

***Doctor Analysis Software
V6.4
Reference Guide***

***Revision 1.4
June 2017***



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CONTENTS

CHAPTER 1 – Introduction

1.1 The Doctor Diesel Engine Analysis System	1-1
1.2 Version 6 Analysis Software Compatibility	1-1
1.3 How to use the Doctor System	1-1
1.4 How to use this Manual	1-2
1.5 Logbooks and Libraries	1-2

CHAPTER 2 – Software Installation

2.1 Installing Doctor Software	2-1
2.2 Initial setup of Doctor V6 Software	2-1
2.3 Demo Mode	2-4
2.4 Demo Library	2-4

CHAPTER 3 – Getting Started with the DK-20

3.1 Introduction	3-1
3.2 Importing a Logbook	3-1
3.3 Connecting the DK-20 to your PC	3-1
3.4 Downloading Tests from the DK-20 to your PC	3-3
3.5 Top Dead Centre (TDC) Adjustment	3-4
3.6 Deleting data from the DK-20	3-5

CHAPTER 4 – Getting Started with the DK-2

4.1 Introduction.....	4-1
4.2 Importing a Logbook	4-1
4.3 Connecting the DK-2 to your PC.....	4-1
4.4 Top Dead Centre (TDC) Adjustment.....	4-4

CHAPTER 5 – Analysis

5.1 The Main Display	5-1
5.2 Setting Your Preferences	5-2
5.3 Setting your Passwords and Permissions	5-3
5.4 Selecting Tests in the Hierachy.....	5-4
5.5 Graph Display	5-6
5.6 Smoothing	5-8
5.7 Table Display and Scalar Values	5-10
5.8 ISO Normalistion	5-12
5.9 Specific Fuel Consumption (SFC)	5-14
5.10 Bar Graph Display	5-15
5.11 Engine Reports	5-15
5.12 Diagnosis	5-16
5.13 Shop/Sea Trial	5-17
5.14 Propeller Curves	5-22

CHAPTER 6 – Setting Up Your System

6.1 Introduction	6-1
6.2 Importing and Exporting Data	6-1
6.3 Importing V6 Logbooks	6-1
6.4 Importing V5 Logbooks	6-4
6.5 Exporting Data via Logbooks	6-5
6.6 Exporting to Other Applications	6-6
6.7 Creating a New Library for Your Vessel	6-7
6.8 Inputting Engine Data	6-8
6.9 Instrument Settings	6-12
6.10 Duplicating an Engine	6-13
6.11 Transferring Engine Data to DK20/DK-2	6-14

CHAPTER 7 – Engine Reports

7.1 Introduction to Engine Reports	7-1
7.2 Generating Engine Reports	7-2
7.3 Engine Report Templates	7-3
7.4 Editing a Report Template	7-4

CHAPTER 8 – Customisation of Doctor 6 Folder Locations

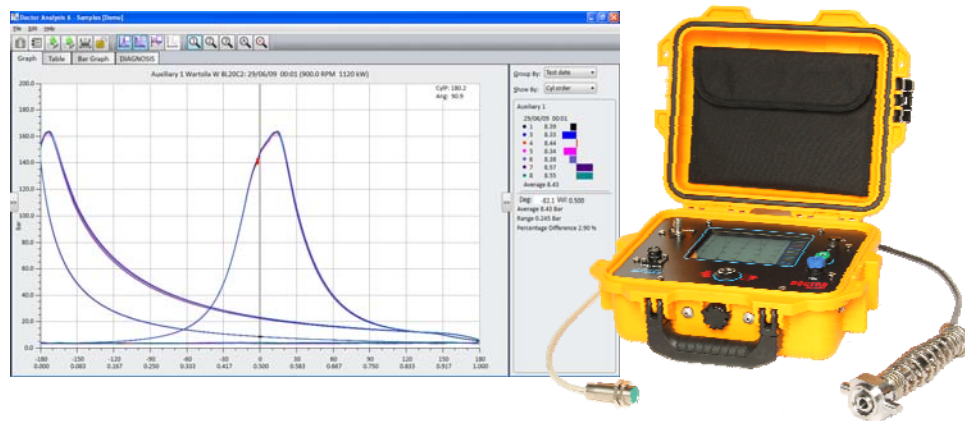
8.1 Customisation of Doctor 6 Folder Locations	8-1
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Chapter 1 - Introduction

1.1 The Doctor Diesel Engine Analysis System

Congratulations on your purchase of Icon Research's "Doctor Diesel" analyser system. Since the early 1990's the Doctor has been used to optimise engine performance and has continuously improved over time. The latest DK-20 *Doctor* instrument along with the new software have been developed by listening to and acting on customers' feedback over the past twenty-five years.

The result is a ground breaking system which combines extreme user-friendliness with new levels of engine analysis, fuel cost saving, optimising performance and minimising down-time, thereby reducing maintenance and running costs.



1.2 Version 6 Analysis Software Compatibility

Version 6 of the Doctor software interfaces to both the DK-20 and DK-2 series instruments from Icon Research. It is compatible with Windows 7 and 10 platforms. It contains many of the features that existing users are familiar with but adds new capabilities enabling faster, better engine analysis.

1.3 How to use the Doctor System

It is recommended that customers take advantage of Icon's setup service. If this has been done, the system is supplied to the vessel with all hardware and software necessary to start taking measurements immediately after installation. Details of the vessels engines will have been supplied to Icon and the instrument will have been programmed accordingly. A logbook file will have been created for the vessel and is provided on a flash drive along with the software installation application and all the support documentation.

The Doctor instrument is ready to take engine readings which can be downloaded to the PC for analysis.

It is envisaged that the Doctor software be installed on both the vessel and the on-shore office. Regular readings can be taken by the crew and emailed to the shore where Fleet Managers can keep libraries containing logbooks of all vessels under their management. If a copy of the software is not available in the on-shore office please contact Icon who will provide it.

1.4 How to use this Manual

Start by going to Chapter 2 - *Software Installation*. After this, if the database setup has been purchased then go to the Chapter 3 or Chapter 4 - *Getting Started*, depending whether you have a DK-20 or DK-2. If no database has been purchased then go to Section 6.7 - *Creating a new library for your vessel*. For information relating to the Doctor instrument, refer to the Doctor DK-2 or Doctor DK-20 Operating Guide documents which are provided with your instrument.

1.5 Logbooks and Libraries

The Doctor software provides flexible and intuitive ways of transferring measurements and engine data. It is important to understand the basics of how this works.

All measurement data together with the engine and operator data is held in a **library**. This is a file with suffix *.idl* (icon data library) which resides on your computer. Data is transferred between libraries by way of **logbooks** which have suffix *.ilb* (icon log book). When data is exported from the Doctor software, a logbook is automatically created which can be transferred by any means (eg. as an attachment to an email). On receipt, the logbook is imported by a simple drag-and-drop action, and all data is automatically inserted into the correct place in the library (eg. measurements are filed under the engine with which they are associated). Note that logbooks are automatically zipped (compressed) to minimise file size when being transferred.

In summary, there are two main file types used by Doctor analysis version 6 software:

Logbooks (.ilb)

Logbooks are compressed files that are used to transfer data, for example, between the vessel and the shore office. A logbook is what is provided by Icon research for the initial setup. Logbooks cannot be modified.

Libraries (.idl)

Libraries are where all engine and test result data is stored either on the vessel or in the shore office. On the vessel it is envisaged that a single library exists containing test data taken for that ship's engines. In the on-

shore office the superintendent can have his whole fleet conveniently stored in his library. Within the library is a *Hierarchy* with a basic structure of *Operator .. Vessel Names(s) .. Engines .. Tests*.

Note that a logbook is also a good way of backing up your library. You can export your entire hierarchy to a logbook and store it in a safe place. If your library was lost for whatever reason you could re-import your data from your saved logbook.

Further information on importing and exporting log books is contained in Chapter 6.

Chapter 2 – Software Installation

2.1 Installing Doctor Software

IMPORTANT: Your computer must have Microsoft® Windows 7™ or 10™ installed in order to run DOCTOR Analysis Software.

It is possible to run both Version 5 and Version 6 Doctor software concurrently on the same PC. However if you have an earlier version of the same *Doctor* analysis software version on your PC (ie. V6.x), you must uninstall this before installing the new version. To do this, use the standard *Uninstall* procedure in *Control Panel*.

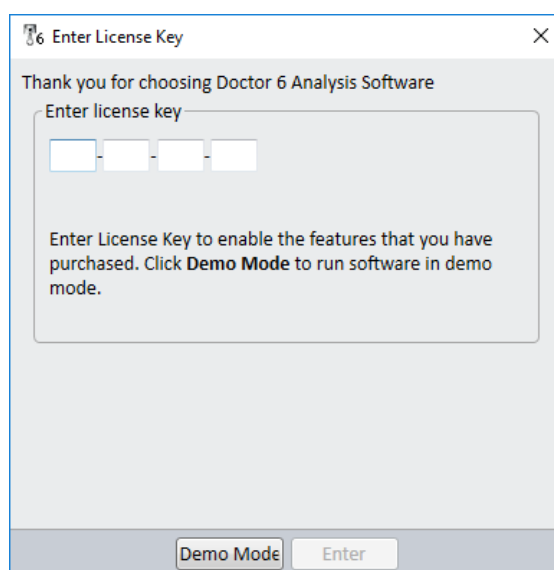
Your software has been provided on a USB flash drive, or it can be downloaded from the website www.iconresearch.co.uk.

Windows 7 or 10

1. Insert USB flash drive.
2. Navigate to this drive which is called **Doctor Analysis 6** and open it.
3. Go to folder **Applications**. Double click the installer in this folder called **DoctorAnalysis6Setup.exe**.
4. Follow the on screen instructions until the installation is complete - you may be required to give permissions for the installer to make changes to your computer, click *Yes* both times. On the final screen click *Finish* to exit the installation wizard. The installation places a shortcut to the Doctor application on your desktop – click this to launch the application.

2.2 Initial Setup of Doctor V6 Application

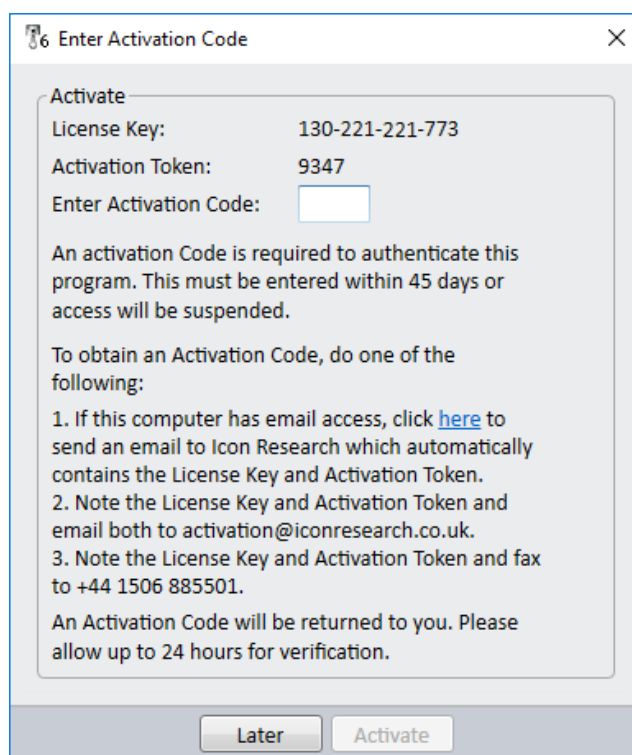
The first time that the application is run the following screen is displayed:



Your license key is printed on the inside of the case containing the USB flash drive. Type this code into the boxes and click **Enter** to run the full version of the application. If you have lost your license key, contact Icon Research who can provide you with it.

If you click **Demo Mode** then you will go into demo mode. This will let you experiment with all the analysis features of the application, but you will not be permitted to import or export logbooks or data from a Doctor instrument. Additionally, any changes that you make will not be saved. On subsequent runs of the software you will have the opportunity to enter your license key or to continue working in demo mode. Refer to section 2.3 for further details.

On successful entry of your License Key you will see a screen similar to the one below:



6 Enter Activation Code

Activate

License Key: 130-221-221-773

Activation Token: 9347

Enter Activation Code:

An activation Code is required to authenticate this program. This must be entered within 45 days or access will be suspended.

To obtain an Activation Code, do one of the following:

1. If this computer has email access, click [here](#) to send an email to Icon Research which automatically contains the License Key and Activation Token.
2. Note the License Key and Activation Token and email both to activation@iconresearch.co.uk.
3. Note the License Key and Activation Token and fax to +44 1506 885501.

An Activation Code will be returned to you. Please allow up to 24 hours for verification.

Later Activate

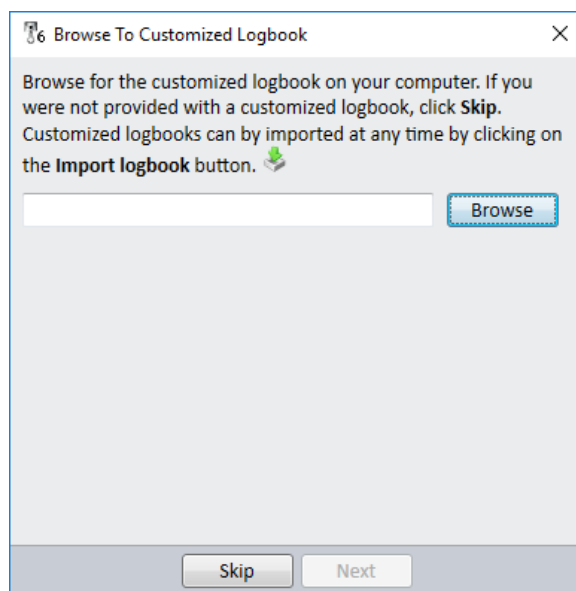
The full software version can now be run but an Activation Code is required to be entered within 45 days to continue operation.

If email access is available, click [here](#) in option 1 to send an email requesting an Activation Code from Icon Research. The email will automatically include your License Key and Activation Token. If email is not available on the local PC, then send an email from another PC to activation@iconresearch.co.uk stating the License Key and Activation Token. This must be done once for each computer the software is installed on. The four-digit Activation Code will be emailed back to you.

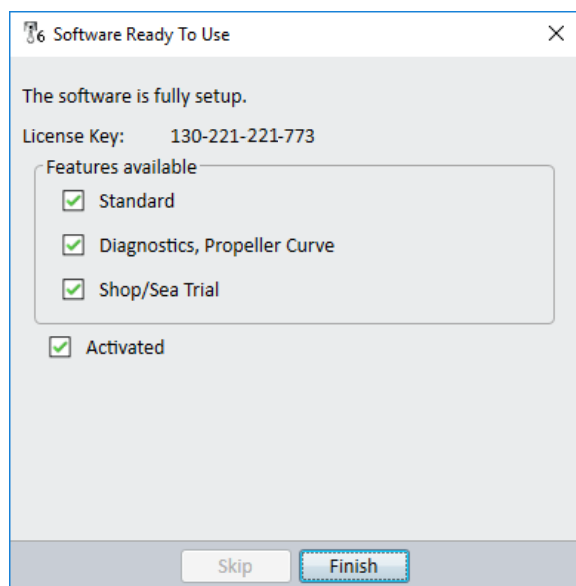
At this stage you can either wait to receive the Activation Code but, if you want to carry on, click **Later** to move onto the next screen where you can

browse and import a logbook (see figure below). You have 45 days in which to enter the Activation Code. After you have received and entered the Activation code the full software version will run permanently and you will not be prompted to enter the code again.

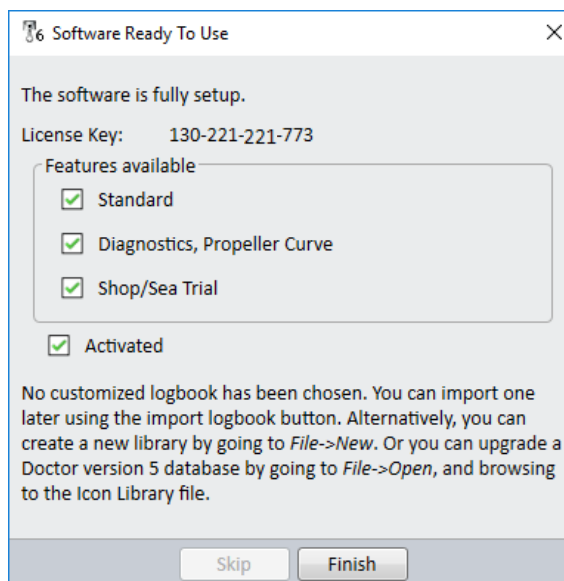
The Doctor V6 software utilises a system of logbook (.ilb) and library (.idl) files. Refer to section 1.5 for details. It is recommended that, on a vessel, a library file is maintained containing specific information for only the vessel. On-shore the Fleet Manager can maintain a library containing a number of vessels that he manages. If you have ordered Icon's setup service, you will have received a customised logbook (.ilb file) containing engine data. This is on the same USB flash drive that contains the main software application and is located in the folder called *customer specific files*. Click **Browse** to navigate to your logbook and click **Open** to select your logbook. Click **Next**.




Your logbook will be loaded into the *Hierarchy* and you will see the screen below confirming successful installation. Click **Finish**.



If you do not have a logbook to hand, you can click **Skip** and the following screen will appear indicating the features that are available.



Click **Finish**.

You will then be invited to create a library manually or you can import a logbook using the import facility. You can load the data in the customised logbook or any other logbook at any time by clicking on the **Import Logbook** button. This is the green arrow pointing downwards in the toolbar .

2.3 Demo Mode

The Doctor V6 software contains a demonstration database for use in *Demo Mode*. Sample vessels and test results are available in this mode for experimenting with the features of Doctor V6 software. Details of the content of the demo library are shown in the next section.

You can enter demo mode at any time by clicking **Help ... Enter demo mode**. Note that any changes you make will not be saved so that, if you close and relaunch the Doctor software, the demo library will revert back to its default content.

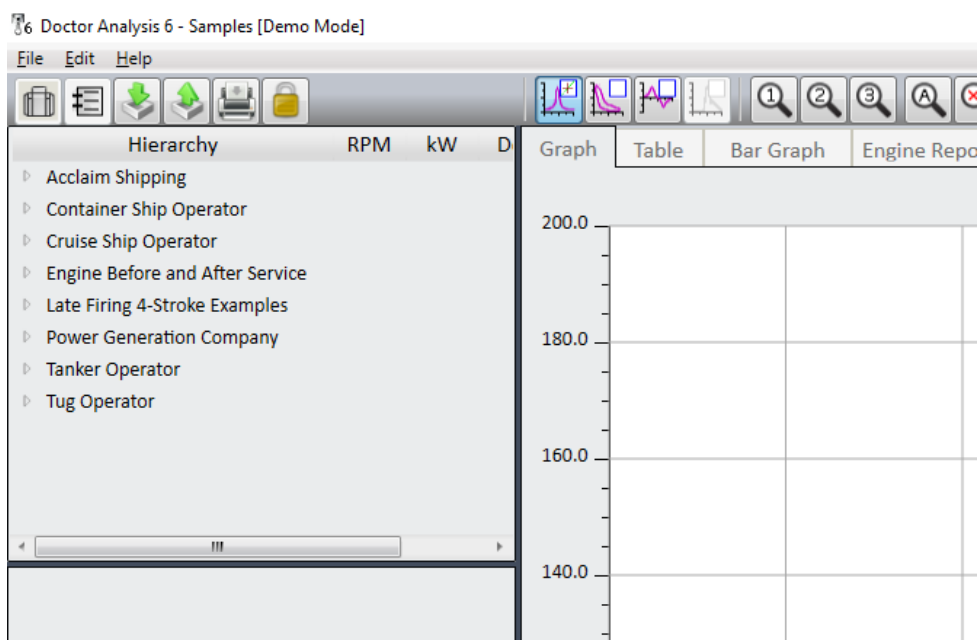
To exit demo mode, simply close the application. It will restart using your library.

2.4 Demo Library

The Demo Library is made available for prospective customers to evaluate the software, or for existing customers to experiment with the various

analysis tools available. A number of different types of vessels and engines are included. It can be accessed by clicking **Help ... Enter demo mode**.

All tools can be accessed in the demo library apart from importing and exporting logbooks. It is necessary to close the application and restart it to exit demo mode. Any changes you have made will not be saved after exiting and re-entering the program.



The library contains examples under the following *Operator* names:

Operator Acclaim Shipping, Vessel M.T. Hillary (Screenshot)

This example provides tests from a typical tanker whose name has been changed to the fictitious *M.T. Hillary*. Shop and Sea Trial data has been entered for the vessel and the comparison with actual operational readings can be viewed.

Container Ship Operator

A small number of tests from four typical container vessels are included. Each vessel has a 2-stroke propulsion engine and 4 x 4-stroke auxiliaries.

Cruise Ship Operator

A test result from each of 4 identical V-engines is included. These tests can be overlaid to compare the engine performance.

Engine Before and after Service

Two tests are included for a 4-stroke in-line engine. Prior to the service a number of issues are identified in the Diagnostic Reporter. A big

improvement is seen after the service highlighting the Doctor's ability to verify the success of remedial work on engines.

Late Firing 4-Stroke Examples

It is very common to see engines whose timing has been retarded to improve NOx emissions. The results of this can appear odd with "double peaks" where the compression pressure is similar to, or even greater than, the pressure at firing. These examples are included to display this phenomenon.

Power Generation Company

Diesel Doctor systems are commonly used in power stations and this example shows a number of typical V-16 engines used for this application.

Tanker Operator

Three sister ships are included. The Doctor system is a particularly powerful tool when the same engine types are used on different vessels as the conditions under which the best performing engines are being operated can be employed to improve the performance of the others.

