

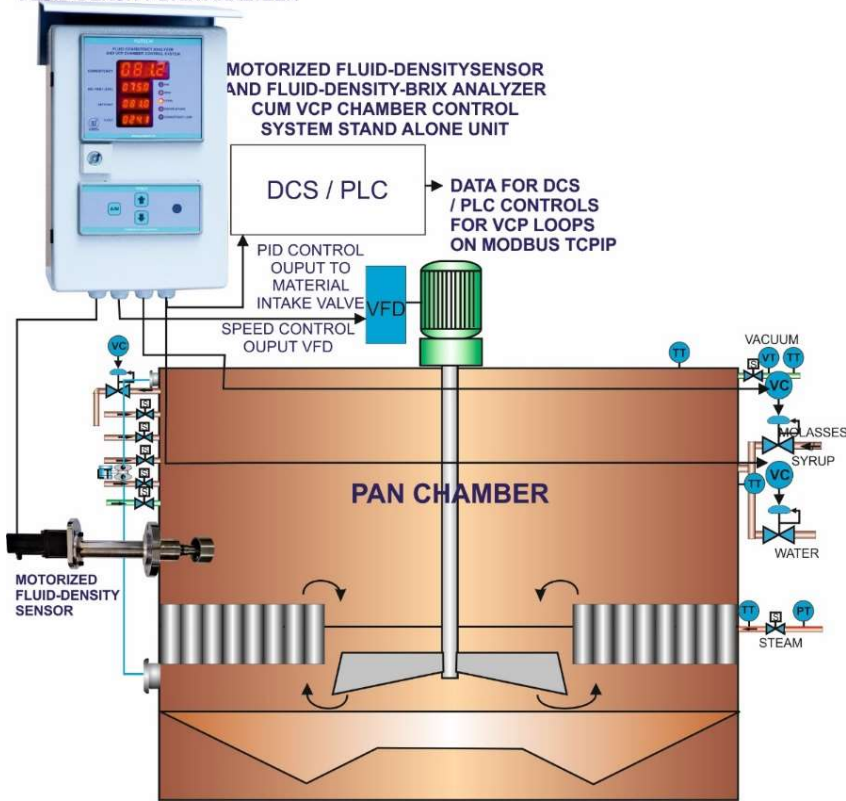
# VERTICAL CONTINUOUS PAN AUTOMATION

BASED ON YUTECH FLUID-DENSITY-BRIX ANALYZER CUM CONTROL SYSTEM AND MOTORIZED FLUID-DENSITY SENSOR



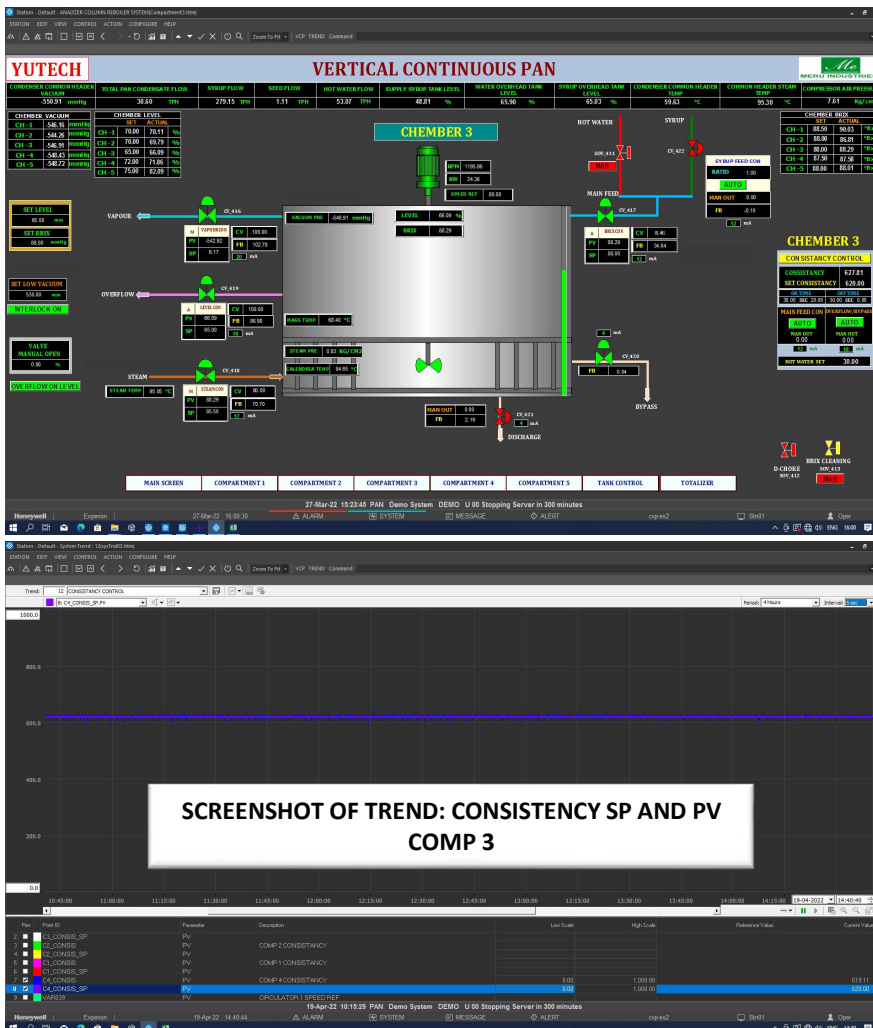
**YUTECH**

## FLUID-DENSITY-BRIX ANALYZER



## VERTICAL CONTINUOUS PAN AUTOMATION ADVANTAGES:

- MAINTAINED SEED-TO-SYRUP RATIO AT ALL TIMES, ENSURES CONSTANT GOOD QUALITY PRODUCT
- ACCURATE FLUID-DENSITY-BRIX SENSING IN EACH COMPARTMENT ENSURES MAINTAINED BRIX THROUGHOUT THE CHAMBER AT ALL TIMES
- MAINTAINED BRIX ENSURES VERY LITTLE OR NO ADDITION OF WATER THUS INCREASING EFFICIENCY
- STEPWISE INCREASE IN BRIX OF THE MATERIAL IN EACH CHAMBER IS ACHIEVED EFFICIENTLY TILL THE FINAL DISCHARGE
- VACUUM CONTROL AND MAINTAINED VALUE WITH TEMPERATURES MAINTAIN EQUILIBRIUM IN THE ENTIRE PROCESS
- VFD SPEED CONTROL AS PER PAN CHAMBER LEVEL ENSURES PROPER MIXING OF MATERIAL THROUGHOUT THE CHAMBER
- SYNCHRONIZATION BETWEEN THE PRECEDING AND NEXT CHAMBER IS MAINTAINED
- SEMI-AUTOMATIC / AUTOMATIC DROP CONTROL IN ABNORMAL CONDITIONS IS CONTROLLED AND THERE IS NO LOSS OF MATERIAL OR TIME
- ENSURED LOWER LOSSES AND VERY HIGH PROFITABILITY



