

**PHOENICS – Your Gateway to CFD Success**  
**Documentation for PHOENICS | TR 110**

## Installation of PHOENICS 2025

**CHAM Ref:** CHAM/TR110

**Document rev:** 11 (MSMPI)  
**Doc. release date:** 23 November 2007  
**Last revised date:** 05 June 2025

**Software version:** PHOENICS 2025

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**Published by:** CHAM

**Confidentiality:**  
**Classification:** Unclassified

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## CHAM – Your Gateway to CFD Success

### Installation of PHOENICS 2025: TR110

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# 1 Introduction

## 1.1 Purpose of the document

The purposes of this document are:

- To explain how to install the PHOENICS program suite on a computer running under Microsoft Windows.
- To describe how to test the success of the installation.
- To provide new users with a brief guide on starting to use PHOENICS.

The contents of this document are applicable to both recompilable, which enables the user to re-link the executables, and non-recompilable with which the user can only use the supplied executables.

## 1.2 System configuration

To install PHOENICS, the user needs to have a hard disk with at least a total of 2 GB free space. Additional space will also be required for running PHOENICS. How much space will depend on the size of simulations made; for complex models it is possible to generate individual output files which are more than 1GB in size. For efficient use of PHOENICS the user should have at least 10GB of free hard disk space available.

PHOENICS will run on platforms of Microsoft Windows from version 7 onwards and the equivalent versions of Microsoft Windows Server. It is recommended that the computer used for running PHOENICS has a minimum of 8GB RAM. The amount of available RAM may limit the size and complexity of simulations made; it is not uncommon for users to require 64GB of RAM or more.

PHOENICS modules as provided are compiled as 64-bit and double-precision 64-bit executables. CHAM no longer supplies the 32-bit executables as part of the standard PHOENICS installation.

There are no special graphics requirements; most modern graphics cards should have no problem running PHOENICS. However, we have found that some of the graphics cards that come integrated with the motherboard do give slow performance when rotating the domain with result contours displayed. To enable the clear display of results, the minimum recommended screen resolution is 1024\*768 pixels.

A compiler is not a requirement for the use of PHOENICS, but users who wish to include their own Ground coding in the PHOENICS solver will require a copy of Intel Fortran Compiler; version 21 or later is required. This compiler is part of the Intel oneAPI HPC Toolkit.

**Please note** that an Administrator account will be required to install the software.

## **1.3 The remainder of the document**

Chapter 2 lists the items supplied with the installation

Chapter 3 describes the installation procedures

Chapter 4 shows how to test the success of the installation

Chapter 5 advises users on starting to use PHOENICS

Chapter 6 shows how to install the parallel version of PHOENICS

Appendix A gives information on how to obtain an unlocking string

Appendix B provides answers to Frequently Asked Questions and to troubleshooting

Appendix C provides guidance on setting up a network server for PHOENICS

## 2 Specification of Items

The following items will be supplied.

### 2.1 Software

- A DVD or a download containing the PHOENICS software.

### 2.2 Documentation

- Installation of PHOENICS 2025;TR 110 (this document)

## 3 Installation Procedures

The quick installation instructions are provided inside the cover of the DVD case and these should enable experienced customers to upgrade their PHOENICS version successfully. Otherwise, it is recommended that the user read through the following sections before starting installation.

### 3.1 Ensuring that there is sufficient free disk space.

The installation will occupy 1.5 GB of disk space, so one will need at least this amount of free disk space on the target machine before starting to install PHOENICS. In practice one will need much more than this in order that there is sufficient space to store the results.

### 3.2 Checking if PHOENICS has already been installed on the target machine

If an **earlier version** of PHOENICS is already present, it is strongly recommended that it be deleted, or the name of the existing installation directory changed **before** installing the new version. You may wish to preserve user files from working directories, such as `\phoenics\d_priv1`, and user geometry files under `\phoenics\d_satell\d_object\users`. These can be copied to a temporary location using Windows Explorer, and later moved to the equivalent locations in the new installation.

To delete the old installation, open the **Control Panel** then in the section *Programs* click on the item *'Uninstall a program'*. Now scroll through the list of installed programs and find the PHOENICS installation – the previous version was labelled **PHOENICS 2023**. Double click on the line labelled PHOENICS to begin the install script and choose the option *'Remove'* then click on the button *'Next'* to begin the uninstall procedure. This will remove all the files which were originally installed, but leave behind any new files which have subsequently been added (e.g. your case files). If you wish to preserve any of these left over files then rename the phoenics folder, otherwise delete it before re-installing PHOENICS. To rename the old installation to, say, PHOENICS.OLD, open Windows Explorer, right click on the `\phoenics` folder, then on *Rename* and type in PHOENICS.OLD.

If a previous version of PHOENICS exists on this computer, and you do not rename or remove it, some of the old files may not be overwritten by this installation process. The installation process will finish normally, but some modules may not function as expected.

If you have an old PHOENICS version on your disk drive C:, and you would like to **keep the old version** on C:, then you can create a virtual drive and install PHOENICS on this virtual drive, with no need to rename or remove your old PHOENICS version from the C: drive.

Click on *'My computer'* icon to ascertain what drive letters are in use. Usually the C: drive will be the user's local hard drive and D: a removable drive (e.g. CD or DVD), other drive letters may already be in use for mapped network drives. Suppose the drive P: is not in use, you can create a virtual drive P:.

First, make a root level folder with a suitable name, e.g. `C:\PHOENICS2025`; then in a Command Prompt window, enter the command

```
SUBST P: C:\PHOENICS2025
```

You now have a virtual drive P: onto which you can load PHOENICS 2025 without affecting any older version of PHOENICS you may have on C:.

**Please note** that any *subst* drives are not remembered after a user logout. The drive will need to be re-created at each logon. This can be achieved by creating a batch file, say *map\_drive.bat* (within which is written the *subst* command above) and include this in the Startup folder under the Start menu.

### 3.3 Changes to the Intel FORTRAN Compiler for PHOENICS

The general PHOENICS user does not need to have a compiler installed. However, for experienced PHOENICS users, the option exists to include specialised user written Ground coding in the solver.

So, only for those users who will be using their own ground coding with the solver a compiler is required. The Intel OneAPI (formerly Intel Parallel Studio XE) suite may be purchased either from a local reseller or directly through [Intel](#). The user will also require a copy of the Microsoft Visual Studio to be able to link the new code.

The compiler version used to build PHOENICS has once more been updated. This was necessitated as the previous build used a combination that would not allow for the use of current version of the Intel FORTRAN compiler (OneAPI 2025). Further, the Intel OneAPI 2025 suite requires the use of Microsoft Visual Studio 2019 or later. These changes mean that that versions of Intel OneAPI Fortran prior to 2021 are no longer supported with the standard installation of PHOENICS.

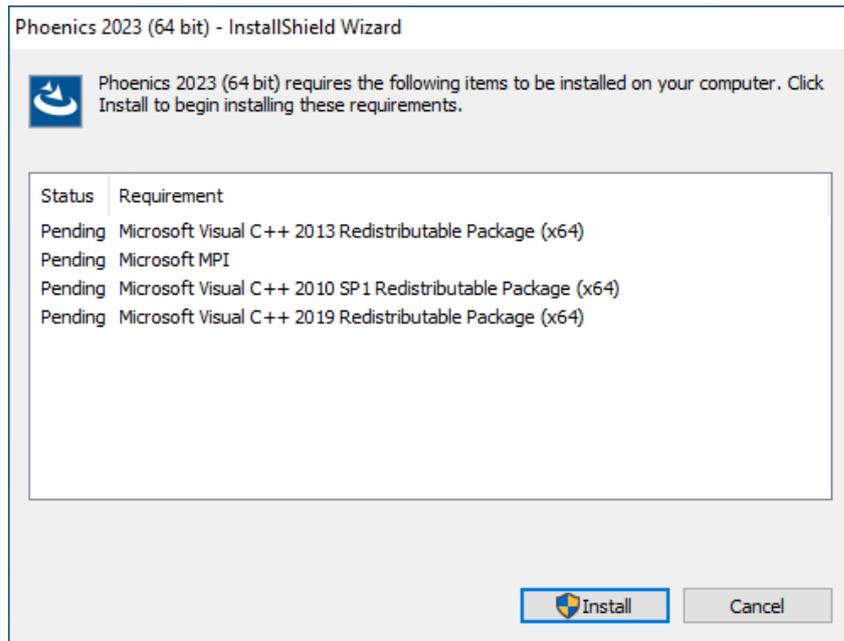
In order to successfully link any of the PHOENICS modules it is recommended that users also install a copy of Microsoft Visual Studio 2019 or later prior to installing the Intel OneAPI Base & HPC Toolkit. It is necessary to use these versions of Visual Studio and not an earlier copy to avoid any mismatch in the libraries.

The Intel FORTRAN Compiler is normally provided as a download executable and when installing it would normally suffice to follow all the default options.

### 3.4 Installing PHOENICS

Follow the steps below to install the entire PHOENICS program suite on to the hard disk.

1. If PHOENICS came on a DVD, load the DVD into your DVD reader; the setup program will automatically start. If PHOENICS came as a download; start the program *phoenics.exe*.
2. There are five pre-requisites for PHOENICS 2025 which are necessary so that the correct DLLs are available to run the various PHOENICS modules, they are
  - a) Microsoft MPI (version 10.0.12498.18 supplied)
  - b) Microsoft .NET Framework 4.7.2 Web
  - c) Microsoft Visual C++ 2010 Redistributable Package (x64)
  - d) Microsoft Visual C++ 2013 Redistributable Package (x64)
  - e) Microsoft Visual C++ Redistributable for Visual Studio 2015, 2017 and 2019 (x64)

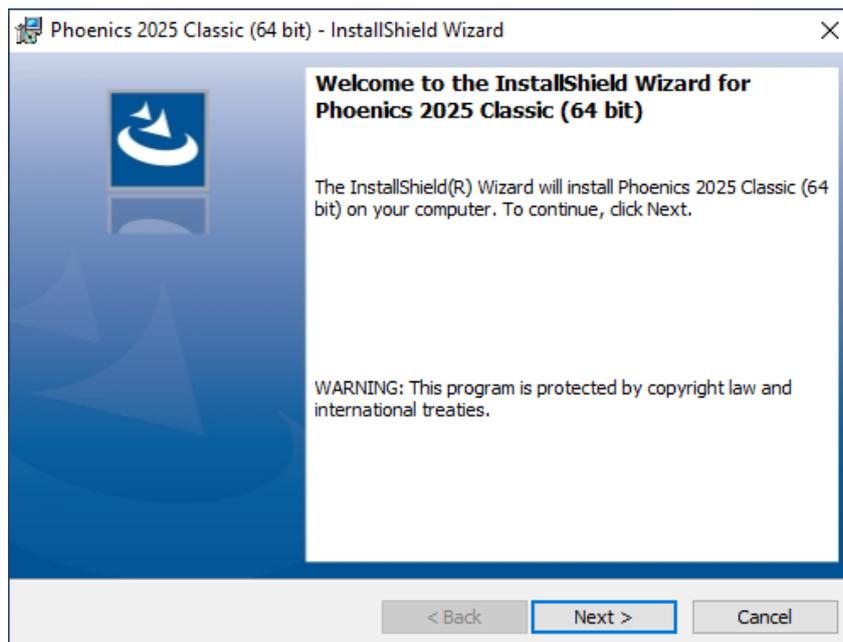


Any items which are already installed on the destination machine will be absent on the above list. If all items are present then the installation will skip this step.

Microsoft MPI (MSMPI) while associated with running of the parallel solver is still required when running the solver sequentially in order that all the necessary DLLs are loaded at run time. The PHOENICS solver is not sensitive to the version of MSMPI, so if you have an earlier version installed that will normally suffice.

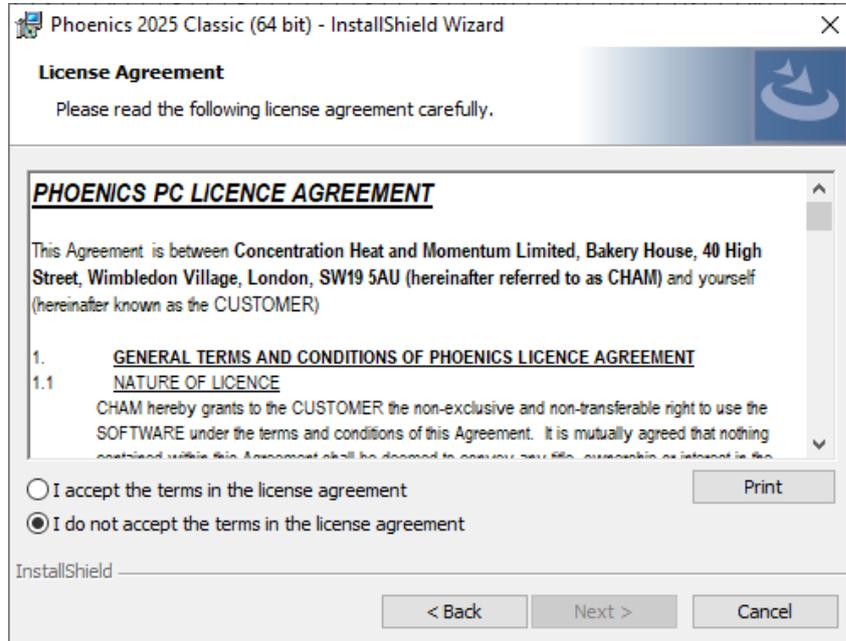
When installing Microsoft MPI, unless your company policy requires otherwise, it is recommended to accept all default settings.

3. Once the pre-requisites have been installed the installation will move on to the PHOENICS options

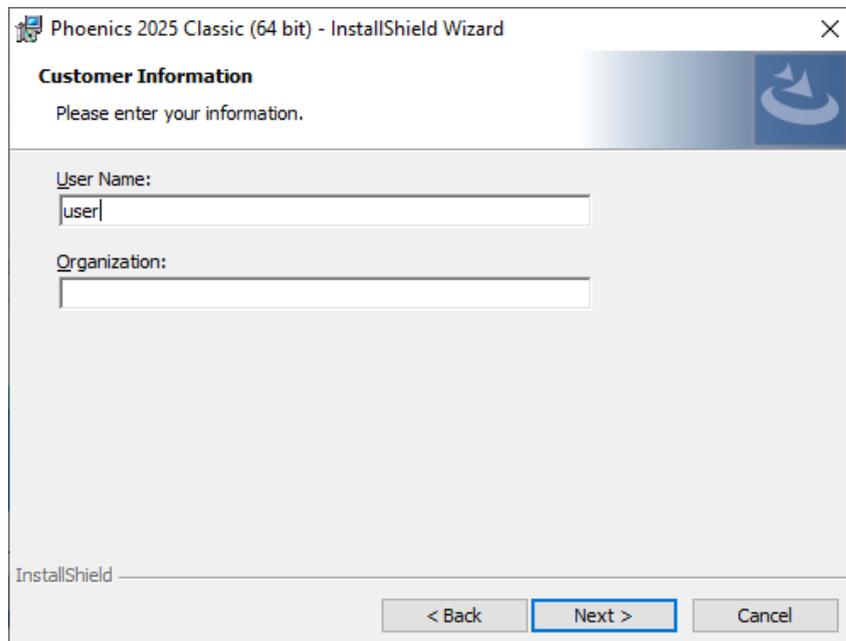


If you do have a previous PHOENICS installation, refer to section 3.2 above for instructions on how to proceed.

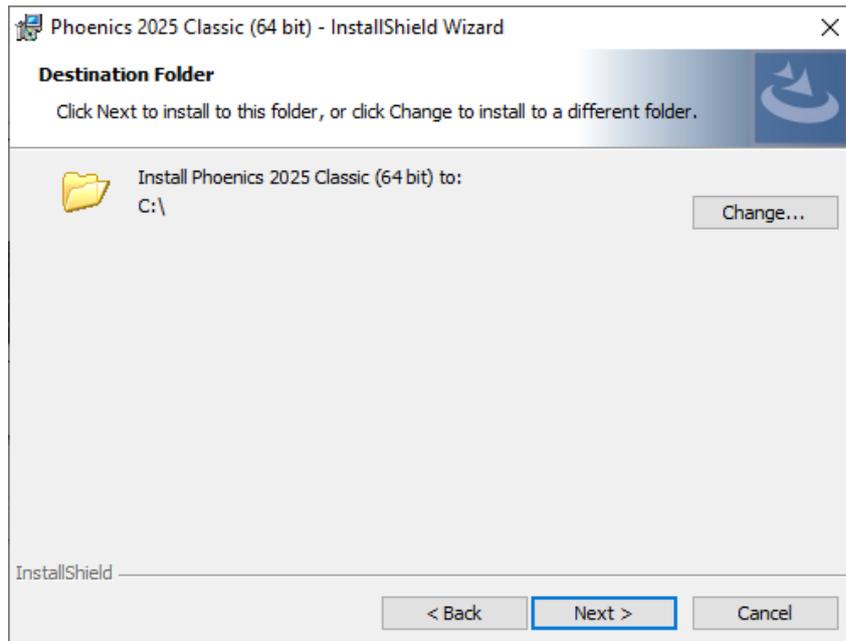
4. First one will need to accept the license agreement



5. Next set your customer information

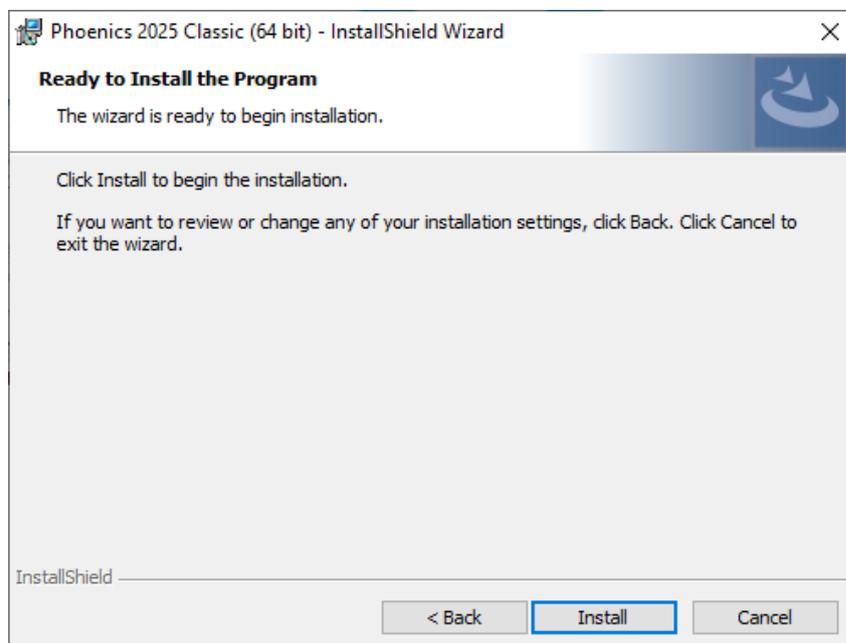


6. Then select the installation location



In response to the screen prompt for the location of the phoenix directory, the user must specify the target location if other than **C:\phoenics**. Ideally the phoenix directory should be located in the root of whichever drive was selected for PHOENICS to be loaded on, but it can be installed elsewhere.

