

# Mecmesin

testing to perfection

## VectorPro™ for Mecmesin Test Stands and Instruments

Operating Manual



## The Scope of This Document

This document refers to Mecmesin VectorPro software (specifically version 5.2.0.0.) for use with Mecmesin test stands and instruments. Please note that sections of this document are only applicable to certain devices, for more information see **Section 1**.

You may also need to refer to these documents:

- 431-965** OmniTest Twin Column Installation and Operation Manual
- 431-959** OmniTest-5.0 Installation and Operation Manual
- 431-957** Long Travel Extensometer Installation Guide
- 431-468** Vortex-*dV* Installation and Operation Manual
- 431-459** MultiTest-*dV* Installation and Operation Manual
- 431-398** Guide to Safe Use of Mains Powered Test Systems
- 431-262** Orbis Digital Torque Tester, Operating Manual
- 431-261** Tornado Digital Torque Tester, Operating Manual
- 431-213** Advanced Force Gauge (AFG Mk4) Operating Manual



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Part no. 431-955-03

# Contents

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<b>1.</b>	<b>Introduction and Device Groups</b>	<b>8</b>
1.1.	Contextual Help	9
1.2.	VectorPro™ MT - Material Test Stands	10
1.3.	VectorPro™ Lite - Motorised Stands	11
1.4.	VectorPro™ Lite - Portable Instruments	12
<b>2.</b>	<b>System Requirements</b>	<b>13</b>
2.1.	Minimum PC Specification	13
2.2.	Recommended Specification	13
<b>3.</b>	<b>Installing VectorPro™</b>	<b>14</b>
3.1.	Previous Installation	14
3.2.	Installing VectorPro™	15
3.3.	Important Installation Information	18
<b>4.</b>	<b>Connecting a Mecmesin Device</b>	<b>19</b>
4.1.	USB Test Stands	19
4.1.1.	Driver Information	19
4.2.	RS232 Instruments	20
4.2.1.	RS232 Instruments Driver Information	20
4.2.2.	RS232 Instruments Communication Settings	21
<b>5.</b>	<b>Launching VectorPro™</b>	<b>22</b>
5.1.	Database Upgrade	23
<b>6.</b>	<b>Workspace</b>	<b>24</b>
6.1.	VectorPro™ Header Bar Features	25
6.1.1.	MultiTest-dV(u) Switching	26
<b>7.</b>	<b>Users and Permissions</b>	<b>29</b>
7.1.	Users	29
7.2.	Admin Account	29
7.3.	Groups	29
7.4.	Creating and Editing Users and Groups	30
7.5.	Configuring Permissions	31
7.6.	Filtering Users and Permissions	31
7.7.	Attributes Permissions Screen Interface	32

7.8.	Test Permissions	32
8.	Language Mapping	33
9.	Designing a Test	34
9.1.	Test Names and Versions	34
9.2.	Attributes	35
9.2.1.	Test Name	36
9.2.2.	Test Notes	36
9.2.3.	Add New and Existing Custom Attributes	36
9.2.4.	Prompt for Value Feature	37
9.2.5.	Grouping Attributes - Creating Test Folders	40
9.2.6.	Searching Within Attribute Groups	43
9.3.	VectorPro™ MT - Specimen	44
9.3.1.	Specimen Shape Definitions	45
9.3.2.	Configuring an Extensometer	46
9.3.3.	Configuring Break Settings	47
9.3.4.	Configuring Pre-test Preload	47
9.3.5.	Grip Separation	48
9.4.	VectorPro™ MT - Operations	50
9.4.1.	Operation Definitions	50
9.4.2.	Creating a Test Sequence	64
9.4.3.	Editing an Operation's Settings	65
9.4.4.	Test Acquisition Settings	66
9.5.	VectorPro™ Lite - Operations	67
9.5.1.	MultiTest-dV Operation Definitions	67
9.5.2.	Vortex-dV Operation Definitions	69
9.5.3.	Creating a Test Sequence	71
9.5.4.	Editing an Operation's Settings	72
9.5.5.	Setting Force/Torque Stand Control	73
9.6.	VectorPro™ MT - Result	76
9.6.1.	By Sample	76
9.6.2.	Attributes	77
9.6.3.	Standard Calculations	77
9.6.4.	Break Definition	80
9.6.5.	Specimen Calculations	80
9.6.6.	Verification of Calculations	80
9.6.7.	Formula	81

9.6.8.	Sequence of Calculations	85
9.6.9.	Units and Polarity	85
<b>9.7.</b>	<b>VectorPro™ Lite - Result</b>	<b>86</b>
9.7.1.	By Sample	86
9.7.2.	Attributes	87
9.7.3.	Standard Calculations	87
9.7.4.	Break Definition	89
9.7.5.	Cyclic Calculations	89
9.7.6.	Verification of Calculations	89
9.7.7.	Sequence of Calculations	89
9.7.8.	Units and Polarity	90
<b>9.8.</b>	<b>Report</b>	<b>91</b>
9.8.1.	Populating the Report Toolbox	92
9.8.2.	Report Configuration	93
<b>9.9.</b>	<b>Permissions</b>	<b>96</b>
9.9.1.	Prompt for Authorisation Settings	97
9.9.2.	Prompt for Authorisation Sign Off	98
<b>9.10.</b>	<b>Saving a Test</b>	<b>99</b>
9.10.1.	Override Test Version	99
9.10.2.	Adding Change Notes to Saved Tests	100
<b>10.</b>	<b>All Tests Viewer</b>	<b>101</b>
10.1.	Editing a Test	102
10.2.	Compare Test Samples	103
10.3.	Duplicating a Test	104
<b>11.</b>	<b>Results Viewer</b>	<b>105</b>
11.1.	<b>Viewing Results: Graph Display</b>	<b>106</b>
11.1.1.	Formatting the Graph Display	106
11.1.2.	Sample Display	107
11.1.3.	Header Bar	108
11.1.4.	Calculations Results	109
11.1.5.	Adding Annotations	110
11.1.6.	Graph Capture	111
11.1.7.	Offsets	111
11.1.8.	Spot Calculations	112
11.1.9.	Zoom and Examine	115
11.2.	<b>Viewing Results: Calculations Display</b>	<b>116</b>

11.2.1. Exporting Data and Results	117
<b>12. Running a Test</b>	<b>118</b>
12.1. Open a Test	118
12.1.1. Control Bar	119
12.1.2. Test Stand Zero Control Panel	120
12.1.3. VectorPro™ Lite - Test Triggers	121
12.1.4. Live Display Bars	122
<b>13. Reporting and Exporting</b>	<b>123</b>
13.1. Exporting	123
13.1.1. Export Settings	124
13.1.2. File Naming Behaviour	125
<b>14. Event Log</b>	<b>127</b>
14.1. Search Filter Definitions	128
14.1.1. Filter by Date Range	128
14.1.2. Filter by User	129
14.1.3. Filter by View, Action and Target	129
14.2. Event Log Archiving	130
14.3. Accessing Archived Event Logs	131
<b>15. SDC - System Deflection Compensation</b>	<b>132</b>
15.1. SDC Viewer	132
15.2. Creating a New SDC Profile	133
15.2.1. SDC Profile Image	133
15.3. Performing an SDC Test	134
15.3.1. SDC Test Sequence	135
15.4. SDC Test Information Panel	137
15.5. Saving SDC Results	137
15.6. Loading SDC Profiles	138
<b>16. Ready to Run</b>	<b>139</b>
<b>17. Change Log</b>	<b>140</b>
17.1. New Features Patch Release - 5.1.8.0	140
17.2. Bug Fixes Patch Release - 5.1.8.0	140
17.3. New Features Patch Release - 5.1.7.0	140
17.4. Bug Fixes Patch Release - 5.1.7.0	140
17.5. New Features Patch Release - 5.1.6.0	140
17.6. Bug Fixes Patch Release - 5.1.6.0	140

17.7. New Features Patch Release - 5.1.5.0	140
17.8. Bug Fixes Patch Release - 5.1.5.0	141
17.9. New Features Patch Release - 5.1.4.0	141
17.10. Bug Fixes Patch Release - 5.1.4.0	141
17.11. New Features Patch Release - 5.1.3.0	141
17.12. New Features Patch Release - 5.1.2.0	141
17.13. Bug Fixes Patch Release - 5.1.2.0	141
17.14. New Features Patch Release - 5.1.1.0	142
17.15. Bug Fixes Patch Release - 5.1.1.0	142
17.16. New Features Official Release - 5.1.0.0	142
17.17. Bug Fixes Patch Release - 5.1.0.0	143
18. Quick Icon Reference	144
19. Software License Agreement	154

# 1. Introduction and Device Groups

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VectorPro is a dedicated software solution used for the programming and acquisition of data from a range of Mecmesin test stands and instruments.

The software enables users to capture data from Mecmesin test stands and instruments, perform calculations and export/report calculations and test data. In addition to providing secure audit trails and user management systems. Operation sequences can be constructed by intuitive drag-and-drop control with test editing including versioning control for full traceability. The test attributes system can be used to store information such as lists, notes and images.

This manual covers the use of VectorPro with all compatible Mecmesin devices, although some sections are only relevant to specific instruments. To improve the accessibility of this document all compatible Mecmesin devices have been grouped into three groups, this detailed further in **Sections 1.1, 1.2 and 1.3**. Software features associated with these device groups are split into two groups:

- **VectorPro MT (Material Test)** - This contains advanced calculations and operation functions. MT devices support high precision ELS and extensometry devices. Compatible with material test stands.
- **VectorPro Lite** - This contains standard calculations and operation functions. Compatible with motorised test stands and instruments.

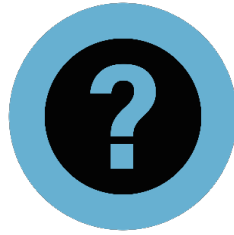
Sections relevant to only specific device groups are denoted by the section heading and can be skipped if they aren't relevant to your test stand or instrument.



