IES INTEGRATED ENVIRONMENTAL SOLUTIONS

Parallel Simulations

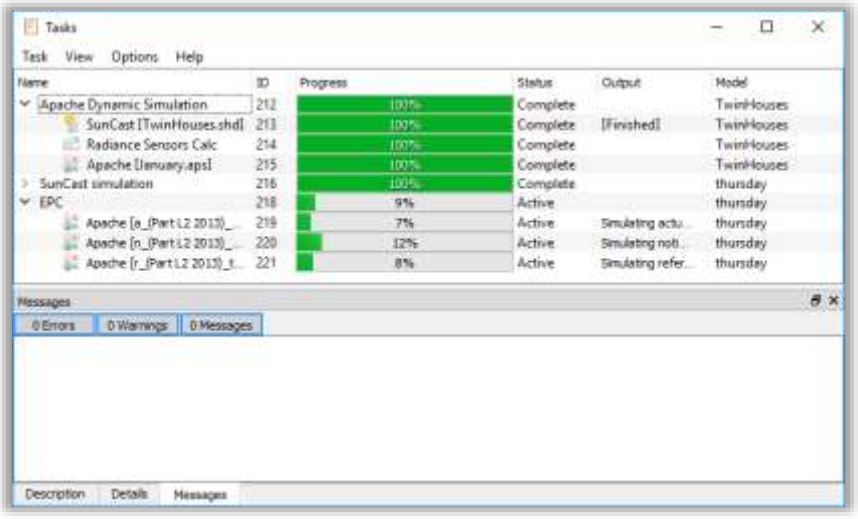
Virtual Environment User Guide

Contents

Overview

What is Parallel Simulations?

Parallel Simulations (or *Parallel Sims*) is a term for a new feature in the VE which allows users to run multiple simulations concurrently. It provides a single user interface for displaying and managing all of your simulations.



You can start simulations and continue using the VE as normal without waiting for those simulations to complete. When simulations complete their results files can be downloaded and inspected. The number of active concurrent simulations allowed is based on the number of cores available on the target machine.

Benefits of using Parallel Simulations

There are many benefits to using Parallel Simulations:

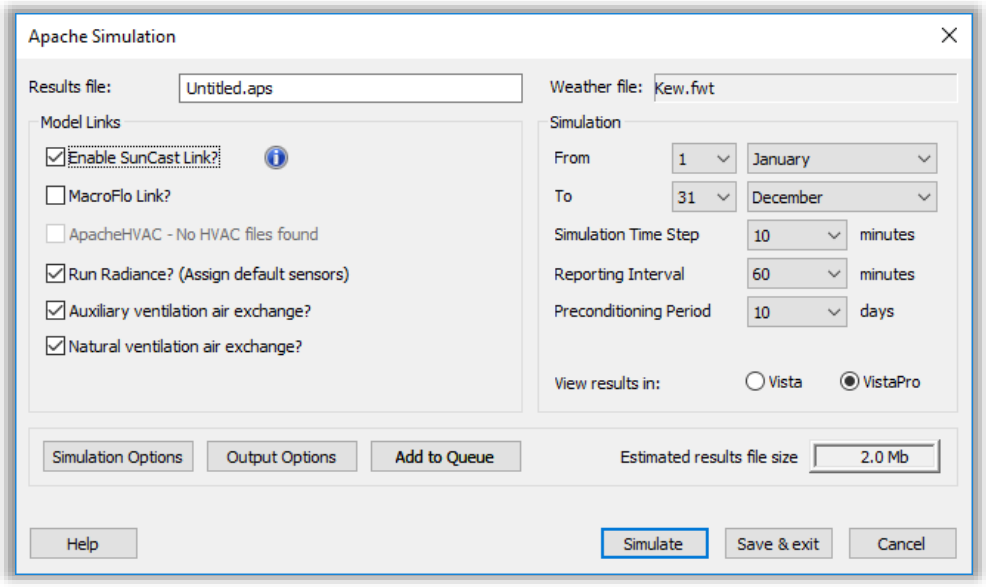
- It allows you to continue working while a simulation is running
- It allows you to queue simulations from as many different models as you want and have them run in the background
- Provides a single, coherent interface for simulations and their progress/status
- Compliance simulations are much faster with an approximated 5x performance increase for PRM simulations including all baseline models.