7. This completes the available options and the Install option now starts to copy the files to your computer.



8. An environment variable 'PHOENICS' is created by the installation process, and this variable is set to the pathname of the location of PHOENICS. For example, if PHOENICS is loaded into **c:\phoe2025\phoenics** then the value of the environment variable 'PHOENICS' is set to **'c:\phoe2025\phoenics'**.

While it is possible to install within the directory 'C:\Program Files' it is not recommended for two reasons; one is that POLIS html files use absolute links which will not work unless the folder **phoenics** is at the root level and also the **phoenics** folder will be read-only for non-administrator accounts (see FAQs in Appendix B).

9. If the installation is successful, the user will see two PHOENICS icons, **PHOENICS-VR – 64 bit** and **PHOENICS Command Prompt** created on the desktop.



The **PHOENICS-VR** icon is a shortcut for the PHOENICS GUI; the **PHOENICS Command Prompt** icon is the shortcut for a Command Prompt window with the correct path for running the INTEL Fortran compiler as well as PHOENICS.

If PHOENICS is installed on one disk drive (e.g. C:) and the working directory is on a different drive (e.g. D:) then the PHOENICS-VR Icon will require changing. Click on the Icon with the right mouse button, select Properties and Shortcut, and change the drive letter in the field 'Start in: ' to be the required letter, in this case D:.

### 3.4.1 Notes regarding installation prerequisites

There are five prerequisites which are included with the PHOENICS 2025 installation which are

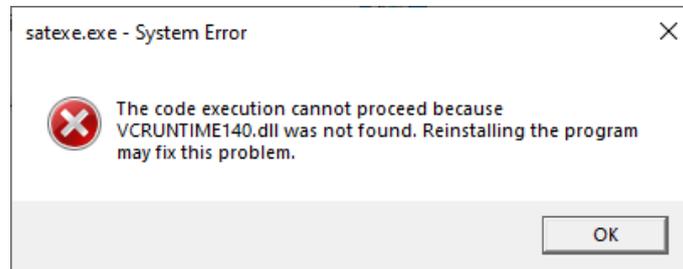
- a) Microsoft MPI (version 10.0.12498.18 supplied)
- b) Microsoft .NET Framework 4.7.2 Web
- c) Microsoft Visual C++ 2010 Redistributable Package (x64)
- d) Microsoft Visual C++ 2013 Redistributable Package (x64)
- e) Microsoft Visual C++ Redistributable for Visual Studio 2015, 2017 and 2019 (x64)

The first Microsoft MPI is required to run the PHOENICS solver Earth. It does not matter whether you will only run the solver in sequential mode (and not in parallel), it is still a requirement to install it otherwise the solver will fail to load the necessary DLLs at run time. However, the solver is not sensitive to which version of Microsoft MPI, so if you have an earlier version of Microsoft MPI installed then it is not necessary to upgrade. If you don't have a copy of Microsoft MPI, then the installer will install version 10.0.12498.18.

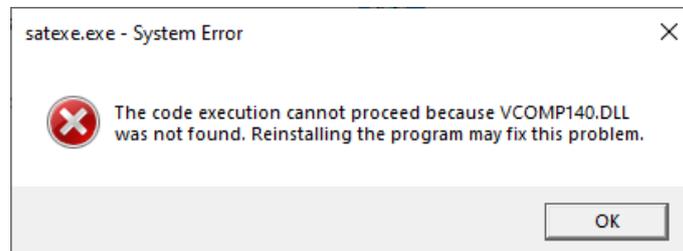
Microsoft .NET Framework 4.7.2 is required for the Earth solver (eaxe.exe), in particular the new GUI. In most cases this should already be installed as part of the Windows OS, but is provided as a Web package for those who may have an older version of Windows.

Microsoft Visual C++ 2010 Redistributable is used by the utilities datmaker.exe and osgcansee.exe and Microsoft Visual C++ 2013 Redistributable is used by the Tecplot interface (tecio.dll).

The PHOENICS suite of programs was built using Microsoft Visual Studio 2019 which requires the Redistributable Packages to be installed, without these you will likely get the following message when you start any PHOENICS module,



followed by

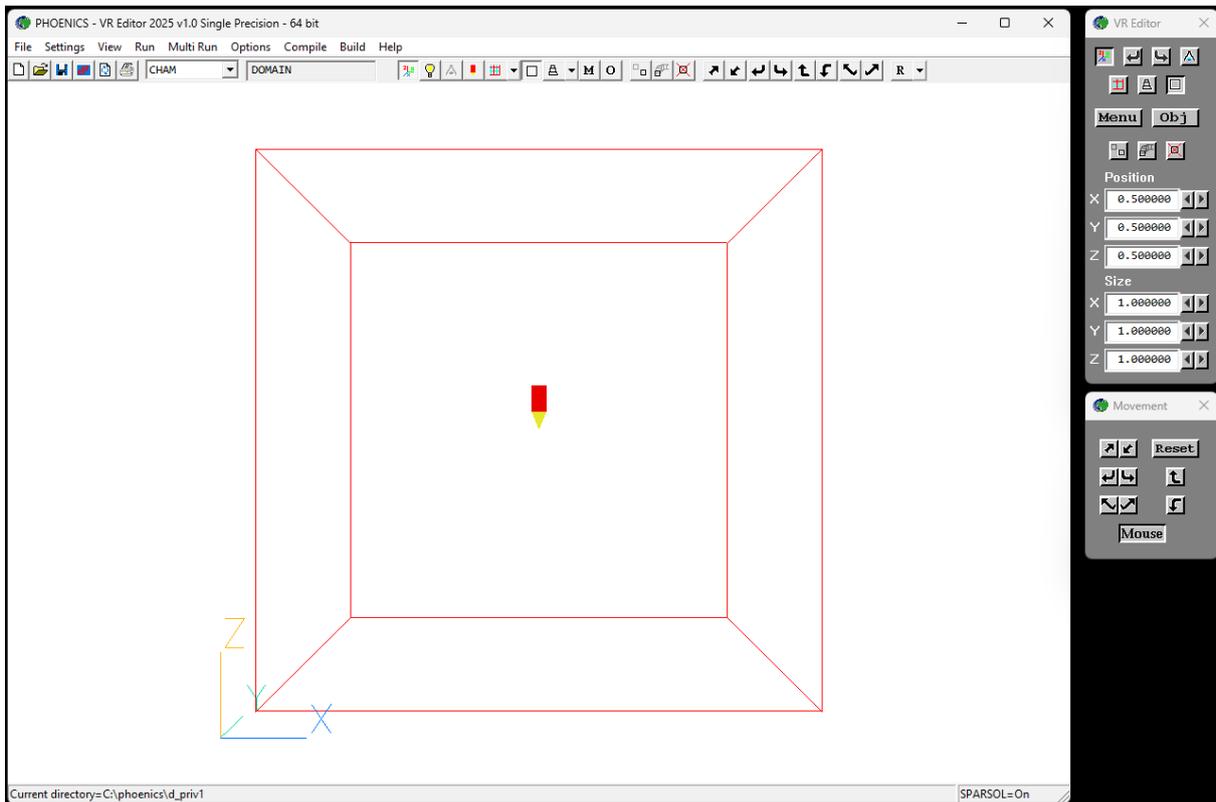


## 4 Brief test of the PHOENICS installation

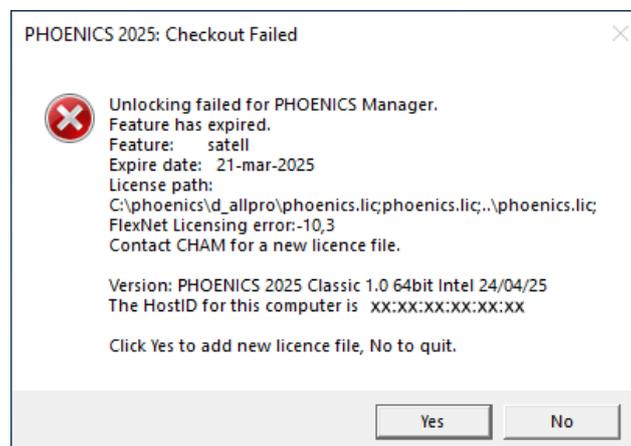
Before running anything more complex, it is recommended that the user runs a simple case from the PHOENICS library of cases to check the correct working of the software.

### 4.1 PHOENICS VR

Double-click on the CHAM icon, labelled '**PHOENICS VR**' in the desktop. The screen shown below should appear.



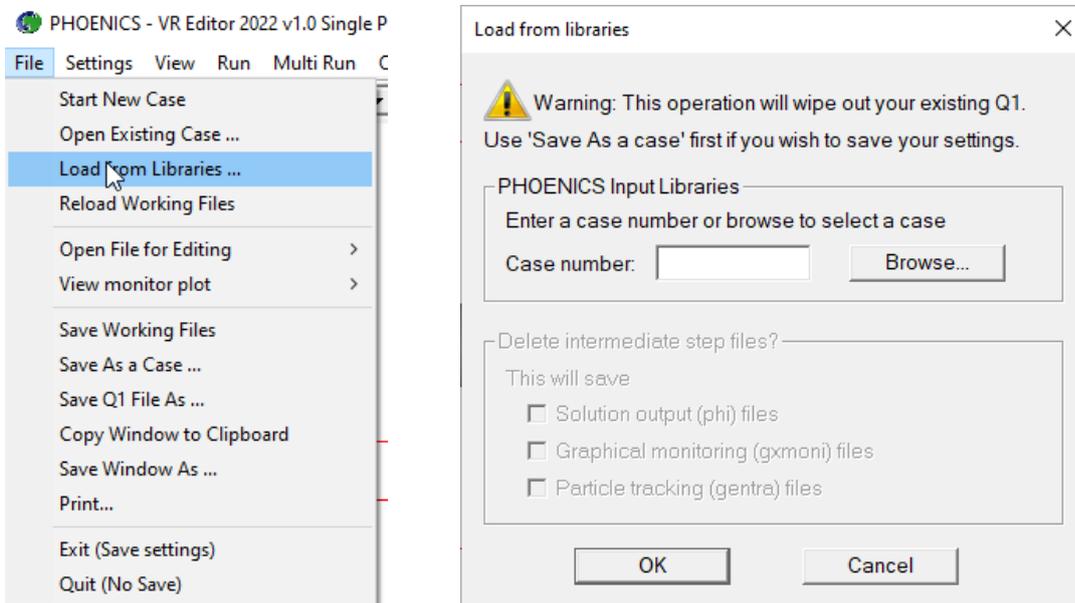
PHOENICS is provided with a temporary license file. If you received PHOENICS on a DVD disc, then this license file should provide up to two months usage before expiry. However, if you received PHOENICS as a download then you are likely to receive a dialog message that the code has expired.



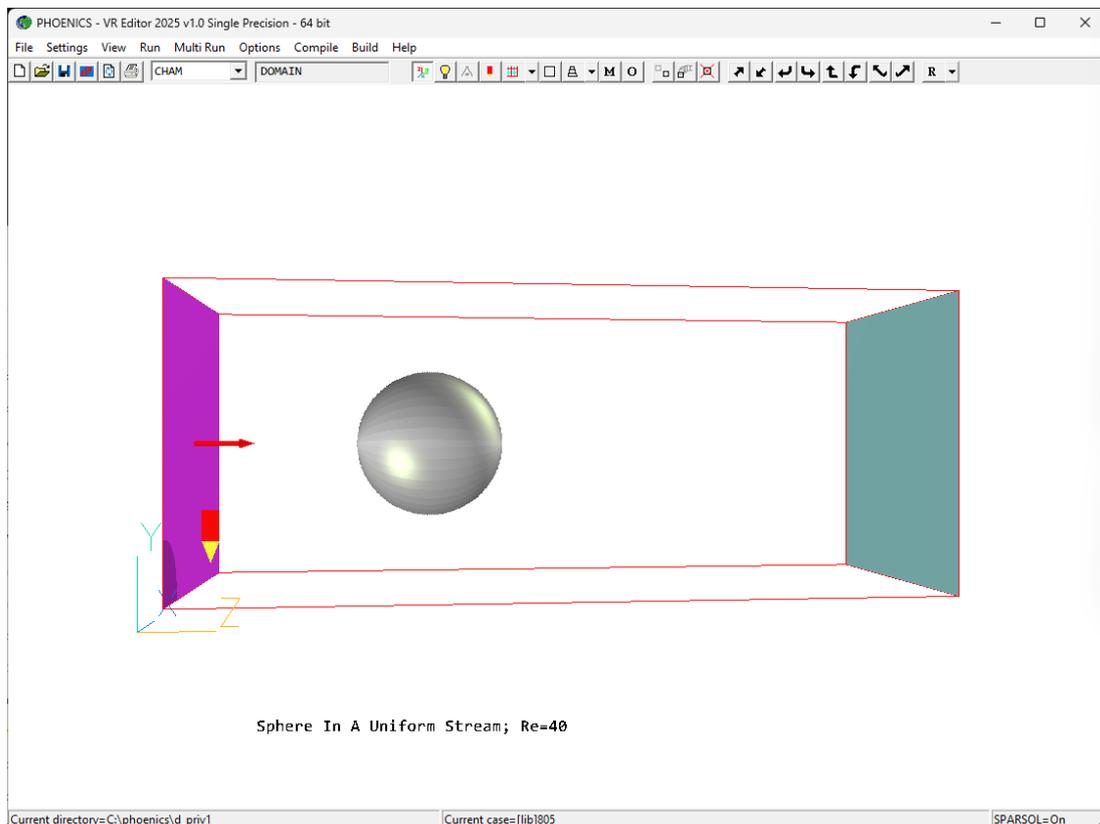
If you get the expired notice, then refer to Appendix A and contact CHAM for a new license file. The HostID required by CHAM for unlocking should match that displayed in your expired dialog message.

## 4.2 Test run of simple library case using VR Editor and Earth

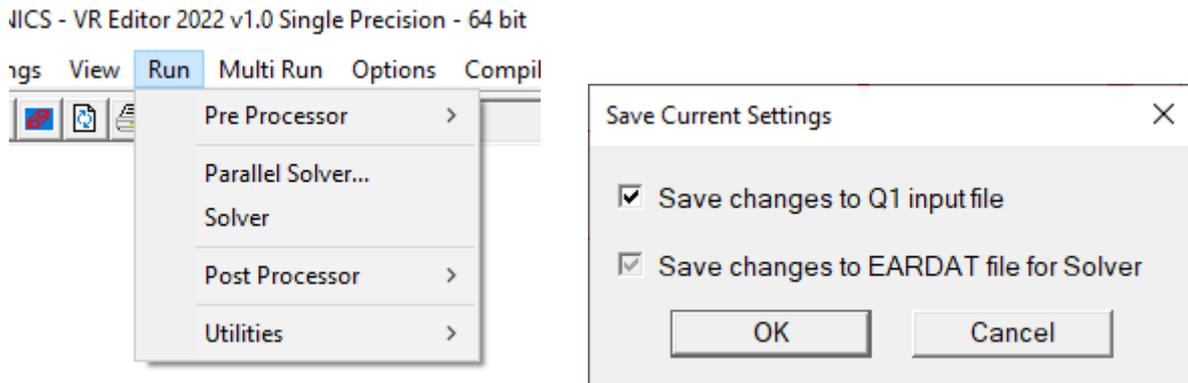
Once you have valid license file you can prepare a test run of the solver. For this is best to select a simple case from the PHOENICS library cases, a good example to use is library case 805 – ‘Sphere in a uniform stream’. To load the library case, from the File menu in PHOENICS VR select the item ‘Load from Libraries...’. This should lead to the dialog shown below.



