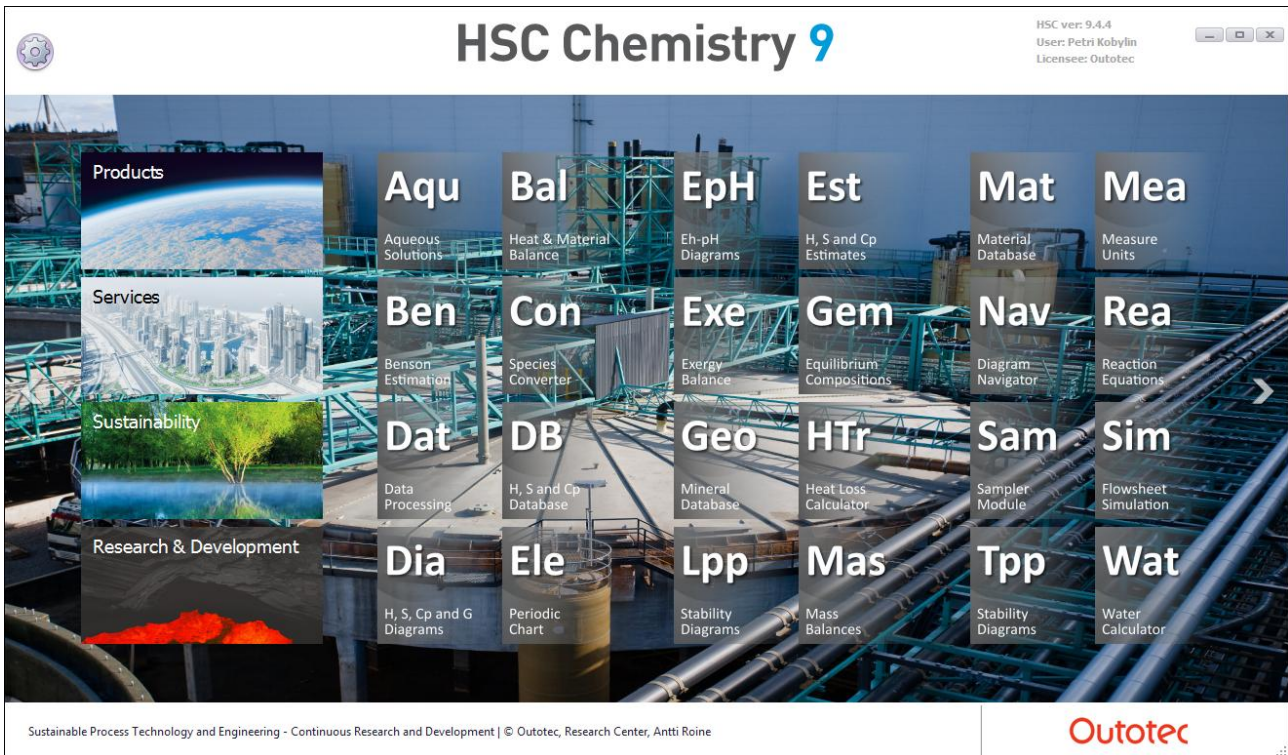


## HSC Chemistry On-Site Training



**HSC is quite easy to use. The HSC installation package contains separate manuals and calculation examples for all 23 calculation modules and 12 databases. However, it is not easy to get a good overall picture of this extensive material package with all its application possibilities and the most typical calculation procedures. The HSC Training courses will help you to get more out of your HSC software.**

The content of private on-site HSC courses is almost the same as the public HSC courses. However, on-site courses allows more time to be spent on the issues that are important for the customer.

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

Course Topic	Dates
HSC Basics	2 DAYS
HSC Equilibrium	1 DAY
HSC Pyro	2 DAYS
HSC Hydro	2 DAYS
HSC Mineral Processing	2 DAYS
HSC Mineral Processing Advanced	1 DAY

### 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.

### Daily schedule outline

Time	Topic
8:30	Registration starts
9:00-10:30	Course starts
10:30-10:45	Coffee break
10:45-12:00	Course continues
12:00-13:00	Lunch break
13:00-15:00	Course continues
15:00-15:15	Coffee break
15:15-17:00	Course continues
17:00	Course ends

## Pricing

### **There are no fixed prices for the on-site courses.**

Specify number of days and the courses that you are interested in and send on-site course offer request to [hsc@outotec.com](mailto:hsc@outotec.com). We will send you a quote as soon as possible.

