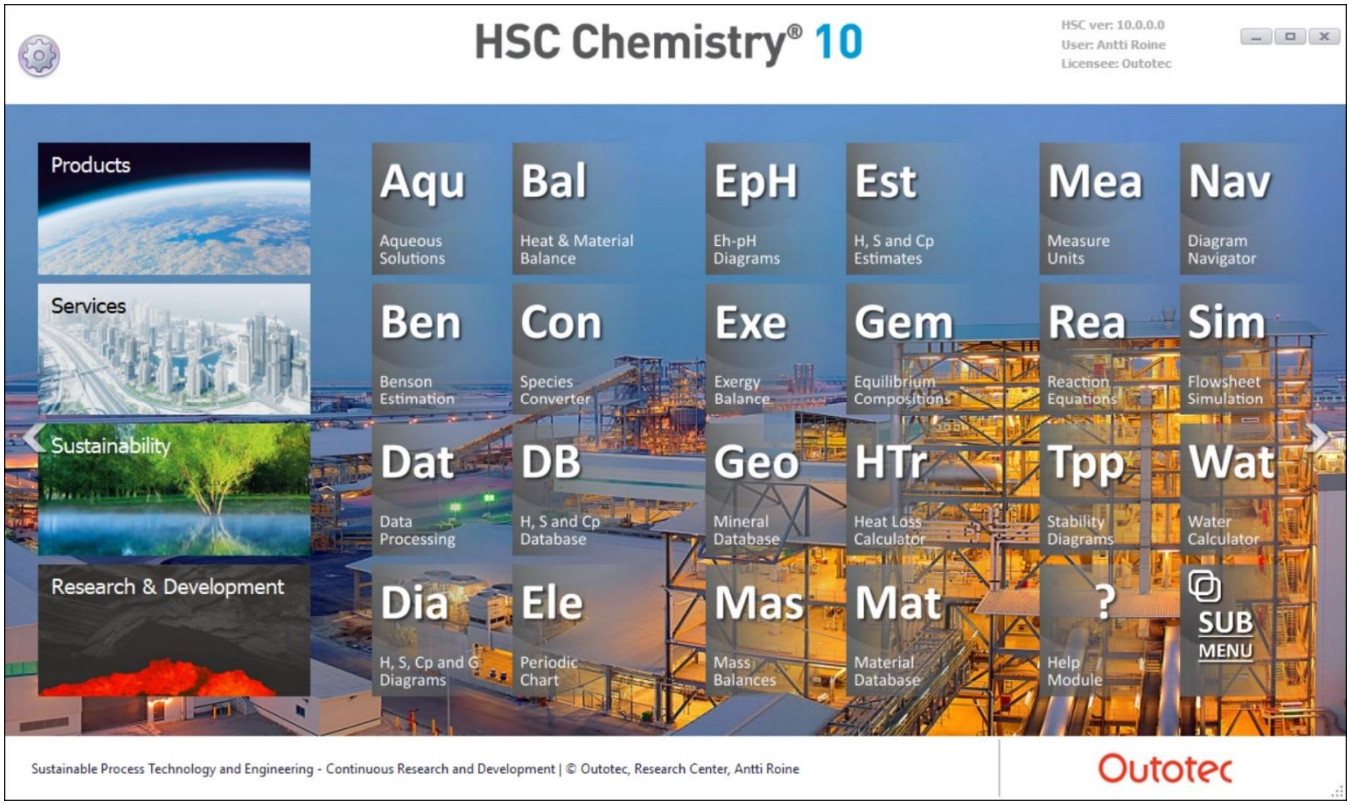
HSC 10 New Features



The new release provides improvements and a number of new features. The new HSC 10 runs simultaneously with your previous HSC versions. A valid HSC 9 subscription entitles you to a free update to HSC 10.

Top new features

- New subscription based licensing replaces old perpetual licensing
- HSC 9 calculation module files are upward compatible with the new HSC 10
- Sim Model Base expands personal expertise to organization expertise
- Sim Model Optimization with Monte-Carlo, PSO, Simplex, MFit (SQP)
- Sim Model Convergence Monitor for static models
- Sim Dynamic Report is a new tool for collecting simulation data
- Sim file loading and calculation speed improvements
- Sim Unit Operation Protection
- Sim model combination improvements
- Sim OpenLCA dialog improved and updated
- Sim new generic unit operations
- Gem Equilibrium Module: Own Pitzer parameters, electrode potential calculations
- Aqua Module with own Pitzer database
- New Sampler Module with save/open features
- Diagram Navigator Module: new triangulation algorithm and several small improvements
- Data Processing Module with new algorithms and faster graphics
- Material Database Module with links to location maps
- HSC Main Database Module with new and updated data for chemical species
- HSC Main Menu with Sub Menu
- Many minor improvements and bug fixes

New features 2020

Model Base

- SharePoint database for HSC Sim process models. See **Figure 1**.
- Expands personal expertise to organization expertise.
- Routine that automatically creates SharePoint database.
- Default SharePoint folders: MinPro, Hydro, Pyro, Water, Energy, Plants, Users.
- Model Base stores process models, Process information, KPIs, and supplementary files.
- Search routine uses process info metadata (technology, products, etc.).
- End user must have a valid Microsoft license for the SharePoint site.

