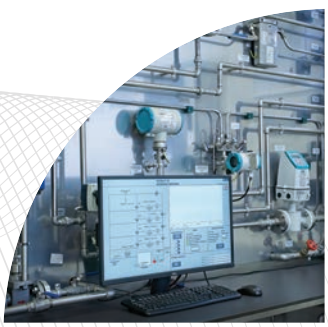
FKITMCMXIX

UNIVERSITY OF ZAGREB

FACULTY OF CHEMICAL ENGINEERING
AND TECHNOLOGY

LABORATORY
FOR AUTOMATION & MEASUREMENT



LAM
LABORATORY FOR AUTOMATION & MEASUREMENTS

Scope

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Process

Monitoring

Diagnostics

Control Optimization

Analytical Technology

Advanced Control

About Us

Laboratory for Automation and Measurement (LAM)

is located at the Faculty of Chemical Engineering and Technology, University of Zagreb.

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, modeling optimization and control.

LAM
LABORATORY FOR AUTOMATION & MEASUREMENTS

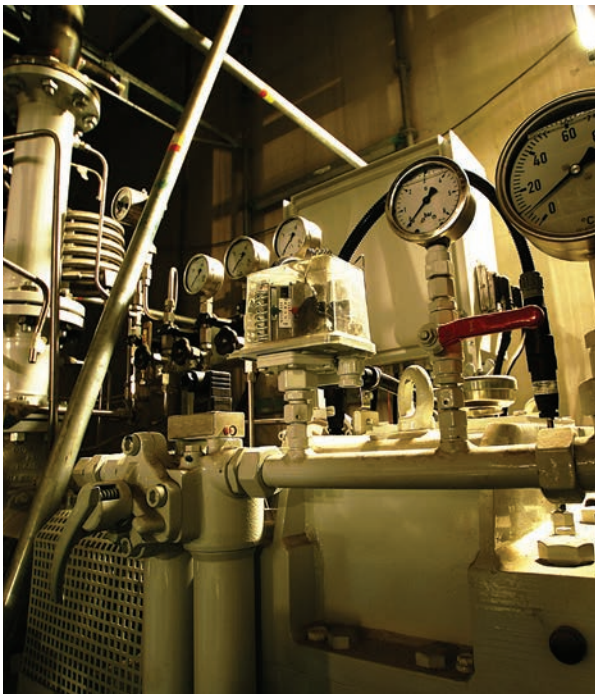
Optimize your operations
on board and onshore.
C20 Two Stage HE Control
C40 Reactor Control
C10 - Level Control - Process
AOC
logitech

Control Monitoring & Optimization

We optimize the performance of PID controllers and process control systems according to process requirements

Monitoring, diagnostics, and optimization 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 the control loop and overall process performance can be improved.



Our process optimization services

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

Advanced process control

We design and develop reliable and cost-effective solutions that can be applied directly in a plant control system.

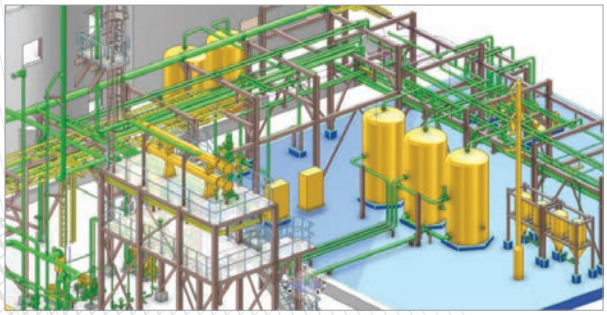
We support APC projects for the entire process industry including chemical, petrochemical, food, pharmaceutical, power, pulp and paper, pharmaceutical, food & beverage, power generation, water & waste water, glass, building materials, pulp & paper industry.

