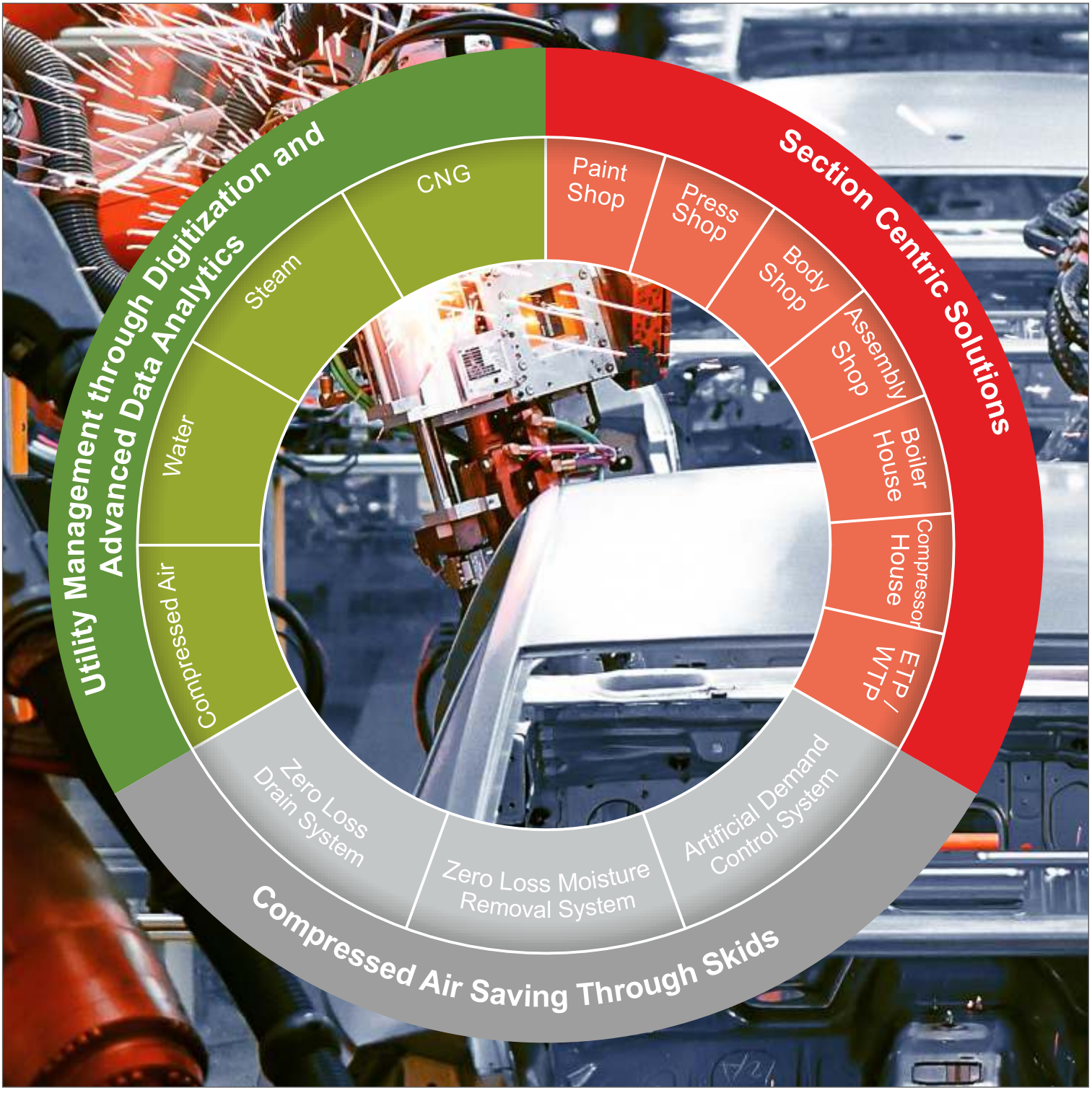
FORBES MARSHALL

Fueling KPIs, Driving KRAs

Solutions for the Automotive Industry



Energy Conservation | Environment | Process Efficiency

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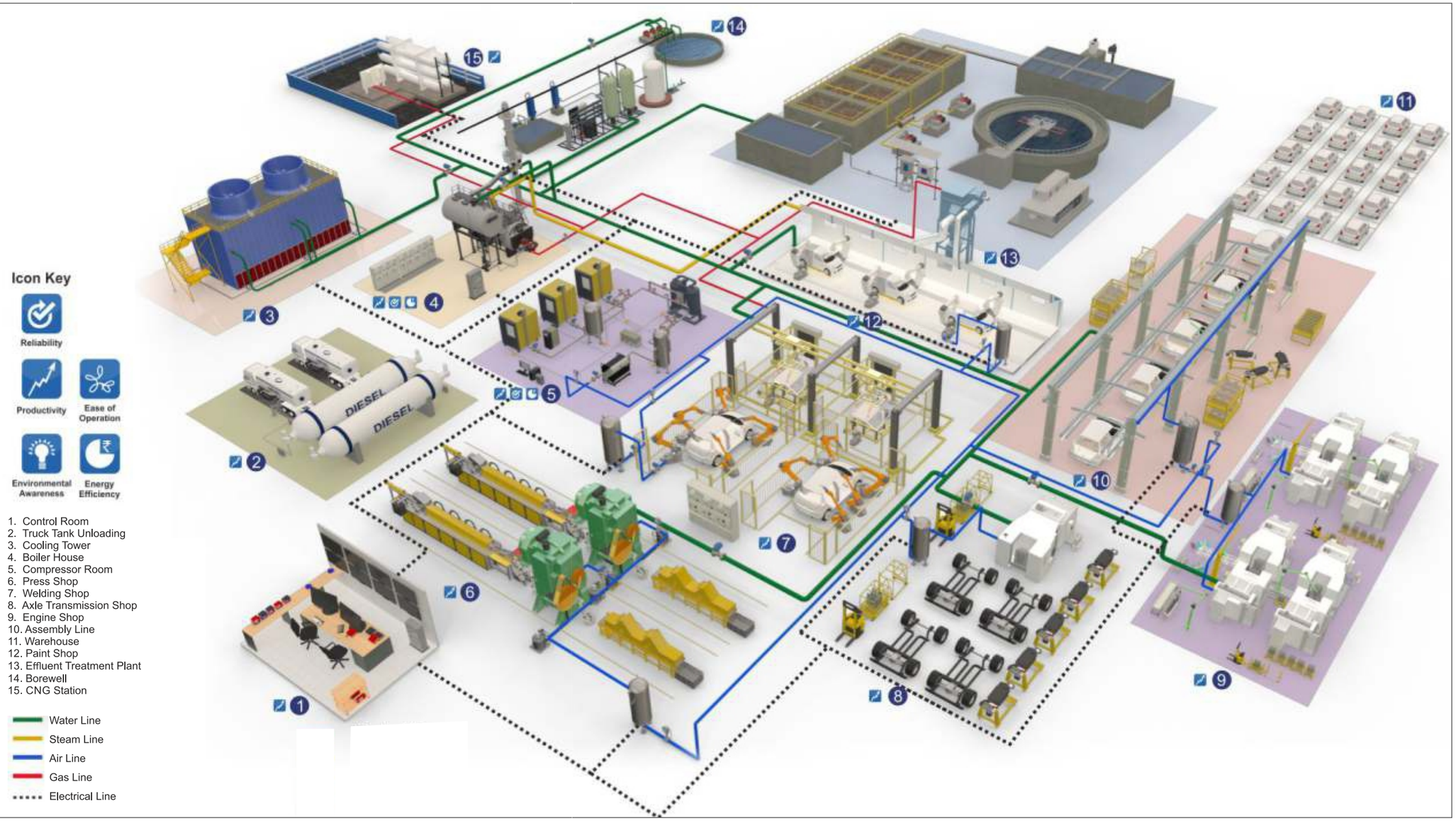
FORBES MARSHALL

