

# Efficient Extraction of Sucrose

Solutions for the Sugar Industry



Reduce  
Carbon  
Emission



Improve  
Productivity



Reduce  
Water  
Wastage



Enhance  
Product Quality



Reduce  
Fuel  
Consumption



# Sugar Industry

Sugar is a widely used commodity the world over, not just as a sweetener but also for preservation, texture modification, and as a colouring and bulking agent. Currently, about 110 countries produce sugar, and sugarcane, on average, accounts for nearly 80% of global sugar production.

Being a food product the sugar manufacturing process is highly sensitive, and process variations can adversely impact its colour, taste, crystal size, etc. Sugar manufacturing is also highly energy and water intensive. High production costs, coupled with challenges like short crushing seasons, can affect the profitability of these plants.

For over 75 years, Forbes Marshall has provided innovative products and services to help industries improve their process and energy efficiency and be more environmentally responsible. We have partnered with major sugar plants globally, with capacities ranging from <1000TCD to >10000TCD, encompassing sugar processing, sugar refining as well as integrated distilleries

Our fully engineered solutions for the boiler and turbine house, mill house, boiling house, distillery, water treatment and effluent treatment help address bottlenecks and conserve energy, offering a typical return of investment of 1-2 seasons.

## Icon Key



**Reliability**



**Safety**



**Productivity**



**Ease of Operation**



**Environment**



**Energy Efficiency**

### 1 Control Room

### 2 Utilities

- a. ETP
- b. Compressor Room
- c. DM Plant
- d. Cooling Tower

### 3 Cane Handling and Milling

- e. Cane Unloading
- f. Cutter
- g. Shredder
- h. Milling Section

### 4 Boiler

### 5 Cogen

### 6 Boiling House

- l. Juice Tanks
- j. Juice Heaters
- k. Lime Sulphitation
- l. Clarifier
- m. Evaporators
- n. Vacuum Pan
- o. Crystallizer
- p. Centrifuge
- q. Sugar Silo and Bagging
- r. Molasses Tanks

### 7 Distillery

- s. Fermentation Tanks
- t. Distillation
- u. Ethanol Storage Tanks

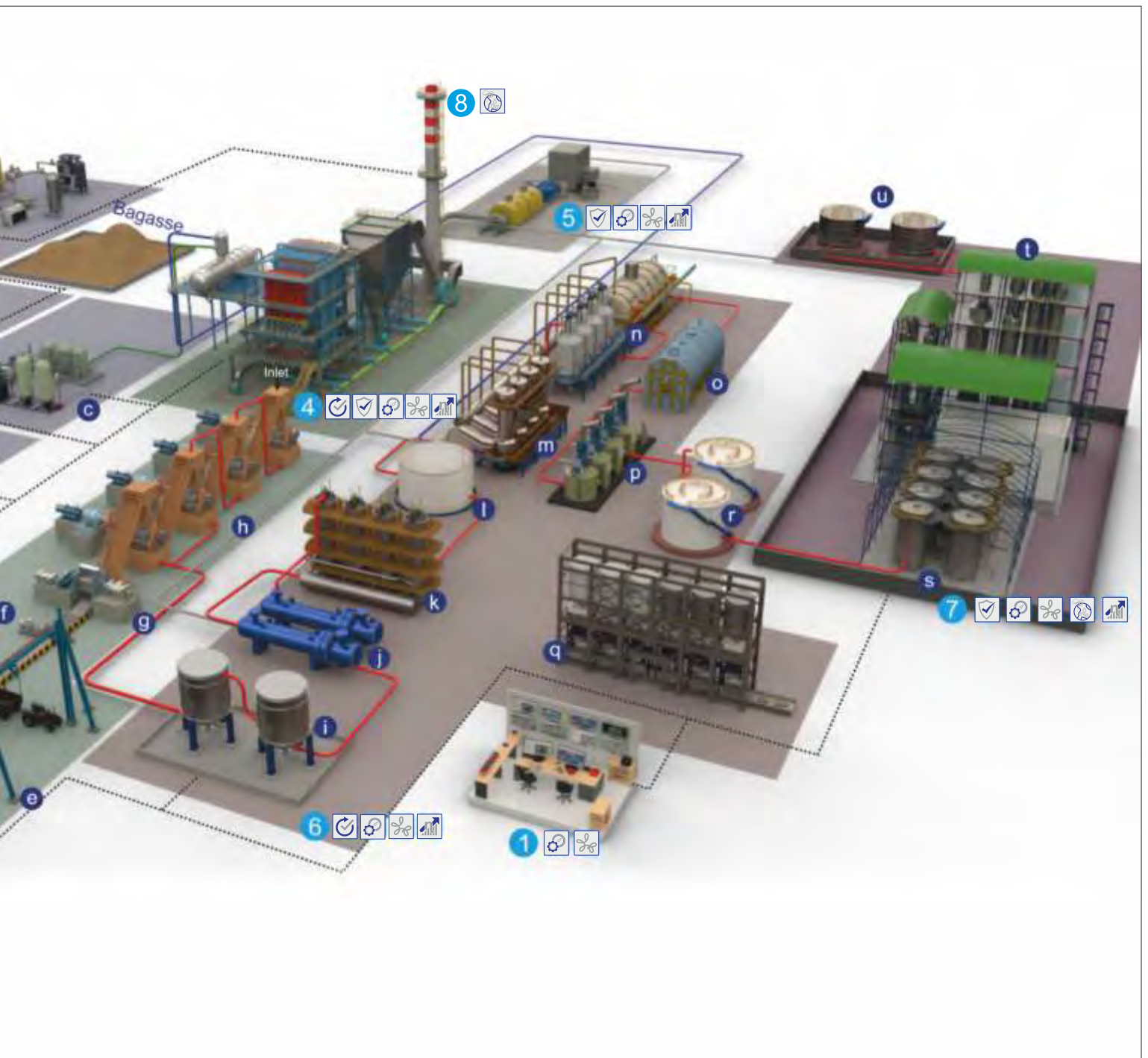


- **Process Line**
- **Water Line**
- **Steam Line (SH)**
- **Stem Line (Sat)**
- **Air Line**
- - - - **Electrical Line**

## Process Efficiency

With our diverse industry experience and process knowledge, we help to improve quality, consistency and accuracy of your process. We offer a wide range of measurement, control and instrumentation solutions for key process and utility parameters like pressure, temperature, flow, level and pH. Our solutions for the sugar industry help maintain quality parameters like colour and crystal size, prevent sucrose loss and optimise the load on the boiling house.

We provide complete turnkey solutions right from design, detailed engineering, drawing, documentation, supply and supervision of installation and commissioning services of the simplest to most complex industrial processes.



## Energy Efficiency

Through our range of products and services we enable plants to operate at benchmark efficiency and bring down the consumption of bagasse. For sugar processing, we work towards reducing energy consumption to 15% and to 0.6% for the distillery.

Through our monitoring and control solutions for the boiler house we help optimise its operating efficiency. Our range of steam accessories enables distribution of steam at the right quality, quantity with the lowest losses while our recovery solutions enable plants to maximise condensate and flash steam recovery.

