Strengthen Your Steel
Solutions for the Integrated Steel Industry
Solutions for the Steel Industry

India is one of the largest iron and steel producers in the world. This growth in industry is attributed to the domestic availability of ore and economical labour. The steel industry continuously strives to modernise and upgrade older plants to achieve higher energy efficiency levels.

Forbes Marshall provides products and solutions to ensure all processes are run efficiently and with optimised process control. Forbes Marshall has inherited know how of the steel industry in terms of making it more predictable from the point of view of unforeseen breakdowns and down time.

Energy Conservation
Our wide range of products, solutions and services help bring down the cost of utilities throughout the process - from generation, to distribution and utilisation right up to recovery.

Selection of the right efficient boiler, Heat Recovery systems can substantially bring down the running cost of a plant. A unique range of products, systems and software help you keep track of exactly how much energy you consume and where it goes.

Solutions for recovering energy from hot condensate and flash steam help maximise condensate recovery and result in huge fuel savings.

Process Measurement and Control
In order to identify areas where control needs to be optimised, it is essential to measure and monitor relevant factors in your process. We provide a wide range of instruments for measuring key parameters like pressure, temperature, flow, level, vibration, gas concentration and process water quality to accurately assess process performance.

Forbes Marshall solutions for complete process control, ranging from valves and flowmeters to state of the art distributed control and SCADA systems, help optimise operations to deliver the desired system performance and product quality.
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Reliability

Productivity

Environmental Awareness

Energy Efficiency

Ease of Operation

Predictive Maintenance

Unplanned plant shutdown due to machine problems can result in huge losses. Predictive analytical solutions from Forbes Marshall provide an understanding of equipment, systems and machine health and help you plan shutdowns in advance, thereby increasing plant uptime by upto 95%.

Forbes Marshall has developed innovative and specific packages to monitor, analyse, Predict and raise alerts to various levels inferring the best practices in metal and mines sector.

Digitalisation

To keep pace with current scenario Metal and Mines industry has shown intentions to go for Industry 4.0 and digitalisation, Forbes Marshall has developed several solution which is simple to implement and yet effective, while developing the same various types of metal and mines processes have been kept in mind.

Available systems and interfaces are having flexibility to communicate with current and Old system and bring to common platform.

Smart Services

Metal and mines industry is still going through the process of leaning which means systems and equipment has to be smart enough to give information, however using this information effectively to maintain the system is a challenge.

Forbes Marshall has developed pool of knowledge where in we provide the service to make system and equipment available to 95% plus and give quality output based on available standards thus making it acceptable to Process team.
### Oxygen Enrichment System

**Drawbacks of Conventional System**
- Excess heat required since nitrogen does not take part in the combustion
- High fuel consumption, low burner zone control, high CO₂ emission is higher

**Benefits of the Forbes Marshall System**
- Higher flame temperature, hence better reduction of raw materials, higher volume availability, low CO₂ emission
- Each percent increase in oxygen content in the blast increases the furnace output by 4.0-4.5% and reduces coke consumption by 0.9-1.5%

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### Blast Humidification System

**Drawbacks of Conventional System**
- Uncontrolled/excessive moisture in the cold blast can result in serious damage to the furnace
- Less heat available for reduction of iron ore

**Benefits of the Forbes Marshall System**
- Customised solution for optimised RAFT control leading to reduction of coke rate and increase in combustible gases, leading to better calorific value
- Availability of hydrogen which is better reducing agent than carbon dioxide
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**Tuyere Leak Detection System**

**Drawbacks of Conventional System**
- Small leakages go unnoticed
- Higher operational cost due to unpredictable water leaks from the tuyere

**Benefits of the Forbes Marshall System**
- Detects leakages by real time measurement thereby increasing safety of the blast furnace
- Optimum management of shutdowns due to accurate prediction of tuyere leak

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**Coal Tar Injection System**

**Drawbacks of Conventional System**
- Higher coke leading to higher coal requirement

**Benefits of the Forbes Marshall System**
- Reduces process cost by reducing coke rate; coal tar replaces coke directly in a ratio of 1:1.2
- Increase in RAFT thereby better reduction of iron ore and increased efficiency of furnace