Simulations

The procedure for running simulations via the new Parallel route is almost identical to that of the old. Simply start a simulation as you would normally and (if it is supported) it will appear as a new entry in the Task dialog. It is important to note that for all parallel simulations a *snapshot* of the model will be created when the simulation is scheduled and this will be used exclusively by the simulation throughout. This means that any modifications to the *actual* model after this will not be reflected in the results file(s) for that particular simulation. The supported simulations are as follows.

Apache (with SunCast and Radiance)

Running an Apache dynamic simulation is done in the same way as before, however you can now automatically run both SunCast and Radiance from the Apache Simulation dialog by selecting the relevant check-boxes:



If you have not yet assigned sensors to rooms in the model, then the 'Run Radiance (Assign default sensors)' option will automatically do this for you. Starting an Apache simulation with these options enabled will also add additional simulation tasks for both SunCast and Radiance if it detects there is no valid shading or illuminance files present.

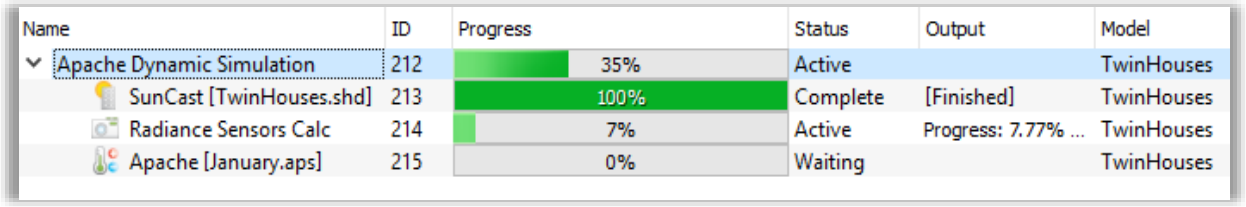


Figure 1: Apache simulation including both SunCast and Radiance

When the SunCast and Radiance simulation tasks complete then the Apache simulation task will start, taking into account the generated shading and illuminance files.

Once the overall Apache simulation completes an alert will be shown, allowing you to view the results of that simulation:

Clicking on the 'View Results' link will open VistaPro with the results file selected.

For every Apache licence you own you can run up to 4 concurrent Apache simulations at once. For more information on purchasing additional licences please contact keys@iesve.com. Note that this is also limited by the number of available cores on your machine.

SunCast

Solar shading calculations for Apache are also supported by the new Parallel workflow. To start a solar shading calculation simply go into the SunCast view, navigate to the *Calculations* menu -> *Solar Shading for Apache*. In the dialog that opens select the *Start* button:

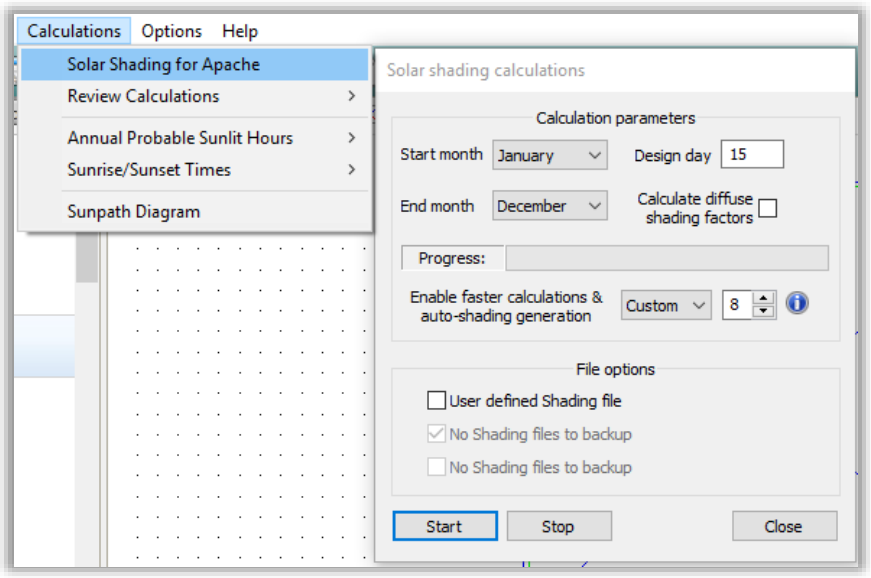


Figure 2: Starting a parallel solar shading calculation

The dialog will close immediately and a new simulation entry will be added to the task dialog like so:

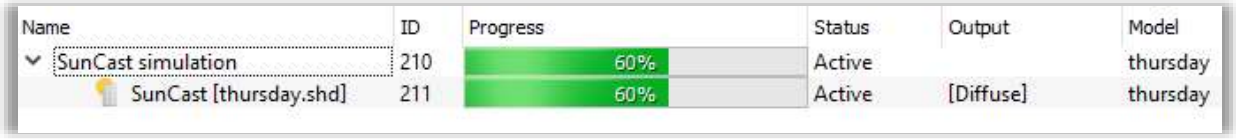


Figure 3: Solar Shading for Apache via Parallel Sims

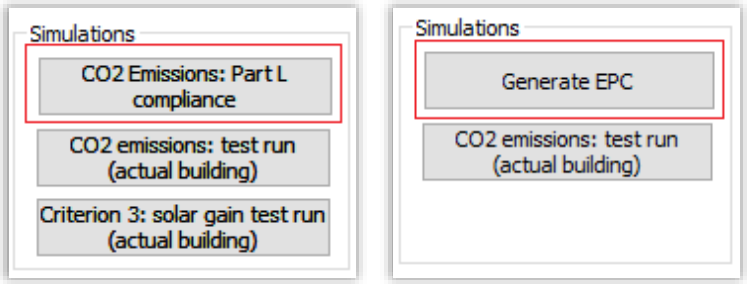
When the simulation completes an alert should display:

Clicking the '*View Results'* link will open the shading file in the same manner as the *'Load shading results'* option does (invoked from the 'SunCast' menu).

VE Compliance

L2 Compliance reports and Energy Performance Certificates (EPC's) can now be generated much faster when using one of either '*ApacheSim – compliance'* or '*ApacheSim - EPC*' simulation modes. This has been achieved by running concurrent Apache simulations for each of the required model variants (*Actual*, *Notional* and *Reference*) at the same time, whereas before these simulations were performed in sequence.

In the VE-Compliance view, and with Parallel Simulations enabled, select either the 'CO2 Emissions: Part L compliance' button or the 'Generate EPC' button to start their respective simulations:



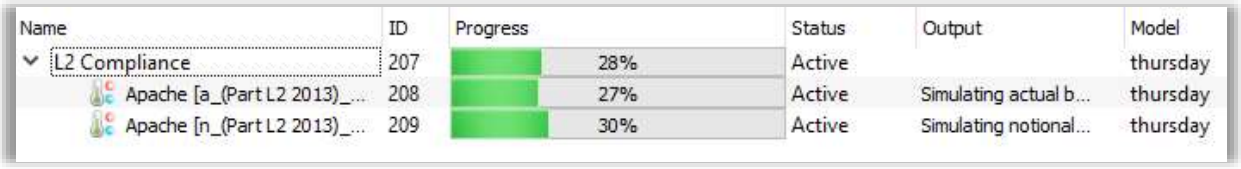


Figure 4: L2 Compliance report being generated via Parallel Sims

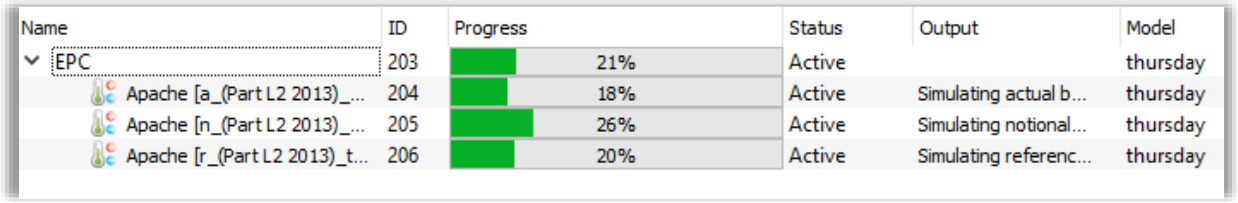


Figure 5: EPC report being generated via Parallel Sims

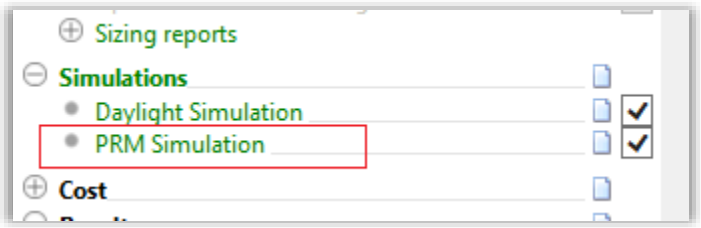
L2 Compliance and EPC *jobs* will be added to the task dialog containing tasks for each of the required Apache simulations. When the jobs complete the results will be downloaded, provided the 'Automatic downloads' option is enabled (see Settings), and reports will be generated as per usual, switching you to the results tab. If automatic downloads are disabled, then you can right-click the 'L2 Compliance' or 'EPC' entries in the dialog and select the 'Download' option manually.

PRM

PRM Simulation

Support for Parallel PRM Simulations has been added to both the 2007 and 2010 PRM Navigators. Out of all the supported simulations, PRM promises to have the largest potential performance gains due to the potential need to run up to 15 different simulations, most of which can be run concurrently.

To start a *Parallel* PRM simulation simply select the 'PRM Simulation' action from the navigator once you have completed (more or less) all of the previous steps:



This will start a 'PRM Simulation' *job* with all required Apache, SunCast and Radiance simulation *tasks* included:

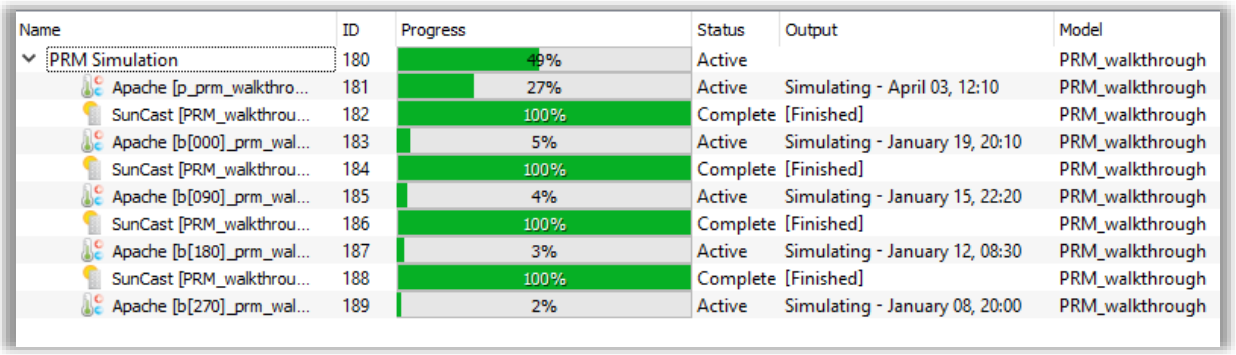
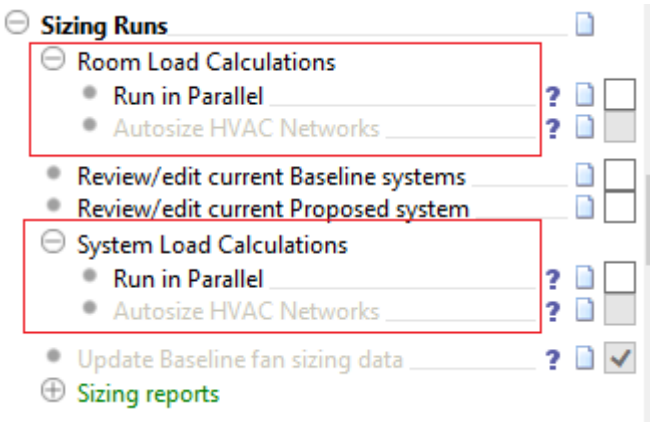