▲ Some of the test stands and instruments compatible with VectorPro

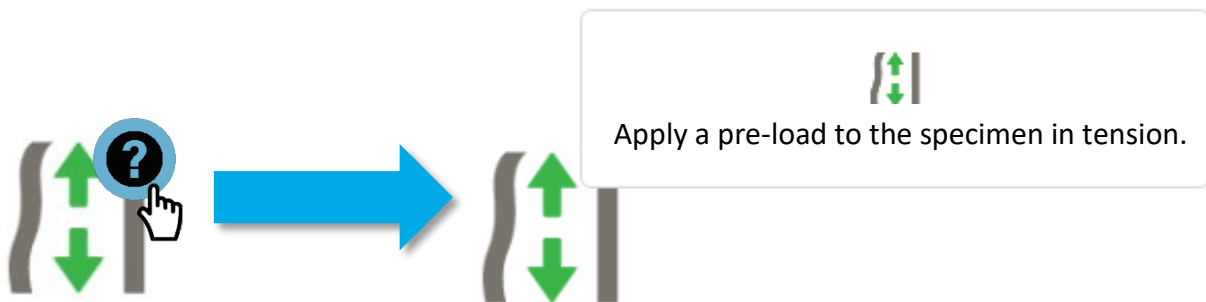


## 1.1. Contextual Help



The above symbol is seen within VectorPro in many places, such as on operations and test settings.

Clicking the contextual help symbol displays help texts and images to explain what the setting or operation is.



## 1.2. VectorPro™ MT - Material Test Stands



▲ From left to right, MultiTest-dV with  $dV(u)$  mode enabled, OmniTest-5.0 kN single column test stand and OmniTest-10 kN twin column test stand

Materials test stands are designed to perform a range of materials testing procedures, as well as some product tests.

The range of rigid test frames enables the properties of metals, plastics, polymers, alloys, composites, wood, fabrics, glass, laminates and ceramics to be accurately tested in tension and compression in forces up to 50 kN.

### Unique Applicable Sections

The following sections are unique to these test stands:

- 9.3 VectorPro™ MT - Specimen
- 9.4 VectorPro™ MT - Operations
- 9.6 VectorPro™ MT - Result

### 1.3. VectorPro™ Lite - Motorised Stands



▲ From left to right, MultiTest-*dV* 0.5 kN, MultiTest-*dV* 1.0 kN, MultiTest-*dV* 2.5 kN and Vortex-*dV* test stands

Mecmesin motorised test stands are designed for a wide range of applications and are available in both force and torque variants.

The MultiTest-*dV* range integrates with the Mecmesin AFG, a versatile and fully-featured digital force gauge, available in 10 load capacities from 2.5 N to 2.5 kN. Stand capacities include 0.5 kN, 1.0 kN and 2.5 kN variants.

The Vortex-*dV* is a versatile torque testing system, comprising of a precision-controlled motorised stand with a choice of torque transducers; 1.5 N.m, 3 N.m, 6 N.m and 10 N.m.

### Unique Applicable Sections

The following sections are unique to these test stands:

- 9.5 VectorPro™ Lite - Operations
- 9.7 VectorPro™ Lite - Result
- 12.1.3 VectorPro™ Lite - Test Triggers

## 1.4. VectorPro™ Lite - Portable Instruments



▲ From left to right, AFTI with torque screwdriver, AFG 500N, Tornado closure torque tester and Orbis closure torque tester

Mecmesin portable instruments are designed for manual operation and in conjunction with VectorPro can be used to capture force and torque readings.

Advanced Force Gauges (AFG) are available in 10 models from 2.5N to 2500N capacity. Both AFG and Advanced Force/Torque Indicator (AFTI) devices are also compatible with Mecmesin external 'Smart' force and torque transducers for increased flexibility.

Tornado and Orbis torque testers are versatile instruments for manually measuring low-level torque up to 10 N.m (Orbis limited to 6 N.m). It provides practical operation, combined with advanced features for easy and accurate testing of clockwise and counter-clockwise torques.

### Applicable Sections

The following sections are unique to these instruments:

- 9.7 VectorPro™ Lite - Result
- 12.1.3 VectorPro™ Lite - Test Triggers

## 2. System Requirements

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The following section details the minimum PC specification to run VectorPro. Please note although devices that meet the minimum PC specification can run VectorPro for the best possible user experience it is recommended that the computer used meets or exceeds the recommended specification.

Windows 7, 8 and 10 are supported in both 32 bit and 64 architecture forms. It is recommended for an optimal experience that you run VectorPro on Windows 10 64 bit.

### 2.1. Minimum PC Specification

- Intel/AMD dual-core processor with 2GHz or faster clock speed
- 4GB RAM
- At least one free USB 2.0 or USB 3.0 port
- Hard drive with 10GB of free space
- Screen resolution 1080x720
- Windows 7 64-bit or Windows 10 64-bit

### 2.2. Recommended Specification

- Intel Core i5 processor
- 8GB RAM
- At least one free USB 2.0 or USB 3.0 port
- Solid State Disk (SSD) with 10GB free space
- Screen resolution 1920x1080 (Full HD)
- Windows 10 64-bit

## 3. Installing VectorPro™

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### 3.1. Previous Installation

If VectorPro is installed on your PC it is recommended you backup your database before updating your software. The default save location is:

- C:\ProgramData\Mecmesin\

Copy the entire 'VectorPro' folder to a safe location.

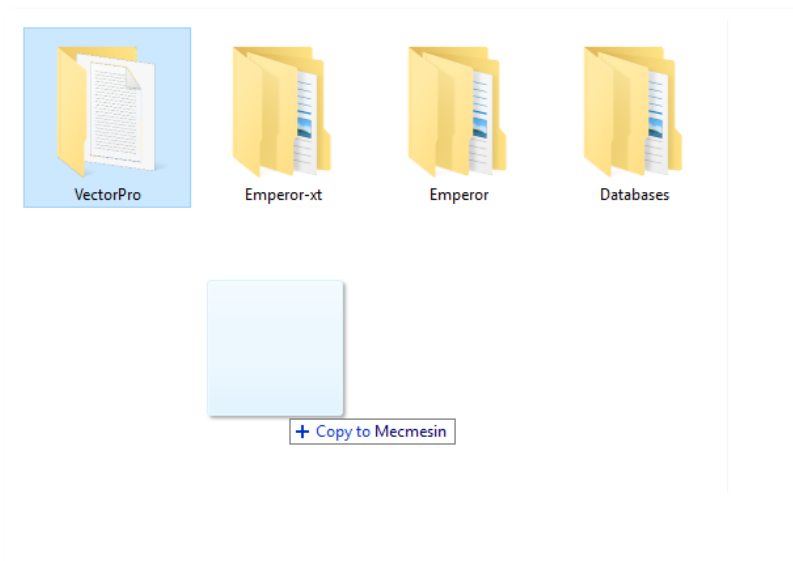
If you are using a database in a custom location this folder should also be backed up. It is important to ensure there are no spaces in the address of the custom save location before updating. In some instances, spaces in the location address can stop the software from updating the database. For example:

- C:\Users\Mark\Documents\Test Files\

Is not an acceptable save location as it contains a space in the address between the words 'Test' and 'Files'.

- C:\Users\Mark\Documents\TestFiles\

The address above is acceptable as there are no spaces.



**▲ Copying the default database to create a backup. This is recommended before installing a new version of VectorPro**

## 3.2. Installing VectorPro™

The required installation software is on the supplied USB key. In some instances, it may be supplied via an online download. Please do not connect the test equipment until the installation has is complete.

### Step 1 - Check the PC Specification

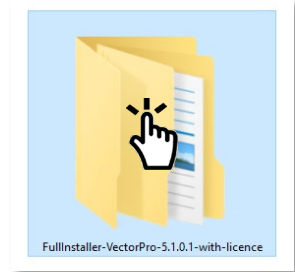
Before installing VectorPro check whether the selected PC is 64-bit or 32-bit.

If you are unsure of the architecture of the computer contact your local IT administrator for help.

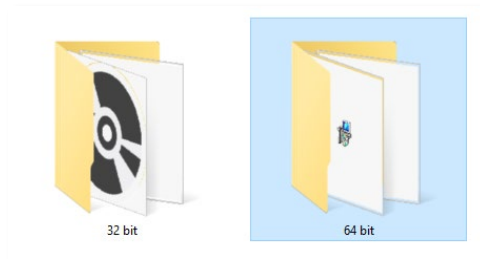
### Step 2 - Locate the Installation Folder

Insert the VectorPro key into the PC and locate the installation folder called:

- FullInstaller-VectorPro-5.1.1.0-with-licence.