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**Reliability**

**Productivity**

**Environmental Awareness**

**Energy Efficiency**

**Ease of Operation**
Oxygen Blowing Skid

**Drawbacks of Conventional System**
Improper design of system and control element may lead to unsafe operation

**Benefits of the Forbes Marshall System**
Customised engineered piping skid for pressure and flow control with safe materials manufactured in clean room atmosphere
Facility to integrate slag splashing in the O2 blowing piping skid

Slag Splashing System

**Drawbacks of Conventional System**
Limited life cycle in case of no slag splashing
Frequent breakdowns due to refractory damage

**Benefits of the Forbes Marshall System**
Increased life of converter up to 20,000 heats and a reduction of gunning rates down to 500 grams per ton of steel
Fast payback through significant increase in furnace utilisation
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**Bottom Stirring Skid**

**Drawbacks of Conventional System**
- Blowing inert gas at required pressure and flow is a challenge. Improper valve design leads to fluctuating flow
- Difficulty in obtaining homogeneous temperature, inclusion of floatation in steel bath

**Benefits of the Forbes Marshall System**
- Flow parameters can be monitored and controlled with greater accuracy which increases safety of manual locking at minimum flow
- Piping skid consisting of instrumental control package provides better stirring results

**SEN Purging Station**

**Drawbacks of Conventional System**
- Nozzle gets clogged
- Achieving steady control of argon is a challenge which is causing frequent air ingress

**Benefits of the Forbes Marshall System**
- No disruption in flow, so less surface defects
- Improved operational performance and quality of steel as inert atmosphere is maintained

**Reliability**
- **Productivity**
- **Environmental Awareness**
- **Energy Efficiency**
- **Ease of Operation**
**Steel Mills**

**Pickling Line Bath Temperature Control**

**Drawbacks of Conventional System**
- Improper condensate evacuation causing stall in traps
- Wastage of steam as bypass valve are opened for increasing the temperature and releasing the stall

**Benefits of the Forbes Marshall System**
- Steam operated pump trap addresses stall issue which enables system to use of latent heat thereby increasing efficiency of the system
- No opening of trap bypass valve during stall, resulting in steam and condensate savings

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**Jet Wiper System**

**Drawbacks of Conventional System**
- Uncontrolled jet pressure leading to uneven coating
- Thickness of coating not as per specification lead to loss of material

**Benefits of the Forbes Marshall System**
- Quality of sheet improves as thickness of coating gets controlled, nitrogen gives additional advantage of its inert nature
- Material saving due to even coating

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**Reliability**

**Productivity**

**Environmental Awareness**

**Energy Efficiency**

**Ease of Operation**

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**Steel Mills**

**Pressure and Temperature Conditioning for Steam, Hydrogen and Nitrogen**

**Drawbacks of Conventional System**
- Variation in pressure and temperature; issues of redundancy, safety, load variations not addressed
- Cumbersome installation and high commissioning time

**Benefits of the Forbes Marshall System**
- System based station/skid design ensures controlled parameters addressing operational safety, redundancy and ease of operation
- Ease of installation, lower commissioning time
**Vibration Monitoring System**

**Drawbacks of Conventional System**
- Manual monitoring leading to unplanned shutdown.
- Analysis is done after problems surface.
- Unpredictable breakdowns.

**Benefits of the Forbes Marshall System**
- Plant wide analysis and diagnosis to reduce downtime and unplanned shutdowns; ensures plant safety.
- Central management system provides vital cross functional information ensuring better coordination between different units of plant.

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**Boiler automation and monitoring system**

**Drawbacks of Conventional System**
- Steam cost, operating cost not focused due to non-availability of efficiency parameter
- More or less blowdown results in loss of heat or increase in TDS level respectively

**Benefits of the Forbes Marshall System**
- Forbes Marshall EffiMax™ boiler efficiency monitoring system is a proven and complete solution which helps improve boiler efficiency to reduce steam cost.
- Measures parameters like blowdown quantity, thus enhancing boiler life

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**Steam and Water Analysis System (SWAS)**

**Drawbacks of Conventional System**
- Efficiency of process reduces due to factors like deposition on turbine blades, corrosion on steam pipe work and so on
- Equipments life gets affected due to bad quality steam and water

**Benefits of the Forbes Marshall System**
- Forbes Marshall compact steam and water analysis systems provide precise measurements on critical parameters.
- It helps to keep erosion and corrosion of equipment in check, and minimises maintenance downtime.
### Boiler Automation and Monitoring System

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### Power and Blowing Station

Turbine Supervisory instrumentation and VMS

#### Drawbacks of Conventional System

- Vibration not being monitored and thus controlled reduces the operation efficiency
- Manual data collection for auxiliary by portable leads to delayed analysis.