Through diagnostic systems and software we help keep track of exactly how much energy is consumed, where it is going.

## Environment

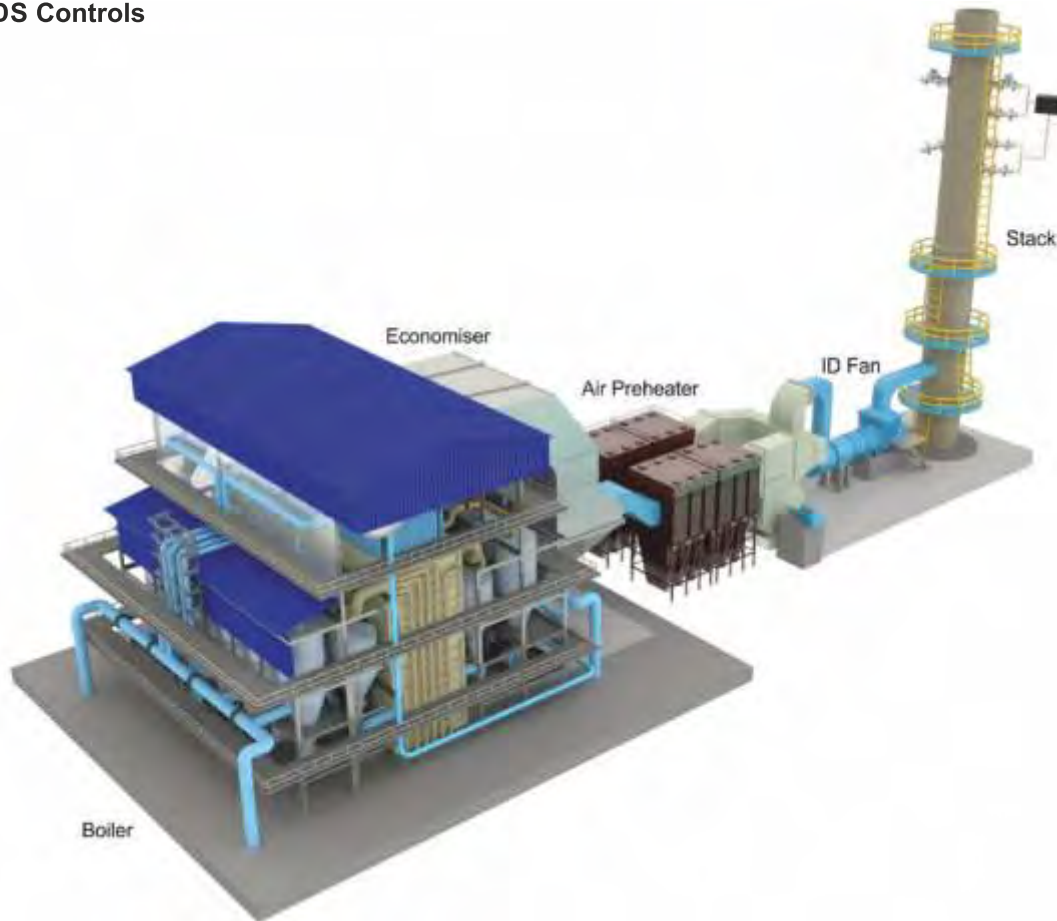
Industry is a major contributor to air and water pollution worldwide. Forbes Marshall's pollution monitoring equipment helps plants comply with set norms and regulations and reduce their environmental impact. High quality instrumentation for analysing combustion processes and emissions help measure and monitor greenhouse gas and dust emissions. Our range of water quality analysers for effluent treatment plants help monitor parameters like pH, BOD, COD, TSS etc.

We also offer a wide range of products and services to monitor water quality (raw water, ground water, RO, DM, process water) and optimise its consumption in the plant.

Through a range of digital solutions and services we are able to sustain the uptime of emission and effluent monitoring systems at >85% and reduce the water foot print of the plant.

By enabling energy efficient operations we are able to reduce plant fuel consumption by about 13-15% thus reducing CO2 emissions.

Boiler and PRDS Controls



**Boiler Efficiency, Environment, Safety Automation System (BEESAS)**

BEESAS ensures intelligent safety, smart controls, peak efficiency and lowest downtime at all operating conditions of the boiler. It is fully automatic with no manual intervention, and hence, no compromise on safety, performance and efficiency of the boiler which results in guaranteed savings.

**Benefits**

Intelligent safety: Ensures that the boiler always starts, runs and stops in safe operation. Safety management system incorporated.

Smart controls: Pressure, feeder, forced and induced draft controls

Smart GUI: Interactive GUI, easy to operate

Real time data trends and patterns

DCS control platform connectivity (optional) (redundancy, hot swapping, large data-event logging and remote monitoring)

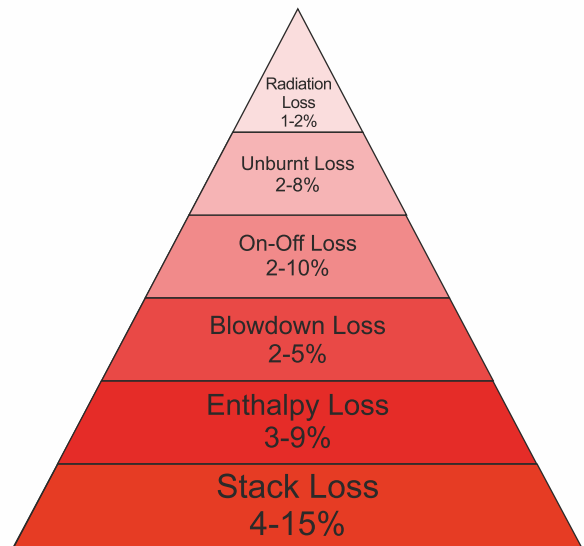
Direct and indirect efficiency analysis: Self-learning to identify the best operating point

Smart feeder control: Heart of the system. Automated feeder control, ID control and FD air control

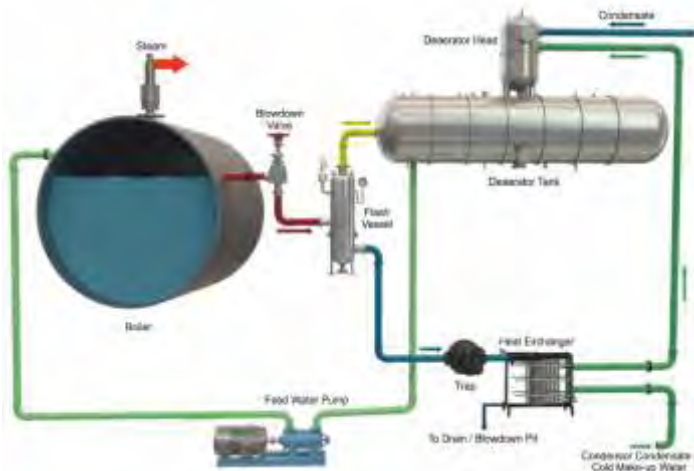
Drum level control: To minimise the shrinking and swelling effect in the boiler drum for enhanced steam quality

Drum TDS control: To enhance the boiler life by maintaining the hardness below unsafe limit

ID and FD draft control: Furnace draft controlled in band of 1 to -5 mmWC and FD regulated through O<sub>2</sub> trim



### Boiler Blowdown Control and Heat Recovery System



In many plants, blowdown is a manual and pre-scheduled activity, where the blowdown is vented to drain.