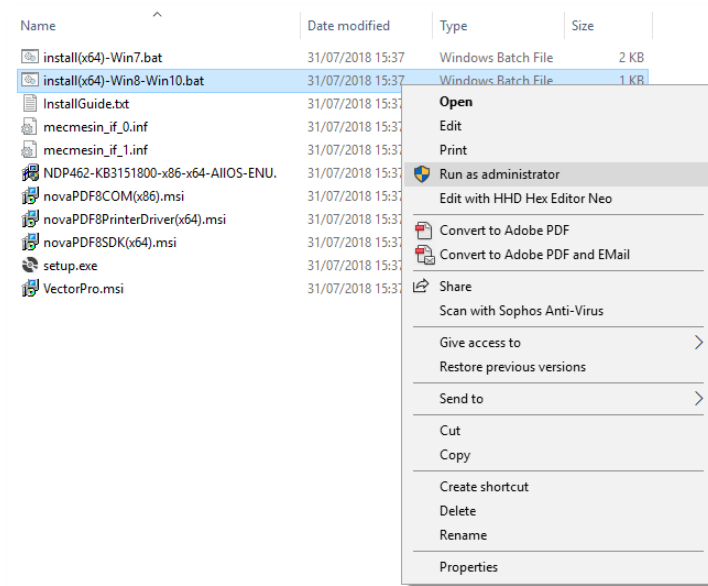
### Step 3 - Start the Installer



First, select either the 32-bit or 64-bit folder depending on the computer's architecture. Within this folder there are the following files:

Name	Date modified	Type	Size
install(x64)-Win7.bat	31/07/2018 15:37	Windows Batch File	2 KB
install(x64)-Win8-Win10.bat	31/07/2018 15:37	Windows Batch File	1 KB
InstallGuide.txt	31/07/2018 15:37	Text Document	1 KB
mecmesin_if_0.inf	31/07/2018 15:37	Setup Information	2 KB
mecmesin_if_1.inf	31/07/2018 15:37	Setup Information	2 KB
NDP462-KB3151800-x86-x64-AIiOS-ENU.	31/07/2018 15:37	Application	60,555 KB
novaPDF8COM(x86).msi	31/07/2018 15:37	Windows Installer ...	1,160 KB
novaPDF8PrinterDriver(x64).msi	31/07/2018 15:37	Windows Installer ...	19,060 KB
novaPDF8SDK(x64).msi	31/07/2018 15:37	Windows Installer ...	6,660 KB
setup.exe	31/07/2018 15:37	Application	531 KB
VectorPro.msi	31/07/2018 15:37	Windows Installer ...	15,250 KB

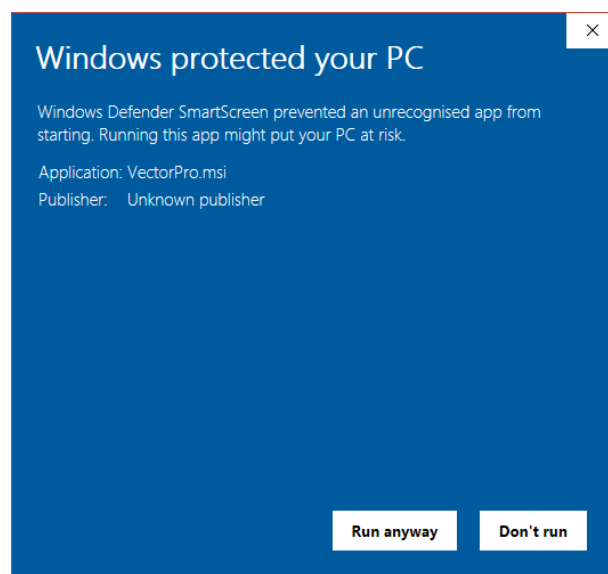
The files shown on the previous page are for a 64-bit installation. The 32-bit version file names differ.



Right click on the appropriate '.bat' file and select 'Run as administrator'. Windows 7 users should use the 'install(x64)-Win7.bat' and users running Windows 8/10 should use the 'install(x64)-Win8-Win10.bat'

## Step 4 - Installing™ VectorPro

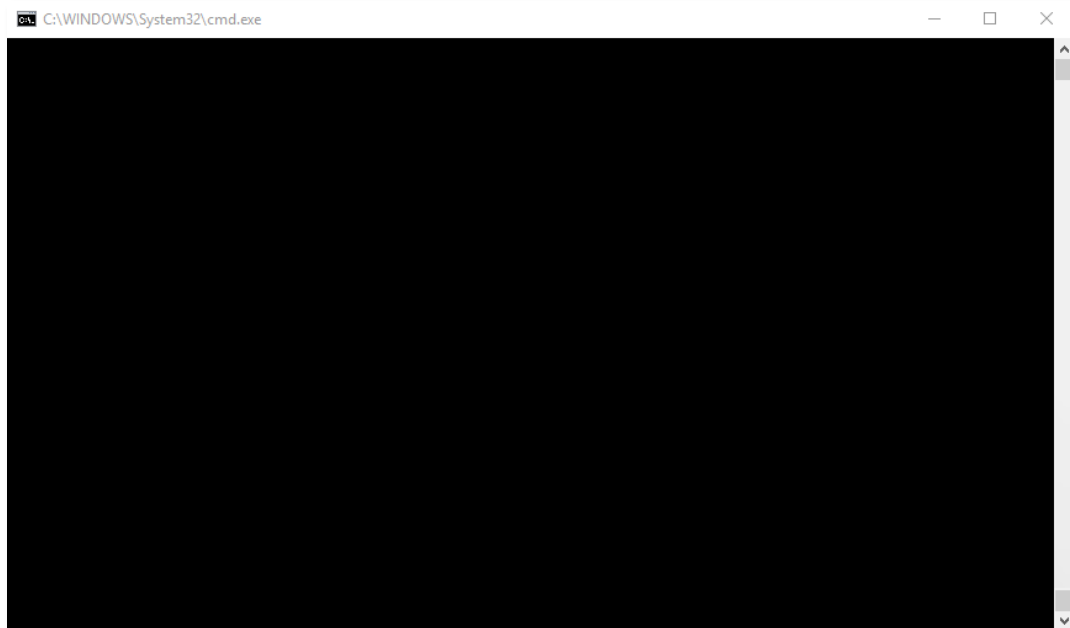
In some instances, Windows Defender\* may prevent the installer from running and the screen below is presented, please select 'More information' and then the 'Run anyway' option.



\*Windows Defender is a trademark of Microsoft Corporation.

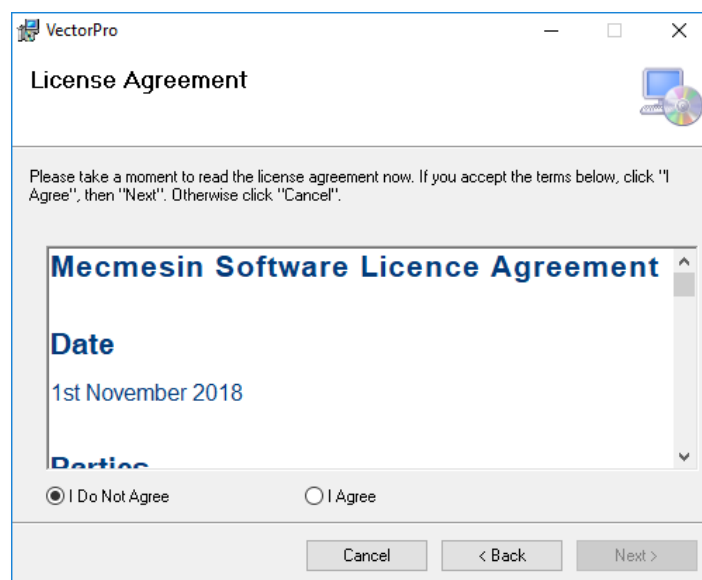


A black command prompt window should now appear onscreen (Shown Below); this manages the installation of VectorPro's associated drivers and PDF printing software.

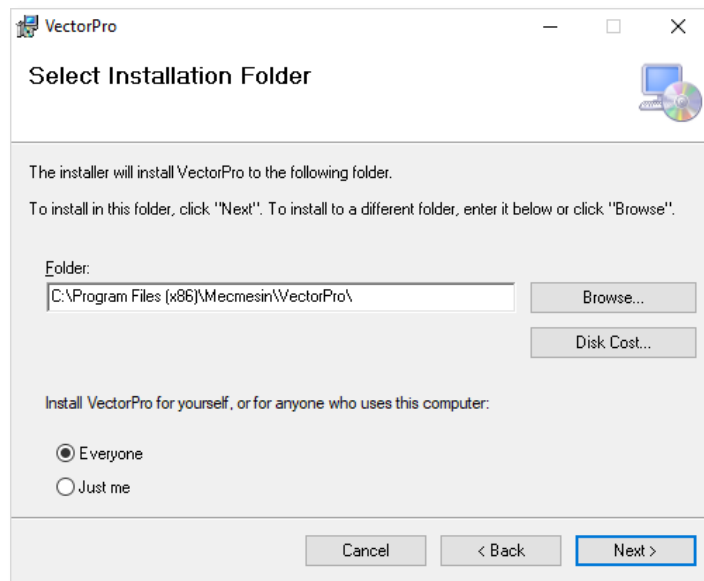


Once the installation of the associated drivers is completed the main VectorPro setup installer will launch.

Before continuing the installation it is important that the software license agreement is read and understood in full; failure to 'Agree' will terminate the installation of the software. This document is also available to view in **Section 19**.



To continue press the 'Next' button. The window on the next page is then displayed.



Next, select the installation location and whether the software installs for just the current user (Just me) or all users (Everyone) on this PC. Press 'Next' to continue. Once the installer is finished press 'Close', VectorPro can now be launched.

### 3.3. Important Installation Information

Please ensure that all Windows user accounts that launch VectorPro have Admin read/write access to the following locations:

- **Default database location:**  
C:\ProgramData\Mecmesin\VectorPro\
- **Default install location (Windows 10 example):**  
C:\Program Files (x86)\Mecmesin\VectorPro\
- **Custom database location:** If a custom database location is used, users must also have admin access within Windows for this location

**Note:** If you are unsure how to perform this please contact your local IT department for assistance.

## 4. Connecting a Mecmesin Device

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### 4.1. USB Test Stands

The following devices connect via USB B to USB A communications cable - Part No. 351-093:

- OmniTest material test stands,
- MultiTest-*dV*, including *dV(u)* mode,
- Vortex-*dV* motorised torque test stand,

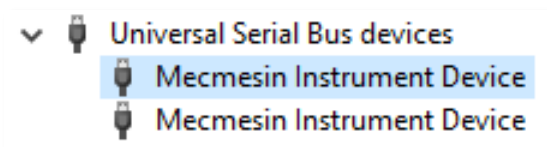


To connect a test to VectorPro first connect the device to a PC using a USB B to USB A cable. Switch on the test stand and open VectorPro, the device is shown as connected on the USB connection icon (located at the top right of the screen).

