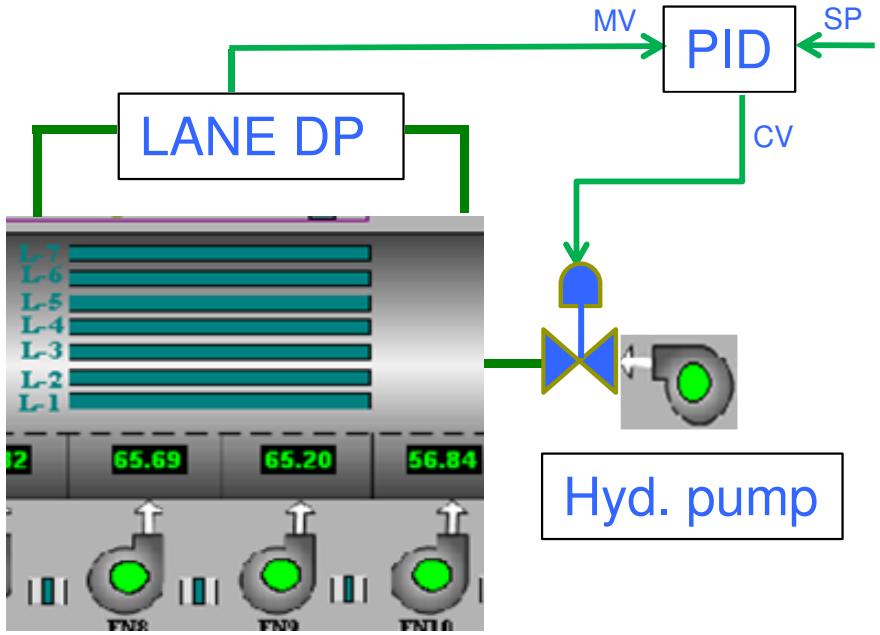
Case Study-4 Hydraulic cooler lane DP Optimization

Kaizen theme :Hydraulic cooler lane DP optimization with cooler lane CPM

Problem/present status : (In words)
Problem : Before KAIZEN, At max. kiln feed or upset process condition, clinker cooler used to get stalled due to high cooler lane DP hence tripping of plant.
1. High power consumption due to inc. cooler fan speed & hydraulic pressures.
2. Freq. kiln stoppages due to cooler lane stalling

logical correlation with root cause:
Analyzed cooler behavior in different process conditions through PI & finally captured lane DP as Measured Variable & Lane Cycle Per Minute as Controlled Variable.

Operators feedback after Kaizen Implementation: Since implementation of Kaizen theme, no any instances observed of cooler stalling. Sp. Cooler power consumption has also come down from 8.1 kwh/MT clinker to 7.3 kwh/MT clinker .