Solutions for the Automotive Industry

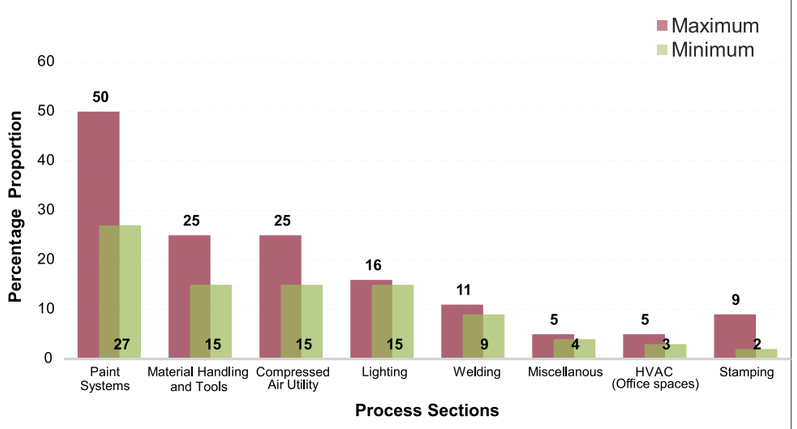
The Automotive industry comprises a wide range of companies and organisations involved in the design, development, manufacturing, marketing, and selling of motor vehicles. It is one of the world's largest sectors by revenue and constantly drives the economy of every country. It is also a huge consumer of energy- be it electricity, steam, compressed air or water. Most plants take several steps and measures to ensure the efficient consumption of these utilities to save on energy consumption without having to compromise on the quality, efficiency or productivity.

Forbes Marshall, being an organisation that is dedicated to process efficiency and energy conservation adds value to the Automobile Industry by providing various effective solutions by following the three major steps to reduce utility consumption: measure, analyse and control.

With our years of expertise in control instrumentation and state of the art data analytics (Industry 4.0), we help you monitor, analyse and benchmark the critical parameters that affect your process, factors that impact and lead to excess consumption of utilities; thereby providing you with a roadmap to control the overall demand and showcase savings through reduction in power consumption.



Energy Consumption Proportion in an Automotive Industry



Process Efficiency

With our instrumentation solutions we help Industry achieve better throughput, reduced process time, predictive maintenance or energy savings, thus resulting in better productivity and reduced cost of operation. We offer a wide range of instruments to serve all the measurement, monitoring and control requirements for an industry. Our product portfolio includes solutions for measuring key parameters like water quality, control valves, pressure, temperature, flow, level, vibration, flue gas monitoring and control systems to accurately assess process performance.

Energy Conservation

Our range of products, packages, solutions and services help bring down the cost of utilities like steam, water, compressed air and others, throughout the process - from generation to distribution and utilisation right up to recovery.

Environment

Industrial pollution is a major contributor to air and water pollution worldwide. Pollution monitoring equipment helps Industry comply with set norms and regulations and reduce environmental impact. Our range of water quality analysers for industrial effluent and sewage treatment plants help monitor important parameters like pH, BOD, COD, TSS etc. while high quality instruments for analysing of emission gases like SOx, NOx, CO_2, O_2, dust and velocity analyser help measure and monitor parameters as per the pollution norms.

The Efficient Boiler House

Steam is the major source of thermal energy for process industry. Steam accounts for 5% to 40% of total processing cost based on the type of industry segment.

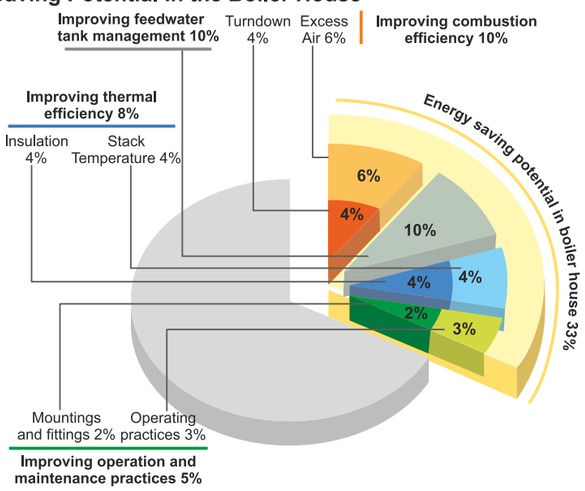
With our knowledge and products, Forbes Marshall complements boilers and boiler house equipment with a host of services and solutions that help maximise energy right through the steam system circuit. Investing in a Forbes Marshall boiler gets you much more than just a boiler. It delivers expertise that ensures steam is at the lowest possible generation cost, both at the point of generation as well as at the point of consumption.

Our expertise in combustion and steam engineering helps us build solutions for the complete steam system, beyond boilers.

Our latest range of gas fired boilers offers innovative and intelligent alternatives in smaller capacity boilers.

Forbes Marshall offerings include new boilers, retrofit of burners and burner conversions (gas) and modernisation of boiler house.

