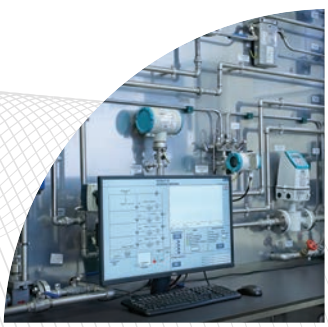
FKITMCMXIX

UNIVERSITY OF ZAGREB

FACULTY OF CHEMICAL ENGINEERING
AND TECHNOLOGY

LABORATORY
FOR AUTOMATION & MEASUREMENT



LAM
LABORATORY FOR AUTOMATION & MEASUREMENT

Scope

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Process

monitoring
diagnostics
control optimisation
analytical technology
advanced control

About us

Laboratory for Automation and Measurement (LAM)

at the University of Zagreb Faculty of Chemical Engineering and Technology.

The laboratory includes a number of unit operations and individual exercises altogether connected to a state-of-the-art system for data acquisition and process control.

The aim is to teach basic and advanced concepts of process measurement, dynamics, modelling, optimisation and control.

LAM
LABORATORY FOR AUTOMATION & MEASUREMENT


Optimize your operations
on board and onshore.
C20 Two Stage HE Control
C40 Reactor Control
C10 - Level Control - Process
AOC
logitech

Control monitoring & optimisation

Optimising the performance of PID controllers and process control systems

Monitoring, diagnostics, and optimisation of process control systems play a key role in ensuring optimal industrial process performance.

Based on detailed analysis control loop problems can be clearly identified and control loop performance can be improved.

Our process optimisation services

- Plant monitoring & analysis
- Process model identification
- Control loop simulation and optimisation
- Adaptive control
- Real-time process optimisation

Advanced process control

Designing reliable and cost-effective solutions for direct application in plant control system.

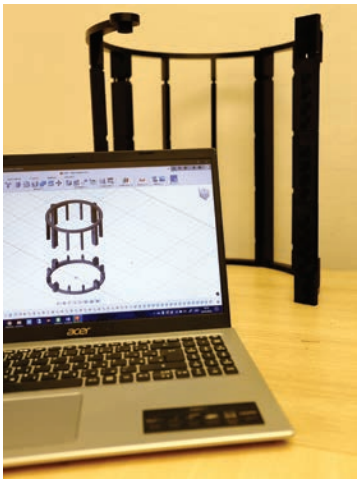
APC projects for the process industry.

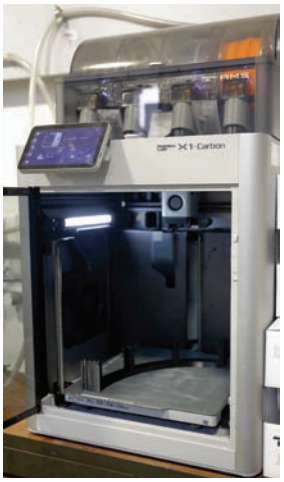

control
monitoring &
optimisation
Feedforward Transfer Function
Delay =
Gain =
Lead =
Lag1 =
Lag2 =
Slave PID
Prop =
Intg =
Derv =
Disturbance Transfer Function
Tau1 =
Tau2 =
Slave PV Noise
Cascade PV Noise
Slave Transfer Function
Cascade Transfer Function
Model
Slave PV Sample Delay
Slave PV Filter
Cascade PV Filter
Filt =
OP
PV
E
Slave PV
Cascade PV

