YUTECH CAPACITIVE LEVEL SENSING AND TRANSMISSION SYSTEM FOR DONNELLY CHUTE

Servicing the Sugar Industry since 1978

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

YUTECH CAPACITIVE / CONDUCTIVITY LEVEL SENSING AND TRANSMISSION SYSTEM

FOR SUGAR MILL DONNELLY CHUTE

BASED ON YUTECH'S A15 INTELLIGENT ANALYZERS AND SYSTEMS PLATFORM

SINCE 1978

YUTECH

CAPACITIVE LEVEL SENSOR
FOR SUGAR MILL DONNELLY CHUTE
Product Code:
ASDCDCLS1210

YUTECH CAPACITIVE LEVEL SENSING
AND TRANSMISSION SYSTEM
FOR SUGAR MILL DONNELLY CHUTE
Product Code:
BASE MODEL: A15DCAACCS10CR10FM;
CONTROLLER: A15DCAACCS10CR10FMC (Modbus TCPIP)
CONTROLLER WITH ETHERNET MODEL: A15DCAACCS10CR10FMCEM (Modbus TCPIP)

CAPACITIVE LEVEL SENSOR FOR SUGAR MILL DONNELLY CHUTE

PRODUCT CODE: ASDCDCLS1210

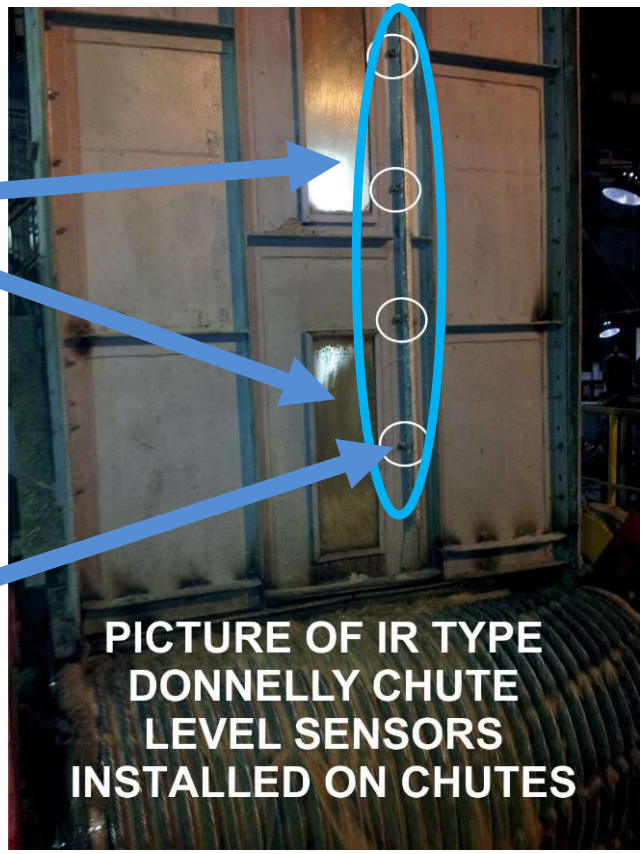
INSTALLATION PICTURE AND SCHEMATIC DIAGRAM

YUTECH SINCE 1978

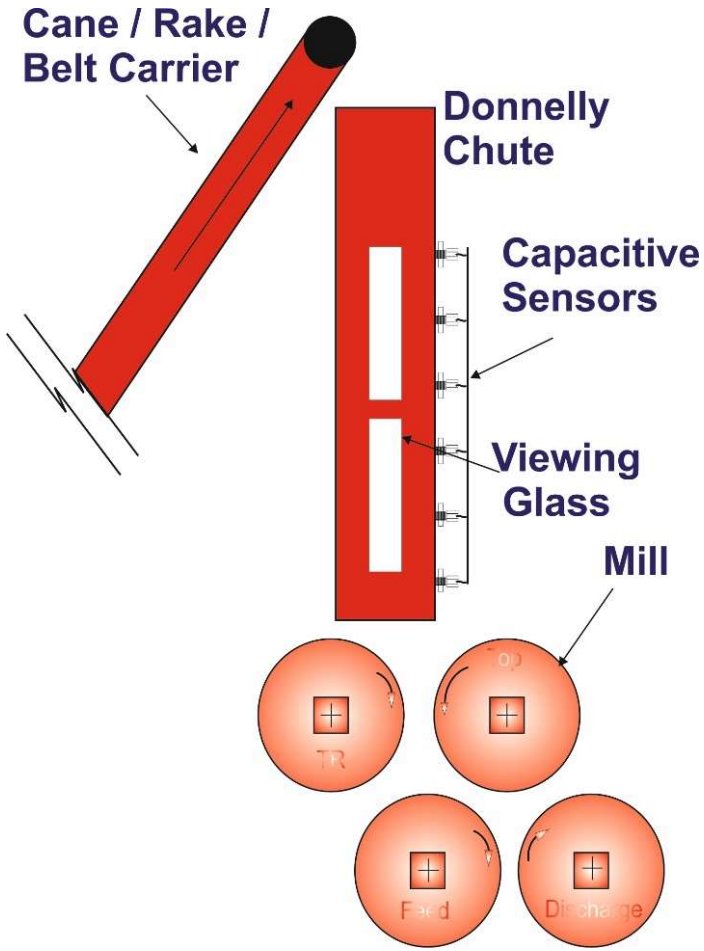
LEVEL SENSOR INSTALLATION ON DONNELLY CHUTE: PICTURE

Picture shows Donnelly Chute is semi filled. Sensors accurately sense only filled portion of the Chute.

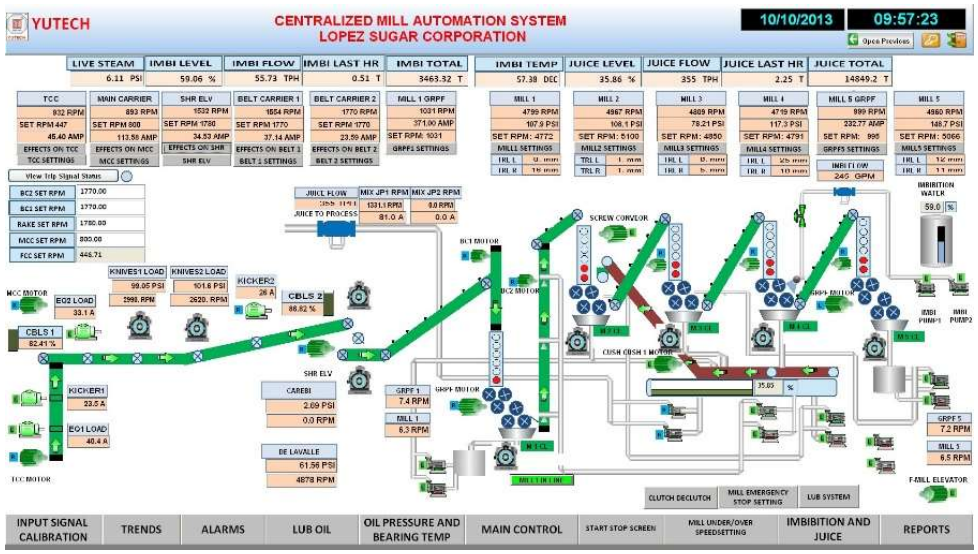
Proper Donnelly Chute Level Sensing and Control Results in Maintained Donnelly Chute Level