Energy Saving Potential in the Boiler House



High Efficiency (94% Rated Efficiency)

Boiler and burner perfect match

Dual insulation

Continuous online monitoring system

Oxygen trim control

Truly wet back construction

ECR and MCR burner technology

Combustion and Turndown Ratio

Turndown of 1:4 on oil and 1:6 on gas

Electronically modulated air to fuel ratio control

Electronic compound regulation burners, fuel saving by 2-3%

Ratiotronics for gas modification

Ease of Operation and Maintenance

Fully automatic and unmanned operation.

Equipped with self-diagnostic systems for trouble shooting

Automatic boiler blowdown control system

Safety

Twin drum water level controllers

High sinking time

VPS (valve proving system) for gas firing

Heat recovery unit - variable 'Q' technology

High Uptime

Zero leak piston valves

Vertical multistage centrifugal feed water pump in SS construction.

Complete instrumentation from Forbes Marshall

Digital fault detection system with data logging

Ease of Installation

Completely packaged construction

Skid mounted, no foundation

Monoblock burner, no foundation required

Pre-wired and factory insulated with no site work

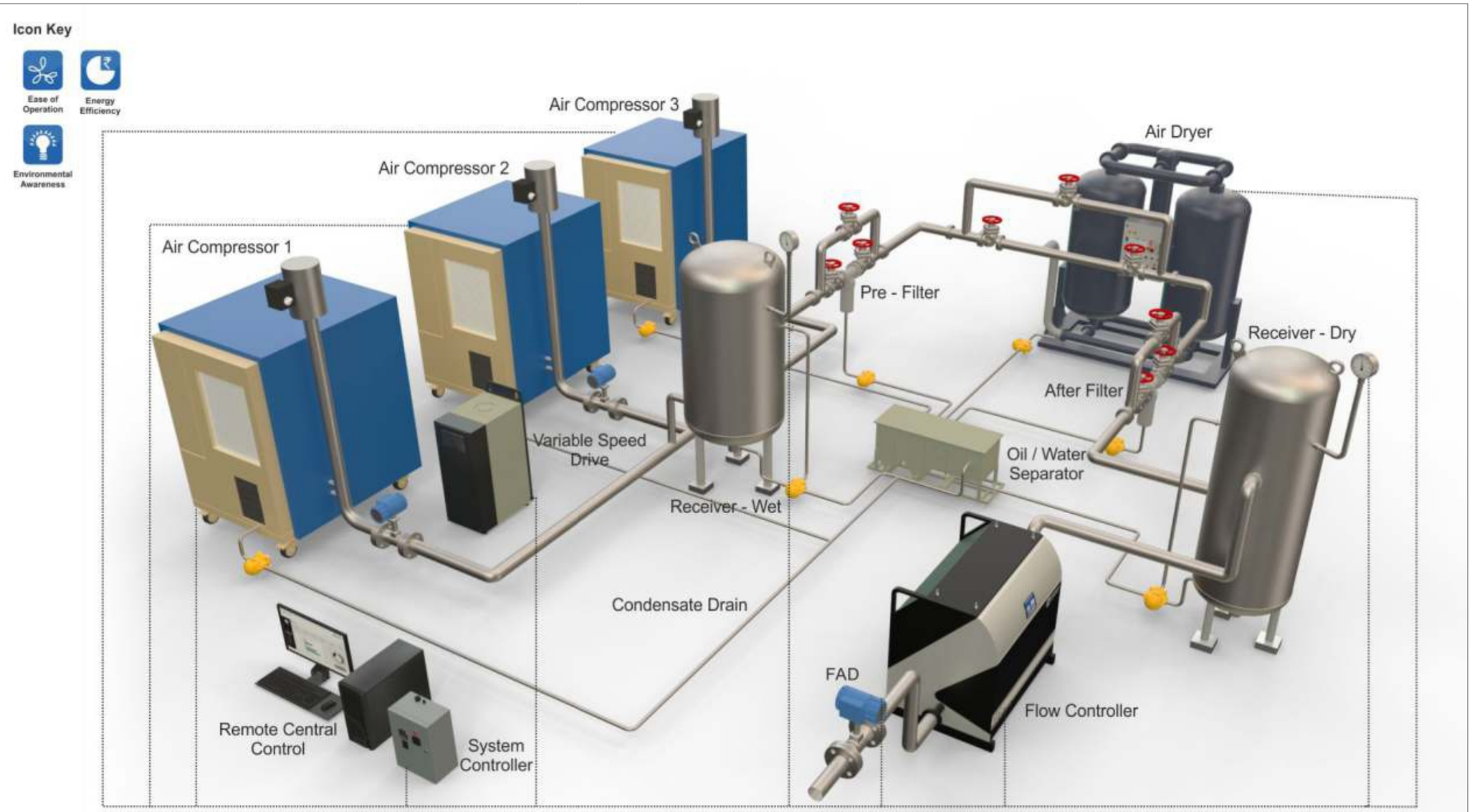
The Efficient Compressor House

With over 60 years of experience in providing solutions for energy savings in various industries and utilities, Forbes Marshall boasts of expertise in providing energy efficiency services for utilities such as compressed air, steam, water and electrical system.

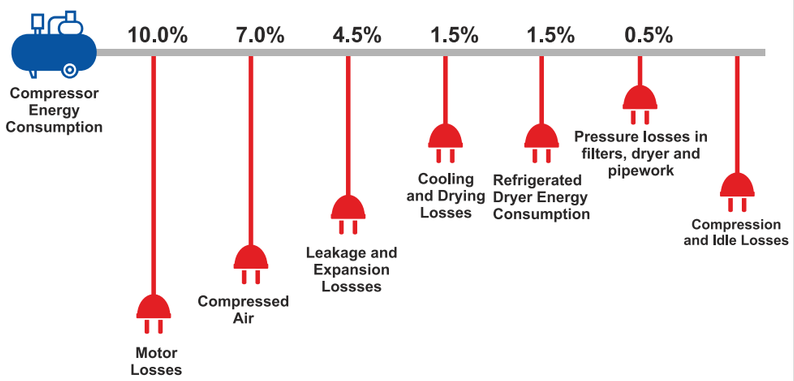
We provide a comprehensive bundle of services that help in the optimisation of compressed air networks. Our services help identify and define system problems, whether they are in demand, distribution or supply, and provide solutions, allowing you to meet your return on investment goals.

We have a varied range of products for monitoring, controlling, analysing and optimising compressed air consumption. These products offer a complete control of your whole compressed air network, help increase efficiency and reduce your energy costs.

