

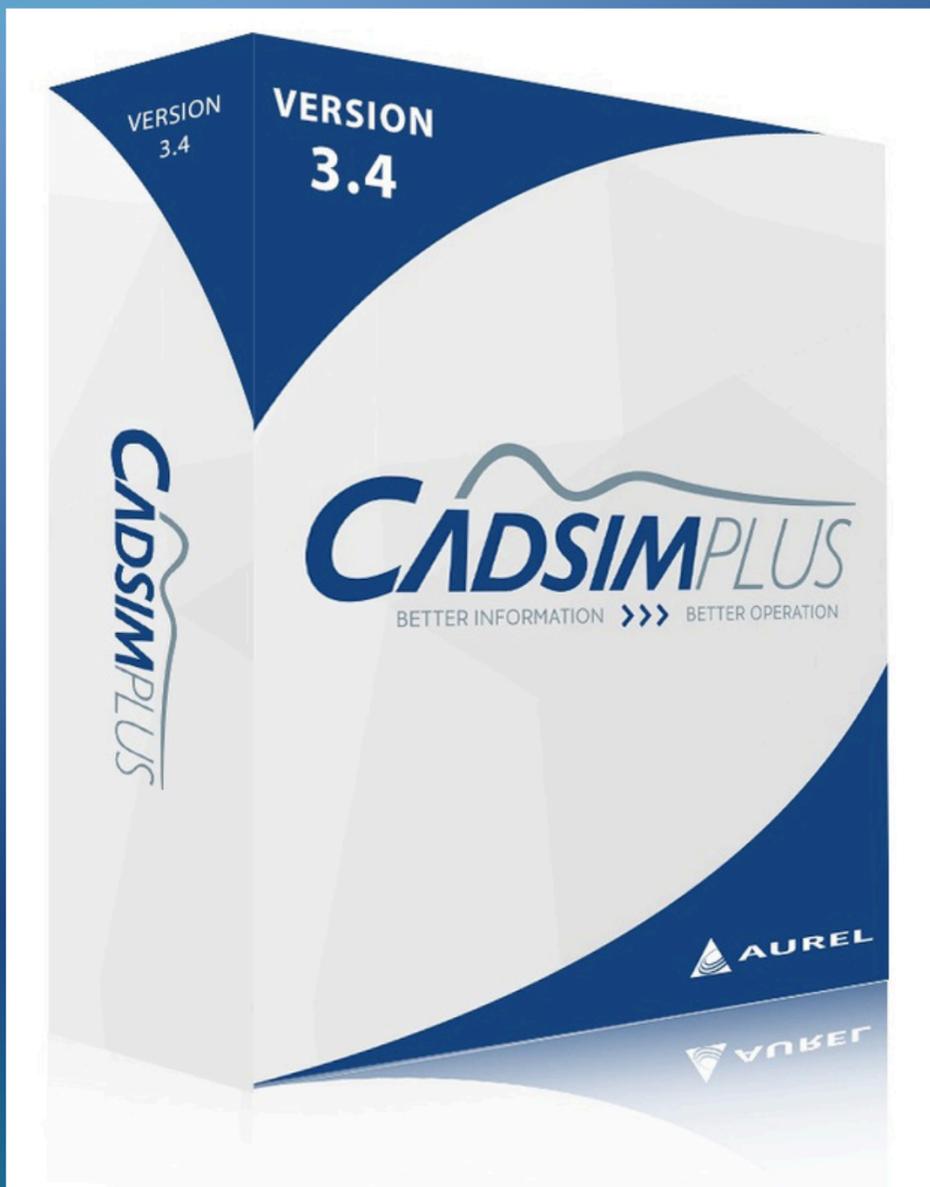


# DYNAMIC SIMULATION & OPTIMIZATION

OF MINERAL PROCESSES IN CADSIM PLUS

Presented By: Patfio Consulting  
BASIC, ADVANCED & EXPERT LEVEL TRAININGS

# 01



Expert Level

>

Advanced Level

>

Basic Level



# COURSES INTRODUCTION

## DESCRIPTION

The PATFIO CADSIM Plus Dynamic Process Simulation Training Course is an intensive, hands-on program designed to equip mineral processing professionals with world-class skills in flowsheet modeling, dynamic simulation, digital process control, and virtual commissioning. This course focuses on applying CADSIM Plus, one of the industry's leading dynamic simulation platforms, to real-world mineral processing applications—enabling participants to design, troubleshoot, optimize, and digitally validate plant performance.

