

Clean, Safe and Efficient Power

Solutions for the Power Industry



Clean, Safe and Efficient Power

The power industry plays a crucial role in economies, supplying energy for commercial and domestic purposes. Being the backbone of development, it is important that plants operate efficiently and safely, in a sustainable manner.

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 over 1325 power plants globally, ranging from 2.5 MW captive power plants to 1000 MW capacity ultra mega plants. Our solutions cover fuel handling, boiler and turbine house, flue gas monitoring, water and effluent treatment and cooling tower, focussing on utilities including water, steam and compressed air.

We are a preferred partner to major power corporations, effectively handling expansion needs and contributing to setting up new projects, as well as enhancing the performance of existing plants.

We work with plants to achieve their KPIs on uptime, safety, environment and statutory compliance.

Icon Key



Reliability



Productivity



Ease of Operation



Energy Efficiency



Environment



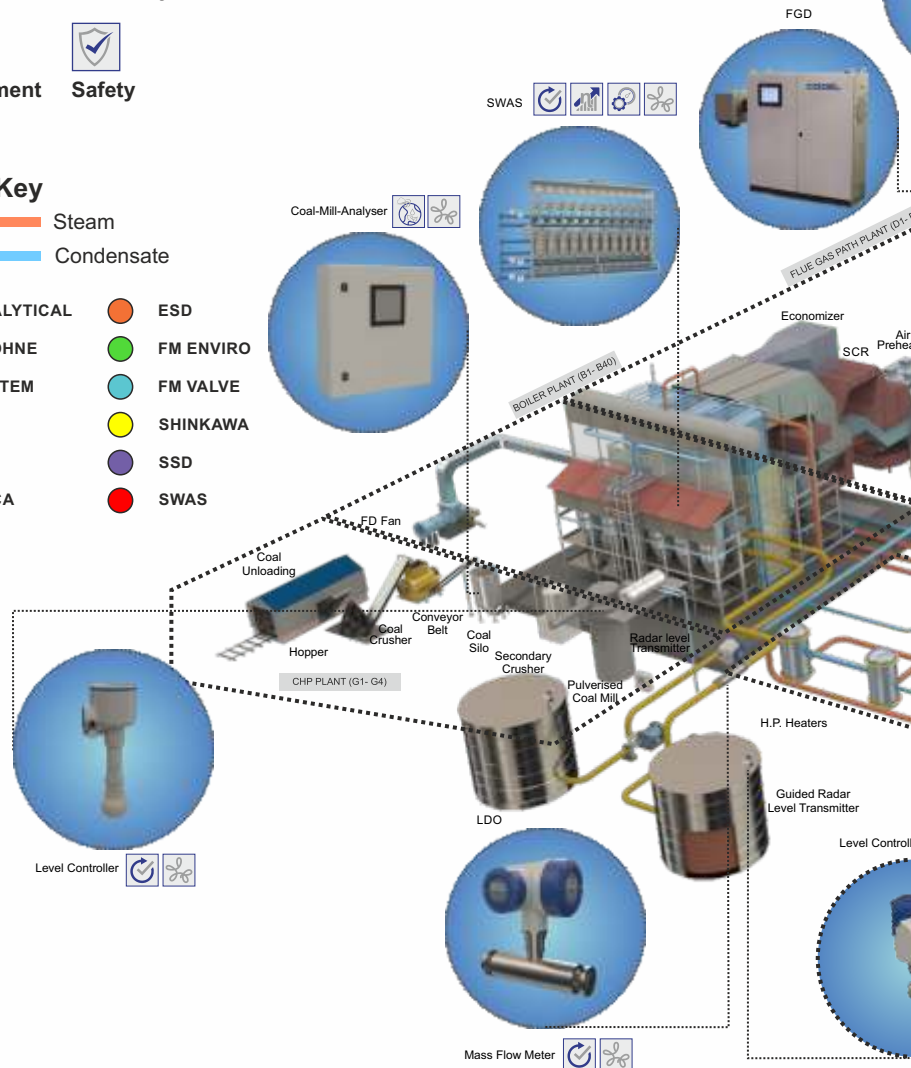
Safety

Utility Key

— Steam

— Condensate

- | | |
|--|--|
| ● ANALYTICAL | ● ESD |
| ● KROHNE | ● FM ENVIRO |
| ● SYSTEM | ● FM VALVE |
| ○ HPU | ● SHINKAWA |
| ● AES | ● SSD |
| ● ARCA | ● SWAS |