Our range of solutions includes compressed air audits, demand control systems, compressor control systems, network monitoring solutions, flow meters and others. Through our various services and solutions we have been able to support our customers in achieving energy efficiency in diverse industrial sectors such as automotive, textiles, cement, power, glass and various others.



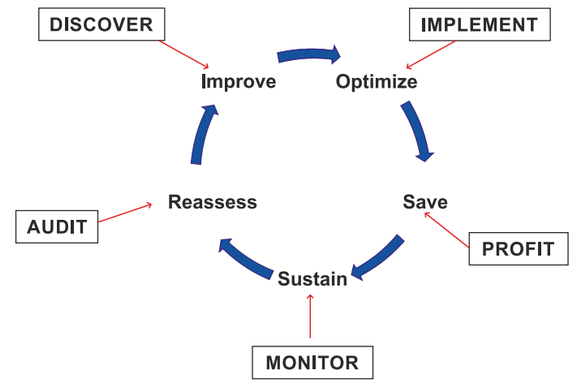
Typical Losses



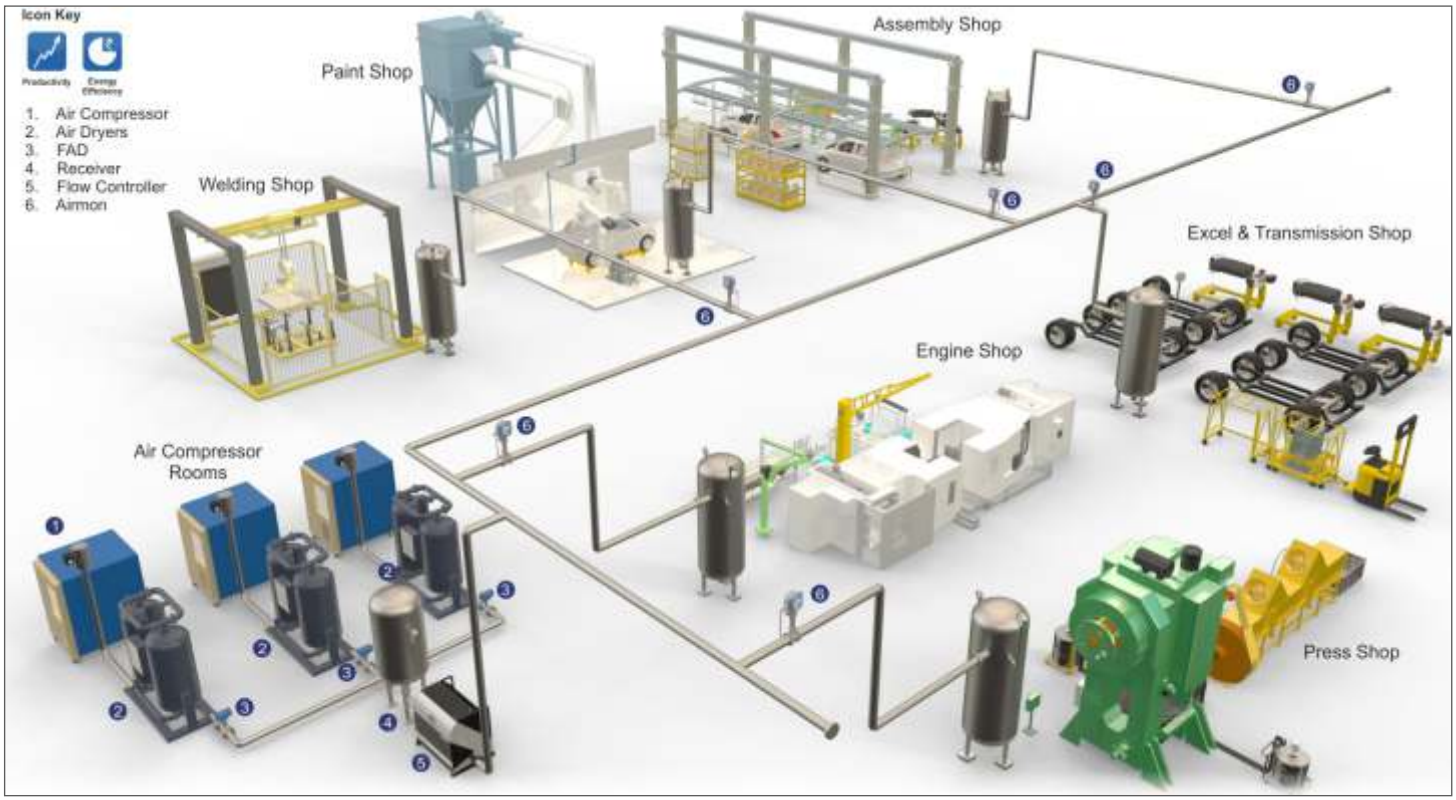
Ideal Scenario

- Maximum compressor efficiency
- Optimised discharge pressure
- Reduced discharge pressure across dryer, filters and piping
- Eliminated/reduced unloading time by improving system capacitance which in turn provides better control
- Reduced transmission loss
- Optimised cooling water system
- Reduced compressed air leaks < 5%
- Optimised operation and demand pattern
- Improved quality of inlet air and compressed air
- Benchmark on quality and consumption of air as per IS8573

Steps to Maintain an Efficient Compressor House



Importance of Compressed Air Flow Monitoring



Compressed air is the most expensive utility in any plant and therefore monitoring the entire network is of vital importance. Monitoring of compressed air (FAD) at the generation side helps understand the efficiency at which the compressors are performing and gives an early indication of wear and tear; at the user end the demand of flow sometimes exceeds the required amount and the artificial demand results in excess energy consumption and increased cost.

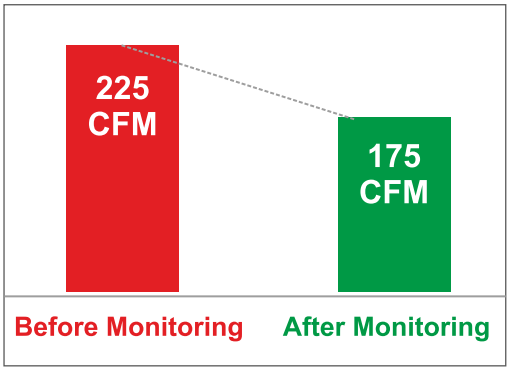
The Forbes Marshall Solution

Forbes Marshall's FAD meter and compressed air flow meters are an innovative cost-effective solution for measurement and monitoring of compressed air. This gives you the most accurate solution for compressed air utility metering. The flow meter works on the vortex principle with online pressure and temperature compensation and is the only practical solution for measuring compressed air consumption on the generation side as well as the distribution lines. It is cost-effective, highly accurate and easy to install.