Figure 6: PRM Simulation including all baseline variants with SunCast simulations included

Once the 'PRM Simulation' job completes the results files should download automatically if you have the 'Auto-download' option enabled in the settings menu (see Settings). If not, you can right-click and manually 'Download' them. Once results have been downloaded you should be able to continue on in the navigator as you would previously and generate the required reports.

Room and System Loads Calculations

Room and System Loads calculations have also been updated to run in parallel. The PRM navigators (2007 and 2010) now have additional auto-sizing steps which should be run after all parallel loads calculations have been performed and results files downloaded:

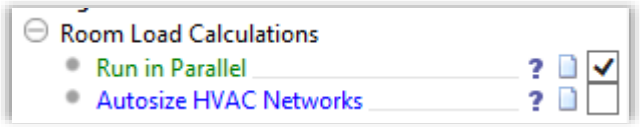


The ‘Run in Parallel’ steps will start new jobs containing Apache ASHRAE Loads simulation tasks for each of the specified variant models:

Name	ID	Progress	Status	Output	Model
PRM Room Load Calculations	197	44%	Active		PRM_walkthrough
Apache [p_test1_p]	198	71%	Active	ASHRAE Cooling Load...	PRM_walkthrough
Apache [b[000]_test1_0deg]	199	49%	Active	ASHRAE Cooling Load...	PRM_walkthrough
Apache [b[090]_test1_90deg]	200	0%	Active		PRM_walkthrough
Apache [b[180]_test1_180deg]	201	0%	Active	Processing data - plea...	PRM_walkthrough
Apache [b[270]_test1_270deg]	202	100%	Complete		PRM_walkthrough

Figure 7: Parallel Room Loads Calculations

When the job is complete and the results have been downloaded, you can check off the navigator item like so:



and continue on to the new ‘Autosize HVAC Network’ steps. This is now a required step for both Room and System loads due to the inherent nature of these parallel calculations.

New Zealand Compliance

Running a *Parallel* New Zealand compliance simulation is done in the same way as before. In ‘New Zealand Compliance’ view, select building type and category and then hit ‘Simulate’. This will add a new ‘New Zealand’ job to the task dialog include simulation tasks for both the proposed and reference buildings:

Name	ID	Progress	Status	Output	Model
New Zealand Compliance	177	28%	Active		thursday
Apache [nzp_thursday]	178	25%	Active	Simulating - March 28, 02:40	thursday
Apache [nzr_thursday]	179	31%	Active	Simulating - April 19, 18:00	thursday

Once complete and results downloaded the ‘Results’ button should become active allowing you to view results and generate the compliance report:

Green Mark Compliance

To run a *Parallel* GreenMark Compliance simulation simply follow the steps in the navigator as usual. The ‘Simulate compliance models’ step will create a new ‘GreenMark’ job with simulation tasks for the proposed and reference buildings.