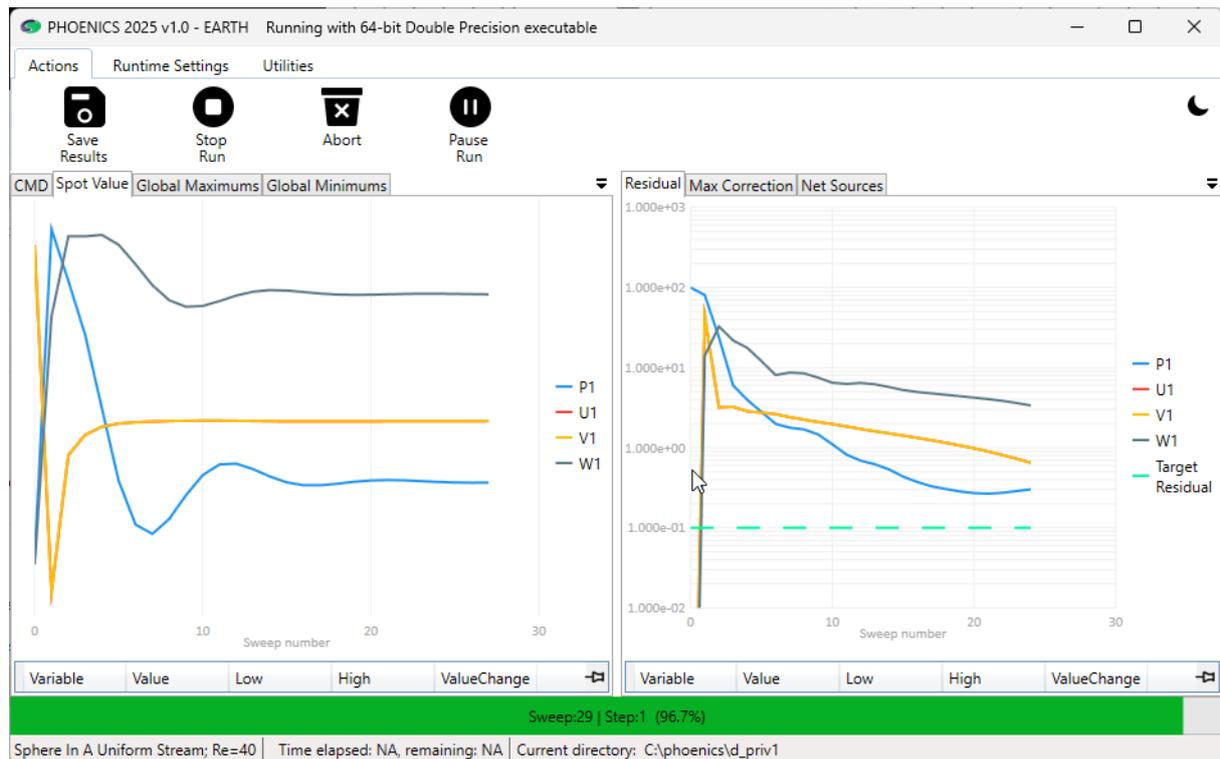
This dialog acts as a warning that if you had a pre-existing case loaded into the VR-Editor then the following action(s) will overwrite your case. This reminder gives the user the opportunity to cancel and save their work before continuing. In the edit box to the right of ‘Case number:’ enter the number 805, and then click on the button ‘OK’. The PHOENICS VR window should then look like



This is a simple case of airflow entering the domain from an inlet on the left and passing a sphere set in the flow field, the air exits through an outlet on the right. One can make adjustments to the flow, but for this initial test run, run the model as it is. On the Run menu, select the item 'Solver'. Once selected, you will see the 'Save Current Settings' dialog below.

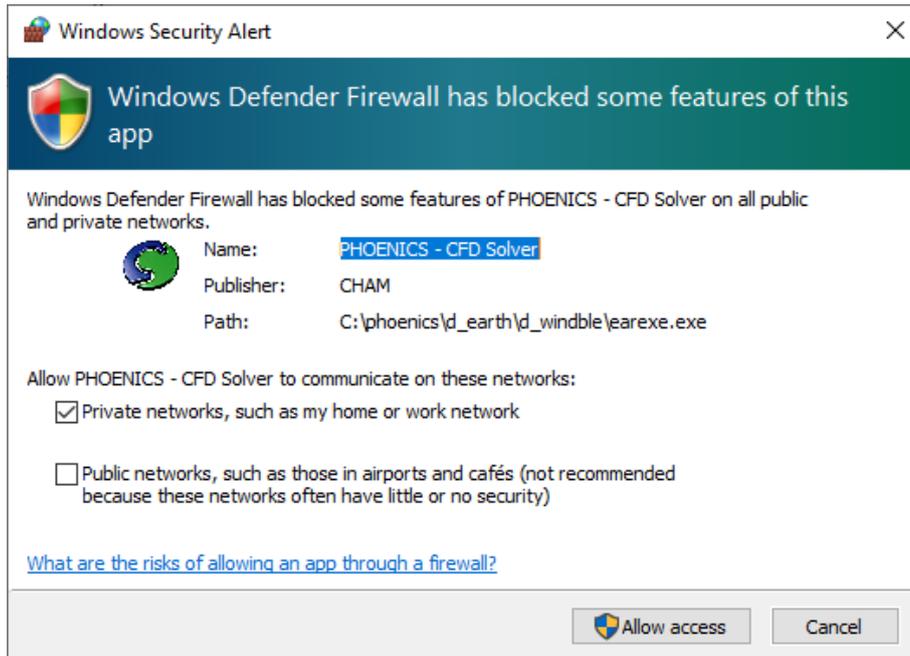


At this point you can choose whether any changes are saved to the current Q1 input file, by default this item will be ticked. This option is provided for those occasions when you wish to retain the original Q1. The file eardat will always be written at this time as it contains the input instructions for the solver. Clicking on the 'OK' button will launch the solver; 'Cancel' will abort the run. This run should only take a few seconds and you will see a new window appear on screen as below.



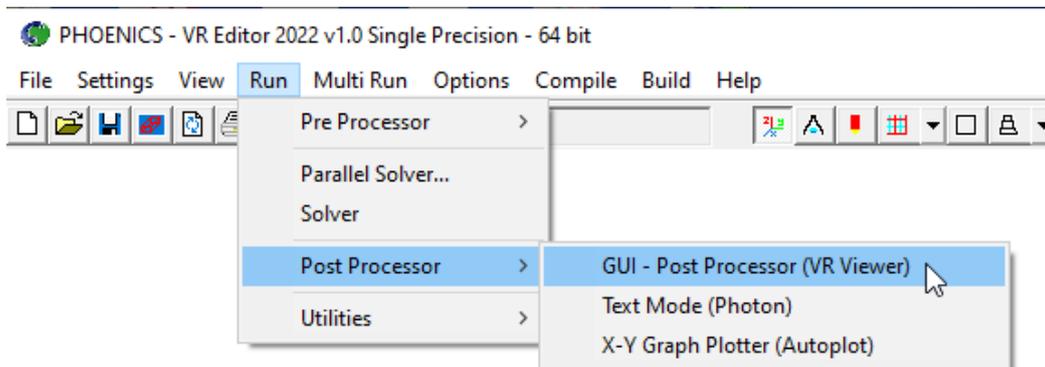
If the window does not appear then it indicates that the solver failed to start. The likely causes for the solver not to start are either an unlocking failure or a failure to locate the necessary DLLs. Any failure in the unlocking should be recorded in the file 'lunit6' which will be located in the working directory (the default location this file should be c:\phoenics\d\_priv1\lunit6). Any necessary DLLs should have been installed during the installation, but should you receive a message indicating that one is absent make a note of it and contact CHAM for further assistance.

As the PHOENICS solver (earexe.exe) is compiled with MSMPI libraries a Windows Firewall Security Alert will be issued when the solver is first run as shown below.



It is only necessary to allow eaexe.exe through the Firewall if running the solver in parallel mode across a cluster. If one will only run the solver on a single host then one may 'Cancel' from this alert without any loss of performance.

Once the solver has finished the window will close and the test is now complete. You may go on to view the results in the post processor.



Use the option 'GUI – Post processor (VR Viewer)' then click OK on the following dialog. Instructions on the use of the VR Viewer are available in documents [TR324](#) and [TR326](#).

## 5 Explanation of PHOENICS functionality

PHOENICS is a **general-purpose** software package which uses the techniques of CFD (*i.e.* Computational Fluid Dynamics) to predict quantitatively:

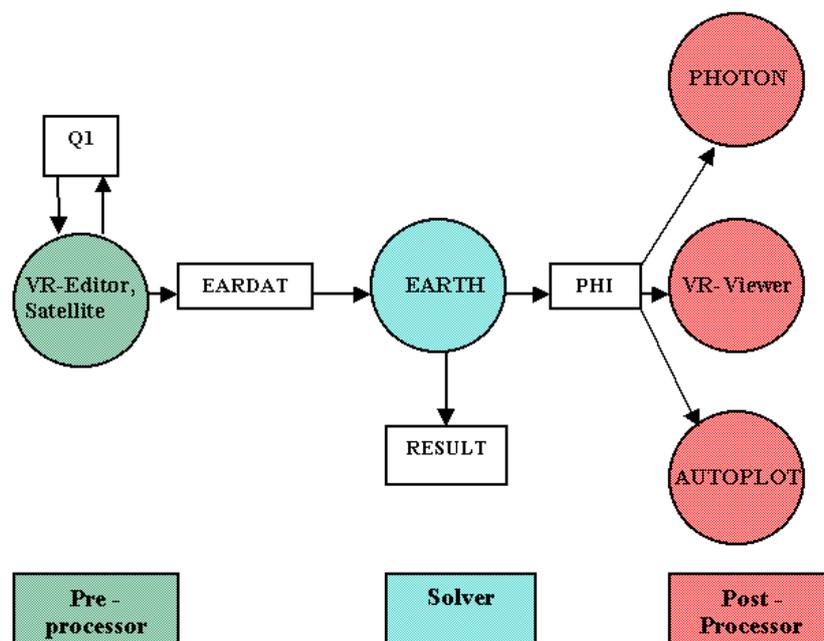
- how **fluids** (air, water, steam, oil, blood, etc) **flow** in and around:
  - engines,
  - process equipment,
  - buildings,
  - human beings,
  - lakes, river and oceans,
  - and so on;
- what are the associated changes of **temperature** and of **chemical and physical composition**;
- what are the associated **stresses** in the immersed or surrounding **solids**.

Its name is an acronym for *Parabolic Hyperbolic Or Elliptic Numerical Integration Code Series*, wherein "parabolic", "hyperbolic" and "elliptic" are the words which mathematicians use to distinguish the underlying equations. However, the mention of equations does not imply that PHOENICS is intended for mathematicians.

PHOENICS performs three main functions:

1. **problem definition** (*i.e.* pre-processing), in which the user prescribes the situation to be simulated and the questions which are to be answered;
2. **simulation** (*i.e.* data-processing), by means of computation, of what the laws of science imply in the prescribed circumstances;
3. **presentation** (*i.e.* post-processing) of the results of the computation, by way of graphical displays, tables of numbers, and other means.

PHOENICS therefore, like many but not all CFD codes, has a distinct software module, or set of modules, for each of the above three functions. Their interrelationships are shown below.



The four names in white rectangular boxes in the above diagram refer to files which are used for communication between modules, as follows:

- **Q1**, the user-readable input-data file, which is written in PIL, the PHOENICS Input Language, and is the main expression of what the user wishes to achieve.
- **EARDAT**, an ASCII file which expresses in EARTH-understandable form what the user has prescribed by way of Q1.
- **PHI(DA)**, which is written by EARTH in accordance with a format which enables PHOTON, AUTOPLOT and the Viewer to display the results of the computation graphically.
- **RESULT**, which is an ASCII file expressing the results in tabular and line-printer-plot form.

## 5.1 Pre-processing modules

The principal input file used by the PHOENICS pre-processor is the [Q1 file](#). This is an ASCII text file that contains a description of the scenario that is to be simulated and is written in the PHOENICS Input Language. This Q1 is read and processed by the pre-processor module Satellite into a form that is ready for the solver module Earth.

There are a number of ways in which the user can write a Q1, these include

- Using the Satellite GUI, the [VR Editor](#), build a representation of the computational domain
- Write the Q1 directly in a text editor. The recommended editor is [pQ1ed](#) which is supplied with PHOENICS, alternatively one can use any convenient editor (for example Notepad).
- Write the Q1 within the Command mode of [Satellite](#).
- With the aid of a [PHOENICS Direct SimScene](#)

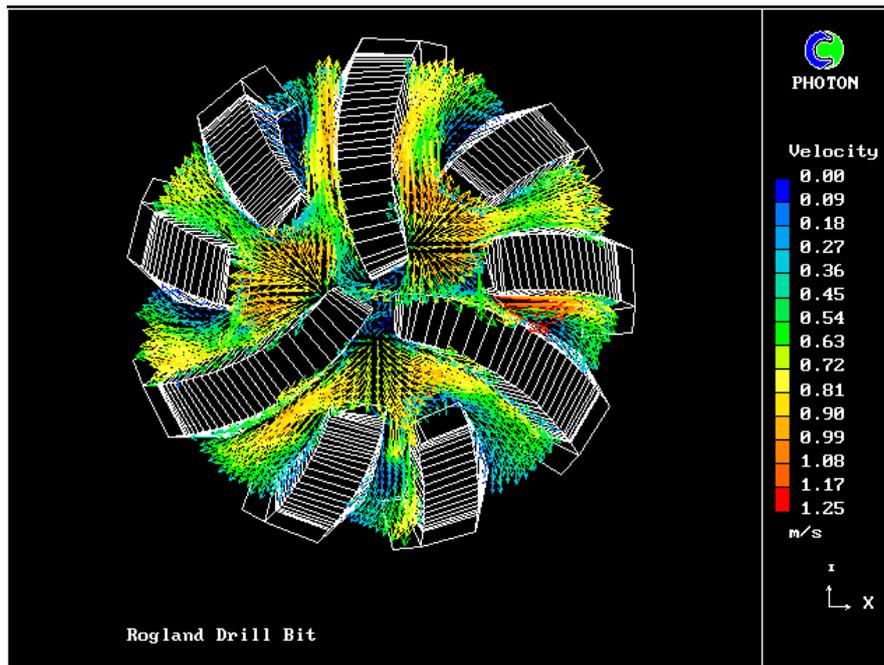
## 5.2 Post-processing modules

In addition to the VR-Viewer, PHOENICS has further modules for the graphical display of flow fields. Two of which are:

- PHOTON, and
- WinPHOTON

Both programs can be launched from the 'Run' then 'Post processor' menu item in the top menu of the VR Editor.

PHOTON(PHOENICS OuTput optiON) dates from the early years of PHOENICS; it is still the module which some users prefer to use.



WinPHOTON came into existence more recently. As its name suggests, its main role is to enable users to do by way of Windows-style mouse-clicks and dialog boxes what most users of PHOTON do by entering typed commands. WinPHOTON can also accept typed commands; but, as well as having a more-modern-looking menu system, it also has several functions which PHOTON, and indeed even the VR-Viewer, does not possess. Among these are:

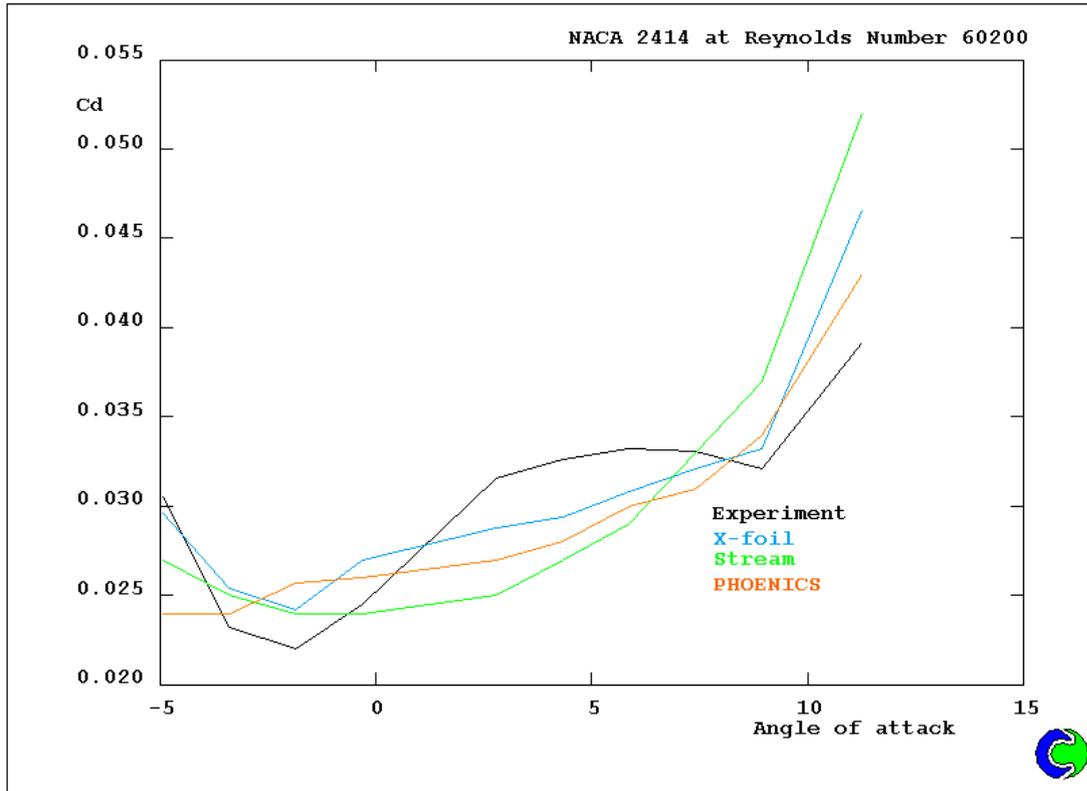
- enabling users to display new variables, derived from the usual ones by way of interactively supplied formulae;
- tabulating numerical values of user-selected variables at user-selected locations;
- permitting users to declare and use integer, real or character variables for use in macros, i.e. the so-called 'use' files which contain a succession of PHOTON commands.

