

**PARAM<sup>TM</sup>**  
ENGINEERING &  
BUSINESS SOLUTIONS

INDUSTRIAL AUTOMATION &  
PROCESS ENGINEERING

# PARAM ENGINEERING & BUSINESS SOLUTIONS

High-Integrity Process Automation Systems  
& Audit-Defensible Plant Data Integrity



Anand | Bengaluru



[paramtechnologies.co.in](https://paramtechnologies.co.in)



Industrial  
Automation



Process  
Engineering



Data  
Integrity



Compliance

## CORPORATE OVERVIEW

# Engineering Partner for Mission-Critical Plants

Process Automation • Data Integrity • Instrumentation • Compliance

PARAM Engineering & Business Solutions provides turnkey automation, electrical panels, instrumentation and plant data solutions for chemical, agrochemical and pharmaceutical environments.

01



### PROCESS EXPERTS

Turnkey automation, electrical panels and instrumentation for chemical and pharma plants.



02



### DATA INTEGRITY

Paperless audit trails, automated compliance logging and validation-ready data architecture.



03



### VENDOR-NEUTRAL ZERO LOCK-IN

Solutions built around standard industrial platforms and interoperable protocols without dependence on a single hardware vendor.



04



### SINGLE-SOURCE ACCOUNTABILITY

From field sensors and control systems to SCADA, telemetry and auditor-ready reports.



## SUPPORTED ENVIRONMENT



CHEMICAL



AGROCHEMICAL



PHARMACEUTICAL



Anand | Bengaluru



[paramtechnologies.co.in](http://paramtechnologies.co.in)

# INDUSTRY CHALLENGES & OUR APPROACH

Understanding Real Operational Challenges and Delivering Practical, Reliable Solutions

## INDUSTRY PAIN POINTS

Common operational challenges in chemical, agrochemical and pharmaceutical environments.

### 01 CPCB / GPCB ENVIRONMENTAL COMPLIANCE DATA LOSS



**Problem:** Network downtime can interrupt transmission of stack and effluent monitoring data.

**PARAM APPROACH:** OCEMS gateway with local buffering and cellular failover.

### 02 MANUAL LOGBOOKS & DATA TRACEABILITY



**Problem:** Paper-based records can create traceability and audit challenges.

**PARAM APPROACH:** Direct digital logging with timestamped audit trails.

### 03 TANKER OVERFILL & HAZARDOUS CHEMICAL SPILLS



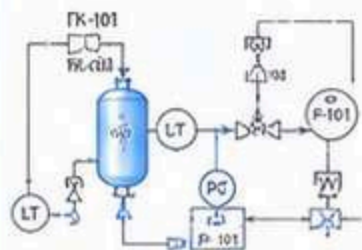
**Problem:** Manual loading operations can increase overfill and safety risks.

**PARAM APPROACH:** Automated mass-flow skids with dual-stage shutoff interlocks.

## OUR 5-STEP INTEGRATED PROJECT ARCHITECTURE

From concept to compliance-ready operation.

### 01 MODEL P&ID & Control Philosophy



- Process Flow Diagrams
- Instrumentation Selection
- Control Philosophy

### 02 SIMULATE Plant Twin / FMU Validation



- 3D Process Modeling
- Dynamic Simulation
- FMU Validation

### 03 CONTROL PLC, Panels & Drives Logic



- PLC Programming
- Control Panel Design
- Drives & Interlocks Logic

### 04 CONNECT OPC UA & MQTT Telemetry



- Secure Data Integration
- Real-time Monitoring
- Plant-wide Connectivity

### 05 PROVE FAT / SAT / Audit Trails / Compliance Documentation



- FAT / SAT Execution
- Audit Trails
- Compliance Documentation



Every step is documented, simulated and field-validated before final handover.

ENVIRONMENTAL COMPLIANCE

# OCEMS & Effluent Data Protection

Reliable Data Capture, Local Buffering & Connectivity Failover

## DATA FLOW ARCHITECTURE

Continuous, reliable and compliant data transmission to CPCB / GPCB portal.