Through expert-led demonstrations and guided exercises, trainees move from foundational interface navigation to full digital twin development. The course integrates process engineering, instrumentation, advanced control, and digital transformation techniques to help participants bridge the gap between plant design, commissioning, and operations.

Dynamic Simulation

Advanced Process Control

3 Levels to build competency

# 02

# AGENDA

- Navigation of CADSIM Plus User Interface – Mineral Processing library
- Model set-up process – Comminution example in CADSIM Plus
- Parts creation & changing part types
- Animations
- Tuning PID controllers
- P&IDs & Process control in CADSIM Plus
- Charting
- COM & DDE
- Component modeling & Chemical reactions
- Dynamic simulation
- Smart connections
- P&ID validation
- Advanced DDE-COM
- Building Digital Manuals – CBMs (Html set-up)
- Converting ordinary P&IDs into a live simulation
- Process Control logic
- Pump Sizing
- DCS Process Control
- DCS Checkout & Operator training
- Design & verify control logic
- Virtual commissioning
- P&ID validation
- Advanced Computer-Based Manuals (CBMs)
- Digital Twin

## 01

Basics Level 1

## 02

Advanced Level 2

## 03

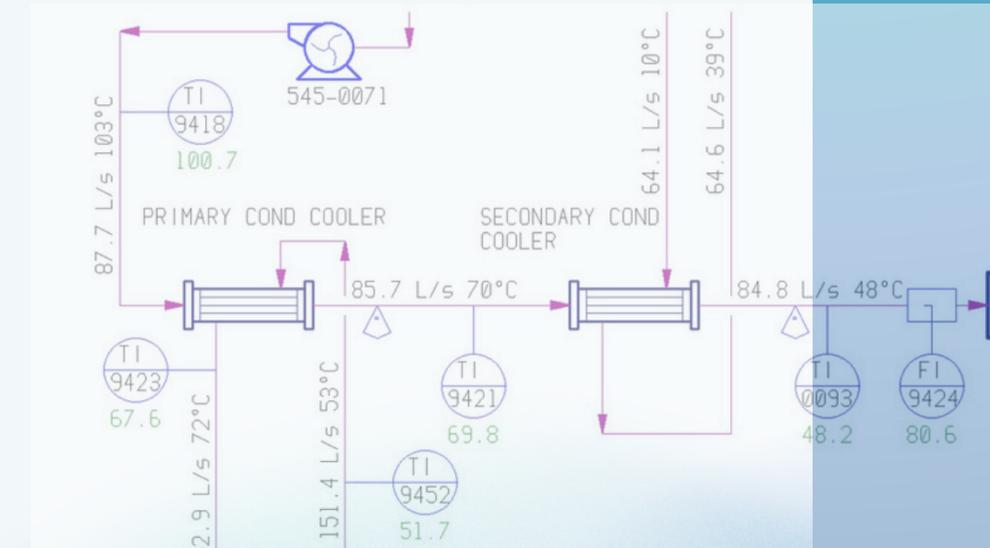
Expert Level 3



# LEARNING OUTCOMES

BY THE END OF THE COURSE, PARTICIPANTS WILL BE ABLE TO:

- Confidently navigate the CADSIM Plus UI and work with the Mineral Processing library.
- Build complete plant models—including comminution & hydroMet & pyroMet circuits—from scratch.
- Create, edit, and convert parts while integrating animations for visual diagnostics.
- Tune PID controllers, design control logic, and implement DCS-style process control.
- Develop and validate P&IDs and convert ordinary diagrams into fully functional dynamic simulations.
- Apply component modeling, chemical reactions, and multi-component mass balance concepts.
- Use COM & DDE interfaces for real-time data exchange and advanced integration.
- Build Computer-Based Manuals (CBMs) and HTML-based interactive documentation.
- Perform virtual commissioning, operator training, and DCS checkout.
- Construct high-fidelity digital twins for optimization and predictive analysis