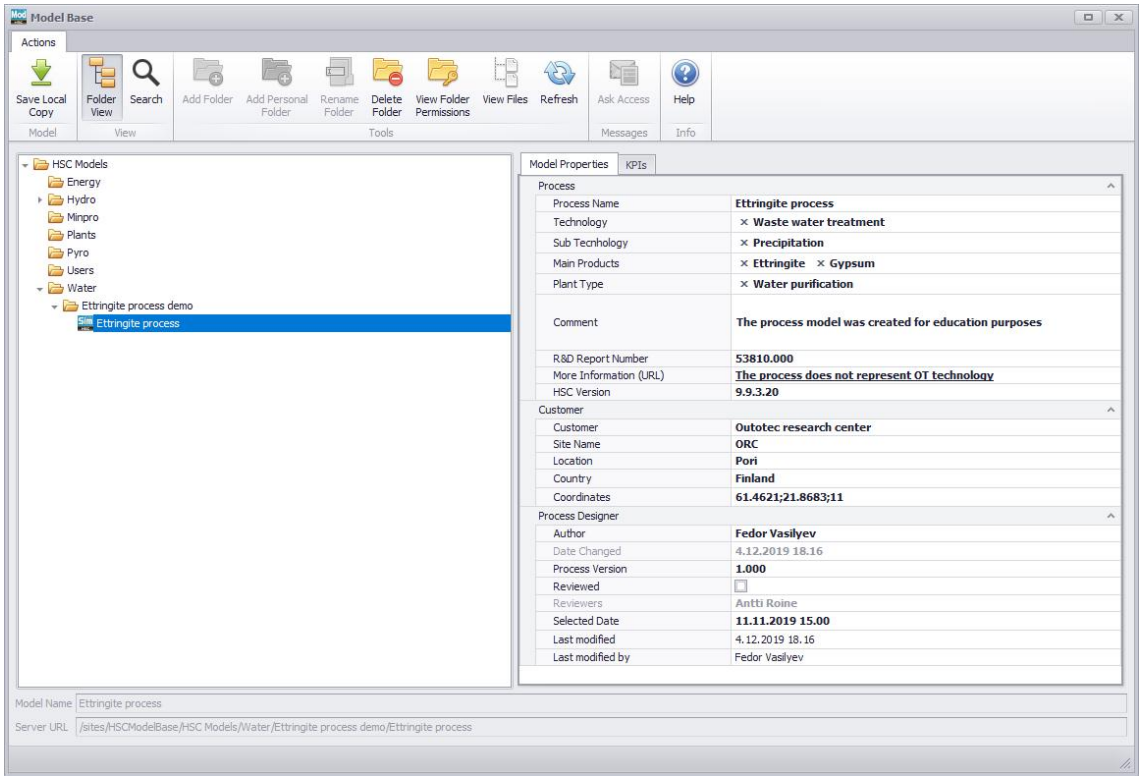
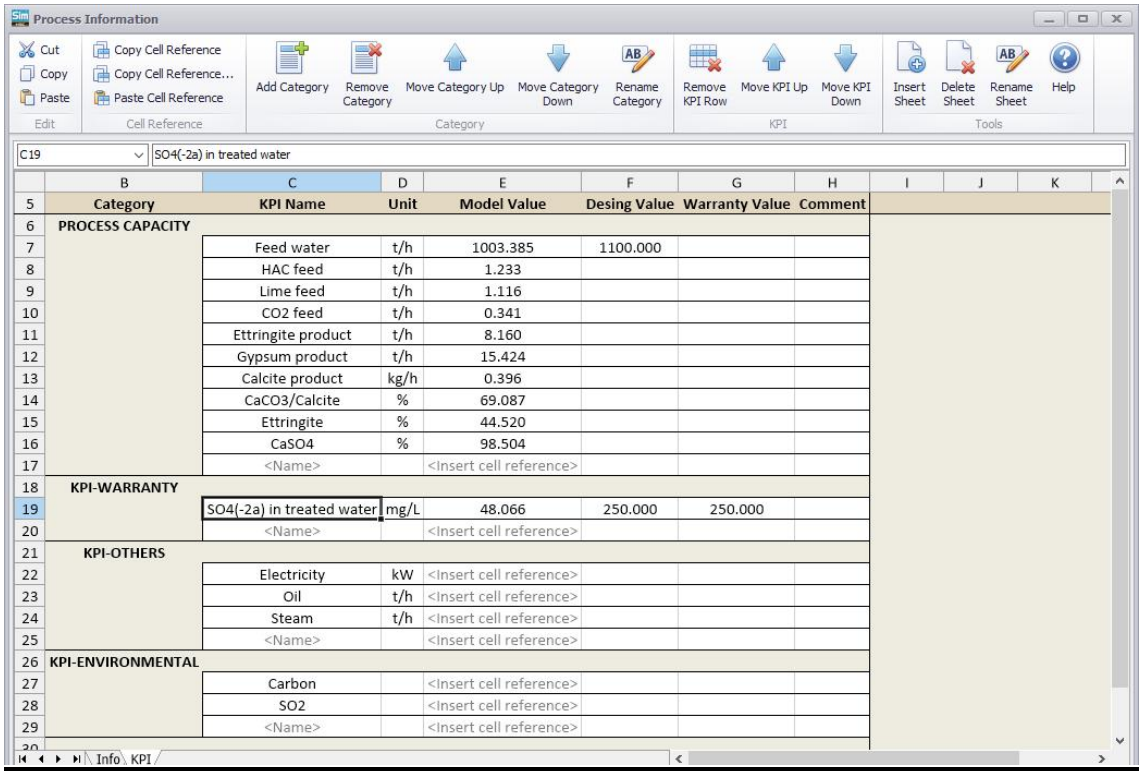


Figure 1. SharePoint database for process models is created automatically. Users can upload their models and supplementary files to the Model Base. The Model Base can be opened from the HSC main menu or accessed from HSC Sim. Model properties and key performance indicators can be viewed and edited in the Model Base.