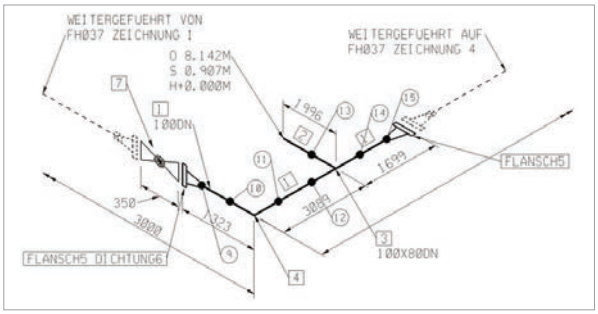
control
monitoring &
optimization
Feedforward Transfer Function
Delay =
Gain =
Lead =
Lag1 =
Lag2 =
Slave PID
Prop =
Intg =
Derv =
Disturbance Transfer Function
Tau1 =
Tau2 =
Slave Transfer Function
Slave PV Noise
Cascade PV Noise
Cascade Transfer Function
Cascade PV
Slave PV
Model
Slave PV Sample Delay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

Process Plant Design

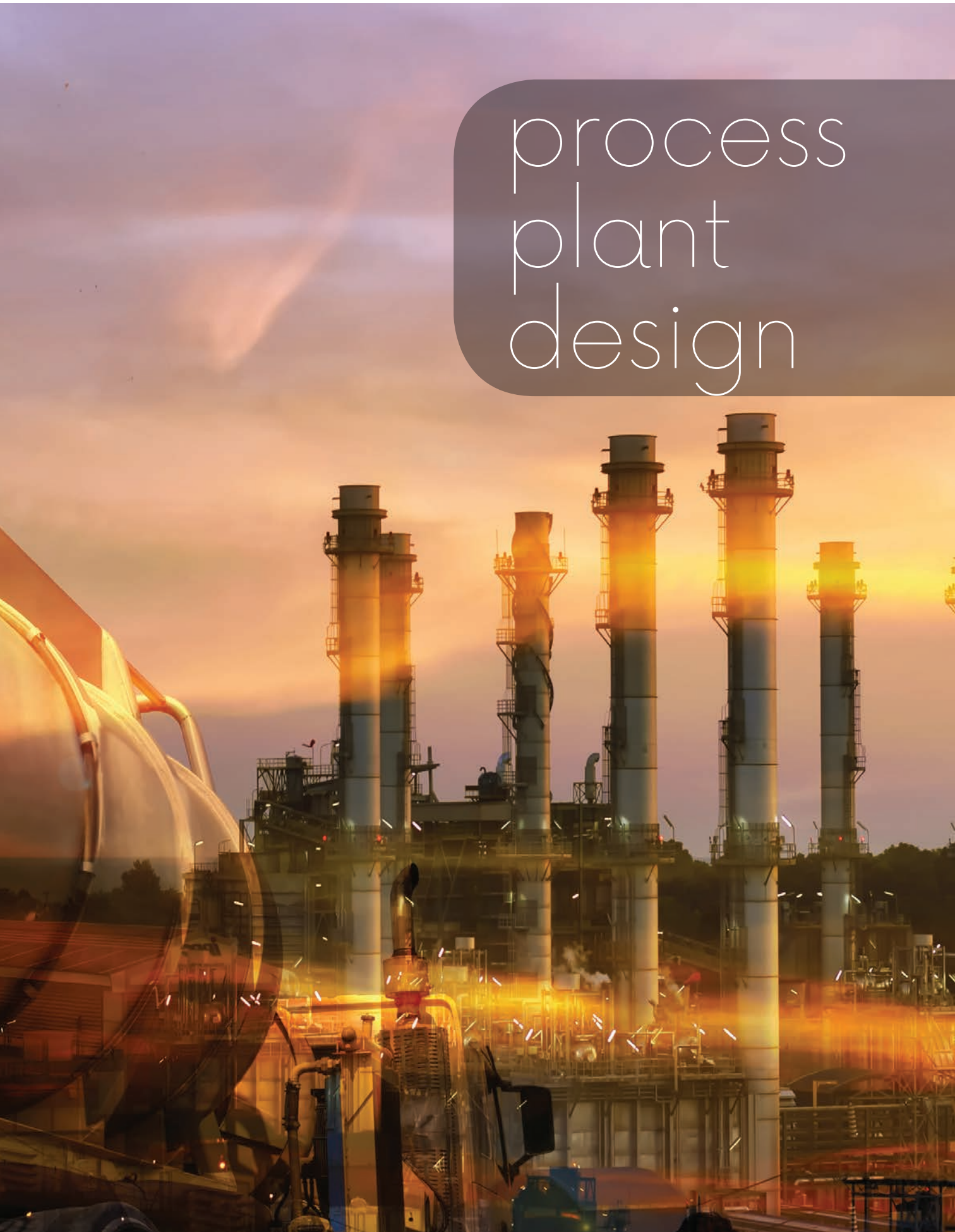
Basic and detailed design projects

- Plant layouts
- Process flow diagrams (PFD) & piping and instrumentation diagrams (P&ID)
- Process data sheets of equipment
- Pipeline and equipment specifications
- Isometrics drawings
- Bill of materials