# 03

# 04

100% Hands-on

Upskill

**01**

- Process & Plant Metallurgists
- Plant Operators & Supervisors

**02**

- Process Designers / EPCM Engineers

**03**

- Process Control & Instrumentation Engineers
- DCS/PLC Engineers

**04**

- Simulation Specialists
- Graduate engineers entering plant design or optimization

## WHO SHOULD ATTEND?

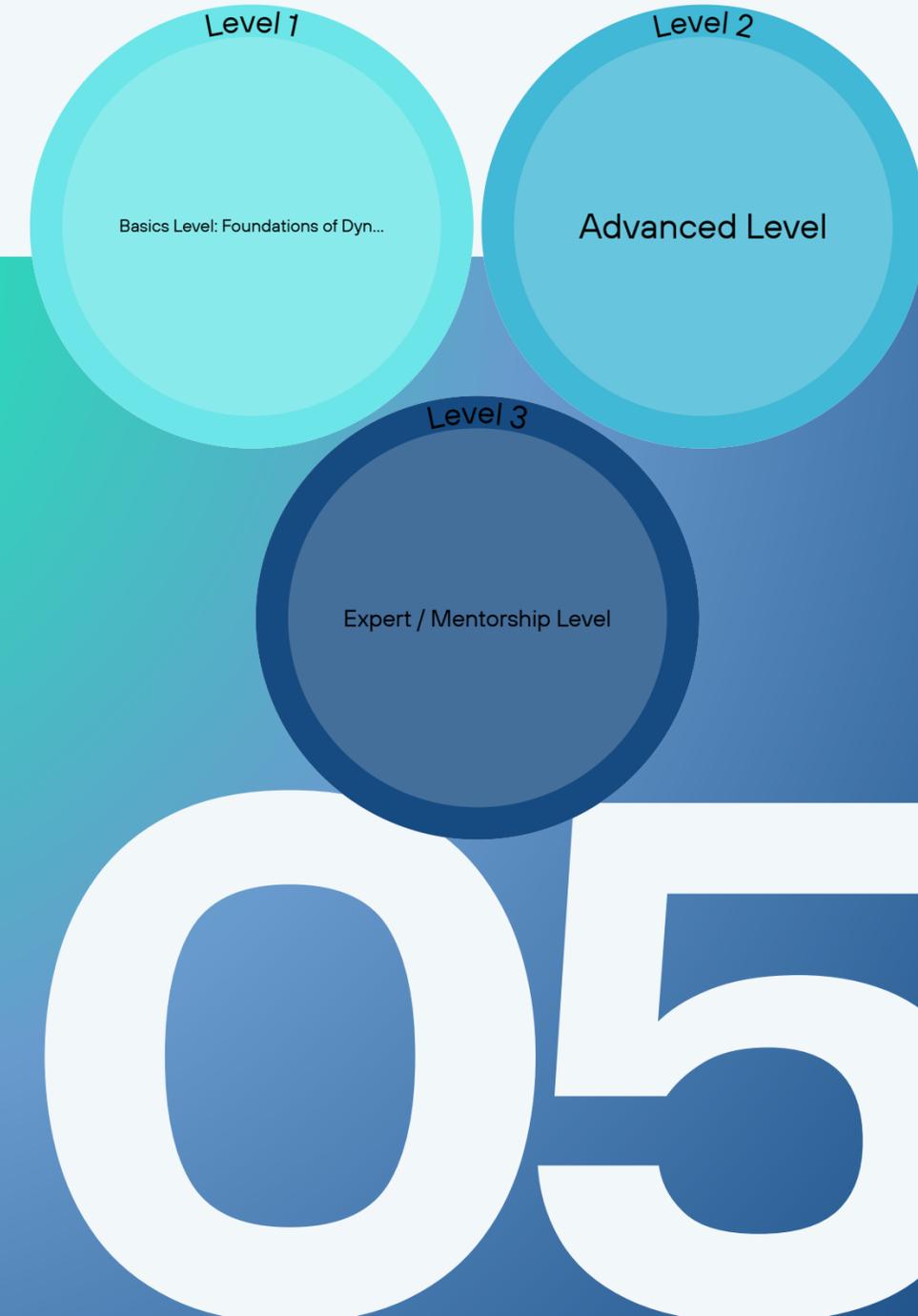
FROM COMPLETE BEGINNER TO EXPERT



# COURSE STRUCTURE

## THREE-LEVEL PROGRAMME STRUCTURE

The PATFIO CADSIM Plus training programme is organised into three ascending levels. Each level builds on the previous, enabling participants to grow from basic understanding to advanced expertise and finally to mentorship/consulting capability. This ensures a structured, cumulative learning path – suitable for engineers, metallurgists, process-control specialists, and design staff working in mineral processing.