#### Benefits of the Forbes Marshall System

- Forbes Marshall turbine supervisory instrumentation monitors, analyses and diagnoses the behavior of turbines by measurement of critical parameters.
- Forbes Marshall Vibtrans™ and Vibassist™ gives flexibility to monitor locally as well as remotely along with analysis and diagnostic of rotating equipments and assets.

### Pressure Reducing and Desuperheating Station (PRDS)

#### Drawbacks of Conventional System

- In the conventional system a pressure reducing valve is placed before a fix nozzle desuperheater.
- Delivering right steam pressure as per process is difficult

#### Benefits of the Forbes Marshall System

- Pressure reduction and desuperheating in a single valve along with redundant variable nozzle desuperheater in station form for hassle free installation and increased efficiency.
- Fully integrated engineered solutions with direct acting, pilot operated and PID controlled pressure reducing valves to deliver the right steam pressure
Steam Systems

**Drawbacks of Conventional System**
- Loss of heat/energy due to steam over usage/leakages
- Maintenance of steam products is a concern

**Benefits of the Forbes Marshall System**
- Optimum steam consumption and condensate recovery with zero leakage
- Better lifecycle with minimal maintenance

Water Management Systems

**Drawbacks of Conventional System**
- Water discharged/effluents not within industry norms, manual monitoring led to crossing the limits frequently
- Increase in operating cost and plant efficiency due to inefficient water systems

**Benefits of the Forbes Marshall System**
- IoT enabled solutions for measurement and control of parameters in water, drinking water, waste water and effluent within norms
- Optimised operational costs due to efficient water systems with remote monitoring and reporting facility
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### Environment Management System

**Drawbacks of Conventional System**
- Manual monitoring, old technology extractive system and maintenance prone
- Systems are not futuristic and does not address changing requirement of regulating bodies

**Benefits of the Forbes Marshall System**
- Insitu systems are well engineered, robust, reliable and capable of continuous operation over long periods of time with minimal maintenance
- Efficient online emission data transmission to SPCB and CPCB central servers ensures maximum availability of quality and continuous data

### Smart Services

**Drawbacks of Conventional System**
- Expert systems and quality monitoring systems does not function due to lack of skilled people and knowledge while maintaining it
- High maintenance and calibration expenditure

**Benefits of the Forbes Marshall System**
- Forbes Marshall experts and service team integrate the existing system with the latest IIoT analytical devices. Specific action is then derived for maximum availability of the system.
- Increased availability of parameters by smart remote maintenance
Flocculant and HRT Automation for Coal Washery

**Drawbacks of Conventional System**
- Poor process and production efficiency due to uncontrolled/ assumption based dosing
- Time consuming, breakdown prone, not user friendly

**Benefits of the Forbes Marshall System**
- Better control of density at HRT outlet yields better process efficiency
- Accurate dosing of polymer/chemical leads to saving.
- User friendly SCADA based system for easier process management

Iron Ore Pulp Density Control and Improvement System

**Drawbacks of Conventional System**
- Poor process and production efficiency, breakdown prone, not user friendly
- Labour intensive

**Benefits of the Forbes Marshall System**
- Better pulp density control before hydro cyclone yields better productivity; accurate control of water addition; avoids water loss and jamming
- User friendly SCADA based system for easier process management; no manual intervention required
**Floatation Column Mist Injection System**

**Drawbacks of Conventional System**
- Less efficient system
- Loss of recovery of materials due to uncontrolled process

**Benefits of the Forbes Marshall System**
- Water addition in air for mist formation and improved efficiency
- Controlled processes with accurate control of air and water for maximum recovery and minimal loss of iron ore

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**Tailing Dam Level Monitoring System**

