Sugar Mill Automation

YU Technologies Pvt. Ltd.
Registered Office:
315, A1, 22, Manishanagar, Off Sahyadrinagar,
Sangli – 416 416, Maharashtra, India.

HO & Works:
B 8/5, MIDC, Miraj, 416 410, Distt: Sangli,
Maharashtra, India.

T: + 91 233 6451803 – 6; F: +91 233 2644042
E: info@yutech.in
W: www.yutech.in

Servicing the Sugar Industry since 1978
Agenda

• Need for Automation
• Automation Approach
• Mill Automation Examples
• Why choose YUTECH
• Case Study and Value Analysis
• Concluding Remarks
Need for Automation

Energy savings by improved throughput, gain in performance and efficiency

Achieve the minimum cost of operations by streamlining operations and increasing Throughput

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The Purpose of Mill Automation

Basic Requirement:

- Safety of the Cane Feeding and Milling Equipment.
- Prevention of Overloading of Feeding and Milling Equipment.
- Prevention of Jams and Choking in Cane Feeding and Milling Equipment.
- Facilitate continuous operation.
- Reduction and Possible Elimination of Stoppages due to Human Error.
- Early indications of Faults.

Optimization:

- Maintaining optimum load on the Preparatory Devices and Mills.
- Maintaining Continuous Positive Feeding at all times.
- Maintaining Uniform Steam / Power Demand over the entire Mill House.

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Common Industrial Activities like Steam Generation or Process Plants share common engineering parameters like Pressure, Temperature, Flow and pH.

Milling is completely different from these activities. Therefore the Automation approach also differs greatly from other common processes. We would like to concentrate on this Approach.
Mill House Automation Systems

Interlocks, Protection and Alarming Systems:

• Automatic Interlocking System between Bagasse Carrier, Inter Carriers, Mills, Rake and Main Cane Carriers, Preparatory Devices, First or Auxiliary Cane Carrier meaning if any equipment stalls or trips then all preceding feeding equipment will stall.

• Bearing Temperatures Of all Mills, Cane Preparatory Devices, Cane Carriers are sensed and Alarms are generated if Temperature of any bearing rises above prescribed limit pin pointing the device.

• Any other Customized Factory Specific Application will be implemented.

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Understanding the Milling Process

SUGAR MILL INPUTS AND OUTPUTS

- CANE
- SUGARCANE JUICE
- MACERATION WATER
- EXHAUST STEAM
- BAGASSE
- ELECTRICITY
- STEAM

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Understanding the Milling Process

SUGAR FACTORY LAYOUT

MILL

BOILER

POWER TURBINE

SUGAR PROCESS

CANE

BAGASSE

STEAM

ELECTRICITY

SUGAR

JUICE

EXHAUST STEAM

MACERATION WATER

STEAM CONDENSATE

STEAM

EXHAUST STEAM

SUGARCANE

JUICE

MACERATION WATER

STEAM

EXHAUST STEAM

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Understanding the Milling Process

SUGAR FACTORY LAYOUT (TURBINE MILL DRIVES)

MILL

POWER TURBINE

BOILER

SUGAR PROCESS

STEAM

FEED WATER

EXHAUST STEAM

STEAM CONDENSATE

MACERATION WATER

FEED WATER STORAGE & PROCESS

SUGARCANE JUICE

ELECTRICITY

BAGASSE

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Mill House Automation Systems

SUGAR FACTORY LAYOUT (TURBINE MILL DRIVES)
If Bagasse is not used as Fuel and sold

- MILL
- BOILER
- POWER TURBINE

CANE → MILL → SUGAR PROCESS → EXHAUST STEAM

SUGARCANE JUICE → EXHAUST STEAM → SUGAR PROCESS

ELECTRICITY → MILL

BAGASSE SOLD → FUEL

STEAM

FEED WATER

EXHAUST STEAM → STEAM CONDENSATE

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What will you achieve by installing YUTECH Mill House Automation Systems?
Mill House Automation Systems