Tug Operator


Test results from three tugboats are included.

Chapter 3 – Getting Started with the DK-20

3.1 Introduction

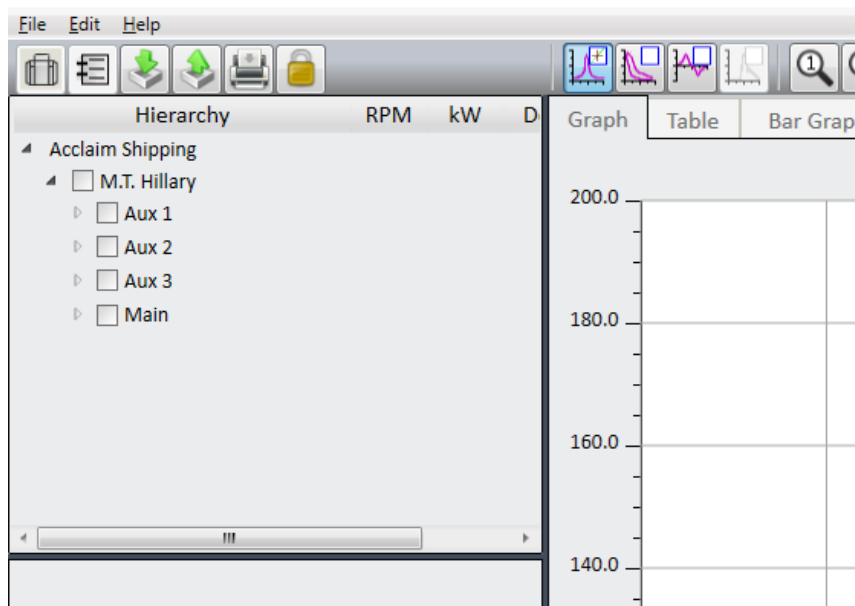
This chapter assumes you have received a customized logbook from Icon Research. If this is not the case, refer to *Chapter 6 – Setting Up Your System*. The intention is to get to the stage where you have been able to successfully download initial measurements from the Doctor instrument to the version 6 software. Note that it is essential that a library is created prior to connecting a DK-20 to the PC that is running the Doctor application.

3.2 Importing a Logbook

During the installation phase you will have had the opportunity to *Browse to your customized logbook* as described in section 2.2. If you have not done this then you can import the logbook by using the import button 

The logbook will be included on the USB flash drive provided with the software application in the folder called *customer specific files*.

After importation you should see a screen similar to the one below with the name of your vessel and its engine configuration listed in the *Hierarchy* panel of the display:




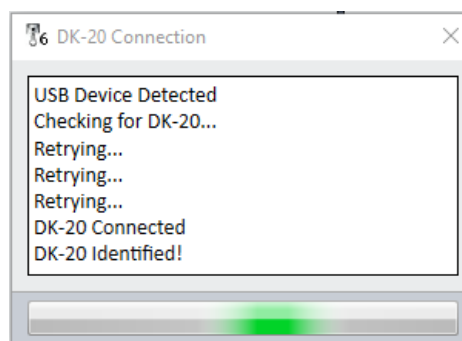
3.3 Connecting the DK-20 to your PC

This section assumes that engine tests have successfully been carried out using your DK-20 instrument and are stored in memory on the instrument.

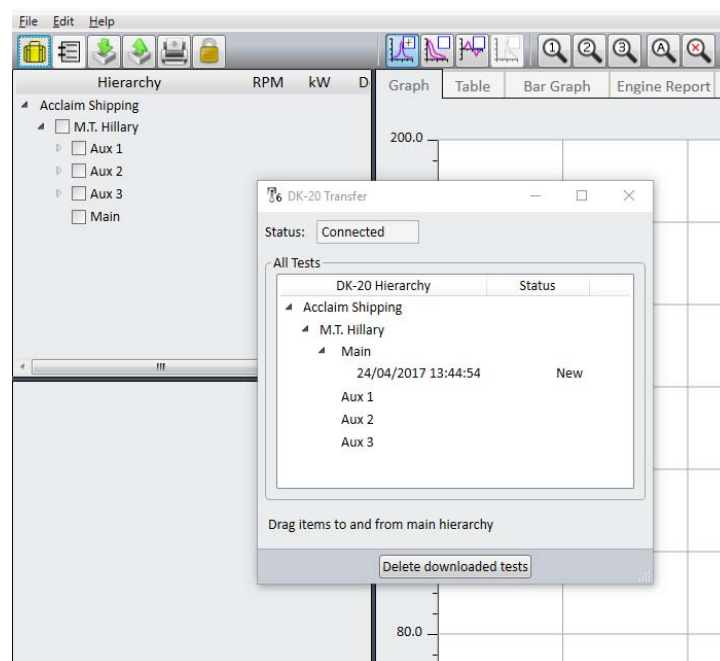
Before you try to start communication between the DK-20 and your computer, check that the Doctor software is set to use the DK-20 by going to **Edit ... System preferences** and make sure that *Doctor unit type* is set to **DK-20**.

Connect a USB cable between the DK-20 and your computer and turn on the DK-20. Note that you do not have to press any buttons or interact with the DK-20 while the USB cable is connected. If this is the first time that you have plugged it in, it will need to install the DK-20's driver.

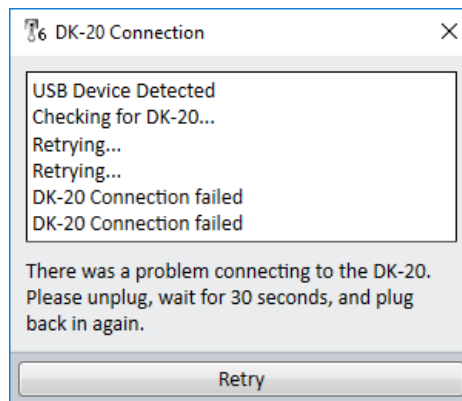
Once the DK-20 has been detected, a window similar to the one below will be displayed briefly and the **DK Instrument** button in the top left corner of the software screen will turn yellow .



You will then see the *DK-20 Transfer* window, similar to the one below. You are now be ready to transfer your tests into your PC.



If the DK-20 does not connect automatically after 20 seconds or so and the window below appears, follow the instructions on the screen.




Once the DK-20 has been successfully identified and the **DK Instrument** button is yellow, you can transfer data to and from it.

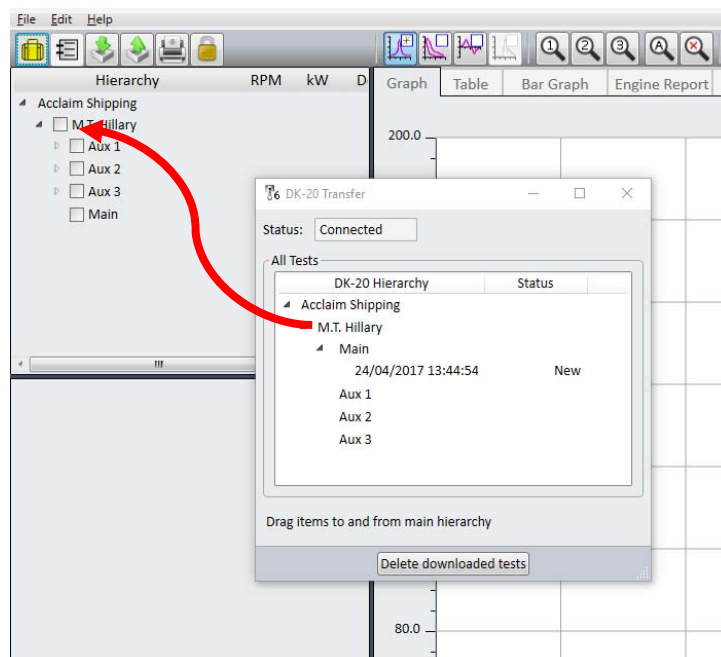
3.4 Downloading Tests from the DK-20 to your PC

Once you have taken some tests (as described in Chapter 2 of the DK-20 Operating Guide), then you can download them onto your computer.

Connect the USB cable between the DK-20 and your computer. The *DK-20 Connection* window will appear and once this disappears, the **DK Instrument**

button  at the top left of the screen will turn yellow and the *DK-20 Transfer* window will open as described in the previous section and as shown below.

In the example below, there is now one new test in *Main Engine*:



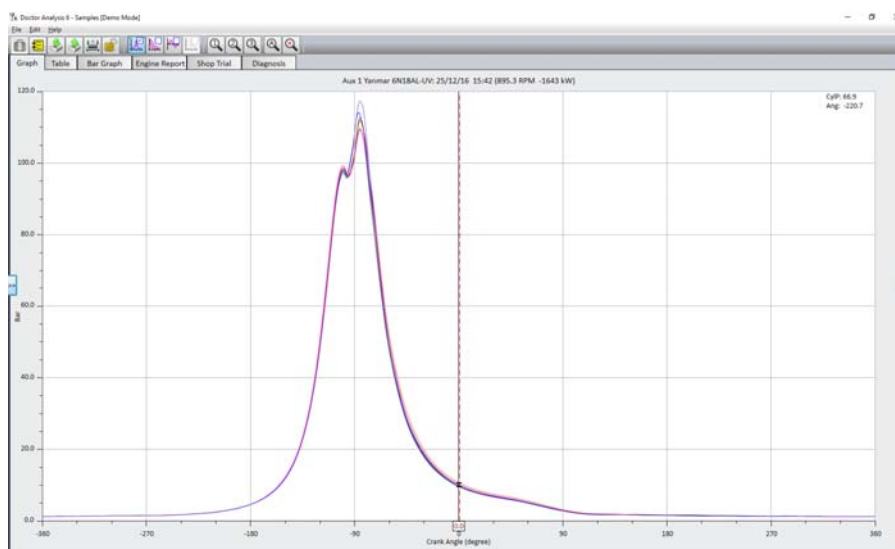
To download this test, drag and drop it into the main hierarchy. Any test will automatically attach to its corresponding engine. If you have more than one test in an engine, just drag and drop the engine to download them all. This also works with the ship or operator. The *Status* will change to *Downloaded* for tests that have been transferred.

The next step is to ensure that the TDC adjust is made correctly after which you can select and view your test results.

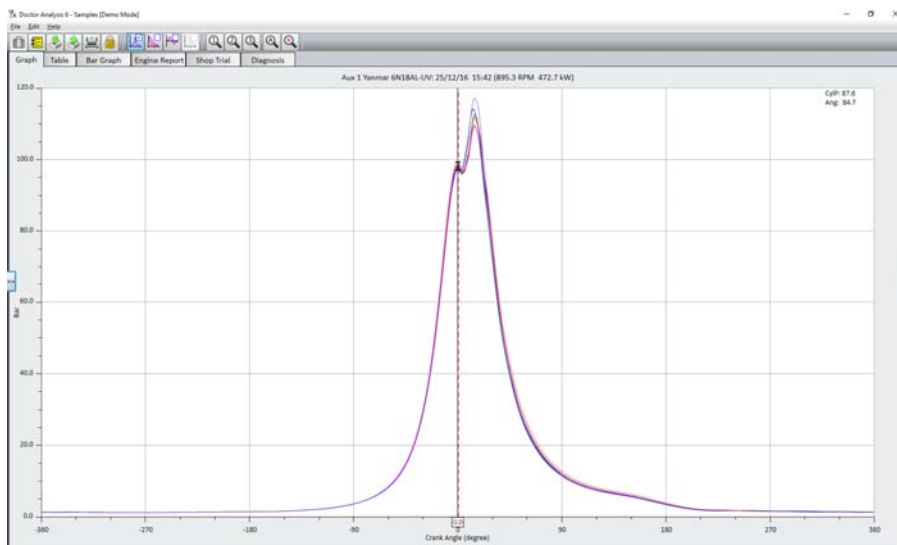
3.5 Top Dead Centre (TDC) Adjustment

Accurate pressure measurement relies upon synchronisation of the pressure variation inside cylinders to the crank angle. In order to do this a marker is inserted on the flywheel of each engine. This marker position is sensed and used to synchronise the Top Dead Centre of the piston as it moves through its cycles. As the position of the marker is random it is necessary to adjust the position of the TDC in the software prior to any analysis being done. This need only be done once as long as the position of the marker on the flywheel does not change.

The screen below shows an incorrect TDC setting.



The screen below shows the correct TDC setting.



If you have purchased Icon's setup service then you should send the first set of test results for each engine back to Icon at doctor@iconresearch.co.uk. This is done by exporting the tests to a logbook – refer to section 6.5 for details. Icon will carry out a TDC adjust and an initial review of the results. If you prefer to do the TDC adjust yourself, you can right-click on a test result from an engine in the hierarchy and click on **Adjust TDC**. You may need to change permissions to enable access – refer to section 5.3 for gaining access using passwords.

3.6 Deleting Data from the DK-20

Once you have downloaded a test, you can click **Delete downloaded tests** to delete all tests whose statuses are *Downloaded*. To delete individual tests, right click on it and choose **Delete**. You will see a warning message if you have not already downloaded that test. To delete an engine or ship from the DK-20, right click on it and choose **Delete**.

If you have accidentally deleted a ship or engine that you did not mean to, these can easily be replaced by dragging them from the PC *Hierarchy* to the DK-20 window.


Chapter 4 - Getting Started with the DK-2

4.1 Introduction

This section assumes you have received a customized logbook from Icon Research. If this is not the case, refer to *Chapter 6 – Setting Up Your System*. The intention is to get to the stage where you have been able to successfully download initial test results from the Doctor instrument to the version 6 software. If you are upgrading from version 5 software, refer to section 6.4. It is essential that a library is loaded before connecting a DK-2 instrument to the PC running the Doctor application.

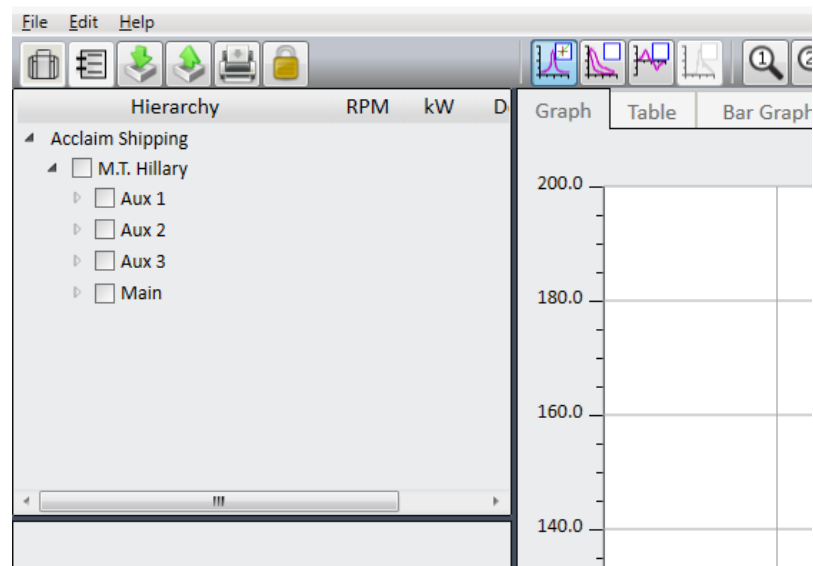
4.2 Importing a Logbook

During the installation phase you will have had the opportunity to *Browse to your customized logbook* as described in section 2.2. If you have not done this

then you can import the logbook by using the import button. 

The logbook will be included on the USB flash drive provided with the software program in the folder called *customer specific files*.

After importation you should see a screen similar to the one below with the name of your vessel and its engine configuration listed in the Hierarchy section of the display:



4.3 Connecting the DK-2 to your PC

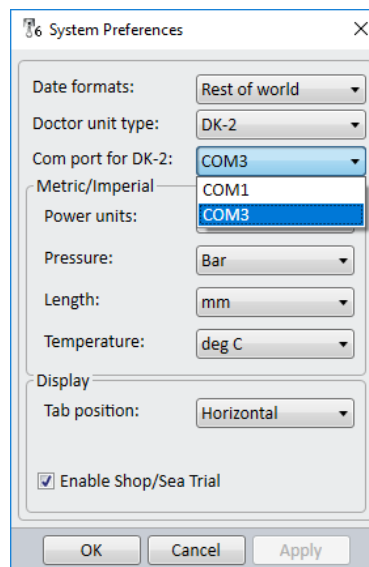
This section assumes that engine tests have successfully been carried out using your DK-2 instrument and are stored in memory on the instrument.

Before you try to start communication between the DK-2 and your computer, check that the Doctor software is set to use the DK-2 by going to **Edit ... System preferences** and make sure that *Doctor unit type* is set to *DK-2*.

Connect the RS232 cable to the serial port on your PC. If you are connecting to a USB port, connect the RS232 cable with the USB adapter supplied. Turn on the DK-2. Note that you do not have to press any buttons or interact with the DK-2 yourself while the cable is connected. If this is the first time that you have plugged it in, it will need to install the DK-2's USB driver.



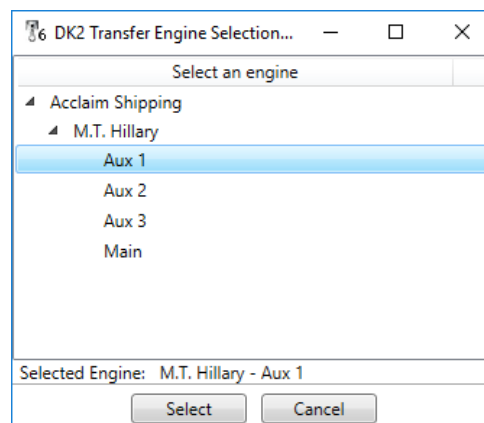
Click the **DK Instrument** button. It may be necessary to select the correct COM port for the PC. To do this, go to **Edit ... System preferences** and select the correct COM port. Note that the USB adapter must be connected to the PC for COM port to be found. (Also note that, if you plug the USB adapter into a different port on your PC in the future, you will have to go through the COM port selection process again).



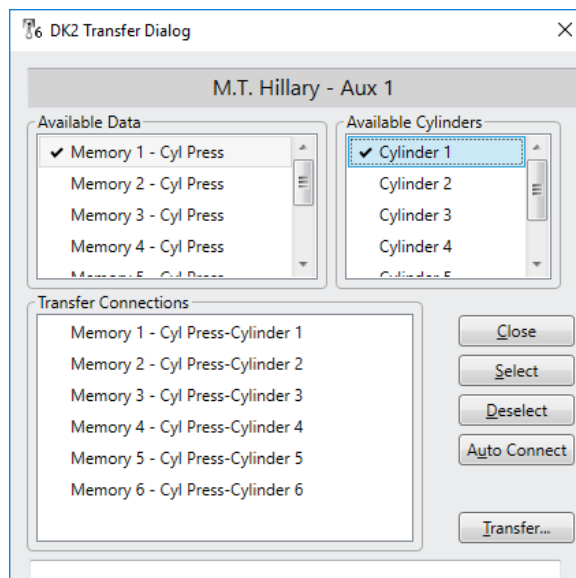
When the correct COM PORT is selected you are ready to download tests.



Click on the button to get the following screen:



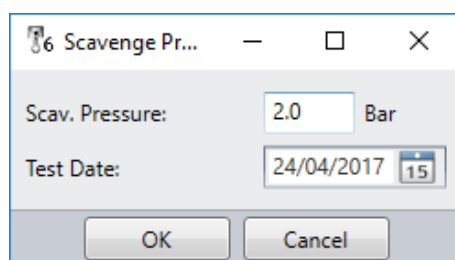
Select the engine that you wish to transfer tests into and click **Select**. In this example, we have selected *Aux 1*. The measurement transfer dialog box will now appear.



If you have the same number of tests as there are cylinders, and you have taken the measurements in cylinder order (1, 2, 3 etc), then the **Auto Connect** button will connect each available cylinder to a data set from the EPU. So, as long as data was taken in order, this is the quickest option to use.

Alternatively, you can select the first store for the test on the target engine by clicking next to it and select Cylinder 1 in the same manner. The **Select** button will couple the selected data with the selected cylinder. The select option is normally only used for special tests where individual cylinder readings have been taken for some reason.

Once all of the desired measurements have been paired, click on **Transfer**. You will need to enter the scavenge pressure (boost pressure) as in the screen below. For in-line engines, just enter one value in the top section and for V engines, enter a value for each bank. This dialogue box also lets you enter the date of the test as the day you are downloading may not be the same day the test took place.

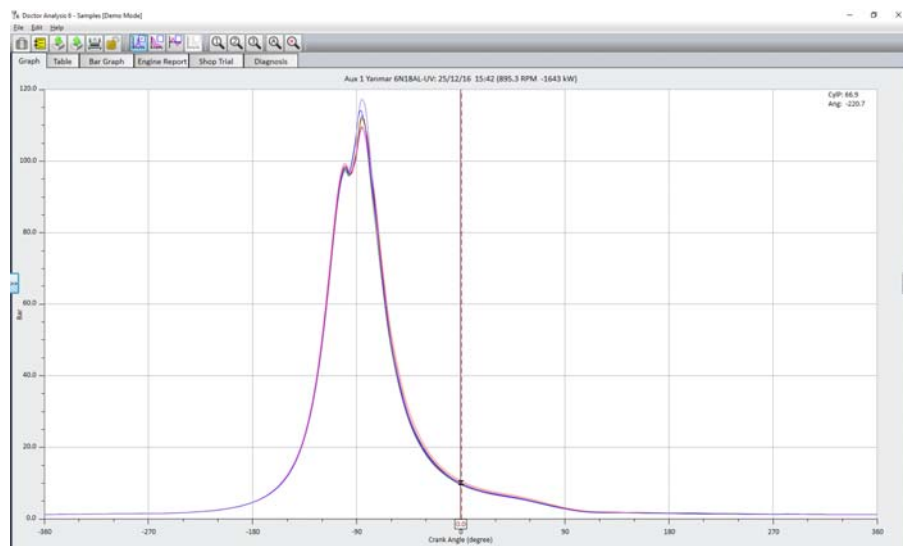


Click **OK** and your results will be transferred into the library. During transfer of data, a tick mark will progress from one result to the next until all results have been transferred. It is advisable to wait until the process is complete before doing anything else on the PC.