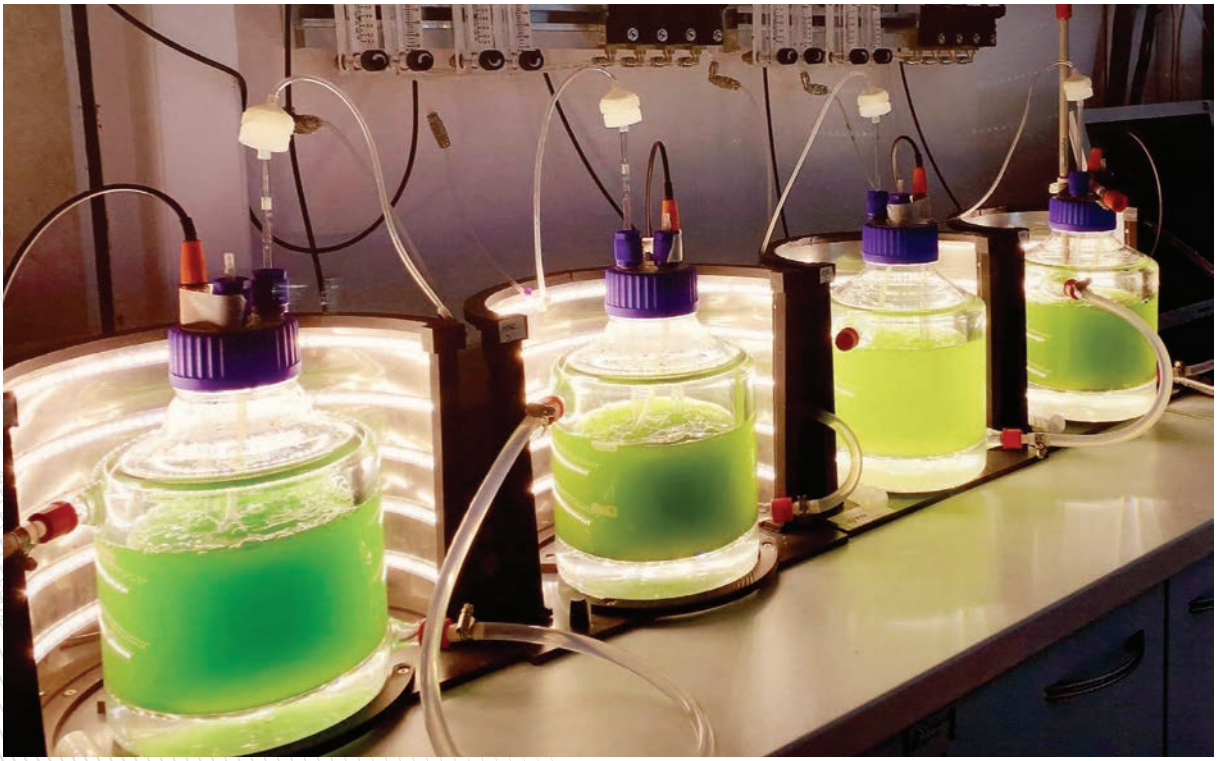
Laboratory & pilot plant design and construction