New KPI Dialog in Sim

- Summary of the process key performance indicators with links to the model. See Figure 2.
- Headings may be used with the Model Base keyword search routines.



	Category	KPI Name	Unit	Model Value	Desing Value	Warranty Value	Comment
6	PROCESS CAPACITY						
7		Feed water	t/h	1003.385	1100.000		
8		HAC feed	t/h	1.233			
9		Lime feed	t/h	1.116			
10		CO2 feed	t/h	0.341			
11		Ettringite product	t/h	8.160			
12		Gypsum product	t/h	15.424			
13		Calcite product	kg/h	0.396			
14		CaCO3/Calcite	%	69.087			
15		Ettringite	%	44.520			
16		CaSO4	%	98.504			
17		<Name>		<Insert cell reference>			
18	KPI-WARRANTY						
19		SO4(-2a) in treated water	mg/L	48.066	250.000	250.000	
20		<Name>		<Insert cell reference>			
21	KPI-OTHERS						
22		Electricity	kW	<Insert cell reference>			
23		Oil	t/h	<Insert cell reference>			
24		Steam	t/h	<Insert cell reference>			
25		<Name>		<Insert cell reference>			
26	KPI-ENVIRONMENTAL						
27		Carbon		<Insert cell reference>			
28		SO2		<Insert cell reference>			
29		<Name>		<Insert cell reference>			

Figure 2. Process information dialog contains a KPI sheet where the process key performance indicators can be summarized. The numerical data can be collected from the model using cell references which allows automatic updating of the values each time the model is changed.

Sim Model Optimization

- New tool for model optimization. See **Figure 3**.
- Direct optimization of any cell reference in Sim model.
- Four available algorithms: Monte-Carlo, PSO, Simplex, MFit (SQP).

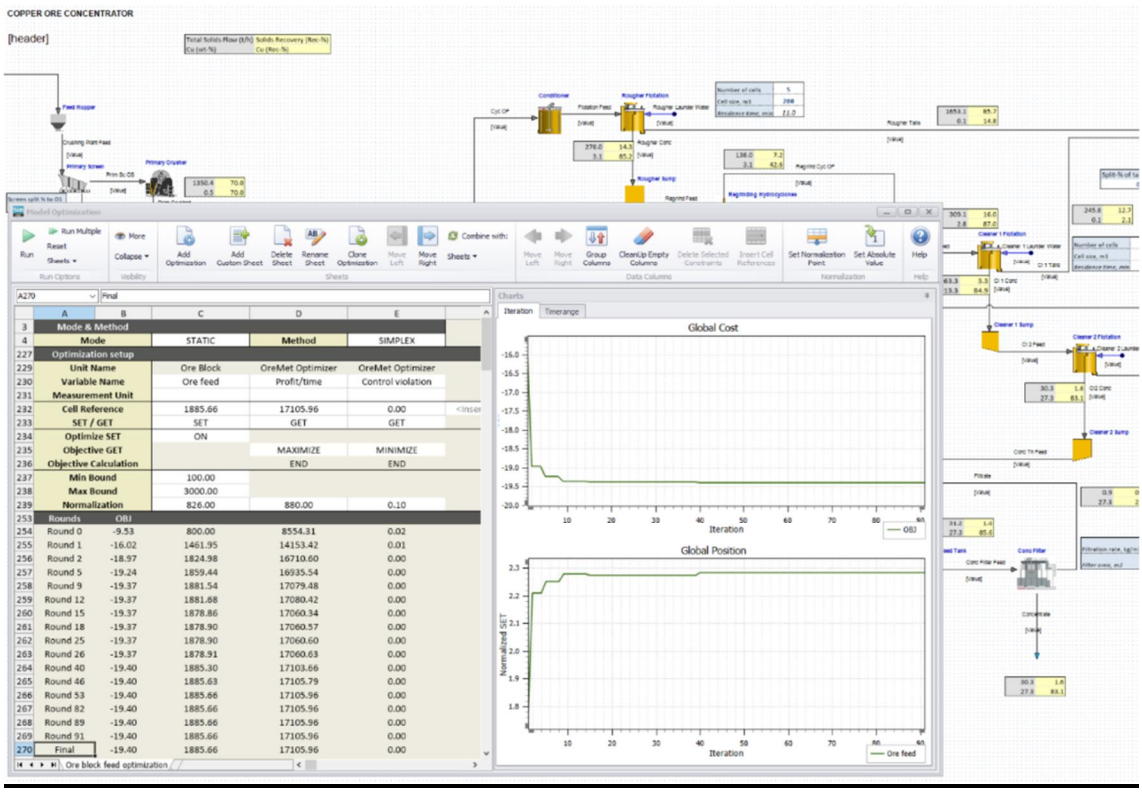


Figure 3. The new Model Optimization tool allows optimizing of process performance.

Sim Model Convergence Monitor

- New tool to finalize steady state calculations when convergence criteria are met. See **Figure 4**.
- Works for static models.
- Variables: Mass, heat, or both.
- An option is available to check the controls before completing the calculations.