An automated blowdown control system ensures blowdown is done only as and when required, thereby ensuring efficient operations. Through online TDS measurement, the set TDS level is continuously maintained.

The heat from the blowdown is recovered using a well designed flash vessel. The flash steam generated at preset pressure is routed to the deaerator. The hot condensate from the flash vessel is then routed through the heat exchanger to be used for preheating either make-up water or return condensate or juice.

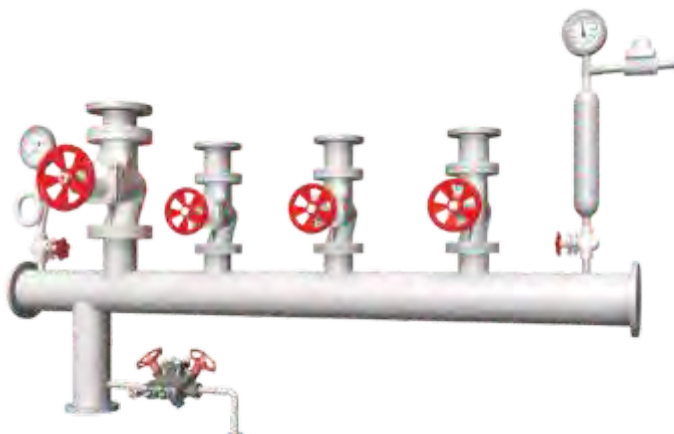
#### Benefits

Increased boiler efficiency

Reduction in bagasse consumption

Steam consumption in deaerator reduced by 3-4%

### Superheated Steam Distribution Header Piston Valves



With gate valves for isolation on the header, gland sealing leakages is an issue. The condensate from this distribution header is evacuated through a globe valve of size of 2 inch or 3 inch, depending on the header size. During plant start-up, a substantial amount of condensate is formed in this area. The start-up time varies between two to eight hours. During this start-up time, the entire condensate formed in this header is drained by the globe valves, resulting in a substantial amount of heat loss. This continues even after the warm up due to the passing globe valve or through gland leakage.

We offer to study the existing superheated steam distribution header and recommend correct drip leg size and location of the trap.

Forbes Marshall piston valves are the best technical fit to cater to isolation applications.

#### Benefits

Class VI bubble tight shut-off

No gland leakage with glandless design

No water hammer effects

Soft seated sealing

In-line maintenance

No wire drawing

**Compact Module Thermodynamic Traps (CMTD)**



A properly engineered compact trap based condensate evacuation system, results in substantial reduction in the energy lost during plant start-up. The Forbes Marshall compact thermodynamic steam trap with built-in piston valves is the ideal mainline trapping solution handle varying loads.

**Benefits**

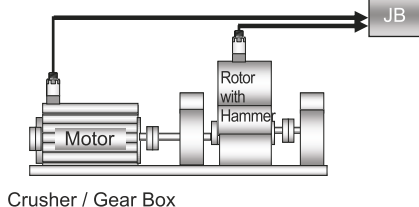
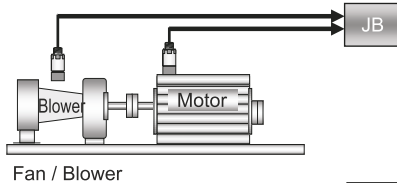
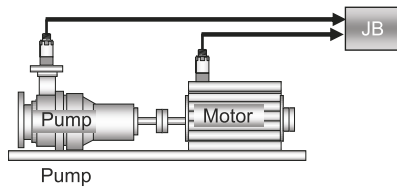
- Ease of installation
- Low cost of ownership due to less inventory
- Reliable performance guarantees improved uptime and reduced safety hassles
- Reduced noise level and erosion for applications with open to atmosphere discharge
- Quick and easy inline / online maintenance
- Less wear and tear

**Vibration Monitoring for Rotating Equipment**



We offer simple, compact and reliable velocity vibration transmitters, to monitor the imbalance / wear and tear of bearings of critical rotating machines.

- Pumps and motors: BFWP, CEP, etc.
- Fans and motors: ID, PA, SA, FD, CT, ACC, etc.
- Gear boxes / fiberizer / mill rollers / HT motors / compressors



# Boiler

## Valves

Superheater attemperator spray control valve



Fixed nozzle desuperheater



Spring loaded safety relief valve



Combined pressure reducing and desuperheating valve



Blowdown control valve (angle pattern)



Blowdown control valve (straight pattern)



Roboter Pressure Control Valve



Pneumatic Control Valve



In the boiler section water, steam and air are used at various stages. It is important to precisely control the pressure, temperature, flow and level of these fluids, depending on the application.

We offer,

Boiler blowdown control valves (continuous and intermittent)