Task Dialog

The task dialog is main interface for managing your simulations. It will usually appear automatically whenever a simulation starts, but it can also be accessed by double-clicking on the new 'Tasks' item in the VE status bar:

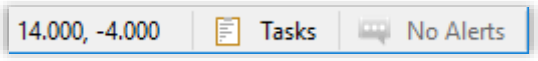


Figure 8: new 'Tasks' status bar item

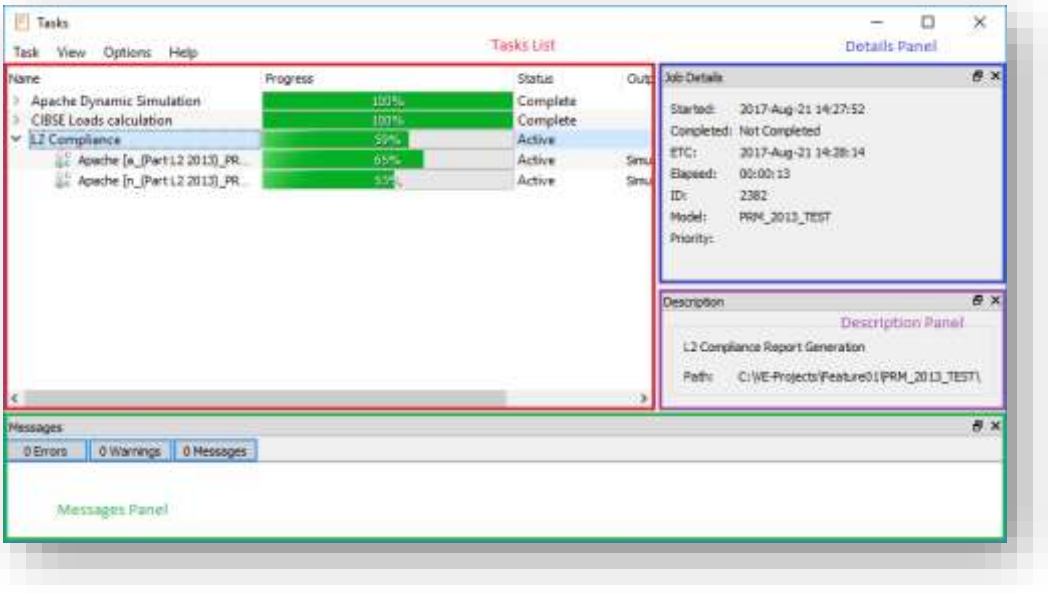


Figure 9: Task dialog

Task List

The Task List highlighted in red above shows a tree view of all scheduled jobs and their associated tasks. Each job has a set of tasks that can be viewed by expanding the job item in the tree view.

You can select entries in the task list and perform actions on them via a right-click context menu or from the 'Task' menu at the top left of the dialog. This menu has the following options:

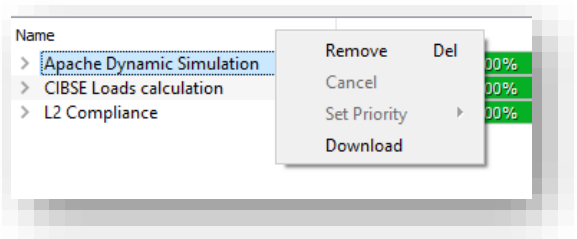
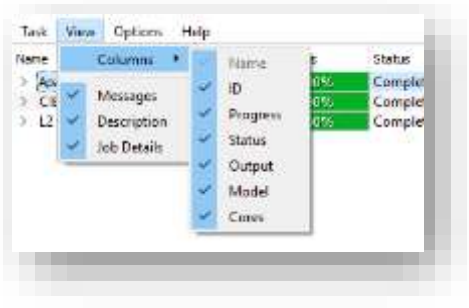


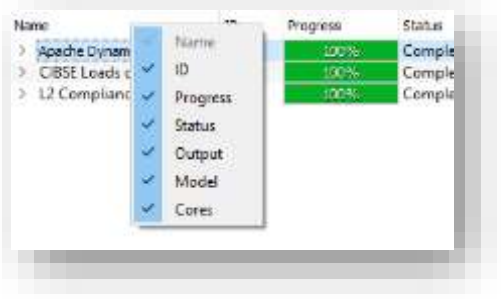
Figure 10: Task actions

- **Remove** – removes a job from the list. Can only be selected when a job has completed, failed or has been cancelled by the user

