YUTECH POWER PLANT AUTOMATION SYSTEM
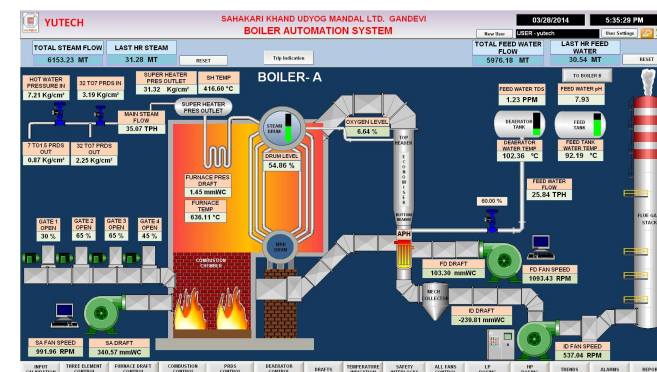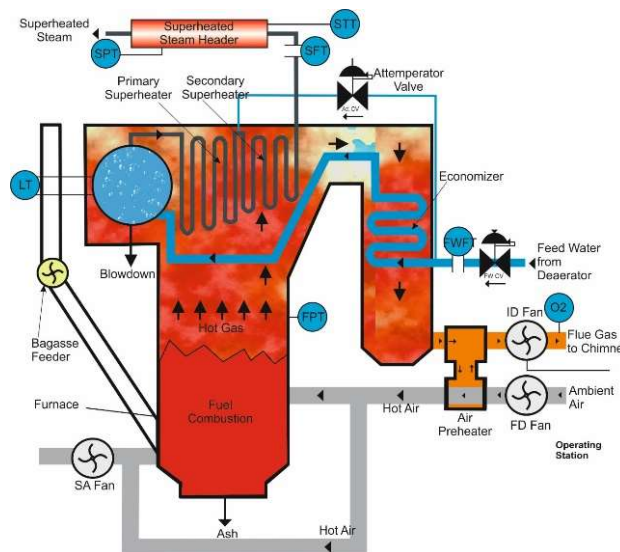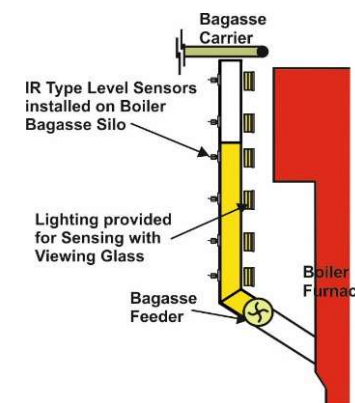
™

YUTECH

SINCE 1978

™

YUTECH POWER PLANT AUTOMATION SYSTEM

YUTECH

SINCE 1978

YUTECH

Servicing the Sugar Industry since 1978

Bagasse Carrier

IR Type Level Sensors installed on Boiler Bagasse Silo

Lighting provided for Sensing with Viewing Glass

Bagasse Feeder

Boiler Furnace

YU Technologies Pvt. Ltd.

HO & Works: B 8/5, MIDC, Miraj, 416 410, Distt: Sangli, Maharashtra, India. T: +91 233 2644042, +91 916 832 4851, +91 916 832 5127 / 8.
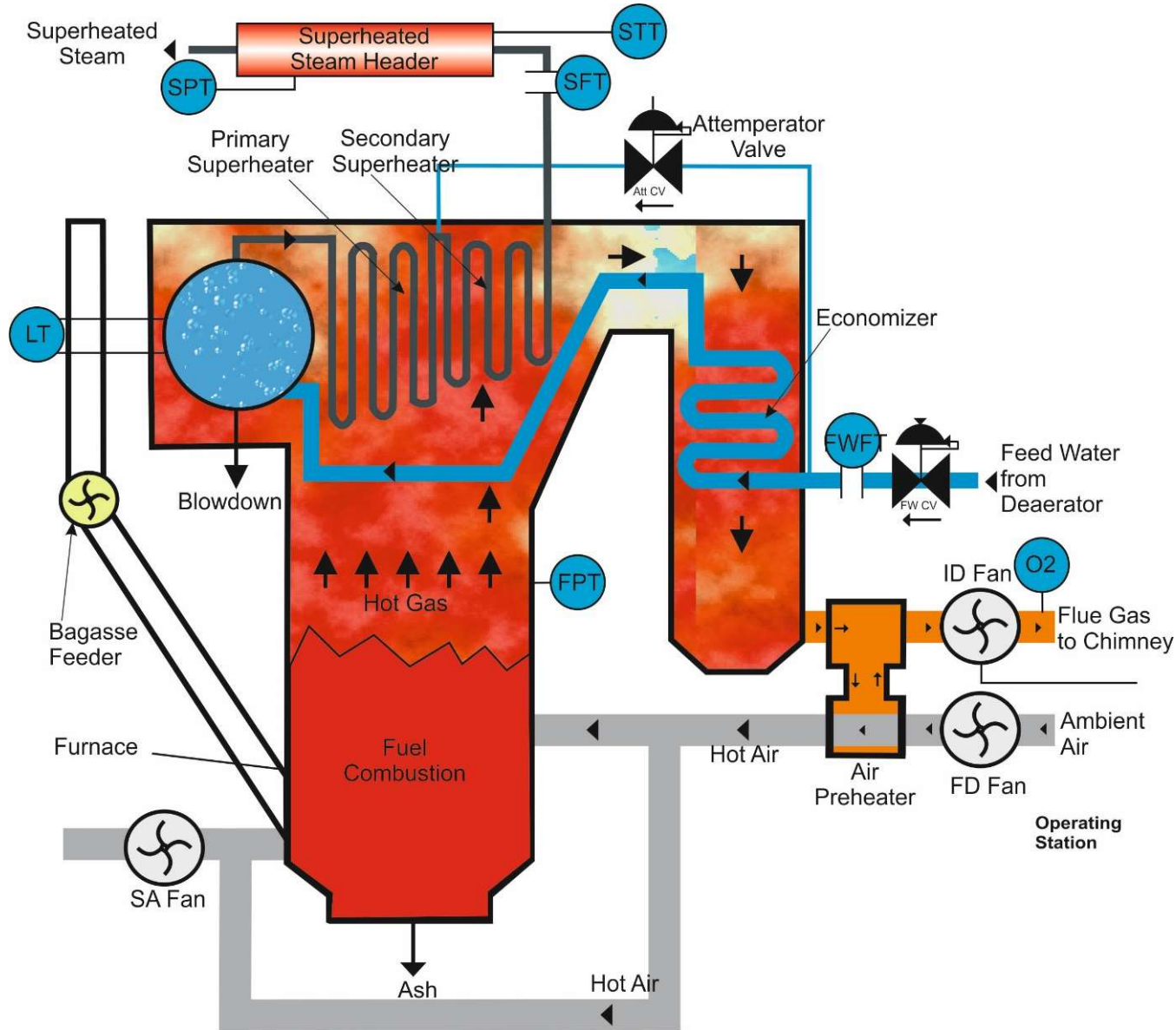E: info@yutech.in; sale@yutech.in W: www.yutech.in; www.yutechautomation.com

BOILER AUTOMATION SCHEMATIC:

- ➢ **Improved Efficiency by 3-5%.**
- ➢ **Improved Steam to Fuel Ratio due to constant FW Temperature and increase in Boiler Efficiency (Please see Fuel Ratio Equation).**
- ➢ **Optimum Combustion Reduces Un-burnt Fuel Losses This is evident from:**
  - ➢ **Decrease in Oxygen and Increase in Carbon Dioxide Percentage in Flue Gas and at the same time reduction in Excess Air Percentage.**
  - ➢ **Reduction in Flue Gas Carbon Monoxide Percentage.**
- ➢ **Reduction in Excess Air means optimum usage of Fan Drives and thus Power Saving.**
- ➢ **Maintained Steam Drum Level with Pressure Compensation Ensures Optimum Steam Generation while compensating for Shrink and Swell in the Drum Level.**

➢ **Reduction in Clinker Formation due to good combustion condition.**

➢ **Reduction in Thermal Shocks, Improves Equipment Life Expectancy.**

➢ **Energy Savings in Electricity, Fuel, Water, Steam.**

➢ **Equipment Protection.**

➢ **All Key Performance Indicators are Highlighted and Recorded, hence Performance Records and Trends maintained which are used for:**