# VERTICAL CONTINUOUS PAN AUTOMATION

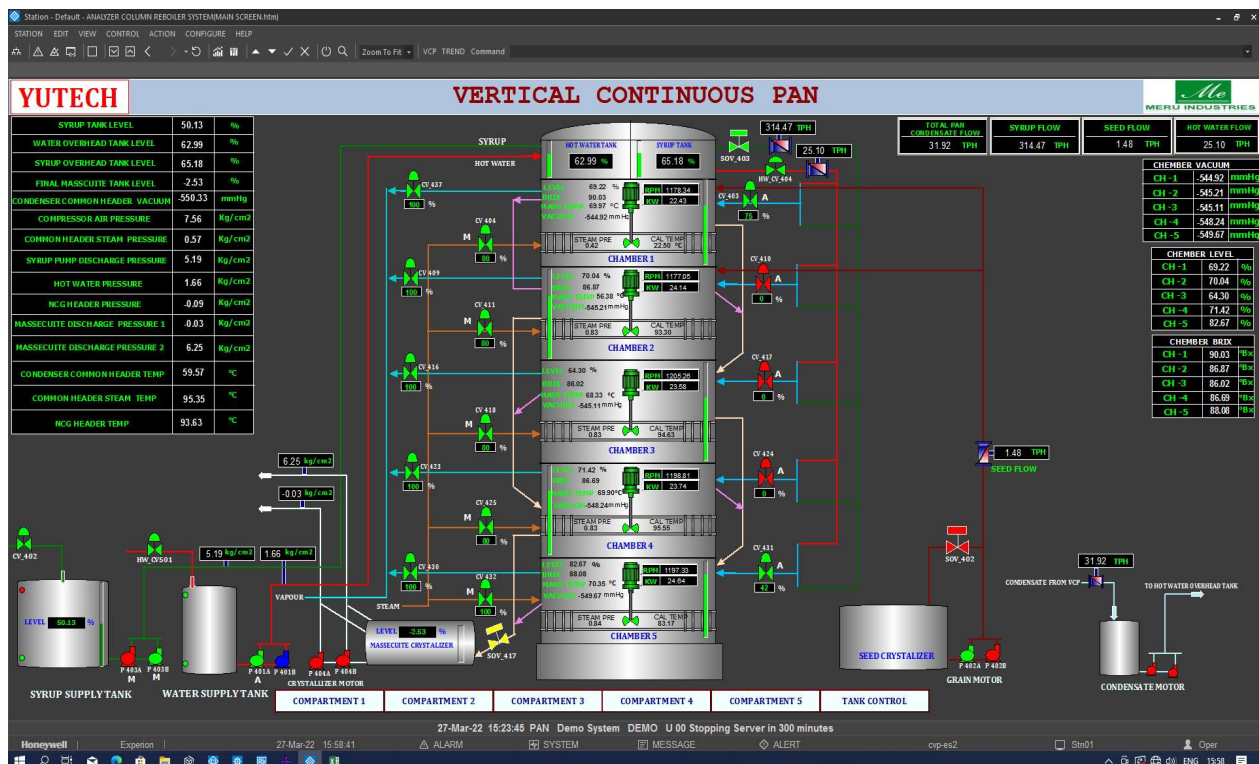
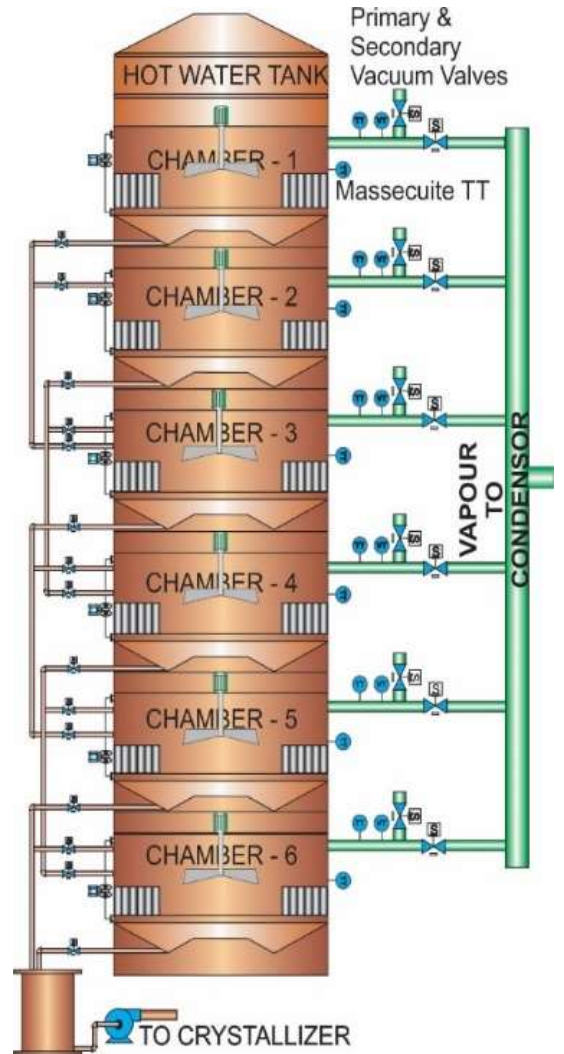
BASED ON YUTECH FLUID-DENSITY-BRIX ANALYZER CUM CONTROL SYSTEM AND MOTORIZED FLUID-DENSITY SENSOR