The on-site course fee does not depend on the number of participants. However, if the number of participants is more than 15, then we will charge a supplementary 80 Eur for each extra participant for the printed course material. This includes courier.

The total fixed price of the course covers:

- The selected HSC training course
- Printed course material for all the participants
- Course workshop cases in printed and electronic form
- 14-day license for latest version of HSC for all participants
- Course certificates (will be sent after the course to the participants)

## Validity of the Offer and Other Terms

Please allow us **at least 6 weeks** before the course:

### **1) Official purchase order with signature**

- We need this document before we can book and pay for the flights.

### **2) Estimated number of participants**

- We need this because we have to print the training booklets.

### **3) Contact person, name, phone, email, street address**

- We use courier for shipping printed material and they require this information.

### **4) Street address of the venue**

- We need this so that we can book some hotel nearby.

**Note:** Your quick booking will help us to schedule our work and to book suitable flights.

### **Please confirm your booking by emailing your company's official Purchase Order to:**

HSC Team  
Outotec, PO Box 69, FI-28101 Pori, Finland.  
Fax: +358 - 20 - 529 3201  
Email: [hsc@outotec.com](mailto:hsc@outotec.com)

We will send you an invoice upon receipt of your purchase order. You may pay by bank transfer or by credit card (VISA, MasterCard, Eurocard, AMEX). Please fax credit card information to: +358 - 20 - 529 3201.

Payment must be settled 2 weeks before the course.

### **Bank Transfer Info:** (For purchase order)

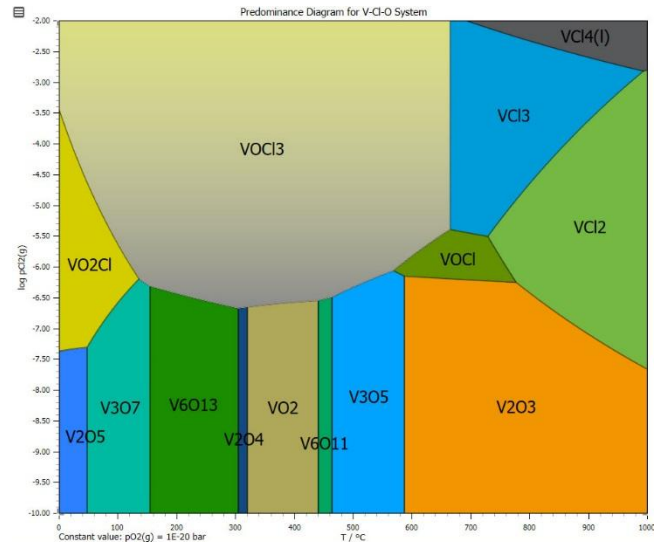
Outotec (Finland) Oy (VAT FI 15386292)  
Bank: Nordea Bank Finland Plc  
Address: Aleksanterinkatu 36B, Helsinki, 00020 Nordea, Finland  
Account (IBAN): FI 8215 7130 0001 6999  
Swift: NDEAFIHH

### **Credit Card details:**

Number:  
Expiry Date:            CVV/CVC (3 digits):

## HSC Basic Course – 2 Days

The HSC Basic course focuses on general information, which is needed to specify a practical problem in the 23 calculation modules, run the calculations, and analyze the results. Participants will learn what can be done with the HSC package and some ideas on what cannot be done. These skills are also needed in the more advanced HSC Equilibrium, Hydro, Pyro, and Mineral Processing courses.



The majority of HSC users utilize perhaps only 1-2 of the HSC calculation modules. This course will help users to understand the capabilities of all 23 calculation modules and 12 databases. This course also provides an understanding of the potential applications of HSC.

The target of the Basic HSC Course is to teach the participants what can be done with the HSC package and what cannot be done. The course will focus on the most common questions and problems raised by HSC users over the last few years.

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. However, even more advanced users may find it useful, because they will have the opportunity to raise questions concerning more difficult issues.