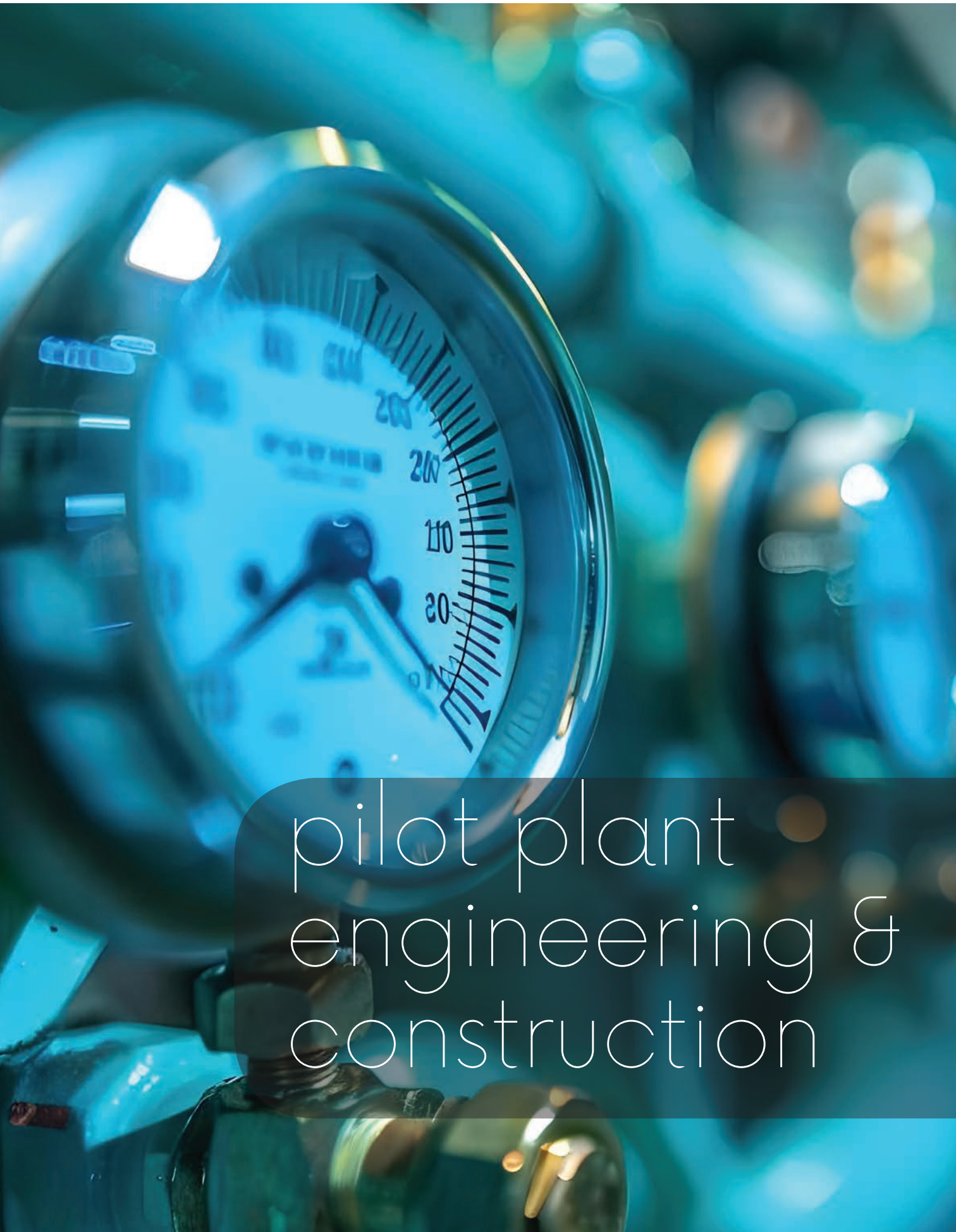
Process engineering and manufacturing of fully automated systems