See **Section 6.1** for more information.

#### 4.1.1. Driver Information

If the test stand does not show as connected open Windows device manager to ensure that the correct driver is installed. Under 'Universal Serial Bus devices' you should see two items called 'Mecmesin Instrument Device'.



If these aren't present please contact your local IT administrator or Mecmesin agent.

## 4.2. RS232 Instruments

The following Mecmesin gauges and instruments connect via D-Sub RS232 to USB A communications cable, the cable part numbers are listed next to the compatible instruments below:

- **AFG/AFTI** - Cable Part No. 351-086,
- **BFG** - Cable Part No. 351-087,
- **CFG+** - Please consult your local Mecmesin agent for the required information,
- **Orbis** - Cable Part No. 351-086,
- **Tornado** - Cable Part No. 351-086,

To connect the device, plug the USB to RS232 cable into the PC's USB port and the test stand's RS232 communication port.

Ensure that the gauges RS232 settings are configured correctly, for more information consult the gauges user manual.

Switch on the device and open VectorPro. Please note RS232 devices are not shown as connected in the top left corner of VectorPro.

### 4.2.1. RS232 Instruments Driver Information

In most instances, driver installation is handled within Windows automatically but if the device does not connect to VectorPro the driver can be manually installed.

The driver installer is available as an executable from the following link:

- [http://www.ftdichip.com/Drivers/CDM/CDM21228\\_Setup.zip](http://www.ftdichip.com/Drivers/CDM/CDM21228_Setup.zip)

If the link is unavailable please contact your local Mecmesin support agent for assistance.

### 4.2.2. RS232 Instruments Communication Settings

To achieve communication between an RS232 instrument and VectorPro the correct settings must be applied within the devices communication menu. The device should be configured as followed:

- **TX Units** is set to 'On',
- **TX Sign** is set to 'On',
- **Baud Rate** is set to '115200',
- **CR LF** is selected,
- **Line Delay** is set to '0',
- **RS232** transmission is selected,

For help setting the device communication settings please consult your devices operating manual:

**431-262** Orbis Digital Torque Tester, Operating Manual

**431-261** Tornado Digital Torque Tester, Operating Manual

**431-213** Advanced Force Gauge (AFG Mk4) Operating Manual

## 5. Launching VectorPro™

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The login dialogue for VectorPro is pictured below. The version number displayed under the VectorPro title.



Enter the username and password, then click to open VectorPro. The default password for user 'admin' is 'admin'. Passwords are case sensitive.



Click to exit VectorPro.



In the event of completely lost administrative access, Mecmesin technical support can unlock your system.



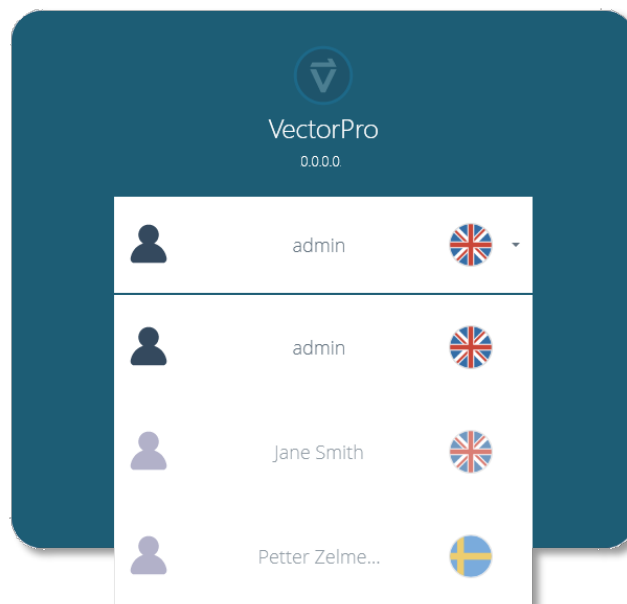
After entering the password, click to select a different database for tests and results (for example, imported from another test location or office). Available only to administrator login. After selection, continue with normal login.



The monitor icon appears when more than one monitor is connected. These are used to select which screen VectorPro opens on upon login; you can choose between the primary and additional monitor.

Clicking the username field displays a list of all available users. The flag denotes the language setting last used by each user.

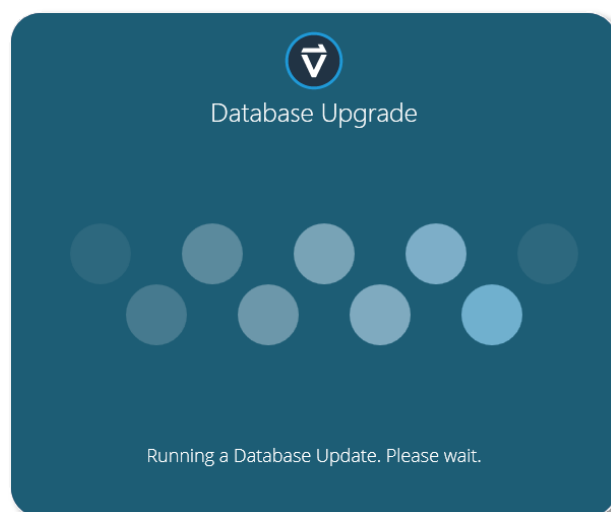
The user's language can be set when the user is logged on. Here, all the users operate with the English language apart from Petter who uses Swedish:



## 5.1. Database Upgrade

When opening an existing database with a new version of VectorPro the software automatically carries out a database upgrade at launch. The upgrade is indicated by the database upgrade window opening (pictured below).

**Important!** For users with large databases, this operation can take a long time. Please do not close the program, allow the operation to complete.

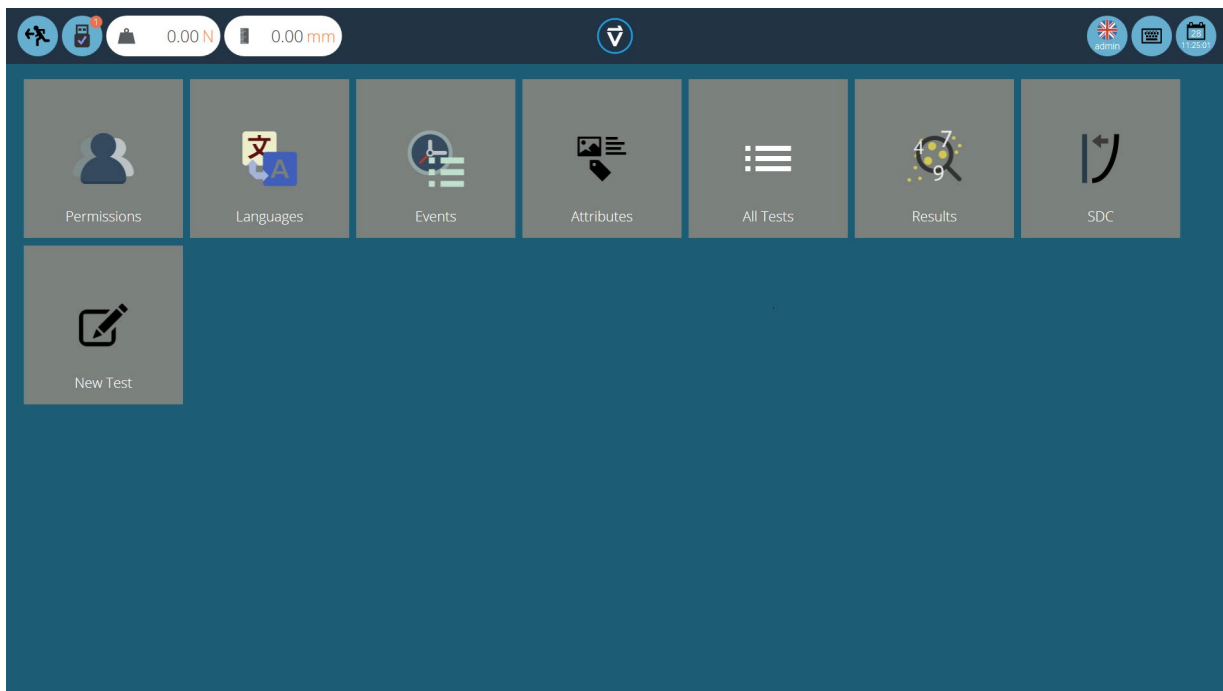


## 6. Workspace

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When VectorPro is launched, the user will see their personal Workspace. The Workspace is populated by those items for which permission has been granted. Therefore the main administrator's workspace displays everything that is available. The administrator account can give other users selective permissions, including the right to grant further permissions.

The initial view of VectorPro, before any tests or results have been added looks like this:



By default, the 'Admin' user has access to every base module, whereas other users need to be given permission before a module appears in their 'Workspace'.

### Maintaining tidy Workspaces

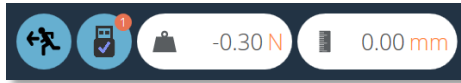
Users other than 'admin' need only have items they need in their workspaces. This can be limited for example, to just those tests they use regularly.

This is done through general permissions (**Section 7, Users and Permissions**) and test permissions (**Section 9.9, Designing a Test: Permissions**).