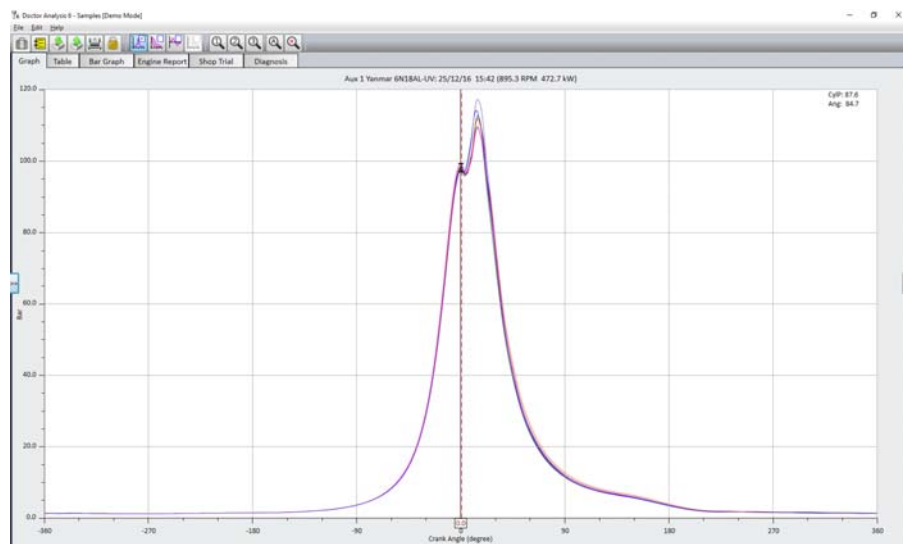
4.4 Top Dead Centre (TDC) Adjustment

Accurate pressure measurement relies upon synchronisation of the pressure variation inside cylinders to the crank angle. In order to do this a marker is inserted into the flywheel of each engine. This marker position is sensed and used to synchronise the Top Dead Centre of the piston as it moves through its cycles. As the position of the marker is random it is necessary to adjust the position of the TDC in the software prior to any analysis being done. This need only be done once as long as the position of the marker on the flywheel does not change.

The screen below shows an incorrect TDC setting.



The screen below shows the correct TDC setting.



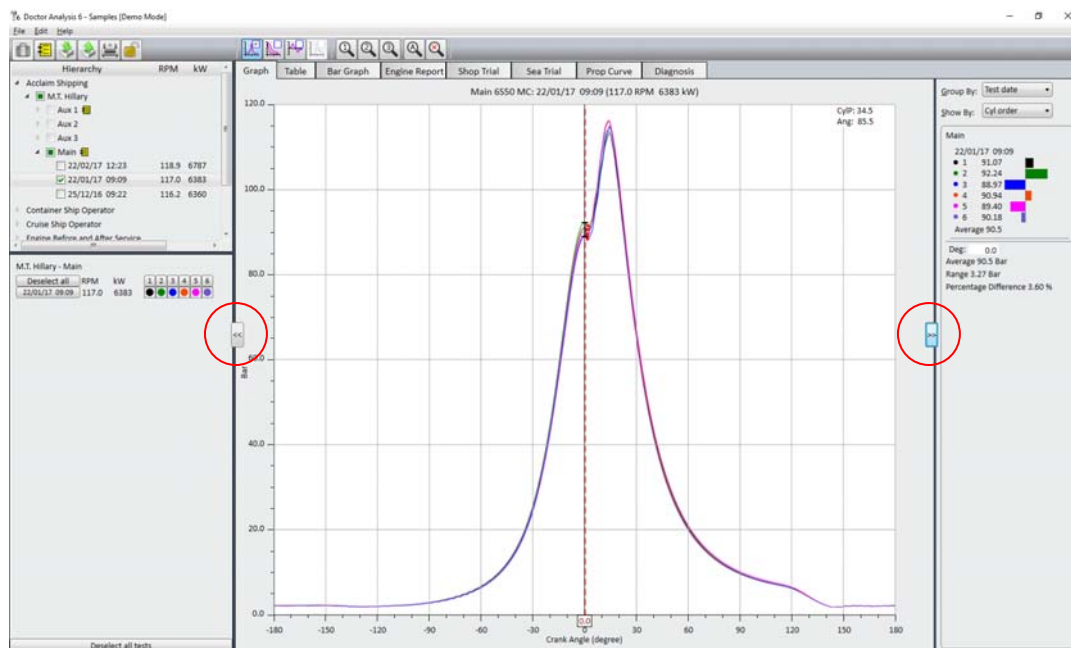
If you have purchased Icon's setup service then you should send the first set of results for each engine back to Icon at doctor@iconresearch.co.uk. This is done by exporting the tests to a logbook – refer to section 6.5 for details. Icon will carry out a TDC adjust and an initial review of the results. If you prefer to do the TDC adjust yourself, you can right-click on the engine in the hierarchy and click on **Adjust TDC**. You may need to change permissions to enable access – refer to section 5.3 for gaining access using passwords.

Chapter 5 – Analysis

5.1 The Main Display

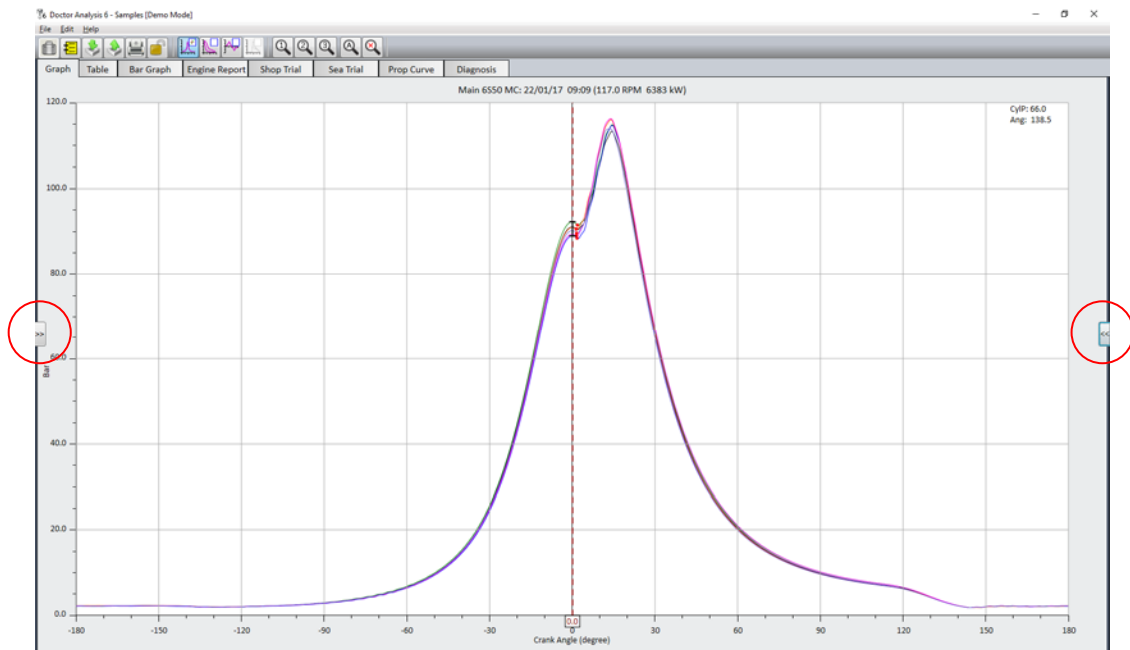
When the software is launched, the main screen will be displayed and will look similar to the one shown below. There are three panels. The one on the left shows the hierarchy of ships and engines, and is used for selecting tests in and out of the main display area. The centre panel is the main display area. At the top of the display are a range of tabs which select different views in this area. For example, graph or table views can be selected by clicking on the appropriate tab. The right panel is the cursor readout panel which shows a histogram of cylinder data and other values at the cursor position for comparison purposes when looking at graphs.

The bar with words *File*, *Edit* and *Help* is called the menu bar. The bar below with various icons is called the toolbar.



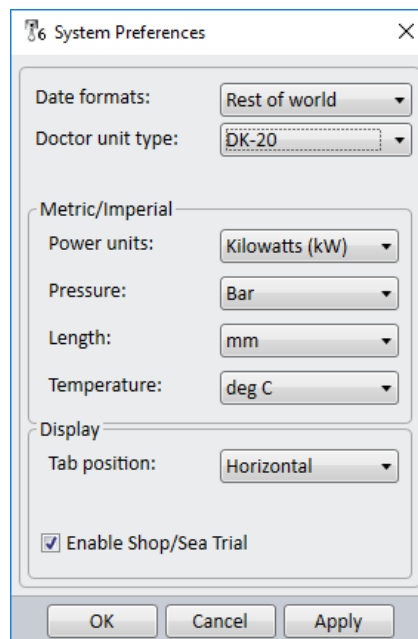
The right and left panel control buttons (circled in red) select the left and right panels in and out. If these are clicked, the main display can be expanded to the whole screen, as below.

If you wish to resize any of the panels, this can be done by dragging the thick panel border lines.



5.2 Setting your Preferences

Before you start to use the software, you should set your preferences by clicking **Edit ... System preferences**. The dialogue box below will appear. Here you can set your preferred time format, which type of instrument (DK-2 or DK-20) that you wish to work with, metric or imperial units and you can also move the graph tab positions to the top or side of the display.

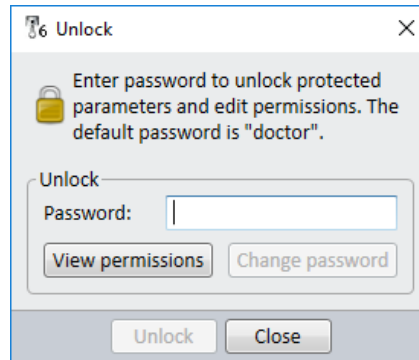


If you do not have Shop or Sea trial data, you can disable this feature here via the tick box so it does not appear as an option in the display area.

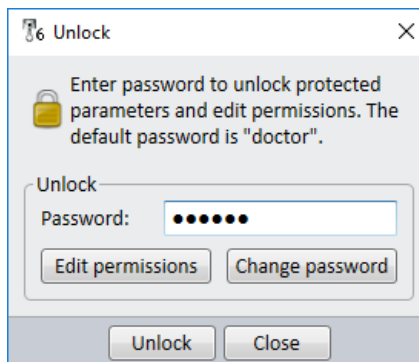
5.3 Setting your Password and Permissions

In order to prevent unauthorised personnel from changing important parameters in the software, various areas are password protected. You can choose which areas you want to protect.

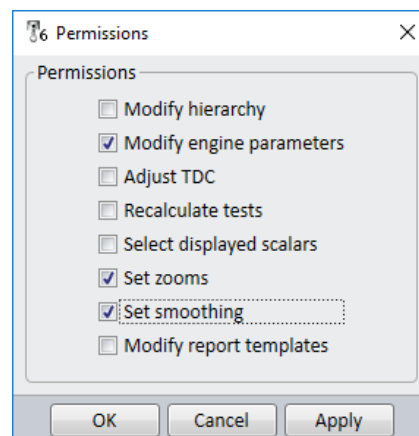
To do this, first click the padlock button  and the box below will appear.



At this point, you can click on **View permissions** but you cannot make any changes unless you enter the correct password. The default password is *doctor* and, when entered, the box will appear as below.



You can now change the password to one of your choice and change what is password protected by clicking on **Edit Permissions**. The following box will appear.



By ticking and unticking the various check boxes, you can allow or block users from making changes. A tick means that the user can make changes in that area – unticked means that it is blocked unless the correct password is entered. If you change the password, make sure that you remember it or write it down in a secure place as the default password will no longer allow access.



The padlock symbol on the toolbar indicates whether permissions are locked or unlocked. Click on the symbol at any time to access the *Unlock* dialogue box.

5.4 Selecting Tests and Measurements in the Hierarchy

The contents of all of the display modes (graph, table etc) are selected in the hierarchy. Note that a TEST is a set of individual cylinder MEASUREMENTS.

The upper window enables navigation to the particular engine or engines that you are interested in, together with the tests associated with those engines. Selecting tests in the upper window displays them in the lower window, where individual cylinder measurements, or groups of measurements, can be selected and deselected. In other words, the lower window allows you to select which tests and measurements you wish to view.

In the upper window, you can expand selections in the hierarchy by clicking the right pointing arrow to the left of an entry in the table. The arrow will then point downwards at 45 degrees. Click on the arrow again to collapse the tree. A green square indicates that that element in the table has been selected but not all sub-entries are shown. A tick indicates that everything below is on view. Examples of each are shown below.

The left screenshot shows the 'Hierarchy' tree with 'M.T. Hillary' selected. The 'Aux 1' table has three rows of data:

	RPM	kW
02/12/17 14:39	902.0	468.3
01/02/17 09:54	893.5	474.7
25/12/16 15:42	895.3	-1643

The right screenshot shows the same interface but with 'Aux 1' expanded, showing a detailed view of the selected row (02/12/17 14:39):

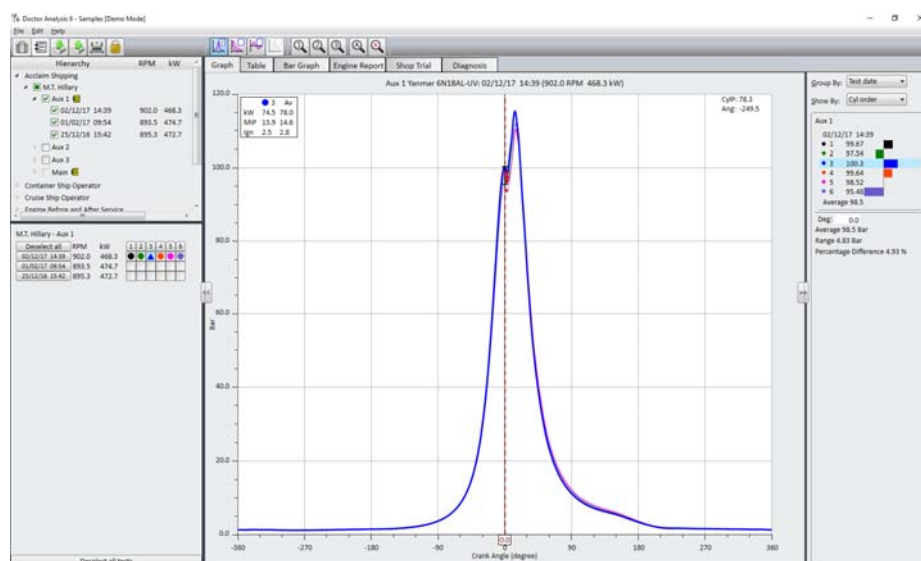
	RPM	kW
02/12/17 14:39	902.0	468.3
01/02/17 09:54	893.5	474.7
25/12/16 15:42	895.3	-1643

Note that engines of different types (eg. a 2-stroke and a 4-stroke) may not be selected at the same time as the number of cycles is different.

Individual tests can be selected and deselected in the lower window - clicking on the button on the left (with test date) selects that entire test. Clicking on a coloured dot in the array selects or deselects a particular cylinder measurement. Clicking on a cylinder on the top row does the same for an entire cylinder (to enable comparison of measurements on the same cylinder). Note that the colours of the dots correspond to the colours of the traces in the graph display and the bar on the histogram display.

The **Shift** and **Ctrl** keys on your keyboard can be used for selecting multiple tests. Holding down the **Ctrl** key while clicking on tests in the left column will display all those selected. Holding down the **Shift** key does the same but selects every test in between.

Right clicking on a test dot and selecting *Highlight Measurement* in the pop-up window highlights that particular test by applying a thicker line in the graph display as shown below. (It also provides a highlight colour on tables and histograms). The dot changes to a triangle on the array.

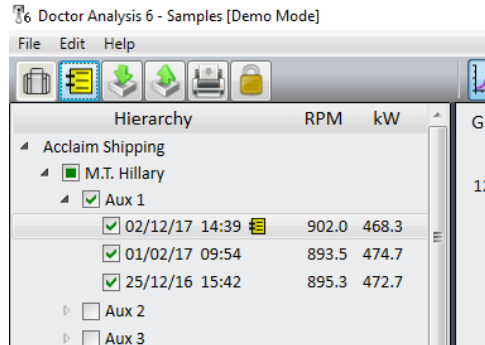


Spend a minute or so trying the various options to see how powerful the selection and deselection processes are.

Note that, if you have taken multiple measurements for one cylinder in a test, you can right click on the measurement and click *Delete measurement* and *Assign as main measurement* to select which measurement you wish to keep. This is important when a diagnosis will be carried out. These options are not available if there are no multiple measurements for an individual cylinder.

Note that, at any time, you can clear all selections by clicking on the **Deselect all tests** button at the bottom of the hierarchy panel.

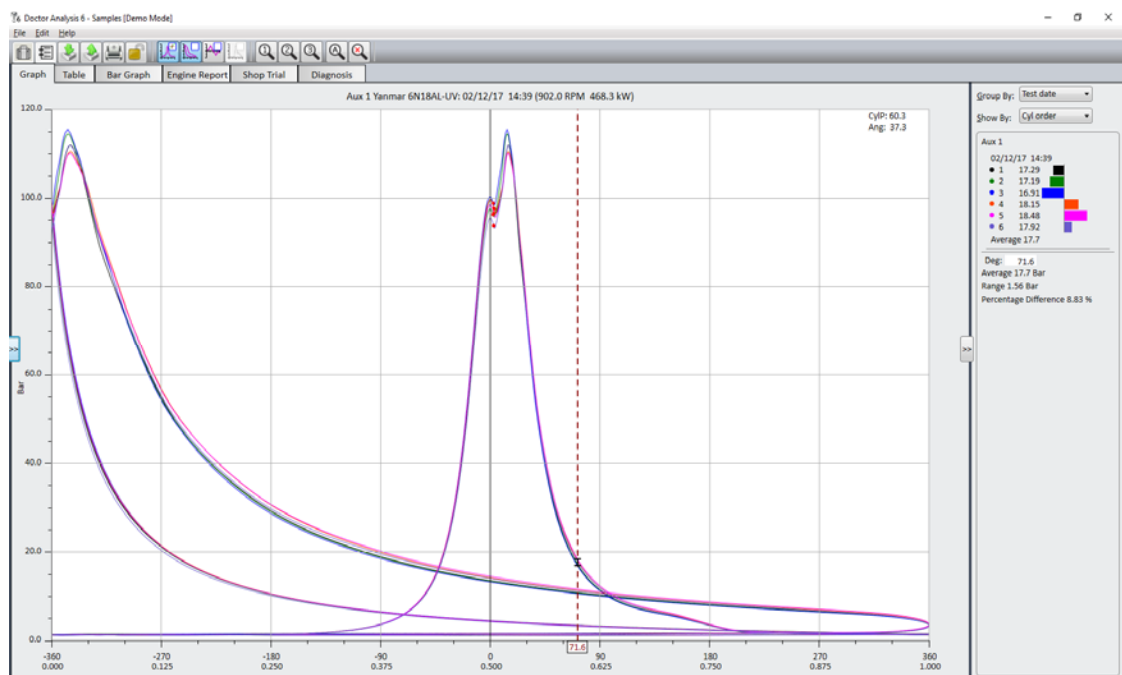
You can add a note to any engine or test in the upper window by first clicking on the required engine or test, and then clicking on the notebook symbol in the toolbar. An example of a note tagged to a test is shown below.



Once a note is added, you can click on the yellow note symbol to edit as required. To delete a note, simply select the note and delete all the text – the note symbol will then disappear.

5.5 Graph Display

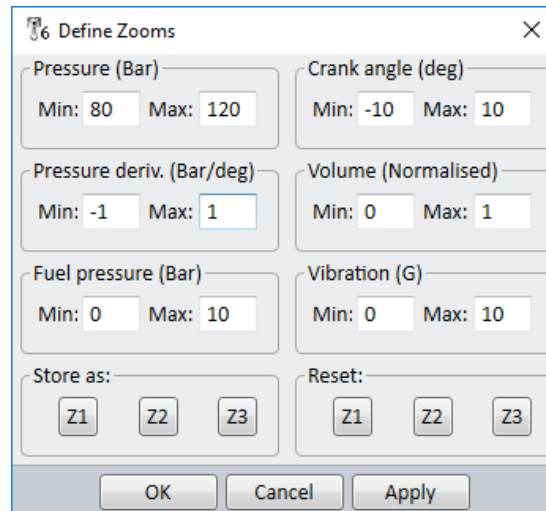
An example of a graph display with the cursor histogram panel is shown below. Graph mode is selected via the *Graph* tab.



The first thing to notice is that the three main trace types namely, P-A (pressure angle), P-V (pressure-volume) and Derivative (rate of change of

pressure versus angle) are selected using the icon in the tool bar with the corresponding symbol. Within each symbol is a cursor enable box – click on this to enable the cursor for the selected trace type. Note that if no cursor is selected, then the cursor readout panel on the right disappears.

The zoom buttons in the toolbar labelled 1, 2 and 3 enable you to define your own favourite zooms. Right click on the display area to bring up a selection box and click on **Define zoom ...**. You can store the zoom you have currently displayed immediately or define the parameters manually. Click on **Z1**, **Z2** or **Z3** in the *Store as:* panel. Zooms can be reset here also.