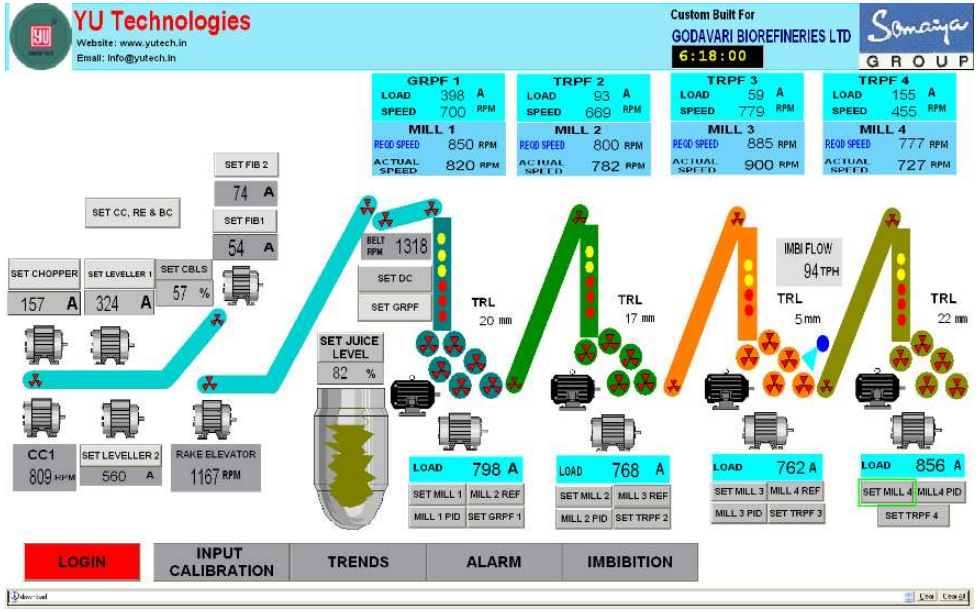


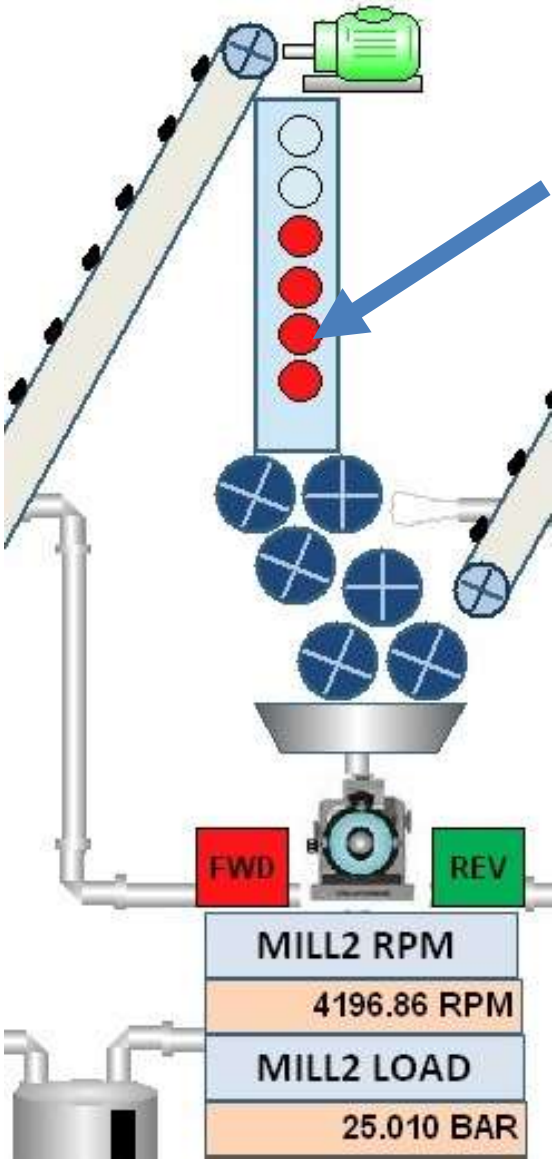
CAPACITIVE LEVEL SENSOR INSTALLATION ON SUGAR MILL DONNELLY CHUTE: SCHEMATIC DIAGRAM



YUTECH LEVEL SENSING AND TRANSMISSION SYSTEM
FOR SUGAR MILL DONNELLY CHUTE
SCREEN SHOTS OF YUTECH MILL SUGAR AUTOMATION SYSTEM







Level Sensed in the Donnelly Chute is used for Speed Control of:
Cane Carrier
Rake Carrier
Mill / GRPF / TRPF

YUTECH CAPACITIVE LEVEL SENSORS

FOR SUGAR MILL DONELLY CHUTE

PRODUCT CODE: ASDCDCLS1210

YUTECH CAPACITIVE LEVEL SENSORS:

- YUTECH invented this Technique in 1983
- However, it was discontinued in 1984 after the invention of IR Sensors and was produced only on specific demand.
- In 2015 Entire product range was redesigned to move to Micro-Controller based Solutions.
- In 2017 Conductivity Sensor and Transmitter were re-introduced in regular production.
- Sensor Design was changed to introduce a large surface and with an increased Di-Electric Plate Area for better sensing.
- Algorithm to remove earlier disadvantages of this technology such as raining bagasse fluctuations, and false readings due to Juice Mist was introduced to minimize this effect.
- 2020 again saw further development with the introduction of Ethernet (Modbus TCPIP) communication.
- YUTECH now regularly produces both Capacitive or Conductivity as well as IR Sensors.
- MOC: Copper Alloy and Virgin PTFE.

YUTECH CAPACITIVE TYPE LEVEL SENSING AND TRANSMISSION SYSTEM
FOR SUGAR MILL DONNELLY CHUTE: SALIENT FEATURES

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

- **Built-in Raining Bagasse Compensation**: to Accurately Sense, Analyze, Calculate and Derive Accurate Chute Level within a very challenging environment of Residual Juice Dirt, Sticky Bagasse Dust and Vibration
- **Built-in Controller (Optional):**
  Highly Accurate Fuzzy Logic Controller developed especially for Carrier and Mill Speed Control Applications.
- **Built-in 3-Point Auto/Manual Station to Select Control Output from (Optional):**
  a. Selector Switch for Local PID Output or DCS/PLC PID Output
  b. Manual Output for Trouble Shooting

  This feature simplifies installation by eliminating need for installing a Junction Box and Extra wiring.