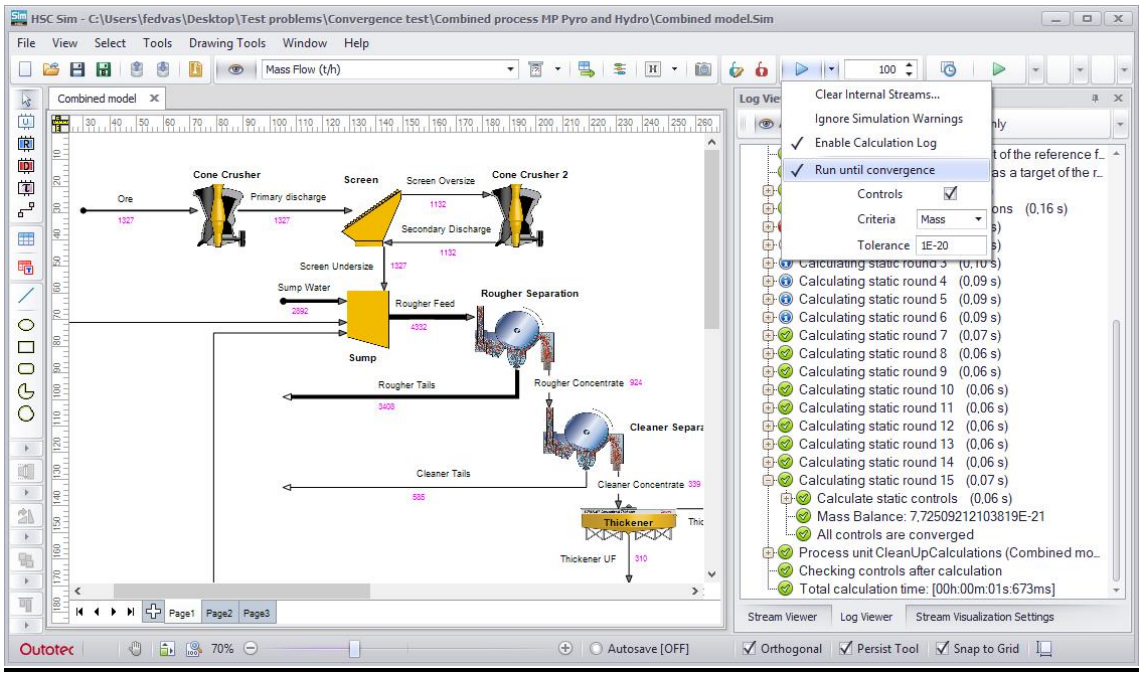


Figure 4. The convergence monitor can be used to complete a steady state calculation once the convergence criteria are met. The convergence monitor can check the global mass or heat balance, or both at the same time. The numerical value of the convergence criterion is shown in the Log Viewer. The convergence monitor can also check that all the controls are set at their setpoints before completing the calculations.

Improvements in dynamic calculations in Sim module

- Dynamic Report is a new tool to collect simulation data. See **Figure 5**.
- New variables for dynamic units.
- New features and bug fixes for Pyro and Hydro.
- Stream pipe delays.

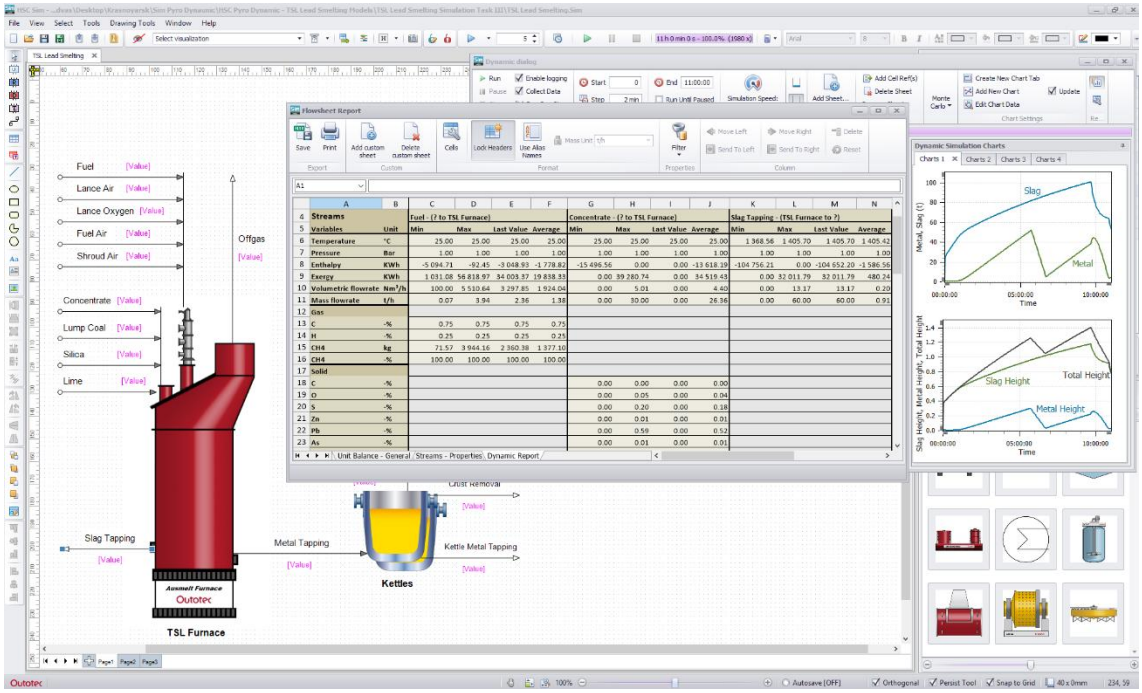


Figure 5. Dynamic Report collects the values of the user-defined variables from streams, tanks, and cell references during simulations and presents the minimum, maximum, average, and final values of the variables.