The 'Define Zooms' dialog box allows users to define six different zoom regions for various engine parameters. Each parameter has a 'Min' and 'Max' value field. The parameters are: Pressure (Bar), Crank angle (deg), Pressure deriv. (Bar/deg), Volume (Normalised), Fuel pressure (Bar), and Vibration (G). Below these, there are 'Store as:' buttons for Z1, Z2, and Z3, and 'Reset:' buttons for Z1, Z2, and Z3. At the bottom are 'OK', 'Cancel', and 'Apply' buttons.

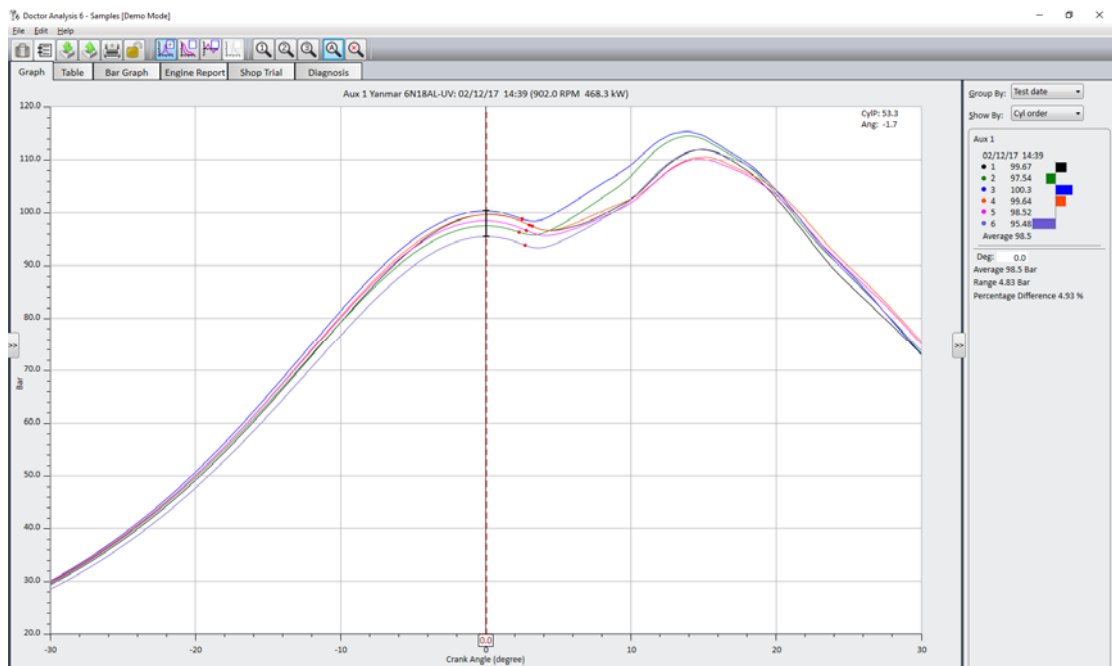
Parameter	Min	Max
Pressure (Bar)	80	120
Crank angle (deg)	-10	10
Pressure deriv. (Bar/deg)	-1	1
Volume (Normalised)	0	1
Fuel pressure (Bar)	0	10
Vibration (G)	0	10

Store as: Z1 Z2 Z3

Reset: Z1 Z2 Z3

OK Cancel Apply

In the main display screen, autozoom  zooms into the area normally of most interest around TDC. Zoom out by clicking on the  symbol. Note that the red dots on the graph curves are the ignition points calculated by the ignition point finder algorithm in the software.



The cursor can be moved by moving your mouse pointer over it, pressing the left button and dragging the cursor to the desired position. It can also be finely adjusted in 0.1 degree increments using the left and right arrow keys on your keyboard. Hold the key down for continuous movement. You can also select a desired cursor position by typing the value into the *Deg:* field in the right pane, followed by **Enter**.

Also note that there is a readout of your mouse pointer position in the top right corner of the graph which is useful for precise readouts of random positions.

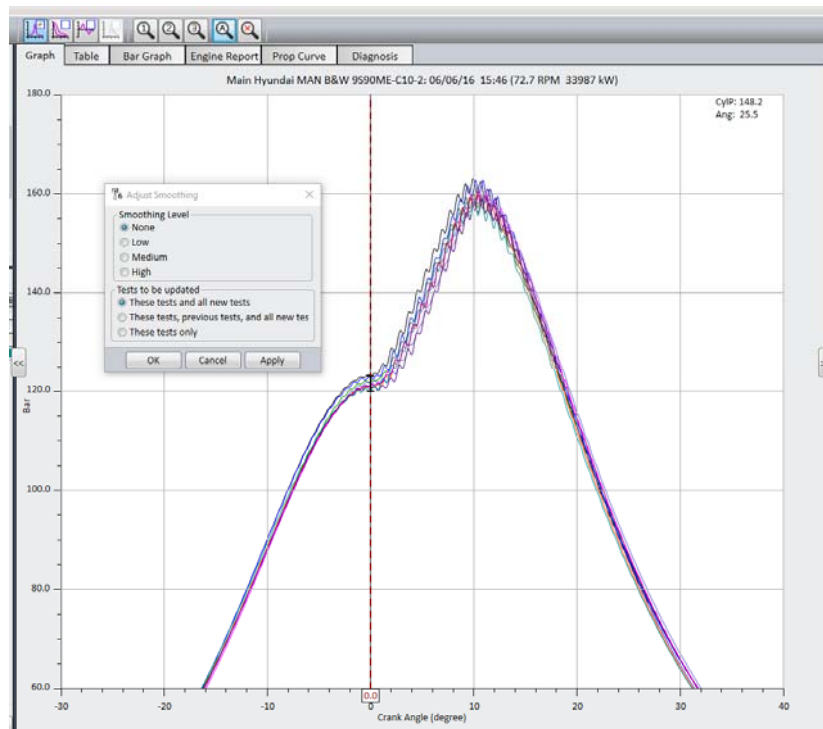
Right clicking on the display enables other advanced display features. You can:

- Manipulate zooms (define, select, and save a zoom as one of your three favourites)
- Increase or decrease the smoothing of the curves as described below
- Add or remove valve timing markers (these markers can be included in engine details)
- Add or remove the ignition point red markers
- Add or remove extrapolated curves
- Adjust the line thickness of the graph traces.

5.6 Smoothing

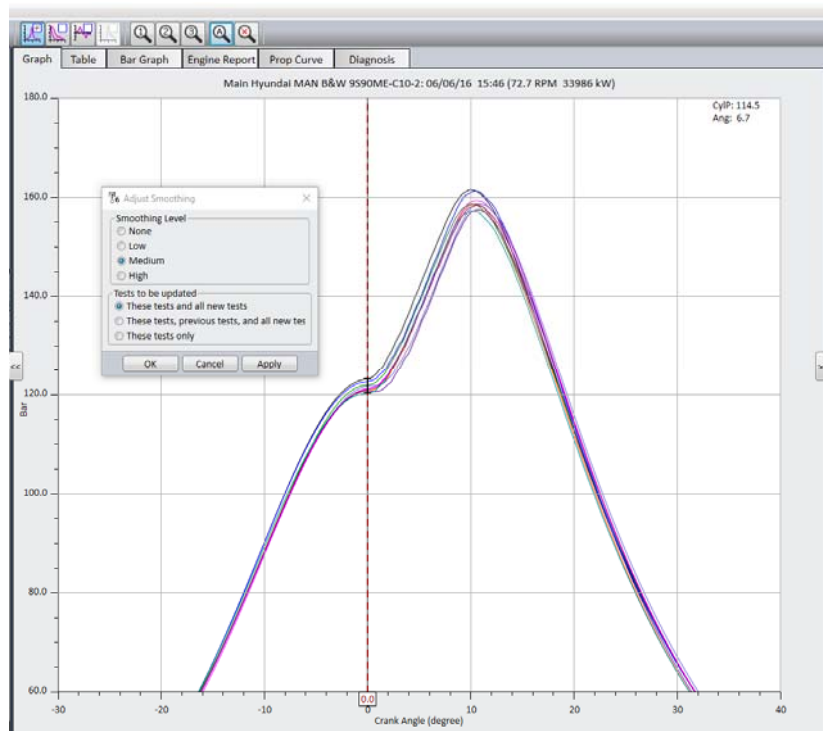
A smoothing feature has been included to remove oscillations that appear in certain traces. These oscillations occur due to acoustic resonance in the indicator valves of the engine. They are not representative of the actual pressure in the cylinder and therefore should be removed.

When smoothing is selected, a popup window appears as shown in the screen shot below.



This trace shows an example of an engine exhibiting resonance. Smoothing can be selected to be none (as above), low, medium or high levels.

The following screen shot shows the same trace as above with a medium level of smoothing applied.



The software recalculates the pressure values and peak pressures are usually reduced by a small amount. They are more accurate as without smoothing the peak of the resonance is recorded whereas with smoothing the mid-point of oscillations will be recorded.

When the appropriate level of smoothing is applied it is important to select which traces require the smoothing applied. This is done on the lower half of the popup window. The three options are:

- The tests currently displayed and all new tests
- The tests currently displayed, previous tests and all new tests (with this selection, all existing tests for this engine are automatically recalculated)
- The tests currently displayed only.

Note that, when an engine is created, the default smoothing is set to *Low*.

5.7 Table Display of Scalar Values


The Table display contains a number of selectable engine parameters known as scalars together with their values. An example of a Table display is shown below.

Parameter	22/01/17 09:09
Engine (RPM)	117.0
Pscav (bar)	1.80
MIP (bar)	14.4
Indicated Power (kW)	1054
Pmax (bar)	113.3
Pcomp (bar)	91.1
Pd (bar)	22.2
Angle of Pmax (°)	14.4
N MCR (%)	68.6
Ignition Angle (°)	1.50
SFC (g/kWhr)	176.7
ISO Pscav (bar)	1.83
ISO Pmax (bar)	114.6
ISO Pcomp (bar)	92.7
ISO Pd (bar)	22.8
ISO Texh (°C)	322.9
ISO SFC (g/kWhr)	182.1
ISO T/C 1 Exh In (°C)	351.9
ISO T/C 1 Exh Out (°C)	244.8
Texh (°C)	345.0
Torque Meter Shaft Power (kW)	6298
T/C 1 (RPM)	12500
T/C 1 In (°C)	37.0
T/C 1 Air Cool WC In (°C)	36.0
T/C 1 Air Cool WC Out (°C)	375.0
T/C 1 Exh In (°C)	264.0
T/C 1 Exh Out (°C)	76.0
Cyl Jacket WC In (°C)	85.0
Cyl Jacket WC Out (°C)	85.0
FO Temp (°C)	95.0
Fuel Pump Index	62.0
FO Flow (m³/hr)	1.15
FO SG (g/cm³)	0.964
Lower Calorific Value (kJ/kg)	44000


There are three types of entry on a table, namely

- Direct measurement from Doctor instrument (eg. RPM or Pmax)
- Calculated measurement from Doctor (eg. power or MIP)
- Manually entered scalar (eg. exhaust gas temperature)







Calculated measurements are processed and displayed automatically. Certain statistical information is also available such as totals and variations. Note that variations can be shown as a percentage or as absolute by using the *%/Abs* dropdown above the *Table* tab.

A manually entered scalar is indicated by a pencil symbol  next to it. Simply click on the appropriate field and type in the value followed by **ENTER** on your keyboard. Manually entered values are shown in italics.

The order in which scalars appear in the table can be changed by simply clicking and holding on a scalar and dragging it to the desired position.

There are certain scalars which are entered automatically but can be edited if required. One example is ignition angle. Once again, a pencil symbol  will appear next to it.

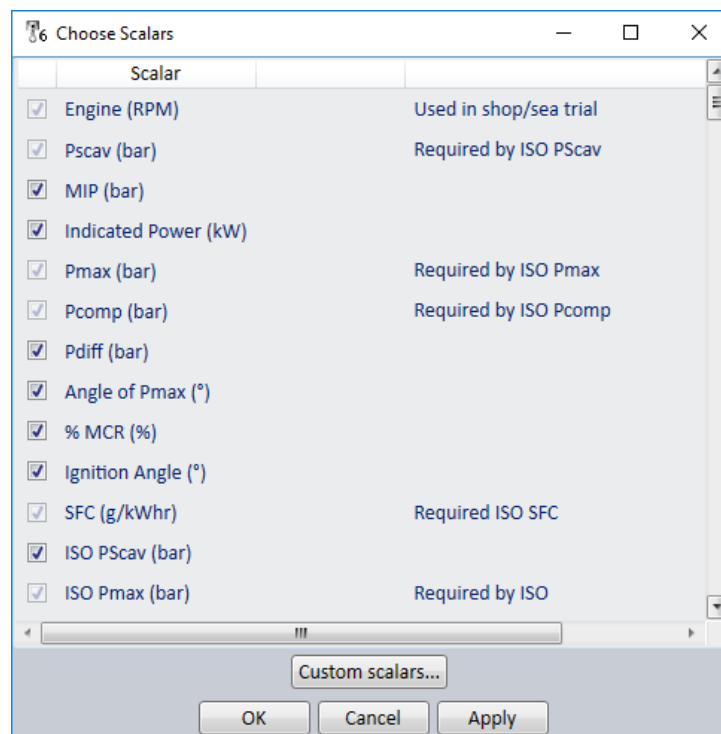
You can add parameters to the table by clicking on the **Choose scalars** button at the bottom of the table (you may have to scroll down if there are a large number of scalars selected).

FO Temp (°C)		95.0							
Fuel Pump Index		62.0	64.0	64.0	63.0	63.0	62.0	63.0	3.17
FO Flow (m³/hr)		1.15							
FO SG (g/cm³)		0.964							
Lower Calorific Value (kJ/kg)		44000							
Barom (mb)		1020							

Deselect all tests

Choose scalars

Select the scalar(s) you want by clicking on the appropriate check box(es). You can also generate your own scalar by clicking on the **Custom scalars...** button.



If a scalar appears ticked but greyed out in the *Choose Scalars* box, then it is required as part of a calculation elsewhere and cannot be deselected. The reason is given next to the scalar in question.

The order of scalars in the *Choose Scalars* box is as per the table. Scalars that are not selected and are available for selection are then shown in alphabetical order.

Scalars can be “ISO Normalised” to take account of the differing ambient conditions that an engine might be operating in in different parts of the world. ISO normalised scalars have the letters *ISO* in front of the text. Refer to the next section for a discussion on ISO normalised scalars.

5.8 ISO Normalisation

ISO normalisation to ambient conditions is desirable when comparing measurements taken at different times to facilitate reliable comparisons. The Doctor program makes available certain scalars where the ISO normalisation calculations will be made automatically by the program as long as

1. ISO normalisation is selected in the engine geometry window. The method used can be selected as MAN B&W or Wartsila/Sulzer standard.

Engine (M.T. Hillary - Main)

Geometry DK-20 settings

General Information

Engine name: Main

Engine model: 6S50 MC

Engine type: Two Stroke Bore: 500.00 mm

Cylinder configuration: Inline Stroke: 1910.00 mm

Number of cylinders: 6 Con rod length: 2190.00 mm

Firing order: 1-5-3-4-2-6

ISO normalisation: MAN B&W

MCR: 8580 kW

RPM at MCR: 127.0 RPM

Losses at MCR: 7.0 %

Max rated indicated power: 9226 kW

Valve timing Choose scalars Shop trial Sea trial

OK Cancel Apply

2. The non-normalised values for the scalar are entered.
3. Certain additional essential scalar values used in the normalisation formulae are manually entered in the table view for each measurement.

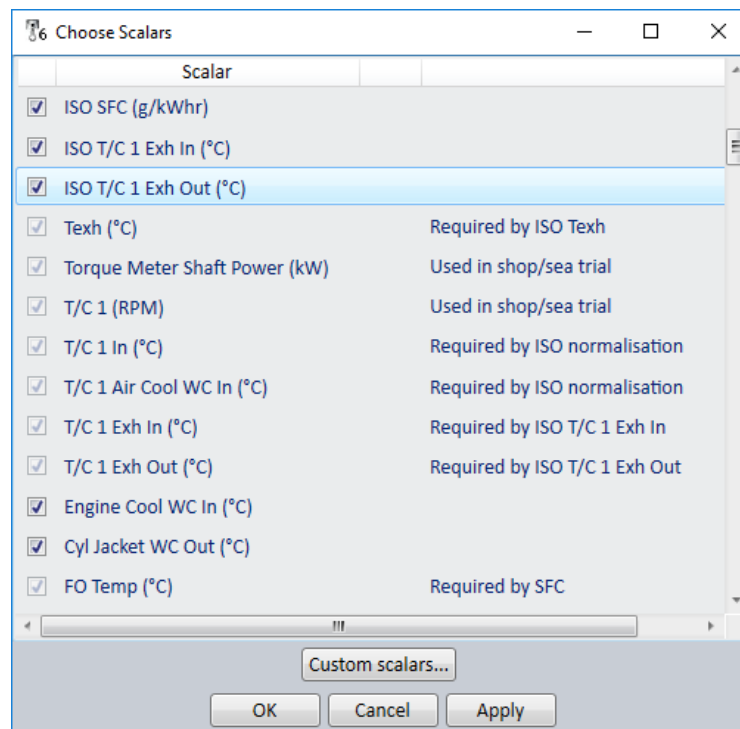
For MAN B&W normalisation the ambient values required are (values for up to four turbochargers can be selected):

- *T/C 1 In* (°C): the ambient turbocharger air inlet temperature.
- *T/C 1 Air Cool WC In* (°C): the cooling water inlet temperature to the air cooler.

For Wartsila/Sulzer normalisation the ambient values required are:

- *T/C 1 In* (°C): the ambient turbocharger air inlet temperature.
- *T/C 1 Tscav Aft. Cooler*: the ambient scavenge air pressure after cooler.
- *Barom* (mb): atmospheric pressure

Enter values for the number of turbochargers on the engine. These required scalars are automatically included in the scalar table when ISO normalisation is selected as shown in the *Choose Scalars* window below.



If no ISO normalisation is required then select *None* in the engine geometry window and do not select any ISO normalised values.

If ISO normalised values are required but are calculated manually then select *None* in the engine geometry window, then select the ISO values as scalars. In this case, the values required for the MAN/Wartsila formulae need not be entered in the program and manually calculated values can be entered in the scalar table view.

For Shop/Sea trial comparisons ISO normalised or non-ISO normalised values can be selected as desired.

The scalars available for automatic ISO normalisation are:

ISO Pcomp (bar)

ISO Pdiff (bar)

ISO Pfire (bar)

ISO Pmax (bar)

ISO Pscav (bar)

ISP Ptdc (bar)

ISO SFC (g/kWhr)). Note ISO SFC calculation requires Lower Calorific Value of the FO to be entered in addition to others.

ISO T/C y ExhIn (°C) (Where y = 1-4)

ISO T/C y Exh Out (°C) (Where y = 1-4)

ISO T/C y In (°C) (Where y = 1-4)

ISO T/C y Out (°C) (Where y = 1-4)

ISO Texh (°C)

5.9 Specific Fuel Consumption (SFC)

SFC can be automatically calculated by the program in the same way as ISO normalised values. It can also be entered manually if preferred by selecting the scalar *Manual SFC* (g/kWhr)

If calculated by the program then the following scalar values are required:

FO Flow (m³/hr)

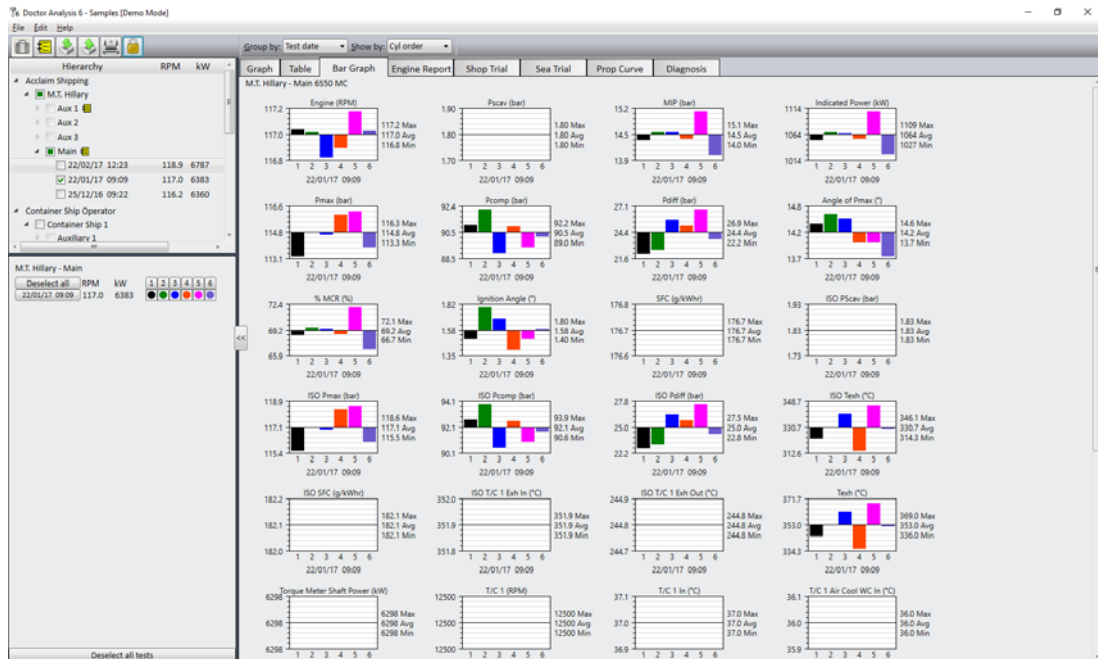
FO SG (g/cm³)

FO Temp (°C)

Please note that if ISO normalised SFC is selected then the additional scalar of Lower Calorific Value (kJ/kg) will automatically be selected and manual values must also be entered.

