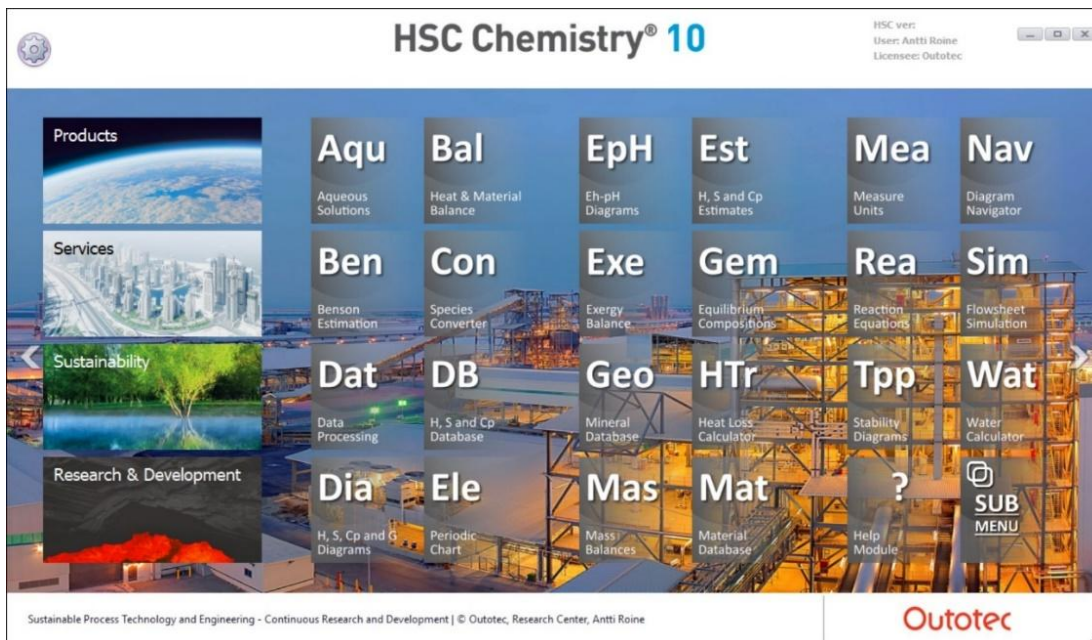


HSC Chemistry On-Site Training



HSC is quite easy to use. The HSC installation package contains separate manuals and calculation examples for all calculation modules and 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 allow more time to be spent on the issues that are important for the customer.

Two onsite courses are available.

Course 1 duration is 2-5 days. It includes HSC Basic and Sim Basic course and 1-4 days of workshops.

Course 2 duration is 2-4 days. It includes HSC Sim Mineral Processing and customer can also select Mineral Processing advanced option and/or customer case workshop.

Course 1 – duration 2-5 days	Duration
HSC Basic + Sim Basic	1 DAY
<i>Select also 1-4 workshops</i>	
HSC Sim Pyro workshop	1 DAY
HSC Sim Hydro workshop	1 DAY
HSC Sim Dynamic workshop	1 DAY
HSC Sim Customer case workshop	1 DAY

Course 2 – duration 2-4 days	Duration
HSC Sim Mineral Processing	2 DAYS
<i>You can also select advanced option or workshop</i>	
HSC Mineral Processing Advanced	1 DAY
HSC Sim Customer case workshop	1 DAY

Pre-requisites for the participants

- Customer takes care of the meeting room booking and corresponding costs. A good data projector with minimum resolution of WUXGA, 1920 x 1200 pix is required with proper on-screen.
- 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

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.

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. We will send you a quote as soon as possible.

The on-site course fee depends on the number of lecturers needed. If the number of participants is between 1-15 one lecturer is enough. For more than 15 participants it is recommended to have two or more lecturers.

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 must 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:

Email: hsc@outotec.com

We will send you an invoice upon receipt of your purchase order. You may pay by bank transfer. It is also possible to pay with credit card (VISA, MasterCard, Eurocard, AMEX) in our webshop. Send e-mail to hsc@outotec.com to receive link to credit card payment.