### STACK / EFFLUENT ANALYZERS

Online analyzers for emission and effluent monitoring



### FIELD INSTRUMENTS

Flow, pH, temperature and other process instruments



### PARAM-GW1 EDGE LOGGER

- Data collection & protocol handling
- Real-time monitoring
- Industrial-grade and reliable



### LOCAL STORE-AND-FORWARD

- Up to 30 days local data storage
- Retains data during network interruptions



### ETHERNET + 4G FAILOVER

- Primary Ethernet connectivity
- Automatic 4G cellular failover



### CPCB / GPCB PORTAL

Secure data transmission to government portal



## UP TO 30 DAYS STORE-AND-FORWARD

Local data buffering helps retain records during network interruptions and automatically resynchronizes when connectivity is restored, subject to configured storage capacity.



Online Emission & Effluent Monitoring

## MONITORED PARAMETERS



### STACK

- SO<sub>2</sub>
- NO<sub>x</sub>
- CO
- PM



### EFFLUENT

- pH
- COD
- BOD
- TSS
- Flow Rate



### DUAL CONNECTIVITY

- Primary Ethernet
- Automatic 4G cellular failover



### HARDWARE OPTIONS

- PARAM-GW1
- Siemens / Moxa hardware



CPCB/GPCB portal connectivity may require coordination with analyzer/system vendors.



PHARMA & CHEMICAL COMPLIANCE

# Data Integrity & Paperless Audit Trails

ALCOA+ Principles • Validation-Ready Architecture • Auditability

## ALCOA+ PRINCIPLES FOR DATA INTEGRITY

Building trust in data for regulated environments.

|                                                                                              |                                                                                              |                                                                                                |                                                                                                |                                                                                                |
|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| <b>A</b>  | <b>L</b>  | <b>C</b>  | <b>O</b>  | <b>A</b>  |
| <b>ATTRIBUTABLE</b><br>Unique user credentials and role-based access.                        | <b>LEGIBLE</b><br>Clear, accessible electronic records and reports.                          | <b>CONTEMPORANEOUS</b><br>Real-time timestamped data capture.                                  | <b>ORIGINAL</b><br>Protected raw records with traceable audit history.                         | <b>ACCURATE</b><br>Calibration linkage and verified measurement data.                          |

## PART 11 READY ARCHITECTURE

Subject to customer-site validation.

Electronic signatures, access control, audit trails and validated workflows can be implemented using appropriate validated SCADA platforms.

**SIEMENS**  
WinCC

**AVEVA**

**Ignition** 

- ✓ Access Control
- ✓ Electronic Signatures
- ✓ Audit Trails
- ✓ Validated Workflows
- ✓ Data Security



**GAMP 5 / CSV  
SUPPORT**



**IQ / OQ / PQ  
DOCUMENTATION**

## QUALITY ASSURANCE

From design to validated operation.

|                                                                                               |                                                                                                |                                                                                                     |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>01</b>  | <b>02</b>  | <b>03</b>      |
| <b>FDS &amp; DQ</b><br>Functional Design Specification and Design Qualification.              | <b>FAT</b><br>Panel power-on, loop simulation and PLC code dry runs.                           | <b>SAT &amp; VALIDATION</b><br>Site Acceptance Testing, IQ/OQ execution and handover documentation. |



Anand | Bengaluru



paramtechnologies.co.in

# PROCESS SAFETY & BATCH AUTOMATION

SAFER PLANTS  
CONSISTENT QUALITY  
AUDIT-READY OPERATIONS

## 1 DISPENSING SAFETY

### Tanker Loading & Drum Filling Automation

Accurate, safe and controlled dispensing of liquid chemicals and solvents.



### KEY CAPABILITIES



#### High-Precision Mass Meter Skids

- Coriolis flow measurement
- $\pm 0.10\%$  accuracy where supported by selected meter vendor/specification.



#### Safety Interlocks & Earthing

- Pumping is blocked until earthing and safety conditions are verified.



#### Automatic Drum & IBC Filling

- Semi-automatic positioning and controlled filling profiles.



PESO / Ex-rated equipment sourced from certified vendors where required.

## 2 CHEMICAL & API PRODUCTION

### Reactor & Recipe Batch Automation

Precise control, consistent quality and repeatable batch execution for chemical and pharmaceutical processes.



### KEY CAPABILITIES



#### Temperature Ramp & Hold

- Automated temperature profiles with PID control.
- Supports heating, cooling and reaction hold steps.



#### Automated Raw Material Dosing

- Load-cell / flowmeter-based dosing.
- Accurate and repeatable addition of liquids, solvents and powders.