SUGAR FACTORY LAYOUT (TURBINE MILL DRIVES)

MILL

CONSTANT FEED

CANES

BOILER

STEAM

FEED WATER

POWER TURBINE

STEAM

EXHAUST STEAM

SUGAR PROCESS

SUGAR CANE JUICE

EXHAUST STEAM

MACERATION WATER

STEAM CONDENSATE

FEED WATER STORAGE & PROCESS

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Mill House Automation Systems

SUGAR FACTORY LAYOUT (TURBINE MILL DRIVES)

- **CANE** → **MILL**
  - CONSTANT feed on Mill Equipment
  - SUGAR CANE JUICE
  - EXHAUST STEAM

- **MILL** → **SUGAR PROCESS**
  - MACERATION WATER

- **SUGAR PROCESS** → **SUGAR FACTORY LAYOUT (TURBINE MILL DRIVES)**
  - STEAM CONDENSATE

- **SUGAR FACTORY LAYOUT (TURBINE MILL DRIVES)** → **BOILER**
  - EXHAUST STEAM

- **BOILER** → **POWER TURBINE**
  - STEAM

- **POWER TURBINE** → **SUGAR FACTORY LAYOUT (TURBINE MILL DRIVES)**
  - ELECTRICITY

- **SUGAR FACTORY LAYOUT (TURBINE MILL DRIVES)**
  - FEED WATER
  - FEED WATER STORAGE & PROCESS

**CONSTANT load on Mill Equipment**

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Mill House Automation Systems

SUGAR FACTORY LAYOUT (TURBINE MILL DRIVES)

- Mill
- Constant Feed
- Constant Juice Water Ratio
- Sugarcane Juice
- Exhaust Steam
- Maceration Water
- Constant

- Boiler
- Bagasse
- Constant
- Steam

- Power Turbine
- Electricity
- Exhaust Steam

- Sugar Process
- Feed Water Storage & PROCESS
- Steam Condensate

If Mill House has Turbine Drive/s

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Mill House Automation Systems

Constant Cane Feeding at all times and Automatic Optimization of Mill Speeds

Constant

- Steam and Power Demand in the Mill House
- Dry Bagasse to the Boilers
- Juice to Water Ratio
- Juice Flow to Process
- Levels in Donnelly Chutes hence ensured positive feeding at all times
Mill House Automation Systems

Therefore Mill Automation

↓

Improves

• Primary Mill Extraction
• Reduced Mill Extraction
• Bagasse Pol
• Bagasse Moisture
• Overall Efficiency
• Throughput

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Mill House Automation Systems

Mill Automation

↓

Reduces or Completely Eliminates

- Human Errors
- Choking and Jamming at Preparatory Devices
- Choking and Jamming at Donnelly Chutes
- Overloading of Drives
- Under feeding
- Wear and Tear of Equipment

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Mill House Automation Systems

Constant Cane Feeding at all times and Automatic Optimization of Mill Speeds

↓

Saves

- Power by reducing Consumption
- Steam by reducing Consumption

Therefore reducing Bagasse Fuel for Boiler

- Water
- Lubricants
- Steam for Process

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Mill House Automation Systems

Mill Automation thus

↓

Facilitates Constant

• Boiler Operation
• Process or Boiling or Raw House Operation
• And Overall Production

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Mill House Automation Systems

Mill Automation Advantage

Crushing with the same Mechanical Equipment
Production with minimized losses
Efficiency with lesser stoppages
Mill House Automation Systems

Milling Process Control Systems:
• Automatic Cane Feeding Control System
• Automatic Mill Speed Control System
• Automatic Maceration Water Control
• Automatic Juice Flow Control System

Mill Protection System:
• Automatic Interlocks
• Alarms and Emergency Trip / Stop

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Automation Approach for Cane Feeding:

Cane Feeding Arrangement and Automation Approach

- Cane Blanket Level Sensors
- Infra Red Type Donnelly Chute Sensors a sure way to detect Levels
- Load Sensing
- Tank Level effect on Feeding
- Fiberizor / Shredder load Sensing