- Design of lab & pilot-scale processes for industrial and scientific research
- Modular design and construction
- Process automation
- System integration and SCADA design







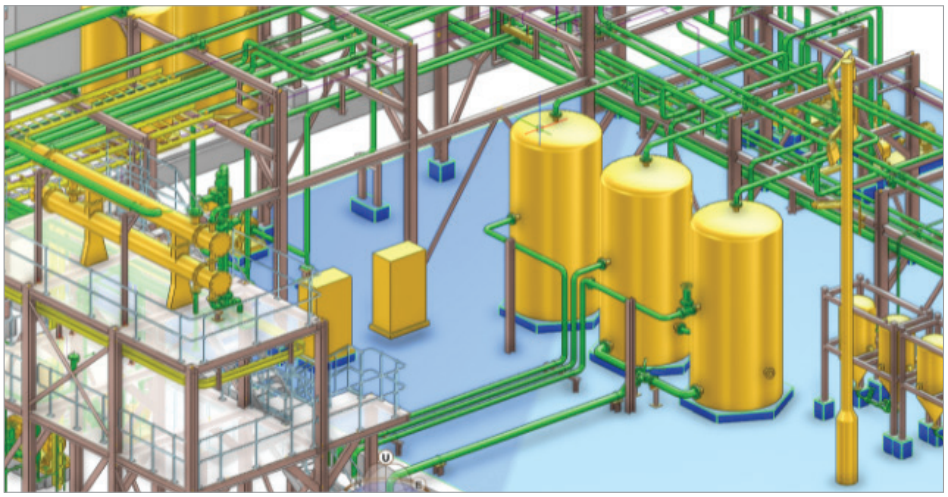


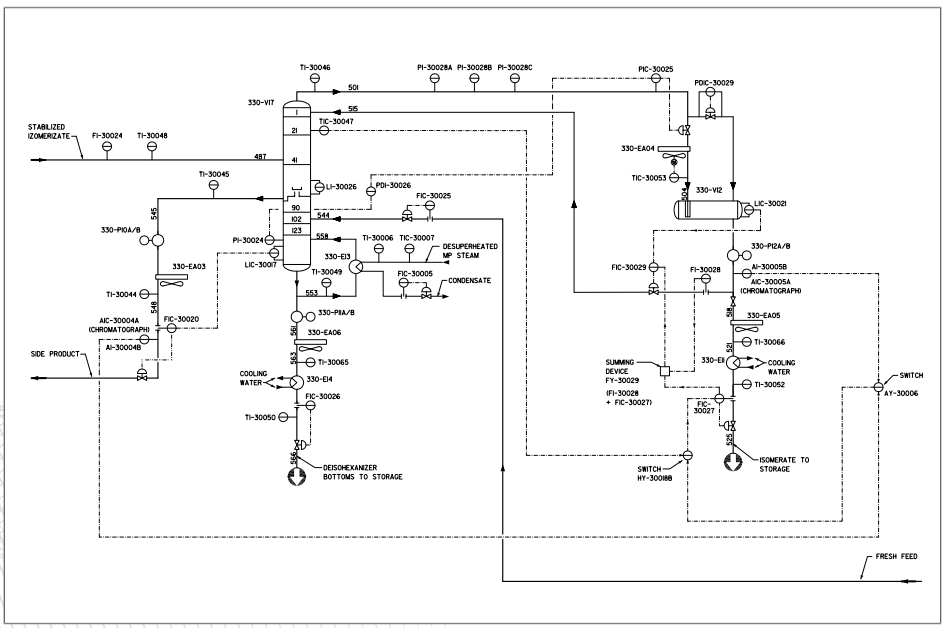
pilot plant engineering & construction

Process plant design

Basic and detailed design projects

- Plant layouts
- Process flow diagrams (PFDs) & piping and instrumentation diagrams (P&IDs)
- Process data sheets for equipment
- Pipeline and equipment specifications
- Isometric drawings
- Bill of materials



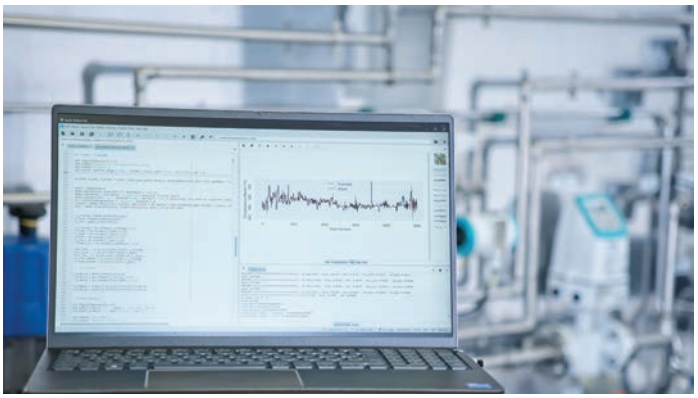



process
plant
design

Modelling, diagnostics & soft sensing

Extensive experience in design and implementation for the chemical and related industries

- **Data preprocessing**, visualisation and analysis.
- Development of **first-principle** and **machine learning**-based models.
- **Soft sensors** to replace analytical instrumentation and estimate unmeasurable process conditions.
- **Predictive diagnostics** of processes and equipment.
- **Statistical process monitoring** for quality control.
- **Digital twin** – virtual representation of processes and plants.



MATLAB python R SIEMENS SIMIT gPROMS aspen

modelling diagnostics & soft sensing

Green energy production & storage

Development, diagnostics, and improvement of energy production and storage

Hydrogen production

- Production and storage using AEM & PEM electrolysis
- Modelling and simulation of electrochemical processes
- Advanced process control

Redox flow batteries

- Energy storage and distribution
- Design of electrochemical cells and stacks
- MEA component testing and optimisation


energy
production
& storage

Process analytical technology

PAT & APC for pharmaceutical, chemical and food research laboratories, pilot and production plants

Crystallisation system development

Selection of a suitable crystallisation method for desired properties.

PAT data management

Acquisition and analysis of spectral data. Development of chemometric calibration models for critical quality attributes (CQA).

Modelling & advanced process control

Determination of the optimal temperature profile for the desired particle size distribution.

System integration & software development

Software and hardware integration for PAT applications in control strategy.