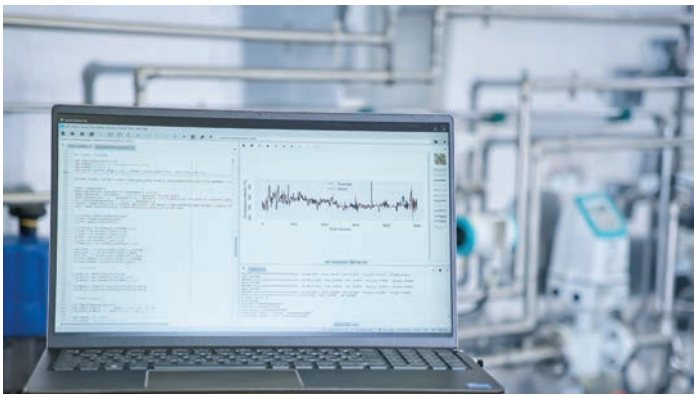
process plant design



Modeling, Predictive Diagnostics & Soft Sensing

Extensive experience in designing and implementation for the chemical and related industry

- **Data preprocessing**, visualisation and data analysis
- Development of **first-principle** and **machine learning**-based models
- Development of **soft sensors** to replace analytical instrumentation and estimate unmeasurable process conditions.
- **Predictive diagnostics** of processes and equipment (heat exchangers, process analysers, *etc.*) using physics-based and machine learning models
- **Statistical process monitoring** for quality control.
- **Simulation** of machines and plants, **digital twin** – virtual representation of processes and plants.



MATLAB python SIEMENS SIMIT

predictive diagnostics & soft sensing

Process Analytical Technology

PAT & APC (advanced process control) for pharmaceutical, chemical and food research laboratories, pilot and production plant

Crystallization system development

Selection of suitable crystallization 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

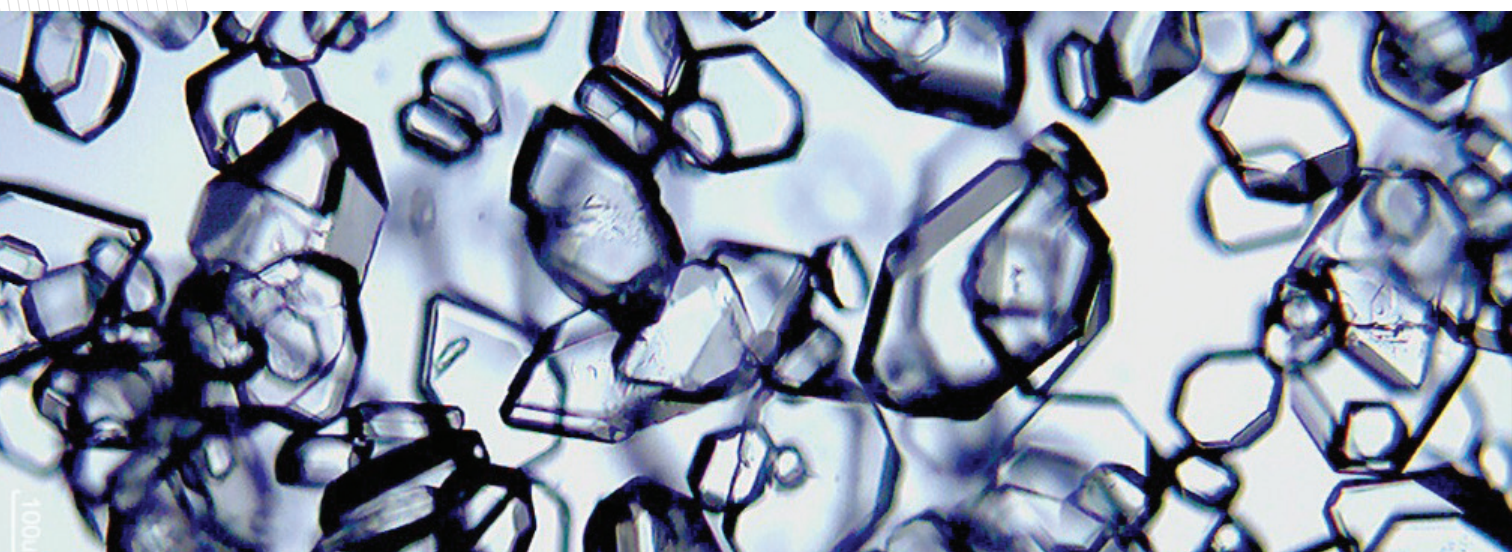
- State-of-the-art equipment for the crystallization process monitoring and control
- PAT *in-situ* probes (FTIR, UV/Vis, Raman, process microscopy)
- Quality by Design (QbD)
- Quality by Control (QbC)