Soot blower control valve

Start-up feed water control valve

Feed water pump re-circulation valve

Main feed water control valve

Superheater attemperator spray control valve

Deaerator level control valve

Deaerator pegging steam control valve

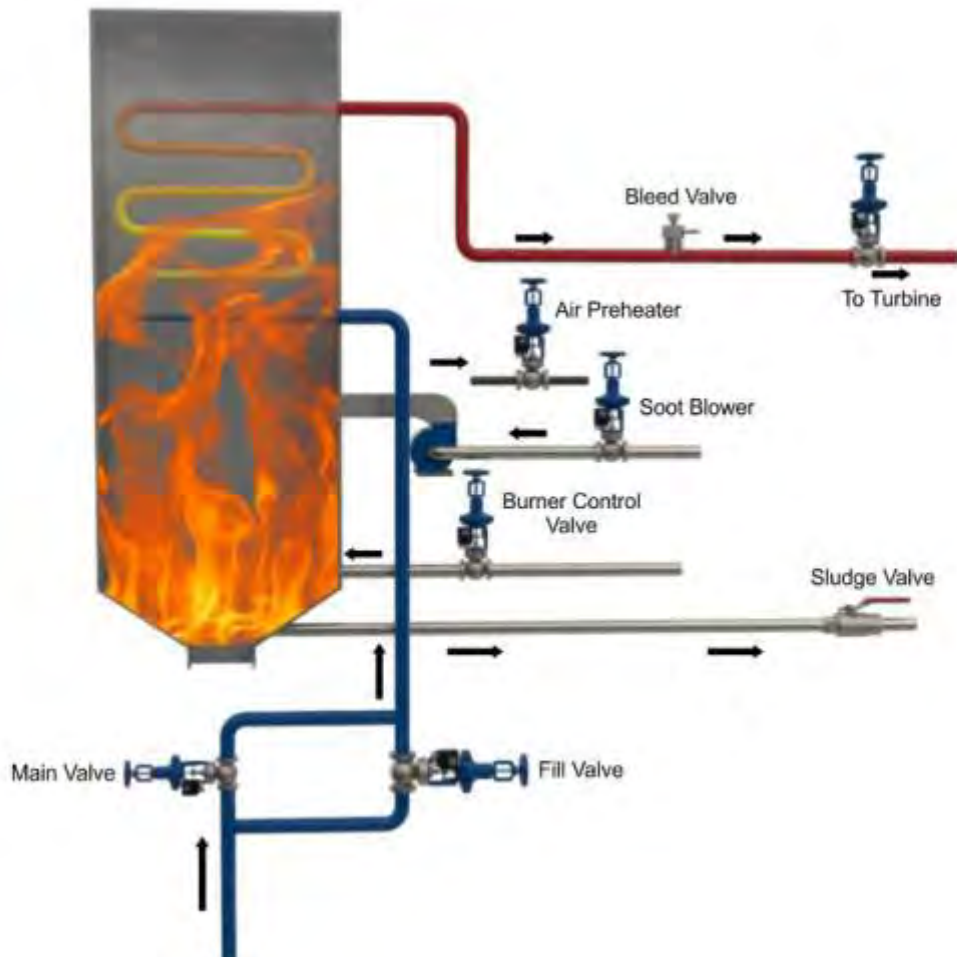
Condensate recirculation valve

High and low pressure drain valve

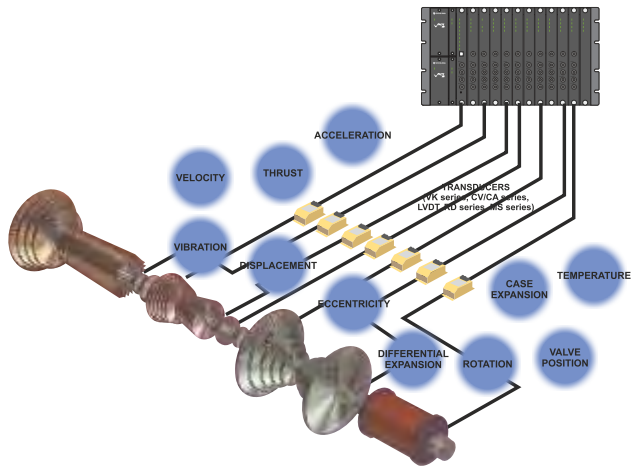
Spring loaded safety relief valve (AMSE Sec. VIII)

Silencers

Combined pressure reducing and desuperheating valve



**Complete Turbo Supervisory System for Turbine with Monitors and Sensors**

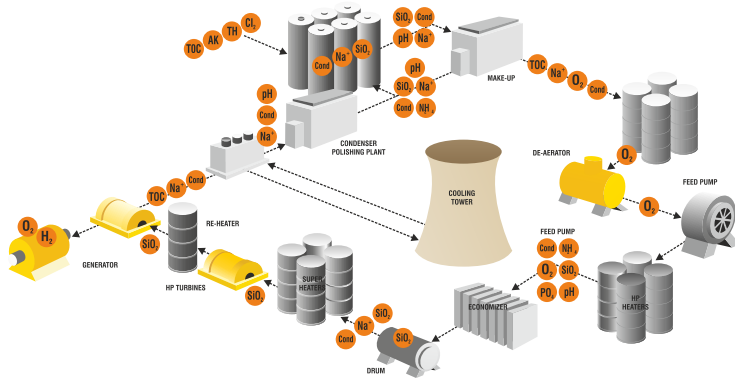


Monitoring vibrations of the complete turbine, shafts, gear-box and alternator for any misalignments, wear and tear and imbalance with casing expansions is most crucial. Forbes Marshall offers a complete solution along with sensors, cables, mounting accessories, monitors, spares and support services for installation, calibration, maintenance and analysis as well. We also offer expert services through remote analysis.

**Benefits**

- Remote vibration monitoring solution
- One-stop-shop for engineering, supervision of erection and commissioning, spares and support services
- Consultancy services with calibration service and certification during overhauling, as desired by insurance agency
- Backward integration with existing systems of other make
- Ease of replacement of compatible sensors and monitors on one-to-one basis

**Steam and Water Analysis System**



Monitoring chemical parameters for water and steam at various points in the boiler and turbine section is a must for the healthy up-keep of the plant. Forbes Marshall offers sample handling and conditioning system (wet panel) along with all the analysers for pH, conductivity, specific conductivity, DO, silica, sodium, phosphate, etc. in the boiler feed water, drum steam, superheated steam and condensate. The system helps prevent damage to and increase efficiency of the turbine and boiler tubes by monitoring the parameters leading to corrosion and erosion.

**Benefits**

- Ease of operation and maintenance
- Systems compliant with local and international standards
- Compact and modular design
- Small footprint, easily expandable
- Engineering, supervision of erection and commissioning, spares and support services
- Support through annual maintenance contracts and training of plant operators
- One-to-one compatible sensors and monitors
- Easy to integrate and/or switch over from other makes



### Pressure Reducing and Desuperheating Stations (PRDS)



Design, manufacturing, supply and support services with process guarantee for PRDS for turbine bypass, ejector steam, etc. Plant specific engineered desuperheater for exhaust steam with complete engineering and process guarantee, to ensure constant temperature steam required for good quality process in the plant.

#### Benefits

Ease of operation and maintenance

Compact foot print

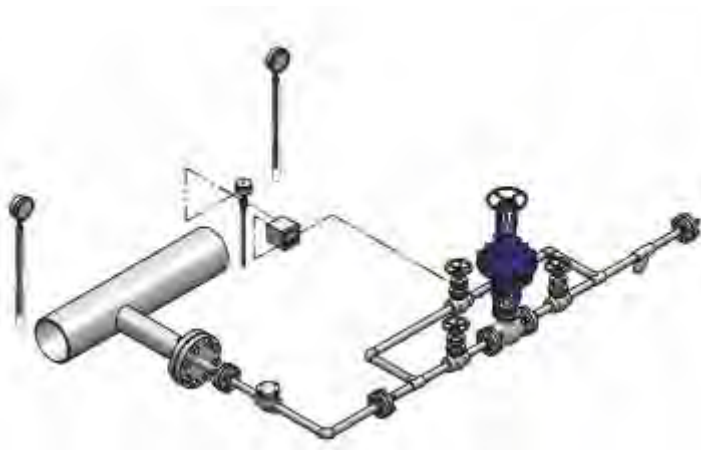
Engineering, supervision of erection and commissioning, spares and support services

Complete engineered solution with process guarantee for superheated steam and exhaust steam temperatures

No condensate being drained

Get away from issues with balloon type desuperheaters and waste drain of condensate

### Turbine Exhaust Desuperheating Station



The turbine in the cogeneration plant of a sugar mill is driven by superheated steam from the boiler. The turbine exhaust steam is low pressure, however superheated. To obtain saturated steam, a desuperheater is required. A balloon type desuperheater has its own design and performance limitations. Even a nozzle type desuperheater, if not engineered properly, can affect the sugar process in terms of quality and consistency.

The perfectly engineered Forbes Marshall fixed nozzle desuperheater is paired with a spray control valve to eliminate all the above technical issues. We recommend a minimum of 4m of straight length from the point of water injection, feedback temperature sensor to be located at 12m distance and no trap in between. This will ensure spray in perfect mist form, homogenization of water with consistent delivery of steam and high quality steam for the boiling house.