The PHOTON/WinPHOTON programs also contain an additional line plotting module AUTO PLOT. AUTO PLOT provides X-Y graphs, made up of straight line segments joining the data points.

The data can be manipulated in a number of ways during plotting, specifically by:

- adding or subtracting a constant
- multiplying or dividing by a constant
- raising to a power
- taking base 10 or natural logarithms
- constructing new data elements can be constructed by operating on existing elements.

AUTO PLOT can access data from PHOENICS PHIDA and XYZDA files, and also from user-created files. It can plot data from many files simultaneously, allowing easy comparison of PHOENICS results with experimental or analytical results.



### 5.3 Additional post processing options

As well as the post-processing modules which are available within PHOENICS, the user can select additional output which will enable users to plot their results using third party graphics programs. There are output options available for Tecplot, FieldView and VTK formats and can be activated either through the Additional Interfaces option in the VR Editor or by adding the PIL lines to the Q1 before running the solver.

## 6 Parallel PHOENICS

### 6.1 Introduction

This chapter describes the installation of MPI for the user who purchased a licence for running Parallel PHOENICS on machines that are running Microsoft Windows or Microsoft Windows Server. Typically users switch to using the parallel PHOENICS solver for their larger cases in order to get to a converged solution quicker.

All new computers now come with multiple core processors, some laptops may only have two cores, but most desktops computers will now have four or more cores. This enables users to often run parallel PHOENICS entirely on their own desktop thus eliminating the complications of setting up a computing cluster.

### 6.2 Preliminary Considerations

PHOENICS 2025 uses Microsoft MPI (MSMPI) as its message passing interface for parallel computations, in place of MPICH2 which was used with PHOENICS 2018 and earlier. Microsoft MPI is now installed as a pre-requisite for all users of PHOENICS whether they are licensed to run the solver in parallel or not. Failure to install MSMPI will result an errors regarding missing DLL msmapi.dll when the solver is run.

When executing a parallel job entirely on a local machine then with Microsoft MPI it is not necessary for SMPD to be running prior to starting a job. When the parallel job is launched with MPIEXEC it will start the SMPD process at the beginning of the run and terminate it at the end.

#### 6.2.1 Switch from MPICH2 to MSMPI

The change from MPICH2 was necessitated as it was no longer possible to install MPICH2 on new machines. CHAM switched to MSMPI as it is the official successor of MPICH2 on Windows systems.

There is a setting for MPI included in the CHAM.INI file, this informs PHOENICS VR which version of MPI to set the user path for, the default setting is MSMPI. The correct settings in CHAM.INI should be

```
[Earth]
MAXFCT = 10000
MPI     = msmapi
NPROCS = 4
```

If you already have MPICH2 installed on your machine it is possible to revert to MPICH2 by setting

```
MPI = MPICH
```

in the CHAM.INI file or if you prefer to use the Intel version of MPI you can set

```
MPI = Intel
```

However, before doing so it will be necessary to ensure that you have a copy of the solver that has been built with the appropriate libraries.

#### 6.2.2 Computers with multi-core processors

As the installation process for PHOENICS now includes the installation Microsoft MPI as a pre-requisite, running the PHOENICS solver in parallel should work 'out of the box' as one does not need to be concerned with firewalls nor with any network connectivity issues.

### 6.2.3 Computers on a Cluster

While it is still possible to set up a group of computers to perform as a temporary cluster with Microsoft MPI it is not generally recommended. The preferred method is to set up an HPC cluster with Microsoft HPC Pack. For an overview of setting up a cluster see [Microsoft HPC Pack 2019 | Microsoft Learn](#)

## 6.3 Installation of Microsoft MPI

Microsoft MPI should be installed as one of the pre-requisites prior to installing PHOENICS 2025, but should you need to install a copy onto a compute node one may download it from [Download Microsoft MPI v10.1.3 from Official Microsoft Download Center](#). To install, copy the installer msmtpsetup.exe to a folder on the compute node and run the installer. In most cases it will suffice to give the default answer on all the installer dialog questions.

A full PHOENICS installation need only be made on one machine in a parallel cluster (the head node from which jobs will be run); however it is recommended that an installation is made on each computer. If PHOENICS is only installed on the head node then it will be necessary to share the `\phoenics` directory so that all computers may see it. Each machine in the cluster will also be required to have a valid local licence file 'phoenics.lic' accessible.

## 6.4 Windows Firewall settings

As the PHOENICS solver (earexe.exe) is compiled with MSMPI libraries a Windows Firewall Security Alert will be issued when it is first run. While it should only become necessary to allow earexe.exe through the Firewall if running across a cluster, it may be more convenient to do so if one intends to run the parallel solver.

When running in parallel mode across a cluster the Firewall must also allow communication with the Process Manager (smpd.exe) and the Process launcher (mpiexec.exe). The Firewall settings for these two processes should have been enabled during the installation of Microsoft MPI. If you intend to run the parallel solver over a cluster it is essential that all three programs (earexe.exe, smpd.exe and mpiexec.exe) are unblocked/allowed access on all the machines in the cluster.

On Windows, type Control Panel in the search box on the taskbar to open the app and then click on 'System and Security'. Under the section 'Windows Defender Firewall' there should be an item 'Allow an app through Windows Firewall'. This will open a dialog from which you can check the permitted programs and allow you to add the additional programs. First click on 'Change settings' to enable changes, then click on the 'Allow another program...' button and then use 'Browse...' for the each following three programs in turn.

`C:\Phoenics\d_earth\d_win64\earexe.exe`

`C:\Program Files\Microsoft MPI\bin\smpd.exe`

`C:\Program Files\Microsoft MPI\bin\mpiexec.exe`

When adding the programs you can use the 'Network location types...' button to restrict network locations to 'Domain' and 'Home/Work'. The 'Public' network option should remain unticked.

On each of the compute nodes you will need to add the programs

`C:\Phoenics\d_earth\d_win64\earexe.exe`

`C:\Program Files\Microsoft MPI\bin\smpd.exe`

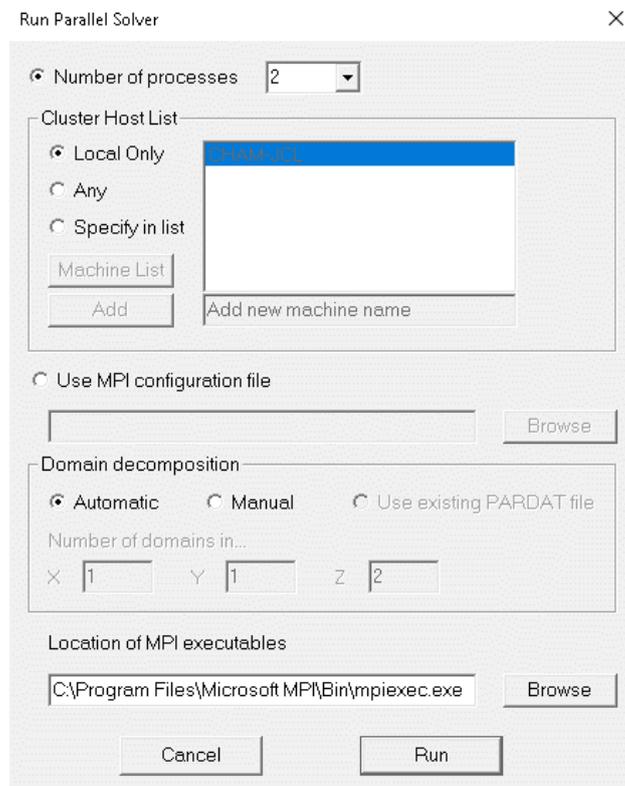
Users of other personal firewalls will need to unblock the above programs in a manner suitable for their firewall software.

## 6.5 Running Parallel PHOENICS

### 6.5.1 Running the standard parallel Earth

The simplest way to launch parallel EARTH is from the VR-Editor, although it can be run from a Command Prompt window.

If a parallel PHOENICS licence has been purchased, an additional sub-menu, 'Parallel Solver', will appear under the 'Run' menu option in the VR-Editor. Once the parallel solver is chosen, a dialog box will appear on the screen where the user can either specify the number of processes to use or to specify a MPI configuration file.



The pulldown combo box provides the user with an option to select up to 64 processes in steps of 2. Those users who have more than 64 processors on their PC cluster may type the appropriate number into the box.

The **Cluster Host List** portion of the dialog enables the user to select which hosts in the cluster are used for computation. Here there are three options,

- a. **Local Only:** the default, will just use cores on the local machine (i.e. that on which the instance of VR-Editor is running).
- b. **Any:** will use a computer assigned distribution of processes on the nodes in the cluster. These must have been previously identified in the cluster.

- c. **Specify in list:** users may select hosts from the scroll list. By default this list should contain those hosts previously identified in the cluster, but one can also add to the list by using the **Add** button. Alternatively, one can supply a 'Machine List' file which contains a list of those workstations from which to select. This file is simply a text file with name of the workstations each on a separate line.

This mode of running the parallel solver will always launch the root process on the local machine and a convergence monitoring window will appear on screen (as per the sequential solver). If running across a cluster, then the run will attempt to launch an instance of the solver from the same location on each of the compute nodes. If the default locations are used, this will be `C:\phoenics\d_earth\d_win64\ear.exe` for the 64-bit solver. If a Private Earth is to be used, then this also should be copied to the equivalent directory for each of the compute nodes.

When running across a cluster, it is important to consider the working directory on the compute nodes. This is because, by default, **mpiexec** will attempt to launch the process in the equivalent directory on all the workstations. So, if on the head node you are working in `c:\phoenics\myprojects\projectbeta` then this directory should also appear on all the workstations in the cluster. The run will fail if this directory does not exist on all the workstations, unless the environment variable `PHOE_WORK_DIR` (see below) is used.

As it can difficult to always remember to create the working directory on all the cluster workstations there is an alternative. One can set up an environment variable `PHOE_WORK_DIR` on each PC in the cluster to point to an existing fixed directory

e.g. `PHOE_WORK_DIR=C:\phoenics\mypar_runs`

Then all processes (aside from the launching process) will write their output to this location.

**PLEASE NOTE:** The use of `PHOE_WORK_DIR` is not recommended if you are likely to make multiple parallel runs simultaneously. This is because the second run (and subsequent runs) will overwrite the working files of the first.

The above methods of launching the parallel solver do not allow the user to fix the number of solver instances on each workstation. If you want that level of control, then the user will need to use the MPI Configuration file (see section 6.5.2 below).

## 6.5.2 Running parallel solver through HPC Cluster Manager

To run the parallel solver across the HPC cluster it is best to submit the job via the Cluster Manager. In the following scenario it will be assumed that the head node computer is called **PHOE-HEAD1**. It will be further assumed that PHOENICS has been installed in `C:\phoenics` (shared as `\phoenics`) and that the user case files will be in the directory `C:\phoenicsData\myCase1` (where `c:\phoenicsData` is shared as `\phoenicsData`).

1. Set up the case using the VR Editor on the head node, Save Working files and/or Exit making sure to 'Save changes to EARDAT file for Solver'.
2. In HPC /cluster Manager, in the Actions pane, click New Job.
3. In the left pane of the New Job dialog box, click Edit Tasks.
4. Point to the Add button, click the down arrow, then click Basic Task.
5. In the task dialog box, type a name for your task.

6. Type the task command in the Command line entry box.  
*mpiexec //phoe-head1/phoenics/d\_earth/d\_win64/earexe.exe*
7. Specify the Working directory for your task. In general, a working directory should be indicated with a Universal Naming Convention (UNC) path, not a relative or a local path. In our example it will be  
*//phoe-head1/phoenicsData/myCase1*
8. Specify the Standard input, Standard output, and Standard error file names relative to the working directory.
9. Set the minimum and maximum number of cores necessary for your job.
10. Click OK to add the task to your job. The new task now appears in the list of tasks for your job.

### 6.5.3 Monitoring the solution of jobs running on the cluster

Parallel runs submitted onto the cluster run in batch mode, and this mode does not permit the interactive viewing of the solver GUI. However, it is still possible to view the progress of the solution through the use of the file snapshot, best used in combination with the file monicurr. The file monicurr is an optional file written by the solver to provide the current monitoring settings. It is turned on by the following setting in the file cham.ini

```
[Earth]
```

```
Monicurr = on
```

This file contains the current monitoring cell and relaxation parameters for the solved variables and number of sweeps. To obtain a snapshot of the current state of the solution one need just copy (or rename) the file monicurr to a file called snapshot, the solver will then read the snapshot file and generate a GXMONI monitor plot. The file snapshot will then be deleted and a new monicurr file generated. Here is an example of the contents of a monicurr file:

```

Start of monitor location
IX = 112
IY = 67
IZ = 5
NX = 200
NY = 200
NZ = 47
End of monitor location
LSTEP = 1
LSWEEP = 3000
Start of relaxations
SARAH = 0.000
P1 = -1.000
U1 = 0.1000
V1 = 0.1000
W1 = 0.1000
KE = -0.3000
EP = -0.3000
PRPS = -1.000
EPKE = -1.000
DEN1 = -1.000
EL1 = -0.2500

```

```
ENUT = -0.2500
```

```
End of relaxations
```

If changes are made to the contents of monicurr (e.g. a change in monitor location or number of sweeps) before being copied to snapshot then these values will be updated in the solver and used for subsequent computations.

It is also possible to cause the current solution to terminate early by creating a file called stopjob. This will signal the solver to stop after the current sweep, write the results to file and terminate cleanly.

#### 6.5.4 Automatic domain decomposition

When using the default automatic domain decomposition, parallel PHOENICS only differs from sequential when Earth is run: problem set-up and post-processing of results can be done in exactly the same way as for the sequential version. A case that has been run in sequential mode can normally be run in parallel without any changes being made. The output from a parallel PHOENICS simulation will be **result** and **phi** files, having the same format as for sequential simulations.

#### 6.5.5 User-specified sub-domains

It is also possible to by-pass the automatic domain decomposition algorithm, and to specify how you want to decompose the calculation domain into sub-domains. This can be done by selecting 'Manual' in the Domain decomposition group box on the Run Parallel solver dialog (see section 6.5.1 above). When you first switch to manual decomposition the arrangement will match the automatic decomposition that would otherwise be used. Normally automatic decomposition will suffice, but there may be occasions where a different decomposition is preferable to avoid a split at a critical location.

#### 6.5.6 Command mode operation

In a Command Prompt window, if the EARTH executable is launched directly, then the sequential solver will be used; to run the parallel solver, the program name 'earexe' is used as an argument to mpiexec.

A script RUNPAR.BAT [nnodes] is provided. The optional argument [nnodes] indicates the number of processes to be launched on the current PC. The default is to launch two processes.

For example, RUNPAR 2 will execute the MPI command:

```
mpiexec -np 2 \phoenics\d_earth\d_win64\earexe
```

If a cluster has been defined by **smpd**, then the command will execute on two processors in the cluster, otherwise it will launch multiple processes on the local machine.

There are also 'run' commands which can be used in conjunction with configuration files, for example 'runcl4' uses the configuration file '**config4**'. **Config4** lists the PCs and processors to be used (see above Configuration file section above). The script runcl4 will execute the following command:

```
mpiexec -configfile \phoenics\d_utils\d_win64\config4
```

#### 6.5.7 Testing Parallel PHOENICS

The parallel installation should be tested by loading a library case.

The different solver used for parallel operation requires a slight modification to the numerical controls. For example, the user may use main 'Menu' in the VR-Editor, and select 'Numerics' and

then 'Iteration control': change the number of iterations for TEM1 (temperature) from 20 to 300. (Increasing the relaxation for the velocity components, U1 and W1, from 1.0 to 10.0 will also improve performance.)

For parallel operation it is recommended that velocities should be solved whole-field (rather than slab-by-slab); this can be achieved from the VR Editor (under 'Models', 'Solution control/extra variables') or by direct editing of the q1 file (by setting 'Y' as the third logical in a SOLUTN command).

## 6.6 Further Information

For further information on Microsoft MPI see their web page, [Microsoft MPI - Message Passing Interface | Microsoft Learn](#).