The HSC Basic course covers general issues, but also more specific topics like:

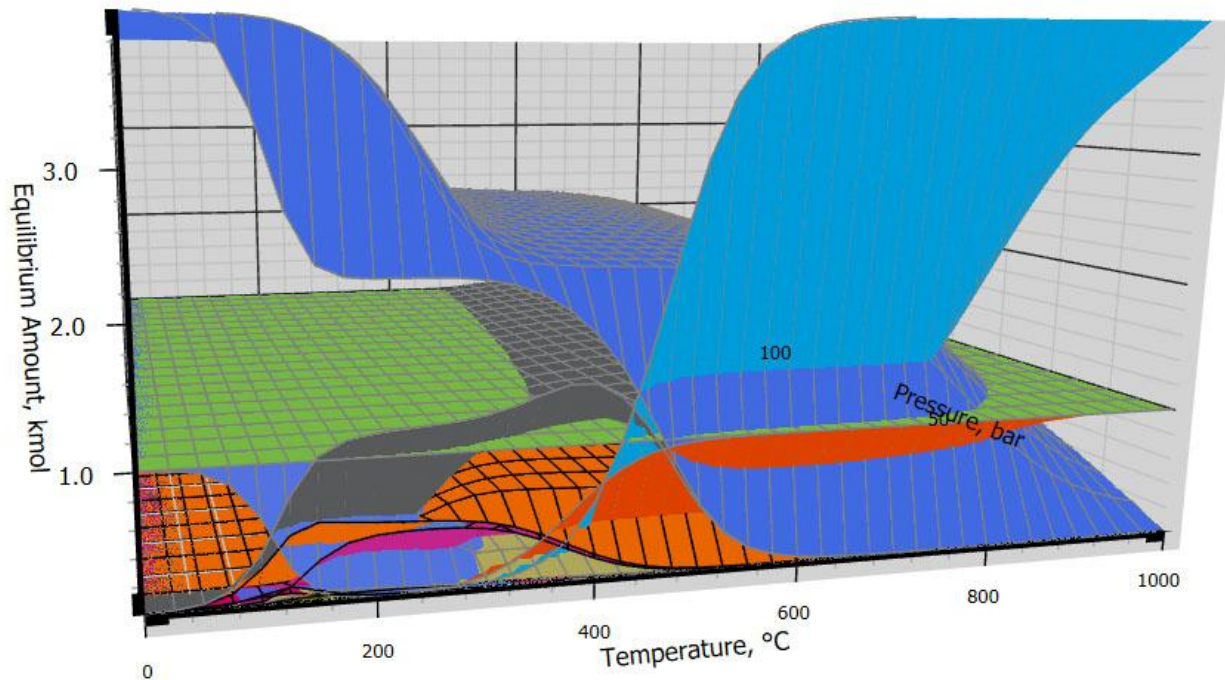
- General information required in most of the HSC modules
- Basic concept, HSC internal structure, user interface issues, etc.
- Some basic principles of thermochemistry related to HSC
- Internal structure of the HSC databases, chemical formula syntax, etc.
- Specification of phases and species, etc.
- Demonstration of the HSC calculation modules with workshop examples
- Common features of HSC Sim and basic principles of the Reactions (Hydrometallurgy), Distributions (Pyrometallurgy) and Particle (Mineral Processing) modes.
- Typical Sim common features include drawing flowsheets, unit and stream properties, controls, cell references, table links, add-in functions, etc.

**The on-site HSC course content may be modified according to customer requirements. For example, we may spend more time on the HSC modules that are particularly important for the customer applications.**

**Lecturers: Dr. Antti Roine, Matti Hietala or Lauri Mäenpää**

Antti has worked with HSC modules and databases nearly 40 years. Matti is one of the scientific advisors behind the HSC development project, his expertise is physical chemistry. Lauri takes care of HSC quality management, his expertise is physical chemistry.

## HSC Equilibrium Module Applications – 1 Day



**This one-day course focuses on HSC Equilibrium module applications. Equilibrium calculations offer a practical way to observe the effects on product composition of process variables, such as temperature and amounts of raw materials.**

The Equilibrium module is one of the most commonly used HSC tools, because it can be applied to many different areas. The course covers a general introduction to the Equilibrium module with several demonstrations and provides an understanding of the potential applications of the Equilibrium module. The target of this course is to acquire the versatile skills required to use and create Equilibrium applications and analyse the results.