Let's Look at a Case

Initially, the average demand per flow in the paint shop was 225 SCFM with a pressure of 6.3 barg; after implementing our flow meter and monitoring regularly, it was observed that the section can operate on a lower pressure and lower volume of air without affecting the actual process requirements. Hence, after the average demand per flow was brought down to 175 SCFM with a pressure of 5.5 barg i.e. **50 SCFM and 0.6 barg saving** in each user side.

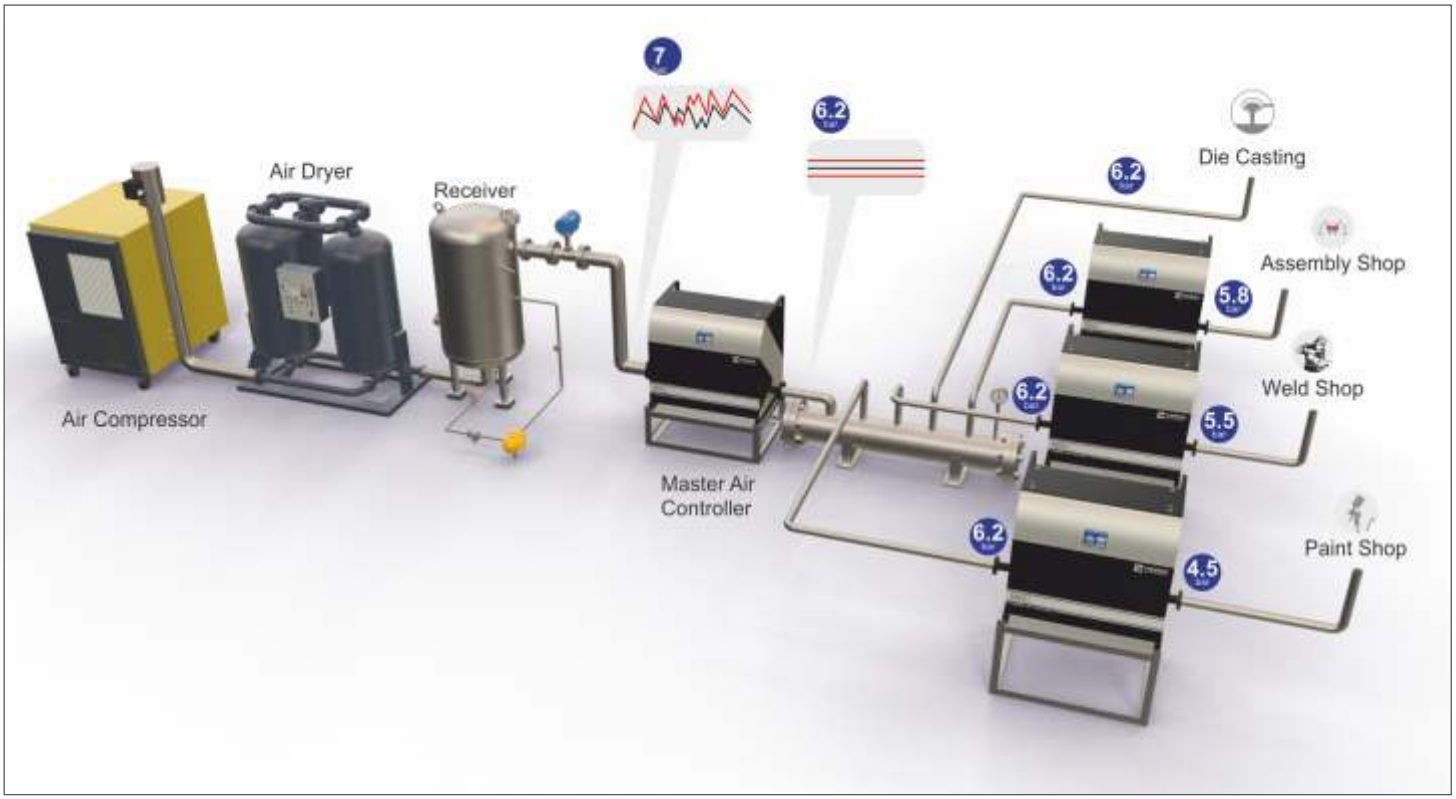
Now, for the whole plant, the saving was more than **550 CFM** (i.e., 110 KW) which is over 20% of the total plant demand. (Savings up to **Rs. 42 Lakhs per annum**)



Benefits

- Specialised solution for utility metering of compressed air
- High accuracy
- Cost effective solution
- Maintenance free sensor design

Artificial Demand Control System



Fluctuating compressed air supply is a major issue faced in various industries due to the varying rate of demand and supply along with the inability to cater to useful storage. These fluctuations in air pressure lead to increased consumption of energy, interruptions in production schedules, inconsistent equipment performance and variable product quality which further gives rise to artificial demand in the process sections.

The Forbes Marshall Master Air Controller (**MAC**) is an energy saving control system which actively helps control the balance across the demand and supply sides. It introduces a differential pressure between the receiver and itself and thus creates a useful high-pressure storage. This helps in isolating the compressors from the demand surges. Peaks in demand are handled by the MAC, rather than being directed towards the compressors. This allows compressors to run for longer on no-load. As a result, mass of air is reduced and a high and compressor load cycles are reduced. This decrease in compressor load cycles is directly proportional to the decrease in energy consumed by the compressors. Thus, due to the MAC compressors are protected from artificial demand and have to cater only to base demand, resulting in savings on compressed air energy consumption.