## 6.7 Parallel Installation Troubleshooting

### 6.7.1 Incorrect MPI setting in CHAM.INI

If the parallel solver fails on start up from PHOENICS VR it may be that there is the wrong MPI setting in the CHAM.INI file. The error message may be similar to..

```
C:\phoenics\d_priv1>call mpiexec -localonly -np 2 "C:\phoenics\d_earth\d_win64\
arexe.exe"
Unable to open the HKEY_LOCAL_MACHINE\SOFTWARE\MPICH\SMPD\process\5000 registry
key, error 5, Access is denied.

Unable to open the HKEY_LOCAL_MACHINE\SOFTWARE\MPICH\SMPD\process\3824 registry
key, error 5, Access is denied.

Aborting: mpi application on CHAM-LAP11 is unable to connect to the smpd manage
r on <null>:51635 error 1722

Aborting: mpi application on CHAM-LAP11 is unable to connect to the smpd manage
r on <null>:51642 error 1722

job aborted:
[ranks] message

[1] fatal error
Fatal error in MPI_Init: Other MPI error, error stack:
MPI_Init(argc_p=0x0000000000000000, argv_p=0x0000000000000000) failed
The RPC server is unavailable. (errno 1722)

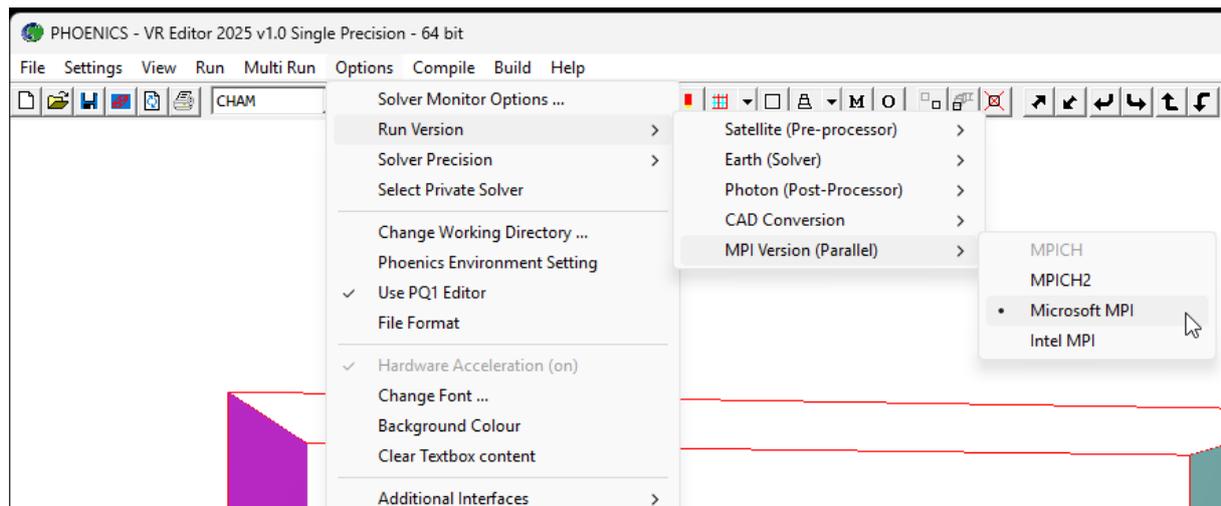
job aborted:
[ranks] message

[0] fatal error
Fatal error in MPI_Init: Other MPI error, error stack:
MPI_Init(argc_p=0x0000000000000000, argv_p=0x0000000000000000) failed
The RPC server is unavailable. (errno 1722)

C:\phoenics\d_priv1>pause
Press any key to continue . . .
```

There are several markers here that indicate that it is trying to launch the parallel solver using the MPICH2 method, the first is the *-LocalOnly* flag in the command line. This is only available in MPICH2, the second is the *registry key* errors, these again will only be seen with MPICH2.

The MPI setting may be checked or reset via the Options menu in PHOENICS VR; for PHOENICS 2025 it should be set to Microsoft MPI.



The correct settings in CHAM.INI should be

```
[Earth]
MAXFCT = 10000
MPI     = msmapi
NPROCS = 4
```

It may be necessary to update this setting in local cham.ini files for cases brought forward from earlier versions of PHOENICS.

### 6.7.2 Difficulty in locating hosts

If the head node has difficulty seeing one or more of the compute nodes and you are using static IP addresses in your cluster then you could consider defining the IP addresses in the host file on each of the PCs. The host file is normally located as

`C:\Windows\system32\drivers\etc\hosts`

An example 'hosts' file is:

```
# Copyright (c) 1993-2009 Microsoft Corp.
#
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
#
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name.
# The IP address and the host name should be separated by at least one
# space.
#
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
#
# For example:
#
#       102.54.94.97       rhino.acme.com          # source server
#       38.25.63.10      x.acme.com             # x client host

127.0.0.1       localhost
192.168.11.1    cham-cfd1
192.168.11.2    cham-cfd2
192.168.11.3    cham-cfd3
192.168.11.4    cham-cfd4
```

To determine the IP addresses, on each of the workstations in the cluster open a Command Prompt window and type the command *ipconfig*. Use the IPv4 Address located in the section *Ethernet adapter Local Area Connection* therein to define the IP address for the workstation in the hosts file.

### 6.7.3 Incorrect unlocking on one of the compute nodes

If, when starting the parallel solver you find that it has stalled during the start-up process, that is, if there are **earexe.exe** processes visible on all the compute nodes but consuming no CPU, then it may be a case of one of the compute nodes not being correctly unlocked. If this happens you will need to check the installations on each of the nodes separately to determine which has not been unlocked correctly.

### 6.7.4 Firewall blocking on one of the compute nodes

If one of the compute nodes has not had the Firewall setting made correctly then the program **mpiexec.exe** should appear in the task manager of the head node, but **earexe.exe** will not appear in the list of processes on the compute node. It will appear to stall but will eventually time out with a message:

```
Error while connecting to host, a connection attempt failed because the
connected party did not properly respond after a period of time, or
established connection failed because connected host has failed to respond.
(10060)
```

```
Connect on sock (host=cham-cfd2, port: 8676) failed, exhausted all end
points unable to post a connect to start the connect command
```

```
Sock error: Error=-1
```

```
Abort: Unable to connect to 'cham-cfd2:8676'
```

```
Sock error: Error=-1
```

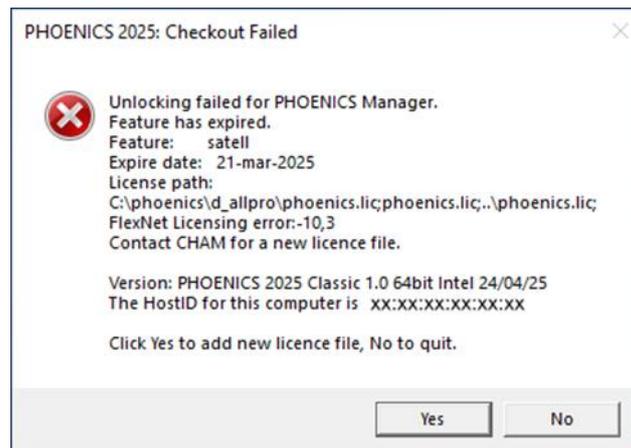
If this message occurs then check the firewall settings on host cham-cfd2 and ensure that the programs **smpd.exe** and **earexe.exe** have been allowed access (see 6.4 for detail).

## Appendix A. Unlocking PHOENICS

### FLEXIm

PHOENICS is normally unlocked using the FLEXIm system, and the delivery DVD contains a FLEXIm licence file which allows use of PHOENICS for an initial period of one or two months.

If you receive a dialog message that the code has expired.



The HostID required by CHAM for unlocking should match that displayed in your expired dialog message. Alternatively when run, the batch file `/phoenics/d_allpro/get_hostid.bat` will create a text file `Imhostid.txt`, which contains the FLEXIm HostID of that computer. This HostID should be sent to CHAM's Installation Section (see Contacting CHAM details below) in order to obtain a long term licence file. The FLEXIm licence file '`phoenics.lic`' supplied by CHAM in response to such a request should be placed in `/phoenics/d_allpro`, and the existing `phoenics.lic` file deleted.

### USB dongle

A USB dongle may be supplied with the delivery, and the unique USB FLEXID will normally be known by CHAM. This FLEXID is printed on the USB dongle itself, and is of the form 9-abcd1234. When requesting a FLEXIm licence file the FLEXID value should be sent to CHAM's Installation Section (see Contacting CHAM details below).

### Parallel

PHOENICS is unlocked using the FLEXIm system, and the delivery DVD contains a FLEXIm licence file which allows use of Parallel PHOENICS for an initial period of two months.

The FLEXIm HOSTID can be obtained as detailed under the paragraph 'FLEXIm' above.

Unlocking for a multi-processor machine is exactly the same whether parallel or sequential PHOENICS is being used on that PC.

For a Parallel cluster installation the HOSTID of all the machines in the cluster is required (because, although PHOENICS need only be installed on one machine, parallel Earth will run on each machine). This is the case for multi-processor installations and clusters of fewer than 16 nodes - alternative unlocking will be arranged for larger clusters.

### **SimLab**

SimLab is an optional third party add-on which may be used to convert a variety of CAD formats into ones usable by PHOENICS. See the chapter [Importing CAD Data](#) in the VR user guide for more details. SimLab can be obtained directly from CHAM

### **Contacting CHAM**

The FLEXIm HOSTID or USB FLEXID should be recorded on the unlocking request form provided and returned to:

Installation Section  
CHAM,  
Bakery House  
40 High Street,  
Wimbledon  
London SW19 5AU

Tel: 020 8947 7651,  
e-mail: [installations@cham.co.uk](mailto:installations@cham.co.uk)

## Appendix B. Frequently Asked Questions and Troubleshooting

### B.1 FAQ

#### 1. What is the PHOENICS directory structure?

A brief description of the first level subdirectories under `\phoenics` is given below.

**d\_allpro** contains the binary code for the PHOENICS service routines shared by SATELLITE and EARTH, the program libraries for all modules and the graphics drivers used by SATELLITE, EARTH and PHOTON;

**d\_chmkin** containing files for the CHEMKIN interface.

**d\_earth** contains the binary code and some source files of the PHOENICS main solver program EARTH, together with the PHOENICS case libraries;

**d\_includ** contains the Fortran common blocks required for recompilation;

**d\_intfacs** contains the interfaces between PHOENICS and other codes;

**d\_photon** contains the binary code of the PHOENICS post-processor program PHOTON, which now incorporates AUTOPLOT;

**d\_polis** contains all files for the PHOENICS On-Line Information System;

**d\_priv1** is referred to as a "private" working directory from which the user may run all the PHOENICS programs, or use the PHOENICS-VR Environment;

**d\_satell** contains the binary code of the PHOENICS pre-processor program SATELLITE, and the menu libraries;

**d\_shapem** contains the executable of Shapemaker, a geometry generator;

**d\_utils** contains utility batch files, such as run scripts, link scripts, and compiler option scripts.

In addition there are subfolders **d\_win64** and **d\_windble** which contain the executable files (64bit single or double precision) which correspond to the subfolder name. The PHOENICS 2025 delivery contains all the files necessary for running 64bit executables and double precision 64bit solver.

#### 2. How do I create a working directory?

A working directory, `\phoenics\d_priv1`, is provided with the installation. New working directories may also be created anywhere on the system. The following steps should be performed in order to create a working directory, such as **d\_work**.

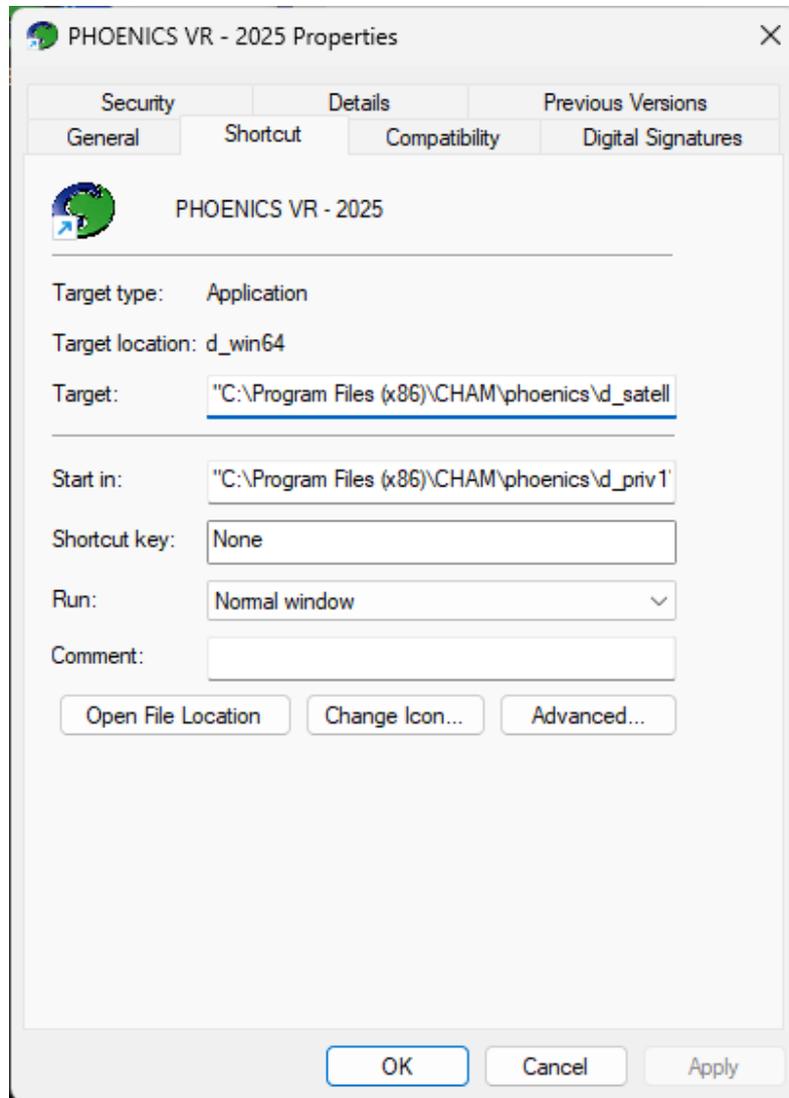
To create the new folder, click the right mouse button on an empty part of the Windows desktop then select New, and Folder. Type in a name for the new folder, e.g. **d\_work**, then press <return>. Drag this **d\_work** folder to any convenient location.

Start the PHOENICS-VR Environment and click on Options, Change working directory. Use the browser to locate the new folder.

Note that the desktop icon created by the installation process is set to start PHOENICS with `\phoenics\d_priv1` as the working directory. This can be changed by bringing up the properties dialog box for the PHOENICS icon, and changing the 'Working' directory on the program tab. Many copies of the icon can be made, each with a different 'Working' folder.

### 3. What to do if the PHOENICS folder is Read-Only?

If PHOENICS has been installed by another user, or if it is located within **C:\Program Files** then the user may only have Read-Only access phoenics folder. This will make the default **PHOENICS VR** and **PHOENICS Command Prompt** icons unworkable as they will attempt to open the program within **phoenics\d\_priv1**. They will fail because it will be unable to write to that directory.



If this happens then the (Computer) Administrator will need to modify the properties of the PHOENICS-VR icon (right-click on the icon and select Properties) so that the folder pointed to for 'Start In:' is in a location to which users will have write access.

### 4. How do I set or reset my PHOENICS Environment variable?

Click on the Start menu icon, then in the 'Search' edit box start typing *environment* the computer should respond by offering a number of possible options one of which should be 'Edit environment variables for your account', choose this one. To create a new User variable click on 'New...' and enter *PHOENICS* as the variable name and *C:\phoenics* as the Variable value (if your installation is not located at C:\phoenics then enter the location of your installation). Then click 'OK' to close each of the dialogs in turn.

### **5. Why did the PHOENICS On-line Information System (POLIS) not run correctly?**

POLIS can be run from the PHOENICS-VR Editor or PHOENICS Commander by clicking on the appropriate button under HELP in the top tool bar. It can also be started on Windows systems from the CHAM-logo icon labelled 'POLIS' on the Desktop.

All the POLIS documents are in HTML format, and can be accessed directly through the Microsoft Internet Explorer. The address of the POLIS home page is usually `\phoenics\d_polis\polis.htm`.

If PHOENICS is not installed at the root level (for example, if it is installed within C:\Program Files) then although the icon will link to the opening page, the links within the document will fail. Historically, the links in POLIS have been made with absolute paths and so POLIS must be located at a root level for the links to work. The answer is to make use of the subst command to map the location of the installation to the root level of a virtual drive (see section 3.2).

### **6. How to configure PHOENICS to enable POLIS to run on a separate drive**

Normally, the POLIS files will be copied to the drive on which PHOENICS has been installed. The Desktop icon and Start-menu item will be set to this drive automatically by the installation program.

The drive letter used by the HELP button is stored in the file `\phoenics\d_allpro\cham.ini`. At installation time, it is set to C. If PHOENICS is installed on another drive, say D, the `cham.ini` file must be edited (with Notepad or any other file editor) and the entry 'drive = ' in the [POLIS] section must be set to the correct drive letter.

### **7. Why don't the POLIS links work in Firefox?**

POLIS uses absolute pathnames in its HTML links; unfortunately Firefox is unable to translate these links correctly from the file system.

The POLIS links will work correctly in Microsoft Edge, Internet Explorer and Google Chrome.

### **8. Can I open a new Command Prompt window to run PHOENICS?**

PHOENICS can be run from a Command Prompt window opened by users, using individual commands such as:

```
sat (to run SATELLITE)
vre (to run the PHOENICS-VR Environment)
ear (to run EARTH)
pho (to run PHOTON)
```

providing that the PATH for that window has been suitably modified. The batch file `\phoenics\d_utils\phoepath.bat` will modify the PATH correctly.

Users should check this file to ensure that the drive letters and paths for PHOENICS and the INTEL Visual Fortran Compiler are both correct.