- **Cancel** – cancels a job. Can only be selected when a job is active.
- **Set Priority** – sets the *queue* priority of the task to be either *High*, Medium or *Low*. This will affect which task starts first out of all the currently queued tasks. Priority can only be set when the task is in a *queued* state.
- **Download** – downloads the results files of the selected job. Can only be selected when the job has completed successfully and the model which was being simulated is the same as the currently loaded model.

Columns for task properties can be hidden or show via the View->Columns menu or by right-clicking on the task list header:





Details Panel

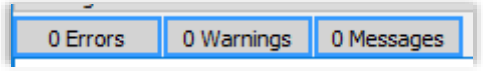
The details panel, highlighted in blue above, provides detailed information about the currently selected job or task in the list.

- **Started** – the date and time of when the job/task started.
- **Completed** – the date and time of when the job/task completed
- **ETC** – the **E**stimated **T**ime of **C**ompletion. This is a rough estimate of when the job/task will finish, calculated based on its start time and current progress.
- **Elapsed** – the elapsed time of the job/task
- **ID** – the job/task ID
- **Model** – the name of the model which the job belongs to
- **Priority** – queue priority of task (*High*, *Medium* or *Low*)

Messages Panel

The messages panel, highlighted in green above, will display any errors, warnings and general messages produced by the currently selected task. If a task fails, there will generally be an error message present in this panel.

The messages can be filtered by their type by toggling the three buttons at the top of this panel:

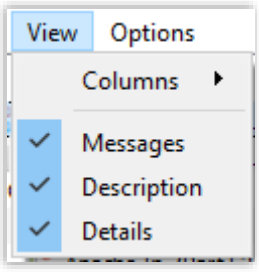


The blue highlights on these buttons indicate that these types should be listed.

Description Panel

The Description panel, highlighted in purple above, contains some additional information about the currently selected job/task. This description depends on the type of job/task selected.

All of the panels (Details, Messages and Description) can be dragged and dropped to different parts of the dialog to customise the appearance of the dialog. They can also be hidden and shown via the View menu:



Settings

The Settings dialog can be accessed from the *Options* menu -> *Settings* item.