    ➢ **Fault Finding and Identifying the Reasons.**

    ➢ **Predictive Maintenance.**

➢ **Reduced Downtime.**

➢ **Ensure Maximum Up Time.**

ADVANTAGES: Power Plant Automations Ensure Higher Efficiency

Proper Combustion reaction in the Furnace Improves Boiler Efficiency, this in turn improves Steam to Fuel Ratio and leads to Fuel Saving. This can be demonstrated by Equation below:

$$\text{Steam to Fuel Ratio} = \frac{\text{Fuel GCV x Boiler Efficiency}}{H - h}$$

Where:

H = Enthalpy of Superheated Steam
h = Enthalpy of Feed Water
Fuel GCV: Fuel's Gross Calorific Value

Our focus on maintaining higher temperature at De-Aerator further improves this equation

ADVANTAGES: Power Plant Automations Ensure Higher Efficiency

**YUTECH having developed the Combustion Control Loop with Draft Fan Speed Algorithm ensures huge Fuel Savings:**

➢ **All fuel Gates, Rotary Feeders, Hoppers are controlled in Fully Automatic Mode with Position or RPM Feedback.**

➢ **All Draft Fans are controlled in Fully Automatic Mode with Variable Speed Drives.**

➢ **YUTECH Draft Fan Speed Algorithm sets all the Fans at Exact Speeds to create the best suited Combustion Environment.**

➢ **Combustion Control gets its Command from the Boiler Load to maintain Set Load.**

➢ **If Two or more Boilers have a common SH Steam Header then YUTECH Load Balancing System maintains Steam Pressures of all the Boilers within 0.05 Bar of each other.**

Power Plant Automations
BOILER CONTROL LOOPS
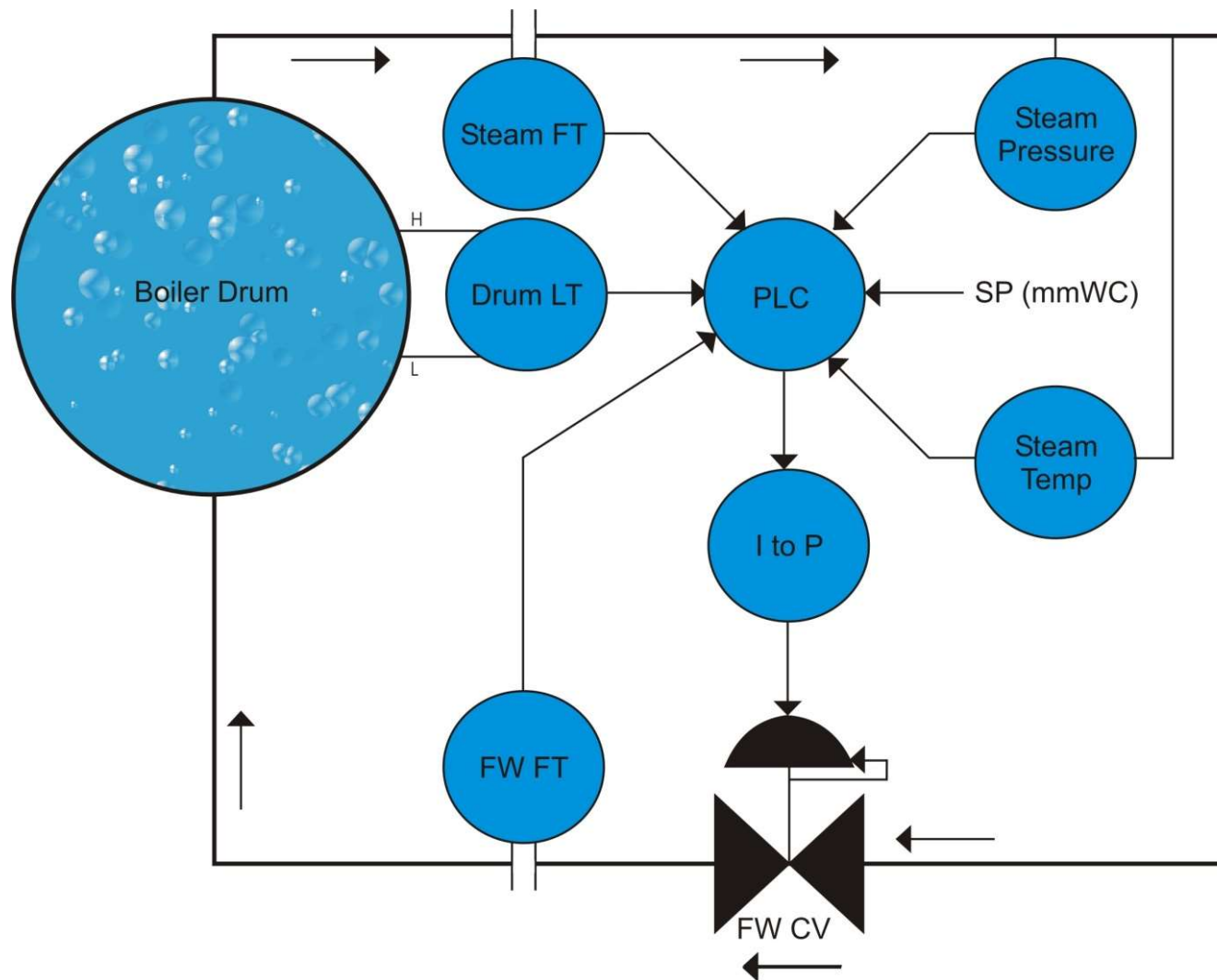
ADVANCEDTHREE ELEMENT CONTROL:

DRUM LEVEL, STEAM FLOW AND FEED WATER FLOW SENSING

FEED WATER FLOW CONTROL TO MAINTAIN DRUM LEVEL, CONSTANT STEAM FLOW, STEAM PRESSURE AND STEAM TEMPERATURE

STEAM PRESSURE AND STEAM TEMPERATURE COMPENSATION

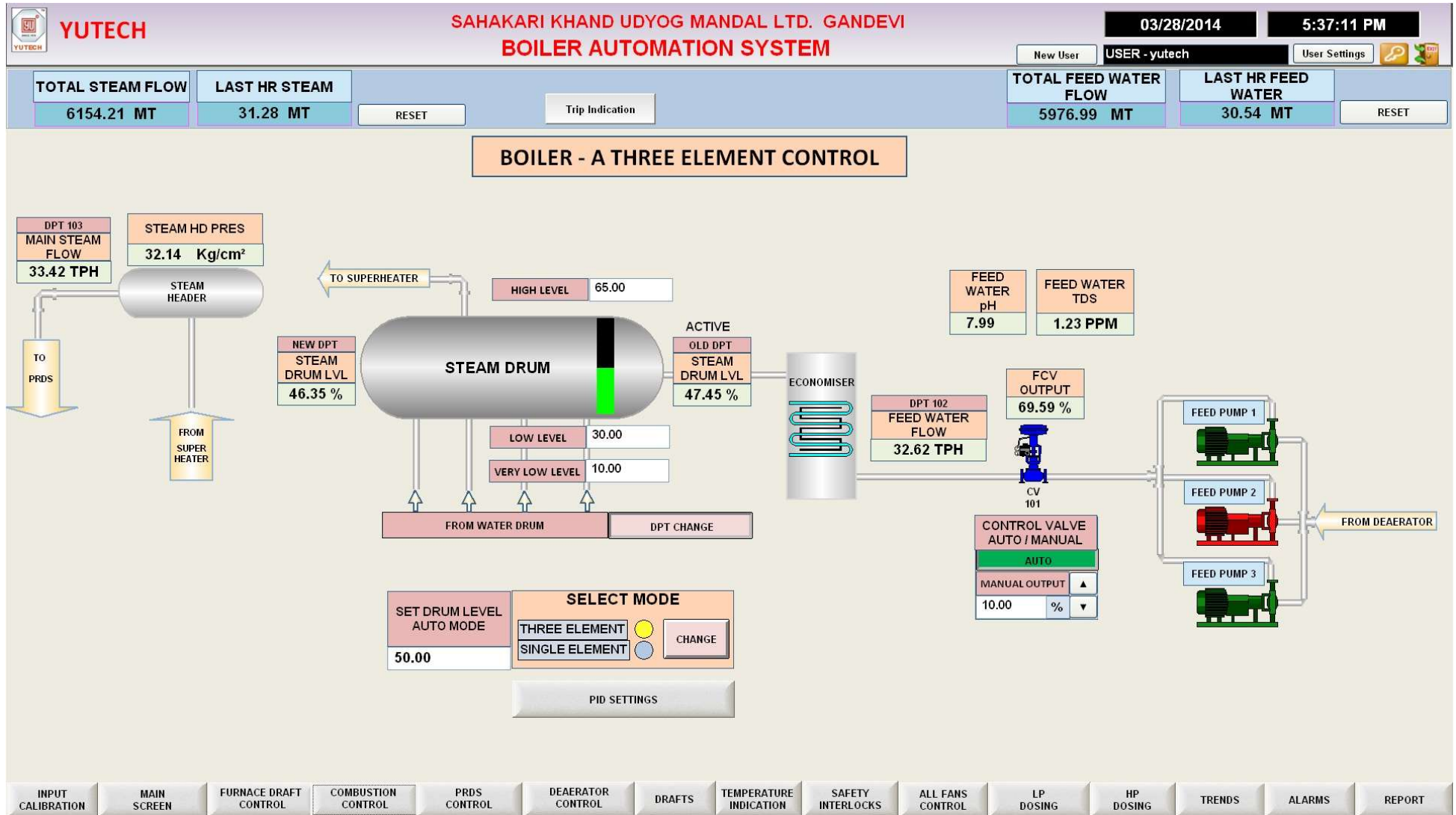**COMPENSATION EQUATION FOR SHRINK AND SWELL IN THE DRUM LEVEL.**

Advanced Three Element Control

Power Plant Automations
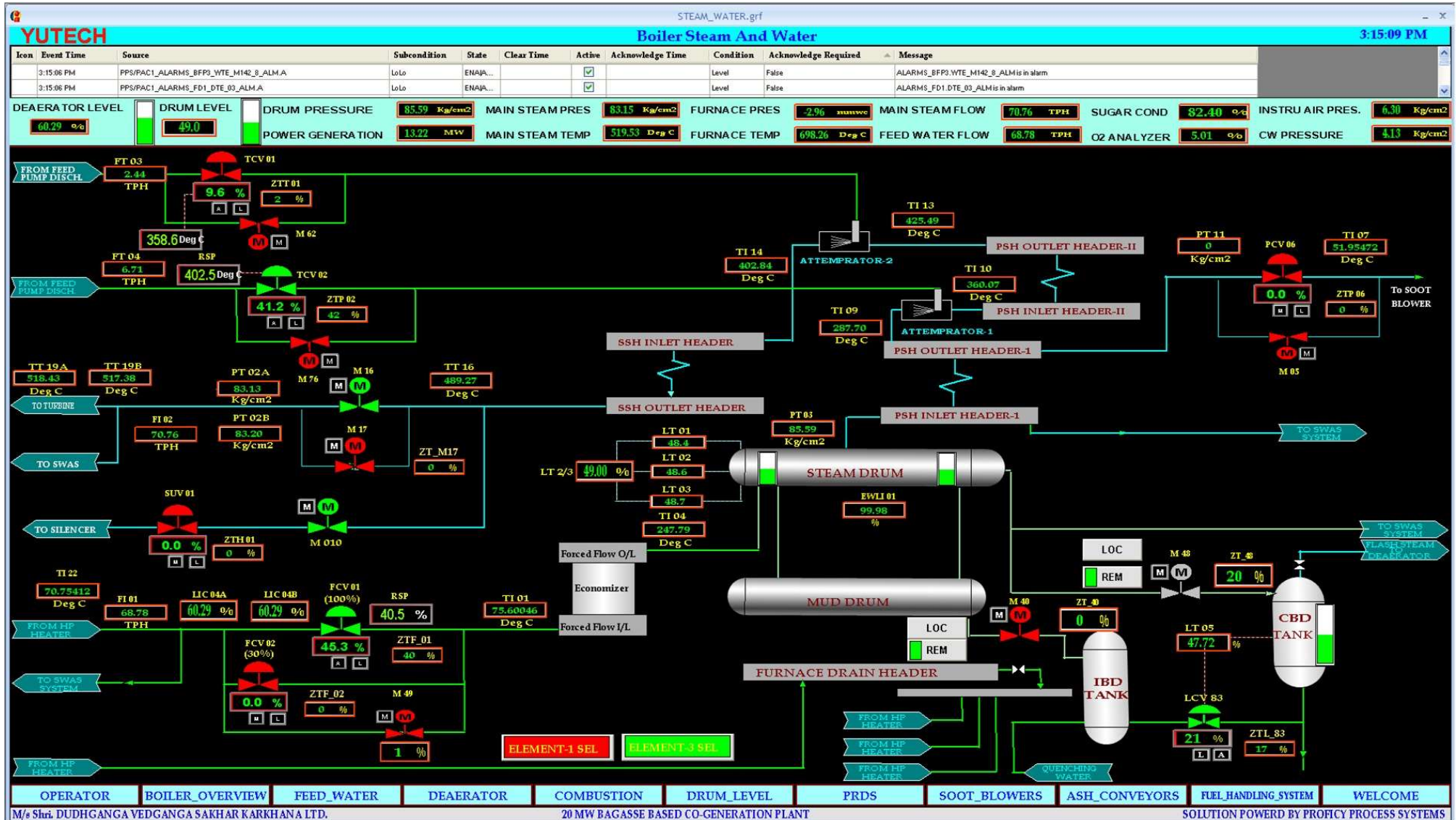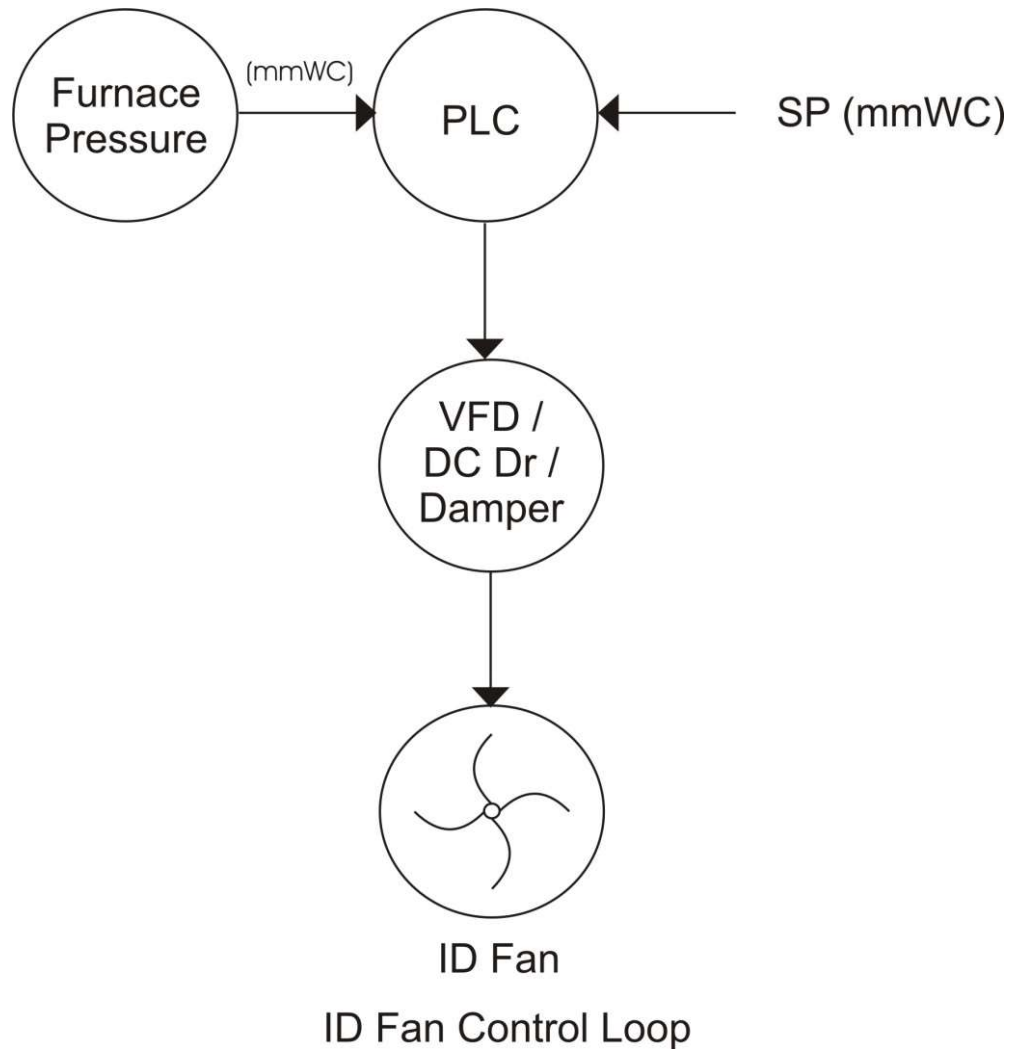# STEAM AND WATER CONTROLS: SCREENSHOT