Let's Look at a Case

Considering, compressor of 480 Kwh of average flow 3398m^3/hr (i.e.2000 CFM)

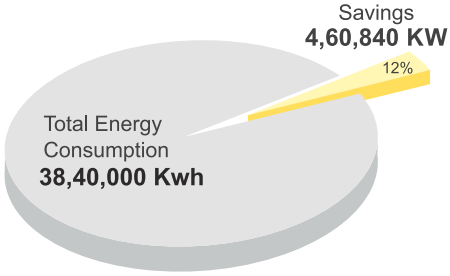
Total KWh consumption for 8000 operating hrs. @ 7 barg for a year is 38,40,000 Kwh

Reduction in pressure from 101.526 PSI to 84.12 PSI (proposed)

Considering leakage of 20%

Saving in power and flow is 12%

Total saving in KW is 4,60,840 KW

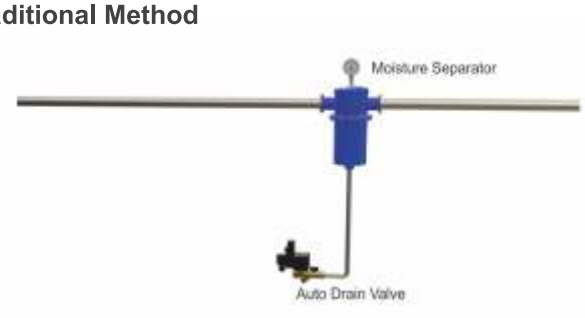


Benefits

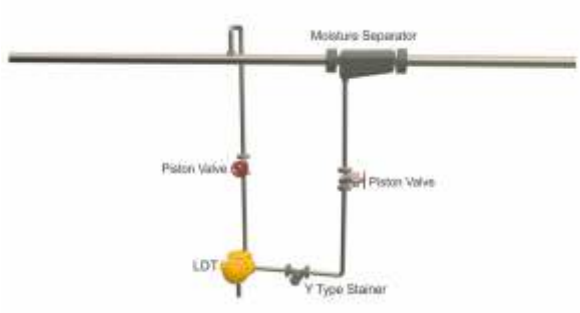
- Saves energy consumed by air compressors by cutting artificial demand for Compressed air
- Reduction in compressor loading and induces higher unloading period
- Consistent air pressure delivery to demand side
- Demand reduction tends to reduce leakages in plant

Zero Loss Drain Traps (ZLDS) and Zero Loss Moisture Removal System

Traditional Method



The Forbes Marshall Solution



Traditional Methods Used

Manual open valve drain

Timer operated solenoid drain

These methods lead to loss of compressed air and risk the presence of moisture in the system which is not desired. This loss of compressed air has to be compensated with extra supply from the compressor.

Every **5 SCFM** of compressed air generated consumes upto **1 KWh**, which is equivalent to **50 SCFM** loss per drain.

Energy Losses Through an Orifice

Trap Orifice Size (mm)	Power Load (KW)	Energy Lost (INR/Year)
0.8	0.2	6,451.2
1.6	0.8	25,804.8
3.2	3.0	96,768.0
6.4	12.0	3,87,072

Challenges Faced

Significant loss of compressed air

More power consumption as it operates irrespective of the presence of moisture

Reset required based on the weather conditions

Rust and corrosion in the air system piping

Productivity losses throughout operation

The Forbes Marshall Solution

Separates and removes any moisture present in the air distribution network without any loss of use format suggested for BENEFITS icons compressed air and thereby generating savings through reduced power consumption.

Benefits

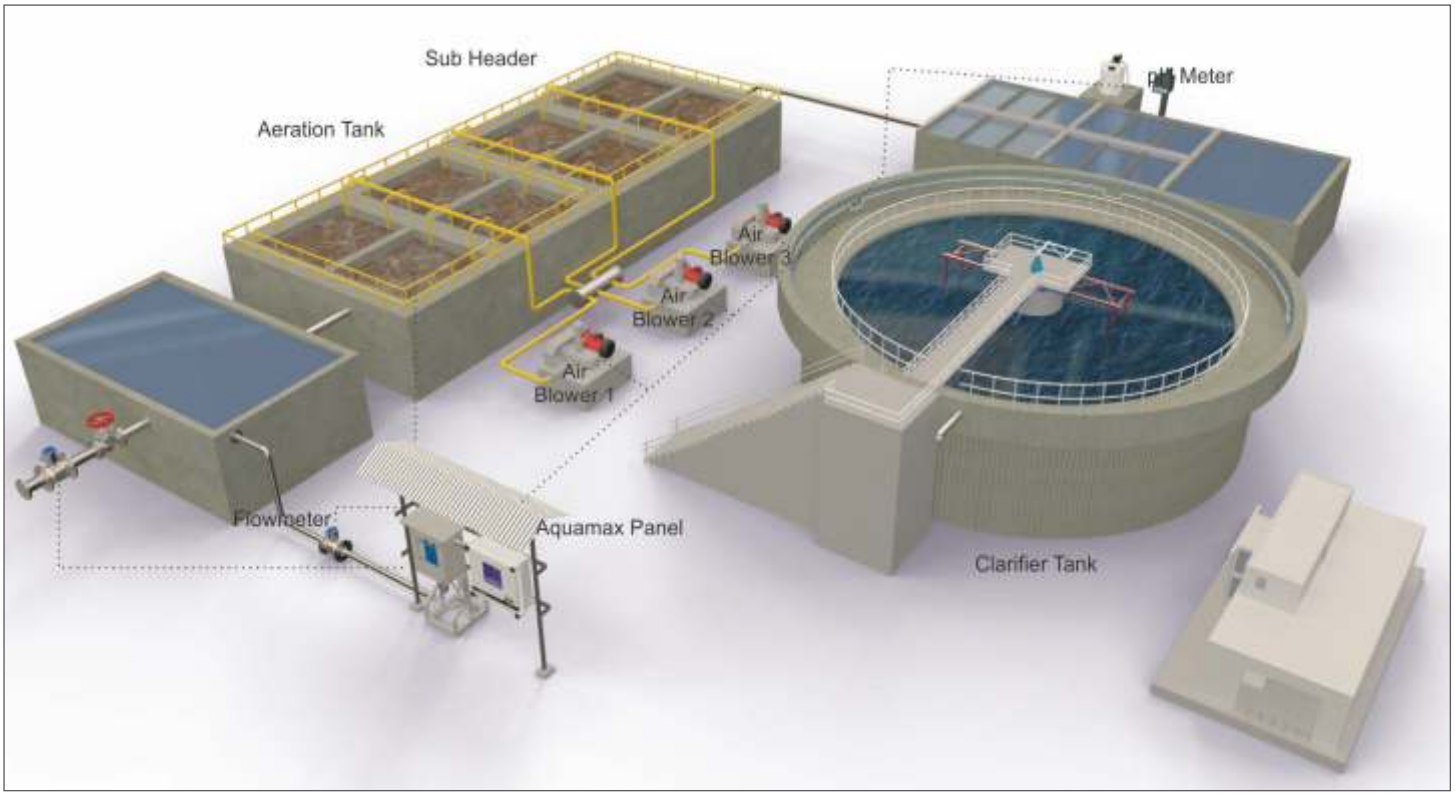
Zero loss of compressed air

No power source or pneumatic supply required for operation

Operates based on the level of moisture present

Maintains instrument air quality

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

We provide a complete energy efficient automation package for ETP to ensure precise online monitoring and control the treated water quality.