Level	Name	Description
Level 1	Basics Level: Foundations of Dynamic Process Simulation	Learn the basics: interface, simple models, dynamic simulation fundamentals.
Level 2	Advanced Level	Build realistic mineral-processing plant models with full control logic, dynamic behaviour, and engineering calculations.
Level 3	Expert / Mentorship Level	Become an expert: create digital twins, run virtual commissioning/operator training,

# LEVEL 1: BASIC — “FOUNDATIONS OF DYNAMIC PROCESS SIMULATION”

**Objective:** Introduce participants to process-simulation fundamentals, CADSIM Plus interface, and the basics of building and running simple dynamic models.

## CORE CONTENTS & SKILLS:

- Navigating the CADSIM Plus user interface and understanding its main features.
- Understanding dynamic simulation vs. steady-state modelling; basic mass and energy balance concepts.
- Setting up simple process models: drawing flow diagrams, defining streams and equipment, building a basic unit or circuit (e.g. a tank or simple flow path).
- Running simulations: switching from drawing mode to simulation mode; monitoring process variables; understanding stream and equipment data.
- Introduction to control elements: configuring simple controllers (e.g. PID-level controller), manipulating setpoints, and observing dynamic response.
- Basic charting and data visualization (e.g. strip-charts) to monitor simulation outputs over time.

**Target Audience:** People new to process simulation — junior engineers, recent graduates, or professionals transitioning into mineral-processing modelling.

**Outcome:** After Level 1, participants will be able to build and run simple dynamic process models, understand key simulation concepts, and perform basic process control and data visualization in CADSIM Plus.



# LEVEL 2: ADVANCED – “INTEGRATED MINERAL-PROCESS SIMULATION & CONTROL”

**Objective:** Expand participants’ capability to model realistic mineral-processing flowsheets, integrate control logic, complex processes, and embrace advanced simulation features.

## CORE CONTENTS & SKILLS:

- Building full mineral-processing circuits: comminution, beneficiation, handling of multiple unit operations and streams. (Reflects your comminution example module.)
- Parts creation, editing part types, adding unit operations, streams, smart connections and comprehensive flowsheet setup.
- Use of animations and visual tools for better representation and diagnostics of process flows.
- Advanced control logic: tuning PID controllers, designing control loops (level, flow, pressure, etc.), specifying process control via P&IDs, developing dynamic control strategies.
- Process control and instrumentation simulation: dynamic response to transients, control interlocks, start-up / shut-down scenarios.
- Data handling and integration: charting, monitoring variables over time, data extraction, and use of simulation data for analysis.
- Component & chemical-reaction modelling, where applicable – enabling simulation of processes involving chemical transformations, multiple phases, and complex mass/energy balances (as permitted by CADSIM Plus modules).
- Model validation and P&ID-to-simulation conversion: taking existing process & instrumentation diagrams (P&IDs) and turning them into live, working simulations with control logic. (This reflects your stated agenda of “Converting ordinary P&IDs into a live simulation,” P&ID validation, digital-manual/CBM building, etc.)
- Dynamic simulation of time-varying processes, equipment sizing, and engineering calculations (e.g. pump sizing) integrated into the simulation context.

**Target Audience:** Engineers, process designers, metallurgists, and control specialists who already have basic simulation exposure and want to model full mineral-processing plants or circuits.

**Outcome:** On completion of Level 2, participants will be capable of building detailed, realistic mineral-processing plant simulations, integrating process control logic, analysing dynamic behaviour, and validating simulation models from P&IDs or engineering design documents. They will also be ready to tackle complex scenarios – e.g., transient events, equipment sizing calculations, and dynamic mass/energy balances with chemical or multiphase processes.