Sim Calculation Speed

- Model loading speed improved.
- Model calculation speed improvements.
- Multithreading (parallel computing) for dynamic models.
- Automatic calculation order of static process flowsheets improved.

Sim Unit Operation Protection

- Makes it possible to protect unit calculation and shows only Input and Output sheets. See **Figure 6**.
- Converts a unit operation to a black box.
- Password and HSC serial number based protection.

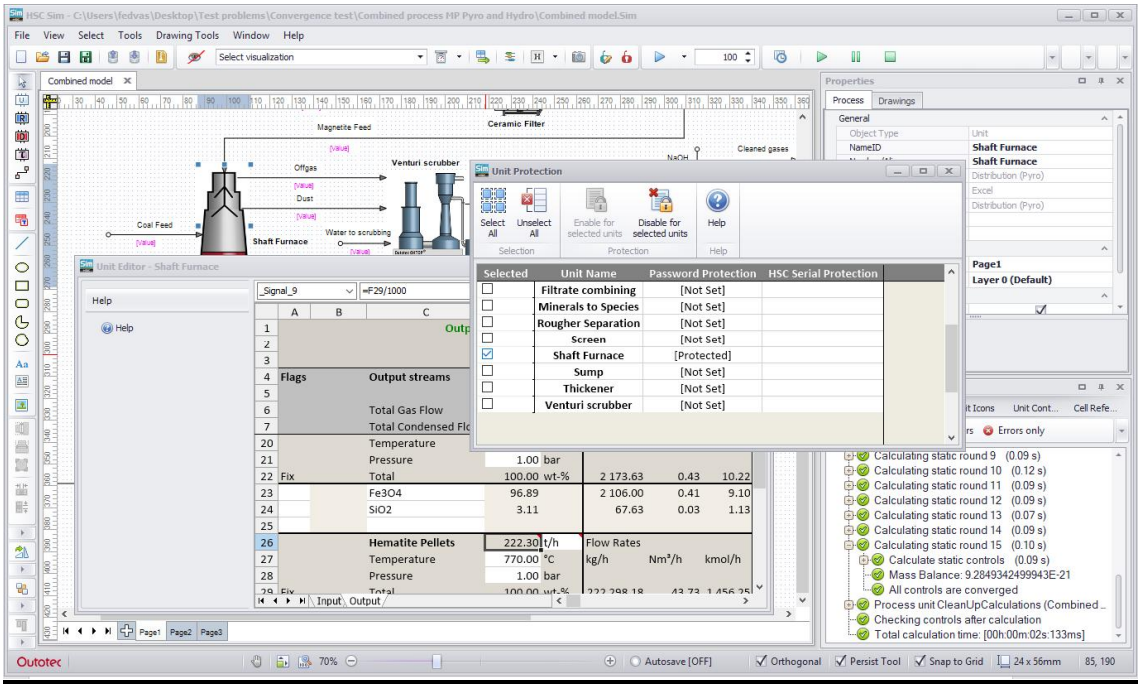


Figure 6. The Unit Protection tool makes it possible to protect a unit calculation. It converts a unit operation to a black box so that the user can see only Input and Output sheets. Password and HSC serial number based protection.

Sim Model Combination Improvements

- Process models may be imported into an existing model one by one.

Sim Environmental Features

- OpenLCA dialog improved and updated.

Sim New Features

- New generic units: Stockpile, Ore Bin.
- Updated generic units: Multicomponent option (Ball, Rod and AG/SAG mills), cyclone, flotation, mill.
- New default Hydro variables.
- New Diagnostics tool, which collects a warning log of possible problems for the end user.

Gem Equilibrium Module

- Own Pitzer parameters can now be used for aqueous solutions calculations in Gem.
- Electrode potential (E) calculations and plotting E for aqueous systems.

Aqua Module

- New database of user's own Pitzer parameters.
- Makes it possible to use own Pitzer data in Aqua calculations. See **Figure 7**.