Process Efficiency

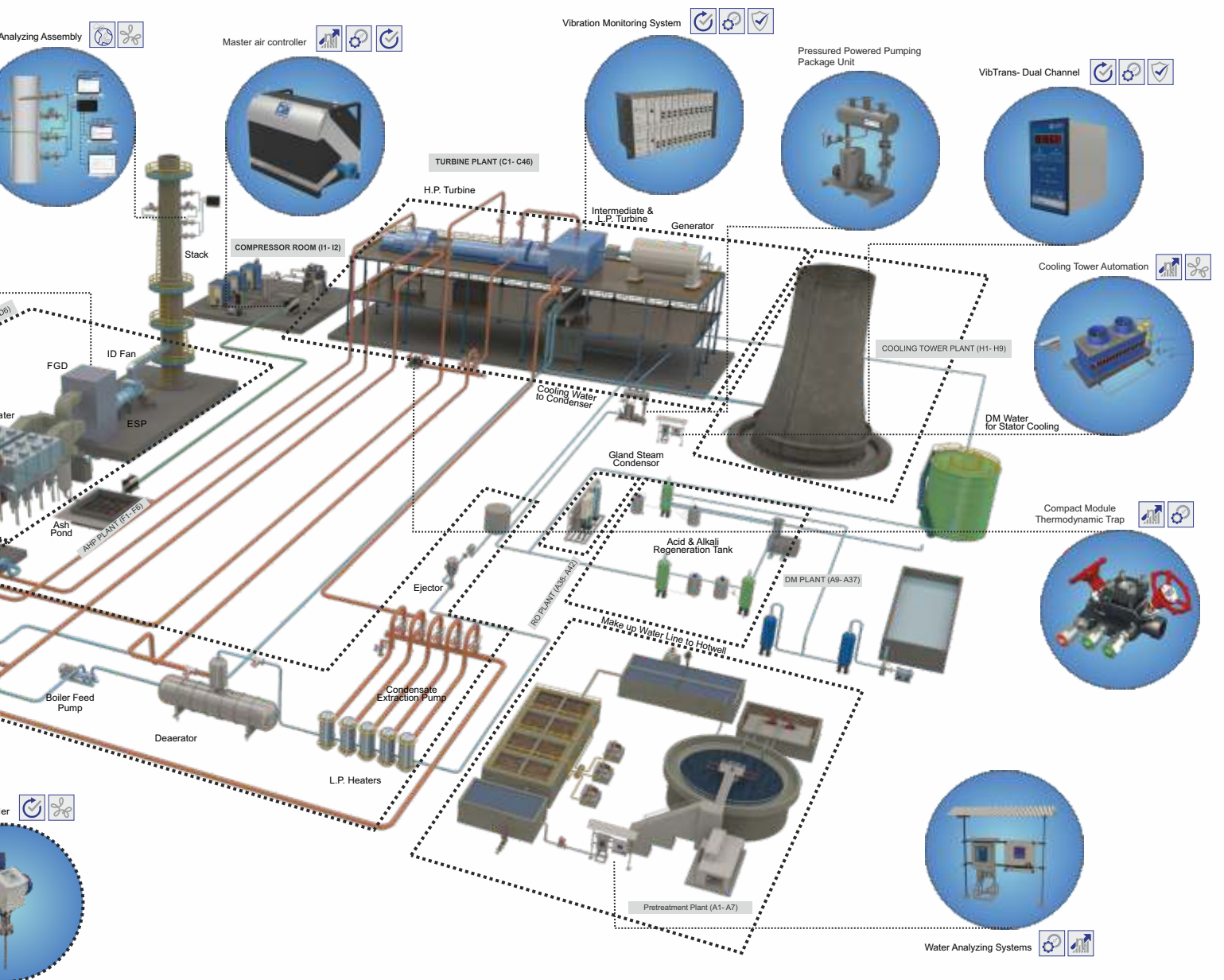
Processes in power plants need to be run at highest efficiency to ensure a high plant load factor. Forbes Marshall provides solutions to optimise the usage of utilities used in these processes and increase efficiency. Solutions for accurate measurement of oxygen and CO at the stack enable optimised boiler combustion efficiency.

Energy Efficiency

Through our range of solutions we enable power plants to operate efficiently by addressing specific energy consumption.

In the steam system, our focus is on ensuring steam quality, eliminating steam losses and maximising heat recovery to reduce fuel consumption. Our solutions include boiler blowdown management and heat recovery, steam traps, and flash and condensate recovery systems.

We also work towards optimising auxiliary power consumption through solutions that optimise the compressed air network right from generation, to distribution and utilisation, and improve compressed air quality.



Environment

Ensuring environmentally sustainable operations is of prime importance. Power generation is one of the largest sources of greenhouse gas emissions. Coal based power plants emit SO_x, NO_x, CO and CO₂. Our range of accurate diagnostic solutions help to monitor these gases online, helping power plants to control emissions and comply with pollution control norms. Through our digital services we also ensure the highest uptime of the CEMS.