## 6.1. VectorPro™ Header Bar Features

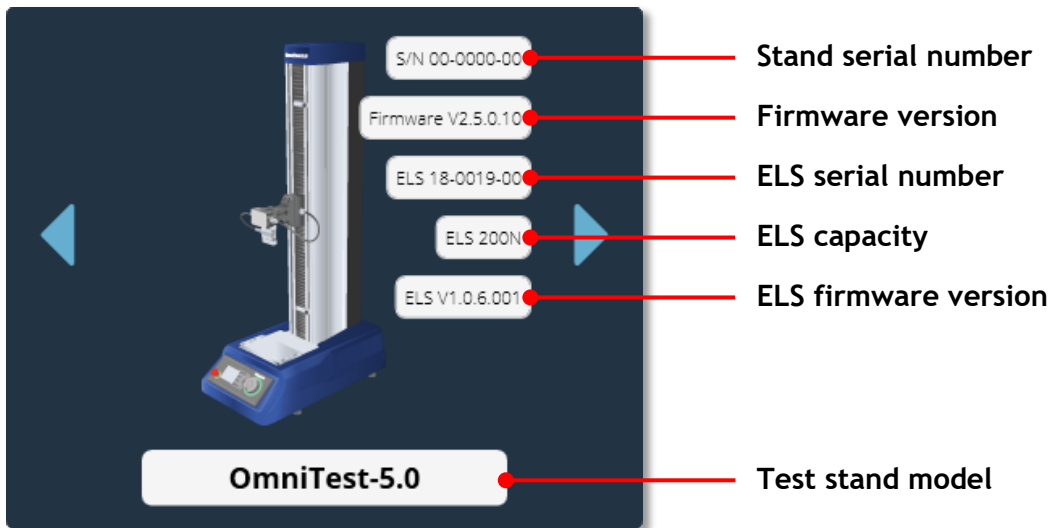
Here is the standard bar in VectorPro with a test system connected.



This icon navigates to the previous screen. If changes have been made to the current screen the save window will appear.



The 'USB' icon, when showing a tick, indicates that a test stand is connected and switched on. When a system is not active (and for RS232 instruments), the tick is replaced by a red cross. The number of connected devices is displayed in the top right-hand circle. Clicking this icon opens the information panel pictured below.



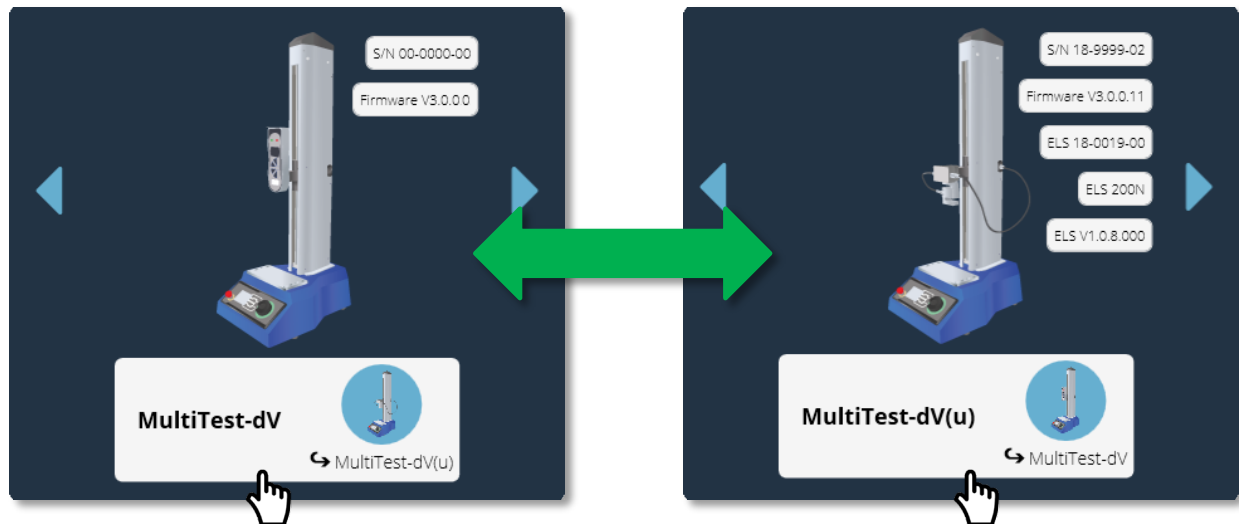
The load displayed on the header bar shows data obtained directly from the system connected. It displays the current load reading so long as the stand is connected to the computer and is switched on.

In this instance, the displacement is the current displacement of the OmniTest-5.0 crosshead relative to the last tared zero. A negative figure indicates displacement below the tared zero, a positive figure is above the tared zero. To zero this reading, tare the position either on the test system or from the test run screen (**See section 12.1.1, Control Bar**).

**Note:** RS232 devices do not appear as a connected device or in the test stand information panel. To check communications with an RS232 device please create and execute a new test.

### 6.1.1. MultiTest-*dV(u)* Switching

For MultiTest-*dV* test stands with *dV(u)* mode enabled you can switch your stands functionality from *dV* to *dV(u)* by pressing the switch located in the information panel.



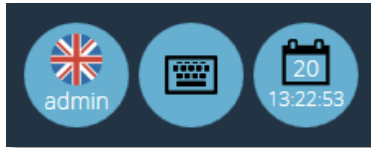
▲ Click the test stand switch button located in the information panel to swap between *dV* and *dV(u)* mode

Please note the following prerequisites are required:

- *dV(u)* functionality is enabled on your test stand,
- A VectorPro Lite key plugged into your computer (supplied when you purchased the software) to run tests using the stand in *dV* mode.
- A *dV(u)* key plugged into your computer when switching to *dV(u)* mode,

For more information regarding MultiTest-*dV* test stands being used in *dV(u)* mode please consult the following document:

- 431-459-04 MultiTest-*dV* Manual,

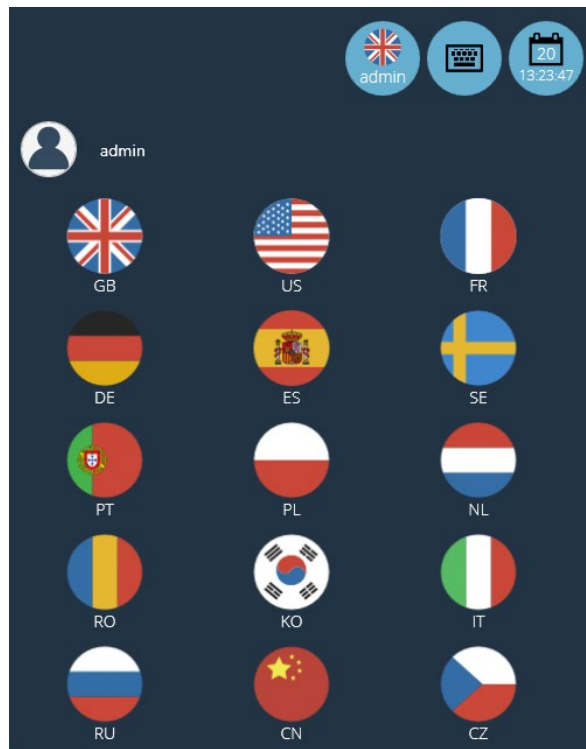


The **keyboard** icon activates the Windows onscreen keyboard (for touchscreen displays) although when operating in Windows 10 'tablet mode' the on-screen keyboard is automatic.

The **calendar** icon shows the current time and day of the month from the PC clock.

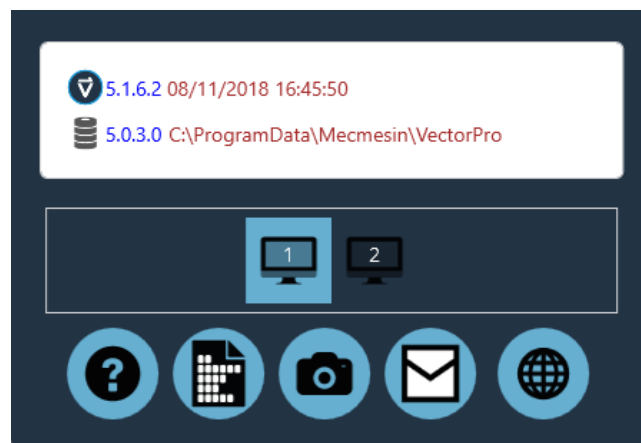
The left-hand icon shows the current username and flag of the display language. Click this icon to select an alternative language.

To improve ease of use in multi-lingual situations each operator can be assigned their preferred languages. This can be done by the user, by clicking on the flag symbol above their name in their 'Workspace':





Click the Vector logo located in the centre of the head bar to display details of the current software version, time/date, database version and save location. This screen is pictured below:



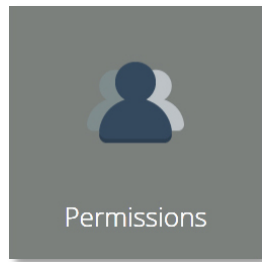
- Click the question mark to access the user manual. Please note that a PDF reader must be installed on your computer to access the manual,
- Click the document icon to view the software license agreement,
- Click the camera to take a screenshot. A .png image is saved to C:\ProgramData\Mecmesin\VectorPro\images,
- Click the envelope to send full system information as a table in an email. You must have Outlook installed on your computer for this function to work,
- Click the web symbol to launch the Mecmesin website homepage. Internet connection is required,
- Click on the monitor symbols to change which screen VectorPro is displayed on.

**Note:** These operations may take time to appear; do not use Windows Explorer to find an image or see an email too quickly.

Other icons are displayed in the header bar when running tests and viewing results, and confirmatory messages in orange boxes. See **Section 12.1.2** for more details.

# 7. Users and Permissions

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Click on the 'Permissions' tile to create new users, groups and to edit permissions for features within VectorPro. Within the main 'Permissions' screen, you have two tabs, 'Users/Groups' and 'Permissions' (Pictured below).

## 7.1. Users

A user is a single VectorPro login. Users can have individual permissions applied to them within the 'Permissions' tab, as well as within the 'Permissions' tab of individual test files (accessed when either creating or editing a test). You can also add users to permissions groups.