5.10 Bar Graph Display

An example of a Bar Graph display is shown below. The Bar Graph displays the same scalars as in the Table display and the bar graphs shown are selected using the **Choose scalars** button as in Table view.



Bar graphs are useful for comparing cylinder readings. Cylinders can be displayed in sequence (1,2, 3 etc) or in firing order, and grouped by test date or cylinder using the drop down selections above the *Bar Graph* tab.

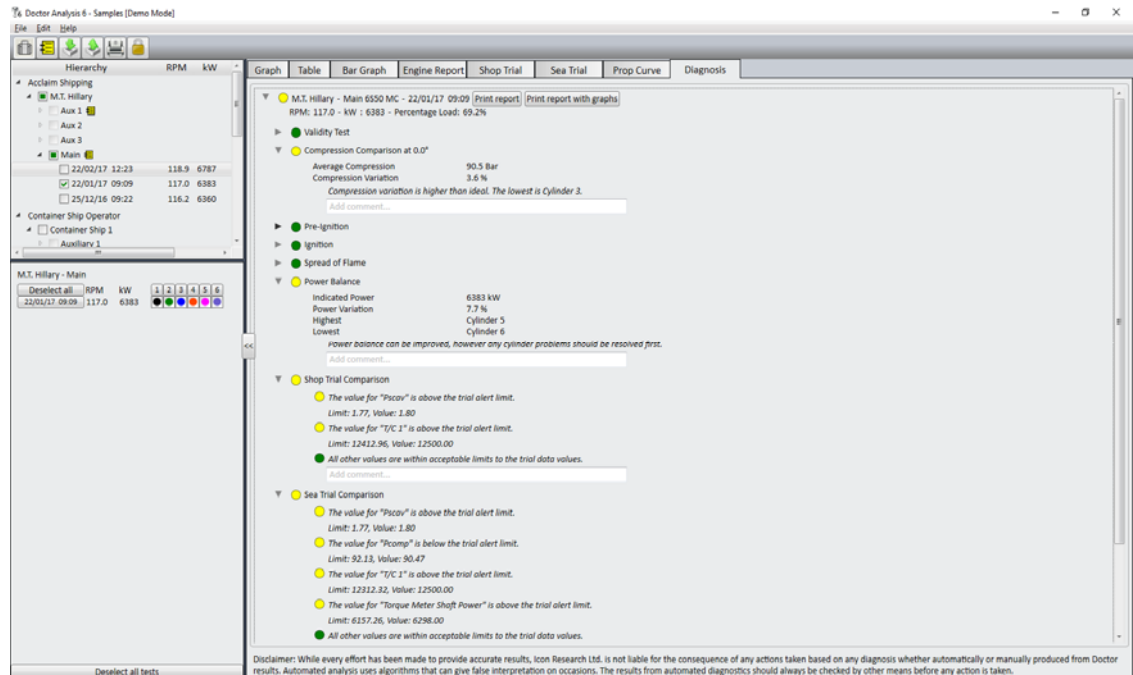
Tests are selected and deselected in the *Hierarchy* panel in the usual way. Right-click on a barchart to select *Relative*, *Relative %* or *Absolute* displays.

5.11 Engine Reports

The Doctor software automatically creates standard engine performance reports whose format can be customised to meet company standards. Refer to Chapter 7 for an explanation of how to set up and generate engine reports.

5.12 Diagnosis

The Doctor software contains powerful diagnostics capability and these functions are selected by clicking on the **Diagnosis** tab. An example of a real diagnosis is shown below with some sections expanded to reveal more details on the diagnosis.



The diagnostics operate on a "traffic light" system. Green means that all appears good, yellow is a warning of a minor or possibly impending problem and red means that some further investigation should be carried out. The software contains a sophisticated rule base that automatically generates the diagnosis. A condensed report (ie. the summary page) or a full report with graphical backup can be printed in pdf format using the **Print report** and **Print report with graphs** buttons.

A window is available to add notes for each diagnostic, or an overall comment at the end.

Automated diagnostics require the traces for a test to be in good condition and properly adjusted for TDC position. Also, the ignition point for each cylinder must be correctly identified.

Quality of Traces: Validity checks are incorporated and can identify measurements taken with the indicator valve closed, faulty indicator valves, clogged indicator passageways, and a variety of other conditions that can affect the accuracy of results. The diagnostic routines will identify most questionable traces, however in some cases suspect readings may not be identified. Traces should be checked visually to ensure they are of good quality with no "electronic" interference, or no effects from clogged indicator

passageways or faulty indicator cocks. The traces should be smooth and free of glitches.

Position of Traces: The TDC reference must be correctly set. If traces are not positioned correctly relative to TDC, then the calculated power will be incorrect. Note that TDC setting is a service offered by Icon Research and is free of charge on new systems for initial readings. Send a logbook of the tests in question to doctor@iconresearch.co.uk for this service.

Ignition Points: The ignition point for each trace must be correct for the analysis module to work properly. The Doctor application automatically identifies ignition points but the algorithm can occasionally fail to find an ignition point especially if the traces are of poor quality. In these cases the system will prompt you to enter a value. In a very few other cases the application may identify ignition incorrectly, and in these cases, you should manually alter the value that the system has generated in the Table view. Double click on the entry in the table and a new value can be entered as shown below. Contact doctor@iconresearch.co.uk for more information on manual identification of ignition points.

Doctor Analysis 6 - Samples [Demo Mode]

File Edit Help

Cylinder variances: Percent

Graph Table Bar Graph Engine Report Shop Trial Sea Trial Prop Curve Diagnosis

M.T. Hillary - Main 6S50 MC

22/01/17 09:09

	1	2	3	4	5	6	Av.	% Var.	Total
Engine (RPM)	117.0	117.0	116.8	116.9	117.2	117.0	117.0	0.325	
Pscav (bar)				1.80					
MIP (bar)	14.4	14.6	14.6	14.5	15.1	14.0	14.5	7.56	
Indicated Power (kW)	1054	1069	1067	1056	1109	1027	1064	7.70	6383
Pmax (bar)	113.3	114.9	114.7	116.1	116.3	113.9	114.8	2.60	
Pcomp (bar)	91.1	92.2	89.0	90.9	89.4	90.2	90.5	3.61	
Pdiff (bar)	22.2	22.6	25.7	25.1	26.9	23.7	24.4	19.1	
Angle of Pmax (°)	14.4	14.6	14.5	14.0	14.0	13.7	14.2	6.34	
% MCR (%)	68.6	69.5	69.4	68.7	72.1	66.7	69.2	7.83	
Ignition Angle (°)	1.50	1.80	1.70	1.40	1.50	1.60	1.58	25.26	
SFC (g/kWhr)							176.7		
ISO Pscav (bar)							1.83		
ISO Pmax (bar)	115.5	117.1	117.0	118.4	118.6	116.2	117.1	2.60	
ISO Pcomp (bar)	92.7	93.9	90.6	92.6	91.0	91.8	92.1	3.61	
ISO Pdiff (bar)	22.8	23.2	26.4	25.8	27.5	24.3	25.0	18.9	

Hierarchy RPM kW

Acclaim Shipping

M.T. Hillary

Aux 1

Aux 2

Aux 3

Main

22/02/17 12:23 118.9 6787

22/01/17 09:09 117.0 6383

25/12/16 09:22 116.2 6360

Container Ship Operator

Container Ship 1

Auxiliary 1

M.T. Hillary - Main

Deselect all RPM kW

22/01/17 09:09 117.0 6383

1 2 3 4 5 6

Disclaimer:

While every attempt is made to optimise the accuracy of a diagnosis, attention should be paid to the disclaimer at the foot of the display.

5.13 Shop/Sea Trial

The Doctor V6 software offers a means to quickly and easily compare key parameters of your engine's performance against the tests made during shop or sea trial tests. Even if the sea or shop trial is not available the analysis software can be used to compare performance trends of your engines against one or more known reference tests.

The original shop/sea trial data (or data from a reference test) must be entered for each engine. This is the data that new tests will be compared against.

Icon Research offers a setup service for shop and sea trial whereby the customer provides the scalars they wish to measure along with data from shop and/or sea trials. Icon then enters the data and it will be available in the custom logbook provided to the customer with the system.

The scalars used in shop and sea trial analysis to be measured against different load levels are flexible and can be selected by the customer as required.

For the setup service Icon Research provides a standard Excel spreadsheet with a number of default scalars. It is possible to select your own scalars and add them to the form.

ISO normalisation, either using formulae from MAN or Wartsila, can be selected. This is described in section 5.8.

Thresholds for alerts and alarms should also be entered. These will trigger appropriate warnings in the diagnostic reporter module.

If required, contact Icon Research for a copy of the spreadsheet that should be completed for a shop/sea trial setup.

Entering Shop/Sea Trial Data

Icon Research offers a setup service for shop and sea trial data but it is possible for users to enter data themselves.

Separate buttons exist for entry of shop or sea trial. In either case the process is identical. The following is an example of how to enter sea trial data.

In the *Hierarchy* panel, right-click the engine which the data refers to and click on **Edit**. You will see the screen below:

Engine (M.T. Hillary - Aux 1)

Geometry DK-20 settings

General Information

Engine name: Aux 1

Engine model: Yanmar 6N18AL-UV

Engine type: Four Stroke Bore: 180.00 mm

Cylinder configuration: Inline Stroke: 280.00 mm

Number of cylinders: 6 Con rod length: 500.00 mm

Firing order: 1-4-2-6-3-5

MCR: 550.0 kW

RPM at MCR: 900.0 RPM

ISO normalisation: None Losses at MCR: 12.5 %

Max rated indicated power: 628.6 kW

Valve timing Choose scalars Shop trial Sea trial

OK Cancel Apply

Now click on **Shop Trial** or **Sea Trial**. You can apply different data in each trial. In this example, we have selected *Shop Trial*. This brings up the Shop Trial Setup Screen as below. It may be necessary to enter the password to enable editing.

Shop Trial Setup

Shop trial setup

% Load 60 65 70 75 80 85 90 95 100 105 Hi Alarm Hi Alert Lo Alert Lo Alarm % or Units

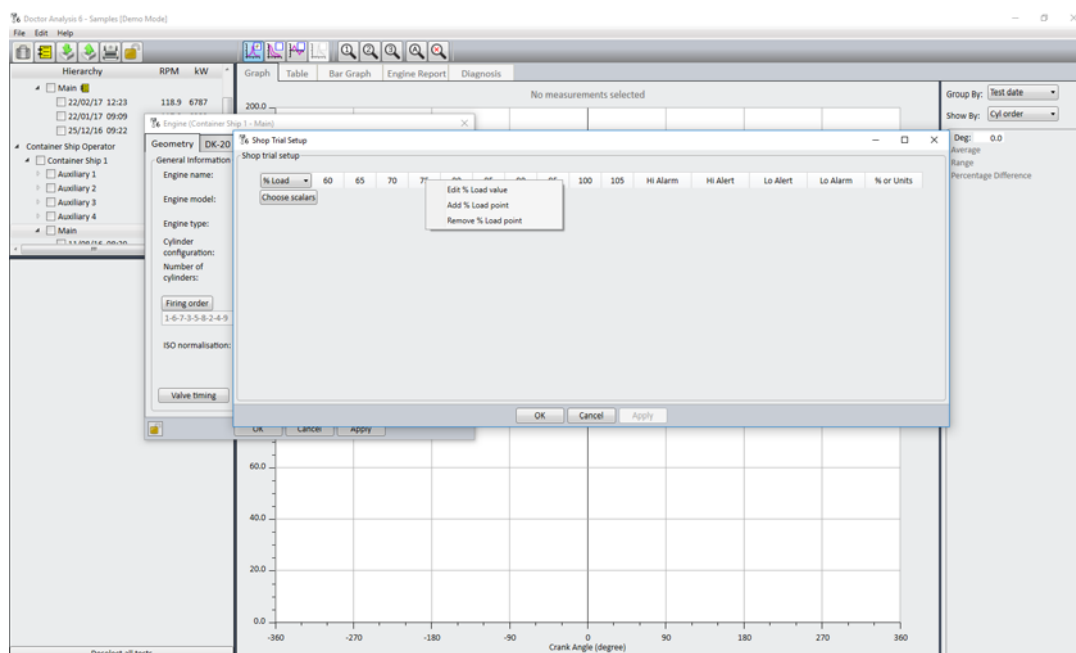
Choose scalars

OK Cancel Apply

The setup procedure is as follows:

1. First, using the drop-down, select whether you wish the x-axis of the graph to be %Load or RPM. In our example, we have selected %Load

2. Next, define the % load points at which tests have been carried out. To do this, right click on a load point in the top row at which point you can edit, add or remove a % load point, as shown below.



3. You are now ready to select the scalars that you wish to enter shop trial data for. To do this, click **Choose scalars** as in the screen below. Select the scalars that you wish to measure, then click **Apply** and then **OK**. Note that you can add and remove scalars at any time by checking and unchecking the corresponding tick boxes under **Choose Scalars**. The scalars you have selected will now appear in the shop trial setup chart and you can enter the data for each load point. For each scalar and at each %Load point, enter the shop trial value. Then enter the alert and alarm limits that you wish to set.

It is necessary to select high and low threshold levels for both alarm and alerts by clicking on the appropriate cell under *Hi Alert*, *Lo Alert*, *Hi Alarm* and *Lo Alarm* and entering either a % or an absolute figure. The *% or Absolute number* is selected on the final column of the table. Each parameter selected will then have a black nominal performance curve along with amber thresholds for *alert* levels and red threshold curves for *alarm* levels.

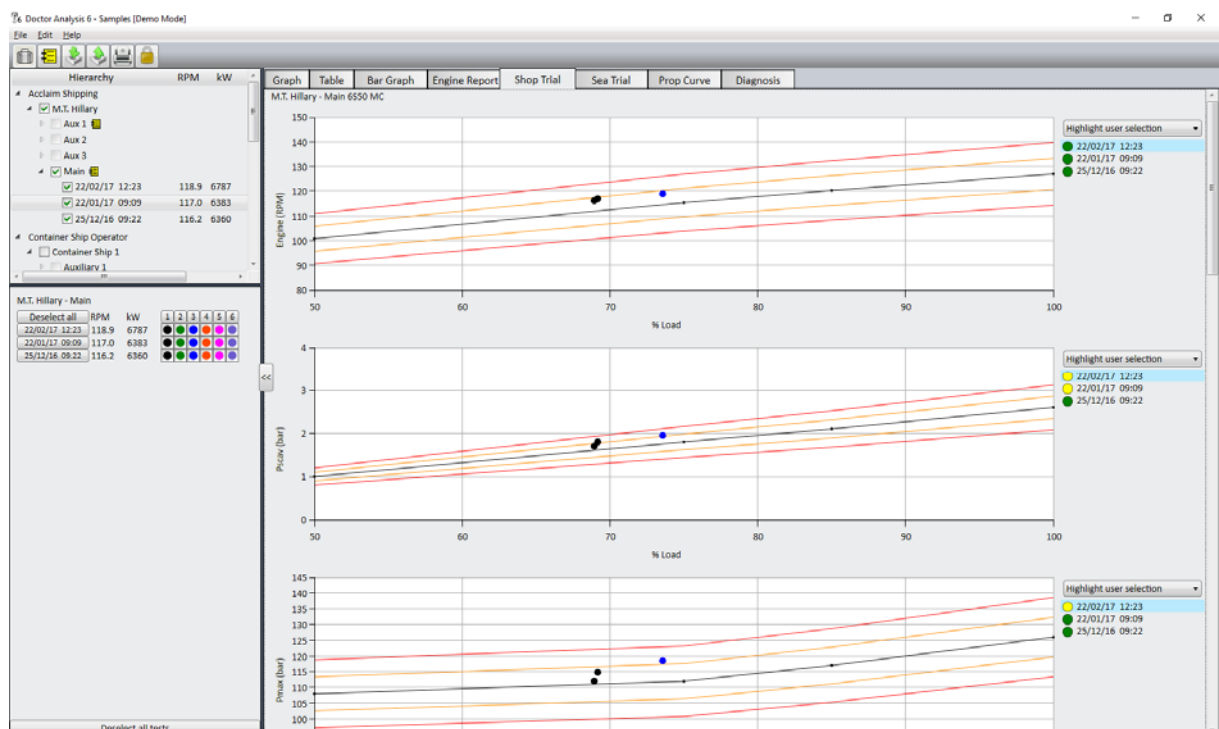
Where appropriate ISO normalised data should be entered to provide as accurate a comparison as possible. The screen below shows an example of a single scalar setup (in this case, *ISO Pmax*).

In our example, we have selected Pmax as a scalar and entered shop trial data and % alert/alarm limits to produce the chart below.



Reviewing Shop and Sea Trial Comparisons

Each time an engine test is made, the measurement data can be automatically compared to the shop or sea trial data. The crew may need to enter manual scalars into the Table section if these are part of the comparison. The comparisons make it possible to quickly see if any parameters are deviating outside the alert or alarm levels. Click on the *Shop Trial* or *Sea Trial* tab and results of tests appear as black dots on the charts. Any transgressions above these alarm levels will also be highlighted in the diagnosis section of the software. The example below shows a *Shop Trial* comparison.



The panel on the right shows the deviation of a test compared with alert and alarm limits. A yellow circle means that the alert level has been exceeded and a red circle means that an alarm level has been exceeded. Clicking on a test in the right panel changes the corresponding black dot on the chart to blue to highlight the test.

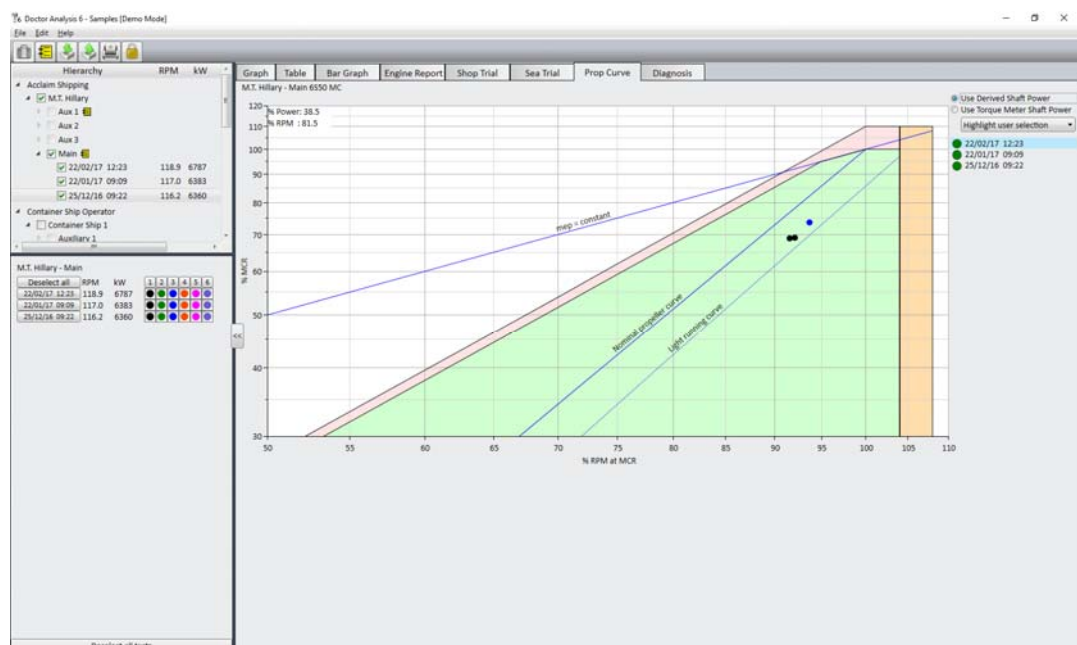
You can also limit the number of tests to the most recent ones using the *Highlight user selection* dropdown in the top right corner.

5.14 Propeller Curves

The application provides a standard propeller curve chart which plots % MCR against % RPM @ MCR. It is essential that the value of *RPM at MCR* is included in the *Engine Details* form (right click on the engine in the hierarchy – refer to section 6.8 for details). Results of engine tests are automatically plotted on this chart which provides instant analysis on the operating point of the engine.

Click on the *Prop Curve* tab. Selected test results appear as black dots on the chart. If the cursor is held over a black dot the date and time of the reading are displayed. The values of % power and % RPM are continuously shown on the upper-left hand corner of the chart.

Any test results which show an engine being operated in an overloaded state can be viewed immediately and are also highlighted in the diagnostic section of the application.



The propeller curve requires “shaft” or “effective” power values. As the Doctor system measures indicated power (ie. the power from the cylinders) an estimate of shaft power is calculated and used for propeller curve analysis. This is selected using the button labelled *Use Derived Shaft Power* in the top right of the screen. If a value of shaft power is available from another instrument and the scalar *Torque Meter Shaft Power* has been selected and the value entered in the Table (refer to section 5.7), then that value can be used by selecting *Use Torque Meter Shaft Power*.

You can also limit the number of tests to the most recent ones using the *Highlight user selection* dropdown in the top right corner.

Chapter 6 – Setting Up Your System

6.1 Introduction

This chapter explains how to set up your system from the beginning if you have not received a customised logbook from Icon Research. Details of how to set up your own hierarchy of engines are shown.

6.2 Importing and Exporting Data

Version 6 of the Doctor Analysis software introduces the concept of libraries and logbooks for the handling of data. Databases from previous version 5.x program can be imported directly into the new software and stored along with new data.