Similarly, we help power plants optimise their specific water consumption per MW power generation. Through our WaterMAP solution we are able to provide visibility on plant-wide water usage, reconcile gaps based on the water balance and help address losses.

Uptime

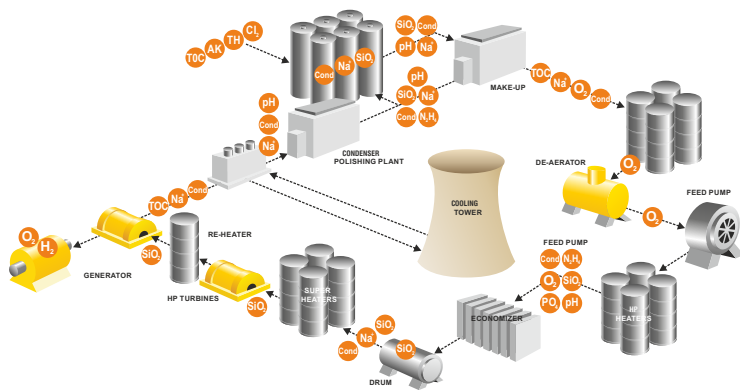
The turbine is the heart of the power plant, and unplanned shutdowns can lead to heavy losses. Monitoring of key parameters like vibration and temperature can help diagnose and sustain health and uptime of the turbine. So also for other rotating equipment like boiler feed pump, ID/FD fans, CT fans, etc. Our condition monitoring systems provide real time diagnostics so proactive action can be taken to maximise uptime of these critical assets.

Safety

Our range of solutions also contribute to safe plant operations. The process of pulverisation in the coal mill releases entrapped CO which is highly flammable. Our coal mill analyser helps plants prevent potentially catastrophic fires in the coal mill.

A wide range of gate, globe, check and ball valves facilitate safe distribution of high pressure steam and water addressing various operational needs to control, divert and isolate flows in the network. Our range of safety valves ensures that parameters are maintained within the statutory requirements of safe operating practices.

Steam and Water Analysis System (SWAS)



FM offer all these analyser pH, conductivity, sodium, dissolved oxygen, turbidity phosphate, hydrazine

Benefits

FM sample cooler max operating temp - 580°C

Isokinetic sampling probe

Effective sample Isolation by needle valve so no gland leakages.

Automatic pressure reducer

Digital Services

Big Data Analytics | Prescriptive, Descriptive |
Predictive Analysis | Alerts and Alarms

Steam
Flow Monitoring at
- Generation
- Utilisation
- Distribution
Temperature and
Pressure Monitoring

Compressed Air
Airflow Monitoring
- Compressors Generation
- Process Consumption
Pressure and Temperature Monitoring
Compressed Air Balancing and Control

Water
Water Balancing for
- Raw Water
- DM/RO Water
- ETP
- Makeup Water
- Condensate



By monitoring utility consumption, help to bridge the gaps between generation and consumption.

Benefits

Creating a benchmark on the overall Utility being consumed per section

Help monitor the efficiency of compressors and boilers

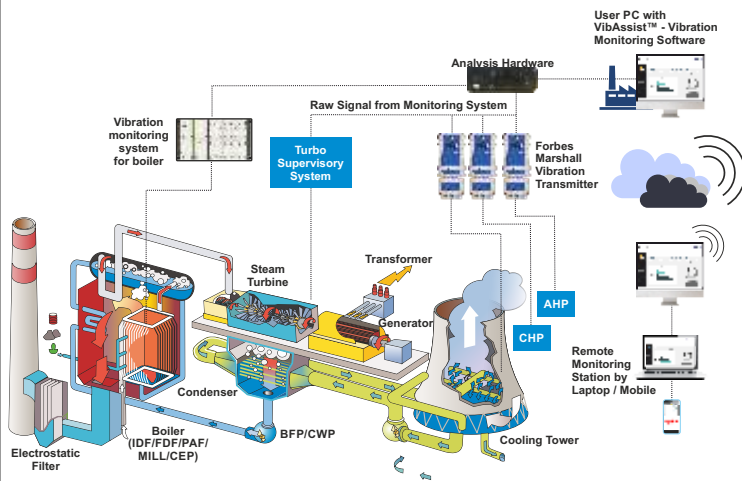
ROI through utility management with optimized utilization

Continuous data logging with advance data analytics

Additional future options include; incorporation of leakage detection system

Ensures continuity in production with full capacity and optimum utilization of utilities

Remote Vibration Monitoring System



FM RVMS is a compact solution to your prevention and predictive need for rotating equipment.