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.

YUTECH CAPACITIVE TYPE LEVEL SENSING AND TRANSMISSION SYSTEM
FOR SUGAR MILL DONNELLY CHUTE: SALIENT FEATURES

TECHNICAL SPECIFICATIONS:

- **Power Supply:** 85 - 265 VAC, 50 – 60Hz
- **Analyzer Enclosure:** IP67 Field Mounted Dust and Moisture Proof
- **Input:**
  - Capacitive 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 / PI / P Output
  - 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: A15DCAAC1CS6C1R6FM (6 Level System)
    - A15DCA is the Product Category or Platform based Donnelly Chute Level Analyzer
    - AC means AC Power Supply (85 – 260VAC, 50-60Hz)
    - CS6 means 6 Capacitive Sensors (number of Sensors can be selected as 6, 8, 10, 12, and 16 Level System)
    - C1 means 1 Channel 4-20mA Current Output which is the analyzed output of the sensed parameter
    - R6 means 6 Potential-Free Relay Outputs. Relay Outputs will be as many as the Number of Sensors
    - FM means Field Mounted Enclosure
  - **Controller Model:**
    - A15DCAAC1CS6C2R6FMC
      - C2 means 2 Channels of 4-20mA Current Output. 2nd Output is Control Output (PID / PI / P)
      - C is for Controller
  - **Controller with Ethernet Model:**
    - A15DCAAC1CS6C2R6FMCEM
      - C2 means 2 Channels of 4-20mA Current Output. 2nd Output is Control Output (PID / PI / P)
      - CEM is for Controller with Ethernet (Modbus TCPIP)
- **Product Codes for various Sensor Combinations are as below:** Replace C1 by C2 and add EM for Controller and Ethernet Models
  - A15DCAACCS6C1R6FM (6 Level System)
  - A15DCAACCS8C1R8FM (8 Level System)
  - A15DCAACCS10C1R10FM (10 Level System)
  - A15DCAACCS12C1R12FM (12 Level System)
  - A15DCAACCS16C1R16FM (16 Level System)

Advantages of Mill Automation and Correct Donnelly Chute Level Readings:

Operational Advantages:
Increased Crushing or Milling with the Same Equipment:

- Continuous, Un-interrupted, Constant Feeding maintains Donnelly Chute Levels and increases Mill Performance as well as Throughput
- Elimination of Choking at Preparatory Devices, Mills, Chutes, or Carriers reduces downtime
- Maintained Juice to Maceration Water Ratio increases Evaporation Efficiency
- Optimum Mill Speeds with respect to Loads and Levels ensure good Milling Results at all times
- Effective water saving and cutting off water flow when crushing is stopped.
- Constant Juice Flow for the Process ensures even loading in the Boiling House and Stabilizes and Reduces the Steam Consumption which means higher Boiling House efficiency and Bagasse Saving
- Stable Juice Flow also helps in better Juice pH Control which in turn ensures better Juice and Sugar Colour which means better Sugar Price

- **ALL THE ABOVE IS ONLY POSSIBLE WHEN DONNELLY CHUTE LEVELS ARE ACCURATELY SENSED AND WITH WELL TUNED AND SYNCHRONOUS MILL AUTOMATION SYSTEM**

Advantages of Mill Automation:

SINCE 1978
YUTECH

Improve Milling Performance by YUTECH MILL AUTOMATION SYSTEM AND INFRA-RED OR CAPACITIVE DONNELLY CHUTE LEVEL SENSING SYSTEM:

- Constant Load on Preparatory Devices ensures Better Cane Preparation resulting in a better Preparatory Index
- Constant Load on Mills and Level in all Donnelly Chutes results in Power and Steam Savings as well as improves Mill Performance in terms of:
  - Increased Extraction
  - Better Reduced Mill Extraction or RME
  - Reduced Bagasse Pol and Moisture
  - Constant Power Demand in Mill House which comprises about 40% or more of the overall Factory Power Consumption results in Overall Stable Power throughout the Factory
- Constant Load on Mills also results in Lesser Mechanical Wear & Tear
  - Lesser Maintenance Cost

Advantages of Mill Automation:

SINCE 1978
YUTECH

Automatic Mill Automation System Features:

Sensing:

- Infra Red / Capacitive Type Donnelly Chute Level Sensing of all Donnelly Chutes
- Hall's Effect Type Cane Blanket Level Sensing
- Hall's Effect Type Top Roller Lift Sensing
- All Preparatory Devices and Mill (Pressure Feeders if driven by separate Drives) Drive Load Current Sensing by High Precision Non-Invasive CT Protectors and Isolating Converters to sense
- Preparatory Devices and Mill Turbine Chest Pressure Sensing, by Pressure Transmitters
- Live Steam Pressure Sensing, by Pressure Transmitters
- Hydraulic Drives Pressure Sensing, by Pressure Transmitters
- Maceration Water Flow Sensing
- Juice Tank Level Sensing
- Juice Flow Sensing by Mass or Magnetic Flowmeter
- Mill Hydraulic Pressure Sensing, by Pressure Transmitters
- Mill and Preparatory Devices Bearing Temperature Sensing and Monitoring
- Motor Winding / Motor Cage Temperature Sensing and Monitoring
- All Inter-Carriers, Cane Carriers, Bagasse Carriers, Mills, Pumps, On / Off / Run Condition Sensing and Inter-Lock Protection

Mill Automation System Features:

Process Controls:

- Speed Control of all Cane Carrier, Rake Carriers, Belt Carriers etc., which Feed Cane to the Mills
- All Mill Speed Controls and Variation with respect to individual Mill's Load and its Donnelly Chute Level
- Maintain Mill and Pressure Feeder Speed Ratio if driven by separate Drives
- Next Mill Donnelly Chute Level and Speed Feedback for Mill Speed Control
- Maintained Mill Speed Safe Operating Band
- Controlled Maceration Water Flow as per Dynamic Process Conditions
- Controlled and Constant Juice Flow to Process / Boiling House as per Dynamic Process Conditions

Alarms, Over-Riding and Safety Controls:

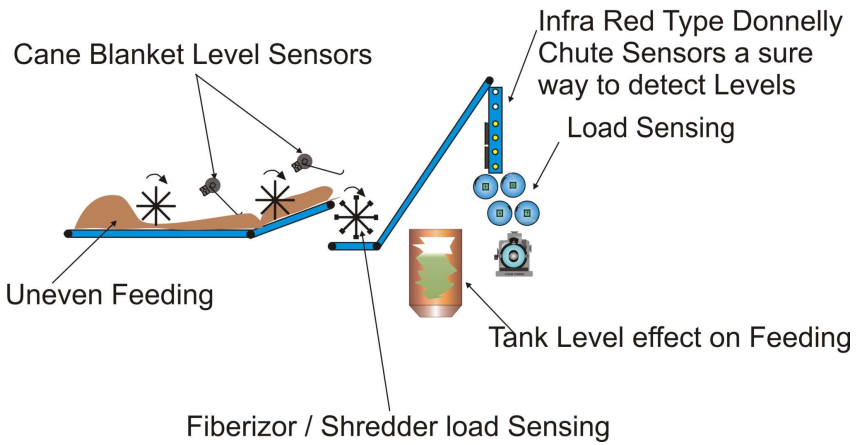
All following conditions will Raise Alarm and Implement Safety Controls as per Factory Conditions and Customization to User Needs:

- Donnelly Chute Levels for Cane Carrier Speeds
- Tripping of any Carrier / Pump / Mill will Trip all preceding Carriers
- Tripping of any Mill will Trip all preceding Mills (By User's Choice)
- Cane Juice Tank Level increase beyond Preset High Level to Reduce Cane Carrier Speeds
- Cane Juice Tank Level increase below Preset Low Level to increase Cane Carrier Speeds (After Checking other Process Dynamics) and Juice Pump Speed Reduction (By User's Choice)

Mill Automation System Features:

SINCE 1978
YUTECH

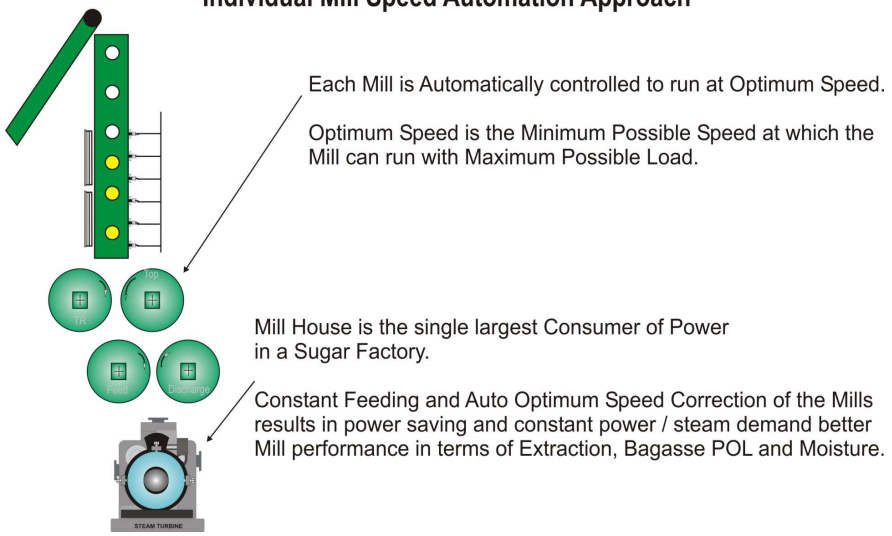
Cane Feeding Arrangement and Automation Approach



CANE FEED CONTROL:

SPEED CONTROL OF CANE CARRIERS, RAKE CARRIERS WITH DONNELLY CHUTE LEVEL AS OVER-RIDING CONTROL, PREPARATORY DEVICE LOADS AND CANE BLANKET LEVELS.
FINE TUNING OF CARRIER SPEEDS TO MAINTAIN LEVELS IN DONNELLY CHUTE

Individual Mill Speed Automation Approach

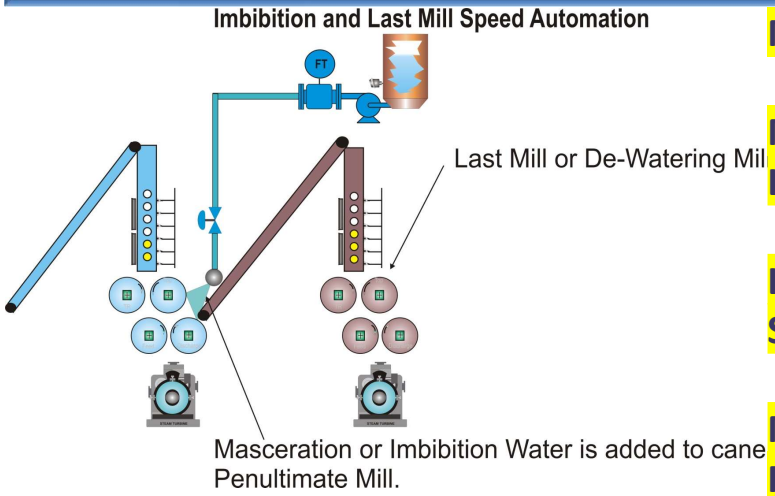


MILL SPEED CONTROL:

SPEED CONTROL OF INDIVIDUAL MILL RESPECT TO ITS LOAD CURRENT OR NOZZLE / CHEST PRESSURE (IF TURBINE DRIVEN) WITH DONNELLY CHUTE LEVEL AS OVER-RIDING CONTROL,
FINE TUNING OF CARRIER SPEEDS AND MILL SPEEDS TO MAINTAIN LEVELS IN DONNELLY CHUTE
MILL SPEED SYNCHRONIZATION WITHIN THE ENTIRE MILL TANDEM AND CARRIERS

SAFETY INTERLOCKS

Mill Automation System Features:

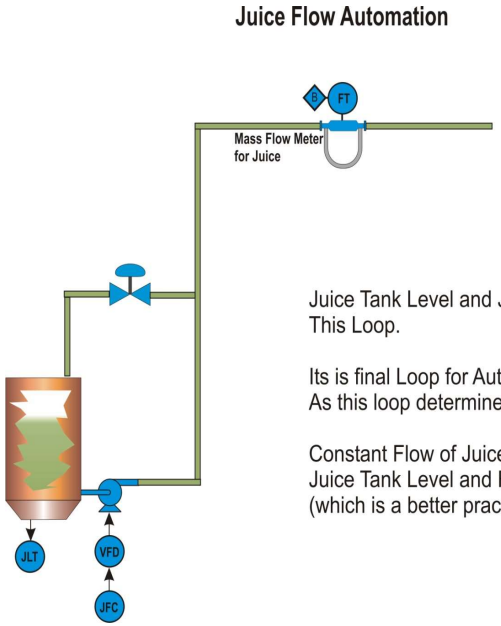


MACERATION CONTROL:

MACERATION WATER FLOW CONTROL WITH RESPECT TO PEN-ULTIMATE MILL LOAD CURRENT OR CHEST / NOZZLE PRESSURE AND JUICE FLOW SETTING.

LAST MILL SPEED CONTROL AS EXPLAINED EARLIER IN MILL SPEED CONTROL SLIDE.

MACERATION CONTROL SYSTEM WITH LAST MILL SPEED CONTROL GIVES BEST RESULTS IN TERMS OF REDUCED BAGASSE POL AND MOISTURE.