**YUTECH**

## VERTICAL CONTINUOUS PAN AUTOMATION:

- SEED / MAGMA AND SYRUP / MOLASSES FLOW SENSING
- SEED OR MAGMA FLOW CONTROL WITH RESPECT TO MOLASSES OR LIQUOR FLOW ENSURES MAINTAINED MOLASSES-TO-SEED RATIO
- FLUID-DENSITY-BRIX SENSING AND SYRUP / MOLASSES INTAKE CONTROL
- AUTO WATER INTAKE IN THE CHAMBER IF PROCESS CONDITIONS DEMAND IT WITH RESPECT TO FLUID-DENSITY-BRIX
- HEATING STEAM / VAPOUR CONTROL WITH RESPECT TO FLUID-DENSITY-BRIX
- VFD SPEED CONTROL AS PER PAN CHAMBER LEVEL
- TEMPERATURE SENSING THROUGHOUT THE PAN CHAMBER TO ENSURE UNIFORM TEMPERATURE INSIDE THE CHAMBER
- SEMI-AUTOMATIC / AUTOMATIC DROP CONTROL IN ABNORMAL CONDITIONS
- STANDALONE SYSTEM FOR PAN CHAMBER FLUID-DENSITY-BRIX CONTROL AND COMMUNICATION WITH MAIN VCP PLC / DCS SYSTEM



# VERTICAL CONTINUOUS PAN AUTOMATION

BASED ON YUTECH FLUID-DENSITY-BRIX ANALYZER CUM CONTROL SYSTEM  
AND MOTORIZED FLUID-DENSITY SENSOR



YUTECH approaches Vertical Continuous Pan Automation from the Process Point of View, not a typical Automation Perspective.

We aim to achieve maximum throughput in the same Batch Time by properly controlling process parameters to improve process dynamics, resulting in consistent maximum capacity production, with the best possible grain size and sugar quality. The following Procedures are performed in a Controlled Manner:

- Seed / Magma Flow Control with respect to Syrup / Molasses Flow as a Ratio Control.
- Auto Feeding of Syrup to each Compartment based on Fluid Consistency-Brix Sensing to maintain / build Preset Brix.
- Auto Selection of Syrup (or Molasses) or Water depending on Consistency-Brix
- Steam Control wrt Consistency-Brix
- Callendria Vapour / Heating Steam Pressure Control.
- Overall, Pan Vacuum Control by Condenser Automation.
  - Please check our Condenser Automation Presentation
- Masecuite Overflow Control wrt Compartment Consistency-Brix.
- Masecuite Bottom Drain Control wrt Consistency-Brix into next Compartment or Abnormal Conditions
- Bypass next Compartment and send material to another compartment wrt Level / other abnormal condition of next Compartment
- Wash Water and Wash Steam Intake after Material Discharge
- Intake of Fresh Material from Previous or Earlier Compartment and repeat procedure
- Seed or Magma Flow Control with respect to Molasses or Liquor Flow:
  - Molasses and Seed Flowmeters sense Flow.
  - Ratio Controller delivers exact Flow of Seed wrt Molasses Quantity by Controlling Seed / Magma Pump VFD.
- Individual Compartment Brix Control by Auto Feeding Molasses or Water into each Compartment:
  - Fluid-Density-Brix Sensing of each Compartment by YUTECH Fluid-Density-Brix Analyzer
  - Control of Molasses Intake Valve w.r.t., Consistency-Brix Set Point, and Process Value in a PID Mode
  - Addition of Water when required as per Process Dynamics.