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Example of Automatic Cane Feeding system
Infra Red Sensing
100% True Level Detection
IR Sensors Sense Level Through Dirt, Juice Films, Bagasse Powder and also Juice and Water Mist in the Donnelly Chute
IR Sensors have Built-in Raining Bagasse Compensation and easily Sense Level through it
No False Level Detections
IR Light is Known for Deep Penetration and used in Medical Applications like Deep Fomentation hence the choice of IR for this Critical Application
Water Ingress and Dirt Proof
YUTECH invented this Technique in 1986
More than 400 Sugar Mills use YUTECH IR Sensors in India, Asia Pacific and African Regions
Automatic Cane Feeding Control System

Features:

• Infra Red Type Donnelly Chute Level Sensing
• Hall’s Effect Type Cane Blanket Level Sensing
• High Precision Non-Invasive CT Protectors and Isolating Converters
• Pressure Transmitters for Sensing Chest Pressure of Turbine, Hydraulic Drives and Live Steam
• Juice Tank Level Feedback
• Smooth and Jerk-less Carrier Speed Variation with respect to above sensing
Infra Red Type Donelly Chute Level Sensors

Infra Red Sensor Installation.

100% True DC Level Detection
No False Indications
No Problems due to Bagasse Particles or Juice

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YUTECH Hall’s Effect Type Cane Blanket Level Sensor Features

- Hall’s Effect Type Electromagnetic Sensor
- Pendulum Type Primary Level Sensor Floats on Cane Blanket
- Extremely Rugged Heavy Duty Enclosure to suit the Physical abuse of Flying Cane from Leveller / Cutter / Knives
- 100% True Level Detection through all the Shocks, Vibration, Moisture and Dirt
- No False Level Detections
- Water Ingress and Dirt Proof
- YUTECH invented this Technique in 1986
- More than 400 Sugar Mills use YUTECH CBLS Sensors in India, Asia Pacific and African Regions
YUTECH Hall’s Effect Type Top Roller Lift Sensors and Indicating Transmitters

- Hall’s Effect Type Electromagnetic Sensor
- Telescopic Primary Level Sensor rests on Mill Pressure Plate
- Extremely Rugged Heavy Duty Enclosure to suit the Physical abuse of Cleaning, Moisture, Sugar Cane Juice and Juice Mist, Bagasse and Steam
- 100% True Top Roller Lift or Float Detection through all the Shocks, Vibration, Moisture and Dirt
- Water Ingress and Dirt Proof
- YUTECH invented this Technique in 1992
- More than 300 Sugar Mills use YUTECH TRL Sensors in India, Asia Pacific and African Regions

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YUTECH Mill Instruments: Hall’s Effect Type Cane Blanket Level and Top Roller Lift Sensors

Hall’s Effect Type Cane Blanket Level Sensors: 100% True Cane Blanket Level Detection
No False Indications
No Problems due to Bagasse Particles or Juice which are associated with Conductivity Type Level Sensors.

Hall’s Effect Type Top Roller Lift Sensors: 100% Linear and Non Contact type Sensing

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Hall’s Effect Type Cane Blanket Level Sensor Assembly Diagram

Threaded Holes to fix the Hex Nut on Sensor shaft with Bolt and Lock Nut provided.

Shaft Hole

Hex Nut

Weld the Tor to Hex Nut Provided with the Sensor threaded holes should be at the bottom.

10 / 12 mm Tor / Round Bar Curved at one end to resemble a Hockey

Length 1/2” of the Pendulum is decided by the depth of Cane Carrier. And should be adjusted such that the curvature at the bottom of the pendulum stays about 25 mm above the Cane Carrier Slat．

Sensor Shaft rotates to indicate level

Clamp to fix Sensor

Clamp Bolts

Level Sensing Pendulum Floats over the Cane Blanket

MS Sensor Mounting Pipe 25mm ID, 31.5mm OD, length should be approximately 300 mm more than the Carrier Cross Section

MS Sensor Mounting Pipe 25mm ID, 31.5mm OD

Cane Blanket

Cross Sectional View of Cane Carrier mounted with CBL Sensors

Cane Carrier Side Wall / Plate

Sensor Cable

Blown Up View of the Sensor Cable Entry

Fully Weld the Channel to the Cane Carrier Side Plate.