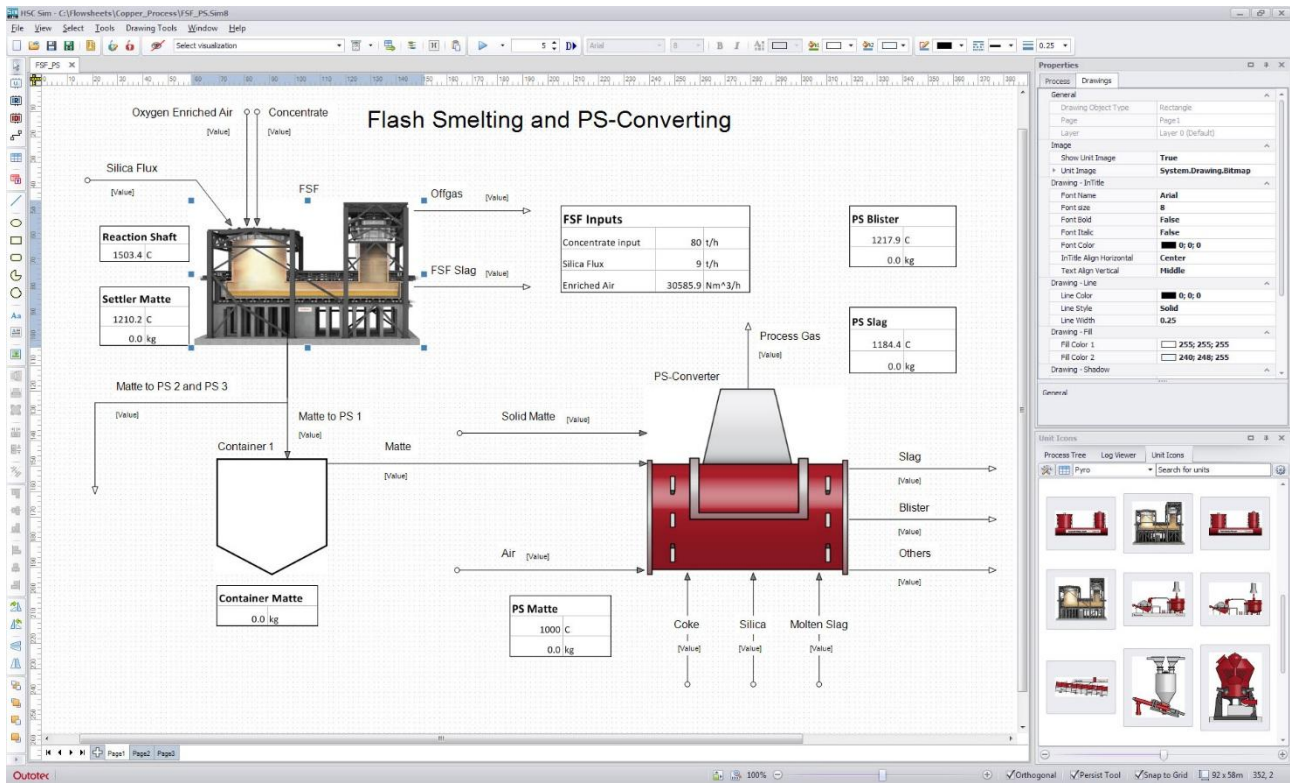
- Theory and general issues
- Specification of chemical system and raw materials
- Diagrams
- High temperature applications with workshop
- Aqua module, water solution properties, Pitzer models
- Water solution applications with workshop
- Cell calculations
- Transitory Evaporation, Open Atmosphere and Target calculations
- Creation of solution model DLL files

**Lecturer: Dr. Petri Kobylin, Matti Hietala or Lauri Mäenpää**

Petri has worked as advisor for HSC Gem Equilibrium module. His expertise is water solutions.

Matti is one of the scientific advisors behind the HSC development project, his expertise is physical chemistry. Lauri takes care of HSC quality management, his expertise is physical chemistry.