There are two main file types used by Doctor analysis version 6 software:


Logbooks (.ilb)

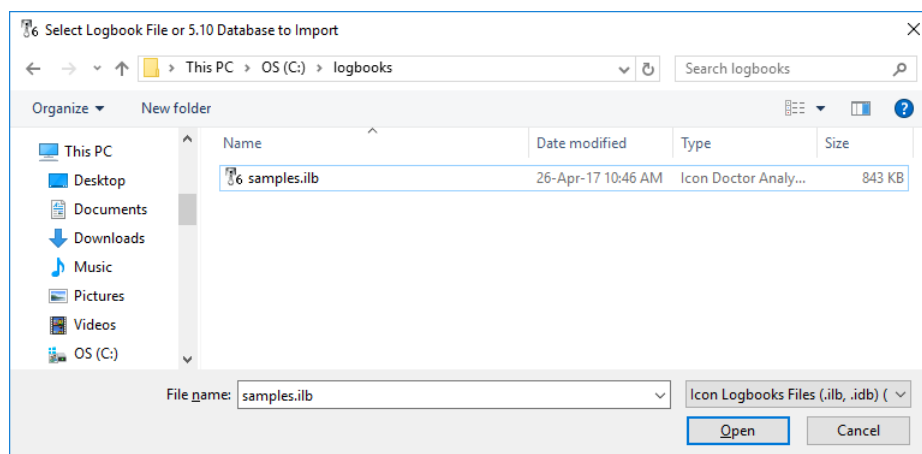
Logbooks are compressed files that are used to transfer data, for example, between the vessel and the shore office. A logbook is what is provided by Icon research for the initial setup. Logbooks cannot be modified.

Libraries (.idl)

Libraries are where all engine and test result data is stored either on the vessel or in the shore office. On the vessel it is envisaged that only test data taken for that ships' engines are stored whereas in the shore office the superintendent can have his whole fleet conveniently stored in his library. Excerpts of libraries can be exported as logbooks which are for emailing to and from vessels.

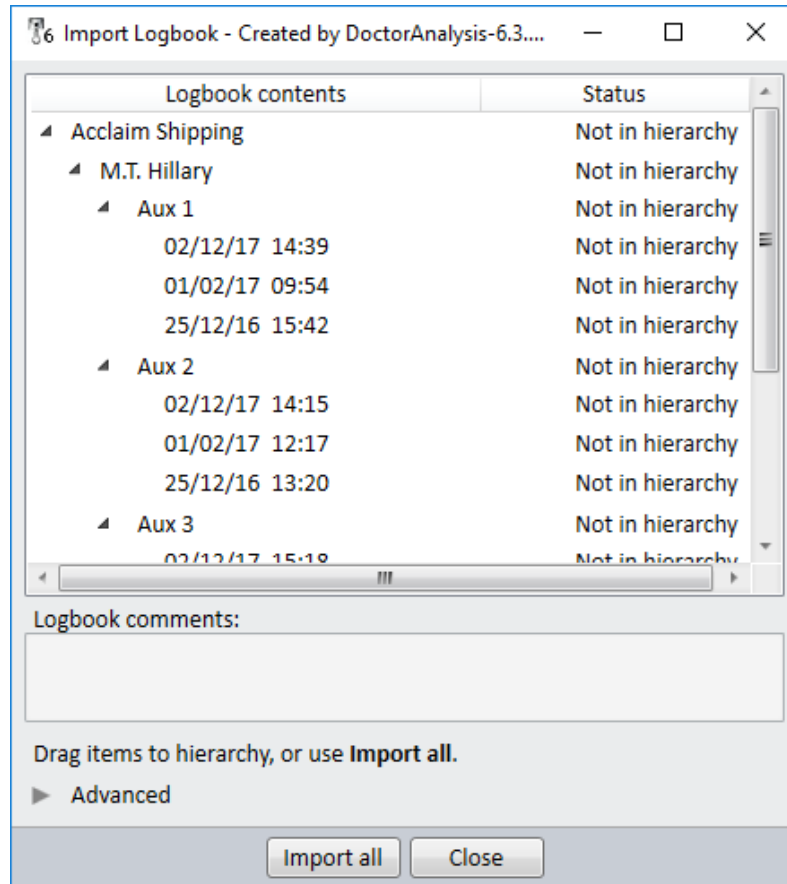
6.3 Importing Version 6 Logbooks

To import a logbook, select the Import button . You will be presented with the following screen:



Browse to the appropriate location, select the logbook that you wish to import (.ilb file), and click **Open**.

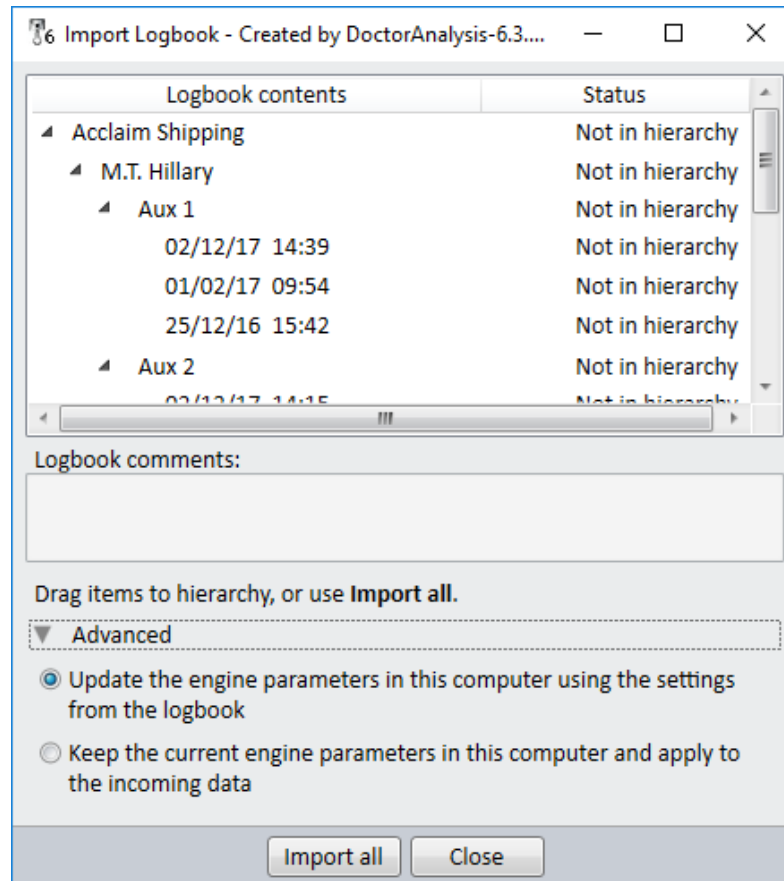
You will now see a screen similar to the one below:



At this stage you have the opportunity to **Import all** the data shown or drag only the data you wish to the **Hierarchy** section. When you have transferred the data you wish, click **Close**.

Note that you can update or retain engine parameters by clicking on the **Advanced** button. The screen below will appear. Select the appropriate radio button whether you wish to update the engine parameters to those contained in the logbook or retain those already in your library.

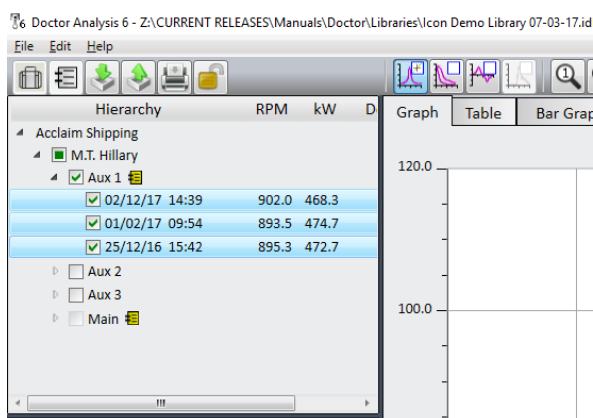
Also note that when the *Update the engine ... logbook* option is selected, there is no change to existing tests unless a recalculation is carried out.



Recalculating Previous Readings

If you are importing the logbook into a library holding existing readings you can recalculate these readings based on the new engine parameters. The procedure is as follows:

1. Select an engine by clicking on the arrow to the left of the name of that engine. Select the readings to be recalculated by left clicking on them. To select a number of individual engines press **Ctrl** and at the same time as clicking the engine with the mouse button. To select a range of contiguous readings, click on the first engine to be recalculated then select **Shift** and then click on the last reading in the list to be recalculated. The reading values must be highlighted in blue (see picture below) which indicates they are correctly selected.



2. Next right click on the mouse and select **Recalculate**. You will be asked to confirm, so accept this. All tests will now be updated with values calculated using the imported engine parameters.

6.4 Importing Version 5 Logbooks

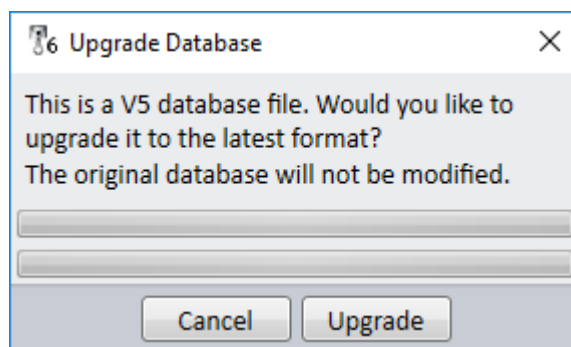
Any software version 5.x may be imported. To import any pre-version 5 software, contact Icon Research who can assist.

To import a version 5 database (.idb) click the Import button.

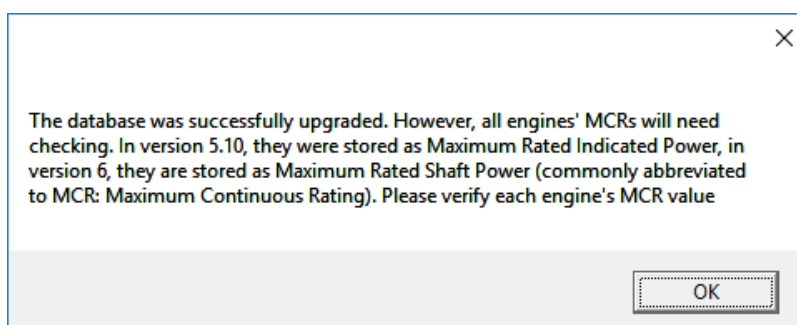


You will then be asked for the file name. Browse to the appropriate location, select the file you wish (.idb) and click **Open**.

You will be presented with the *Upgrade Database* screen:



Click **Upgrade**. You will see the following message:



At this stage you have the opportunity to Import all the data shown or drag only the data you wish to the *Hierarchy* panel. When you have transferred the data you wish click **Close**.

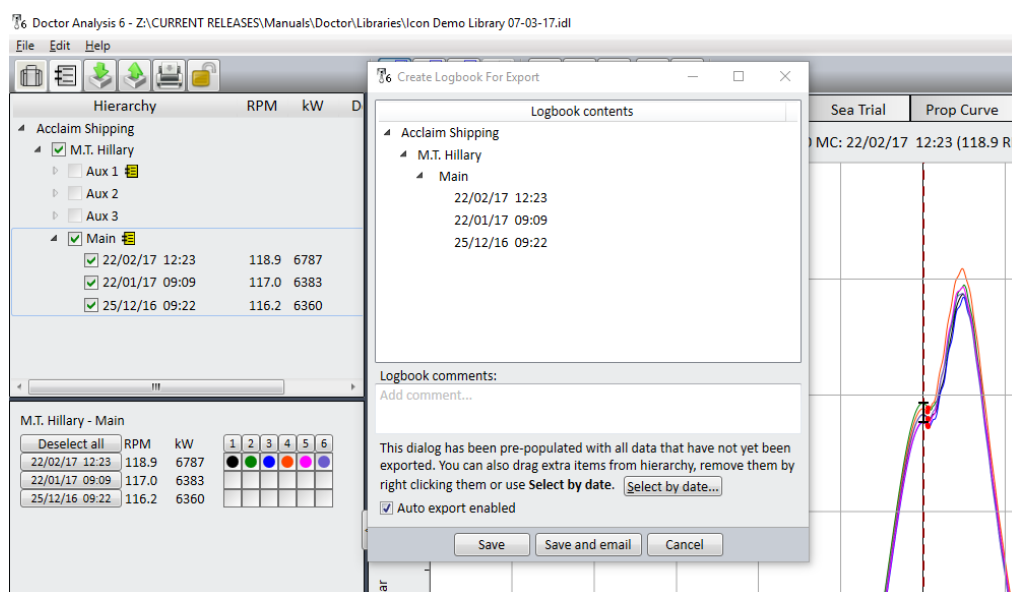
Ensure that the correct figures for MCR are included in your new logbook.

6.5 Exporting Data via Logbooks

Once you have taken measurements using the Doctor instrument and downloaded these to your computer, the measurements will be held in the Doctor library on your computer. You will be able to export all or some of this data to a logbook which you specify, for forwarding to another location (eg. the office on-shore).

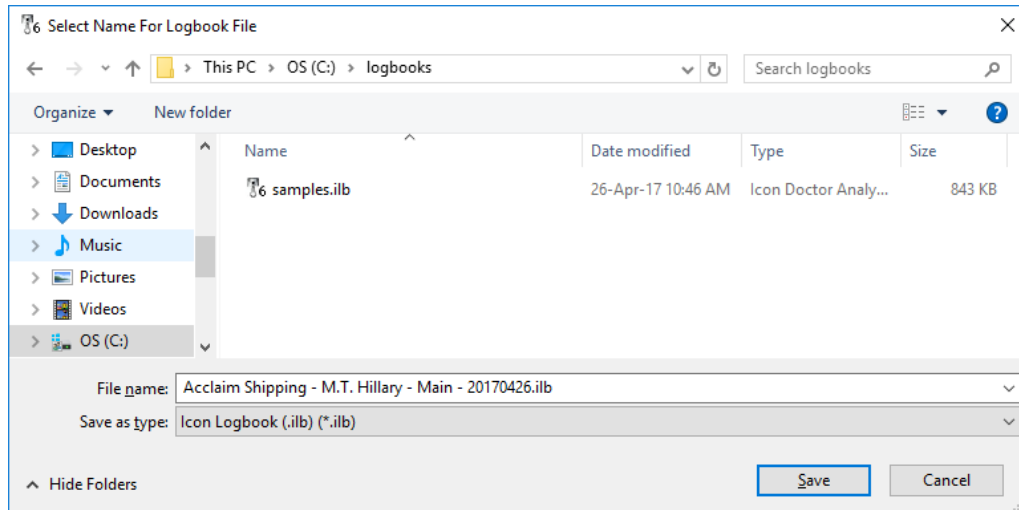


Click the Export Logbook icon. You will then be asked to *Create Logbook For Export*. If you have the *Auto export enabled* tick box selected, the dialogue box will contain all data that has not yet been exported. Otherwise the dialogue box will be empty and you can drag over the tests that you require. Data can be removed by right clicking on it and removing it. Or it can be added to by dragging more data from the hierarchy window. In the example below, data for the *Main Engine* on the *MT Hillary* has been selected.



Click **Save** and the following screen appears. Give your logbook the name you wish and save it in an appropriate location. Alternatively, you can click on **Save and email** and your logbook will automatically be attached to an email in your default mail service.

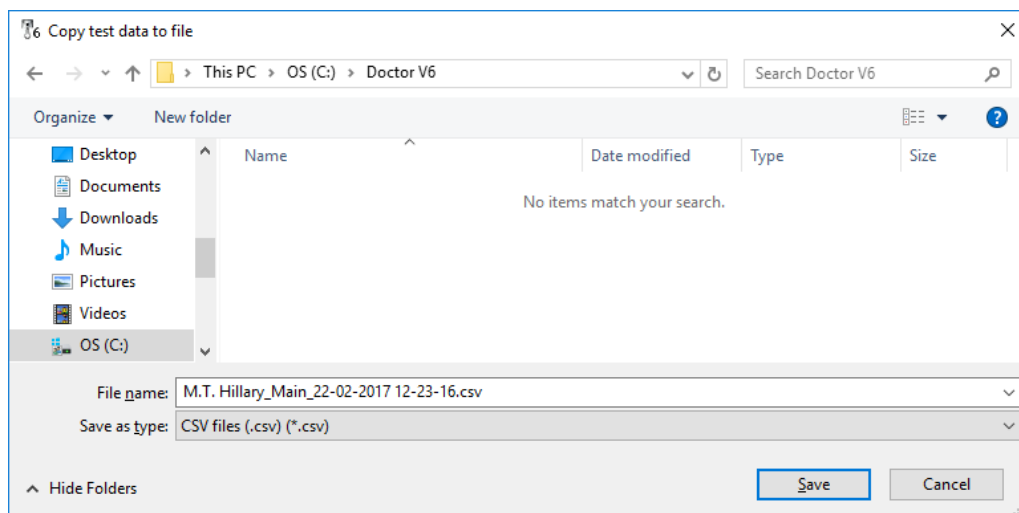
Hint: If there is a lot of data in the *Logbook Contents* window, you can unclick the *Auto export enabled* tick box to clear the contents, and then select the tests you wish.



6.6 Exporting to Other Applications

It is possible to export raw data from any test to a Comma-Separated Values (CSV) file for use by other applications such as Excel.

In the *Hierarchy* panel, select the reading you wish to export and right click. Select the option **Copy to CSV file**. Select a file name and save in the appropriate place.



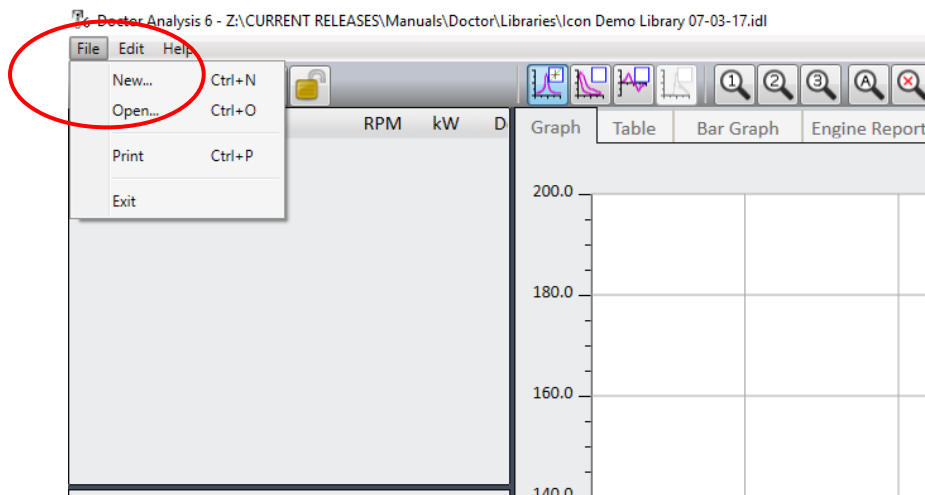
6.7 Creating a New Library for Your Vessel

A library is a file which contains all the information about vessels and engines and is where your test results are stored. A library file has the suffix *.idl* (icon doctor library) eg. *myship.idl*.

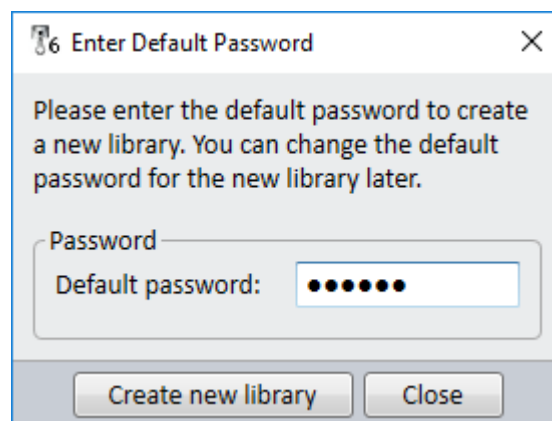
Within the library is a hierarchy containing a tree of how you want to organise your vessels. At the top of the hierarchy is the Operator (typically your company or division name). Below this you will have one or more vessels identified by their names. Under each vessel will be one or more engines.

When the software is installed, a template library is installed for you. The following is an example of how to set up your own hierarchy within the library.

Start the Doctor application. Click on **File** in the top menu bar, as shown below:

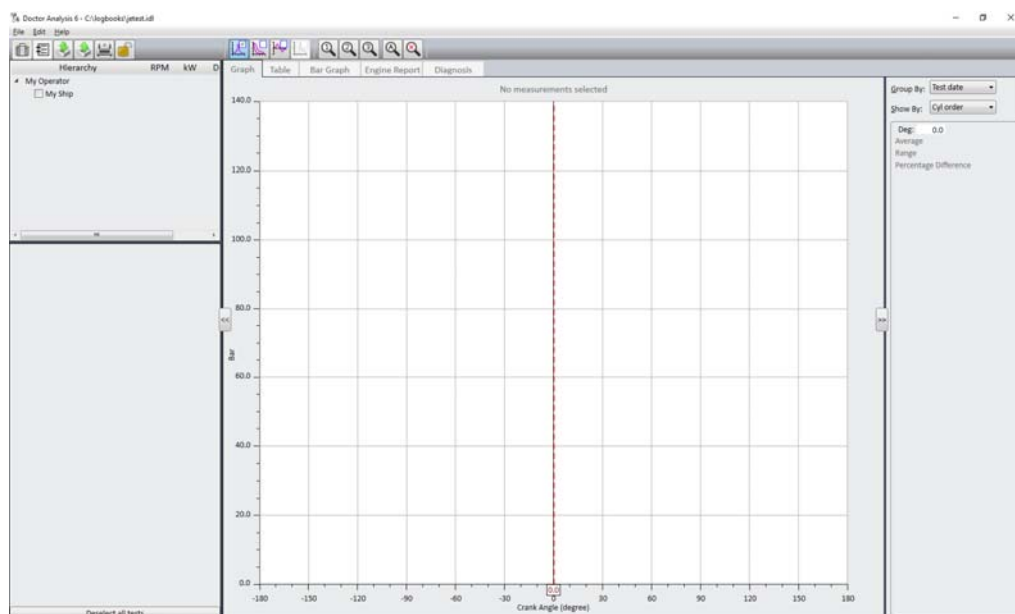


Now click **New**. If you have not already unlocked your software, the following screen will appear:



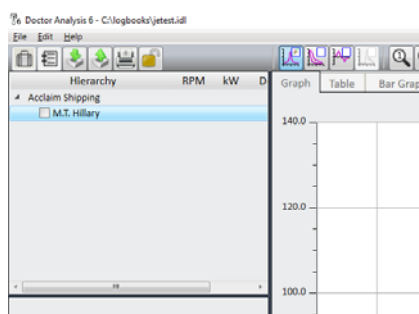
Enter your password, or the default password of *doctor* if you have not changed it, and click on **Create new library**.