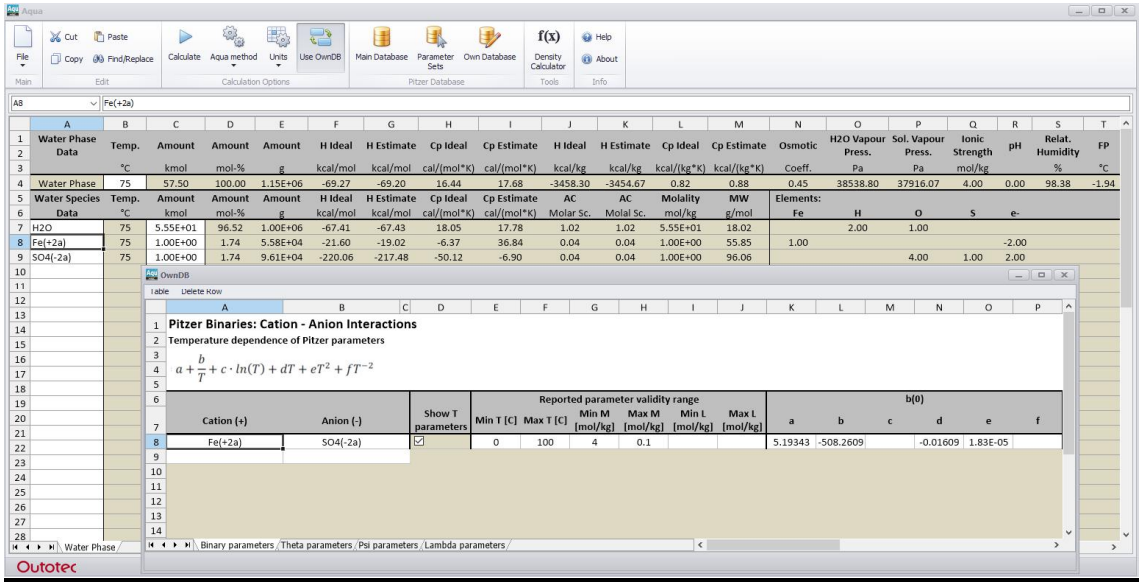


Figure 7. It is now possible to add your own Pitzer parameters in the Aqua module. These Own Pitzer parameters can also be used in the Gem and Sim modules.

Sampler Module

- New Sampler module replaces the old HSC 7 Sampler. See **Figure 8**.
- Better user interface and charts.
- Calculation results with comments can now be saved.

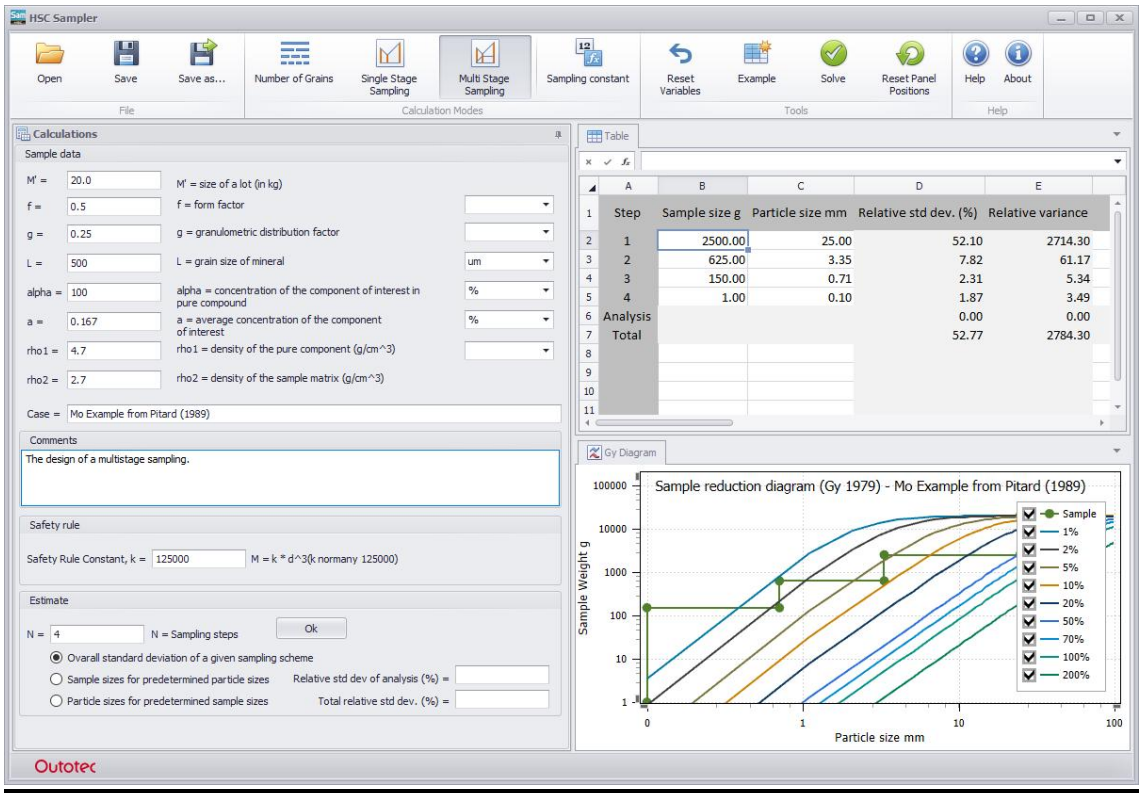


Figure 8. The new Sampler module replaces the old HSC 7 Sampler. The new Sampler features a better user interface and charts and allows the user to save the calculation results with comments.

Improved Diagram Navigator Module

- New triangulation algorithm for diagram digitalization. See **Figure 9**.
- New crystallization path calculation is available for ternary phase diagrams in the HSC Navigator module and as an Add-in function.
- New visualization features.
- Improved user interface.