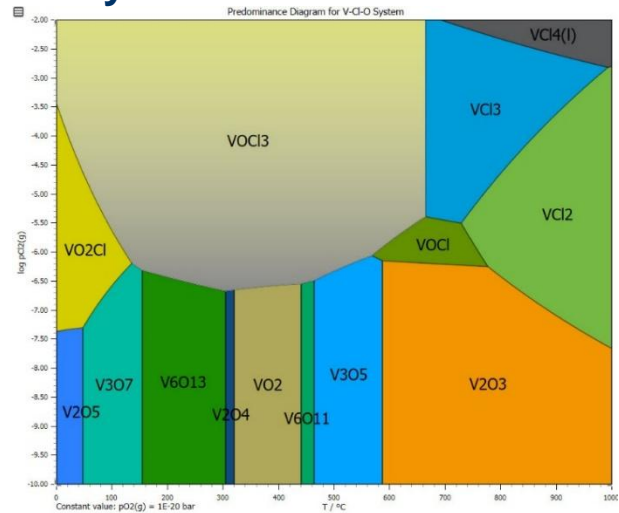
Payment must be settled 2 weeks before the course.

Bank Transfer Info:
(For purchase order)

Metso Outotec Finland Oy (VAT FI10942595)
We will send the bank info with the invoice.

HSC Basic + Sim Basic Course – 1 Day

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 Sim Hydro, Sim Pyro, and Sim Mineral Processing courses.



Most 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

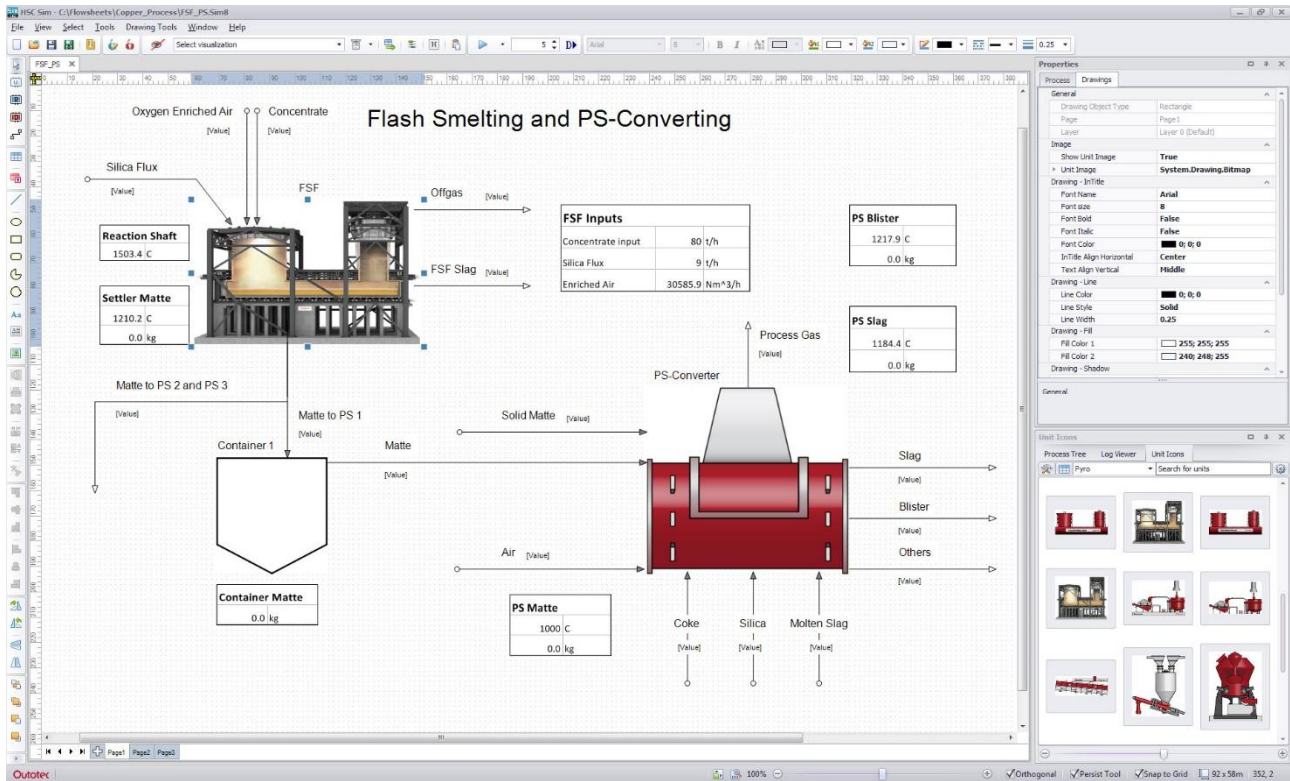
The HSC Sim Basic course covers topics like:

- Introduction to Sim
- Introduction to basic tools in Sim
- Flowsheet drawing and editing
- Using different units in flowsheet
- Basic example of elemental distribution unit operation
- Basic example of reaction unit operation
- Basic example of minerals processing unit operation
- Creating calculation scenarios

Lecturers: Matti Hietala, Dr. Fedor Vasilyev or another specialist

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

HSC Sim Pyro workshop – 1 Day



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.