YUTECH

SAHAKARI KHAND UDYOG MANDAL LTD. GANDEVI
BOILER AUTOMATION SYSTEM

03/28/2014   5:37:11 PM

New User   USER - yutech   User Settings

TOTAL STEAM FLOW	LAST HR STEAM			TOTAL FEED WATER FLOW	LAST HR FEED WATER	
6154.21 MT	31.28 MT	RESET	Trip Indication	5976.99 MT	30.54 MT	RESET

BOILER - A THREE ELEMENT CONTROL

DPT 103 MAIN STEAM FLOW
33.42 TPH

STEAM HD PRES
32.14 Kg/cm²

STEAM HEADER

TO SUPERHEATER

TO PRDS

FROM SUPER HEATER

HIGH LEVEL   65.00

NEW DPT STEAM DRUM LVL
46.35 %

STEAM DRUM

ACTIVE

OLD DPT STEAM DRUM LVL
47.45 %

LOW LEVEL   30.00
VERY LOW LEVEL   10.00

FROM WATER DRUM   DPT CHANGE

ECONOMISER

DPT 102 FEED WATER FLOW
32.62 TPH

CV 101

FEED WATER pH
7.99

FEED WATER TDS
1.23 PPM

FCV OUTPUT
69.59 %

FEED PUMP 1

FEED PUMP 2

FEED PUMP 3

FROM DEAERATOR

CONTROL VALVE AUTO / MANUAL
AUTO

MANUAL OUTPUT   ▲
10.00   %   ▼

SET DRUM LEVEL AUTO MODE
50.00

SELECT MODE
THREE ELEMENT   ⬤
SINGLE ELEMENT   ⬤
CHANGE

PID SETTINGS

| INPUT CALIBRATION | MAIN SCREEN | FURNACE DRAFT CONTROL | COMBUSTION CONTROL | PRDS CONTROL | DEAERATOR CONTROL | DRAFTS | TEMPERATURE INDICATION | SAFETY INTERLOCKS | ALL FANS CONTROL | LP DOSING | HP DOSING | TRENDS | ALARMS | REPORT |

Power Plant Automations
STEAM AND WATER CONTROLS: SCREENSHOT

Furnace Pressure → (mmWC) → PLC ← SP (mmWC)

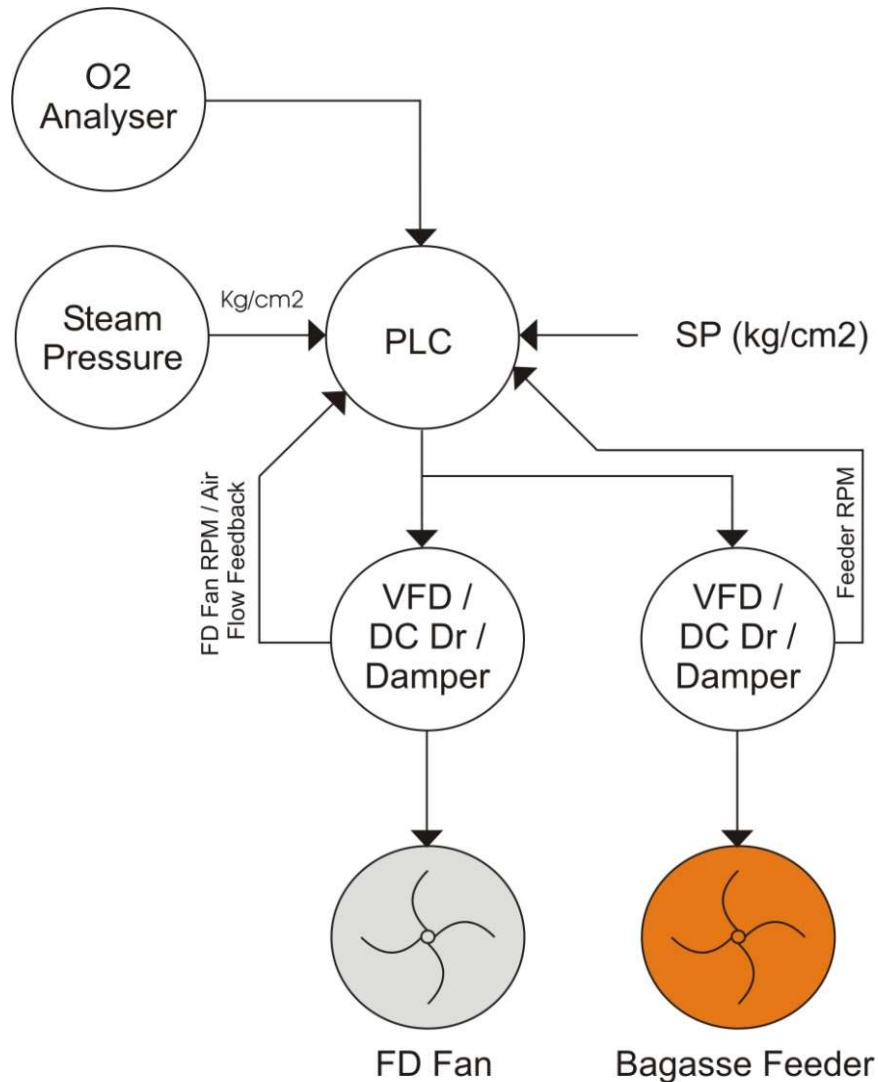PLC → VFD / DC Dr / Damper → ID Fan

ID Fan Control Loop

INDUCED DRAUGHT FAN LOOP CONTROL:

FURNACE DRAUGHT PRESSURE SENSING

INDUCED DRAUGHT CONTROL

- **ID FAN VFD SPEED CONTROL**

- **ID FAN DAMPER CONTROL IF VFD UNAVAILABLE**

Power Plant Automations
BOILER CONTROL LOOPS: COMBUSTION CONTROL

Advanced Combustion Control Loop

FORCED DRAUGHT FAN LOOP CONTROL:

STEAM PRESSURE SENSING

FLUE GAS OXYGEN CONTENT SENSING

FORCED DRAUGHT CONTROL

- FD FAN VFD SPEED CONTROL

- SECONDARY AIR FAN VFD CONTROL

- FD AND SA FAN DAMPER CONTROL IF VFD UNAVAILABLE

- BAGASSE FEEDER CARRIER VFD CONTROL

- BAGASSE GATE CONTROL

Power Plant Automations
COMBUSTION CONTROLS: SCREENSHOT

YUTECH

SAHAKARI KHAND UDYOG MANDAL LTD. GANDEVI
BOILER AUTOMATION SYSTEM

03/28/2014   5:36:08 PM

New User   USER - yutech   User Settings

TOTAL STEAM FLOW	LAST HR STEAM			TOTAL FEED WATER FLOW	LAST HR FEED WATER
6153.61 MT	31.28 MT	RESET	Trip Indication	5976.48 MT	30.54 MT RESET

BOILER -A- COMBUSTION CONTROL

DPT 103 MAIN STEAM FLOW	PT 101 STEAM HD PRES	SCANNER-CH1 HEADER TEMP
35.45 TPH	31.48 Kg/cm²	416.50 °C

OXYGEN LEVEL 5.72 %   OXYGEN LEVEL HOUR AVG 6.95 %

DRUM LEVEL 53.50 %

MASTER CONTROLLER INTERFACE
MASTER CONTROLLER HEADER SET POINT
32.00 kg/cm²

	GATE 1	GATE 2	GATE 3	GATE 4
	AUTO	AUTO	AUTO	AUTO
MANUAL OUTPUT	5	10	10	10
CONTROL OUTPUT	30 %	65 %	65 %	45 %

O2 PID SETTINGS

O2 TRIM ON
O2 TRIM ON SA

OXYGEN OPERATOR INTERFACE
MANUAL OUTPUT
AUTO   0.00   %

GATE EXTREM

BAGGASSE CARRIER

FIRE DEMAND
LOAD VIEW

SA FAN MOTOR OPERATOR INTERFACE
MANUAL OUTPUT
AUTO   1000.00   RPM

FD FAN MOTOR OPERATOR INTERFACE
MANUAL OUTPUT
AUTO   650.00   RPM

CROSS LIMIT ENABLE

DPT 107 FD DRAFT
100.55 mmWC

COMBUSTION CHAMBER

SA FAN SPEED
988.52 RPM

SA FAN MOTOR ON OFF

DPT 108 SA DRAFT
350.41 mmWC

FD FAN SPEED
1093.43 RPM

FD FAN MOTOR ON OFF

| INPUT CALIBRATION	MAIN SCREEN	THREE ELEMENT CONTROL	FURNACE DRAFT CONTROL	PRDS CONTROL	DEAERATOR CONTROL	DRAFTS	TEMPERATURE INDICATION	SAFETY INTERLOCKS	ALL FAN CONTROL	LP DOSING	HP DOSING	TRENDS	ALARMS	REPORT