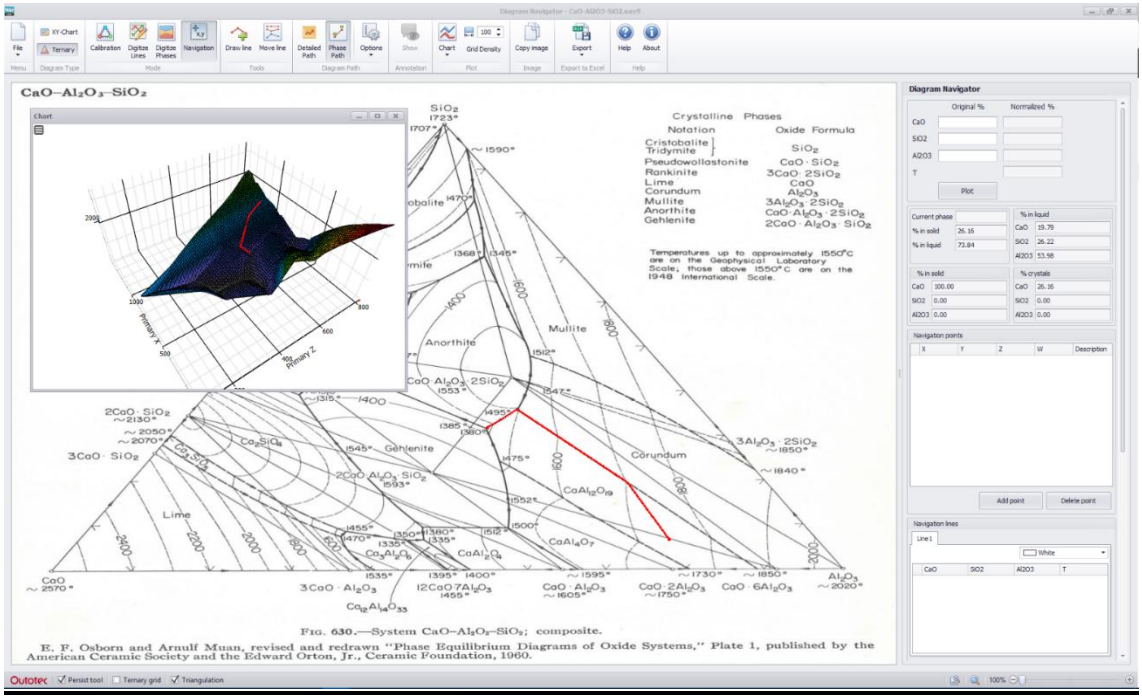


Figure 9. The new triangulation algorithm for the digitalization of the diagram surface allows the capturing of every tiny detail and use of the diagram for accurate calculation of crystallization paths. The digitized diagram surface and the crystallization path are visualized in a 3D chart. The crystallization path calculation is also available as an Excel Add-in function and can be used in other HSC modules.

HSC Data Processing Module

- New algorithms: principal component analysis (PCA) (see **Figure 10**) and k-means clustering (See **Figure 11**).
- Faster graphics.

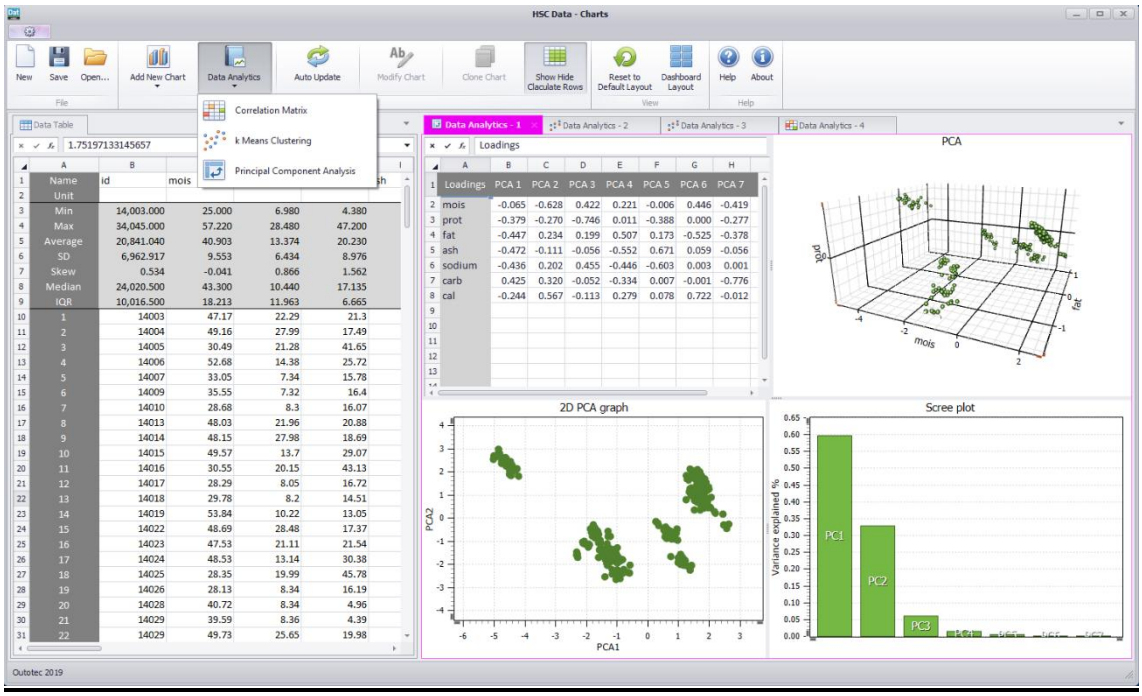


Figure 10. Principal component analysis (PCA) is a statistical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated variables into a set of values of linearly uncorrelated variables called principal components.