Benefits

- Accurately monitors and analyses data
- Analysis provides predictive maintenance
- Trends, graphs provides complete controllability
- Remote support possible

Continuous Emission Monitoring System

Direct connectivity to CPCB/SPCB server via Blackbox unit.

Analyser data
in SPCB via Internet



Analyser data
in CPCB via Internet



PC with
EnviroSense Software



1000+ Blackbox connectivity in CPCB Server

- 4000 Dust Monitor
- 2200 Insitu multigas analyser
- 350 Gas flow monitors

Benefits

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

Coal Mill Fire Protection



FM Solution

Coal mill Analyzer

Benefits

By monitoring CO and O2 online, will ensure safe coal mill operation and can avoid accidents, even it prevents costly downtime from unnecessary shutdowns.

Rapid and accurate results for coal mill safety.

To prevent catastrophic damage to coal mill. Safe and efficient plant operation with Predictive Maintenance



Safety

Coal Bunker Level Measurement



FM Solution

OPTIWAVE 6300C with Dn150

PP drop antenna

Benefits

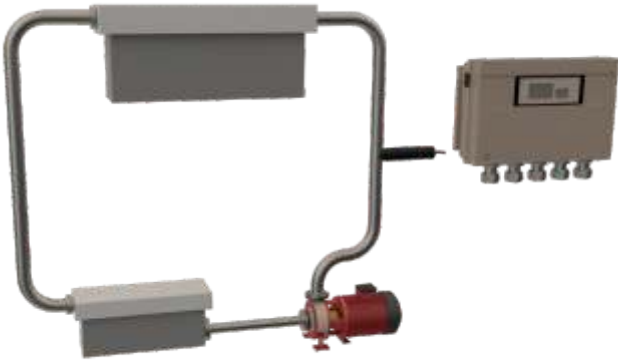
Heap measurement correction. Present crust forming because of shape and smooth surface of innovative drop antenna

Purging is obsolete and maintenance is minimum



Reliability

DO Measurement in Generator Stator Coolant



Environment

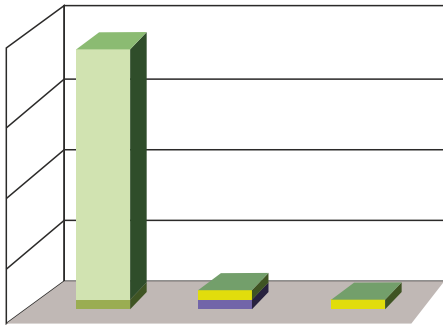
Turbine generator stator is cooled down with water circulation in copper alloy tubing in closed loop system.

Benefits

Tubing is oxidized to form protective layer of copper oxide and finds scaling and fouling.

So dissolved oxygen in cooling water must be maintained between 2-5 ppm to ensure stable operating condition and to prevent reducible environment.

Ensure Quick Start up in Power Plant- Degas-Cation Conductivity Measurement



Energy
Efficiency

By maintaining degas conductivity $< 0.2 \text{ us/cm}$ and conductivity after cation exchange (CACE) $< 0.5 \text{ us/cm}$, quick start up of plant which is approx 3-4 hr half the time taken than usual required 8-10 hr

Seven Decades of Product Solutions

We have created an efficient business by integrating our knowledge, services and technology to provide smarter solutions. Our installed base stands testimony to this.

Power Plants Serviced 429	Across Capacities Ultra Mega (1000 MW) to CPP (2.5 - 100 MW)	Flow Meters 1,36,000+	Control Valves 80,000+
Captive Power Plants serviced 896		Process Analysers 2,80,000+	Steam & Water Analysers 2,850+
Pressure Reducing Stations 45,500+	Condensate Pump Stations 21,000+	Gauges 19,80,000+	Vibration Monitoring Systems 9500+
Solutions Across India Sri Lanka United Arab Emirates Indonesia Saudi Arabia South Korea Bangladesh Thailand Australia Malaysia Vietnam		Steam Traps 31,50,000+	Dust & Gas Monitoring System 7800+



Contact us at coremktg@forbesmarshall.com or scan the QR code



Forbes Marshall Pvt. Ltd.
Opp 106th Milestone, CTS No. 2220, Mumbai-Pune Road,
Kasarwadi, Pune- 411034 INDIA
Tel: +91(0)20-68138555 Fax: +91(0)20-68138402



Forbes Marshall
Krohne Marshall
Forbes Marshall Arca
Codel International
Forbes Vyncke
Forbes Marshall Steam Systems

Email : coremktg@forbesmarshall.com
www.forbesmarshall.com

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