## 7.2. Admin Account

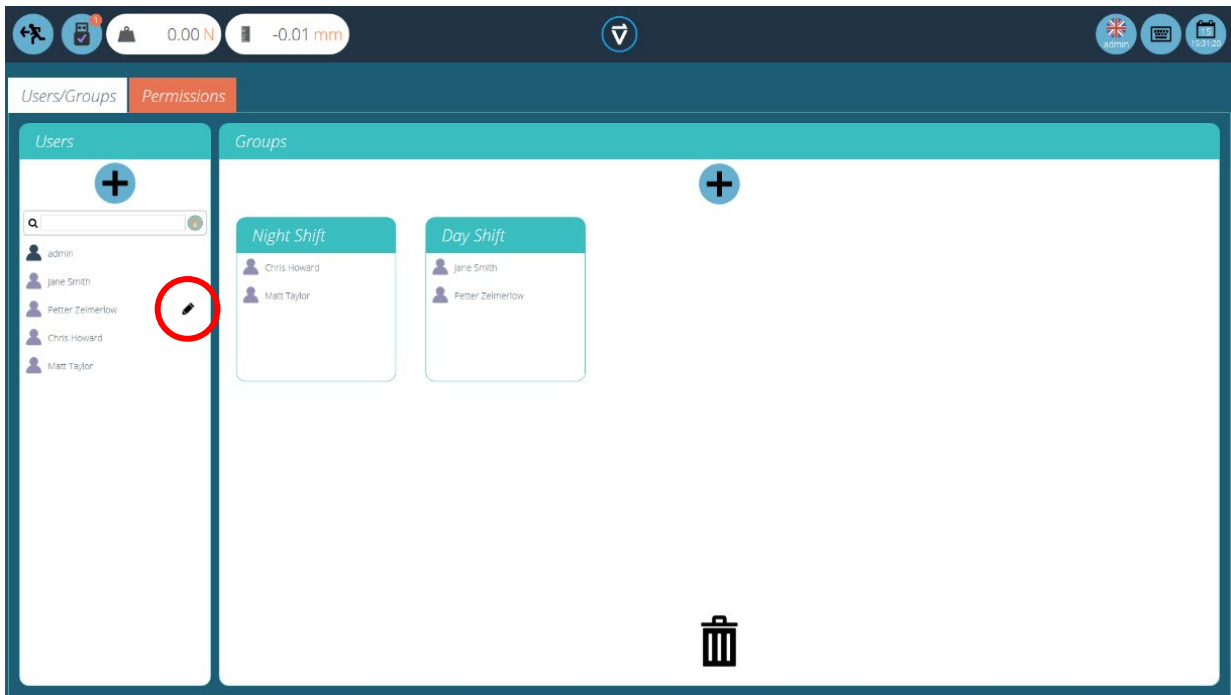
This account's access to functions cannot be limited and so it is important for the security of your database that you change the default password of the admin account and store it securely in case it is needed in the future.

## 7.3. Groups

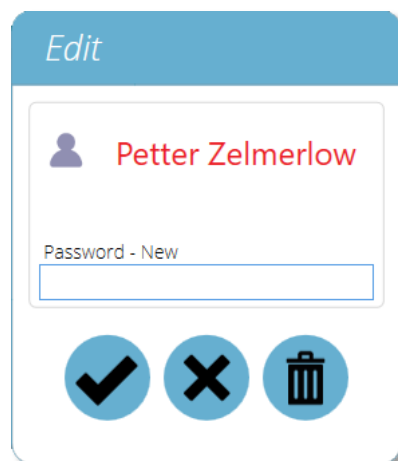
A group is a collective of one or more user. Groups can be used to apply permissions to several users at the same time, for example, if you have four users who all need permissions to run tests but not edit them, rather than editing permissions for each individual you can create a group and edit permissions for this group. See **Section 7.4** for more details.

This group can be named to represent the users in the group, for example on the screen on the next page there is a night and a day shift group. Any permissions applied to this group apply to all users within the group.

## 7.4. Creating and Editing Users and Groups

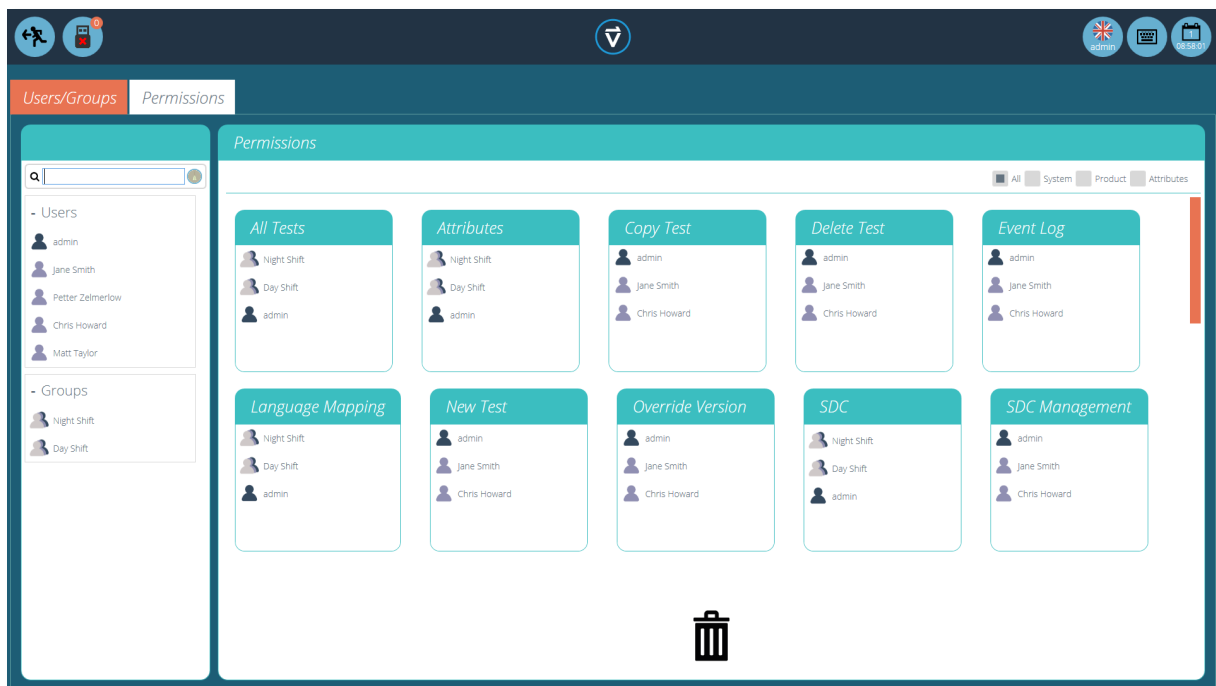


- To **add** a new user with a password, click the '+' button located in the 'Users' section on the left –hand side of the screen and define a username and login for this account.
- To **add** a new group, click the '+' button located in the 'Groups' section in the centre of the screen and define a name for the group. In the previous image, the company has a night and day shift groups.
- To **edit** a user password, hover over the name and click the black pencil (circled red in the image at the top of the page). To edit a group name, hover over the name and click the black pencil.
- To **delete** a user or group, select edit and click the trash icon in the edit dialogue box.



## 7.5. Configuring Permissions

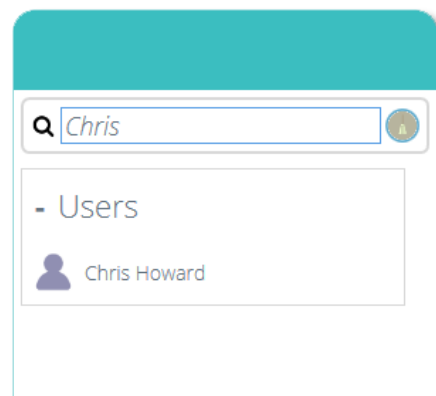
- To configure the permissions for an individual user or group, navigate to the 'Permissions' tab. Here, using drag-and-drop control you can place users and groups into predefined settings cards located in the centre of the screen.
- When a user or group is placed in one of these settings cards they are granted the relevant permission. In the image below you can see a typical example of the permissions screen.
- In this example the user groups 'Day Shift' and 'Night Shift' have been placed in 'All Tests', 'Attributes', 'Language Mapping' and 'Test Results' this means these aspects of VectorPro are visible to these groups.
- In this scenario, as 'Chris Howard' is the supervisor for the night shift and 'Jane Smith' is the supervisor for the day shift. Therefore they have been given permissions to all aspects of VectorPro.

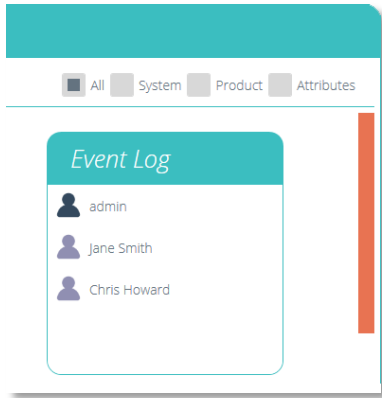


## 7.6. Filtering Users and Permissions

Within the 'Permissions' tab, you have options to filter both the users and groups visible, and the permission settings cards. Users and groups can be filtered using the search bar located on the left-hand side of the screen (pictured right).

To filter your results simply type the name of the user or group you are looking for, click the 'broom' icon to clear your results.





Within the 'Permissions' tab, you can also filter the settings cards displayed. To filter the permission settings cards on the screen select one of the four tick boxes located at the top of the 'Permissions' window on the right-hand side.

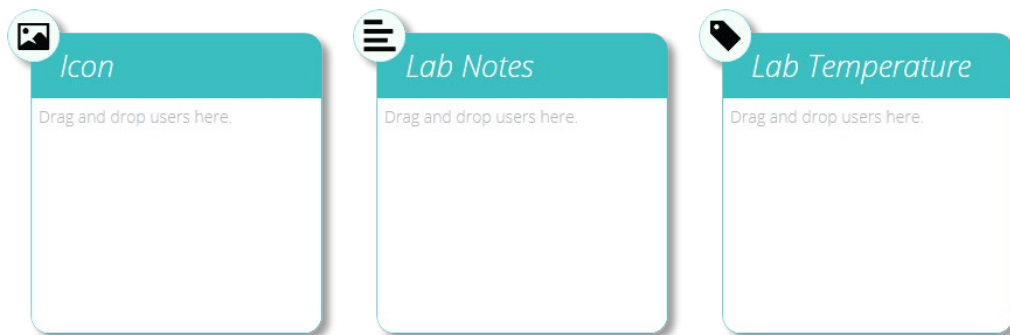
You can select system, product and attributes. System displays workflow settings, with permissions such as the ability to delete tests being shown.