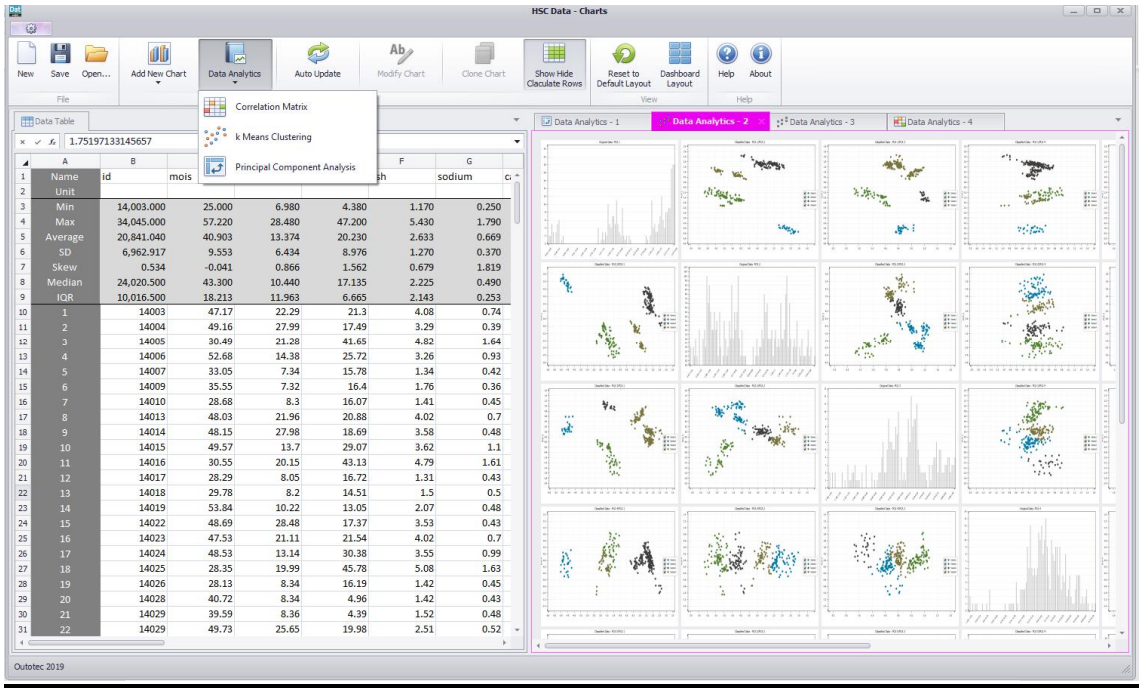


Figure 11. k-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster. The k-means clustering method implemented in HSC Data processing module clusters your data and visualizes the clusters in a multidimensional space.

Material Database Module

- New links to geographical location and maps.

HSC Main Database Module

- New and updated data for chemical species.

HSC Main Menu with Sub Menu

- The new Sub Menu lets the user easily hide rarely used module tiles. See **Figure 12**.

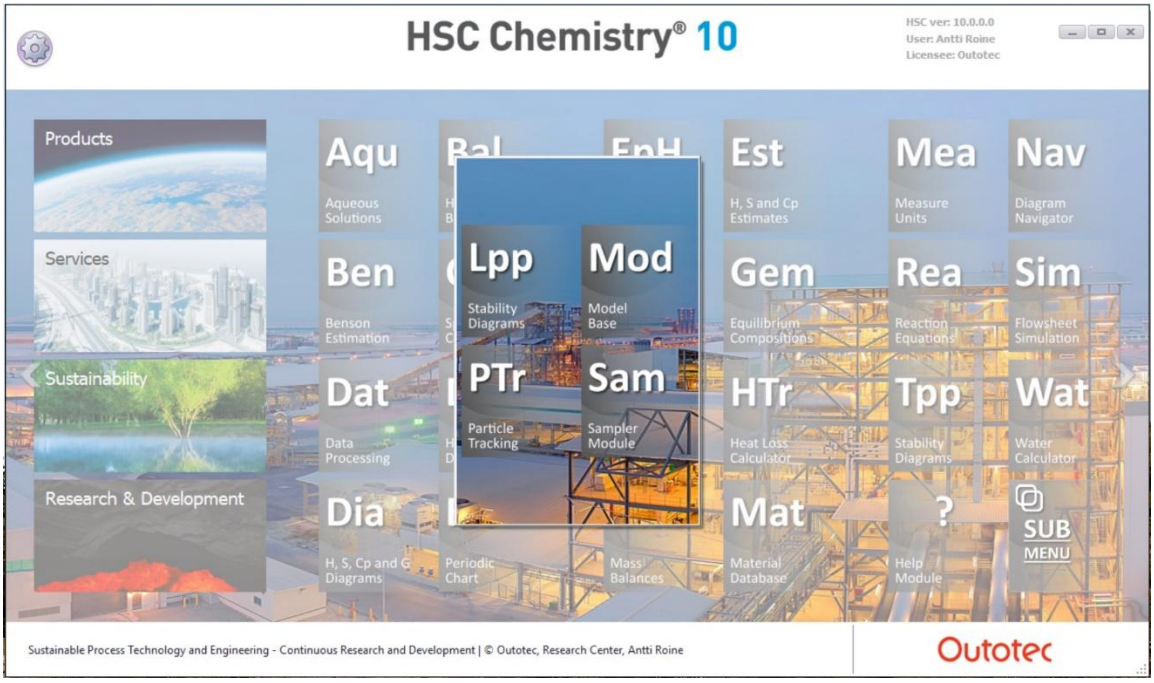


Figure 12. Rarely used module tiles can be easily moved into Sub Menu.

Others

- New Ptrack module (BETA version) for particle based balancing with mineral liberation data.
- Lots of small improvements and bug fixes.

HSC 10 Installation

- Default installation path C:\Program Files (x86)\HSC10.
- HSC 7, HSC 9, and HSC 10 can work simultaneously on the same computer.

New EULA Licensing Model with Subscription

- HSC 9 calculation module files are upward compatible with the new HSC 10.
- With the new subscription licensing model end users will get new software versions as they are released.
- The new licensing model does not support perpetual licenses without subscription. HSC 10 stops working after subscription period ends.
- Subscriptions are available for a period of one year or three years.