## HSC Sim Pyro Applications – 2 Days



**This two-day 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.

### Day 1: Sim Flowsheet Distribution Mode Introduction and Workshops

- Basic use of HSC Sim
- Drawing a flowsheet with HSC Sim
- Data needed for building up a simulation based on distribution models
- Using controls and model tools. Excel and DLL type unit operations
- Checking and identifying errors
- Demonstrations with several Sim distribution mode example cases
- Sim Flowsheet workshop with distribution models

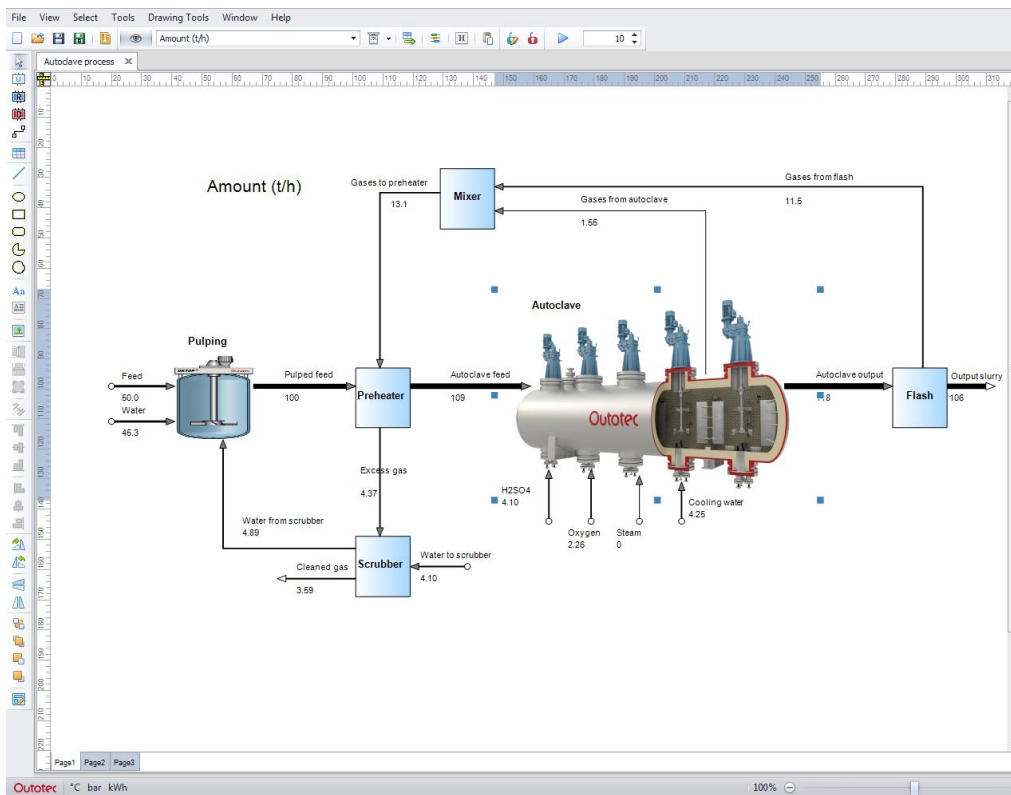
### Day 2: Sim Flowsheet Distribution Mode Workshops

- Several examples of different types of distribution unit operation.

### Lecturers: Matti Hietala, Lauri Mäenpää

Matti is one of the scientific advisors behind the HSC development project. His expertise is physical chemistry. He manages Sim module development. Lauri has worked as a technical advisor in HSC development and as a physical chemistry specialist.

## HSC Sim Hydro Applications – 2 Days



**This two-day 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.

### Day 1: Sim Flowsheet Reactions Mode Introduction

- Basic use of HSC Sim
- Sim internal structure, user interface issues, tools, specified working methods, etc.
- Drawing a flowsheet with HSC Sim
- Data necessary for building up a simulation
- Using controls and model wizards
- Checking and identifying errors
- Demonstrations with several Sim reaction mode example cases.