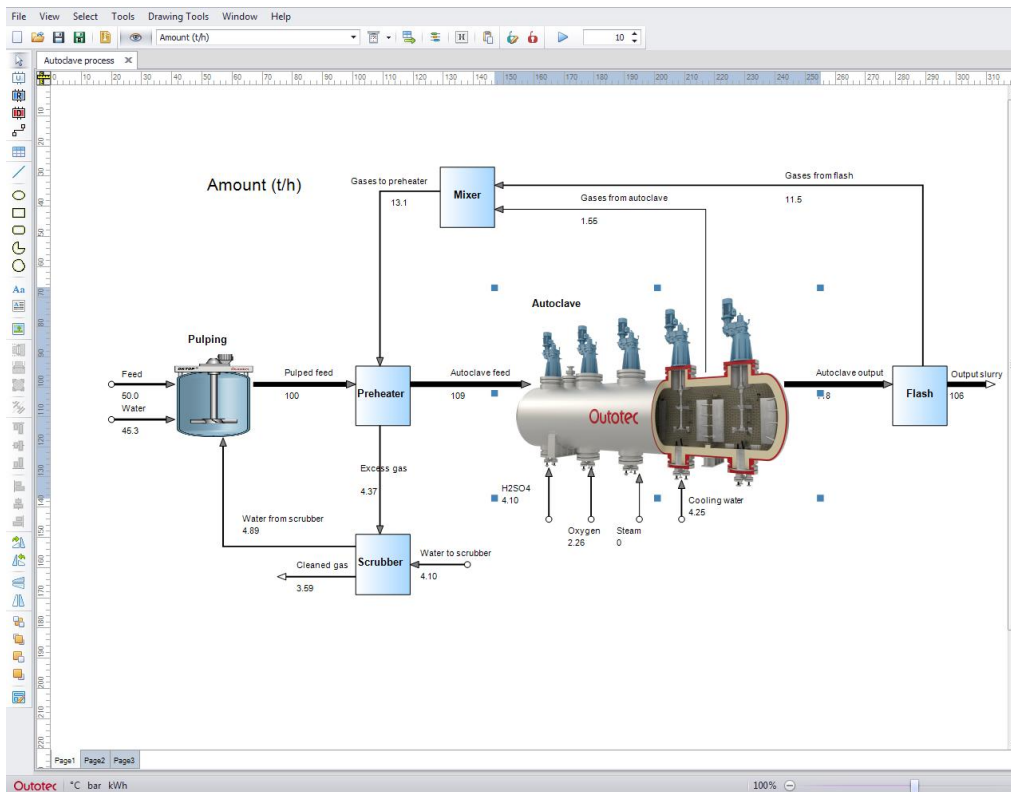
Day 1: Sim Flowsheet Distribution Mode Workshops

- Several examples of different types of distribution unit operation.

Lecturers: Matti Hietala, Dr. Fedor Vasilyev or another specialist

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

HSC Sim Hydro workshop – 1 Day



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.