DO based aeration control of a wastewater treatment plant is among the highest electricity consuming processes. Our AquaMax package is an energy efficient solution that monitors and controls the dissolved oxygen levels with optimised operation of the aerator. It also helps bring down electricity bills as a direct benefit with a defined ROI period.

Our pH monitoring and dosing system for the neutralisation pit of an ETP plays an important role to control the treated water quality.

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

Multi-parameter analysers for measurement of COD/BOD/pH/TSS help the user comply to PCB norms.

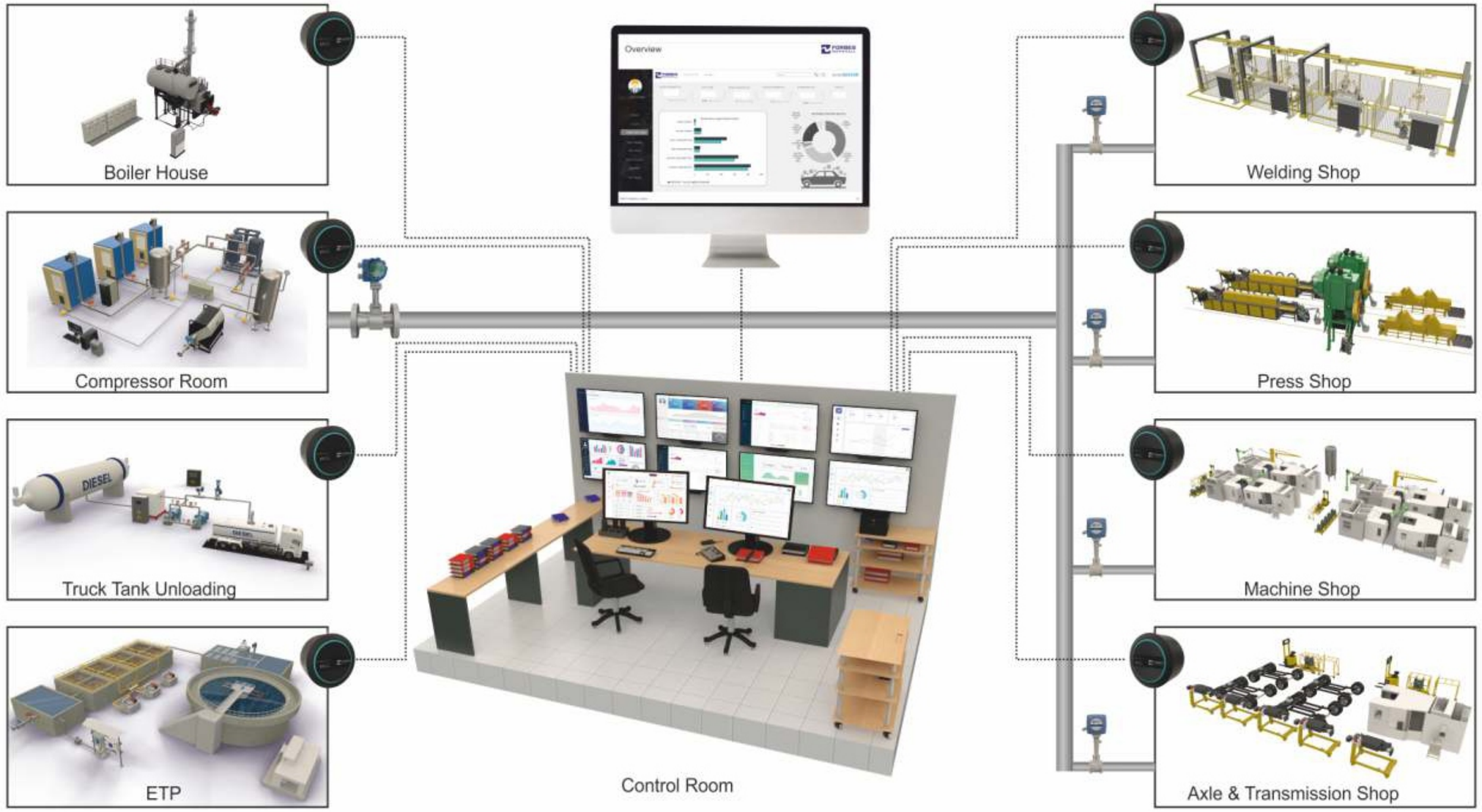
Benefits

- Direct electrical energy savings in terms of deduced bills
- Stabilised DO/COD and BOD levels
- Maintenance free sensors for continuous monitoring
- Reduced operational cost of ETP
- Automated recording and reporting

Benchmarking of Utility Consumption

Today, utility managers are hard pressed to bring down the costs incurred on utility consumption, wastage and improve efficiency to meet environmental standards. With various types of utilities spread across different sections of the plant, it becomes very difficult to get accurate and consistent data. Deriving cost of utility per product becomes difficult and often leads to incorrect logging of essential and critical parameters.

Forbes Marshall has helped bridge the gaps between generation and consumption through our expertise in control instrumentation solutions and an IIOT based approach. Our state of the art data analytics software with built in regression models and various algorithms can detect the excess consumption points, factors leading to excess consumption and help gauge the impact of individual sections and process parameters on the utility (compressed air, steam and water) consumption. This in turn will help to monitor and improve plant efficiency, thereby ensuring continuous productivity.



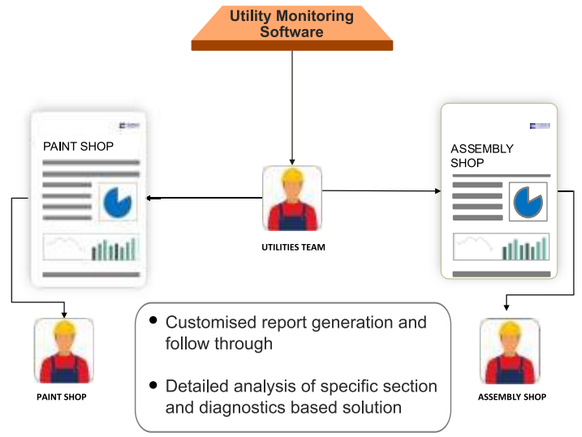
Challenges Faced

Compressor Room
Compressor efficiency through loading and unloading time
Compressor health monitoring (through pressure build-up time)
Dryer health and efficiency
Online pressure difference based on flow rates