Power Plant Automations
COMBUSTION CONTROLS: SCREENSHOT

YUTECH

SAHAKARI KHAND UDYOG MANDAL LTD. GANDEVI
BOILER AUTOMATION SYSTEM

03/17/2014   7:12:44 PM

New User   USER - yutech   User Settings

TOTAL STEAM FLOW	LAST HR STEAM			TOTAL FEED WATER FLOW	LAST HR FEED WATER	
1251.13 MT	0.00 MT	RESET	Trip Indication	1235.25 MT	0.00 MT	RESET

BOILER - A   FURNACE DRAFT CONTROL

DPT 101
FURNACE PRES DRAFT
5.44 mmWC

FURNACE TEMP
84.03 °C

COMBUSTION CHAMBER

FROM MECH COLLECT

DPT 109
ID DRAFT
-134.26 mmWC

FLUE GAS STACK

ID FAN SPEED
223.16 RPM

ID FAN MOTOR ON OFF

FURNACE DRAFT PID OPERAOTR INTERFACE

FURNACE DRAFT SET POINT	AUTO	
	MANUAL SPEED	▲
0.00	500	RPM ▼

FURNACE DRAFT PID SETTINGS

| INPUT CALIBRATION | MAIN SCREEN | THREE ELEMENT CONTROL | COMBUSTION CONTROL | PRDS CONTROL | DEAERATOR CONTROL | DRAFTS | TEMPERATURE INDICATION | SAFETY INTERLOCKS | ALL FANS CONTROL | LP DOSING | HP DOSING | TRENDS | ALARMS | REPORT |

Power Plant Automations
BOILER CONTROL LOOPS: DE-AERATOR CONTROL
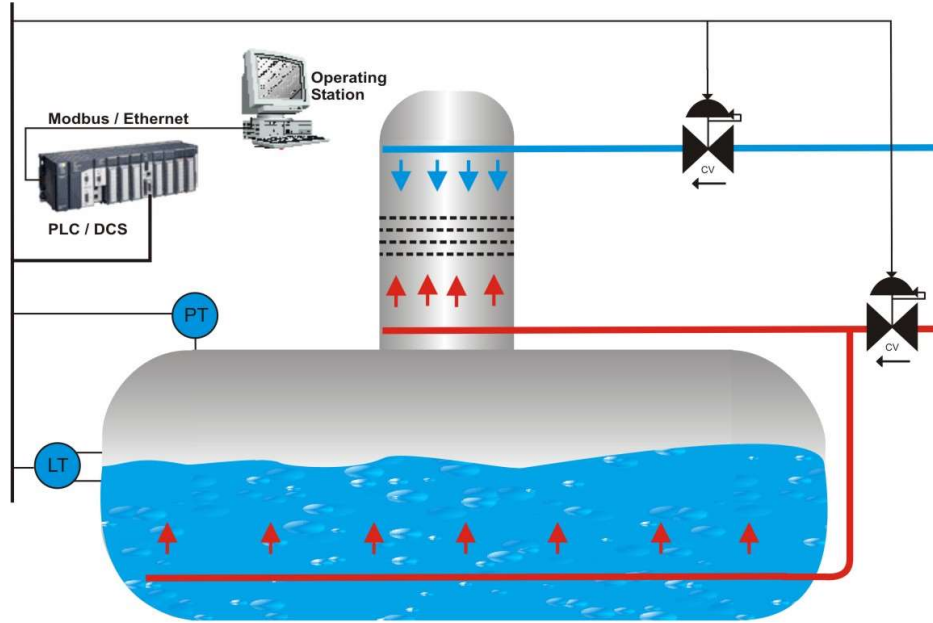

Deaerator Pressure and Level Control

Boiler Deaerator Control

DE-AERATOR CONTROL:

DE-AERATOR PRESSURE AND LEVEL SENSING

DE-AERATOR TEMPERATURE SENSING

MAKE UP WATER CONTROL AND DEAERATOR PRESSURE CONTROL

Power Plant Automations
DEAERATOR CONTROLS: SCREENSHOT

Power Plant Automations
DEAERATOR CONTROLS: SCREENSHOT

PRESSURE REDUCING AND DE-SUPERHEATING STATION:
STEAM PRESSURE AND TEMPERATURE SENSING

DE-AERATOR SENSING

STEAM PRESSURE REDUCTION BY CONTROLLING PRESSURE REDUCING VALVE

HOT WATER OR FEED WATER INTAKE CONTROL

PRDS Control
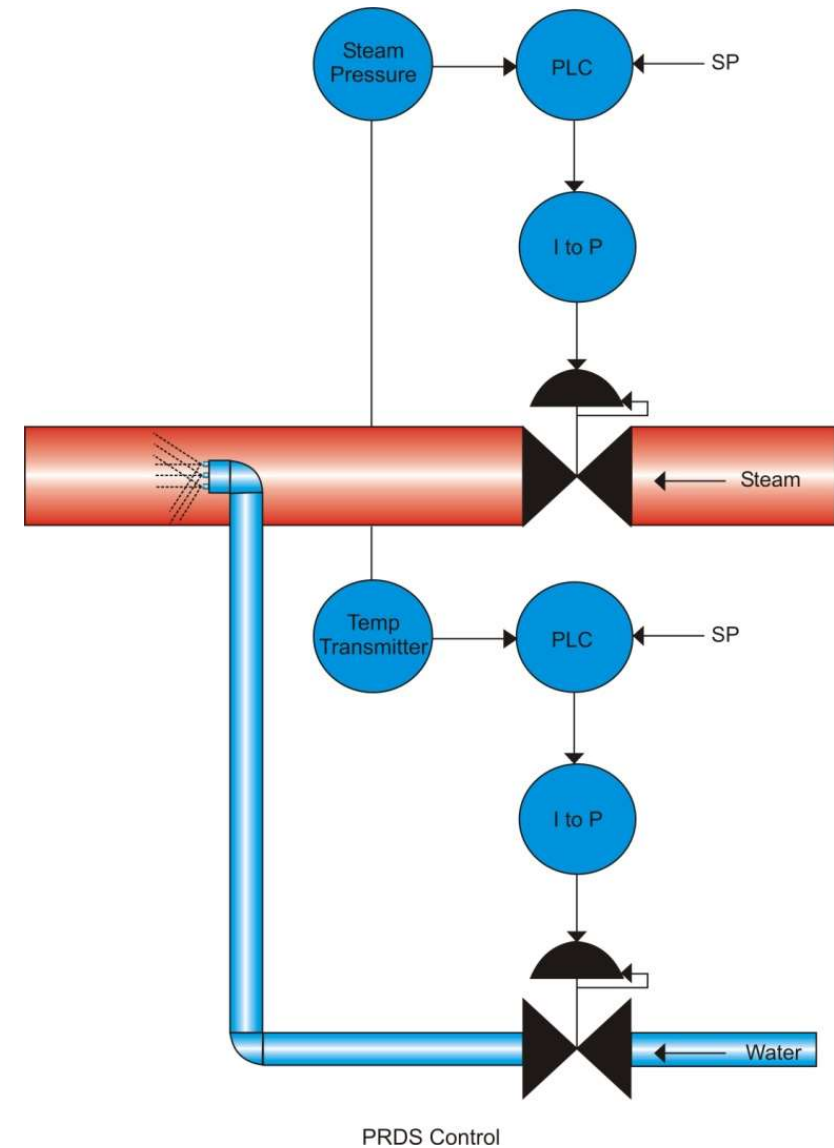
Power Plant Automations
PRDS: SCREENSHOT

YUTECH

SAHAKARI KHAND UDYOG MANDAL LTD. GANDEVI
BOILER AUTOMATION SYSTEM

03/17/2014   7:13:41 PM

New User | USER - yutech | User Settings

TOTAL STEAM FLOW	LAST HR STEAM			TOTAL FEED WATER FLOW	LAST HR FEED WATER	
1251.13 MT	0.00 MT	RESET	Trip Indication	1235.39 MT	0.00 MT	RESET