# LEVEL 3: EXPERT / MENTORSHIP LEVEL — “DIGITAL TWIN & VIRTUAL COMMISSIONING / COACHING”

**Objective:** Elevate participants to expert-level competence — enabling them to develop high-fidelity digital twins of plants, perform virtual commissioning or operator-training simulations, and offer mentorship/coaching or consulting services.

## CORE CONTENTS & SKILLS:

- Constructing full-scale plant simulations (digital twin) that mirror real-world mineral-processing plants: combining flowsheet modelling, chemical reaction modules (if needed), dynamic control logic, interlocks, start-up/shutdown sequences, transients, etc.
- Designing, verifying, and optimizing detailed control logic — as used in real DCS (Distributed Control System) environments: building logic for process control, interlocks, safety, operator interactions, fail-safe behavior, and realistic operator-training scenarios.
- Virtual commissioning: simulating plant commissioning, start-up, shut-down, upset/recovery scenarios — enabling testing of control logic, operator procedures, and process behavior in a risk-free environment.
- Building interactive digital documentation/manuals: Computer-Based Manuals (CBMs), HTML-based documentation, interactive process manuals linked to the simulation — supporting standard operating procedures (SOPs), training manuals, and operator guidance. (Reflects “Building Digital Manuals – CBMs (Html set-up)” from your agenda.)
- Advanced DDE/COM data integration and external interfacing: linking the simulation with external systems, data exchange in real time, enabling integration with plant data historians, DCS/SCADA frameworks or other external data sources.
- Coaching / mentoring others: using the simulation as a teaching/training tool to onboard new engineers or operators; leading simulation-based training; providing consultancy and support for simulation adoption in projects.
- Performing model validation, benchmarking, sensitivity analyses, optimisation studies, “what-if” analyses, and project-level simulation consulting — turning the simulation into a strategic engineering and decision-making tool for plant design, upgrades, trouble-shooting or performance optimization.
- Advanced scenario planning: process improvements, debottlenecking, start-up/shutdown, emergency scenarios, process control upgrades — all within a simulated environment before committing changes on real plant.

**Target Audience:** Senior engineers, process simulation specialists, consultants, control-systems engineers, engineering managers — anyone who needs mastery of process simulation and wants to leverage CADSIM Plus for digital-twin development, virtual commissioning, operator training, or consulting services.

**Outcome:** On completing Level 3, participants will be fully capable of creating and managing high-fidelity digital twins of mineral-processing plants, performing virtual commissioning, training operators, validating control logic, and delivering simulation-based consulting services. They will be qualified to mentor others and lead simulation-based projects, bridging plant design, control logic validation, and operations.





**WHY THE THREE-LEVEL  
STRUCTURE MATTERS**  
TRANSFORMATIONAL JOURNEY

1

Progressive learning & competence building: Starting from simple concepts and gradually increasing complexity helps ensure a strong foundation before tackling advanced or expert tasks.

2

Flexibility for different backgrounds: Beginners can start from Level 1, while experienced engineers can skip directly to Level 2 or 3 (depending on prior knowledge).

3

Scalable skills for industry needs: From basic simulation for educational or small-scale tasks to full digital-twin development for real-world industrial plants.

4

Alignment with real-world applications: Level 2 and Level 3 map directly to plant design, commissioning, operations, troubleshooting, and optimization – making the training valuable for both consultants and operating companies.

5

Support for knowledge transfer and organizational capability building: Level 3 enables mentorship and consulting – allowing organizations to embed simulation capabilities in-house rather than relying solely on external consultants.

6

Each engagement is structured around the client's technical priorities, ensuring direct applicability to real operations and strengthening organisational competence in advanced process simulation.



# REQUIREMENTS

Flexible Schedule

Access to Software Tool

2026

## REQUIREMENTS

### **LAPTOP**

CADSIM Plus can run on any laptop, the speed of running will be relative to the speed of your laptop

### **RUNNING MS OFFICE SUITE**

A running Office suite is required.

### **ACCESS TO SOFTWARE**

- CADSIM Plus demo version will be provided
- Access to monthly/bi-annual/Annual license/Perpetual license will be provided by PATFIO at a fee.

### **INTERNET CONNECTION**

Strong internet connection for LMS login and live video meetings with the coach

### **PRE-REQUISITES PER LEVEL**

Enrollment into level 2 requires completion of level 1 and enrollment into Mentorship level 3 requires completion of both level 1 & 2.