Distribution Network
Efficiency of air compressor network which includes pressure drop to identify losses
Predicting load demand based on the rate of pressure drop

Process Sections
Primary factors for fluctuations in excess air consumption
Benchmarking ideal air consumption for individual sections
Prediction of utility consumption/demand through a central intelligent monitoring system

Utility Benchmarking Report for Paint Shop



Features and Benefits

Creating a benchmark on the overall utility being consumed per section

Help monitor the efficiency of compressors and compressed air network

ROI through utility management

Advance data analytics

Future options include air leakage detection system

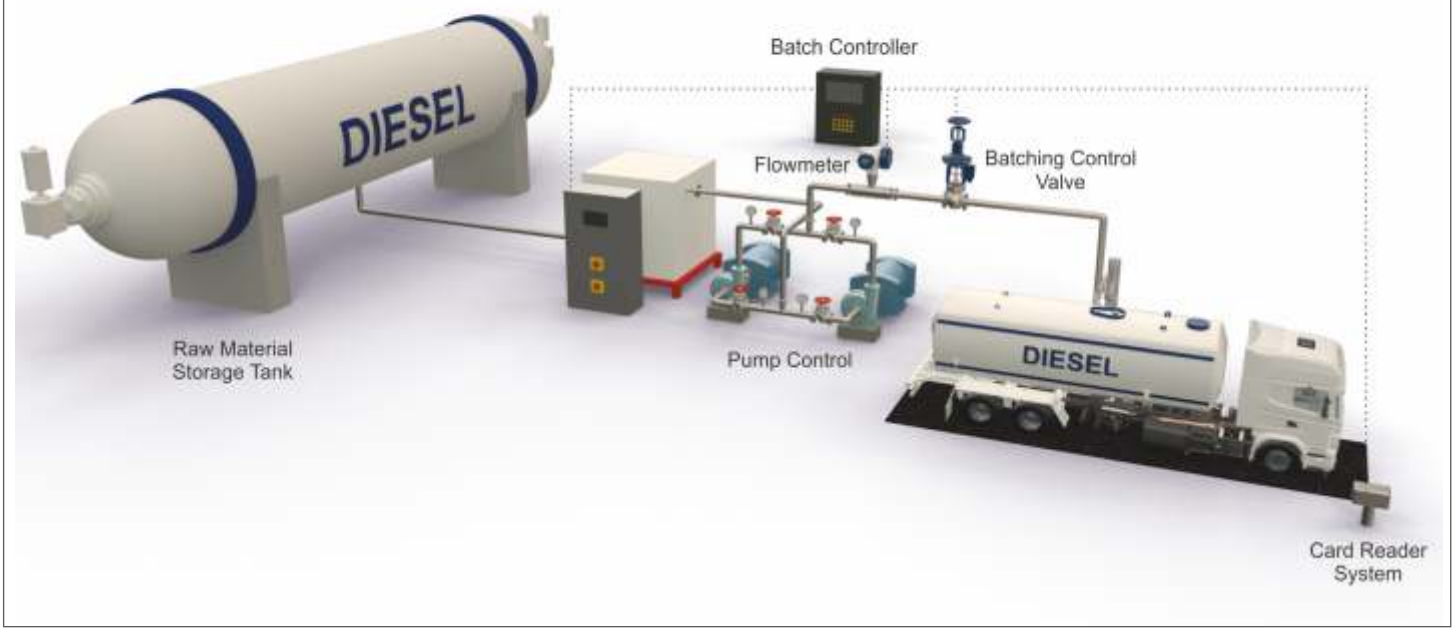
Ensures continuity in production with full capacity and optimum utilisation of utilities

Critical plant parameter data available on mobile devices

Daily / shift-wise / monthly reports

Seamless integration with various platforms

Tanker Unloading System



Rising material and utility costs, coupled with increased global competitions are forcing the Industry to trim cost of manufacture and wastage through precise measurement and accurate delivery. Thus, incoming and outgoing chemical handling becomes a very important section for a chemical industry to help achieve these results. Safety is of prime importance and hence industries are adopting automated systems for loading and unloading of costly chemicals. The time taken for transfer from the tanker to the bulk storage tanks or to the day tanks is also crucial. Therefore, industries need a safe and easy to operate solution to handle these concerns.

The Forbes Marshall Solution

Stand-alone skid with out dependability on centralised system

Entire instrumentation package including measuring and controlling instruments as per user requirements

Customised package with remote switches or card reader facility

User-friendly programme with facility to modify as per batch requirements

Earthing detection for user / plant safety with fail-safe alarms

Data logging and report facility for inventory management

Benefits

Ensure quick and accurate transfer with zero loss

Increased safety

Reduced error

Automated report generation

Sector Centric Solutions for Automobile Industry

- Paint level measurement in paint storage tanks
- Utility monitoring system
- Condensate recovery systems and steam solutions
- Energy audits
- Air and water balancing
- Borewell level measurement
- Sludge pit automation (paint sludge)
- Continuous emission monitoring system
- Engine testing rig with complete instrumentation
- Vibration monitoring system for paint booth blowers

Product Offering

Sections / Products	Boiler Section	Compressor Room	Paint Shop	Air Distribution Line	Water Distribution line	Steam Distribution Line	Water			
							ETP	DM Plant	STP	WTP
Electro Magnetic Flowmeter	●		●		●		●		●	●
Mass Flowmeter	●		●							
Variable Area Flowmeter					●		●	●	●	●
Vortex Flowmeter	●	●	●	●	●	●		●		
Level Transmitter	●		●				●		●	●
Control valves	●	●	●	●	●	●	●	●	●	●
pH	●		●		●		●	●	●	●
Conductivity / Tds	●		●				●	●	●	●
Multiparameter Analyser							●		●	●
PLC / DCS	●	●	●	●	●	●	●	●	●	●
RTU	●	●	●	●	●	●	●	●	●	●
Gauges	●	●	●	●	●	●	●	●	●	●
Traps	●	●		●		●				
VMS		●	●							

Delivering Products That Perform

We have created an efficient business by integrating our knowledge, services and technology to provide innovative solutions for the automotive industry. Our installed base in this industry, stands testimony to this.

Water Flow Meters
5000+

Free Air Delivery Flow Meters
800+

Compressed Air Flow Meters
400+

Steam Flow Meter
500+

Master Air Controller
100+

Boiler and Steam Efficiency Solutions
200+

Gauges and Transmitters
100+

Energy Audits
150+

Steam Traps
300+

Process Analysers
200+

Control Valves
150+

Moisture Drain Traps
250+







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