Product displays just test systems and instruments such as an OmniTest-5.0. Attributes display permissions only for the available attributes. These are created when new attributes are added to tests.

## 7.7. Attributes Permissions Screen Interface

The attribute cards within the 'Permissions' screen can be quickly identified by looking for the icon in the top left of the tile. You can also use the filter to select just attributes to be displayed. For more information see **Section 7.6, Users and Permissions: Filtering Permissions**

For example, below we have three attributes; an image, a note and a label, you can see this by looking at the Icon in the top left-hand corner.



## 7.8. Test Permissions

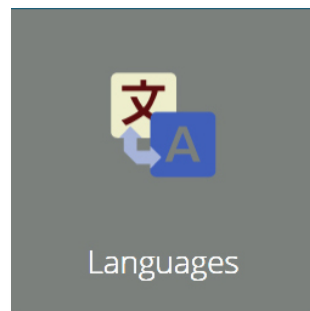
Every test routine that is created and saved offers further test-specific permissions to be granted. A test can be added to a user's 'Workspace' with the option to grant permissions to edit and save, upload, execute, view and print reports from this test. See **Section 9.9** for more information.

**Note:** For a user to be able to execute a test they must be granted correct permissions within the test's permissions settings as well as having permission to use the corresponding instrument for this test. For the above examples, all users must be placed into the OmniTest-5.0 permissions card to use and OmniTest-5.0 test stand.



## 8. Language Mapping

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All text phrases displayed within VectorPro are held in a user-editable dictionary and can be edited:

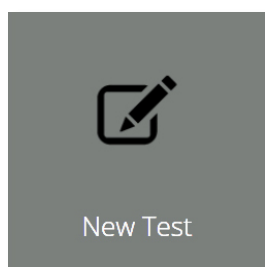


To edit your desired language select the language to examine and when or where necessary, edit entries as required.

Ensure you save the changes before closing. These changes are now visible within the software in place of the original phrase.

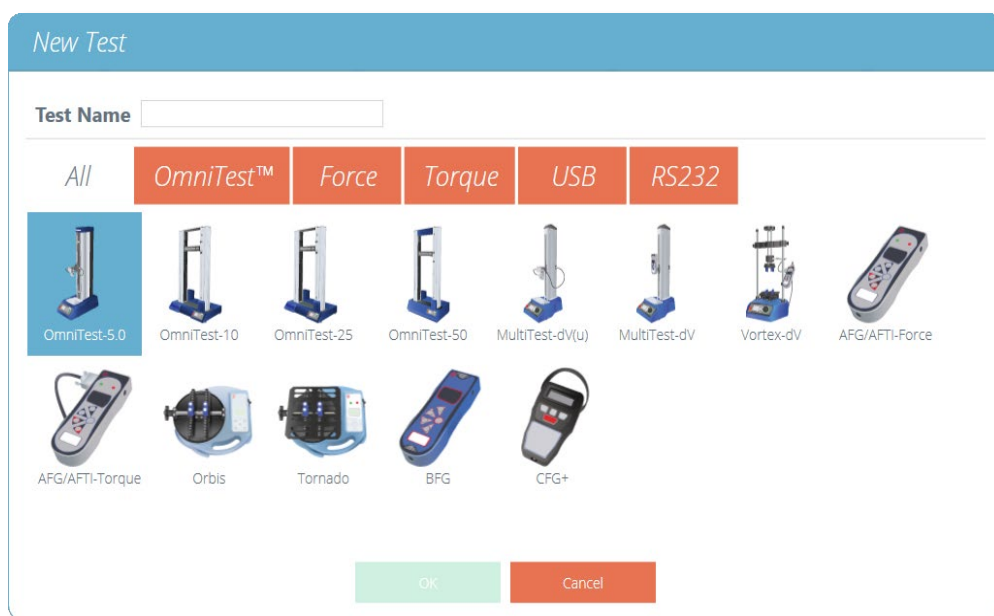
## 9. Designing a Test

Certain segments within this section only apply to either VectorPro MT or VectorPro Lite compatible devices. This is indicated by the heading for each applicable section. For more information regarding test stands and software features please see **Section 1**.



### 9.1. Test Names and Versions

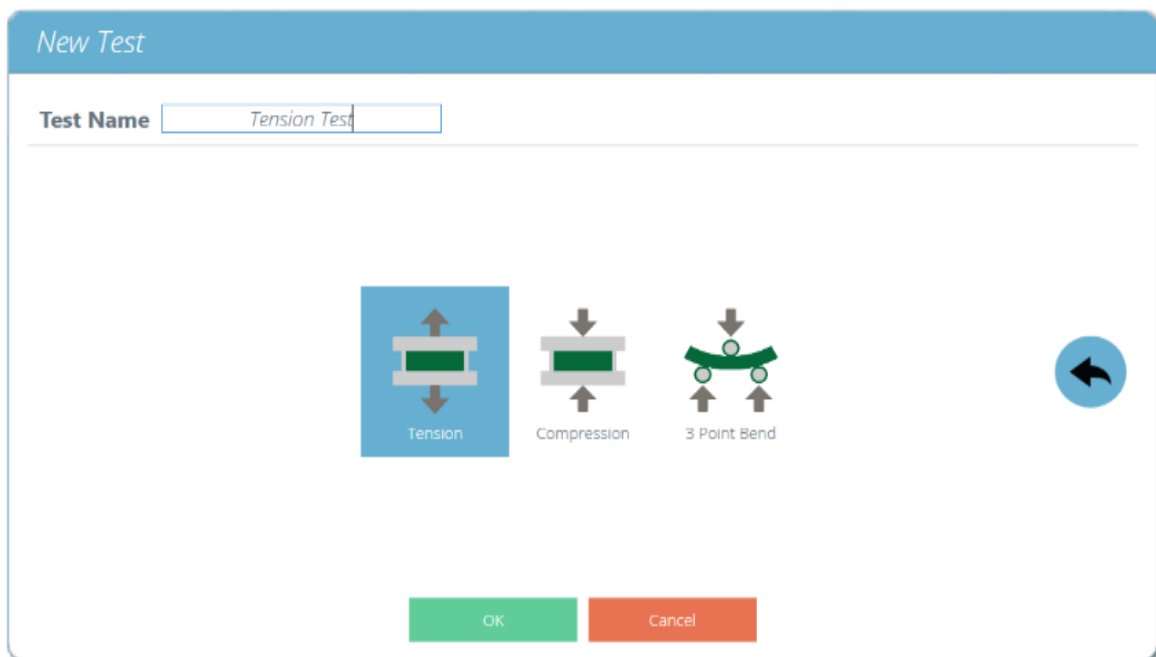
Click the 'New Test' tile to configure a new test. The 'New Test' screen, pictured below, is displayed onscreen. VectorPro MT test stands are listed under the OmniTest tab. Within this tab select your desired test stand. Please note, the test will then only run on the selected system or instrument. To continue enter a test name, select an instrument and press OK.



▲ The 'New Test' selection screen, from here you can select which instrument you are using

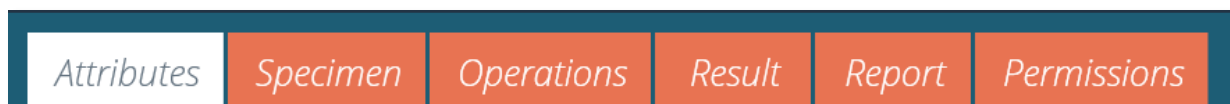
**Note:** For MultiTest-*dV* test systems with switching enabled ensure you select *dV(u)* for ELS and extensometer support and MultiTest-*dV* for standard tests using an AFG force gauge.

For VectorPro MT compatible stands you the screen shown below will be displayed asking you to select whether you are running a compression, tension or 3-point bend test.



▲ Here you can select either 'Tension', 'Compression' or '3-Point Bend' tests.

A new test contains a series of settings tabs; attribute configuration, specimen definition (VectorPro MT Only), a sequential operation (USB Test Stands Only), result calculations, an optional editable report layout and permissions specific to this test.



## 9.2. Attributes

Attributes extend the information about a test. Some are the default, others are customisable. The 'System' attribute, for example, is not editable and is available in results and reports to indicate the test system used for the test.

Attributes can be added to store notes, labels or attach images to the test. You can also configure attributes to prompt for input value before or after the test.



▲ Icons for a 'Label', 'Note' and an 'Image' attribute

## 9.2.1. Test Name

### Default attribute

Names the test routine and all versions. This attribute can be edited but is in all versions of the test, not just subsequent versions. Test names must be unique.