75 / 100 mm Channel

Cane Carrier Side Plate

25 mm

33mm hole cut using Gas Cutter to mount Sensor Mounting Pipe

200 mm
Hall’s Effect Type Top Roller Lift Sensor Assembly Diagram

Hall’s Effect Type Top Roller Lift Sensor

Sensor Mounting Assembly

Extension to rest on Mill Pressure Plate
Precision HT and LT Current Sensing

Isolating CT Converter
Precision Drive Speed Sensing

YUTECH RPM Sensor

Isolating RPM Indicator cum Transmitter

Isolating RPM Transmitter

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Mill Speed Control Automation Approach:

Individual Mill Speed Automation Approach

Each Mill is Automatically controlled to run at Optimum Speed.

Optimum Speed is the Minimum Possible Speed at which the Mill can run with Maximum Possible Load.

Mill House is the single largest Consumer of Power in a Sugar Factory.

Constant Feeding and Auto Optimum Speed Correction of the Mills results in power saving and constant power / steam demand better Mill performance in terms of Extraction, Bagasse POL and Moisture.
Screen Shot of Mill Automation at Sakthi Sugars, Sakthinagar

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Email: info@yutech.in

Centralized Mill Automation System

<table>
<thead>
<tr>
<th>MILL</th>
<th>INTER RAKE CARRIER 1</th>
<th>INTER RAKE CARRIER 2</th>
<th>INTER RAKE CARRIER 3</th>
<th>INTER RAKE CARRIER 4</th>
<th>MILL 6 &amp; 7</th>
<th>MILL 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILL 1 LOAD</td>
<td>470 AMP RPM</td>
<td>LOAD 17 A</td>
<td>LOAD 12 A</td>
<td>LOAD 15 A</td>
<td>LOAD 18 A</td>
<td>LOAD 21 A</td>
</tr>
<tr>
<td>MILL 1 SPEED</td>
<td>619 RPM</td>
<td>RPM 35</td>
<td>RPM 55</td>
<td>RPM 55</td>
<td>RPM 55</td>
<td>RPM 55</td>
</tr>
<tr>
<td>MILL 1 ACTUAL SPEED</td>
<td>851 RPM</td>
<td>RPM 25</td>
<td>RPM 55</td>
<td>RPM 55</td>
<td>RPM 55</td>
<td>RPM 55</td>
</tr>
</tbody>
</table>

Current

- Juice Flow: 276 TPH
- Water Flow: 41 TPH
- To Date Juice: 131072 TONS
- To Date Water: 33500 TONS

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Screen Shot of Mill Automation at URC - SONEDCO

Centralized Mill Automation System

MILL 1
- MILL 1 LOAD: 9.83 BAR
- REQD SPEED: 3430 RPM
- ACTUAL SPEED: 3420 RPM

MILL 2
- MILL 2 LOAD: 9.04 BAR
- REQD SPEED: 3364 RPM
- ACTUAL SPEED: 0 RPM

MILL 3
- MILL 3 LOAD: 16.5 BAR
- REQD SPEED: 3800 RPM
- ACTUAL SPEED: 4750 RPM

MILL 4
- MILL 4 LOAD: 12.77 BAR
- REQD SPEED: 4090 RPM
- ACTUAL SPEED: 4129 RPM

MILL 5
- MILL 5 LOAD: 1.20 BAR
- REQD SPEED: 3380 RPM
- ACTUAL SPEED: 0 RPM

Cane Carrier Details:
- Cane Carrier 1: 406 rpm
- Cane Carrier 2: 605 rpm
- Rake Carrier: 1735 rpm

Juice Flow Details:
- Juice Flow: 308 TPH
- Juice Tank Level: 17%

Contact Information:
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Automatic Mill Speed Control System