Juice Tank Level and Juice Flow Sensing is the means of Automating This Loop.

Its is final Loop for Automation of the Mill. The essence of Mill Automation. As this loop determines the Mill Tandem's Output.

Constant Flow of Juice is maintained by this Automation with respect to Juice Tank Level and Flow Rate. By Controlling either the Juice Pump VFD (which is a better practice) or by regulating the Juice Bypass Valve.

JUICE FLOW STABILIZATION:

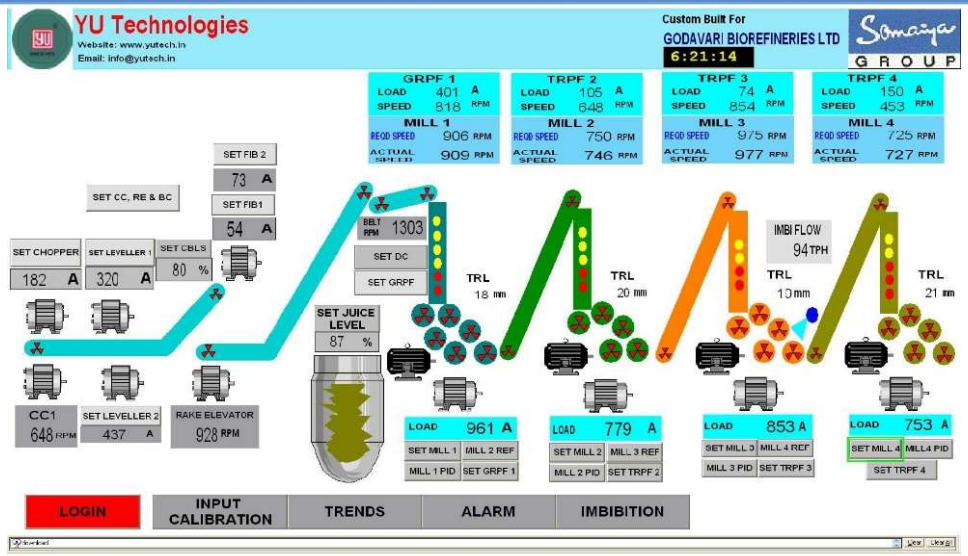
JUICE FLOW CONTROL AS PER SET JUICE FLOWRATE BY VARYING JUICE PUMP VFD'S SPEED / JUICE BYPASS CONTROL VALVE.

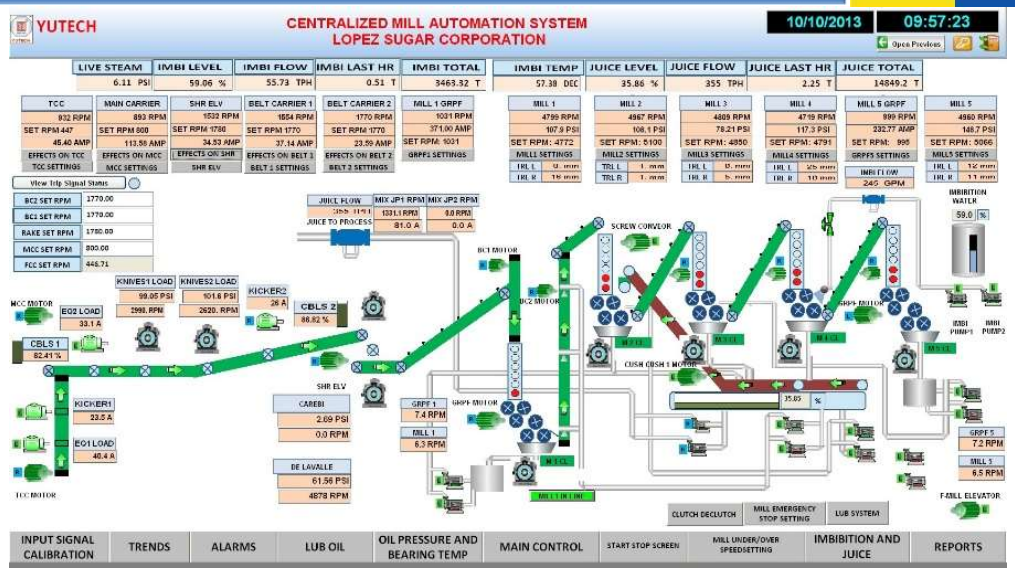
JUICE FLOW SETTING AS PER JUICE LEVELS AND BOILING HOUSE FEEDBACK AND OVER-RIDING CONTROL TO CANE CARRIERS.

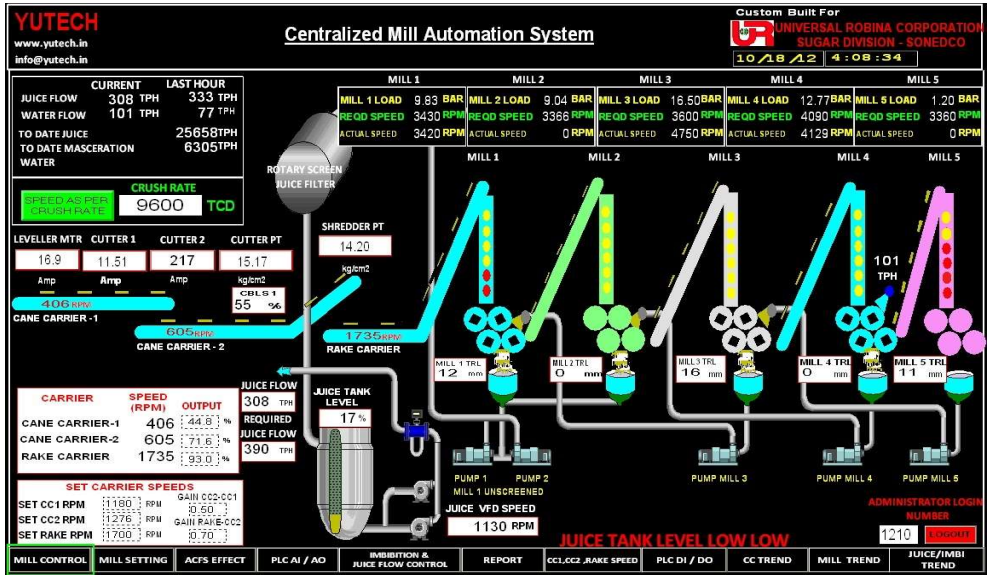
JUICE TANK LEVEL FEEDBACK TO CONTROL CARRIER SPEEDS.