### **REGISTRATION FEES**

- Level 1 - \$USD500
- Level 2 - \$USD750
- Level 3 - \$USD3,800

ONLINE

ONSITE

2026

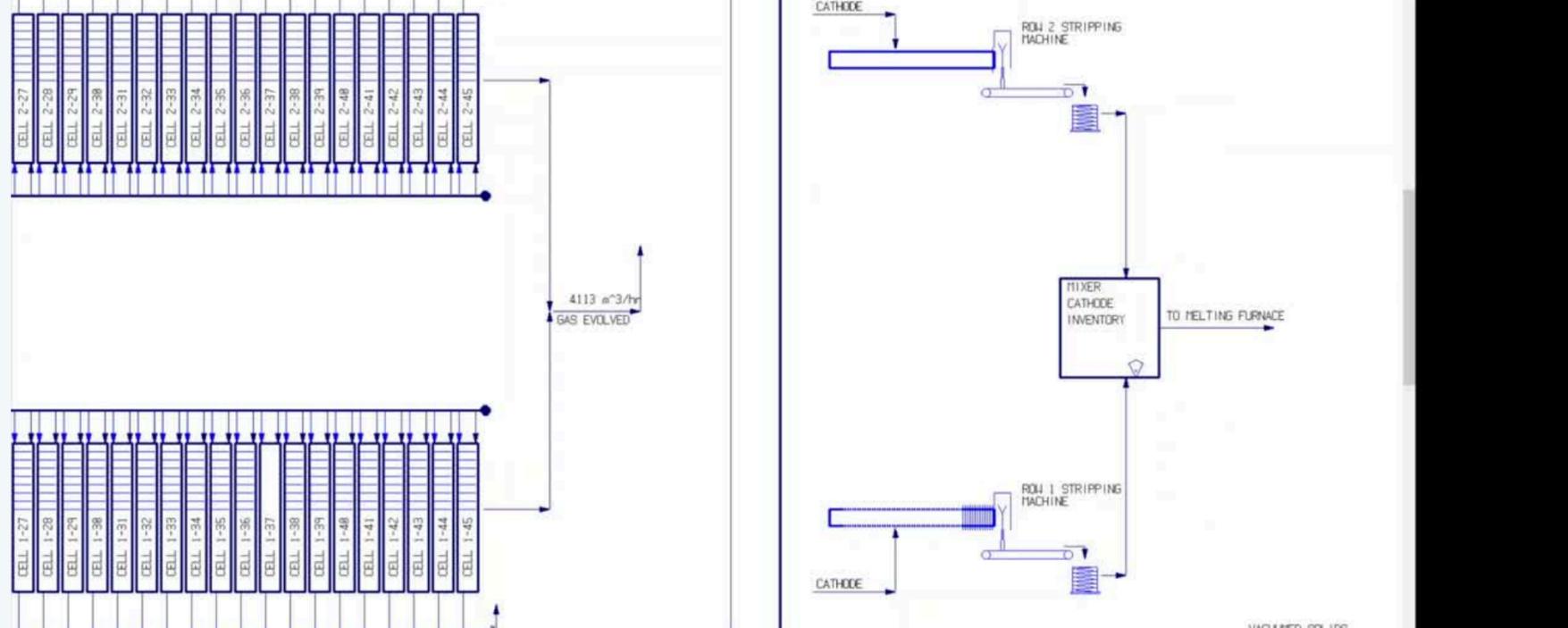


# COMPANY BOOKINGS

BRING PATFIO TO YOUR TEAM – WE DELIVER COMPANY-SPECIFIC DYNAMIC SIMULATION TRAINING ALIGNED TO YOUR CIRCUITS, CONTROL STRATEGY, AND KPIS.

PATFIO provides tailored group and company-wide CADSIM Plus training designed to meet the specific process requirements, flowsheets, and operational objectives of each organisation.

Delivered in either online or onsite formats, our programmes equip engineering, metallurgical, and process control teams with practical, plant-aligned dynamic simulation capabilities. Each engagement is structured around the client's technical priorities, ensuring direct applicability to real operations and strengthening organisational competence in advanced process simulation.



# REGISTRATION



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Register on our LMS platform:

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