Features:

- Infra Red Type Donnelly Chute Level Sensing
- Hall’s Effect Type Top Roller Lift Sensing
- High Precision Non-Invasive CT Protectors and Isolating Converters
- Pressure Transmitters for Sensing Chest Pressure of Turbine, Hydraulic Drives and Live Steam
- Mill Speed Variation with respect to individual Mill Load and Donnelly Chute Level
- Next Mill Donnelly Chute Level and Speed Feedback
- Maintained Mill Speed Safe Operating Band
Maceration or Imbibition Control Approach:

Imbibition and Last Mill Speed Automation

Last Mill or De-Watering Mill.

Maceration or Imbibition Water is added to cane at the Penultimate Mill.
Mill House Automation Systems

• Automatic Maceration Control System

Features:

• Hall’s Effect Type Top Roller Lift Sensing
• High Precision Non-Invasive CT Protectors and Isolating Converters
• Pressure Transmitters for Sensing Chest Pressure of Turbine, Hydraulic Drives and Live Steam
• Water Flow Variation with respect to Pen-Ultimate Mill Load and Top Roller Lift
• Juice Flow Feedback to adjust Crush Rate Variations
• Built-in Maceration Calculation
• Water Cut-Off when: No Cane in Mills
• Maceration Tank Level and Temperature Control

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Juice Flow Control and Stabilization:

Juice Flow Automation

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 Control Screen Shot:

YU TECHNOLOGIES

33"x66" JUICE FLOW
TOTALIZER 81833.44
LAST HOUR FLOW 192.57

EX. PRESS
1.22 kg/cm²

35.62 %

COMMON
JUICE TANK

33"x66" JUICE FLOW
0 m³/hr

JP SET A
RPM 1015
200.65 TPH

JP COMMON
RPM 0
212.13 TPH

JP SET B
RPM 1009

SYSTEM BUILT FOR
THE UGAR SUGAR WORKS
27/12/2010 10:11:21

MASS FLOW
SET A 200.65
SET B 212.13

MASS FLOW (PV)
67.89

MASS FLOW (SP)
200

MASS FLOW (CV)
67.81

TOTALIZER
117353.26
114648.59

LAST HOUR FLOW
249.7
249.44

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Juice Flow Control Actual Trend Screenshot:

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Mill House Automation Systems

• Automatic Juice Flow Control System

Features:
• Level Transmitters for Sensing Juice Tank Level
• Maintain Constant Juice Flow to Process
• Juice Tank Level Sensing to avoid Juice Overflow and Pump Dry Run

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Field Instrument Installation

LT Installation
Magnetic Flow Meter Installation
Mass Flow Meter Installation
Cable Routing
Jumbo Displays Installation
RTD Installation

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Screen Shot of Centralized Mill Automation at Shree Renuka Sugars Gokak, India

Centralized Mill Automation System

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Screen Shot of Mill Automation: Settings

### MILL SETTINGS

#### MILL - 1 SETTING
- **MAX MILL SPEED**: 700 RPM
- **MIN MILL SPEED**: 505 RPM
- **MAX MILL LOAD**: 500 AMP
- **MIN MILL LOAD**: 300 AMP
- **DCL 1 EFFECT**: 10 RPM
- **DCL 2 EFFECT**: 30 RPM
- **DCL 3 EFFECT**: 40 RPM
- **DCL 4 EFFECT**: 200 RPM
- **DCL 5 EFFECT**: 900 RPM
- **DCL 6 EFFECT**: 1000 RPM
- **LOOP UPDATE**: 5 Sec

#### MILL - 5&6 SETTING
- **MAX MILL SPEED**: 900 RPM
- **MIN MILL SPEED**: 300 RPM
- **MAX MILL LOAD**: 400 AMP
- **MIN MILL LOAD**: 200 AMP
- **DCL 1 EFFECT**: 0 RPM
- **DCL 2 EFFECT**: 0 RPM
- **DCL 3 EFFECT**: 0 RPM
- **DCL 4 EFFECT**: 0 RPM
- **DCL 5 EFFECT**: 0 RPM
- **DCL 6 EFFECT**: 0 RPM
- **LOOP UPDATE**: 5 Sec