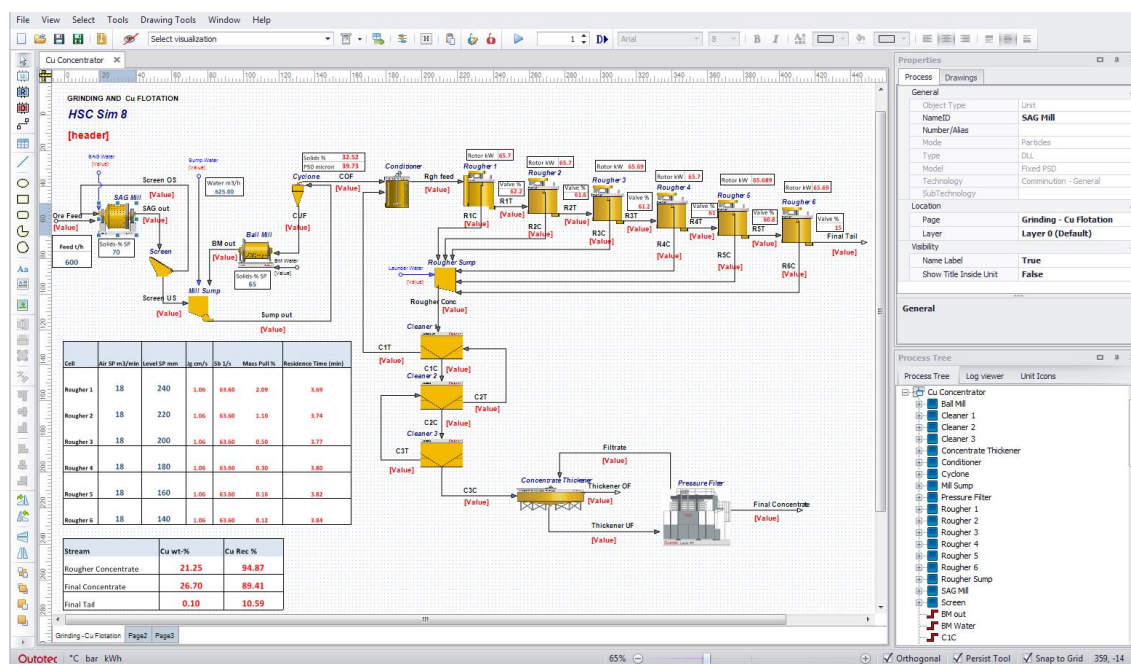
### Day 2: Sim Flowsheet Workshop

- The second day focuses on workshops, which provide information on drawing flowsheets, creating models, testing simulations, and analysing the results
- Workshop with simple reaction mode examples
- Workshop with participants' own processes.

**Lecturer: Tuukka Kotiranta, Dr. Petri Kobylin**

Tuukka has more than ten years' experience of hydrometallurgical modelling. He is one of the scientific advisors behind the HSC software. His expertise is hydrometallurgy. Petri has many years' experience of water solutions and equilibrium calculations.

## HSC Mineral Processing Course – 2 Days



This two-day 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.

This 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.

### Day 1: Sim Particles Mode Introduction

- Basic use of HSC Sim
- Drawing a flowsheet with HSC Sim
- Data needed for building up a simulation based on particles & minerals processing models
- Using controls and model tools. DLL type unit operations models.
- Checking and identifying errors
- Demonstrations with several Sim minerals processing example cases
- Sim Flowsheet workshop with minerals processing models