#### Benefits

Supply of consistent and quality saturated steam with constant temperature for sugar process

Saves energy and optimises the process by eliminating pumping of excess quantity of spray water and subsequent draining of the same at the outlet

No temperature variations

No condensate drainage

### Imbibition Flow Control System



Adding the appropriate quantity of hot water in the last mill, to extract maximum sucrose from the cane, is important. Forbes Marshall offers a complete imbibition flow control system with electro-magnetic flow meter, pneumatic globe control valve and suitable controller.

#### Benefits

- No manual intervention
- Speedy process
- Increased reliability
- One point monitoring and controlling

### Juice Flow Stabilisation System



Ensuring constant juice flow to evaporators in the boiling house is a task. Forbes Marshall offers a complete system consisting of the coriolis mass flow meter with built-in brix, density and temperature measurements and/or electro-magnetic flow meter for juice flow measurement, pneumatic globe control valve on the re-circulation line, radar level transmitter for tank level monitoring and suitable controller for this with single point responsibility.

#### Benefits

- No manual intervention
- Speedy process
- Increased reliability
- One point monitoring and controlling

**Lime Sulphitation Control System**



Adding the exact quantity of milk of lime (MoL) into the sugarcane juice to clarify it from impurities and get white crystals is a crucial process.

Forbes Marshall offers a complete lime sulphitation control system consisting of,

- °Brix analyser for MoL concentration
- Electro-magnetic flow meter for measuring flow of sugarcane juice and MoL
- Pneumatic notch valve for MoL and pneumatic butterfly/damper valve for SO<sub>2</sub> gas control
- Multi-loop controller with logics
- pH sensor in retractable holder with built-in cleaning facility for consistent and reliable pH measurement

**Benefits**

- Completely automated with proven logic and systems, no manual intervention required
- Consistent quality process, to ensure whitest crystals with reduced cycle time
- Increased reliability
- One point monitoring and controlling
- Online pH measurement using auto-retractable and auto cleaning of pH sensor
- MOL flow and °brix measurement for guaranteed process results
- System components to overcome effects of process build-ups and high temperatures

**Flow and Level Measurement**



Juice, syrup, molasses with increasing viscosity are the various stages during sugar manufacturing. The flow rate, as well as the level in the relevant equipment such as feed tanks, evaporators, pans, storage tanks, etc., needs to be measured at every stage. Our state-of-the art electro-magnetic flow meters, coriolis mass flow meters with density and temperature (optional – °brix or concentration) accurately measure flowrates of raw water, soft water, chemicals, raw juice, hot juice, concentrated juice, syrup, molasses, etc.

We also offer vortex flow meter for saturated steam and condensate flow measurements.

Our range of contact and non-contact type radar level transmitters for water tanks, juice tanks, evaporators, pan, syrup and molasses tanks and sugar silos are highly cost-effective and reliable measuring aids.

**Benefits**

- High accuracy and reliability
- Measurements not influenced by changes in particle size or viscosity
- Variety of end connections, configuration, material of construction, antennas – to suit specific application

### Compact Module Two Orifice Float Trap



Most of the saturated steam is utilised in the boiling house. The first body evaporator, sulphur burner, superheated wash water and air dryer utilise steam. Vapours generated in the first effect and subsequent effects of evaporator bodies are used for heating. This is basically wet steam, containing high degree of moisture. As the vapours are at low pressure and high volume, the headers carrying them are little oversized resulting in condensate formation in these headers.

Removal of condensate is essential for efficient heat transfer and prolonged life of equipment and piping, which otherwise get eroded due to hammering effect. Usually we see a 2" or 3" pipe being run down from the header directly and a drain valve or a thermodynamic trap connected at the end of this pipe, before draining. The thermodynamic trap is not capable of handling high condensate discharge flow rates, hence usually it is bypassed, thereby venting steam/ vapour.

Forbes Marshall offers to study the piping layout, suggest appropriate drip leg size with drain pocket at required locations. The drain pocket installed with the Forbes Marshall compact module two orifice float trap ensures that condensate and moisture are effectively removed leading to optimum heat transfer thereby saving energy.

#### Benefits

High accuracy and reliability

Measurements not influenced by changes in particle size or viscosity

Variety of end connections, configuration, material of construction, antennas – to suit specific application

### Condensate Contamination Detection and Flow Diversion System



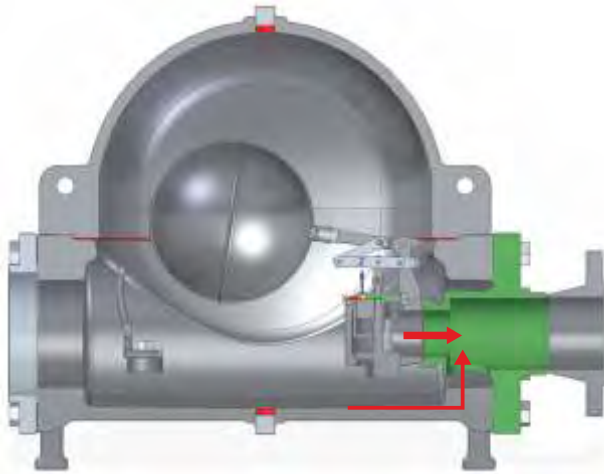
Occasionally, the tube puncture or leakage in evaporator contaminates the condensate, making it unsuitable for use in boiler circuit. Forbes Marshall offers a complete system using conductivity sensor based contamination detection along with a 3-way pneumatically operated diverting globe valve. This ensures immediate detection and diversion of contamination in the return condensate.

#### Benefits

Online contamination detection and automatic diversion

Saves load on deaerator and ensures uninterrupted steam generation

### Evaporator Condensate Evacuation System



Capacity - 70 TPH for 0.5 barg AP

Major consumption of steam in the sugar plant is in the first effect evaporator. 1.5 bar g steam is used to heat the juice to increase its concentration. Steam consumption is very high in this area during start-up after every cleaning cycle. Even in normal running conditions, the steam consumption is higher than the theoretical requirement as there is no control on condensate evacuation. A good condensate evacuation system ensures that the steam is held in the heating area till it loses all its latent heat and gets converted into condensate. The Forbes Marshall evaporator condensate evacuation system can reduce steam consumption by up to 4% in a controlled heating environment thereby resulting in substantial savings.

#### Benefits

Increased heat transfer efficiency with controlled condensate removal helps energy conservation

Reduction in steam consumption by 3 to 4%

### Flash Recovery and Steam Driven Condensate Return System



The condensate from the first effect evaporator is routed through a small flash separation tank. In most plants, the flash is vented. In some, the flash line is connected to the vapour line going to the second effect. The condensate is routed through CIGAR / heat exchanger system in some plants for liquid to liquid heat transfer. The condensate is then pumped to the feed water storage tank or the deaerator, using electrically operated pumps. We often see lot of steam being vented or flashing at most of these points. Seals are leaking at these pumps, impeller maintenance is a big issue, electricity consumption is high and temperature of the condensate going to the boiler circuit is low.