#### MILL - 7 SETTING
- **MAX MILL SPEED**: 700 RPM
- **MIN MILL SPEED**: 350 RPM
- **MAX MILL LOAD**: 500 AMP
- **MIN MILL LOAD**: 200 AMP
- **DCL 1 EFFECT**: 50 RPM
- **DCL 2 EFFECT**: 75 RPM
- **DCL 3 EFFECT**: 100 RPM
- **DCL 4 EFFECT**: 300 RPM
- **DCL 5 EFFECT**: 350 RPM
- **DCL 6 EFFECT**: 375 RPM
- **LOOP UPDATE**: 5 Sec

#### PID SETTING

<table>
<thead>
<tr>
<th>MILL CONTROL</th>
<th>MILL SETTING</th>
<th>ADC EFFECT</th>
<th>ALARM</th>
<th>PLC AI/AO</th>
<th>PLC DI/DO</th>
<th>IMBIBITION &amp; JUICE FLOW CONTROL</th>
<th>REPORT</th>
<th>START/STOP</th>
<th>CC TREND</th>
<th>MILL TREND</th>
<th>JUICE/MIB TREND</th>
</tr>
</thead>
</table>

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Screen Shot of Mill Automation at Lopez Sugar, Negros, Occidental
Centralized Sugar Plant Automation Control Rooms:

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Centralized Sugar Plant Automation Pictures:
Superior Quality Norms and Protection for Automation Systems:

- UPS System
- Built-In Panel Isolation Transformer for Mains Power Supply
- RCD for Mains Power Supply
- MCB for Each Power Distribution Head
- EMI / RFI Filter for Mains Power Supply
- Switching Surge Arrestor for Controller Power Supply Head
- Isolation Barrier for all Analogue I/Os
- Potential Free Relay for all Digital I/Os
- Fuse TBs for all Digital I/Os
Advantages of Mill Automation:

Operational Advantages:

Increased Milling with the Same Equipment due to:

- Continuous and Un-interrupted Feeding reduces Downtime and Increase Throughput
- Elimination of Choking at Preparatory Devices, Mills, Chutes or Carriers
  - Maintained Juice to Imbibition 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 Process ensures even loading in the Boiling House and Stabilizes and Reduces the Steam Consumption which means higher Boiling House efficiency and Bagasse Saving

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Advantages of Mill Automation:

- Stable Juice Flow also helps in better Juice pH Control which in turn ensures better Juice and Sugar Colour which means better Sugar Price
- Constant Process Flow ensures better Boiling House Efficiency

Improved Milling Performance

- Constant Load on Preparatory Devices ensures Better Cane Preparation resulting in better extraction, RME, Reduced Bagasse Pol and Moisture
- Constant Load on Mills and Level in all Donnelly Chutes results in Power and Steam Savings
- Constant Load on Mills also results in Lesser Mechanical Wear & Tear
Why invest in YUTECH Products

1. Experience of over 30 years with Expertise of a very highly qualified Engineering Team.
3. Excellent Quality Workmanship.
4. Extensive Warranty Coverage.
5. Highly accurate calibration facilities with traceability certifications.

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YUTECH Technical Advantage:

- Highly Qualified Experienced and Strong Engineering Team.
- In-house System Engineering.
- In-house Design and Development of Systems and Controls.
- In-house Design, Development and Manufacturing of Industrial Electronics, Instrumentation and Automation Equipments.
- In-house Software Development from Micro Controller Programming to SCADA, PLC, DCS Programming to Visual Basic etc.