### 9. What compiler options should I use?

For the 64bit Intel Visual Fortran version, the PHOENICS code has been compiled using the compiler options (using Intel OneAPI HPC Toolkit 2023)

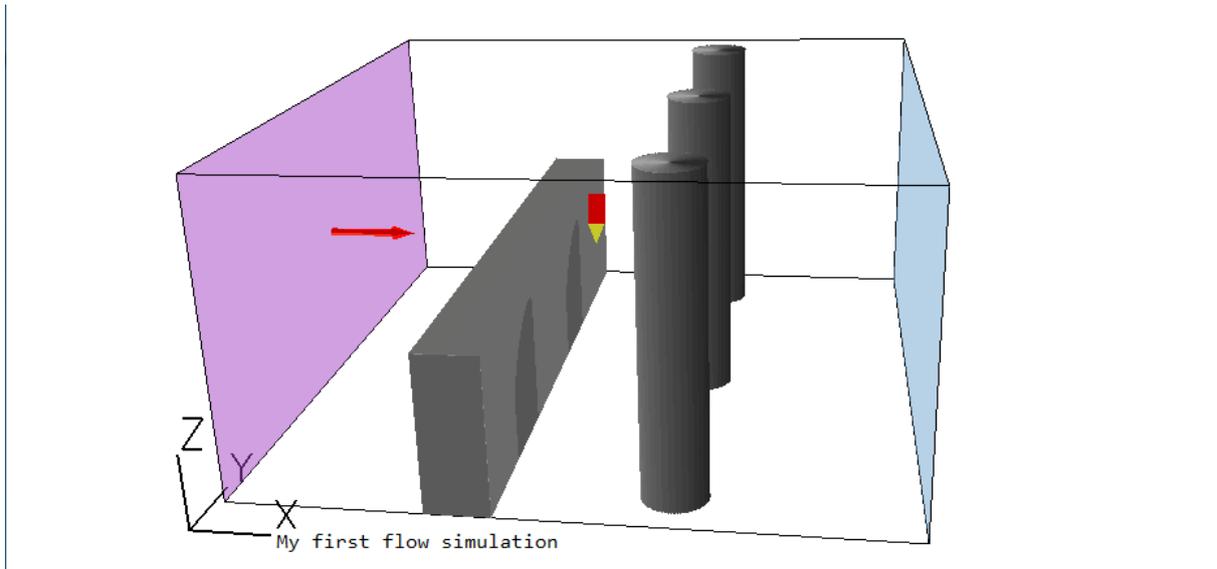
```
ifort /D_X64_ /D_WDIR_ /integer-size:64 /threads /libs:static /winapp /compile-only  
/assume:byterecl /debug:none /O3 /include:\phoenics\d_includ  
/include:\phoenics\d_includ\d_win64
```

The current set of compiler options are specified in the batch file COMPILE.BAT, located in the directory **\phoenics\d\_utils\d\_win64**.

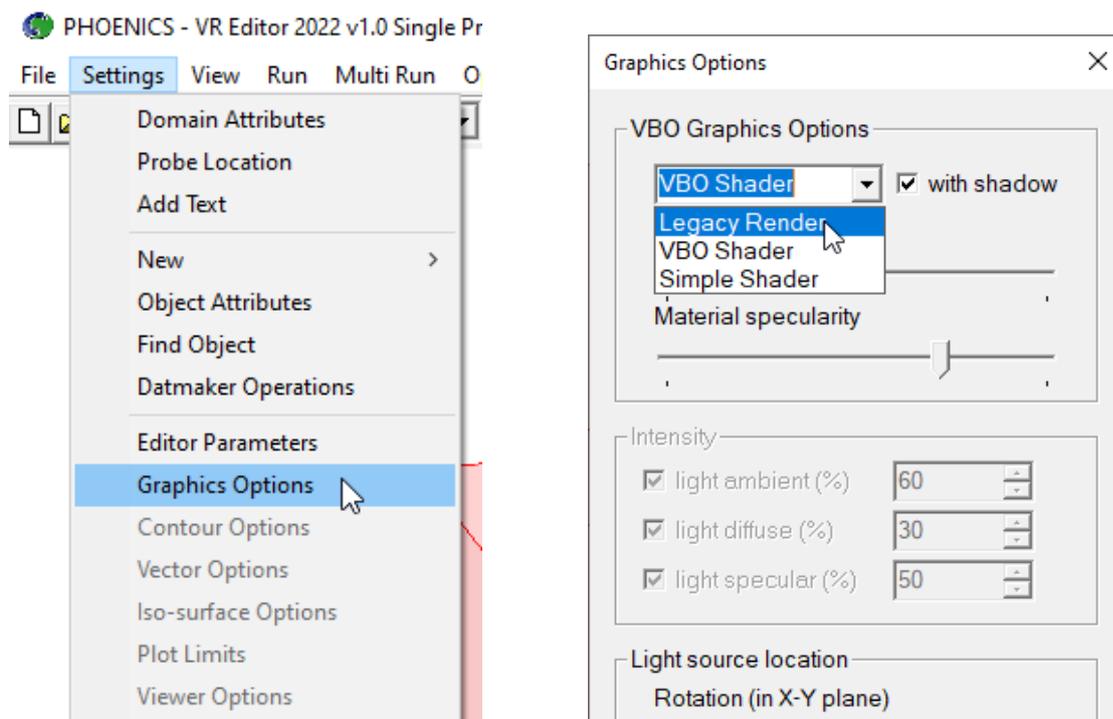
## B.2 Troubleshooting

### The colours in the VR Editor don't appear to be correct

Phoenics 2021 introduced a new way of displaying the graphics in the VR Editor, these VBO graphics ideally require OpenGL 4.6+ libraries to display correctly. Some older graphics cards therefore may not display the image correctly. In the following image the domain outline and axes appear incorrect.



In this case it is possible to revert to the 'legacy' method to restore the image. To do this go to the Settings menu and select 'Graphics options' and then within the VBO Graphics Options section select 'Legacy Render'.



**PHOENICS starts but immediately stops. When I click on the PHOENICS icon, the PHOENICS-VR window appears and disappears almost immediately.**

Check in the working directory for the file **lu6pvr**. If it exists, open it with Notepad or some other file editor. It may contain an error message indicating what the problem may be.

If there are no indications in **lu6pvr**, the next file to check is **satExeShader.log**. This file will contain some start up information including the name of the graphics card and the version of OpenGL available. If the version of OpenGL is less than 4.5 then it might be worth switching off the VBO graphics in the file **cham.ini**. Edit the file **\phoenics\d\_allpro\cham.ini** and replace the line

Shaders = on

by

Shaders = off

Then attempt to run the PHOENICS-VR program once more.

**Somehow the CHAM icon, PHOENICS-VR, disappears from my desktop. How do I recreate this icon.**

Should the PHOENICS-VR desktop Icon be deleted in error it can be recreated thus:

Select the following by clicking, using the left button of the mouse

Start, then point to Programs  
Windows Explorer

Then, in 'All folders', double click on

Phoenics  
d\_satell  
d\_win64

Finally, in the 'contents of d\_win64' box, click right button of the mouse on

satexe.exe

Create Shortcut

A Shortcut to satexe.exe is now created. Drag this Shortcut, using the left mouse button, onto a suitable part of the Windows screen. Rename the icon, using the right button, to 'PHOENICS-VR'. Right-click on the icon and select 'Properties' then add the argument **vre** after **SATEXE.EXE**. Set the 'Start in' folder to a suitable location, e.g. **\phoenics\d\_priv1**.

**When I click on the PHOENICS-VR desktop icon, I get an error message that 'Windows cannot find C:\phoenics\d\_satell\d\_win64\satexe.exe'.**

The desktop shortcut created by Install assumes that PHOENICS has been copied to drive C:. If you have copied it to another drive, you will have to modify the 'Cmd line' and 'Working' entries on the Program tab of Properties to reflect the correct drive letter. Click on the PHOENICS-VR icon with the right mouse button to bring up the Properties dialog box.

**I can't run any PHOENICS modules from a Command Prompt window with the 'runsat', 'runear' commands - I get 'bad command or file name' error messages.**

You should check if the path is correct by typing 'PATH' on the Command Prompt window. The correct path should point to `\phoenics\d_utils\d_win64` and `\phoenics\d_utils`. If it does not, you must run the batch file `<drive>:\phoenics\d_utils\phoepath.bat` in the Command Prompt window before running any PHOENICS modules. Check that this file contains the correct `<drive>` letter for PHOENICS, and the correct path to the INTEL Fortran compiler.

**My Solver windows open and close too quickly for me to be able to see the messages.**

Edit the file `\phoenics\d_allpro\cham.ini` ('Files', 'Open file for editing', 'cham.ini' from environment top menu bar) and replace the line

```
pause = off  
by  
pause = on
```

**My compile window opens and closes too quickly for me to be able to see the error messages.**

Edit file `\phoenics\d_utils\d_win64\compile.bat`, and add `/list` to the argument list as follows:

```
%IFORT% /list %IFACE% %CMP_OPTS% %INT_SIZE% %IDIR% %1
```

You will now generate listing files for each file compiled.

**The INTEL Visual Fortran compiler version does not appear to be accessible when I try to compile a program.**

In order to use the Visual Fortran compiler it must first be visible on the user's path. PHOENICS uses the file `\phoenics\d_utils\phoepath.bat` to set the users path correctly. This script depends on the correct Environment variable being set when the Intel Visual Fortran Compiler was installed. The script should be good for versions of the Intel compiler between 2021 and 2025. The current Fortran compiler is contained within Intel OneAPI HPC Toolkit version 2025.

If, for some reason, you do not have the Environment variable set you can modify the file **phoepath.bat** to explicitly set it. For example, if you have installed Intel OneAPI HPC Toolkit 2025 in its default location, in **phoepath.bat**, after the line

```
if defined phoenics (set pho=%phoenics%) else set pho=\phoenics  
add
```

```
set IFORT_COMPILER25=C:\Program Files (x86)\Intel\oneAPI\compiler\2025.0
```

Check that this is where the compiler is located and adjust the location if necessary.

**When I click on 'compile' from the VR Environment I encounter the error message 'Bad command'. How do I cure the problem?**

This problem is usually because the path name for the script **ifortvars.bat** is incorrect in the file */phoenics/d\_utils/phoepath.bat*. Please refer to the previous FAQ for the correct setting of the compiler path.

If the Compiler path is set correctly then the other possibility is that the path to the PHOENICS script is incorrect. The script PHOENICS uses for compilation is **compile.bat** and is normally located in *\phoenics\d\_utils\d\_win64*. If you have installed PHOENICS somewhere other than the root directory and you do not have the Environment variable PHOENICS set correctly then it will fail to find the script. Refer to the FAQ 7 “*How do I set or reset my PHOENICS Environment variable?*” for instructions on how to do this.

**I have put PHOENICS on to a Windows server, but could not run from another computer on my network.**

You will need to have local copies of some files and directories on each machine. You will also need to modify the **config** and **prefix** files, and to have the option TS\_OK in the licence file **phoenics.lic**. Please contact CHAM to amend the licence file and for more information.

**PHOENICS has been working satisfactorily, but today it fails with a Microsoft error window reporting an error in 'satexe'. I have made no changes since yesterday, and my computer has not been upgraded or modified since PHOENICS last worked.**

If no changes have been made on your computer it is just possible that the length of the FLEXlm licence path list in the Registry has become too long. CHAM can supply instructions on clearing long pathname lists in the Registry, these can be obtained on request from User Support.

**I get a message indicating there is insufficient Virtual Memory when I run a PHOENICS module**

The F-arrays for all the modules are allocated dynamically at run-time, in the file CHAM.INI.

Sometimes, when running large cases, the Earth Solver will display a dialog complaining that there is insufficient virtual memory, and give the size of the F array it is trying to allocate. In many cases changing the CHAM.INI setting to allocate that much memory initially will allow the case to run.

**When I attempt to compile from within VR Editor, an error in the Command Prompt window indicates that the wrong compiler has been accessed**

This can happen if you have more than one Fortran compiler installed. The solution is to set up an Environment Variable PHOENICS\_COMPILER with a value which is the pathname to the correct compiler (ifort.exe). For example if you have Intel OneAPI HPC Toolkit 2025 installed the correct value would be

*C:\Program Files (x86)\Intel\oneAPI\compiler\2025.0\bin*

## Appendix C. Setting up a network licence server

### C.1 Selecting the license server

The first step is to decide which machine that you would like to use as the license server. The license server machine should ideally be one that is 'always on' and is visible to all machines which will be required to use PHOENICS. It is not necessary for the machine to have a Windows Server operating system, any current Microsoft Windows edition should suffice.

Once you have decided on the machine which will act as the license server then CHAM will need to know the host name (or IP address) and the host-id for that machine in order that a suitable license file may be provided. The simplest way to do this is to open a Command Prompt window then enter the command:

```

Command Prompt
Microsoft Windows [Version 10.0.19041.746]
(c) 2020 Microsoft Corporation. All rights reserved.

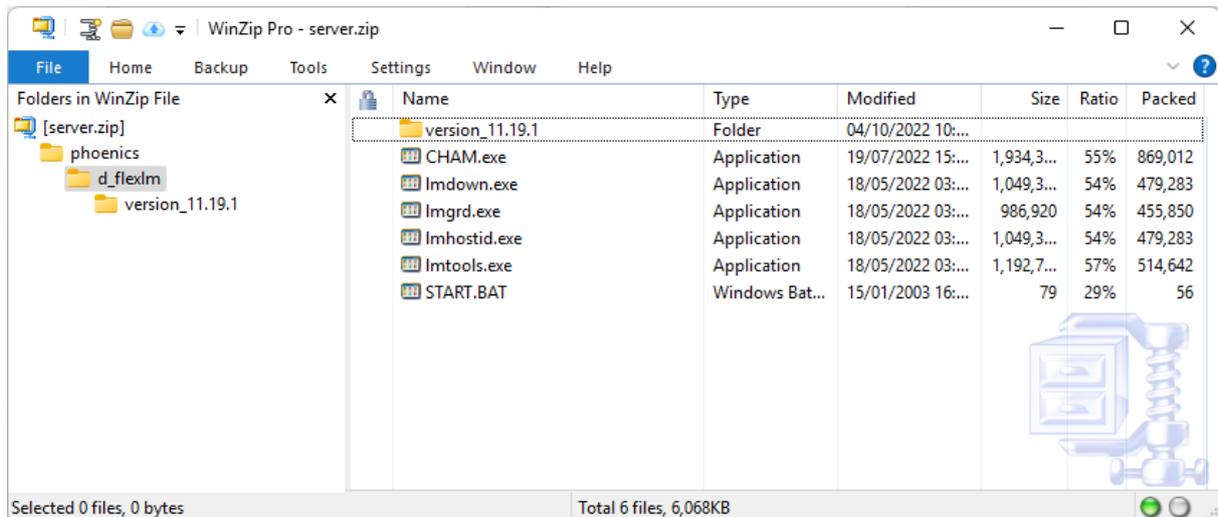
C:\Users\cham1>ipconfig /all > hostinfo.txt

C:\Users\cham1>

```

This will put all the necessary information into the file hostinfo.txt which can then be sent through email to CHAM.

The file server.zip contains the files necessary for running the network license server for PHOENICS. The following image reveals the contents of the file.



For smooth operation of the license server it is strongly recommended that the zip file is extracted in the root directory of the destination machine so that the files reside in C:\phoenics\d\_flexlm. Indeed the script and license file as provided require that the files are located there.

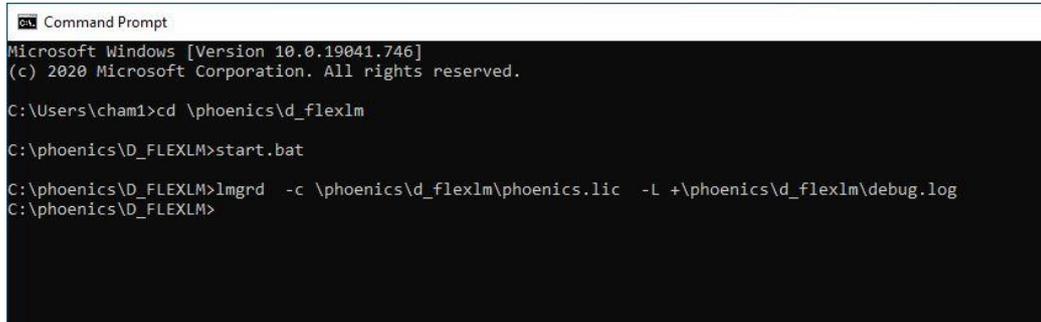
After copying files to the server it is necessary to replace the file C:\phoenics\d\_flexlm\phoenics.lic with the one supplied by CHAM that identifies your server. There are two simple ways in which the license server may be started:

1. The command script START.BAT: You will need to use this method if you do not have access to an Administrator account on your PC.
2. The GUI lmtools.exe: This provides greater flexibility but does require Administrator privileges to start.