The Forbes Marshall flash header with multiple steam driven condensate return pump systems, pumps the condensate back at higher temperature (close to sensible heat) directly to the deaerator. This reduces the deaerator steam consumption by 2 to 4 TPH. Further, the flash steam is fully recovered from the common header, which is totally dry. This can be either mixed with the wet vapours of the first effect making the heating in subsequent evaporators and pans more efficient due to the increased dryness. Alternatively, it can be used for juice preheating.

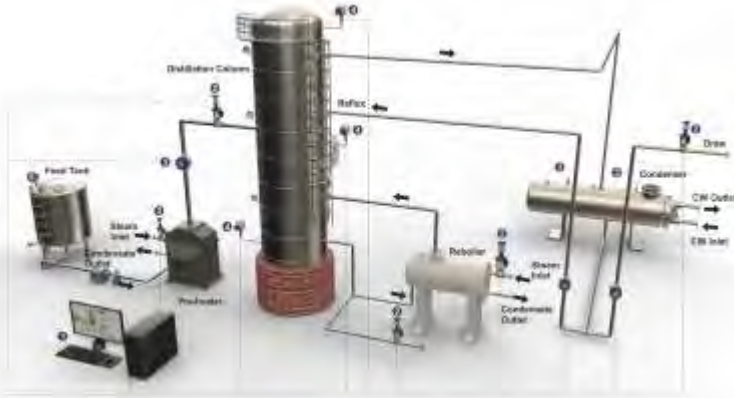
#### Benefits

Condensate is returned at a higher temperature in the deaerator, reducing deaerator steam consumption by 2 to 4 TPH

Optimum flash recovery and effective heat transfer

Maintenance free condensate pumping with saving of electrical energy consumed for condensate pumps

### Distillation Column Automation



Specialised instrumentation packages for molasses fermentation control systems including molasses sterilisation, temperature control, pH control, anti-foam control, etc.

Specialised instrumentation packages for distillation columns in alcohol industry to provide substantial savings on steam, consistency in alcohol quality

Instrumentation and control for biogas generation plants

#### Benefits

Higher throughput

Consistent product quality

Savings on utility cost

Safety

User flexibility

### Coriolis Mass Flowmeter



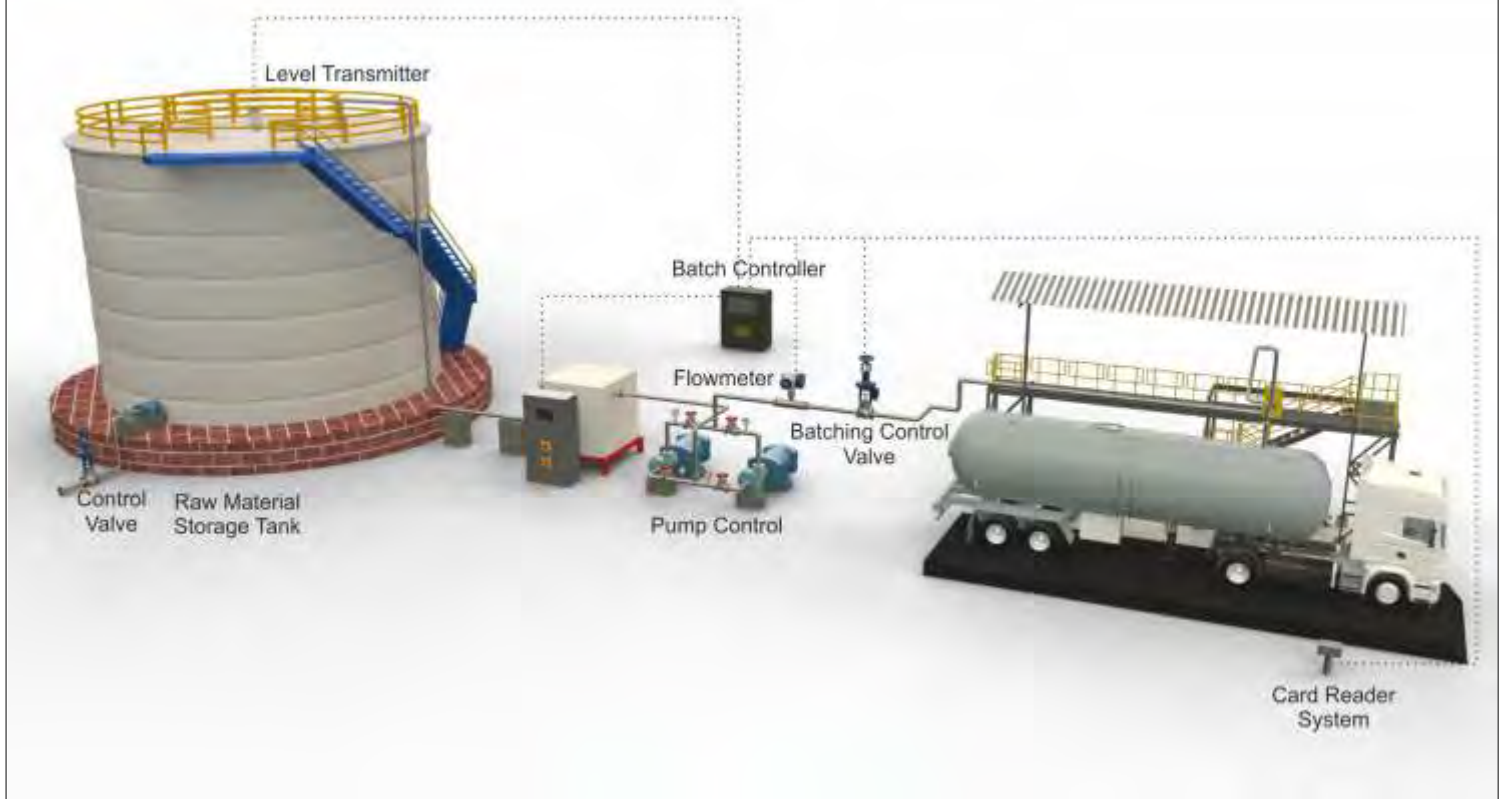
Apart from power boiler systems and accessories, we offer coriolis mass flowmeter with temperature and °brix measurement which is crucial for deriving the efficiency of spent wash fired boilers.

### Control Valves



In the distillery process, water, steam, air, raw feed stocks and intermediate stage liquids need to be controlled at various stages. For precision control of the pressure, temperature, flow and level of these fluids, depending on the applications, we offer pneumatic globe control valve

## Alcohol Dispensing System



Dispensing the alcohol/ ethanol into tankers is a task. Traditional PD meter based systems are manual and have a lot of limitations and maintenance issues.

Forbes Marshall offers a complete skid mounted system with mass flow meter, batcher-cum-controller, digital control valve and accessories. PC based ticket printing, invoice generation, data logging and interface with central control system are the other features. Safety interlocks like earthing protection, overfill protection, authentication, emergency start-stop are embedded. The system ensures all transactions at standard volume, with required conversions.