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A Case Study of Performance of the Mills with and Without Automation in:
The Ugar Sugar Works Ltd.,
Ugar Khurd, Tal: Athani, Dist. Belgaum, Karnataka, India.

www.ugarsugar.com
helpdesk@ugarsugar.com
### Milling Performance with and without Automation: Ugar Sugar Works – Value Analysis

<table>
<thead>
<tr>
<th>Sr</th>
<th>PARTICULARS</th>
<th>SEASON 2009-2010 AutoCane</th>
<th>SEASON 2010-2011 Partial Automation</th>
<th>SEASON 2011-2012 Full Automation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CROP DAYS</td>
<td>160</td>
<td>177</td>
<td>132</td>
</tr>
<tr>
<td>2</td>
<td>CANE CRUSHED</td>
<td>1427046</td>
<td>1599327</td>
<td>1322904</td>
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<tr>
<td>3</td>
<td>AVERAGE CRUSHING PER DAY</td>
<td>8919</td>
<td>9036</td>
<td>10022</td>
</tr>
<tr>
<td>4</td>
<td>POL % CANE</td>
<td>13.58</td>
<td>13.21</td>
<td>13.86</td>
</tr>
<tr>
<td>5</td>
<td>RECOVERY % CANE</td>
<td>11.54</td>
<td>11.26</td>
<td>11.86</td>
</tr>
<tr>
<td>6</td>
<td>MILL EXTRACTION</td>
<td>95.03</td>
<td>95.09</td>
<td>95.38</td>
</tr>
<tr>
<td>7</td>
<td>REDUCED MILL EXTRACTION (RME)</td>
<td>95.66</td>
<td>95.72</td>
<td>95.93</td>
</tr>
<tr>
<td>8</td>
<td>POL % BAGASSE (LAST MILL)</td>
<td>2.26</td>
<td>2.17</td>
<td>2.16</td>
</tr>
<tr>
<td>9</td>
<td>MOISTURE % BAGASSE (LAST MILL)</td>
<td>50.10%</td>
<td>50.02%</td>
<td>49.66%</td>
</tr>
<tr>
<td>10</td>
<td>POL LOSS IN BAGASSE % CANE</td>
<td>0.68</td>
<td>0.65</td>
<td>0.64</td>
</tr>
<tr>
<td>11</td>
<td>BAGASSE SAVE % CANE</td>
<td>1.93</td>
<td>2.24</td>
<td>2.84</td>
</tr>
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## Power Savings due to Mill Automation: Ugar Sugar Works

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<td>160</td>
<td>177</td>
<td>132</td>
</tr>
<tr>
<td>2</td>
<td>CANE CRUSHED</td>
<td>1427046</td>
<td>1599327</td>
<td>1322909</td>
</tr>
<tr>
<td>3</td>
<td>AVERAGE CRUSHING PER DAY</td>
<td>8919</td>
<td>9036</td>
<td>10022</td>
</tr>
<tr>
<td>4</td>
<td>POWER CONSUMPTION ON 33x66 MILL KWH</td>
<td>13.84</td>
<td>14.31</td>
<td>12.56</td>
</tr>
<tr>
<td>5</td>
<td>POWER CONSUMPTION ON 42x84 MILL KWH</td>
<td>11.91</td>
<td>11.41</td>
<td>12.13</td>
</tr>
<tr>
<td>6</td>
<td>TOTAL POWER CONSUMPTION ON BOTH MILLS KWH</td>
<td>25.75</td>
<td>25.72</td>
<td>24.69</td>
</tr>
</tbody>
</table>

www.yutech.in; sale@yutech.in
Tangible Economic Benefits at Ugar Sugar Works
By Power Saving:

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Saving 1 KWH per ton of cane</td>
<td>KWH</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Cane Crushed in Season 2011-2012</td>
<td>M.T.</td>
<td>1322909</td>
</tr>
<tr>
<td>3</td>
<td>Energy Saved during Season 2011-2012</td>
<td>KWH</td>
<td>1322909</td>
</tr>
<tr>
<td>3</td>
<td>Power Rate per KWH</td>
<td>Rs.</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Savings</td>
<td>Rs.</td>
<td>5291636.00</td>
</tr>
<tr>
<td>5</td>
<td>Savings in US Dollars</td>
<td>USD</td>
<td>101762.00</td>
</tr>
</tbody>
</table>
Tangible Economic Benefits at Ugar Sugar Works
By Bagasse and Sugar Savings:

<table>
<thead>
<tr>
<th>Table Title</th>
<th>Quantity</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Bagasse Saving (0.6% increase)</td>
<td>Tons</td>
<td>2391</td>
</tr>
<tr>
<td>Monetary Benefit by this saving (Price 1400/- per Ton)</td>
<td>Rs.</td>
<td>3,347400.00</td>
</tr>
<tr>
<td>Bagasse Price per Ton</td>
<td>Rs.</td>
<td>1400.00</td>
</tr>
<tr>
<td>Sugar in Bagasse % Cane</td>
<td>Tons</td>
<td>36</td>
</tr>
<tr>
<td>Sugar Price per Kg</td>
<td>Rs.</td>
<td>30.00</td>
</tr>
<tr>
<td>Total extra earning by sale of this sugar</td>
<td>Rs.</td>
<td>1,080000.00</td>
</tr>
</tbody>
</table>

Total Saving: Rs. 9,719036.00
Total Saving: USD 186904.00
### YUTECH Mill Automation Case Study: Benefits of Mill Automation:

**Sahakari Khand Udyog Mandal Ltd., Gandevi, Gujarat, India**

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Crushing (TPD)</th>
<th>Total Cane Crushed (Tons)</th>
<th>Total Steam Consumed (Tons)</th>
<th>Steam consumed as % of Cane</th>
<th>Saving wrt last year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>6049</td>
<td>9,73,357</td>
<td>1,38,479</td>
<td>14.23%</td>
<td></td>
</tr>
<tr>
<td>2012-13</td>
<td>6378</td>
<td>11,09,610</td>
<td>1,38,180</td>
<td>12.45%</td>
<td>1.77%</td>
</tr>
<tr>
<td>2013-14 (till 31st Dec 13)</td>
<td>6462</td>
<td>3,58,178</td>
<td>42,367</td>
<td>11.83%</td>
<td>0.62%</td>
</tr>
</tbody>
</table>

[www.yutech.in; sale@yutech.in](http://www.yutech.in; sale@yutech.in)
## Benefits of Mill Automation

<table>
<thead>
<tr>
<th>Bagasse Pol</th>
<th>Mill Extraction</th>
<th>Recovery %</th>
<th>Mix Juice %</th>
<th>Bagasse Water %</th>
<th>Avg Added Water to %Cane</th>
<th>Stoppages Mechanical Total Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.826</td>
<td>96.30</td>
<td>11.68</td>
<td>106.40%</td>
<td>49.38%</td>
<td>33.7160</td>
<td>21 Hrs</td>
</tr>
<tr>
<td>1.785</td>
<td>96.45</td>
<td>11.74</td>
<td>105.22%</td>
<td>49.34%</td>
<td>32.0200</td>
<td>18 Hrs</td>
</tr>
<tr>
<td>1.810</td>
<td>96.62</td>
<td>12.71</td>
<td>104.51%</td>
<td>49.44%</td>
<td>31.2330</td>
<td>12 Hrs</td>
</tr>
</tbody>
</table>
Benefits of Mill Automation

Gandevi Benefits Observed:
• Reduced Maintenance and Breakdown
• Increased Throughput due to constant Crushing
• Reduced Steam Consumption of upto 2% hence Bagasse Saving

Ugar Intangible Benefits Observed:
• Reduced Overall Maintenance
• Reduced Mill DC Drives Maintenance
• Reduced Breakdown
• Increased Throughput
• More Cane Crushed in Lesser Days
Concluding Remarks

Tailor-made automation solutions within Sugar Industry are the need of time to gain

- Efficiency
- Energy savings in electricity, fuel and other natural resources.
- Improving Quality while achieving Cost Reduction
THANK YOU!
For your time and Presence

SAVE FUEL
REDUCE CARBON FOOTPRINT
MAKE THE WORLD GREENER

AND YET, MAKE MONEY