## C.2 The Command Script START.BAT

The script START.BAT is written on the assumption that the server files are correctly located in C:\phoenics\d\_flexlm. To start the license server using START.BAT either

- a. open (double click) the script in File Explorer
- or
- b. open a Command Prompt Window, change to the server files directory then start the script by entering start.bat as shown below.



```

Command Prompt
Microsoft Windows [Version 10.0.19041.746]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\cham1>cd \phoenics\d_flexlm

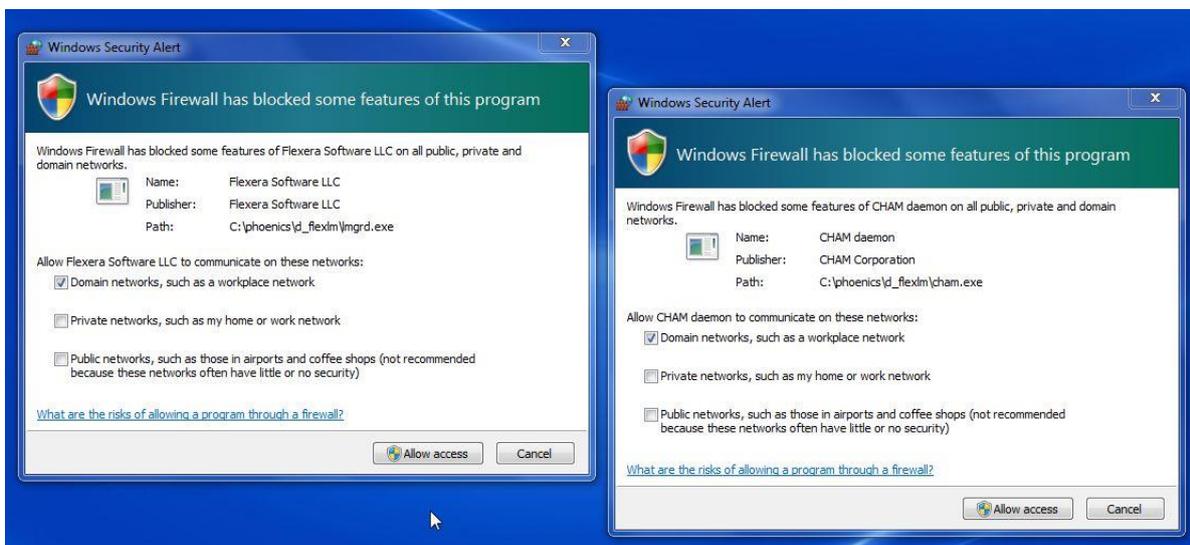
C:\phoenics\D_FLEXLM>start.bat

C:\phoenics\D_FLEXLM>lmgrd -c \phoenics\d_flexlm\phoenics.lic -L +\phoenics\d_flexlm\debug.log
C:\phoenics\D_FLEXLM>

```

Please note that the line beginning lmgrd above is actually the content of the script start.bat being echoed to the screen.

On starting the server for the first time you will get Windows Firewall warnings for lmgrd.exe and CHAM.exe, both these programs must be granted permission to pass through the firewall in order for the license server to function.



The license server will need to remain active in order to allocate licenses, so it should be a machine which will be left always on and logged into the same account. It may also be useful to add a shortcut to the script START.BAT to the account Startup folder so that the license server is started whenever the machine is restarted.

Once the license server has started it will generate a log file (C:\phoenics\d\_flexlm\debug.log) which provides a history of activity and may give useful information in event of failure. Initially the end contents of the log should be (similar to):

```
11:45:23 (lmgrd) Server's System Date and Time: Mon Feb 15 2025 11:45:23 GMT Standard Time
11:45:23 (lmgrd) pid 6688
11:45:23 (lmgrd) SLOG: Summary LOG statistics is enabled.
11:45:23 (lmgrd) Detecting other license server manager (lmgrd) processes...
11:45:26 (lmgrd) Done rereading
11:45:26 (lmgrd) FlexNet Licensing (v11.19.1.0 build 285581 i86_n3) started on 192.168.1.235 (IBM PC)
(2/15/2021)
11:45:26 (lmgrd) Copyright (c) 1988-2022 Flexera. All Rights Reserved.
11:45:26 (lmgrd) World Wide Web: http://www.flexerasoftware.com
11:45:26 (lmgrd) License file(s): \phoenics\d_flexlm\phoenics.lic
11:45:26 (lmgrd) lmgrd tcp-port 27000
11:45:26 (lmgrd) (@lmgrd-SLOG@) =====
11:45:26 (lmgrd) (@lmgrd-SLOG@) === LMGRD ===
11:45:26 (lmgrd) (@lmgrd-SLOG@) Start-Date: Mon Feb 15 2025 11:45:26 GMT Standard Time
11:45:26 (lmgrd) (@lmgrd-SLOG@) PID: 6688
11:45:26 (lmgrd) (@lmgrd-SLOG@) LMGRD Version: v11.19.1.0 build 285581 i86_n3 ( build 285581 (ipv6))
11:45:26 (lmgrd) (@lmgrd-SLOG@)
11:45:26 (lmgrd) (@lmgrd-SLOG@) === Network Info ===
11:45:26 (lmgrd) (@lmgrd-SLOG@) Listening port: 27000
11:45:26 (lmgrd) (@lmgrd-SLOG@)
11:45:26 (lmgrd) (@lmgrd-SLOG@) === Startup Info ===
11:45:26 (lmgrd) (@lmgrd-SLOG@) Is LS run as a service: No
11:45:26 (lmgrd) (@lmgrd-SLOG@) Server Configuration: Single Server
11:45:26 (lmgrd) (@lmgrd-SLOG@) Command-line options used at LS startup: -c
\phoenics\d_flexlm\phoenics.lic -L \phoenics\d_flexlm\debug.log
11:45:26 (lmgrd) (@lmgrd-SLOG@) License file(s) used: \phoenics\d_flexlm\phoenics.lic
11:45:26 (lmgrd) (@lmgrd-SLOG@) =====
11:45:26 (lmgrd) SLOG: FNPLS-INTERNAL-VL1-4096
11:45:26 (lmgrd) Starting vendor daemons ...
11:45:26 (lmgrd) Started CHAM (pid 7888)
11:45:26 (CHAM) SLOG: Summary LOG statistics is enabled.
11:45:26 (CHAM) SLOG: FNPLS-INTERNAL-CKPT1
11:45:27 (CHAM) SLOG: VM Status: 255
11:45:27 (CHAM) SLOG: FNPLS-INTERNAL-CKPT5
11:45:27 (CHAM) SLOG: TPM Status: 0
11:45:27 (CHAM) SLOG: FNPLS-INTERNAL-CKPT6
11:45:27 (CHAM) Server started on 192.168.1.235 for:
11:45:27 (CHAM) phoenics (consisting of: earth
11:45:27 (CHAM) core inform 2phase
11:45:27 (CHAM) flair hotbox satell
11:45:27 (CHAM) photon autoplott)
11:45:27 (CHAM) EXTERNAL FILTERS are OFF
11:45:27 (lmgrd) CHAM using TCP-port 52285
11:45:27 (CHAM) SLOG: Statistics Log Frequency is 240 minute(s).
11:45:27 (CHAM) SLOG: TS update poll interval is 600 seconds.
11:45:27 (CHAM) SLOG: Activation borrow reclaim percentage is 0.
11:45:27 (CHAM) (@CHAM-SLOG@) =====
11:45:27 (CHAM) (@CHAM-SLOG@) === Vendor Daemon ===
11:45:27 (CHAM) (@CHAM-SLOG@) Vendor daemon: CHAM
11:45:27 (CHAM) (@CHAM-SLOG@) Start-Date: Mon Feb 15 2025 11:45:27 GMT Standard Time
11:45:27 (CHAM) (@CHAM-SLOG@) PID: 7888
11:45:27 (CHAM) (@CHAM-SLOG@) VD Version: v11.19.1.0 build 285581 i86_n3 ( build 285581 (ipv6))
11:45:27 (CHAM) (@CHAM-SLOG@)
11:45:27 (CHAM) (@CHAM-SLOG@) === Startup/Restart Info ===
11:45:27 (CHAM) (@CHAM-SLOG@) Options file used: None
11:45:27 (CHAM) (@CHAM-SLOG@) Is vendor daemon a CVD: No
11:45:27 (CHAM) (@CHAM-SLOG@) Is FlexNet Licensing Service installed and compatible: No
11:45:27 (CHAM) (@CHAM-SLOG@) FlexNet Licensing Service Version: -NA-
11:45:27 (CHAM) (@CHAM-SLOG@) Is TS accessed: No
11:45:27 (CHAM) (@CHAM-SLOG@) TS access time: -NA-
11:45:27 (CHAM) (@CHAM-SLOG@) Number of VD restarts since LS startup: 0
11:45:27 (CHAM) (@CHAM-SLOG@)
11:45:27 (CHAM) (@CHAM-SLOG@) === Network Info ===
11:45:27 (CHAM) (@CHAM-SLOG@) Listening port: 52285
11:45:27 (CHAM) (@CHAM-SLOG@) Daemon select timeout (in seconds): 1
11:45:27 (CHAM) (@CHAM-SLOG@)
11:45:27 (CHAM) (@CHAM-SLOG@) === Host Info ===
11:45:27 (CHAM) (@CHAM-SLOG@) Host used in license file: 192.168.1.235
11:45:27 (CHAM) (@CHAM-SLOG@) HostID node-locked in license file: 0024e8f088b5
```

```
11:45:27 (CHAM) (@CHAM-SLOG@) HostID of the License Server: "0024e8f088b5 904ce581f85d 924ce581f85d
924ce581785d"
11:45:27 (CHAM) (@CHAM-SLOG@) Running on Hypervisor: None (Physical)
11:45:27 (CHAM) (@CHAM-SLOG@) =====
```

When the license server is first started the important thing to look for in the log file is

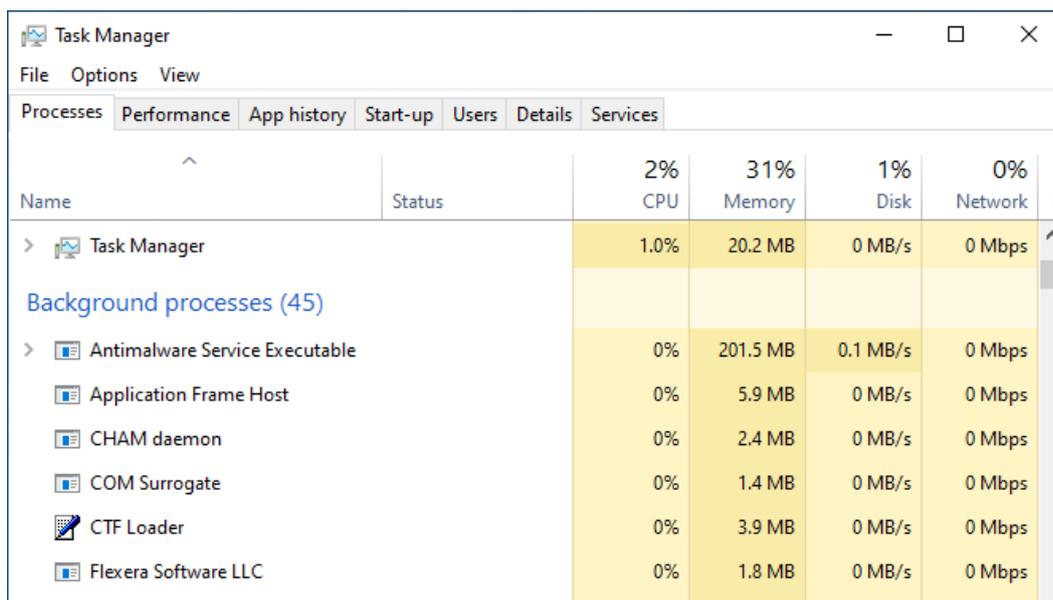
- That the license server has successfully started, check for the lines  
 11:45:27 (CHAM) Server started on 192.168.1.235 for:  
 11:45:27 (CHAM) phoenix (consisting of: earth  
 11:45:27 (CHAM) core inform 2phase  
 11:45:27 (CHAM) flair hotbox satell  
 11:45:27 (CHAM) photon autoplot)
- If instead you see lines similar to  
 11:25:13 (lmgd) "DESKTOP-WQ2NERH": Not a valid server hostname, exiting.  
 11:25:13 (lmgd) Valid license server system hosts are: "192.168.1.235"

It probably indicates either that you have not updated the license file from the default (in the zip file) to your specific one or that the server information you provided to CHAM was incorrect.

If the license server has not started correctly then send the whole of the 'debug.log' file through to CHAM and we may be able to identify what the problem is.

When the CHAM license server is started using START.BAT the server will only remain active during that log in session. This means that when one logs out, or the machine is restarted, the license server will no longer be active. Consequently on each log in it is necessary to remember to rerun START.BAT to reactivate the server. If you regularly end your log in sessions on the server machine it may also be useful to add the script STARTUP.BAT to the account Startup folder so that the license server is started whenever one starts a new session.

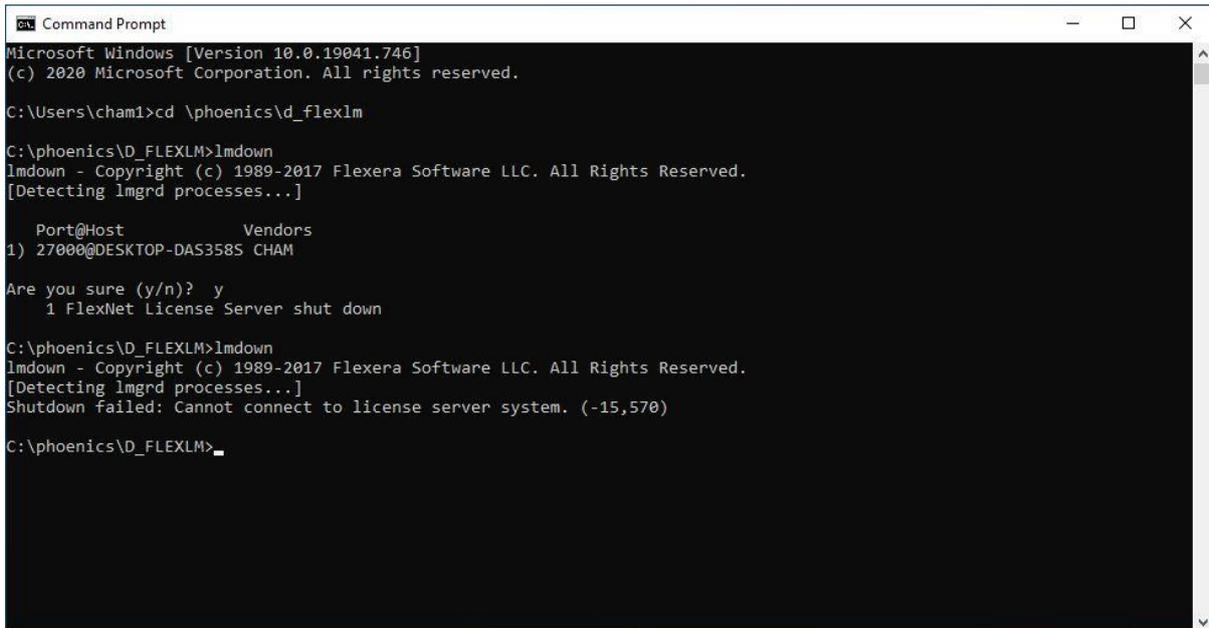
The Task Manager can be used to check whether the server is running. There are two processes which are required for the license server, these will be listed as 'CHAM daemon' and 'Flexera Software LLC' (see image below). If you cannot see these in the list of (background) processes then the license server will not be running.



Once the license server is running correctly it is important to make sure that the license files on the client machines are correctly pointing to the server. One can use the same server license file 'phoenics.lic' on each of the client machines.

### C.3 Updating license file on the license server

When it becomes necessary to update the license file on the server, either because the previous license has expired or to change the listening port(s), one must first shutdown the current instance before the server can read the new file. The command `lmdown.exe` should be used to terminate the server instance as shown below.



```
Command Prompt
Microsoft Windows [Version 10.0.19041.746]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\cham1>cd \phoenics\d_flexlm

C:\phoenics\D_FLEXLM>lmdown
lmdown - Copyright (c) 1989-2017 Flexera Software LLC. All Rights Reserved.
[Detecting lmgrd processes...]

   Port@Host          Vendors
1) 27000@DESKTOP-DAS3585 CHAM

Are you sure (y/n)? y
   1 FlexNet License Server shut down

C:\phoenics\D_FLEXLM>lmdown
lmdown - Copyright (c) 1989-2017 Flexera Software LLC. All Rights Reserved.
[Detecting lmgrd processes...]
Shutdown failed: Cannot connect to license server system. (-15,570)

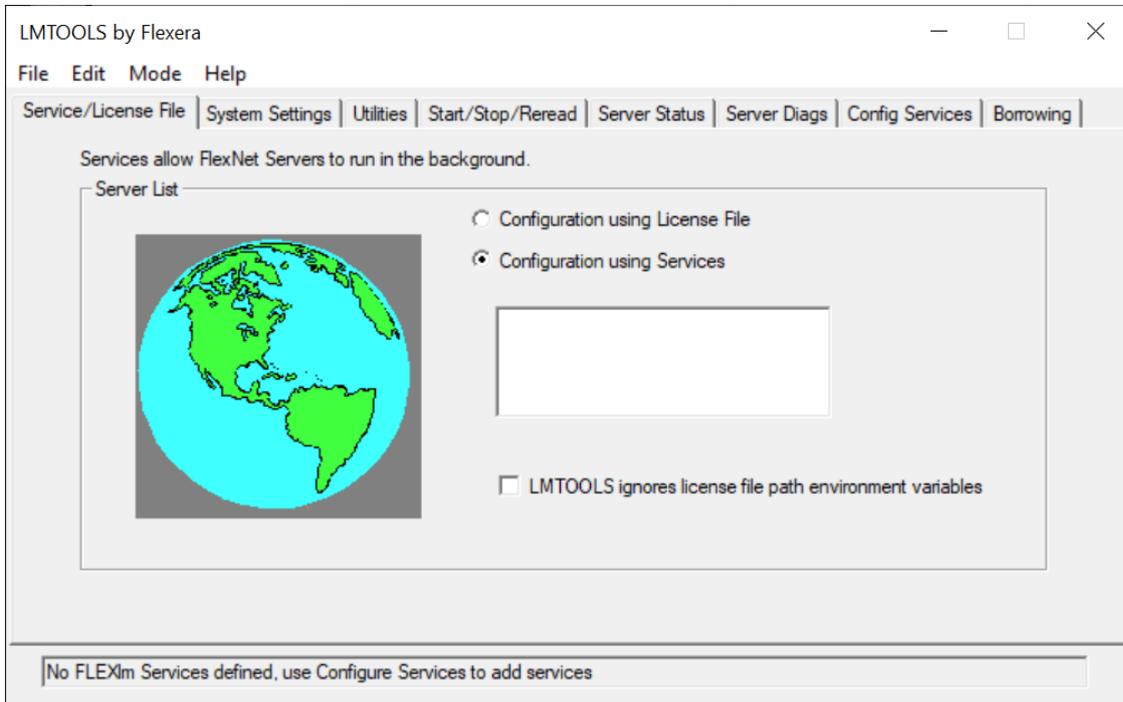
C:\phoenics\D_FLEXLM>
```

In the Command Prompt above we show the command `lmdown` being given twice, this is not strictly necessary, but can be used to check that the instance has been shut down correctly. Once the server is down one can replace the copy of the license file 'phoenics.lic' on the server and restart the server using `START.BAT` (as previously).