### Benefits

- Ensure quick and accurate transfer with zero loss
- Increased safety
- Reduced error
- Automated report generation

### Steam Operated Pump Trap



Forbes Marshall recommends for correct drip-leg size and location, type and size of trap for steam lines based on a detailed survey and study of the plant.

In some applications, the condensate stalls in the trap, due to back-pressure. For such applications, to evacuate the condensate, we recommend the installation of a steam operated pump trap for effective removal of condensate, using steam as motive to push it further.

#### Benefits

Effective condensate removal in case of stalled condition

Transfer of condensate without use of additional energy

### Flash Steam and Condensate Recovery



The distillery of a sugar plant is located away from the sugar / cogen boiler and is a separate unit. Condensate from the first effect evaporator condensate is poorly handled and, in many plants, not returned to the deaerator. Even when it is returned, the electrical energy consumed is high and the return condensate temperatures are low.

The Forbes Marshall pressure powered pump packaged unit driven by steam/ air keeps energy requirements to the minimum. This unit has flash separation with steam driven condensate return pump. The condensate is pumped back at 105°C directly to the deaerator. This reduces the deaerator steam consumption. The flash steam is recovered from the header of this pump, which is totally dry. It can be either mixed with the wet vapours of the first effect, to have dry vapour in the vapour line, making the heating in subsequent evaporators more efficient due to the increased dryness. Alternatively, it can be used for preheating.

#### Benefits

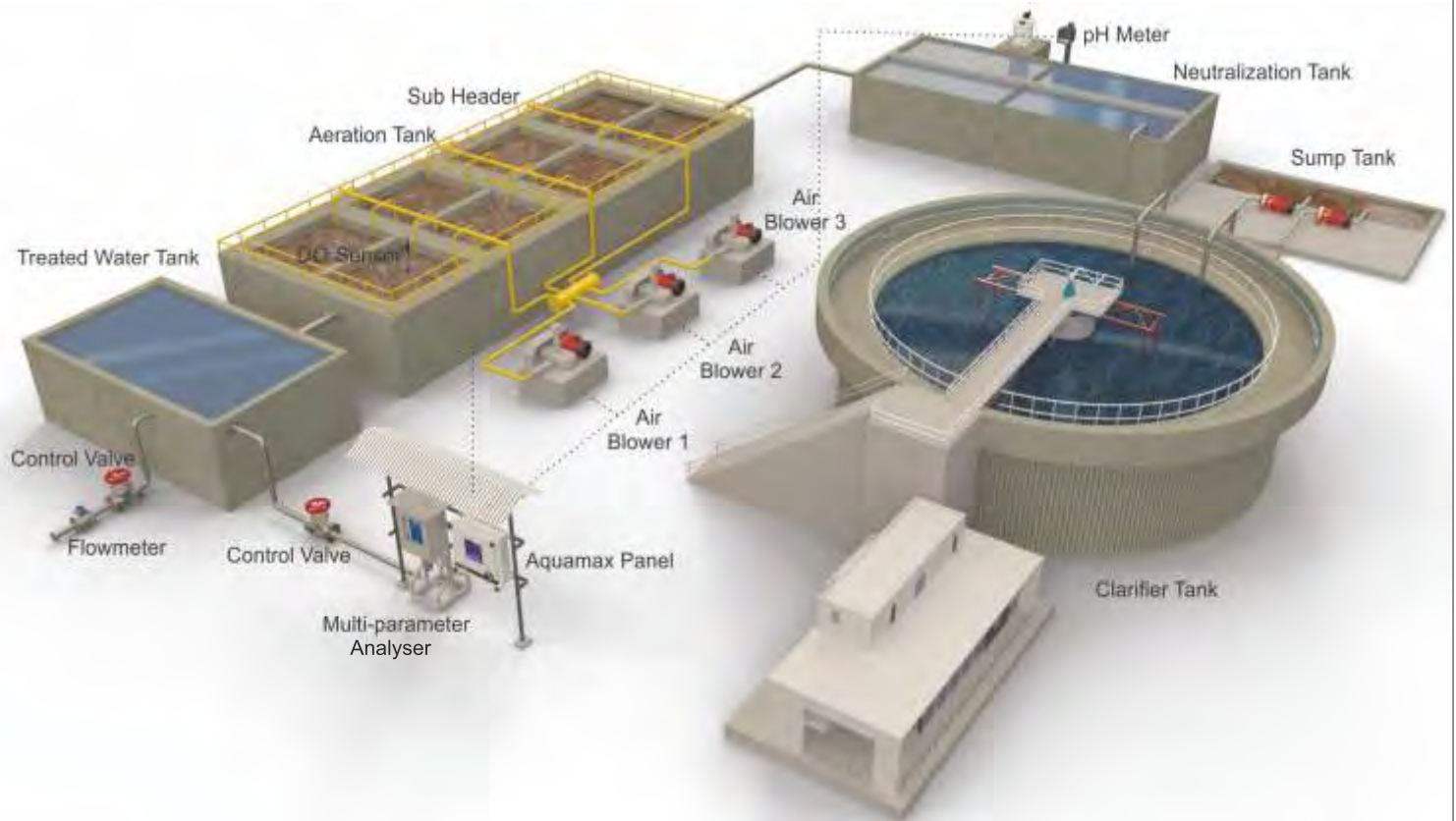
Condensate is returned at higher temperature in deaerator, reducing deaerator steam consumption

Flash recovery and effective heat transfer

Maintenance free condensate pumping with saving of electrical energy consumed for condensate pumps



ETP Automation



Handling the wastewater output from a process industry, treating it before disposal and meeting stringent pollution board norms has always been a tedious task. Therefore, it becomes very essential to run the effluent treatment plant effectively to achieve the desired results as well as optimise the process so that the cost of operation is minimal.

**The Forbes Marshall Solution**

Complete automation packages for ETPs to ensure precise online monitoring of the effluent and control the treated water quality with energy efficient solutions.

AquaMax, an energy efficient DO based aeration control system that monitors and controls the dissolved oxygen levels with optimised operation of the aerator. It also helps reduce electricity bills as a direct benefit with a defined ROI period.

pH Monitoring and dosing system for the neutralisation pit of an ETP to control treated water quality

Flow monitoring of effluent at inlet and outlet of the ETP to keep a track of the incoming loads and outlet quantity

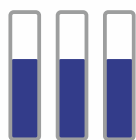
Multiparameter analysers for measurement of COD/BOD/pH/TSS for compliance to comply the PCB norms

