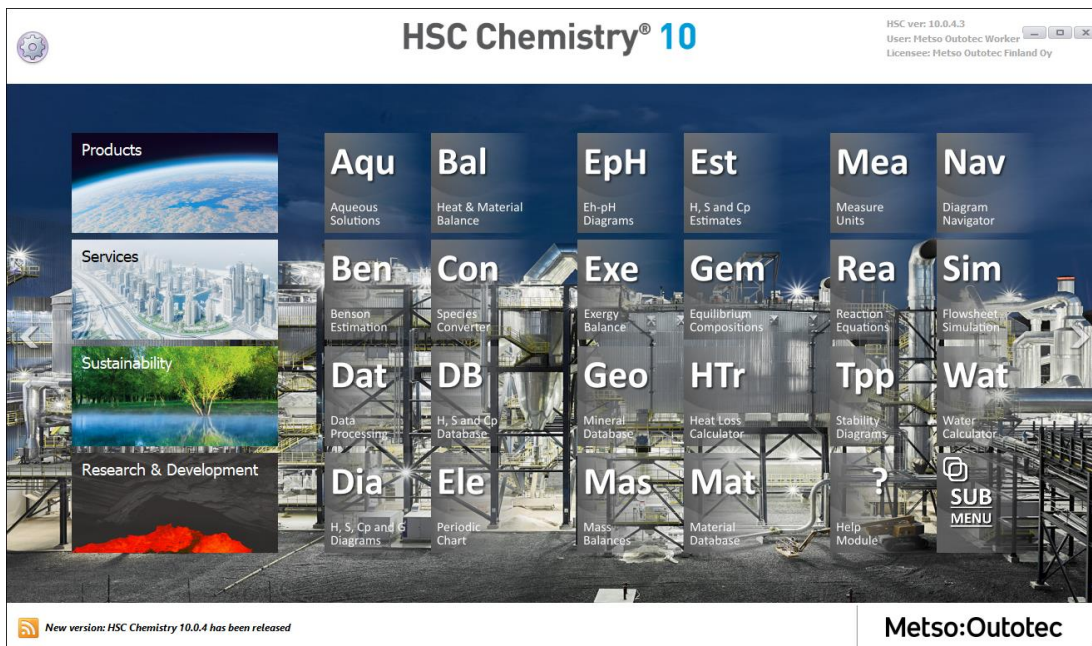


## HSC Chemistry Public Courses 2022



Get more out of your HSC software and join the HSC courses at Pori, Finland on November 7 – 17. Confirm your reservation by October 31, at the latest. Online course will not be available this time.

### 1. Outline

Six different courses are available. We recommend everyone to start with the HSC Sim Basics course, since this information is needed in the more advanced Mineral processing, Hydrometallurgy, and Pyrometallurgy courses.

Course *	Duration	Dates	Lecturer
HSC Sim Basics	1 day	November 7, 2022	Matti Hietala & Tuukka Kotiranta
HSC Sim Pyro	2 days	November 8 - 9, 2022	Matti Hietala
HSC Sim Hydro	2 days	November 8 - 9, 2022	Tuukka Kotiranta
HSC Sim Pyro & Hydro Dynamic	1 day	November 10, 2022	Matti Hietala & Tuukka Kotiranta
HSC Sim Mineral Processing	2 days	November 14 - 15, 2022	Caroline Izart
HSC Sim Mineral Processing Advanced	1.5 days	November 16 – 17, 2022	Caroline Izart

\* If there are less than 5 participants the course may be cancelled

## 2. Pre-requisites for the participants

- The official language of the courses is English.
- All participants must bring their own laptops with Windows 7, 8 or 10.
- A fast laptop with at least 6 GB memory and at least 4 GB free hard disk space is needed.
- External mouse is recommended for flowsheet drawing.
- The latest HSC version will be installed on the laptops and temporary user licenses are available for the participants. **NOTE: Participants must have full administrative rights for their computers to allow HSC installation.**
- Participants can test calculation examples on their PC, ask questions at any time, or just follow the presentations.

## 3. Pricing and registration

The price for the courses is 500 EUR per day per participant (VAT 0%).