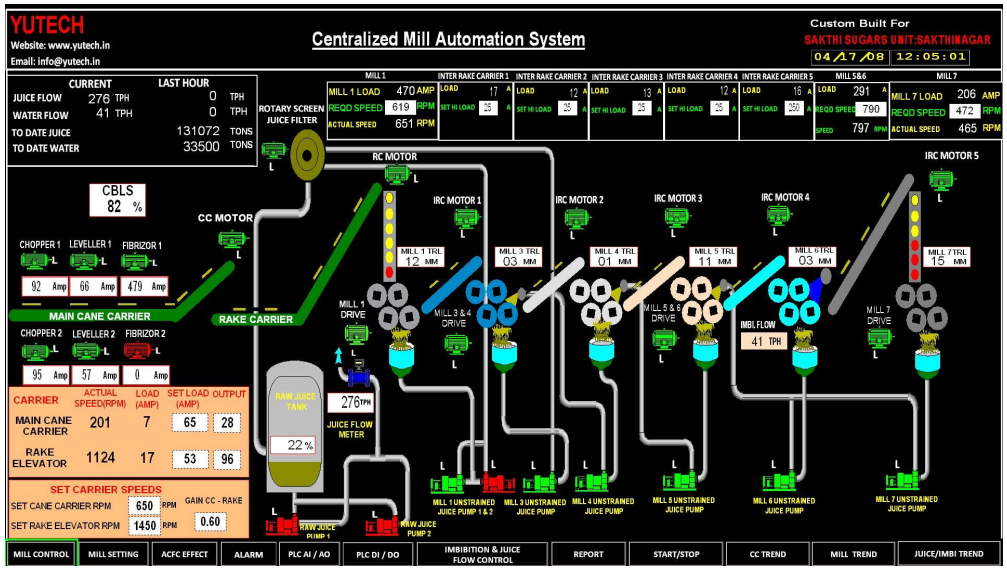
JUICE TANK LEVEL SENSING AND CONTROLS AVOID JUICE OVERFLOW AND PUMP DRY RUN

Mill Automation System Various Screenshots:









YUTECH HALL'S EFFECT TYPE DISPLACEMENT SENSING AND TRANSMISSION SYSTEM FOR SUGAR MILL ROLLER LIFT AND CANE BLANKET LEVEL

BASED ON YUTECH'S A12 INTELLIGENT ANALYZERS AND SYSTEMS PLATFORM

SINCE 1978

YUTECH

HALL'S EFFECT TYPE SENSOR FOR CANE BLANKET LEVEL SENSING

Product Code: ASDCBLS1210

HALL'S EFFECT TYPE SENSOR FOR TOP ROLLER LIFT SENSING

Product Code: ASDTRLS1210

YUTECH HALL'S EFFECT TYPE DISPLACEMENT SENSING AND TRANSMISSION SYSTEM

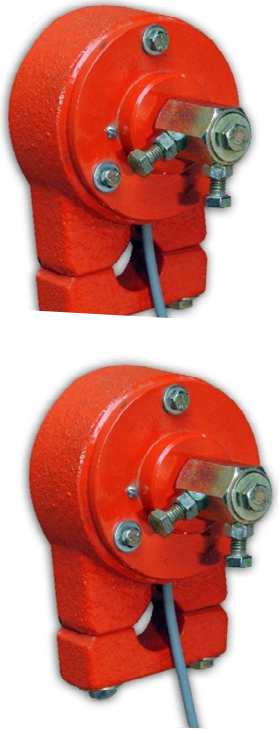
Product Code:

CANE BLANKET LEVEL INDICATOR TRANSMITTER: A12DCHTACCBLS2C2R2GFM;
TOP ROLLER LIFT INDICATOR TRANSMITTER: A12DCHTACTRLS2C2R2GFM;

TOP ROLLER LIFT SENSORS

TOP ROLLER LIFT INDICATOR CUM TRANSMITTER

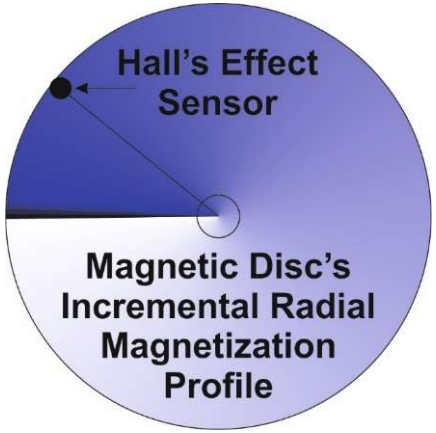
CANE BLANKET LEVEL INDICATOR CUM TRANSMITTER



CANE BLANKET LEVEL SENSORS

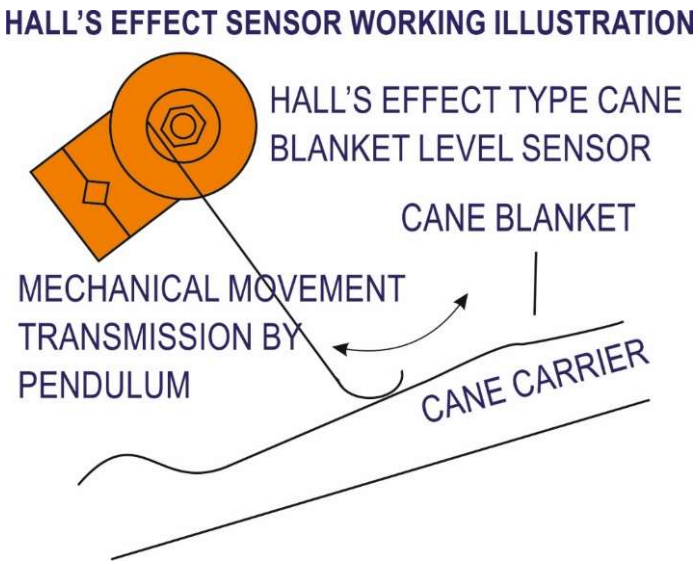
YUTECH HALL'S EFFECT TYPE DISPLACEMENT SENSING AND TRANSMISSION SYSTEM FOR SUGAR MILL ROLLER LIFT AND CANE BLANKET LEVEL INSTALLATION PICTURE AND SCHEMATIC DIAGRAM