A pop-up box will appear asking you to name your library. Type in the name of your vessel and save it in a convenient location. You will now see the following screen:



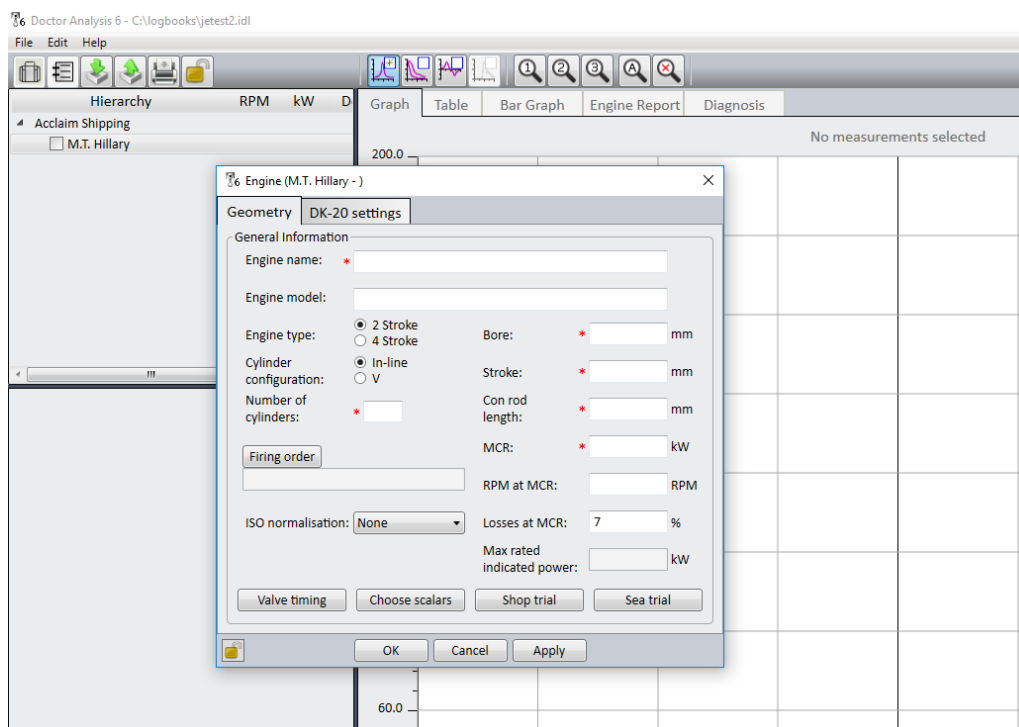
In the *Hierarchy* panel, right-click *My Operator* and click **Edit**. You will need to enter the password again as above. Rename to a name of your choice.

Right-click *My Ship* and repeat the process. You will now see your *Operator Name* and *Vessel* in the *Hierarchy* panel as shown below. You can add further vessels by right-clicking on the operator name and selecting **Add ship**.



6.8 Inputting Engine Data

Right-click on the name of your vessel and click **Add Engine**. You will see the following screen which is opened under the *Geometry* tab.



All items marked with a red asterisk * must be entered, otherwise the engine parameters cannot be uploaded to the DK-20 instrument. The engine name, model, type, number of cylinders, firing order, bore, stroke are all readily available from the engine manufacturer.

The con rod length can be difficult to obtain and Icon should be able to provide this for most engines, otherwise contact the engine manufacturer. Note that this dimension is from the centre bearing to centre bearing.

The Maximum Continuous Rating (MCR) must be entered. This is the power in kW and is provided by the engine manufacturer. This figure is the actual power produced at the shaft and is inclusive of friction and heat losses along with energy lost due to driving pumps and cams.

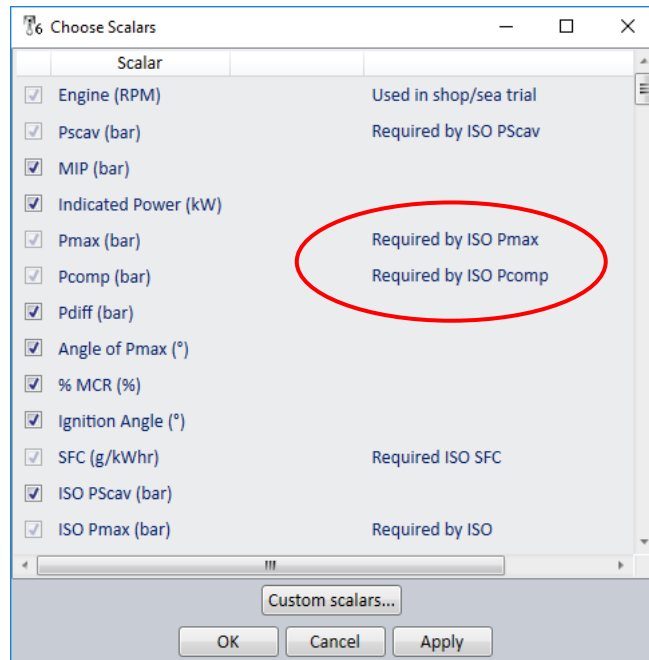
The Doctor system measures the actual power produced in the cylinders which is called "Indicated Power". A percentage figure is included in the set-up screen which compensates for these losses. This figure is adjustable but by default is set to 7% for 2-stroke engines and 12.5% for 4-stroke engines. The resultant *Max rated indicated power* is included and displayed on the screen.

RPM at MCR must be entered if any sea, shop trial or propeller curve analysis is required.

If you are defining a V engine, you will need to enter three additional parameters ie. angle between banks in degrees, engine rotation (*A to B* or *B to A*), and the cylinder numbering format, all from the drop-down menus.

The *ISO Normalisation* drop-down menu allows you to select between Wartsila/Sulzer or MAN B&W for the calculation method required to work out ISO normalised values in the sea and shop trial analysis. Alternatively it can

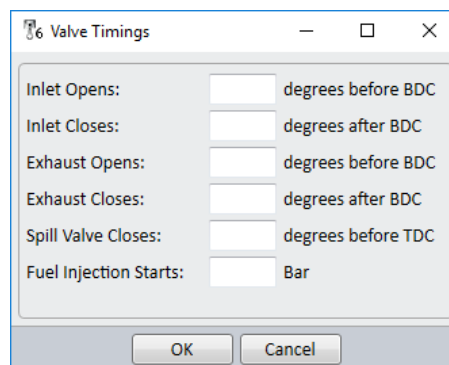
be turned off by selecting *None*. In order for ISO normalisation or SFC calculations to be carried out, a number of scalar values used in the calculations must be entered. These are identified in the scalar list. Refer to sections 5.8 and 5.9 for further details.



There are four additional buttons for optional data entry. These are described below.

Valve Timing

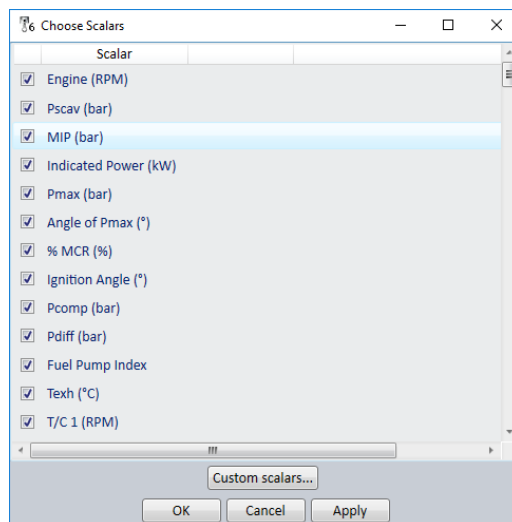
It can be useful to see on the traces where valves open and close. This button allows manual entry of the appropriate angle for valves and pressure for fuel injection, as shown in the screen below.



The valve markers may be selected/deselected when viewing engine traces by right clicking on the graph display.

Choose Scalars

Scalars are simply engine parameters that can be selected for display in the tables. Those scalars that are calculated by the software are automatically included. There are others that require to be entered manually. There are a number of scalars that are selected by default. There are many others that can be selected as desired.



There are three types of scalar, namely

- Direct measurement from Doctor instrument (eg. RPM)
- Calculated measurement from Doctor (eg. power or MIP)
- Manually entered scalar (eg. exhaust gas temperature)

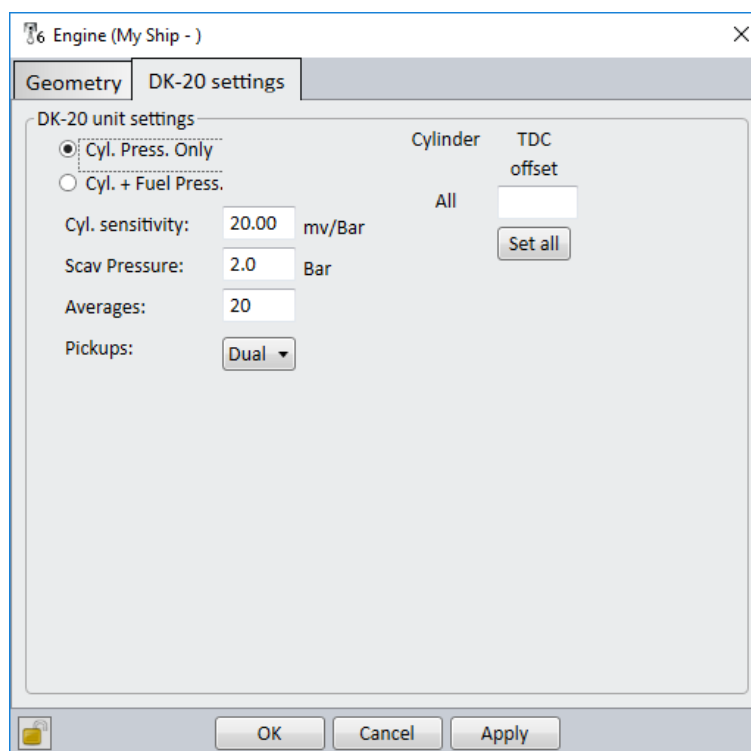
There are also four *User Angle* scalars included in the list that can be set if pressure is required to be recorded at any specific angle. Custom Scalars can be generated by pressing the **Custom scalars...** button, adding a scalar and completing the form that appears.

Shop Trial / Sea Trial

It can be very useful to compare ongoing main propulsion engine performance versus initial shop or sea trial data. Even if this data is not available, the change in performance of these parameters can provide valuable information as to an engine's condition. Refer to section 5.13 for details.

6.9 Instrument Settings

After completing all the required data in the *Geometry* tab section, now go to the *DK-20 settings* or *DK-2 settings* tab. Note that your choice of DK-20 or DK-2 is selected in **Edit..System** preferences if you have not already selected the model of instrument you are using.



Here you need to enter the settings for the instrument which will be downloaded when connected.

The settings are as follows:

Averages (configurable in DK-20 only)

This is the number of sample averages taken during a reading. The default is 20 for a 2-stroke and 40 for a 4-stroke. In the DK-2 this must be set on the instrument itself.

Pressure sensitivity

This is the sensitivity (in mV/bar) of the pressure sensor. The default is 20mV/bar. The actual number can be found on the calibration certificate of the sensor.

Fuel Sensitivity (Fuel Versions Only)

This is the sensitivity (in mV/bar) of the fuel sensor. The default is 2.5mV/bar. The actual number can be found on the calibration certificate of the sensor.

Scav Pressure

This is where the default scavenge pressure for the engine can be entered. This will be over-written by the actual scavenge pressure entered into the instrument when taking a reading.

Pickups (DK-20 only)

This is the pickup configuration as installed on the engine. The default is *DUAL* (two pickups) for a 2-stroke engine and *TDC* (one pickup) for a 4-stroke engine. The DK-20 also has an Auto detect mode which will automatically detect the number of pickups. In the DK-2 this must be set on the instrument itself.

TDC Offset

The position of the Top Dead Centre must be set after the first reading. Adjustment angles can either be entered here or in Graph mode. In Graph mode, right-click on a test in the hierarchy that has been made on the engine in question and click on **Adjust TDC**. You may need permissions to carry out this operation.

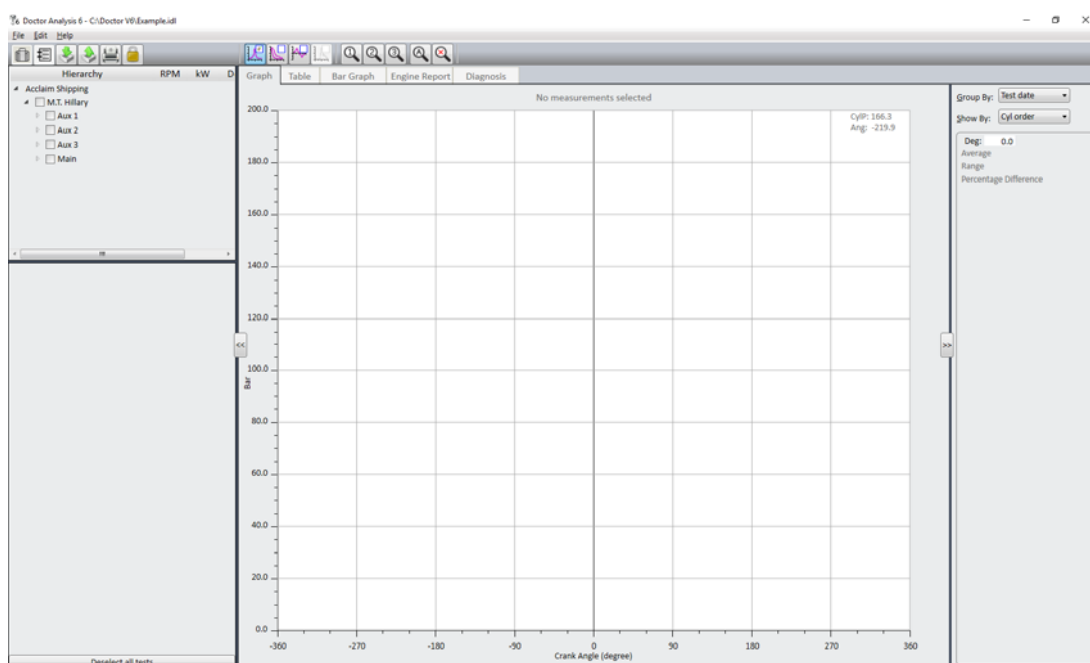
After you have entered all the required data, click **Apply** followed by **OK**.

6.10 Duplicating an Engine

Very often there is more than one engine of the same type on board a vessel. To duplicate an engine right click on the name of the engine and click **Copy**.

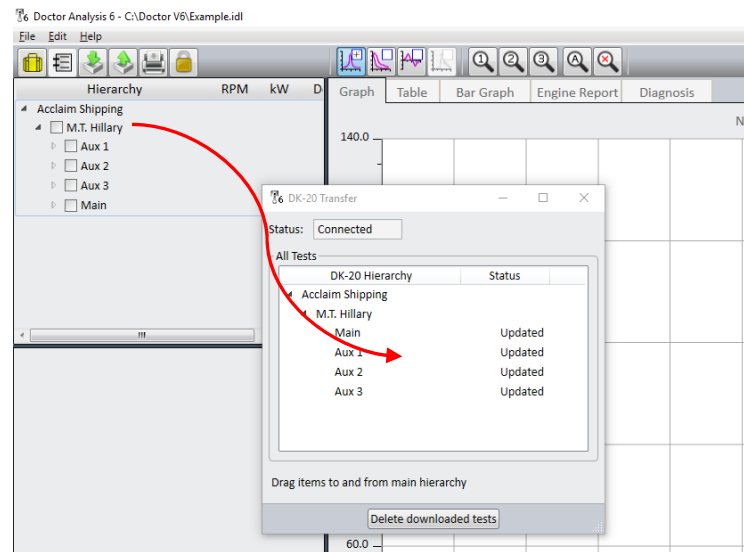
Right click on the name of the ship then click **Paste**. This can be repeated until all the required engines are included. Edit the engine names appropriately.

You have now completed your library and you should see a screen similar to the following:



6.11 Transferring Engine Data to DK-20

When you have set up your engine data you may now transfer it to your DK-20 instrument. Refer to chapters 3 and 4 for connecting your PC to your Doctor instrument. After successful connection you may click on the yellow Doctor icon at the top left corner of the screen. Your DK-20 window will appear and you can simply drag the engine data from the Hierarchy to the Doctor window.



Chapter 7 – Engine Reports

7.1 Introduction to Engine Reports

The Doctor application automatically creates standard engine performance reports whose format can be customised to meet company standards. An example report produced by the software is shown below.

SERVICE DATA		Engine Type:		Name of vessel: M.T. Hillary			
		Engine Builder:		Engine No.:		Yard:	
Layout kW: 8580		Layout RPM:		Sign.:		Test No.:	
Turbocharger(s)		No. of TC:		Serial No.		No. of Cyl.: 6 Bore: 500 Stroke: 1910	
Make:		Type:		Cylinder Constant (kW.bar):		Mean Friction Press., bar:	
Max. RPM:		Max. Temp., °C:		Lubrication Oil System (Tick box) <input type="checkbox"/> Internal <input type="checkbox"/> External from M. E. System <input type="checkbox"/> External from Gravity Tank			
Compr. Slip Factor:		Compr. Diam., m:					
TC specification:							
Observation No:							
Fuel Oil Viscosity before Engine: 690 cst				Temp: 95 °C		Brand	
Bunker Station:				Cylinder Oil		Type	
Oil Brand:				Heat value, kcal/kg: 44000		Circulating Oil	
Density at 15 °C: 690.00				Sulphur, %: 2.50		Turbo Oil	
Test Date		Load		Ambient Pressure		Engine RPM	
(dd:mm:yy hh:mm)		%		mbar		Total Running Hours	
22-Jan-17 09:09		68.6		1020		117.0	
Governor index		Speed Setting		VT Control			
bar		bar		bar			
Shaft Power		Indicated power		Eff. Fuel Consumption		ISO conversion	
kW		kW		g/kWh		g/kWh	
6298		6383		176.70		182.10	
Displacement		Draft Fore, m		Log Knots		Wind Speed	
14.0		21.6		5.0		7.0	
Sea State		Draft Aft, m		Obs. Knots		Wave Height	
14.5		21.6		4.0			
Course Direc., °		Slip					
90							
Cylinder No.		1		2		3	
Pi, bar		14.4		14.6		14.5	
Pmax, bar		113.3		114.9		116.3	
Pcomp, bar		91.0		92.2		88.9	
Indicated Power KW		1054.0		1069.0		1067.0	
Fuel Pump Index mm		62.0		64.0		63.0	
VIT index mm							
Exhaust Gas Temp., °C		345		353		363	
J C Water Outlet Temp. °C		85		85		85	
Piston Outlet Lub.Temp. °C							
Cooling Water Temperature, °C		Exhaust Gas Temp., °C		Exhaust Pressure		Turbo Charger	
Air Cooler		Main Engine		Turbine		Receiver 1	
Inlet		Inlet		Inlet		Turb. Outl.	
Outlet		Turb. Outlet		Outlet		bar	
1		1		1		1	
36		41		Sea w. Temp.		73.0	
2		2		2		2	
36		41		71.0		373	
3		3		3		3	
34		40		72.0		370	
4		4		4		4	
Ave.		Ave.		Ave.		Ave.	
35.3		40.7		72.0		372.7	
Scavenge Air Temperature, °C		Exhaust Pressure		Turbo Charger		Aux. Blower	
Inlet Blower		Before Cooler		After Cooler		Pressure, bar	
1		1		1		System Oil	
35.0		130		34		2.70	
2		2		2		Cooling Oil	
35.0		129		33		45.0	
3		3		3		Inlet Cam	
35.0		133		34		1	
4		4		4		2	
Ave.		Ave.		Ave.		46.0	
35.0		130.7		33.7		62.0	
Lubricating Oil		Temperature, °C		Temperature, °C		Fuel Oil Pressure	
Inlet Engine		TC Inlet / Blower end		TC Outlet / Turb. end		bar	
45.0		47.0		63.0		Before Filter	
Outlet Cam		4		4		After Filter	
46.0		62.0		62.0		Temperature, °C	
Thrust Segment		3		3		Before Fuel Pumps	
46.0		62.0		62.0		141	
Specific Cylinder Oil Consumption in gm / KW-Hr		4		4			
46.3		62.3		62.3			
Remarks:							

Rel. 2005-01-12

Engine reports are in Excel style format which allows the layout to contain grids, tables and surrounds to aid in the reports readability. The design of the report layout is called a TEMPLATE.

The Doctor Analysis Software is supplied with two pre-installed templates:

Icon Main Engine Report which is intended for use with main propulsion engines;

Icon Generator Engine Report which is a template for use with 4-stroke generator engines.

If these are not exactly as required they may be edited to suit the customer's requirements, or a completely new template may be imported from a pre-existing Excel file.

Once a new template has been designed it can be distributed to other users who only have to copy it into their report template folder to start using it.

7.2 Generating Engine Reports

Engine reports can be generated at any time. The report relates to a single test, so only one test can be selected when using engine reports.