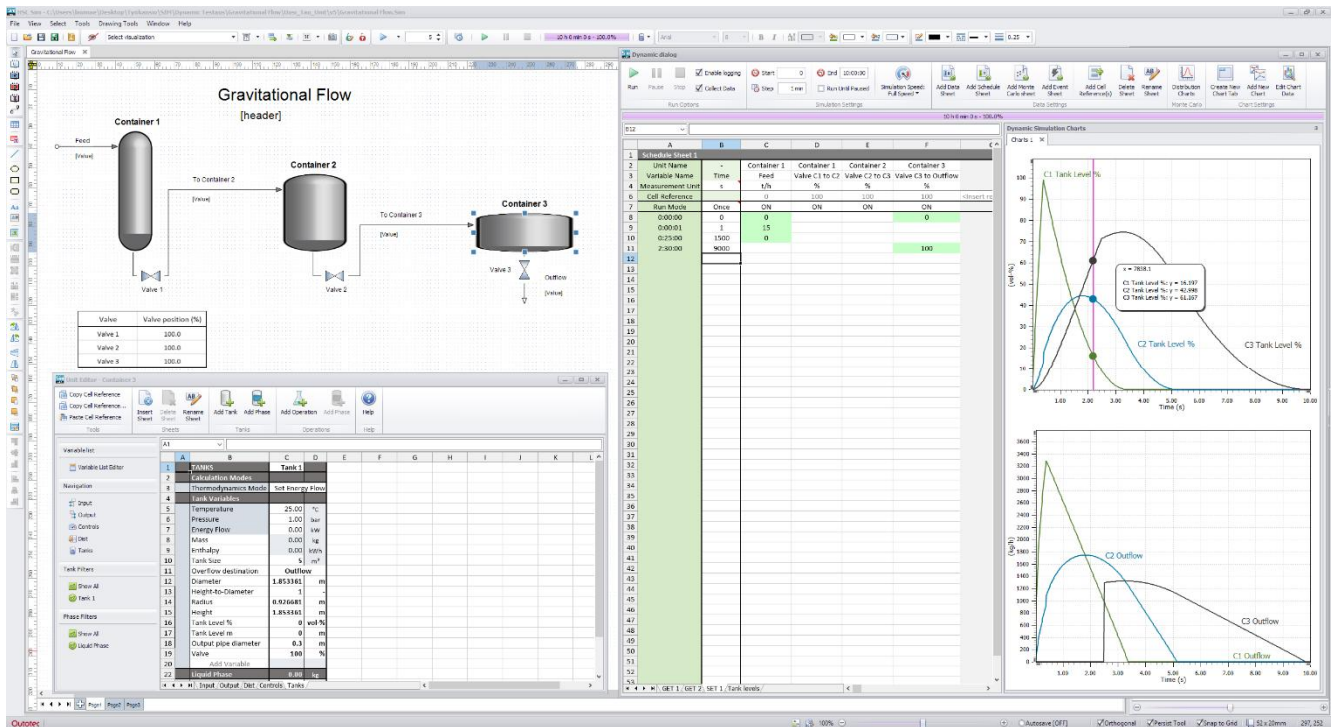
Day 1: Sim Flowsheet Workshop

- 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. Fedor Vasilyev or another specialist

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. Fedor has worked as a technical advisor in HSC development.

HSC Sim Pyro and Hydro Dynamic Simulation – 1 Day



This one-day course focuses on how to use HSC Sim dynamic simulation in pyro and hydro applications by using the Dynamic Unit.

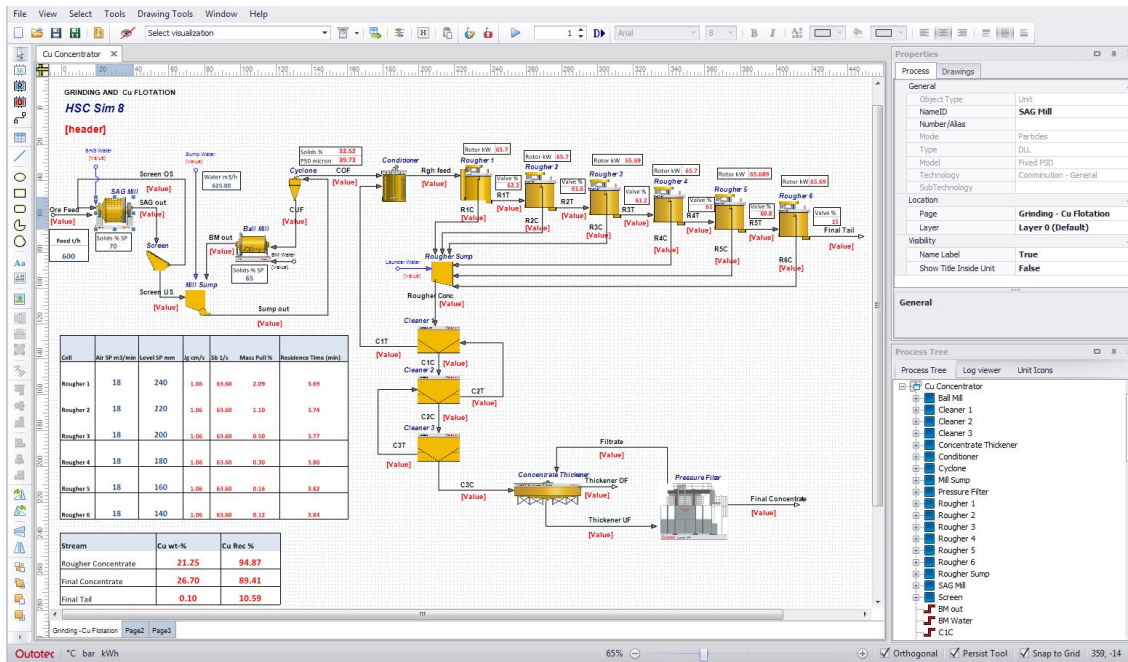
The course covers a general introduction to using the Dynamic Unit and setting up dynamic calculations with several demonstrations and provides an understanding of the potential pyrometallurgical and hydrometallurgical dynamic applications. The target of this course is to acquire the basic skills to use and create Sim dynamic applications and analyse the results.