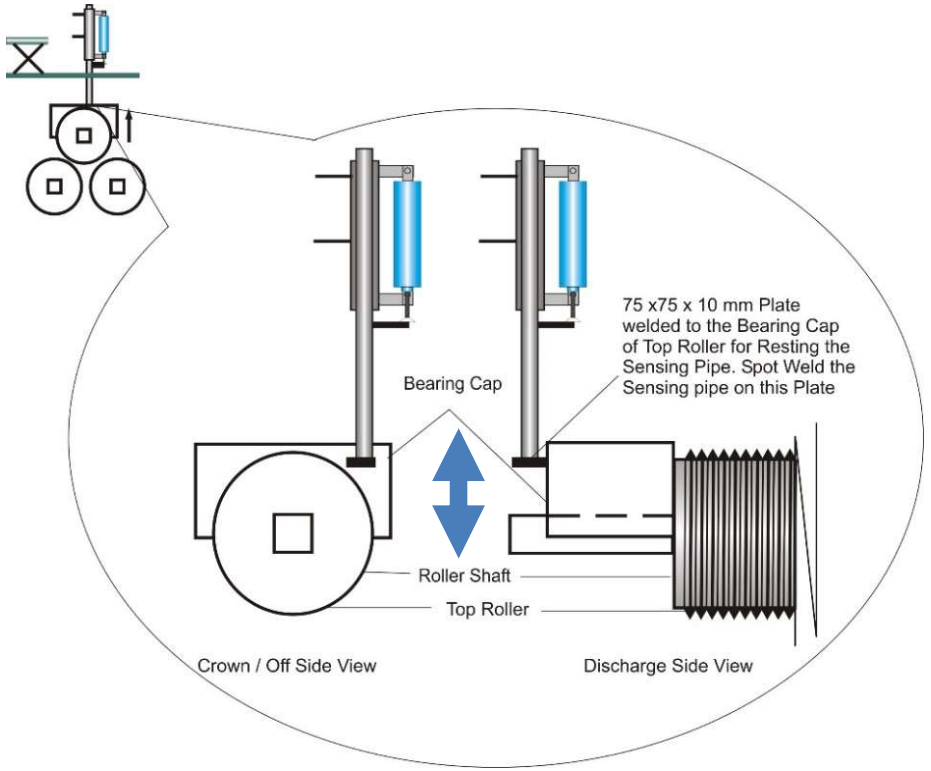
HALL'S EFFECT SENSOR WORKING SCHEMATIC DIAGRAM:



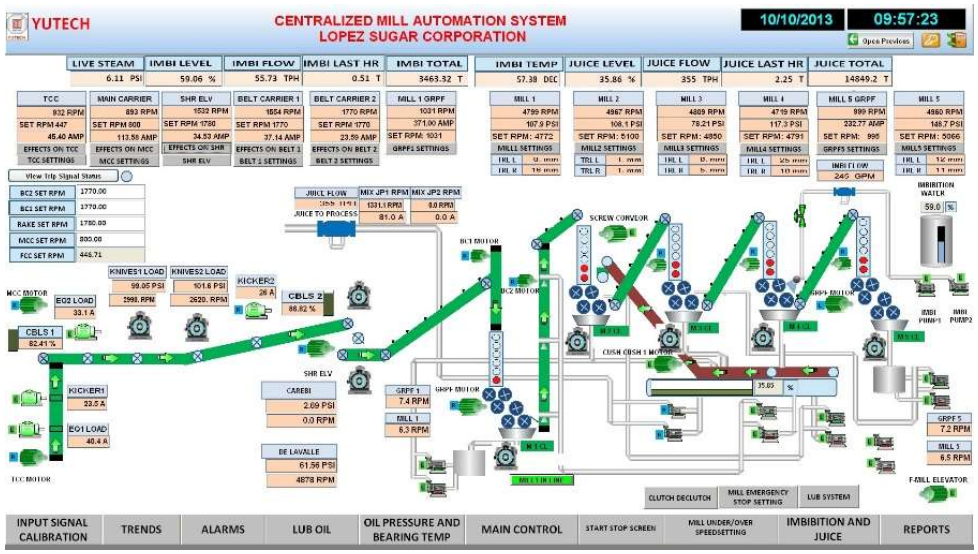
CANE BLANKET LEVEL SENSOR AND TOP ROLLER LIFT SENSOR:

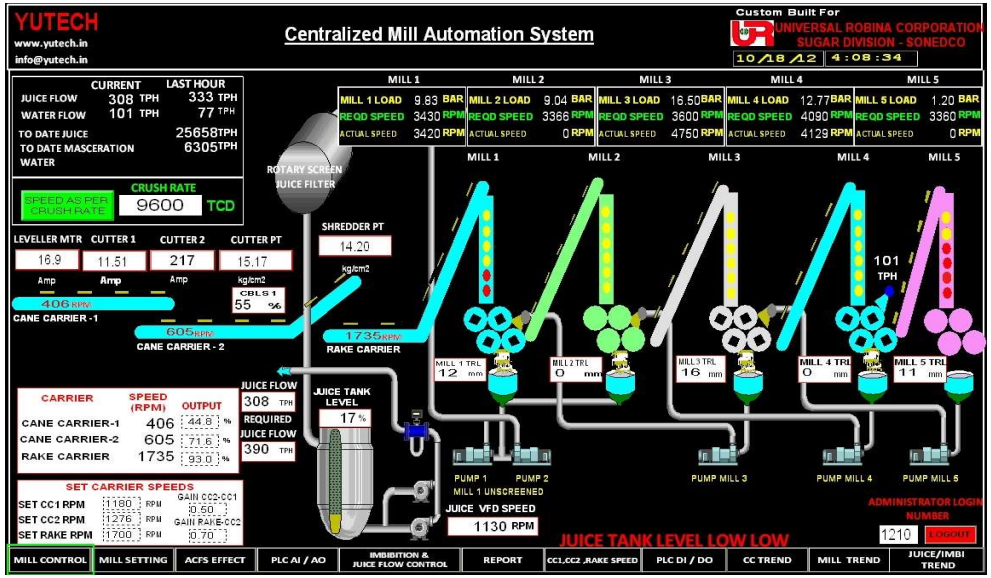
SCHEMATIC INSTALLATION AND WORKING DIAGRAM

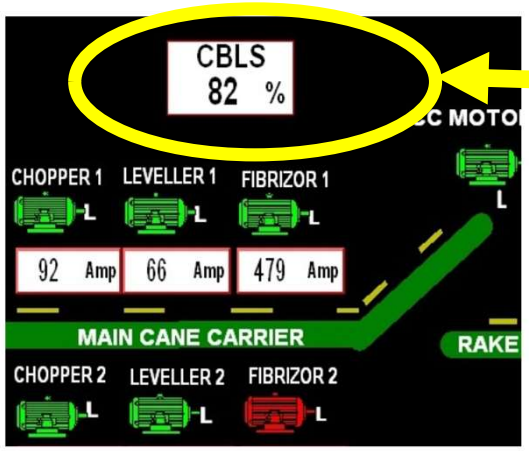




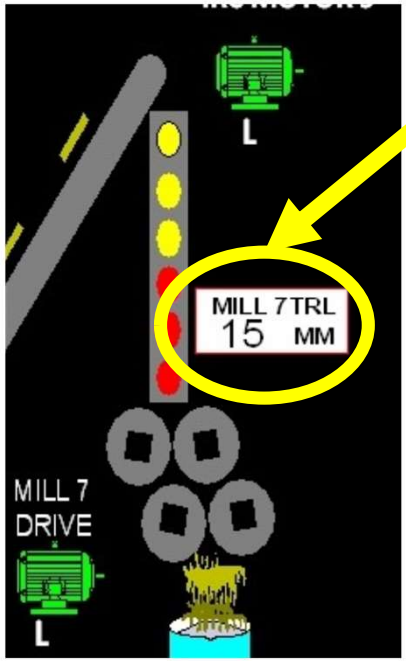
YUTECH HALL'S EFFECT TYPE DISPLACEMENT SENSING AND TRANSMISSION SYSTEM FOR SUGAR MILL ROLLER LIFT AND CANE BLANKET LEVEL INSTALLATION PICTURE AND SCHEMATIC DIAGRAM