**Drawbacks of Conventional System**
- Surface level monitoring which does not give the information of solid level
- Manual checking of solids leading to inaccurate profiling of solid content over the depth of tailing dam

**Benefits of the Forbes Marshall System**
- Accurate measurement based on profiling technique give clear idea of solid content apart from level measurement.
- Wireless transmission of signal and alerts.
Improvement Packages

**Sinter Bed Steam Injection System**

- **Drawbacks of Conventional System**
  - Limitation on speed
  - Higher coke consumption

- **Benefits of the Forbes Marshall System**
  - Increase of heat generation in the bed \([\text{CO}+\text{OH} = \text{CO}_2 + \text{H}]\)
  - Increase in sintering machine speed, lower coke consumption, lower exhaust gas temperature

**Sinter Plant Efficiency Monitoring**

- **Drawbacks of Conventional System**
  - Efficiency calculation is based on negative pressure measurement and temp which does not give true picture

- **Benefits of the Forbes Marshall System**
  - Calculation based on flow, temperature and pressure leads to accurate measurement of efficiency
  - Optimised control on sinter mix to get the required porousness is possible through the system
**Steam Expanders**

- Reliability
- Energy Efficiency

**Benefits of Forbes Marshall System**

Forbes Marshall turbines for saturated steam harness the potential of pressure difference between boiler pressure and process pressure to generate incidental electricity and operate parallel to the pressure reducing valve.

**Thermocompressors**

- Environmental Awareness
- Energy Efficiency

**Drawbacks of Conventional System**

- Steam is wasted because of no utilisation due to very low pressure.
- Inefficient use of steam system leads to increased production cost.

**Benefits of the Forbes Marshall System**

- Solution for intermediate pressure requirement, avoids the pressure reducing station.
- Specific energy consumption reduces leading to huge saving.
**Asset Management System**

- **Productivity**
- **Ease of Operation**

**Drawbacks of Conventional System**

- Unmonitored / manually monitored system leading to unpredictable breakdowns
- Difficult to keep both processes and expenses in check, plant-wide

**Benefits of the Forbes Marshall System**

- Monitoring, analysing and diagnosing asset performance for better predictive control
- Expert process guidance software for proper energy and asset management

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**Acoustic Wireless Trap Monitoring System**

- **Environmental Awareness**
- **Energy Efficiency**
- **Ease of Operation**

**Drawbacks of Conventional System**

- Condition of the traps were checked manually leading to regular survey
- Due to the large number of traps installed, it was time consuming. This lead to inefficient maintenance of steam systems, to avoid the condensate in the line most of the time bypass valve was crack opened

**Benefits of the Forbes Marshall System**

- Online health monitoring of the trap is done connected to expert software wirelessly, this enable user to maintain specific trap based on expert alert generated from system
- Increased uptime with optimised manpower to maintain the traps, reduction in steam loss leading to reduction in specific energy consumption
Remote Transmission System

- **Reliability**
- **Ease of Operation**

**Drawbacks of Conventional System**

Many steel plants have old and traditional systems where spares and maintenance are an issue leading to higher maintenance costs. Expansion and upgrade are issues and it is not seamless to current maintenance practices.

**Benefits of the Forbes Marshall System**

Forbes Marshall Rtru201 acts as an edge computing device (building block) for driving IIoT enabled eco systems required in process plants. It opens up all the data and provides a simple web-based monitoring platform.

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Smart Skids

- **Reliability**
- **Ease of Operation**

**Drawbacks of Conventional System**

Preventive maintenance schedule is based on fixed-time intervals not really based on actual maintenance requirements. No health and diagnostic data available leading to poor management of spares.

**Benefits of the Forbes Marshall System**

A Smart Skid collates raw parameters from the process, derives key performance indicators (KPIs) from them, enabling proactive decision-making on-the-go. System generates smart alerts on mobile devices leading to better control of manpower and time lines for doing the maintenance.
Delivering Products That Perform
We have created an efficient business by integrating our knowledge, services and technology to provide innovative solutions for the steel industry. Our installed base in this industry, stands testimony to this.

<table>
<thead>
<tr>
<th>Products</th>
<th>Number</th>
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<tbody>
<tr>
<td>Flowmeters</td>
<td>16000+</td>
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<tr>
<td>Control Valves</td>
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