The total fixed price of the course covers:

- The selected HSC training course
- Workbooks as printed copy
- Training and exercises in electronic forms
- 30 days course license
- Course certificates
- Lunches and refreshments

Course	Price
HSC Sim Basics	500 EUR
HSC Sim Pyro	1000 EUR
HSC Sim Hydro	1000 EUR
HSC Sim Pyro & Hydro Dynamic	500 EUR
HSC Sim Mineral Processing	1000 EUR
HSC Sim Mineral Processing Advanced	750 EUR

Registration happens online at <http://www.hsc-chemistry.com/webshop&subcat=8>. Registration needs to be done latest October 31.

No refunds will be made for cancellations unless the whole course is cancelled by the organizer.

**Holding onsite training courses is dependent on the COVID-19 situation and legislation of the country of origin and destination country, including company policies.**

## 4. Daily schedule and venue

Time	Topic
8:30	Breakfast
9:00	Course starts
10:30 - 10:45	Coffee break
10:45	Course continues
12:00 - 13:00	Lunch break
13:00	Course continues
14:30 - 14:45	Coffee break
14:45	Course continues
17:00*	Course ends

\*most likely 16:00

Metso Outotec Research Center, MORC

November 7-17, 2022

**Metso Outotec Research Center**

Kuparitie 10

FI-28330 Pori, Finland ([Metso Outotec Research Center - Google Maps](#))



Course	Room in MORC
HSC Sim Basics	Auditorium
HSC Sim Pyro	Rock
HSC Sim Hydro	Auditorium
HSC Sim Pyro & Hydro Dynamic	Auditorium
HSC Sim Mineral Processing	Monday: Auditorium, Tuesday: Rock
HSC Sim Mineral Processing Advanced	Auditorium



## 5. Hotels, flights, and local info

Please make your own hotel and flight reservations.

### Hotels:

Vaakuna: <https://www.sokoshotels.fi/fi/pori/sokos-hotel-vaakuna-pori>

Scandic: <https://www.scandichotels.fi/hotellit/suomi/pori/scandic-pori>

and some smaller ones which Google finds.

### Flights:

Finnair: <https://www.finnair.com/fi-en>

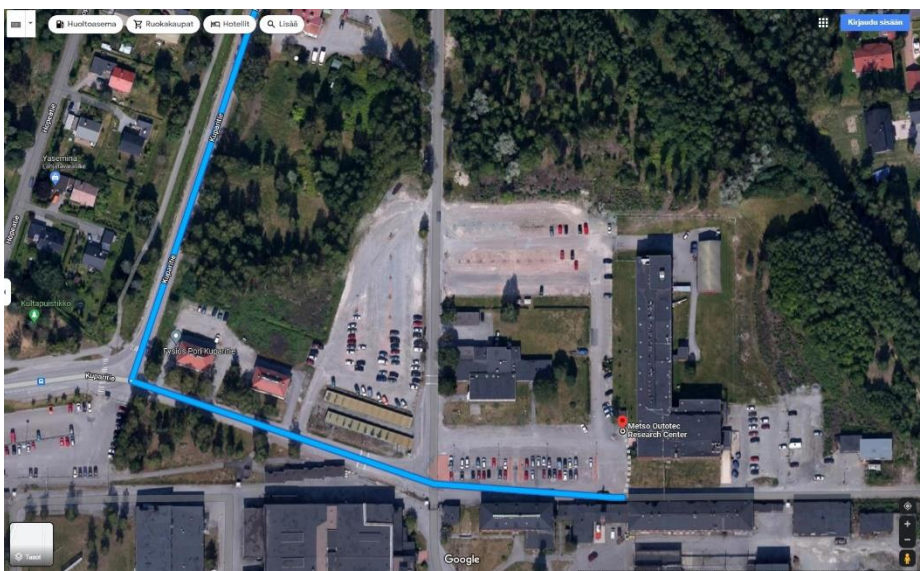
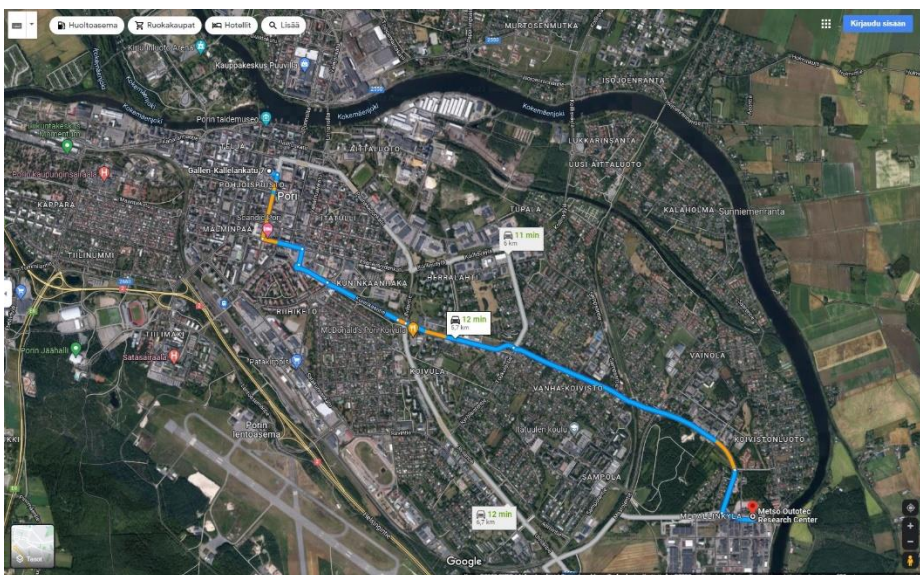
Pori: <https://www.karhu.aero/index-en>