Cane Blanket Level Sensed in the Cane Carrier is used for Speed Control of: Cane Carrier



Mill Top Roller Lift Sensed is used for Monitoring Top Roller Float Balance

Mill Top Roller Lift Sensed Installation

YUTECH HALL'S EFFECT TYPE DISPLACEMENT SENSING AND TRANSMISSION SYSTEM FOR CANE BLANKET LEVEL

YUTECH CANE BLANKET LEVEL SENSING SYSTEM:

- Cane Level in Carrier is Primarily Sensed by a Pendulum riding on Cane Blanket which Mechanically Transmits the actual Blanket Level or Height to a Contact-less Hall's Effect Sensor. Hall's Effect Technology which is based on Electromagnetic Principle, thus Electronic Sensing is essentially Contact-less where the Sensor's Wiper moves over a Radial Strip of varying magnetism and thus being induced with a Voltage corresponding to that position which is then transmitted as Cane Blanket Level.
- 100% True Level Detection through Shocks and Vibrations.
- Extremely Rugged, Heavy Duty, Water-Proof, Ingress Protected Enclosure Protects the Sensor against all external abuse of being hit by Flying Cane pieces, Moisture, Dirt, Juice Mist and Wash Water AND Cane Carrier's Vibrations.
- YUTECH's founder Mr. Arun Dalvi is the originally invented this Technique way back in 1986 and upgraded to Hall's Effect in 2006.
- More than 400 Sugar Mills use YUTECH CBL Sensors and Transmitters in India, Asia Pacific, West Asia and the African Continent.
- Specs: 230 VAC Power Supply, Input: CBL Sensor Dual Channel, Output: Dual Channel 4-20mA.

YUTECH DISPLACEMENT SENSING AND TRANSMISSION SYSTEM
FOR SUGAR MILL ROLLER LIFT

SINCE 1978
YUTECH

YUTECH TOP ROLLER LIFT SENSING SYSTEM:

- Mill Top Roller Lift is Sensed by a Primary Telescopic Sensor whose Sensing End Rests on Mill Pressure Plate, which Mechanically Transmits the actual Lift to a Contact-less Hall's Effect Sensor. Hall's Effect Technology which is based on Electromagnetic Principle, thus Electronic Sensing is essentially Contact-less where the Sensor's Wiper moves over a Radial Strip of varying magnetism and thus being induced with a Voltage corresponding to that position which is then transmitted as Top Roller Lift (4-20mA from Indicator).
- In Ultra-Sonic Type Sensor, the Primary Sensor's Mechanical Movement is sensed by an Ultrasonic Sensor, which is then transmitted as Top Roller Lift (4-20mA from Indicator). Ultrasonic Sensing was added in 2019.
- Very Rugged, Heavy Duty, Water-Proof, Ingress Protected Enclosure provides 100% True Lift Detection even during Shocks and
- The Enclosure is very well capable of Protecting the Sensor against all external abuse of being hit by Cleaning Sticks by Workers trying to remove stuck Bagasse and also from Direct Hot Wash Water / Steam Spray during Mill Cleaning / Vibrations generated by Full Load Milling Operation . Needless to say, it also Protects the Sensor against Moisture, Dirt, Juice Mist and Powdered Bagasse Particles.
- YUTECH's founder Mr. Arun Dalvi is the originally invented this Technique way back in 1992 and upgraded to Hall's Effect in 2006,
- Specs: 230 VAC Power Supply, Input: TRL Sensor Dual Channel, Output: Dual Channel 4-20mA.

YUTECH HALL'S EFFECT TYPE DISPLACEMENT SENSING AND TRANSMISSION SYSTEM FOR SUGAR MILL ROLLER LIFT AND CANE BLANKET LEVEL

SINCE 1978
YUTECH

TECHNICAL SPECIFICATIONS:

- **Power Supply:** 85 - 265 VAC, 50 – 60Hz
- **Analyzer Enclosure:** IP67 Field Mounted Dust and Moisture Proof
- **Input:**
  Hall's Effect Type Cane Blanket Level Sensor Signals
  OR
  Hall's Effect Type Top Roller Lift Sensor Signals
  OR
  Ultrasonic Type Cane Blanket Level / Top Roller Lift Sensor Signals

- **Calibration can be done from:**
  - **Keyboard:** Keyboard with 4 Keys is provided in the Transmitter
  - **USB Port:** for Windows / Android based YUTECH-AccessApp (Optional)
- **Display:** 4 Digit LED Dual Display, LED
- **Signal Output:**
  - 4 - 20 mA Processed Measured Variable Output
  - 4 - 20 mA Processed Measured Variable Output
  - Potential-Free Relay Output for each Sensor Input
  - Ethernet Communication Protocol: Modbus-TCPIP

YUTECH HALL'S EFFECT TYPE DISPLACEMENT SENSING AND TRANSMISSION SYSTEM
FOR SUGAR MILL ROLLER LIFT AND CANE BLANKET LEVEL

PRODUCT CODE:

CANE BLANKET LEVEL INDICATOR TRANSMITTER: A12DCHTACCBLS2C2R2GFM;

TOP ROLLER LIFT INDICATOR TRANSMITTER: A12DCHTACTRLS2C2R2GFM;

- Example: A12DCHTACCBLS2C2R2GFM; A12DCHTACTRLS2C2R2GFM;
- A15DCHT is the Product Category - Hall's Effect Type Displacement Sensing and Transmission System
    - AC means AC Power Supply (85 – 260VAC, 50-60Hz)
    - CBLS means Cane Blanket Level Sensor Input (2 Channels)
    - TRLS means Top Roller Lift Sensor Input (2 Channels)
    - C2 means 2 Channel 4-20mA Current Output which is the analyzed output of the sensed parameter
    - R2 means 2 Potential-Free Relay Outputs.
    - GFM means Gol Field Mounted Enclosure
- **Ethernet Model:**
    - A12DCHTACCBLS2C2R2GFMEM; A12DCHTACTRLS2C2R2GFMEM
        - EM is for Ethernet (Modbus TCPIP)

HALL'S EFFECT TYPE SENSOR FOR CANE BLANKET LEVEL SENSING:
Product Code: ASDCBLS1210

HALL'S EFFECT TYPE SENSOR FOR TOP ROLLER LIFT SENSING:
Product Code: ASDTRLS1210

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

THANK YOU