**Benefits**

Direct electrical energy savings in terms of reduced bills



Stabilized DO/COD and BOD levels



Maintenance free sensors for continuous monitoring



Reduced operational cost of ETP



Automated recording and reporting



**Continuous Emission Monitoring**



GCEM  
Insitu Multi Gas Analyser



DCEM  
Dust Monitor



VCEM  
Insitu Flue Gas Flow Monitor

**Effluent Monitoring**

**Multi-parameter Analyser**



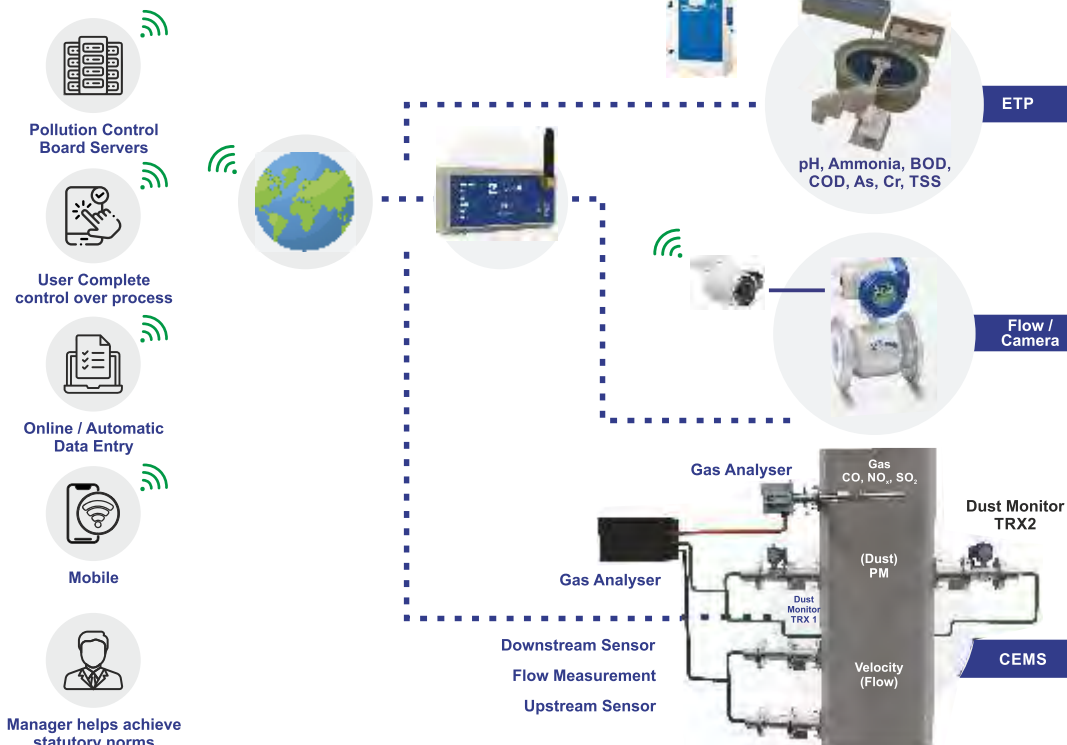
Parameters :  
Ammonia, COD,  
BOD, TOC,  
hydrocarbons,  
nitrate and  
fluorescent  
tracers

**Aqua4Trans  
Multi-channel Transmitter**



Parameters :  
pH/ ORP,  
dissolved oxygen  
and conductivity /  
TDS, free chlorine,  
chlorine dioxide,  
turbidity and  
suspended solids

**Real Time Monitoring**



Flue gases from boiler are exhausted from the stack. These gases contain SO<sub>x</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>, dust, etc. To know and calculate the total emission, velocity and flow metering is also essential.

For boiler efficiency, one needs to know the concentration of gases passing through the stack. Further, pollution control boards have issued the directives for mandatory online monitoring of the stack parameters, for environmental protection. Similarly, the ETP treated water flow and quality (pH, BOD, COD and TSS) needs to be monitored.

For distilleries with evaporation ponds, the spent wash flow and density at the distillery outlet and pond receipt point need to be monitored and displayed. The cameras need to be connected via web for remote monitoring. For distillery with zero liquid discharge, also, the flow meters and cameras must be provided.

**The Forbes Marshall Solution**

Forbes Marshall offers a complete solution with reliable measuring instruments in the field with latest technologies, their inter-connectivity for online data transmission with necessary accessories and software. We support these systems with an annual maintenance contract, spares and services, for this long term requirement.

**Benefits**

- No sampling, heating or conditioning of flue gases required
- Seamless data transfer to CPCB / SPCB server
- Low power consumption
- Continuous data availability

**Energy Audits**

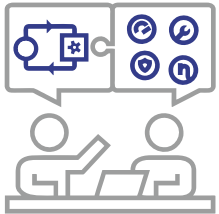


Forbes Marshall audits focus on improving specific energy consumption benchmarks, benchmarking the overall steam system uptime, delivering generic savings or carrying out troubleshooting of the steam system. The aim is to address utility related production bottlenecks alongwith safety, environment and operations maintenance issues. Our inherent strengths of detailed engineering and project management enable us to deliver savings. Through a digital infrastructure with ongoing engagement on real time basis, we work with plants to sustain the savings and plant performance.

Measures to improve benchmarks and deliver savings are typically categorised into an energy triangle to enable plants to prioritise actions. Our offerings include

- Steam and condensate system audits
- KPI based sustenance audits
- Industry specific benchmark audits (SFC, SSC, SEF)
- Steam trap and steam trap system management audits
- Safety audits
- Utility de-bottleneck audits (steam, thermic fluid, compressed air)
- Compressed air audits

**Design Consultancy**



Our utility design consultancy and project management services for greenfield plants and expansions, focus on designing reliable, safe, energy efficient and easy to operate and maintain utility systems for process industries. Across industry segments, plants designed by us have been set up with the most optimised capex and are operating at the lowest opex, with utility performance through digital infrastructure to monitor and sustain the performance of KPI's on real time basis.

Our project management expertise enables us to deliver turnkey engineering by providing technical expertise during erection and commissioning. Our strength lies in industry expertise, alongwith in house 3D modelling capabilities and stress analysis softwares with dedicated support system to meet the project timelines.

Offerings include

- Basic engineering for utility generators (capacity selection)
- Detailed engineering of utilities
- Renewable/waste streams energy mapping
- Feasibility studies (fuel switchover, cogeneration)
- 3D Modelling and stress analysis
- Tank farm design with automation (industry specific)
- Utility debottleneck studies and network optimisation

**Sustenance Management Services (SMS)**



One of the core requirements to design, run and maintain utility systems efficiently and safely is the expertise of people. It plays a key role right from day-to-day functional requirements of operations to putting in place an organisation wide system and structure for effective energy management.

- The main challenges KPI sustenance
- Process dynamism
- No real time visibility for variations.
- Causes of variations - whether due to process load variations or thermal inefficiency
- Thermal inefficiencies not visible and hence no actions are taken routine

Our SMS service covers both new plants as well as existing plants where steam system expertise is required to guide and train plant personnel in sustaining benchmark performance. Our methodology focuses on monitoring and controlling key variations along with of job-role based competency enhancement on people aspect and improvement in steam system SOP's.

# Energising Businesses and Communities Worldwide



## Steam Traps

**>30,000**

## PRDS, DSH and Attemperators

**>4,000**

## Control Valves

**80,000**

## Control Systems & Automation Packages

**>500**

## Flowmeters

**7800**

## Online Monitoring Systems

**>450**

## Vibration Monitoring Systems

**500**

## Process Analysers

**11250**

## Gauges

**18000**

## Dust and Gas Monitoring Systems

**500**

## Steam and Water Analysis

**75**

## Alcohol Dispensing Systems

**>100**



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