Train: <https://www.vr.fi/en>

Bus: <https://www.matkahuolto.fi/passengers/timetables>

Taxi: <https://satakunnaluetaaksi.fi/>

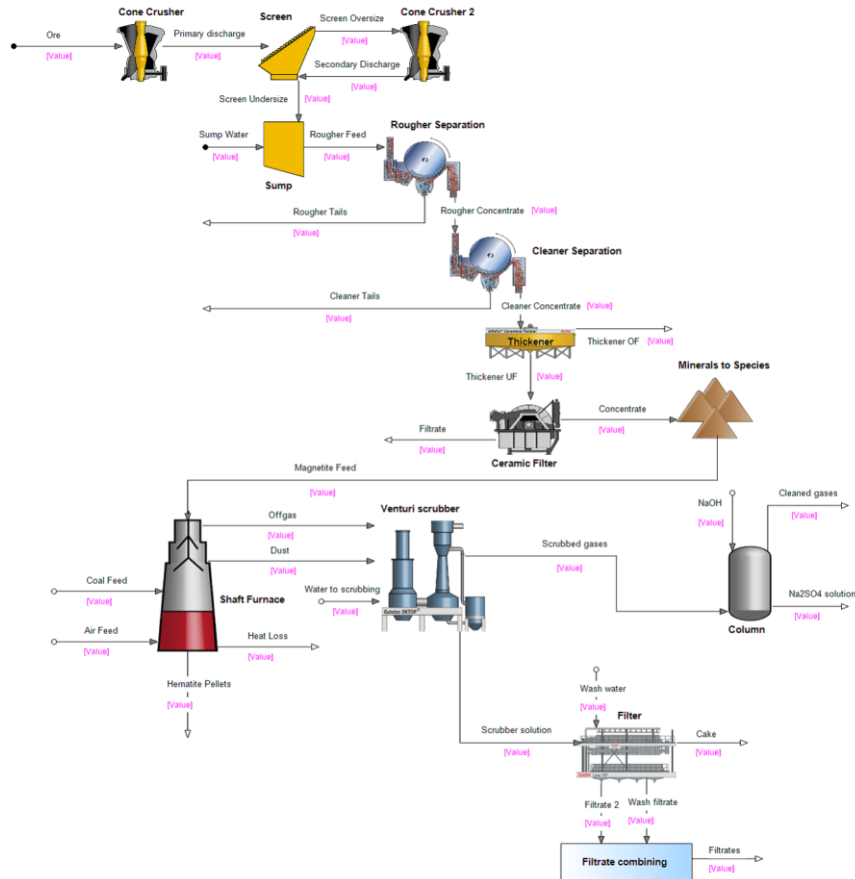
Shopping: <https://porinpuuvilla.fi/>



Metso Outotec Research Center  
Kuparitie 10  
FI-28330 Pori, Finland

## 4. Courses

### 4.1. HSC Sim Basics



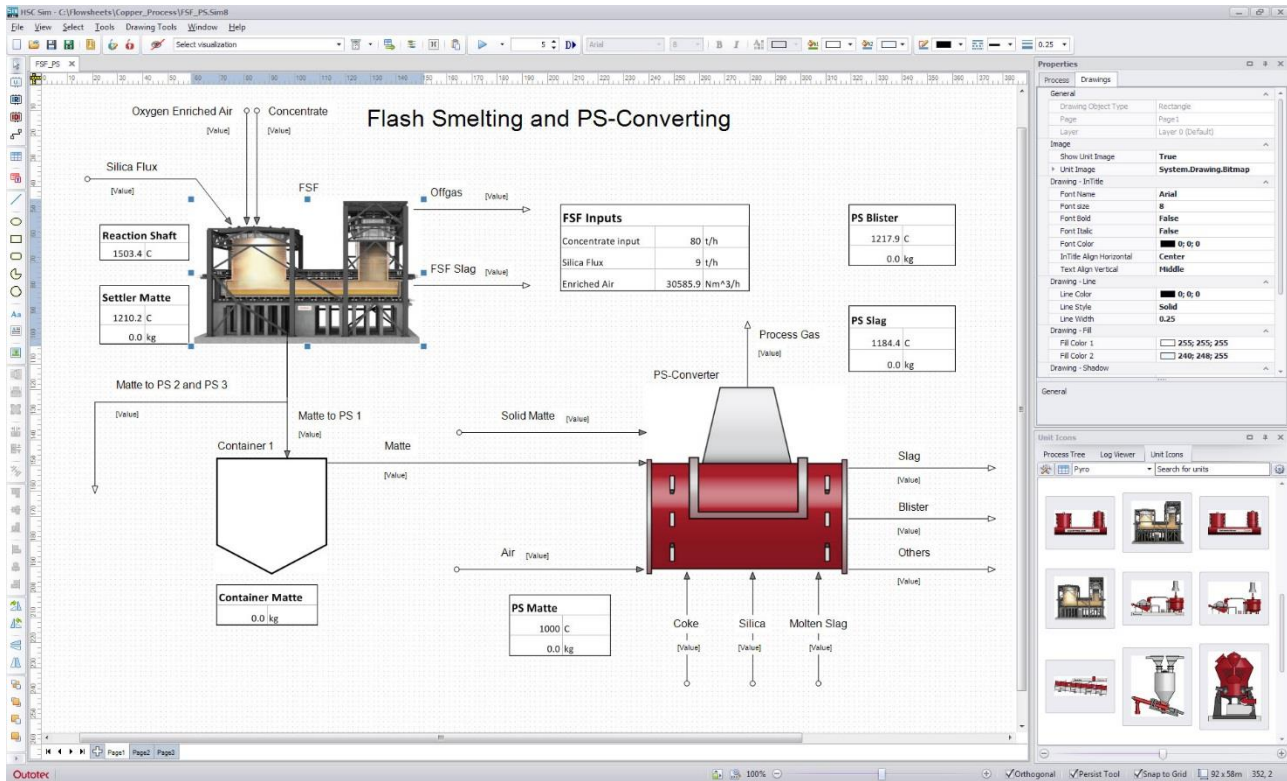
**This course gives an overview of the basic HSC operation principles and the major procedures needed to solve more complicated problems with the HSC software. The course will also illustrate thermochemistry application possibilities in practical problems.**

The Basic Course is intended for beginners and intermediate users of HSC. Earlier use of HSC Sim is not required. However, even more advanced users may find it useful because they will have the opportunity to raise questions concerning more difficult issues. The recommended course duration is 1 day.

#### Contents:

- Introduction to modelling with HSC Sim
  - Static flowsheet calculations
  - Dynamic flowsheet calculations
  - Elemental distribution unit operation model
  - Reaction unit operation model
  - Multiple specific unit operation models for handling particles
  - Different types of controls to set the model convergence
  - Calculating difference scenarios
  - Utilizing HSC Neural Networks with the flowsheet calculations
- Example exercises
  - Shaft Furnace
  - Gas Cleaning
  - Magnetite Concentration
- Combining models together in the same flowsheet

## 4.2. HSC Sim Pyro



**This course focuses on HSC Sim distribution mode applications. Typically, these are used to simulate pyrometallurgical processes, but they may also be applied in many other areas.**

The course covers a general introduction to the Sim Flowsheet module with several demonstrations and provides an understanding of the potential applications of the Sim Distribution mode. The target of this course is to acquire the versatile skills to use and create Sim Distribution mode applications and analyse the results.