PRDS CONTROL

PT 103
HOT WATER PRESSURE
0.41 Kg/cm²

PRDS 32 TO 7 TEMPRATURE OPERAOTR INTERFACE
TEMPRATURE SET POINT | AUTO
MANUAL OUTPUT
0.00 | 0.00 | %

PRDS 1 TEMP CON OUT
0.00 %

PRDS 2 TEMP CON OUT
0.00 %

PRDS 7 TO 1.5 TEMPRATURE OPERAOTR INTERFACE
TEMPRATURE SET POINT | AUTO
MANUAL OUTPUT
0.00 | 0.00 | %

PRDS 1 TT
32 TO 7 PRDS TEMP
114.50 ºC

10.00 %

PRDS 2 TT
7 TO 1.5 PRDS TEMP
26.17 ºC

100.00 %

PRDS 1
32 TO 7

PRDS 2
7 TO 1.5

TO PROCESS

PT 102
32 TO7 PRDS IN
0.03 Kg/cm²

PT 104
32 TO7 PRDS OUT
0.00 Kg/cm²

PT 105
7 TO1.5 PRDS OUT
0.01 Kg/cm²

PRDS PUMP 2 | PRDS PUMP 1

STEAM DISTRIBUTION HEADER

PRDS 32 TO 7 PRESSURE OPERAOTR INTERFACE
PRESSURE SET POINT | AUTO
MANUAL OUTPUT
2.50 | 40.00 | %

PRDS 7 TO 1.5 PRESSURE OPERAOTR INTERFACE
PRESSURE SET POINT | MANUAL
MANUAL OUTPUT
0.75 | 10.00 | %

FEED WATER

PRDS 32 TO 7 PID SETTINGS

PRDS 7 TO 1.5 PID SETTINGS

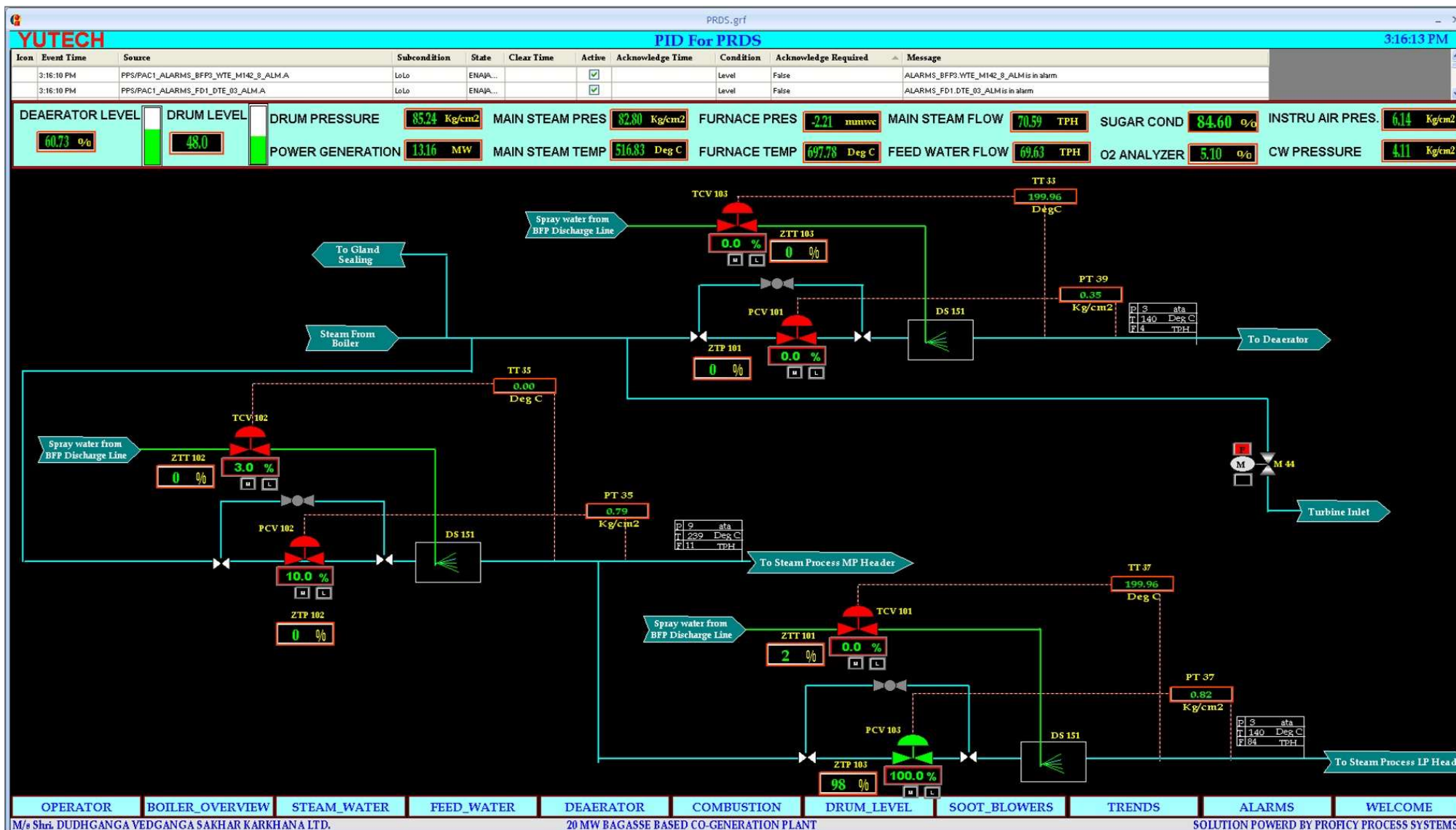| INPUT CALIBRATION | MAIN SCREEN | THREE ELEMENT CONTROL | FURNACE DRAFT CONTROL | COMBUSTION CONTROL | DEAERATOR CONTROL | DRAFTS | TEMPERATURE INDICATION | SAFETY INTERLOCKS | ALL FANS CONTROL | LP DOSING | HP DOSING | TRENDS | ALARMS | REPORT |

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Power Plant Automations
DEAERATOR CONTROLS: SCREENSHOT