Day 1: Introduction to Dynamic Unit and Dynamic calculations in Sim

- Basic use of Dynamic Unit [Variable list, tanks, operations]
- Dynamic calculation settings and collecting results
- Creating schedules for the simulation
- Creating events for the simulation
- PID controls
- Pyro- and hydrometallurgical workshop examples

Lecturers: Matti Hietala, Tuukka Kotiranta

HSC Sim 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

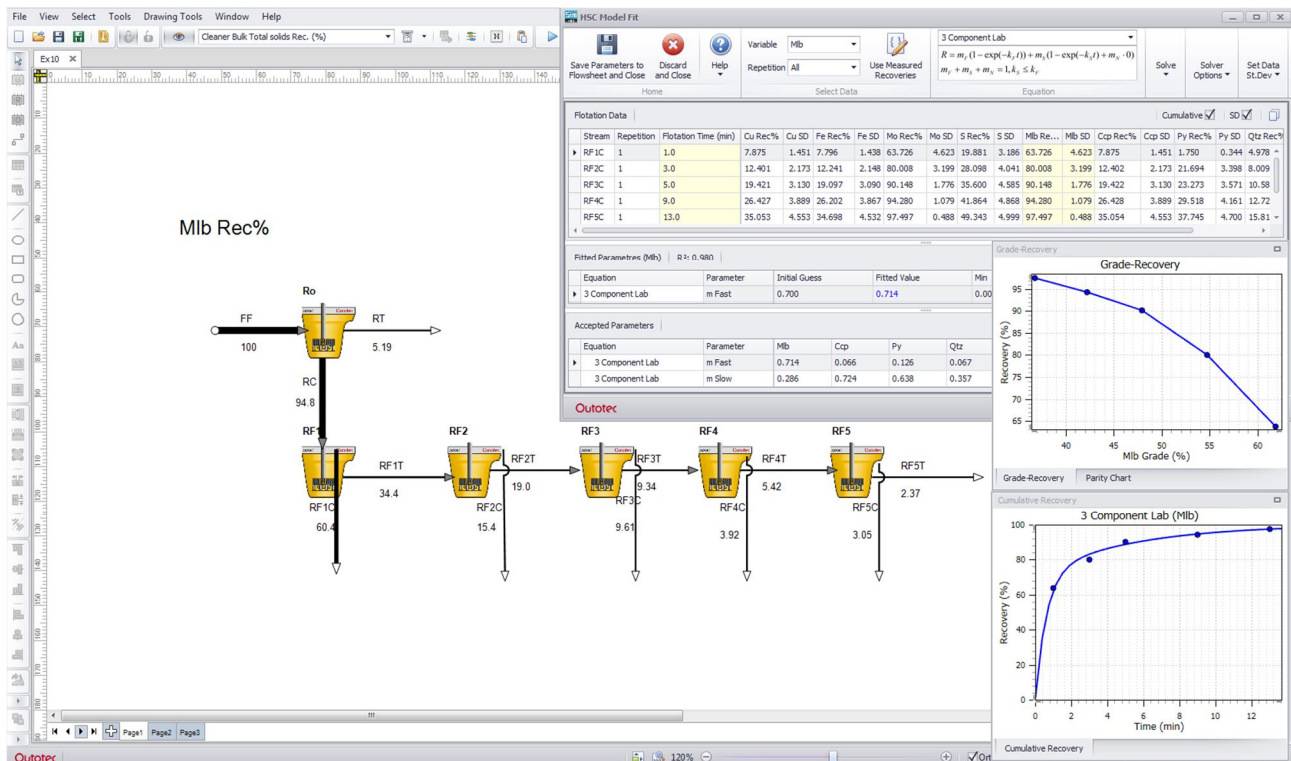
Day 2: Sim Flowsheet Workshop for Minerals Processing

- 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 or another specialist

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 or another specialist

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.