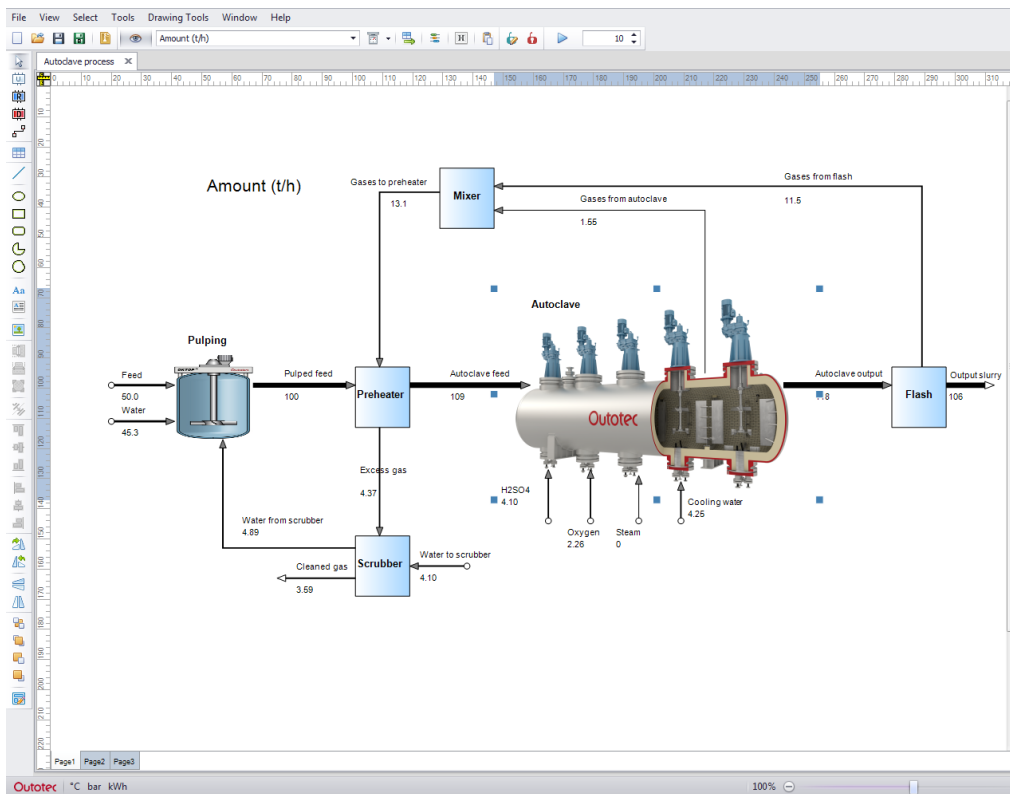
The course is suitable for metallurgists, researchers and process engineers who understand the basics of pyrometallurgy. Earlier use of HSC Sim is not required. The recommended duration of the course is 2 days.

### Contents:

- Introduction to making Sim Pyro unit operations
  - Making the unit
  - Defining input and output
  - Defining the unit operation
  - Defining a control
- Example exercises
  - Gold Distribution
  - Simple burner
  - Mixed Wizard
  - Post-Combustion
  - CO Burner
  - Copper Rotary Furnace
  - Iron Process
  - Imported Units (Gradual Oxidation)
  - Slag Leaching (extra)



## 4.3. HSC Sim Hydro



**This course focuses on HSC Sim reaction mode applications. Typically, these are used to simulate hydrometallurgical processes, but they may also be applied in many other areas.**

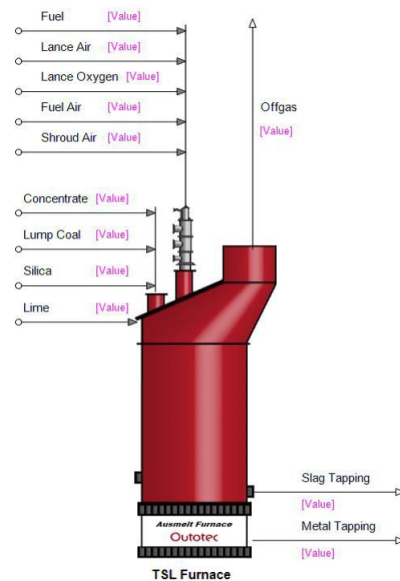
The course covers a general introduction to the Sim Flowsheet module with several demonstrations and provides an understanding of the potential applications of the Sim Reactions mode. The target of this course is to acquire the versatile skills to use and create Sim Reactions mode applications and analyse the results.