https://crystapc.fkit.hr

CrystAPC
crystallization advanced process control

Europska unija "Zajedno do fondova EU" · REPUBLIKA HRVATSKA Ministarstvo regionalnoga razvoja i fondova Europske unije · EUROPSKI STRUKTURNI I INVESTICIJSKI FONDOVI · Operativni program KONKURENTNOST I KOHEZIJA

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



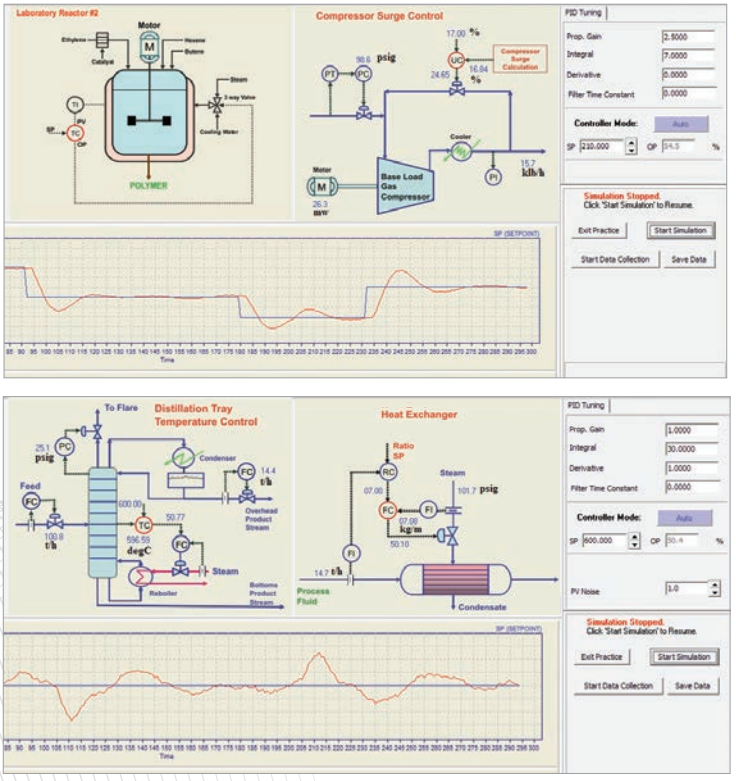
process
analytical
technology

Education & Training

Practical courses with the use of an interactive process control simulator and controller optimizer

- **APC-1** ***Automatic process control***
- **APC-2** ***Advanced process control***
- **APC-3** ***Process diagnostics & optimization***
- **APC-4** ***Process measurements***
- **APC-5** ***Batch process control & optimization***
- **APC-6** ***Modeling & process simulation***

- Most process plants can achieve **significant savings** with using adequate process control, measurement and diagnostic techniques.
- During the courses **real examples** of industrial processes are interactively simulated and analyzed.
- Upon completion you will understand the **key elements** related to process performance, process control, measurement techniques and process control optimization.
- Training is important for the professionals directly involved in production, as well as for the personnel responsible for the maintenance and **optimal operation** of the plant.



education & trainings

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