#### Reproducible Batch Control

- Recipe management.
- Cascade PID.
- Interlocks and phase control.



#### Batch Trend Reporting

- Temperature / pressure / agitation trending.
- Electronic batch records and reports for review.



### REDUCED MANUAL ERRORS THROUGH VERIFIED RECIPE SEQUENCES

Standardized recipes, interlocks and automated sequences help minimize manual intervention and operational errors.

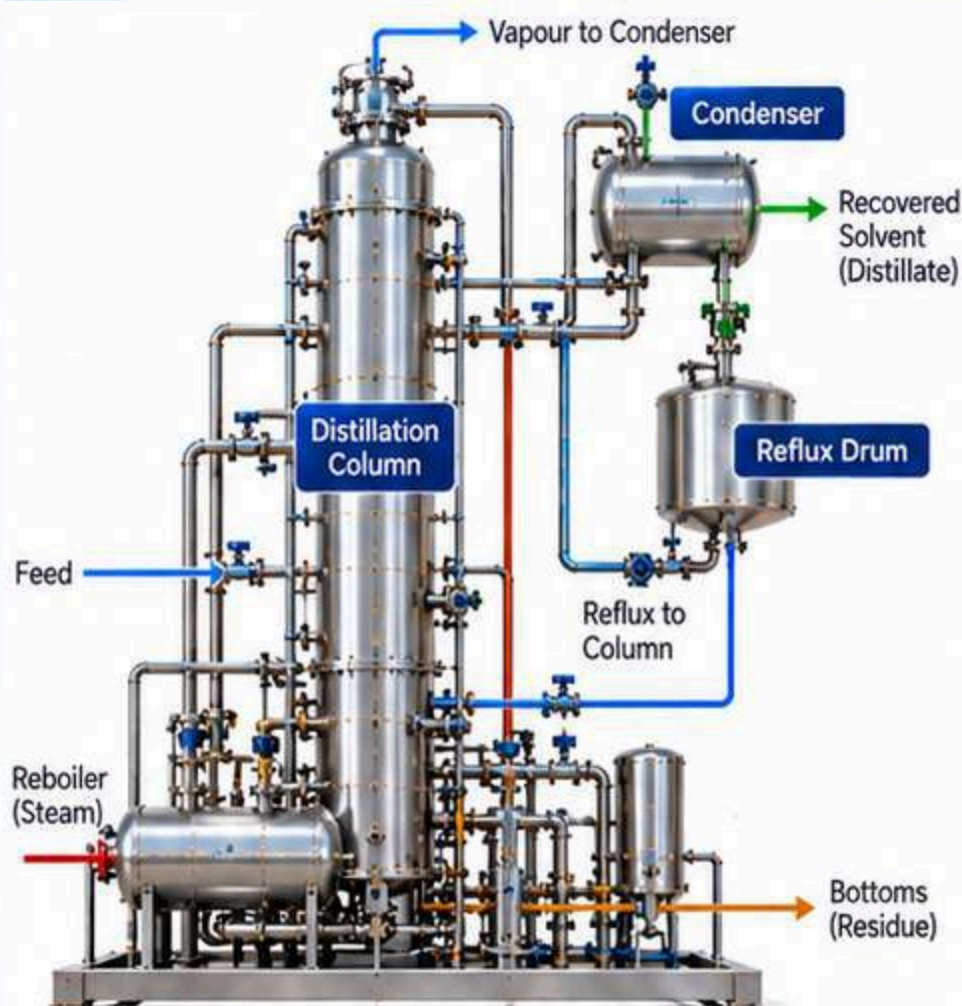


# PROCESS EFFICIENCY & HYGIENIC AUTOMATION

OPTIMIZED PROCESSES  
CONSISTENT QUALITY  
COMPLIANT OPERATIONS

## 1 SOLVENT RECOVERY & DISTILLATION AUTOMATION

Improved recovery, efficient utility usage and stable operations.



### DISTILLATION

#### Reflux Ratio Control

Dynamic reflux control based on process measurements and column conditions.

- Stable column operation
- Consistent product quality
- Automated control logic



### ENERGY OPTIMIZATION

#### Reboiler Steam Control

Automated steam control to help optimize thermal utility consumption.

- Efficient steam usage
- Better energy management
- Process condition-based control



### PROCESS SAFETY INTERLOCKS

#### Pressure & Cooling Interlocks

Protective trips for condenser cooling failure or excessive pressure conditions.