The course is suitable for metallurgists, researchers and process engineers who understand the basics of hydrometallurgy. Earlier use of HSC Sim is not required. The recommended duration of the course is 2 days.

### Contents:

- Introduction to making Sim Hydro unit operations
  - Example definition: Leaching example
  - Drawing units and streams
  - Unit type selection and variable list
  - Unit model
  - Feed streams (Input sheet)
  - Controls (Controls sheet)
  - Running the model – results
- Example exercises
  - External control
  - Energy balance
  - Gypsum precipitation
  - Copper solvent extraction
  - Autoclave
    - Scenario editor
    - Creating stream tables
- Adding new compounds to HSC Database
- Using equilibrium calculation in Hydro models

## 4.4. HSC Sim Pyro & Hydro Dynamic



**This course focuses on HSC Sim distribution mode applications in the dynamic mode.**

During this training session the user will become more familiar with the HSC Sim Dynamic Unit for species that is commonly used for modelling smelting operations. Although this training document is not comprehensive in all the features that the Dynamic units offer, it attempts to showcase the significant functions and differences as compared to the HSC Static units so a passing familiarity with the use of HSC Sim with those units would be useful.

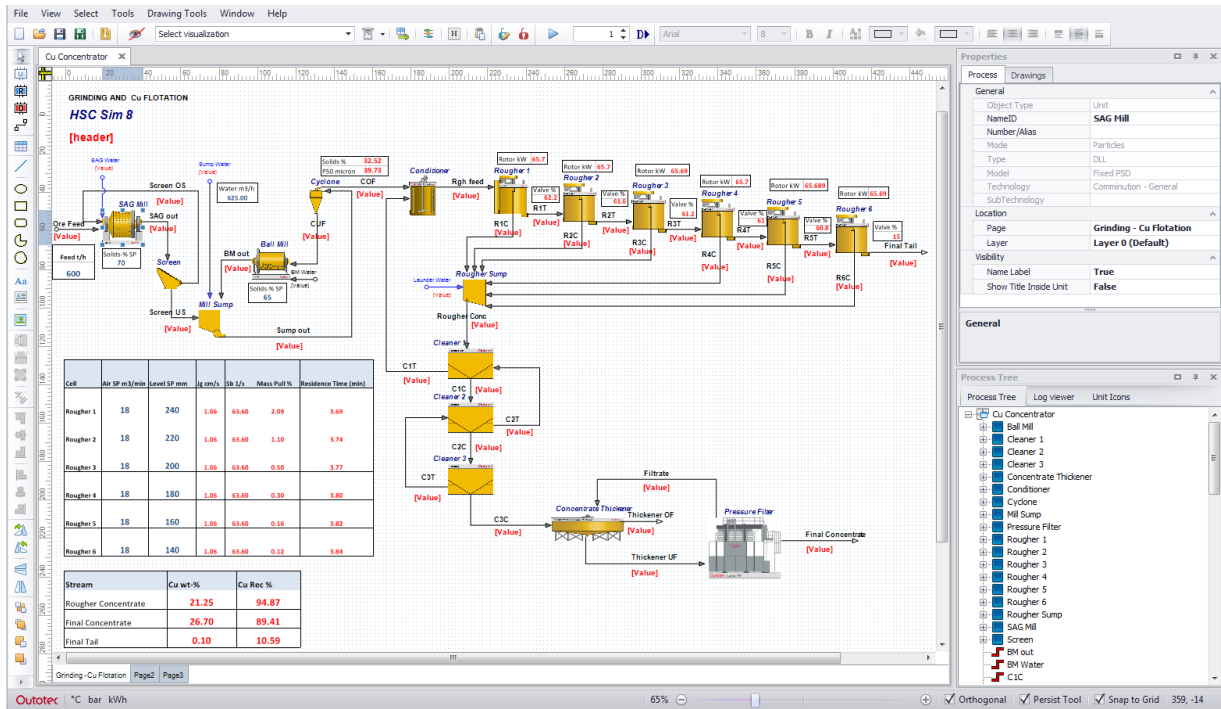
The course is suitable for metallurgists, researchers and process engineers who understand the basics of pyrometallurgy. Earlier use of HSC Sim is recommended. The recommended duration of the course is 1 day.