With a test selected, click the **Engine Report** tab and select the name of the report you wish to use from the dropdown list. The Icon supplied templates are displayed first, with any user templates displayed below the dividing line. Once the template has been selected the report will be displayed along with any already known scalar values inserted.

The screenshot displays the 'Doctor Analysis 6 - Samples [Demo Mode]' software interface. The 'Engine Report' tab is selected, showing a template for 'M.T. Hilary'. The interface includes a sidebar with a hierarchy of tests (Aux 1, Aux 2, Main) and a main area with a form for entering engine data. The form is divided into sections: SERVICE DATA, TURBOCHARGER, FUEL, OIL, and CYLINDER. The CYLINDER section contains a table with 18 columns for individual cylinder data and an 'Ave.' column for averages.

Cylinder No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Ave.
Pi, bar	14.4	14.6	14.6	14.5	15.1	14.0													14.5
Pmax, bar	113.3	114.9	114.7	116.1	116.3	113.9													114.9
Pcomp, bar	91.0	92.2	88.9	90.9	89.4	90.1													90.4
Indicated Power KW	1054.0	1069.0	1067.0	1056.0	1109.0	1027.0													1063.7
Fuel Pump Index mm	62.0	64.0	64.0	63.0	63.0	62.0													63.0
VIT index mm																			0.0
Exhaust Gas Temp. °C	345	353	363	336	369	352													353.0

The engine report will have various cells highlighted with different colours of background. These indicate how these cells may be used:

White background:

These cells contain the report titles and automatically entered scalar values that cannot be changed by the user.

Blue background:

These cells contain scalar values that can be changed by the user. The report will contain values for all the scalars that have been previously entered using either the Engine Report or Table views.

Grey background:

These cells contain scalar values that can be changed by the user, but these scalars are currently not defined for the engine that the test belongs to. When you first enter a value for one of these cells it will automatically add the scalar to the engine, and the cell will turn blue to indicate indicating that the scalar is now known.

Green background:

These cells contain values and text that is not stored within the Doctor Analysis Library. The content will be remembered for the next time that this report template is used with a test for the same engine.

All scalar values that can be changed by the user may be entered either in the Engine report or the Table view. The user is able to switch between these two views as required depending on which form of data entry is easiest for them.

Just above the report is a *Zoom* slider bar. Dragging this left reduces the zoom allowing the entire report to be viewed in the window, and dragging it right increases the zoom to make it easier to enter data into a complex report template.

Once all of the values have been entered the report is ready for publishing. Clicking the **Publish** button at the top of the window will prompt for the location and name to be used for the finished report. This is an Excel file so can be edited by other users who may have non-doctor related content to add.

7.3 Engine Report Templates

Creating a template as a 'once-only' operation and the created template can be shared with other users. If an existing template is close to the format required, it can be edited to generate a new template, alternatively if an existing report is already available as an Excel file this can be imported into the Doctor software as a new template.

If starting a report template from scratch it may be easier and quicker to start by first generating an Excel file containing the general layout and formatting styles.

Note that while the report template can contain formulae for sums, averages etc, there is no formulae editing facility within the Doctor Analysis software so this part of the report must be performed first using Excel.

7.4 Editing a Report Template

The editing process is identical regardless on if editing an existing template or The easiest way to create a new template is from an existing Excel file. From the menu bar click **Edit... Modify engine report templates... Import new template from Excel** and you can then select the excel file to be imported. Note the template must be the first sheet in the Excel file.

To either make changes to one of your existing templates, or to create a new template based on another, from the menu bar click **Edit... Modify engine report templates... Edit existing template** and select the template to be edited from the list provided. Note that the Icon supplied templates that are listed above the dividing line cannot be changed and if selected will create a new user template with identical content.

The report template will then be presented for editing.

The layout of the editor is as follows:

The top contains the *Template Header*, this has descriptive information about the template along with action buttons for managing it.

Under the template header is a *Zoom* slider bar. Dragging this left reduces the zoom allowing the entire report to be viewed in the window, and dragging it right increases the zoom to make it easier to edit small sections of the report.

Under the zoom is the actual report template on which you will select the cells to be configured. If the report is too big for the display, scrollbars are provided to allow individual areas to be viewed.

To the right of the report template are the editing controls. From top to bottom these are:

Current Cell: indicates the currently selected cell in the report template and controls merging of cells as well as row/column adding/removal.

Content Selection: selects what is to be placed in the selected cell.

Borders and Lines: selects the style of the lines surrounding and dividing cells.

Font: selects the font and attributes to be applied to the text in the cell.

Template Header

Regardless of which method was used, when starting a new template you should first change the *Title* and *Description* fields in the template header of your new report. The title is the text that will be displayed in the report selection lists and so should be unique and informative. The description should contain text that can advise users when this type of report should be used.

At any time you can check the report for potential problems with its content by clicking the **Validate** button. A list of verification warnings will then be shown. Note these are not necessarily errors but may for example indicate if you have inserted the same scalar in more than one cell accidentally

The **Save** button will become enabled after any changes have been made to the report template. It will also automatically perform a validation action to allow a check before saving in case unnoticed errors have been introduced.

Clicking the **Cancel** button will close the editor discarding any changes made. If changes have been made you will be warned before the editor finally closes.

If a report template is no longer required it can be removed by clicking the **Delete** button. A confirmation for this action is required to prevent accidental use.

Report Template Content

The report template is shown in the format that it will be presented to the user within the Engine Report view. The cells are coloured depending on the type of content they contain:

White background (Label):

These cells contain the framework text of the report and will not be changed by the user.

Dark Blue background (Doctor parameter):

These cells contain Doctor Parameter values, these are constant definitions related to the test eg. *Test Date* and *Time*.

Blue background (Doctor Scalar):

These cells contain Doctor Scalar values. Any of the pre-defined Doctor Analysis scalars can be selected and in the case of cylinder or bank scalars the specific bank or cylinder number assigned for each.

Light Blue background (Custom Scalar):

These cells contain Custom Scalar values. Any scalar that is not already part of the pre-defined Doctor Analysis scalars can be defined here. If the specific engine does not already have this scalar defined, it will be automatically added the first time a value is entered in the cell when the report template is used in the Engine Report view.

Green background (User Text):

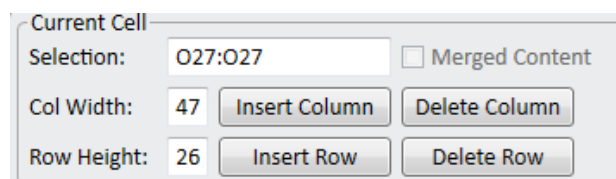
These cells contain values and text which while not stored within the Doctor Analysis Library will be remembered for the next time that this report template is used with a test for the same engine.

Typically these will be used for details of the engine that never change e.g. its serial number, or running parameters that are not necessary for the Doctor Analysis system e.g. Oil brand used.

Editing the report template is similar to using Excel. A single click on the report template will select a single cell, while a group of cells may be selected by pressing the mouse button and dragging over the range of cells required before releasing the mouse button.

Current Cell

Your current selection is highlighted in the template by a coloured border, and shown at the top of the editing controls.



The 'Current Cell' panel displays the following information and controls:

- Selection:** A text box showing 'O27:O27'.
- Merged Content:** An unchecked checkbox.
- Col Width:** A text box showing '47'.
- Insert Column:** A button to add a column to the left of the current cell.
- Delete Column:** A button to remove the current column.
- Row Height:** A text box showing '26'.
- Insert Row:** A button to add a row above the current cell.
- Delete Row:** A button to remove the current row.

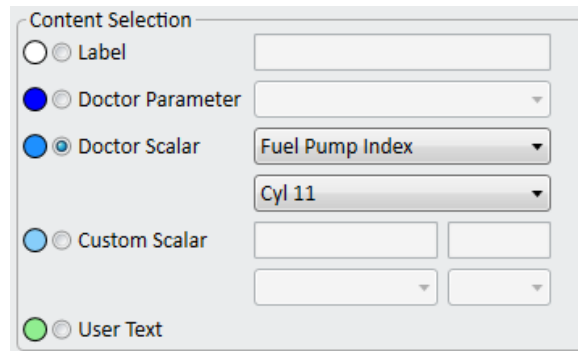
If multiple cells have been selected it is possible to combine them into a single cell by checking the **Merged Content** box. To split merged cells back simply uncheck the same box.

Additional rows or column may be added. Clicking **Insert Column** will add a column to the left your current cell, and clicking **Inert Row** will add a row above your current cell.

Similarly if you wish to remove a row or column, clicking the **Delete Column** or **Delete Row** will remove the column or row of your current cell. If your cell is merged it will be the last column or row that will be removed.

The heights of rows and widths of columns can be set by editing the values in the **Col Width** or **Row Height** edit fields. If the current cell spans multiple rows or column all of these will be set to the same value.

Content Selection

A screenshot of a 'Content Selection' dialog box. It features five radio buttons on the left, each with a colored circle: 'Label' (white), 'Doctor Parameter' (blue), 'Doctor Scalar' (blue with a dot), 'Custom Scalar' (light blue), and 'User Text' (green). The 'Doctor Scalar' option is selected. To the right of the radio buttons are several input fields: a text box for 'Label', a dropdown menu for 'Doctor Parameter', a dropdown menu for 'Doctor Scalar' showing 'Fuel Pump Index', a dropdown menu for 'Doctor Scalar' showing 'Cyl 11', two text boxes for 'Custom Scalar', and two dropdown menus for 'Custom Scalar'.

These controls allow the type of content of the cell to be set or changed. Each of the different types of content has a colour key and radio button next to them. The current content is indicated by the checked radio button.

To change the type of content simply check the appropriate radio button and this will enable any additional controls to help define its content.

Label

An edit field is provided to enter the text to be displayed in the report template cell.

Doctor Parameter

A dropdown list of available options is provided to select which of the doctor parameters is to be placed in the template cell.

Doctor Scalar

A dropdown list of all the pre-defined Doctor Analysis scalars is provided to select which of these values is to be placed in the template cell. For scalars that are bank or cylinder related, a further dropdown list will be enabled to select which bank or cylinder this cell relates to.

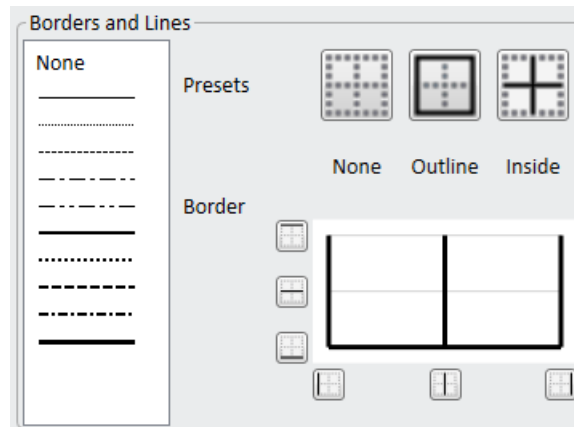
Custom Scalar

Two edit fields are provided to enter first the name of the custom scalar and then its units. There is also a dropdown list to select the context of the scalar (engine / bank or cylinder) and for scalars that are bank or cylinder related, a further dropdown list will be enabled to select which bank or cylinder this cell relates to.

User Text

No additional configuration is required for this template cell.

Borders and Lines



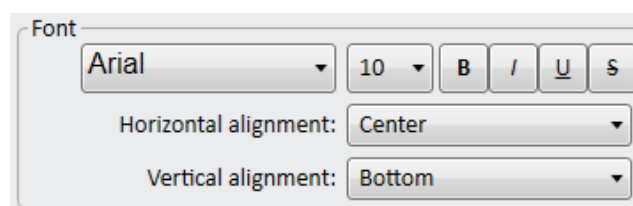
The borders around cells can be set to allow tables, grids and other separators to be displayed in the report template. Within this section of the editor controls a depiction of the current borders of the selected cell is shown. If multiple cells have been selected and not all of their borders are identical, a thin grey line will be used to indicate a mixed setting.

To the left of this are three buttons to set the top, central dividing and bottom lines. Underneath are three buttons to set left, central dividing and right lines.

Above are three shortcut buttons that will clear the entire cell, or set all the borders or inside dividers at once.

To change a border, first select the style you wish to use from the left-hand list box, and then click on the button appropriate to the border you wish to set. To remove a border select the option *None* before clicking on the borders button.

Font



The top row of controls selects the font in which text will be displayed within the current cell, including its size and attributes of **Bold**, *Italics*, Underlined or ~~Strikethrough~~.

In addition to the font format, the horizontal and vertical alignment of the text within the cell can also be set using the appropriate dropdown lists.

Chapter 8 – Customisation of Doctor 6 Folder Locations

8.1 Customisation of Doctor 6 Folder Locations

This chapter is intended for IT professionals who are aware of the requirements and consequences of sharing files and folders between users and computers. It is only required for the situations in which:

- There are multiple user accounts on a single computer all wishing to use the same data
- There are multiple users on separate computers all wishing to use the same data

Background

The Doctor6 Analysis Software uses a variety of files and folders to store its information and user settings. Up to V6.3 these folder locations have been fixed, but now V6.4 allows these to be changed in order to allow for more complex installation circumstances eg. centralised file server installations.

The default settings are suitable for an installation involving a single user working on a single computer, however if there are multiple users using the same computer all using the same library or multiple computers on a network it may be advisable to change some of these folder locations.

Relocatable Folders

LibraryFolder

This is the folder that is offered by default when opening or creating a new library. It is recommended that when multiple libraries are being used that they are stored in a single location to make them easier to find when needed.

LogbookFolder

This is the folder that is offered by default when importing or exporting logbooks. A logbook can be easily imported by double-clicking on it, but it is recommended that if logbooks are to be kept for future use they are stored in a single location to make them easier to find when needed.

PreferencesFolder

This is the folder in which all the users customised settings are held.

ReportsFolder

This is the folder in which user created *Engine Report* templates, and the most recent values used for all the Engine Reports are stored.

LicenseFolder

This is the folder in which the software License information is held for the application.

LogsFolder

This is the folder in which the application creates log files of its operation in order to assist in diagnosing problems if they occur.

Folder Location Options

The location of each of the folders can be configured using one of three different values:

USER - stored in the users account location so may be protected from other users' access.

SHARED - stored in a shared location so may be used by all users on that computer.

<folder> - any other value indicated the explicit folder to be used. This folder must exist prior to the software running otherwise it will default to the *USER* option

The locations for the *USER* and *SHARED* folder options are as follows:

Folder	Value option	Default location
<i>LibraryFolder</i>	USER	Win7: C:\Users\<username>\My Documents\Doctor 6\Libraries Win10: C:\Users\<username>\Documents\Doctor 6\Libraries
	SHARED	Win7: C:\Users\Public\Public Documents\Shared\Doctor 6\ Libraries Win10: C:\Users\Public\Public Documents\Shared\Doctor 6\ Libraries
<i>LogbookFolder</i>	USER	Win7: C:\Users\<username>\My Documents\Doctor 6\Logbooks Win10: C:\Users\<username>\Documents\Doctor 6\Logbooks
	SHARED	Win7: C:\Users\Public\Public Documents\Shared\Doctor 6\ Logbooks Win10: C:\Users\Public\Public Documents\Shared\Doctor 6\ Logbooks
<i>PreferencesFolder</i>	USER	Win7: C:\Users\<username>\AppData\Roaming\Doctor 6\prefs Win10: C:\Users\<username>\ AppData\Roaming \Doctor 6\prefs
	SHARED	Win7: C:\ProgramData\Doctor 6\prefs Win10: C:\ProgramData \Doctor 6\prefs
<i>ReportsFolder</i>	USER	Win7: C:\Users\<username>\My Documents\Doctor 6\Reports Win10: C:\Users\<username>\Documents\Doctor 6\Reports
	SHARED	Win7: C:\Users\Public\Public Documents\Shared\Doctor 6\Reports Win10: C:\Users\Public\Public Documents\Shared\Doctor 6\Reports
<i>LicenseFolder</i>	USER	Win7: C:\Users\<username>\AppData\Roaming\Doctor 6\prefs Win10: C:\Users\<username>\ AppData\Roaming \Doctor 6\prefs
	SHARED	Win7: C:\ProgramData\Doctor 6\prefs Win10: C:\ProgramData \Doctor 6\prefs
<i>LogsFolder</i>	USER	Win7: C:\Users\<username>\AppData\Roaming\Doctor 6\logs Win10: C:\Users\<username>\ AppData\Roaming \Doctor 6\logs
	SHARED	Win7: C:\ProgramData\Doctor 6\logs Win10: C:\ProgramData \Doctor 6\logs

Changing Folder Locations

Note that changing the values after the application has been in use will mean previously created files may be in the wrong location and would need to be manually moved to be made effective again, this is especially true for the *PreferencesFolder* and *LicenseFolder*.

It is therefore best to decide if the default locations need to be changed prior to installation, and then the options set before running the application for the first time.

The options for each of the folder locations are located in the applications configuration file *Doctor6.exe.config* and is located in the applications installation folder (by default *C:\Program Files (x86)\Doctor 6*).

If this file is located in the protected folder Program Files (x86) it can only be modified with Administrator permissions, therefore to edit it you will need to right-click *Notepad* from the Windows programs menu and select *Run as administrator* before opening this file. Alternatively a copy of this file could have been edited previously and can then be copied into the folder to set the folder locations for that computer.

There are many options within the file, but the section of interest is called *<applicationSettings>*. Each folder location is defined by a setting entry, identified by name and having a single value option set.

Example Configurations

There are many different configuration options possible for the folder locations, however the three typical ones will now be described.

Single user account on a single computer

This is the default mode of operation for the application, therefore the standard installation method should be performed on the computer and no alterations made to the configuration file.

Folder Values:

Folder	Value option
<i>LibraryFolder</i>	USER
<i>LogbookFolder</i>	USER
<i>PreferencesFolder</i>	USER
<i>ReportsFolder</i>	USER
<i>LicenseFolder</i>	SHARED
<i>LogsFolder</i>	USER

Configuration File Section:

```
<applicationSettings>
  <IconResearch.Doctor.Properties.Settings>
    <setting name="LibraryFolder" serializeAs="String">
      <value>USER</value>
    </setting>
    <setting name="LogbookFolder" serializeAs="String">
      <value>USER</value>
    </setting>
    <setting name="PreferencesFolder" serializeAs="String">
      <value>USER</value>
    </setting>
    <setting name="ReportsFolder" serializeAs="String">
      <value>USER</value>
    </setting>
    <setting name="LicenseFolder" serializeAs="String">
      <value>SHARED</value>
    </setting>
    <setting name="LogsFolder" serializeAs="String">
      <value>USER</value>
    </setting>
  </IconResearch.Doctor.Properties.Settings>
</applicationSettings>
```

Multiple user accounts on a single computer

This configuration is for when the application is to be installed on a single computer, but there are multiple user accounts on this computer who need to use the application and share the same data.

In this case it is advisable to make changes in order that the Libraries, Logbooks and Reports are stored in a common shared location.

Folder Values:

Folder	Value option
<i>LibraryFolder</i>	SHARED
<i>LogbookFolder</i>	SHARED
<i>PreferencesFolder</i>	USER
<i>ReportsFolder</i>	SHARED
<i>LicenseFolder</i>	SHARED
<i>LogsFolder</i>	USER

Configuration File Section:

```
<applicationSettings>
  <IconResearch.Doctor.Properties.Settings>
    <setting name="LibraryFolder" serializeAs="String">
      <value> SHARED </value>
    </setting>
    <setting name="LogbookFolder" serializeAs="String">
      <value> SHARED </value>
    </setting>
    <setting name="PreferencesFolder" serializeAs="String">
      <value>USER</value>
    </setting>
    <setting name="ReportsFolder" serializeAs="String">
      <value> SHARED </value>
    </setting>
    <setting name="LicenseFolder" serializeAs="String">
      <value>SHARED</value>
    </setting>
    <setting name="LogsFolder" serializeAs="String">
      <value>USER</value>
    </setting>
  </IconResearch.Doctor.Properties.Settings>
</applicationSettings>
```

Multiple user accounts on a multiple computers

This configuration is for when multiple computers on a shared network all need to use the application and share the same data. In this case a shared network drive is required to hold the data, and the values of the folders explicitly set to this shared drive.

The application may be either installed on the network drive with each user having a shortcut to it, or the application can be installed on each computer separately and the modified configuration file copied into each computers installation folder.

As an example let's say we have a network drive *T:* and a folder has been created on this drive for the specific use of the Doctor software *T:\Doctor6*. In this folder we will want the application to create separate folders for each of the applications folder we wish to share.

Folder Values:

Folder	Value option
<i>LibraryFolder</i>	T:\Doctor6\Libraries
<i>LogbookFolder</i>	T:\Doctor6\Logbooks
<i>PreferencesFolder</i>	USER
<i>ReportsFolder</i>	T:\Doctor6\Reports
<i>LicenseFolder</i>	T:\Doctor6\License
<i>LogsFolder</i>	USER

Configuration File Section:

```
<applicationSettings>
  <IconResearch.Doctor.Properties.Settings>
    <setting name="LibraryFolder" serializeAs="String">
      <value>T:\Doctor6\Libraries</value>
    </setting>
    <setting name="LogbookFolder" serializeAs="String">
      <value>T:\Doctor6\Logbooks</value>
    </setting>
    <setting name="PreferencesFolder" serializeAs="String">
      <value>USER</value>
    </setting>
    <setting name="ReportsFolder" serializeAs="String">
      <value>T:\Doctor6\Reports</value>
    </setting>
    <setting name="LicenseFolder" serializeAs="String">
      <value>T:\Doctor6\License</value>
    </setting>
    <setting name="LogsFolder" serializeAs="String">
      <value>USER</value>
    </setting>
  </IconResearch.Doctor.Properties.Settings>
</applicationSettings>
```