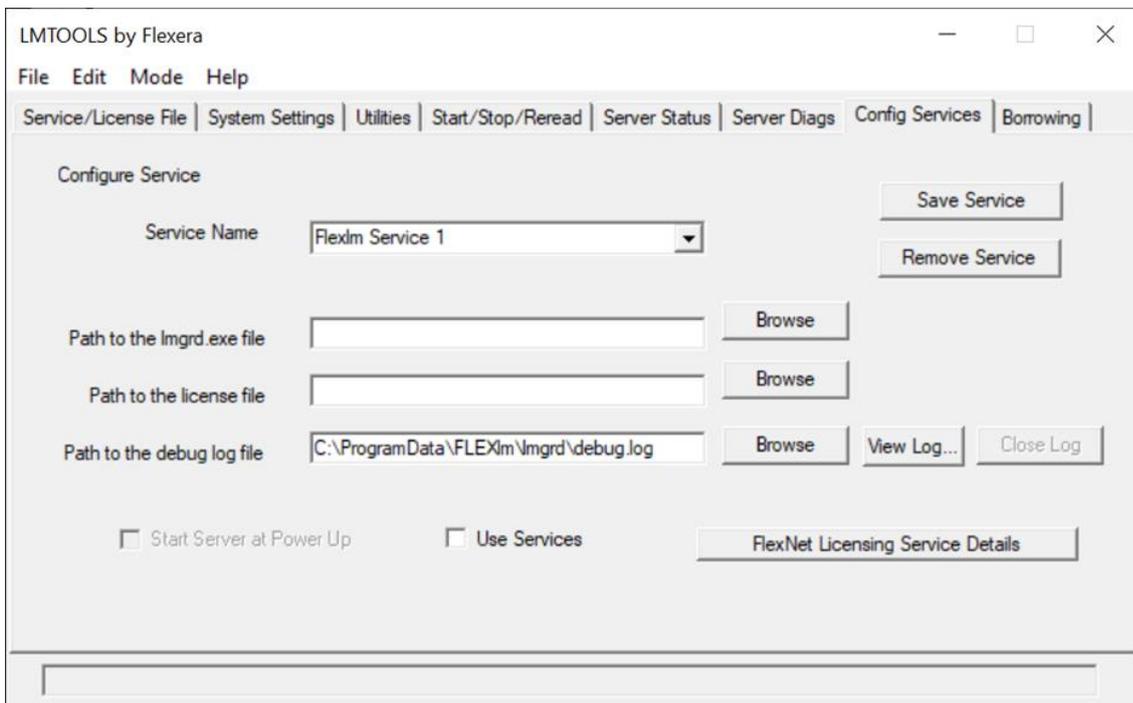
If one is replacing an expired license on the server it should not be necessary to also modify the client licenses unless one has modified the port number on the `SERVER` line of the license file.

## C.4 The GUI Lmtools.exe

In Windows File Explorer go to the directory C:\phoenics\d\_flexlm where the license files are stored and open the item Lmtools.exe. You should now get a prompt asking if you want to allow the app Lmtools.exe to make changes to your system. At this point you will need to allow Administrator privileges to the program in order to continue. On first opening it should look like this.



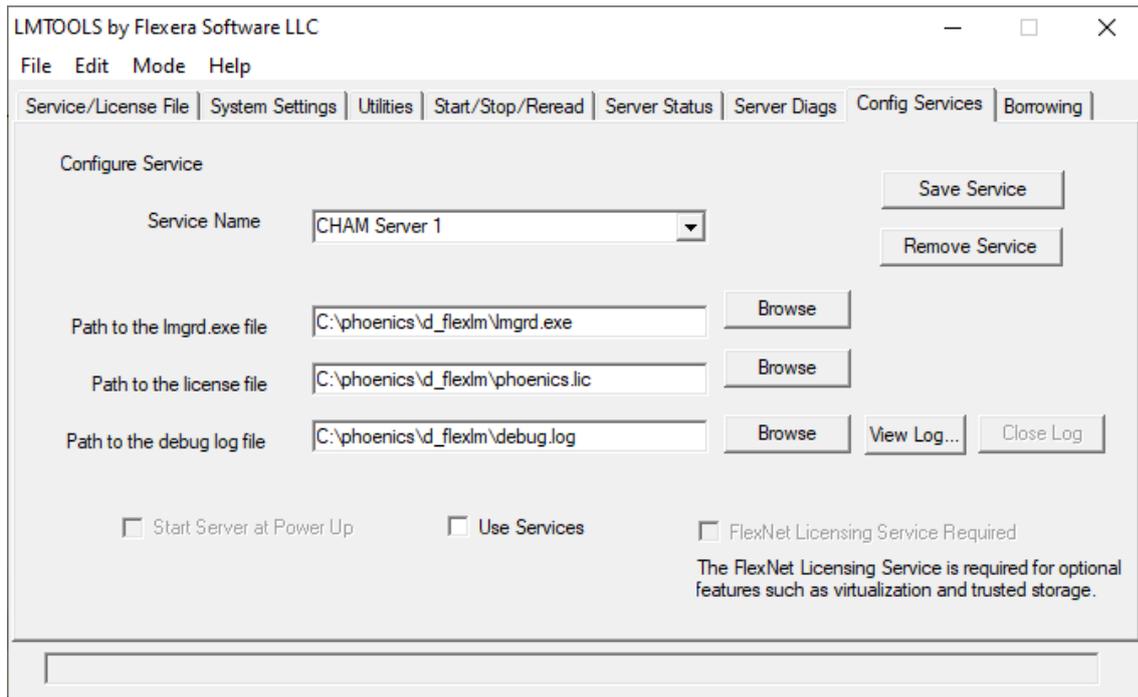
There are a number of tabs here, the two which of immediate interest here are 'Config Services' and 'Start/Stop/Reread'. So, first select the 'Config Services' tab which on first opening should look like:



Edit the Service Name, replacing 'Flexlm Service 1' with 'CHAM Service 1' and then use the first 'Browse' button to select the path to lmgrd.exe. Select the lmgrd.exe executable (in the directory \phoenics\d\_flexlm) and then click on 'Open'. Then repeat for Path to License file.

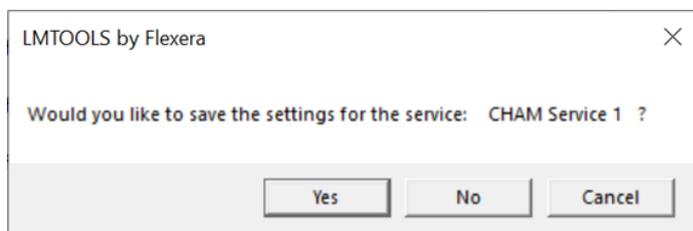
The location for the file debug.log may be left as default or you prefer change it to be C:\phoenics\d\_flexlm\debug.log so that it is easier to locate later and all the server files then remain in one location. [If you have not previously started the server then the file debug.log will not exist, so one will not be able to browse to it.]

Once you have entered the above it should now look like:

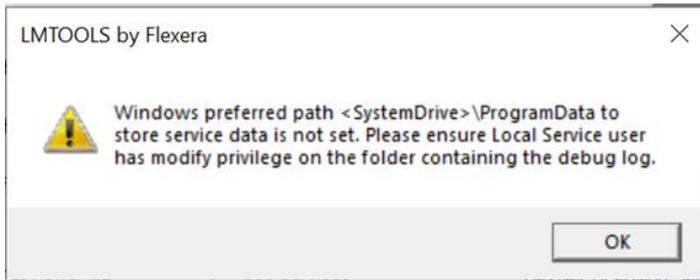


There are a couple of tick-boxes at the bottom of the window which you may wish to use. The first will install the license server as a Windows service the second will set the service start up to Automatic so that it is always started at power up and you don't need to remember to restart the license server each time you restart the machine (e.g. after updates).

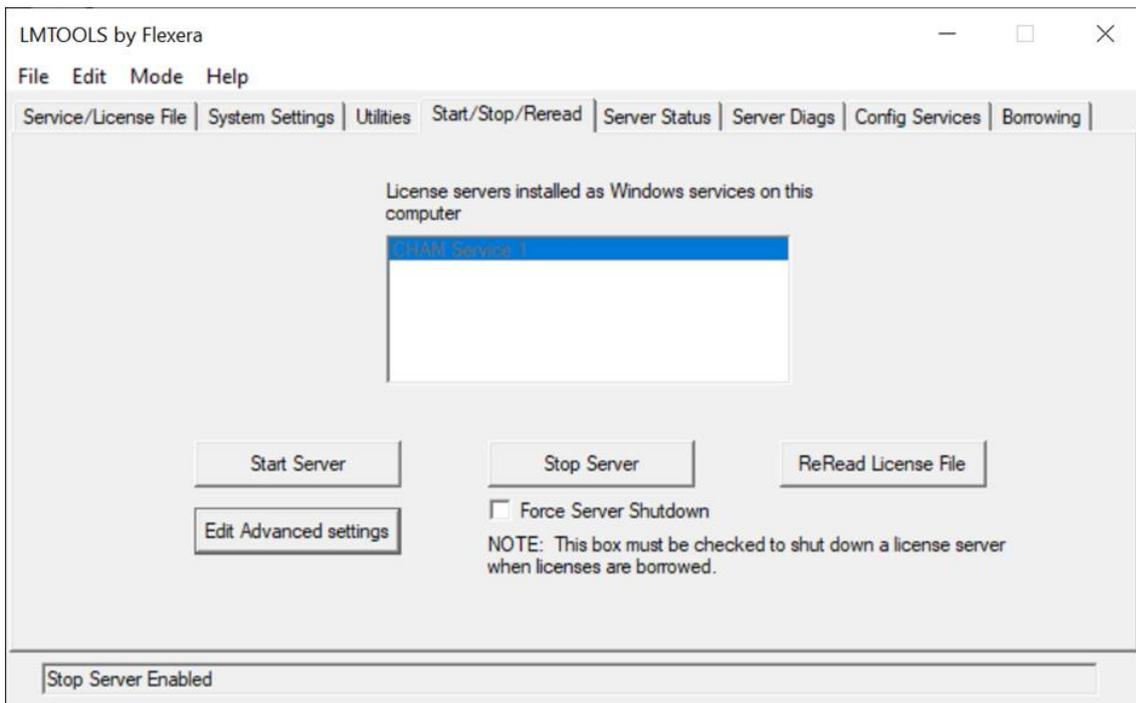
Once you've got everything set it's best to 'Save Service'. Once you click on this you will get a confirmation dialog, click 'Yes' in response here.



If you have selected the 'Use Services' checkbox you will also get a second dialog response as follows. This is just a reminder that the service account will need write permissions to write to the log file in C:\phoenics\d\_flexlm. Just click through and accept it.



Now we have the service set up you can switch to the 'Start/Stop/Reread' to manage the server. If you have not yet started the License server, then click on 'Start Server' here. The other buttons allow you to either manually stop the license server or Reread the License file when there have been changes.



Once you have started the Server here you may view the debug.log file by returning to the Config Services tab and clicking on 'View Log...'. To subsequently close the log file use the 'Close Log' button.

## C.5 Further Information and Troubleshooting

### 1. The Server license file

The typical server license file (phoenics.lic) will look like

```
#
# This is the FLEXlm licence used to unlock Network PHOENICS 2025
#
# The lines themselves can only be modified by CHAM, with the
# exception of the Server IP address, which should replace
# the text 'this_host'
#
# This licence is for : Place holder
# Date of issue      : 10 August 2025
#

SERVER this_host 12ab34cd56ef
VENDOR CHAM /phoenics/d_flexlm/cham.exe
PACKAGE phoenics CHAM 2025 COMPONENTS="earth core inform 2phase cvd \
  parall satell photon autoplot" OPTIONS=SUITE SIGN="007F E166 \
  3586 9F03 02A2 F106 A4FF 27F2 15E6 FA46 B21A 17B1 88BE 35A9 \
  EB01 05C7 4F5C 6DC7 0301 A130 7A1F F989 462D 706F 70FC 18E4 \
  65E5 99E3 829F E2AD"
FEATURE phoenics CHAM 2025 31-dec-2025 4 DUP_GROUP=H SIGN="001C 751B \
  4DB8 36C3 38FC F231 3A1A C8E6 9BE1 4C32 9D0F 844D EE0A 8761 \
  FE98 171F 531C 91C8 C24D A9F3 D9D0 94F0 4E8B 5611 CB0A 1D53 \
  BC7B C997 B70E 820D"
```

The SERVER line details your specific license server. The first item will either be the host name or the IP address of the server, the client machines will use this detail to locate the server machine. The second item details the host-id (MAC address of the server). An optional third item may be added to this line to fix the listening port of the server, details of which is given below (item 3).

The VENDOR line details the server Daemon and also has an optional third item to fix the listening port of the Daemon.

On the client machines one can use the same server license file, but the software will actually only pay attention to the SERVER line as the granting of the license will occur on the server. A suitable client license corresponding to the server license above would be

```
#
# This is the FLEXlm licence used to unlock Network PHOENICS 2025
#
# The lines themselves can only be modified by CHAM, with the
# exception of the Server IP address, which should replace
# the text 'this_host'
#
# This licence is for : Place holder
# Date of issue      : 10 August 2025
#

SERVER this_host 12ab34cd56ef
USE_SERVER
```

It may be noted that once a client license has been successfully added it will not be necessary to update it each time to server license file is replaced.

## 2. Determine whether it is a problem with the server not running or if it is error with the firewall.

When there is a problem in the network unlocking it can be difficult in the early stages to determine where the problem lies. In troubleshooting it is probably best to start at the server and then work back to the client. So,

- a) Look at the license server log file (\phoenics\d\_flexlm\phoenics.lic) and ensure the license server is running correctly.
- b) Check firewall settings that both Flexera Software LLC (lmgrd.exe) and CHAM daemon (CHAM.exe) have been given permission to pass through the firewall(s).
- c) Are you using an appropriate correct license file on the client machine? Often we also use the server license file on the client machines, but actually all the client license file needs to do is to point to the server, so just need the lines equivalent to

```
SERVER 128.91.83.176 005056A75047
USE_SERVER
```

Remember to replace the hostname and host-id above with those for your server.

For users who have installed PHOENICS in the default location, the license file will be located as C:\phoenics\d\_allpro\phoenics.lic.

## 3. How to fix the port numbers used by the network server and daemon.

Customers may wish to fix the port numbers used by the license server when client machines are either outside of the office or when the license server is residing on the cloud. In these cases it is possible to fix the license server to two single ports to minimise the exposure of open ports.

On each start up the license server will allocate a listening port for both lmgrd.exe and the daemon CHAM.exe (lmgrd will allocate a port in the range 27000 to 27009 whereas the daemon will use any available port in range 0 to 65535). The listening ports are clearly identified in the server log file, the following lines have been extracted from the log file earlier in this document.

```
11:25:13 (lmgrd) (@lmgrd-SLOG@) === LMGRD ===
11:25:13 (lmgrd) (@lmgrd-SLOG@) === Network Info ===
11:25:13 (lmgrd) (@lmgrd-SLOG@) Listening port: 27000
```

```
11:25:13 (CHAM) (@CHAM-SLOG@) === Vendor Daemon ===
11:25:13 (CHAM) (@CHAM-SLOG@) Vendor daemon: CHAM
11:25:13 (CHAM) (@CHAM-SLOG@) === Network Info ===
11:25:13 (CHAM) (@CHAM-SLOG@) Listening port: 49473
```

If we wish to fix the license server to always use these port numbers on future restarts then it is permissible to modify the SERVER and VENDOR lines in the license file phoenics.lic to fix them, for example:

```
SERVER 128.91.83.176 005056A75047 27000
VENDOR CHAM /phoenics/d_flexlm/cham.exe PORT=49473
```

Once you have fixed the port number in the license file you should restart the server to ensure the changes have been accepted.

## 4. License server keeps restarting

A user has reported that the server log show that there is a time out causing the license server to re-start.

```
9:21:57 (CHAM) Lost connection to lmgrd, heartbeat timeout expired, exiting.
9:21:57 (CHAM) Heartbeat timeout is 300 seconds. Elapsed time is 59466 seconds.
9:21:57 (CHAM) EXITING DUE TO SIGNAL 28 Exit reason 5
9:22:02 (lmgrd) CHAM exited with status 28 (Communications error)
9:22:02 (lmgrd) Since this is an unknown status, license server
```

9:22:02 (lmgrd) manager (lmgrd) will attempt to re-start the vendor daemon.

This behaviour is likely being caused by the Power Management settings on the host computer. To cure this switch the Sleep settings to "Never".