Power Plant Automations
FIELD INSTRUMENTS INSTALLATION PICTURES

Impulse Tubing and Condensing Pots for Drum Level Sensing

DPT for Drum Level Sensing

Control Valve

Cable Routing

DPT for Flow Sensing

Tubing for Draft Gauges

Pressure Gauge

**BAGASSEBASED
CO-GENERATION
POWER PLANT**

PT INSTALLATION

PT INSTALLATION

Power Plant Automations
TURBINE MONITORING: SCREENSHOT

YU
YUTECH
SINCE 1978

Power Plant Automations
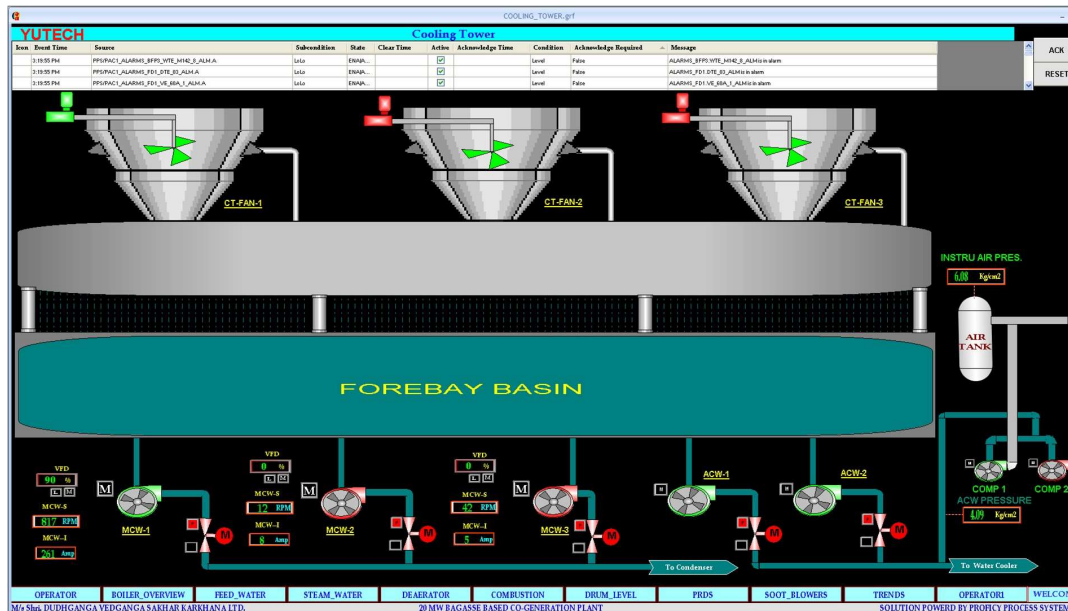# FUEL AND ASH HANDLING: SCREENSHOT
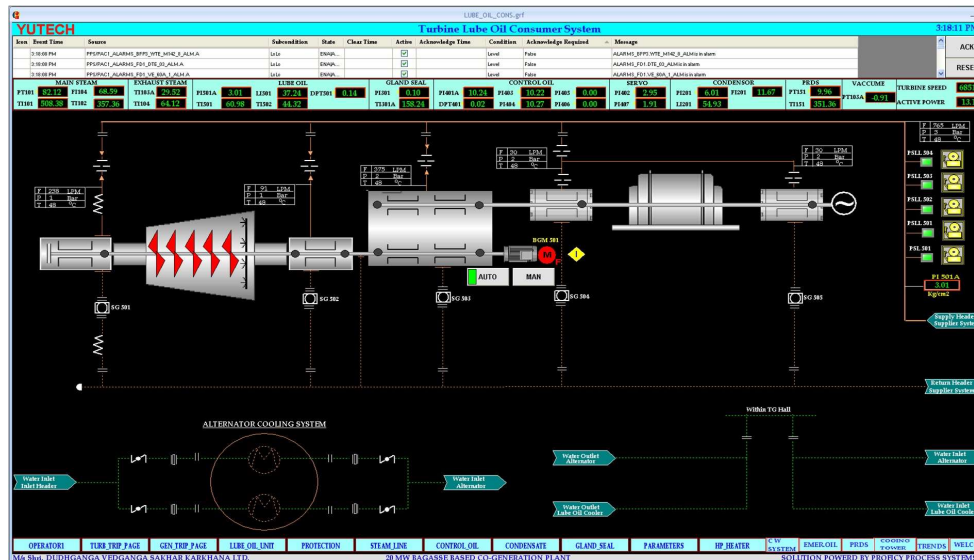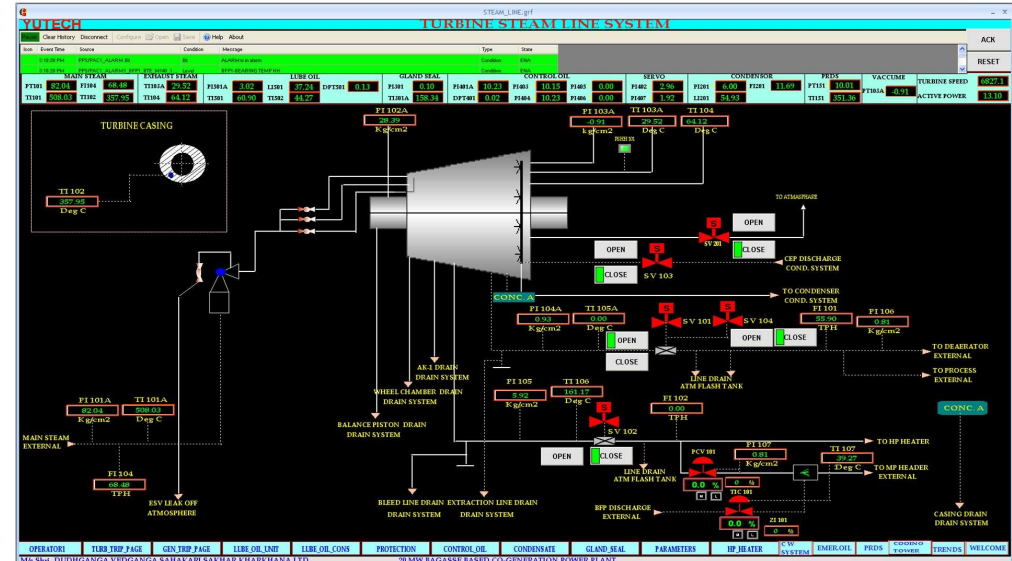
Power Plant Automations
COOLING TOWER CONTROLS: SCREENSHOT
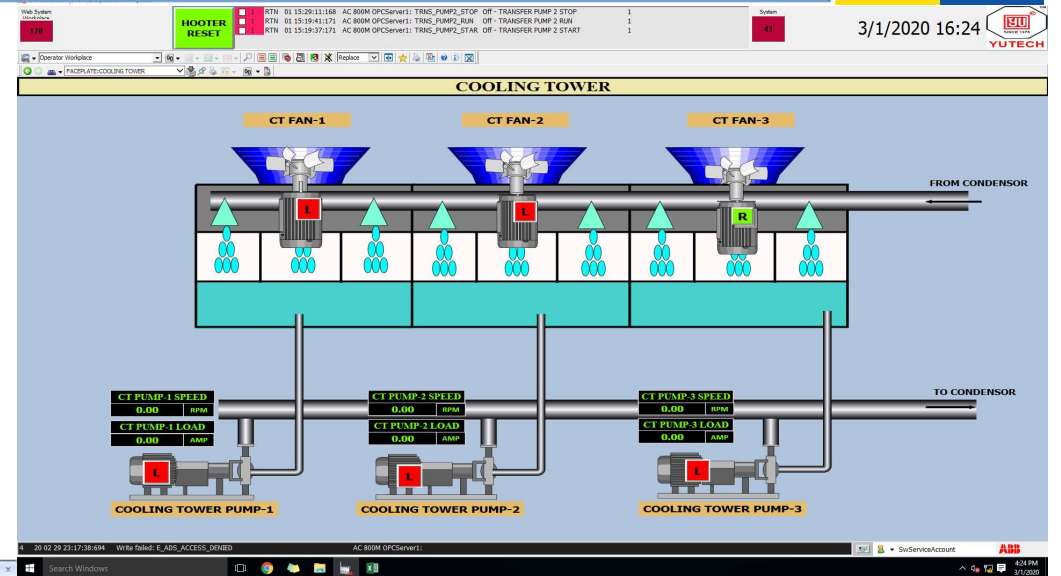
Power Plant Automations
TRENDS: SCREENSHOT

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INFRA RED LEVEL SENSOR INSTALLATION ON DONNELLY CHUTE:
PICTURE
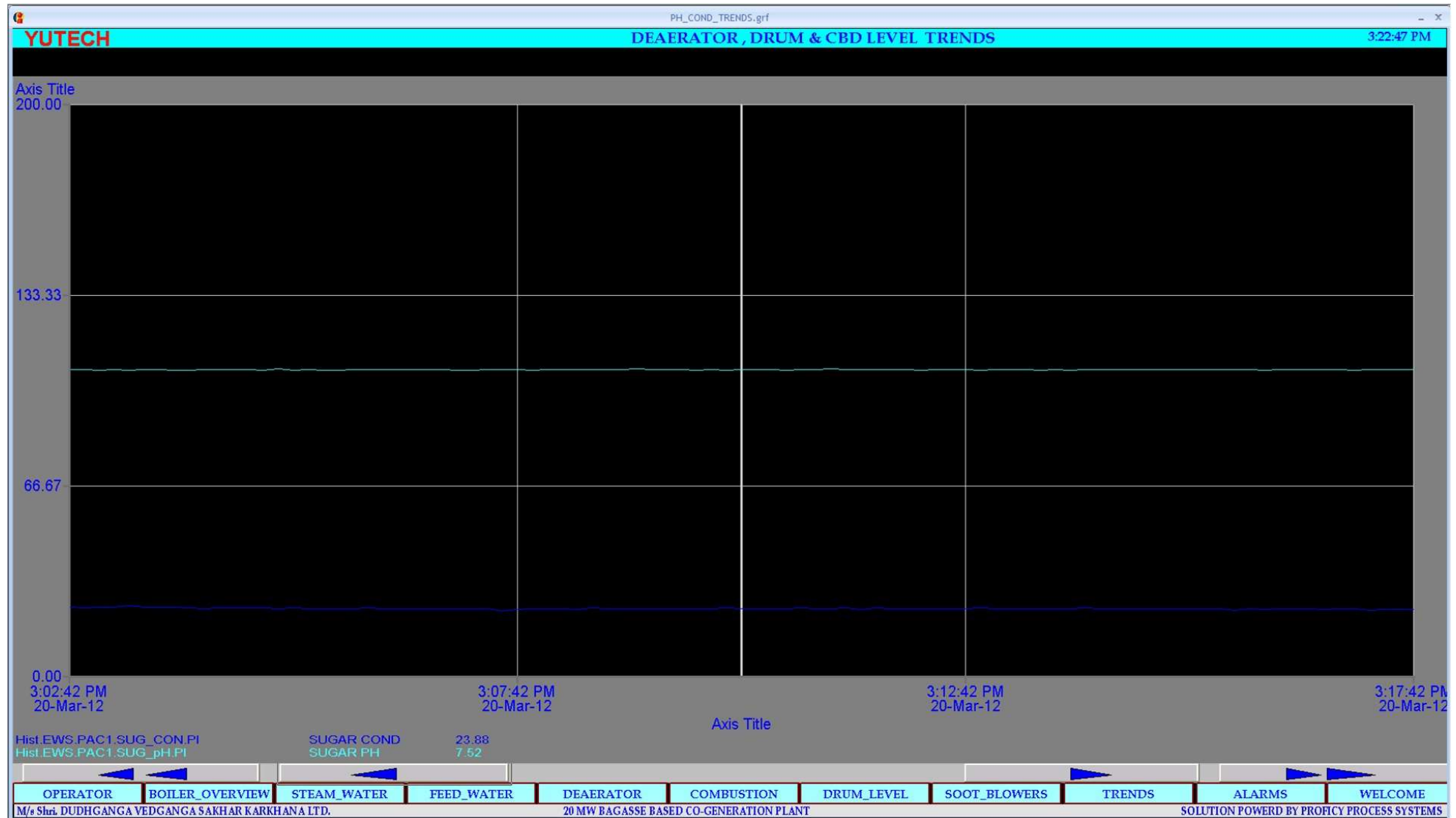
INFRA RED LEVEL SENSOR INSTALLATION ON BOILER BAGASSE SILO:
SCHEMATIC DIAGRAM