Contents:

- Introduction to making dynamic simulations
- Dynamic dialog
- Dynamic unit for working species models
- TSL Lead Smelting – Multi-Stage Batch Simulation exercise example



## 4.5. HSC Sim Mineral Processing Basic



The course focuses on HSC Sim Particles mode applications. Typically, these are used in minerals processing simulations, but they may also be applied in many other areas, e.g. recycling.

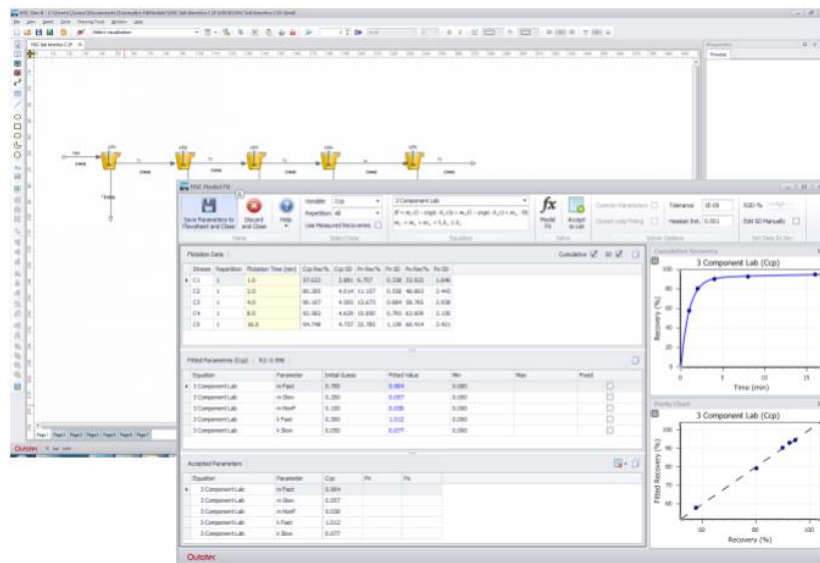
The course gives an overview of the basic HSC Sim operating principles and the major procedures required to solve more complicated problems. The course will also illustrate the potential applications of HSC Sim mineral processing by means of practical problems. The target of this course is to acquire the versatile skills to use and create Sim Particles mode applications for minerals processing and analyse the results.

The course is suitable for metallurgists, researchers and process engineers who understand the basics of minerals processing. Earlier use of HSC Sim is not required. The recommended duration of the course is 2 days.

### Contents:

- Working with ready-made simulation
  - Basic usage of HSC Sim 10 and understand what can be done with HSC Sim
  - Cell references, running scenarios
- Creating a simulation model – flotation flowsheet balance
  - Drawing of a flowsheet with HSC Sim
  - Defining the feed stream: stream setup
  - Setting controls
  - Using unit models & simulating
- Kinetic flotation circuit model
  - Introduction to kinetic flotation modelling
- Comminution circuit with size classes
  - Feed composition with size fractions
  - Element to mineral conversion
- Grinding – flotation – dewatering
  - Element to mineral conversion
  - Water balance
- Flotation circuit design and scale-up
  - Plant design: scale-up of laboratory tests and selecting flotation cells

## 4.6. HSC Sim Mineral Processing Advanced



The Advanced Course for Mineral Processing studies HSC Sim Particle mode application more deeply covering data reconciliation with HSC Mass Balance and model fitting of flotation data with HSC Sim Model Fit.

The course gives knowledge of processing experimental data with HSC modules, and more detailed information of the Sim Flowsheet module's advanced tools. The course is suitable for metallurgists, researchers and process engineers who understand the basics of minerals processing.

Earlier use of HSC Sim is recommended. The recommended duration of the course is 1-2 days, depending on required scope and if some own mass balancing, model fitting and simulation model cases are to be covered.

### Contents:

- Mass balancing
  - Basic concepts of data reconciliation with HSC Mass Balance
  - Balancing of laboratory assays
  - Mineral based balancing: flotation kinetic test data
  - Sized balances
  - Plant wide balance: Au concentrator case
- Flotation kinetic modelling
  - Rougher flotation
  - Sequential selective flotation
  - Open loop cleaner repetitions
  - 1<sup>st</sup> cleaner kinetic test
  - Closed loop cleaner repetitions (locked cycle)
- Process plant sampling
- Advanced simulation
- Creating dynamic HSC Sim simulation models (optional)