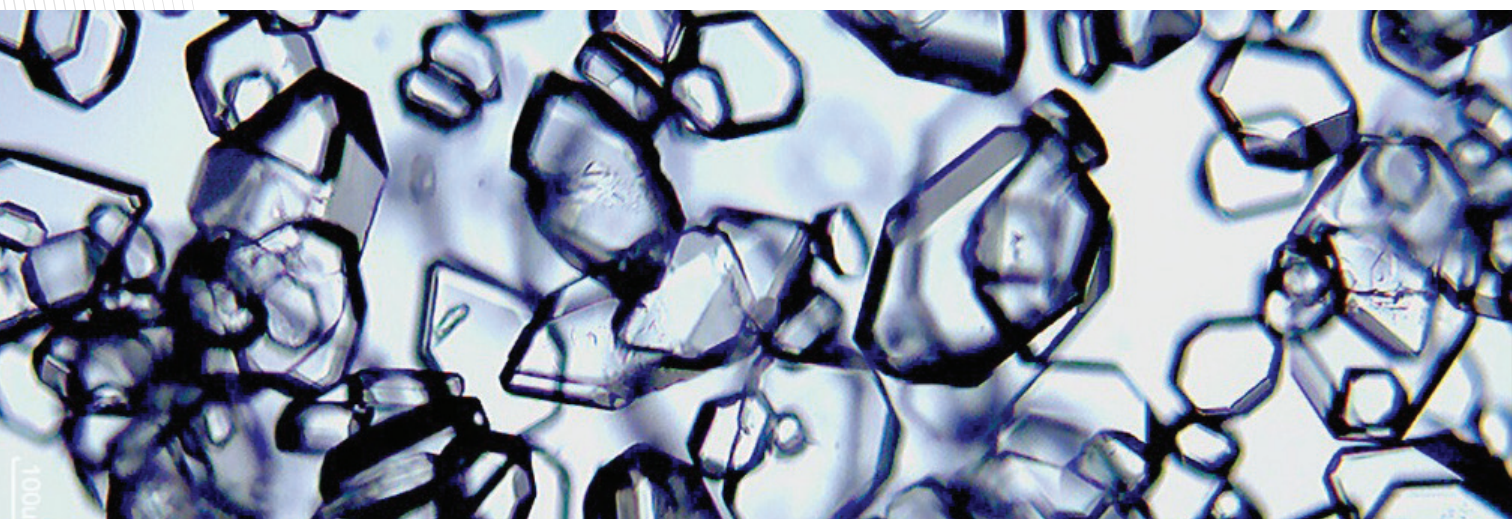
Research laboratory

- State-of-the-art equipment for the process monitoring and control
- PAT *in-situ* probes (FTIR, UV/Vis, Raman, process microscopy)
- Quality by Design (QbD)
- Quality by Control (QbC)

https://crystapc.fkit.hr

CrystAPC
crystallization advanced process control

The project is co-financed by the EU from the European Fund for Regional Development.



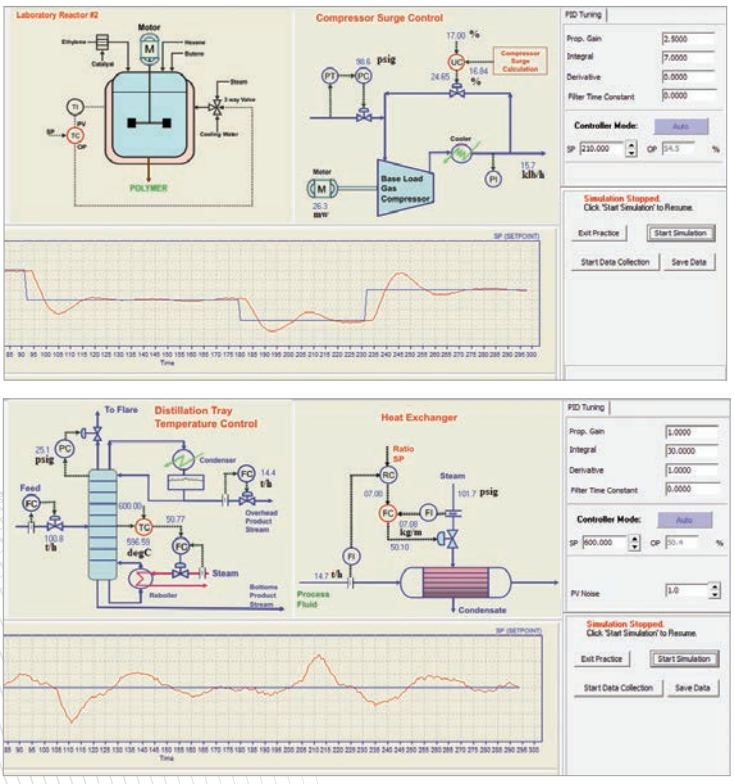

process
analytical
technology

Education & training

Practical courses using an interactive process control simulator and controller optimiser

- **APC-1** Automatic process control
- **APC-2** Advanced process control
- **APC-3** Process diagnostics & optimisation
- **APC-4** Process measurements
- **APC-5** Batch process control optimisation
- **APC-6** Modelling & process simulation
- **APC-7** AI for engineers

- Most process plants can achieve **significant savings** with adequate process control, measurement and diagnostic techniques.
- Interactive simulation and analysis of **real process examples**.
- Understand the **key elements** related to process performance, process control, measurement techniques and process control optimisation.
- For professionals directly involved in production, maintenance and **optimisation** of the plant.




education
& training

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