Sensor Mounting Plate welded on the Chute / Silo. Please see Operating Instructions for Installation Procedure and Guidance.
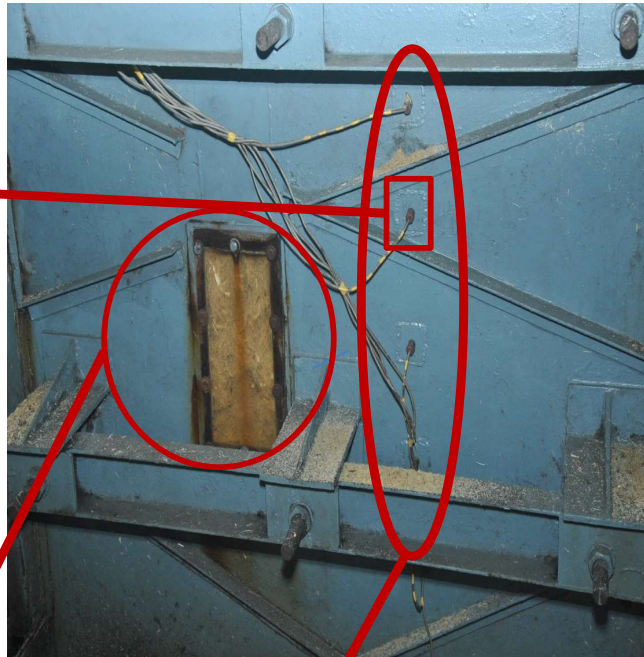
Proper Bagasse Silo Level Sensing Results in Continuous and Maintained Fuel Feeding to Boiler and avoids Stoppage due to Silo overflow

Infra Red Level Sensor Installation on Donnelly Chute

Bagasse Carrier

IR Type Level Sensors installed on Boiler Bagasse Silo

Lighting provided for Sensing with Viewing Glass

Bagasse Feeder

Boiler Furnace

YUTECH INFRA RED LEVEL SENSORS:

➢ YUTECH invented this Technique in 1986
➢ 100% True Donnelly Chute Level Detection
➢ No False Indications due to Bagasse Powder
➢ No False Indications due to Cane Pieces
➢ No False Indications due to Juice Mist, Water Mist, Sticky Juice Residues, Juice Films and Dirt, Bagasse Powder & Juice Mix formed on the Donnelly Chute Walls
➢ True Chute Level Detection leads to Excellent Control
➢ Water Ingress and Dirt Proof
➢ YUTECH IR Sensors have Built-in Raining Bagasse Compensation and easily Sense Level through Raining Bagasse and Juice Moisture
➢ Infra Red Light known for Deep Penetration and used in Military Applications for Night Vision, Medical Applications like Deep Fomentation hence the choice of IR for this Critical Application.
➢ 500+ Sugar Mills use YUTECH IR Sensors in India, Asia Pacific and African Regions

➢ **ASDDCLIRS10**: Use for Level Sensing before Maceration Water is applied.
➢ **ASDDCLIRS12**: Use for Level Sensing after Maceration Water is applied. It is the High Temperature variant which can withstand Operating Temperatures up to 100-degree C.

Innovative Features for Ease of Operation and to save on Installation Cost and Materials:

- **Built-in Communication Links: See Product Code to select desired protocol Ethernet:**
  a. Modbus TCPIP or EtherNet/IP Communication Protocols
  b. External Controller Calibration Facility from DCS / PLC- SCADA / HMI System via Ethernet. Control Variables can be accessed and changed from DCS / PLC- SCADA / HMI.
  c. Process Value Data is Communicated for Data Acquisition and Data Storage within DCS / PLC- SCADA / HMI.

  RS485: Modbus RTU

  USB Communication Facility: For Calibration from PC or Android using System's USB Port. (This facility is available only with Ethernet Models).
  YUTECH Access App: Calibration Software can be installed in PC or Android.

TECHNICAL SPECIFICATIONS:

- **Power Supply:** 85 - 265 VAC, 50 – 60Hz
- **Analyzer Enclosure:** IP67 Field Mounted Dust and Moisture Proof
- **Input:**
  - IR Sensor Signals
- **Calibration can be done from :**
  - **Keyboard:** Keyboard with 5 Keys is provided in the Analyzer
  - **USB Port:** for Windows / Android based YUTECH-AccessApp
- **Display:** 4 Digit LED Dual Display, LED
- **Signal Output:**
  - 4 - 20 mA Processed Measured or Analyzed Variable Output
  - 4 - 20 mA Controller Output (Optional)
    - This Output can be Configured as below:
      - PID Output
      - Scaled Output
      - PID / Scaled Output can be selected by C2P or C2S in the Product Code.
  - Potential-Free Relay Output for each Sensor Input
  - Ethernet Communication Protocol: Modbus-TCPIP
    - Modbus TCPIP Communication can be selected by adding suffix EM to the Product Code this is available only in the Controller Model.

- **Model Selection by Product Code:**
  - Example: A15DCAACIR6C1R6FM (6 Level System)
  - A15BSAACIR6C1R6FM: **A15BSA** is the Product Category or Platform based Donnelly Chute Level Analyzer
  - A15BSA**AC**IR6C1R6FM: **AC** means AC Power Supply (85 – 260VAC, 50-60Hz)
  - A15BSAAC**IR6**C1R6FM: **IR6** means 6 IR Sensors (number of Sensors **can** be selected as 4, 6, 8, 10, 12, and 16 Level System)
  - A15BSAACIR6**C1**R6FM: **C1** means 1 Channel 4-20mA Current Output which is the analyzed output of the sensed parameter
  - A15BSAACIR6C1**R6**FM: **R6** means 6 Potential-Free Relay Outputs. Relay Outputs will be as many as the Number of Sensors
  - A15BSAACIR6C1R6**FM**: **FM** means Field Mounted Enclosure
  - **Controller Model:**
    - A15BSAACIR6**C2**R6FMC: **C** is for Controller AND **C2** means 2 Channels of 4-20mA Current Output. 2nd Output is Control Output (PID / PI / P)
  - **Controller with Ethernet Model:**
    - A15BSAACIR6**C2**R6FM**CEM**: **CEM** is for Controller with Ethernet (Modbus TCPIP)
- **Product Codes for various Sensor Combinations are as below:**
  - A15BSAACIR4C1R4FM (4 Level System)
  - A15BSAACIR6C1R6FM (6 Level System)
  - A15BSAACIR8C1R8FM (8 Level System)
  - A15BSAACIR10C1R10FM (10 Level System)
  - A15BSAACIR12C1R12FM (12 Level System)
  - A15BSAACIR16C1R16FM (16 Level System)

Centralized Sugar Plant Automation Control Rooms:

Centralized Sugar Plant Automation Control Rooms:

YUTECH SUGAR MILL PROCESS INSTRUMENTS

MEASURING SUGARS BRIX BY BRIX

YUTECH FLOW CONTROLS

CONTROL SAVE EARN

YUTECH AUTOMATION

THE SWEETENER TO SUCCESS

YUTECH INSTRUMENTS

ANALYZE TRANSMIT CONTROL COMMUNICATE

YUTECH

SINCE 1978

YUTECH
SERVICE
SUPPORT

**FACTORY OWNERS'
PEACE OF MIND**

**SAVE FUEL, REDUCE CARBON FOOTPRINT,
MAKE THE WORLD GREENER
AND YET, MAKE MONEY
THANK YOU**