- Condenser cooling monitoring
- High pressure interlocks
- Safety alarms and automated trips



### ADVANCED PROCESS OPTIMIZATION

Advanced process optimization should be supported by process-engineering expertise and simulation where required.



DWSIM /  
OpenModelica

Process Simulation (Optional)

## 2 CIP & SIP AUTOMATION

Hygienic, repeatable and validated cleaning and sterilization processes for pharmaceutical and chemical production.



### CLEAN-IN-PLACE — CIP

Automated Cleaning with Optimized Resource Usage



Automated caustic and acid wash sequencing



In-line conductivity-based rinse termination



Optimized water and chemical consumption



### STERILIZE-IN-PLACE — SIP

Automated Sterilization with Validation Support



Automated pure-steam sterilization timing



Temperature validation at critical equipment points



Exportable temperature-versus-time records

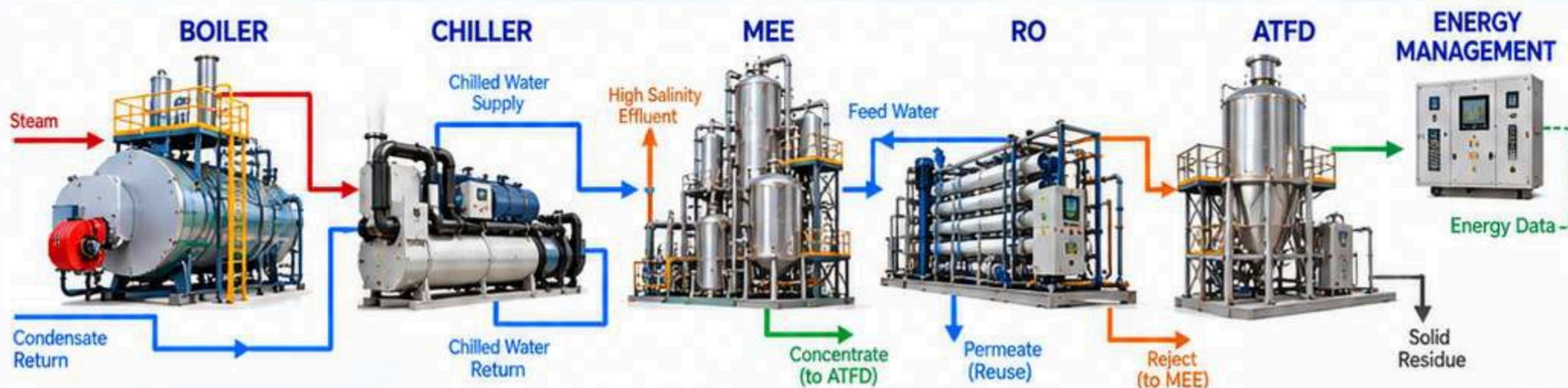


# UTILITY MANAGEMENT & OPEN ARCHITECTURE

OPTIMIZED UTILITIES  
EFFICIENT PROCESSES  
FLEXIBLE ARCHITECTURE  
FUTURE-READY OPERATIONS

## 1 UTILITIES & ETP / MEE AUTOMATION

Integrated automation for reliable, efficient and compliant plant operations.



### BOILER & CHILLER SEQUENCING

- Load-based lead-lag sequencing for improved utility efficiency.
- Automated start/stop logic and interlocks.



### MEE

- Density and vacuum control for high-salinity effluent concentration in ZLD systems.
- Automated level, temperature and pressure control.



### RO & ATFD

- Automatic membrane flushing and controlled ATFD feed stabilization.
- Interlocks for stable and continuous operation.