### Day 2: Sim Flowsheet Workshop for Minerals Processing

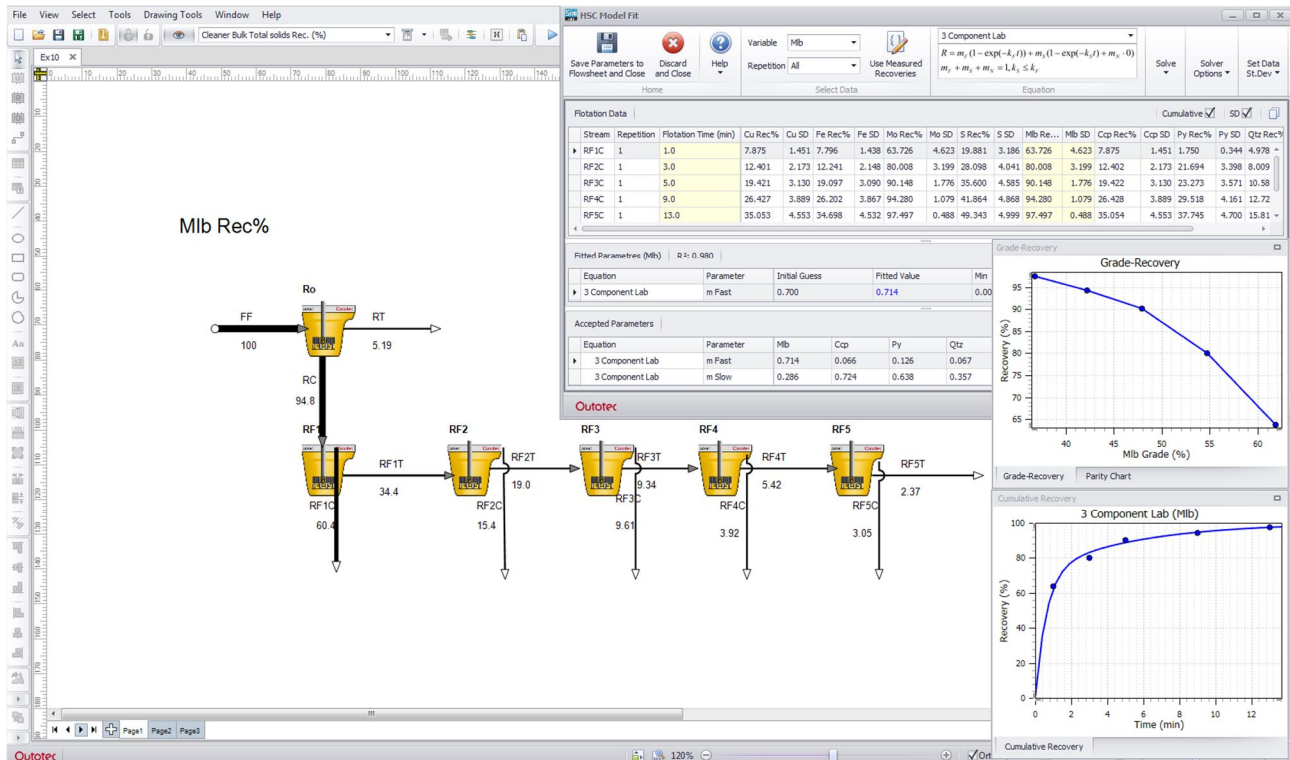
- Continuing with several examples of different types of minerals processing unit operation. Main focus in in flotation. The modelling cases covers topics of:
- Describing mineralogy (Stream Setup)
- Element to mineral conversion
- Using unit models and setting their parameters and controls
- Simulating different scenarios, e.g. for creating grade-recovery plots
- Alternative flowsheets

### Lecturer: Dr. Antti Remes, Matti Hietala

Antti has been working with mineral processing applications for more than 15 years. He is one of the scientific advisors behind the HSC software. Matti has worked as a technical advisor in HSC Sim module development.



## HSC Mineral Processing Advanced Course – 1 Day



The Advanced Sim Course gives knowledge of processing experimental data with HSC modules, and also more detailed information of the Sim Flowsheet module's advanced tools. The course duration is 1 – 2 days, depending of required scope and if some own mass balancing, model fitting and simulation model cases are to be covered.

### Day 1: Mass Balancing of Experimental Data and Model Fitting of Flotation Kinetics

- Working with experimental data
- Collecting and organising experimental data in **HSC Mass Balance**
- Element to mineral conversion with **HSC Geo** (working with mineral database)
- Mass balancing and data reconciliation
- Model fitting of flotation kinetics with **HSC Sim Model Fit**
- Workshop on experimental data mass balancing with minerals processing operations
- Flow rate and assay mass balancing
- Mineral based balances
- Handling of sized data, size by assay (cyclone, flotation bank)
- Flotation kinetics model fitting with laboratory and plant scale data: rougher flotation, cleaner repetition stages, closed loop (locked cycle) data

### Day 2: Other usage HSC Sim and HSC Mass Balance (optional)

- Continuing workshop with experimental data balancing and model fitting examples
- Processing of your own custom mass balancing and model fitting cases
- Creating of a simulation model using your own experimental data and processing flow sheet.

**Lecturer: Dr. Antti Remes, Matti Hietala**

Antti has been working with mineral processing applications for more than 15 years. He is one of the scientific advisors behind the HSC software. Matti has worked as a technical advisor in HSC Sim module development.