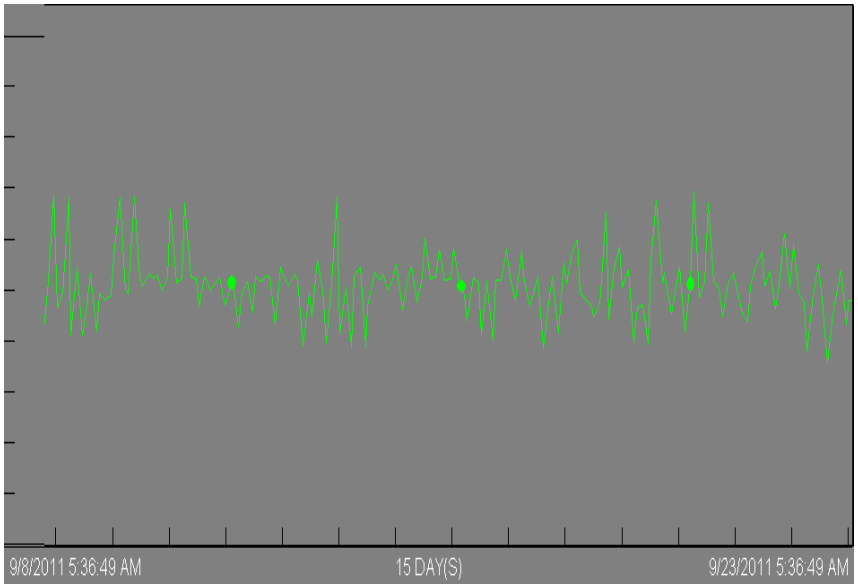


Countermeasures : A PID was taken in to circuit to fine tune further auto controlling of cooler lane DP by varying Cooler lane CPM set point as per process behavior.

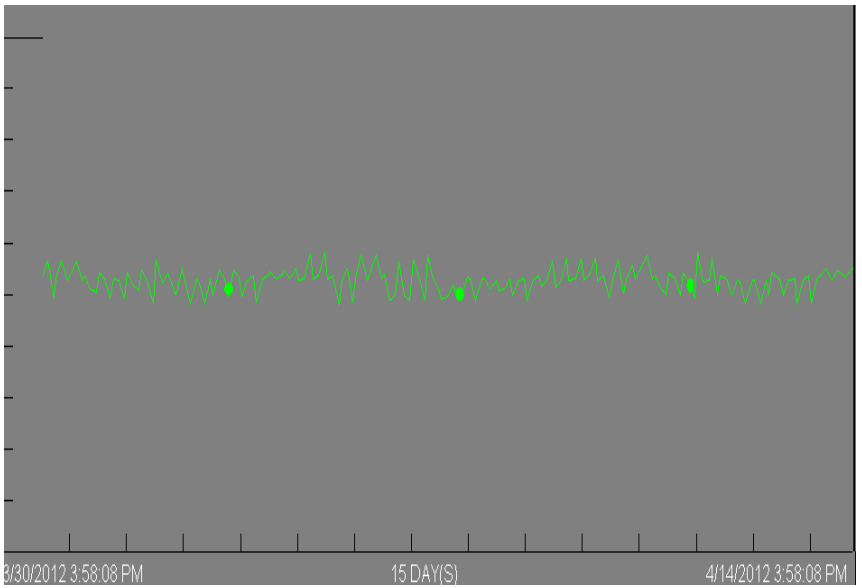
Case Study-4 Hydraulic cooler lane DP Optimization

Analysis : It was analyzed by team after taking Six months data through PI that there was keen need to control cooler lane DP in auto mode by varying lane SP set point according to situation & further optimize it to reach desired results.

Pictorial representation PI Trends (Schematic Diagram)



Before condition :



After condition :

Results : Plant has been benefitted by Kaizen theme in terms of

1. Net saving achieved by said theme as 211.2 Lacs Rs./anum(4 Lacs US$/anum)
   Sp. Heat reduction by 5 kcal/kg clinker Means =8 MT Coal saving/Day=5x9500/6200
2. Low cooler sp. Power consumption
3. Non occurrences of cooler lane stalling phenomena
4. Equipment availability increased along with normal process parameters.

AGENDA

WHO WE ARE

SOLUTION ARCHITECTURE

PERFORMANCE & MONITORING

RESULT & BENEFITS

CONCLUSION & FUTURE PLAN

CONCLUSION & FUTURE PLAN

- Link all PI Servers with Integrated SAP under installation.
- Extensive use of PI Process Book/PI DataLink for “Process optimization.”
- PI SQC in the On-Line Mode.
- Strengthen Maintenance System in conjunction with PI.
- Understanding and Implementation of latest OSIsoft products.
- Better ways to build displays from assets.
- Ways to launch PI Coresight for ad hoc analysis.
- More and more data sources, more correlation and more analysis.
- Connecting PI Server to Smart phones for display of trends/status.

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"The Success Story of PI System at Our Cement & Power Plant"

The journey continues…….with continual improvement.

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