# VERTICAL CONTINUOUS PAN AUTOMATION

BASED ON YUTECH FLUID-DENSITY-BRIX ANALYZER CUM CONTROL SYSTEM  
AND MOTORIZED FLUID-DENSITY SENSOR



## BASIC SCIENCE BEHIND FLUID-DENSITY-BRIX:

- **Fluid-Density:** the Density of a particular Fluid.
- **Density:** is defined as “**Mass per unit volume**”, which means it is the Mass contained in a fixed volume. It is denoted by “**ρ**” which is a Greek Letter called “**Rho**”.
- **Density** can be derived using the formula “**ρ = m/v**” where ρ is the Fluid-Density, m is the Mass and V is Volume. The unit to measure Fluid-Density is **kg/m<sup>3</sup>** (Kilogram per cubic meter).
- **Brix:** the measurement in percentage by weight of sucrose in pure water solution.
- Online Direct measurement of Brix in a Process Fluid is difficult, so indirect methods are used.
- **The most popular ways of measuring Brix are:**
  - **Hygrometric and Refractometric (Lab Methods)**
  - **High-Frequency or Radio-Frequency Conductivity type Brix Sensing**
  - **Microwave Type Brix Sensing**
  - **Fluid-Density Type Brix Sensing**
- While Conductivity or Microwave methods are very successful in measuring Brix of “**B and C**” Massequite in CVP, Brix of Sugar Melt, and Brix in a Molasses Conditioner unit, they cannot measure Brix of “**A**” Massequite as we measure the Fluid’s electrical quality which is variable.
- Fluid-Density Measurement using a Motorized Stirring Sensor proves very successful as it directly measures the Fluid’s mechanical quality irrespective of its electrical characteristics. Thus, measured Fluid-Density Value is further processed in the **Fluid-Density-Brix Equation**, to derive **Fluid-Density-Brix**.

## SALIENT FEATURES OF FLUID-DENSITY-BRIX ANALYZER:

- Fluid-Density Type Brix Analyzer System targets sensing the Fluid-Density of Liquids, Slurries, or Syrups like Sugar Massequite, Sugar Syrup, Sugar Melt, Liquors, and Molasses.
- The Motorized Fluid-Density Sensor is specially designed to be inserted in a vessel to stir the Fluid Media and Measure its Fluid-Density which can be expressed in simple terms as the Tightness or Thinness of a Fluid Media. It can also be informally referred to as the Consistency of the Fluid and is a Mechanical Property of a Fluid which in Liquids is directly proportional to its Viscosity.
- Motorized Sensor’s torque and power which is required to stir the Fluid varies with varying Fluid-Density.
- The Motorized Fluid-Density Sensor’s Power Consumption is directly proportional to the Fluid’s Density.
- The variation in the Motorized Fluid-Density Sensor’s Power Consumption is sensed by the Fluid-Density Type Brix Analyzer’s highly accurate Sensing Circuitry, this deviation is further processed to Derive the Raw Fluid-Density Value.



## FLUID CONSISTENCY-BRIX ANALYZER AND CONTROL SYSTEM WITH FLUID-DENSITY SENSOR

FOR MORE DETAILS, PLEASE SEE THE PRESENTATION ON OUR WEBSITE [www.yutechautomation.com](http://www.yutechautomation.com).

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