### ENERGY MANAGEMENT

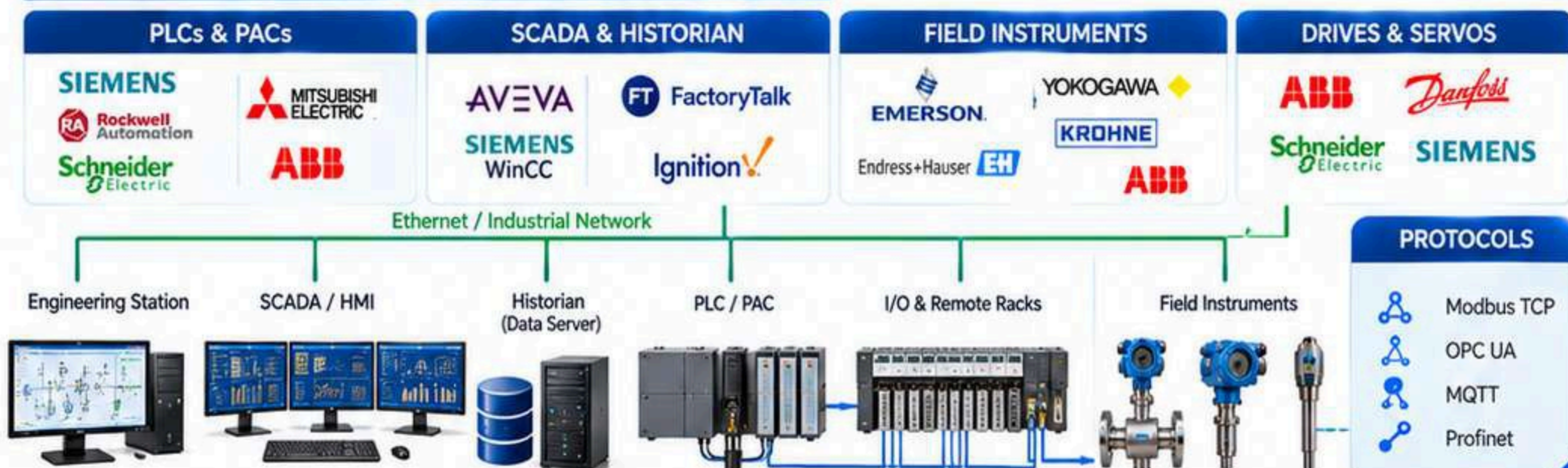
- Modbus / RS485 energy-meter integration for real-time monitoring.
- Utility consumption trending and reporting.

## 2 VENDOR-NEUTRAL AUTOMATION ARCHITECTURE

Flexible, scalable and interoperable automation systems.

### ZERO BLACK-BOX HARDWARE LOCK-IN

Solutions built around standard industrial platforms and interoperable protocols.



# Digital Twin & Virtual Commissioning

Faster Commissioning | Safer Operations | Optimized Performance

SIMULATE  
VALIDATE  
OPTIMIZE  
OPERATE BETTER

## PHYSICAL PLANT



Real process, real equipment and operating conditions.

## DIGITAL PLANT MODEL



High-fidelity dynamic model of your process plant.

## PLC / CONTROL LOGIC



Control logic tested and validated in virtual environment.

## OPC UA / MQTT



Standard industrial protocols for secure data exchange.

## REAL PLANT DATA



Live data for continuous monitoring and optimization.

## KEY FEATURES

From engineering design to stable operations with digital twin technology.



### VIRTUAL COMMISSIONING

Test control logic before site deployment.



### PLANT SIMULATION

Physics-based simulation using OpenModelica / FMU.



### PLC VALIDATION

Validate PLC logic against the virtual plant before installation.



### SAFETY TESTING

Stress-test emergency trips and power-loss recovery scenarios.



### 3D SPATIAL MODELING

NVIDIA Isaac Sim / OpenUSD where applicable.



### OPERATOR TRAINING

Train operators on rare fault conditions in a controlled environment.

## WHY PARAM

A trusted engineering partner for your automation and digital transformation journey.



### EXPERIENCED ENGINEERING

Process + automation understanding.



### CUSTOMIZED SOLUTIONS

Solutions designed around actual plant requirements.



### QUALITY & RELIABILITY

Structured engineering and testing methodology.



### END-TO-END SUPPORT

Design → Engineering → FAT → SAT → Documentation.



Anand | Bengaluru



[paramtechnologies.co.in](http://paramtechnologies.co.in)

# START WITH A 1-3 DAY SITE SURVEY

Receive a comprehensive written findings report, data-flow assessment and prioritized automation roadmap.



## LET'S DISCUSS YOUR NEXT PROJECT



PARAM Engineering and  
Business Solutions Pvt Ltd



parth@paramtechnologies.co.in



Anand & Bengaluru



paramtechnologies.co.in



+91 8780748711



SCAN TO CONNECT

# THANK YOU

ENGINEERING WITH PRECISION.  
AUTOMATION WITH ACCOUNTABILITY.