General tab

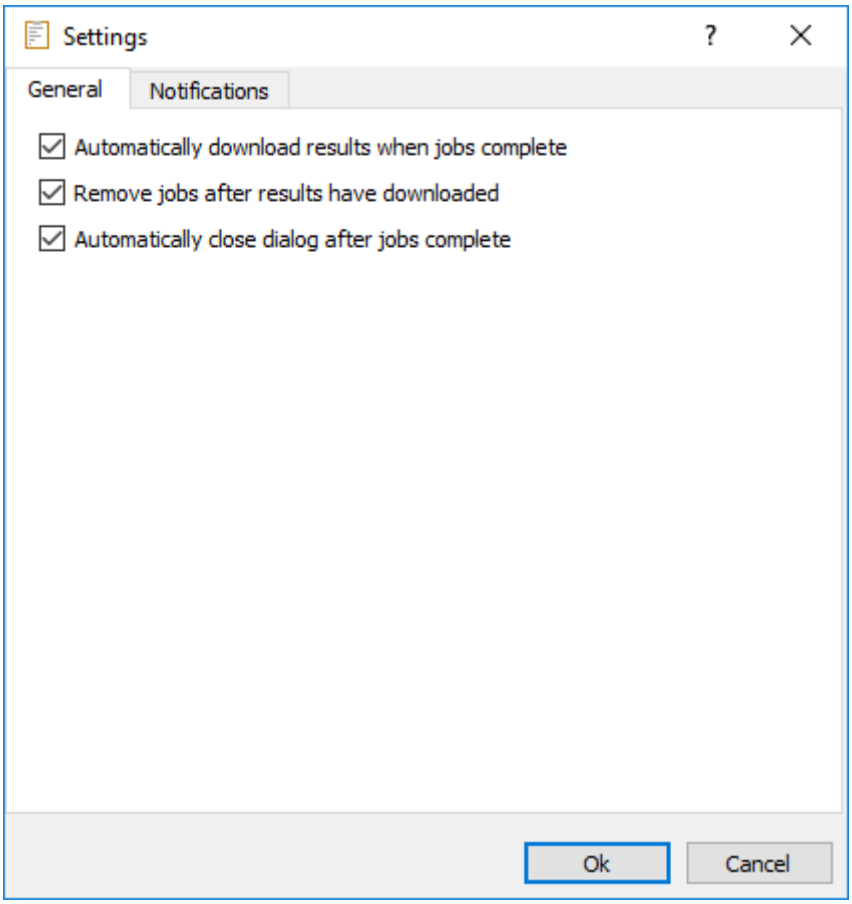


Figure 11: General settings tab

The *General* tab contains a few options:

- **Automatically download results when jobs complete** - This option, if checked, will automatically start downloading results files for jobs whose status changes to *Complete*. This has the same effect as the user right clicking the job and selecting the *Download* option when it completes.
- **Remove jobs after results have downloaded** – This option will remove jobs automatically after their results files have been downloaded successfully to the project directory. This is the same as right clicking and selecting 'Remove'
- **Automatically close dialog after jobs complete** – This option will automatically close the dialog when all simulations have completed, granted that the dialog was opened automatically after a simulation started.

Notifications tab (E-mail)

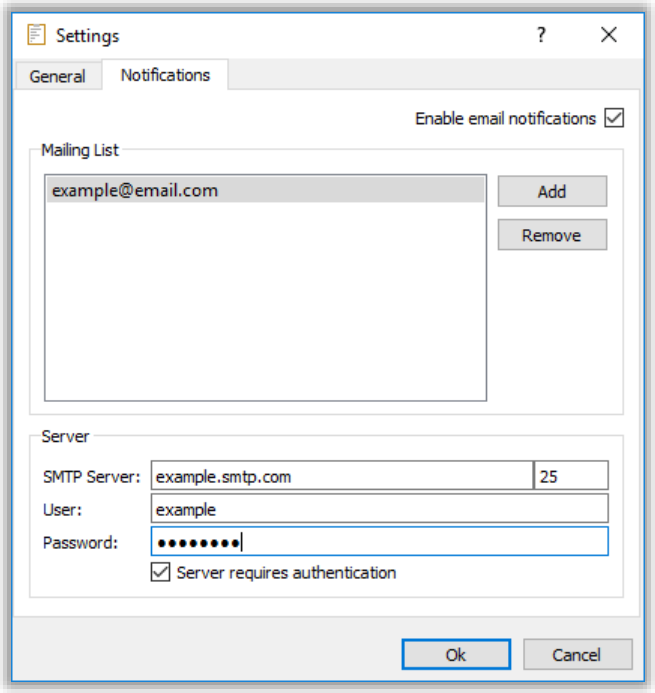


Figure 12: Notifications settings tab

The *Notifications* tab allows you to setup a mailing list of recipients who will receive email notifications when simulations/jobs complete or fail. In order to do this, you first need to check the 'Enable email notifications' check-box.

You can add and remove recipient email addresses by selecting the 'Add' and 'Remove' buttons respectively. 'Add' will prompt you to enter a new email address to add and 'Remove' will remove all currently selected items in the list.

In order to send emails, the VE requires an SMTP server. If you wish to use the same SMTP server as your local/company email client application, then these settings can generally be found somewhere in the Application settings. For Outlook, this would be in File -> Account Settings -> Select account and then 'Change…' and it should give the address of the SMTP server it is using.

If the server requires authentication, then check the 'Server requires authentication' check-box and enter the username and password.