## 9.2.2. Test Notes

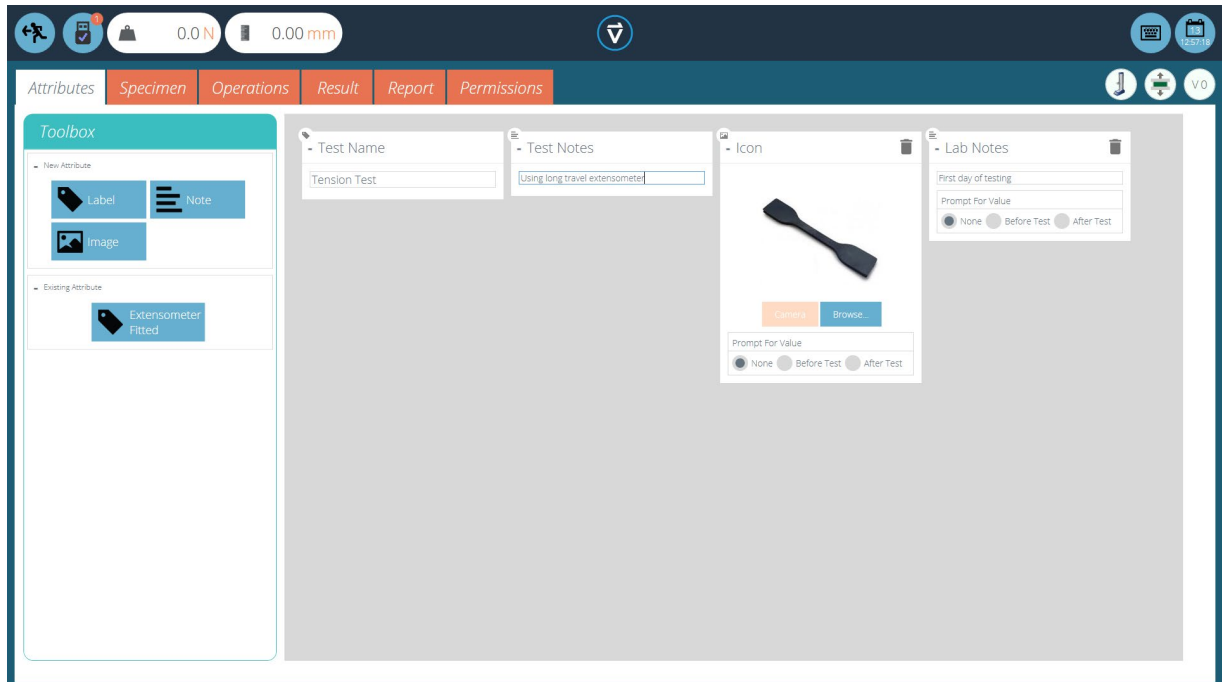
### Default attribute

Applies to this test version, and is inherited by subsequent versions until amended again.

## 9.2.3. Add New and Existing Custom Attributes

Once an attribute has been used in VectorPro, it is incorporated into the database and becomes available to all tests under the existing attribute Section. An attribute must have a unique name and can be a label (up to 30 characters), a note (up to 300 characters) or an image.

**Note:** Once a test has been assigned an attribute it cannot be removed from the test altogether, only from a version of that test. The overall test will always remain associated with the attribute.



▲ Here you can see an image attribute showing the specimen that is being tested

Image attributes allow the insertion of an image file, which may be browsed for, or captured on a webcam. The first image to be assigned appears as the 'Workspace' icon for this test (attributes for a test, once assigned, cannot be rearranged).

Image and note attributes also have a 'Prompt for Value' setting, here you can select:

- **None:** No action is prompted before or after the test, fixed image or note can be entered here,
- **Before Test:** The user is prompted for an image file or note before the test,
- **After Test:** The user is prompted for an image file or note after the test,

**Note:** Attributes can be minimised by clicking on the header at the top of each individual attribute.

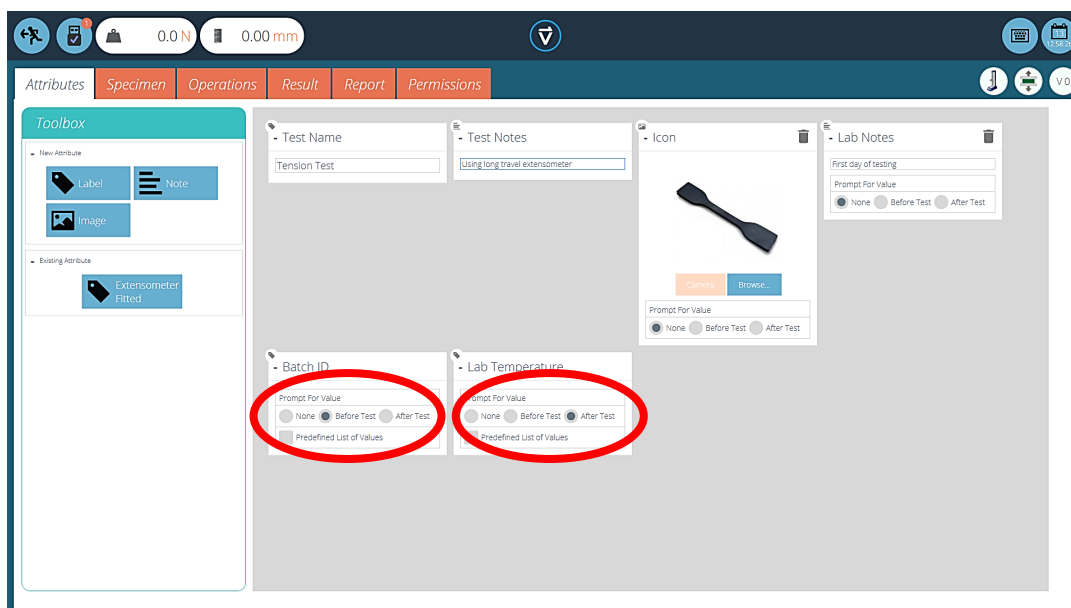
### 9.2.4. Prompt for Value Feature

Within VectorPro you can configure attributes to prompt for input value before or after the test is run.

For example, this can be applied to a note, label or image attribute which enables the test to prompt the user for input before or after testing. These labels are then saved to the relevant result file. This is shown below whereby a 'Batch ID' label has been set up with a before test prompt and a 'Lab Temperature' label has been set up with an after test prompt.

As you can see from the screenshot below when editing or creating a test the image and note attributes have the option to configure before or after test options. For example, this can be useful for logging important notes or for adding pictures of the specimen pre and post-test.

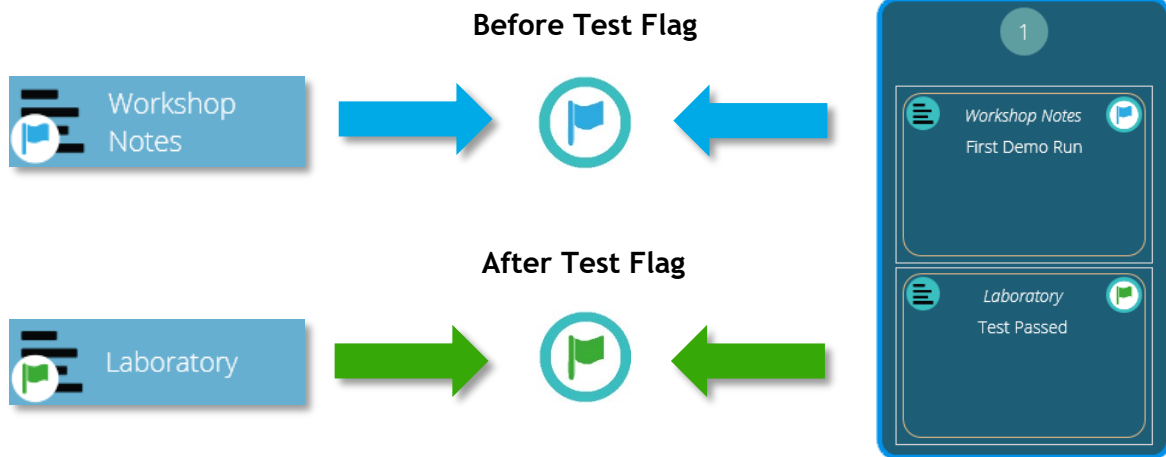
**Note:** Once the test contains results you cannot add/remove or edit a prompt for value attribute.



▲ This image shows the 'prompt for' settings highlighted by the red circle.

## Prompt for Value - Flag Definitions

Prompt for Value attributes carry flag markers to give easy visual identification to whether they are before or after the test values. These markers are visible in the 'Results' tab when both within the 'Test Designer' and the 'Results Viewer'.

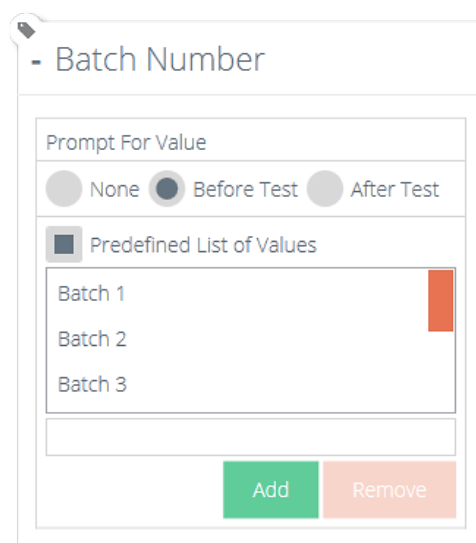


▲ Diagram displaying the new flag markers. The left-hand icons are the markers within the 'Results' design page and the right hand are within the 'Results

## Prompt for Value - Predefined List

Label attributes using the 'Prompt for Value' feature can be set up with a predefined list. For example, these lists could be used to state batch numbers or the diameters of the specimens.

To use the predefined list feature you must first create a new label attribute, then select the 'Predefined List of Values' option to display the input table. You can enter the values by pressing 'Add' and remove unwanted values by pressing 'Remove'.

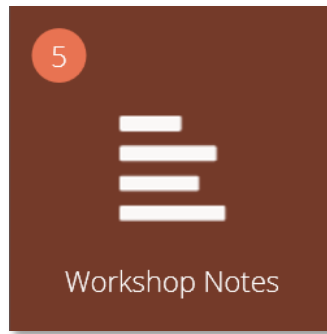




In the example above, a label attribute called 'Batch Number' was configured within the test designer with 'Before Test' selected and a predefined list of batch numbers entered.

Upon starting the test the 'Prompt for Value - Before Test' window appears, here you can enter your input to any attributes that have been configured to prompt before the test is run.

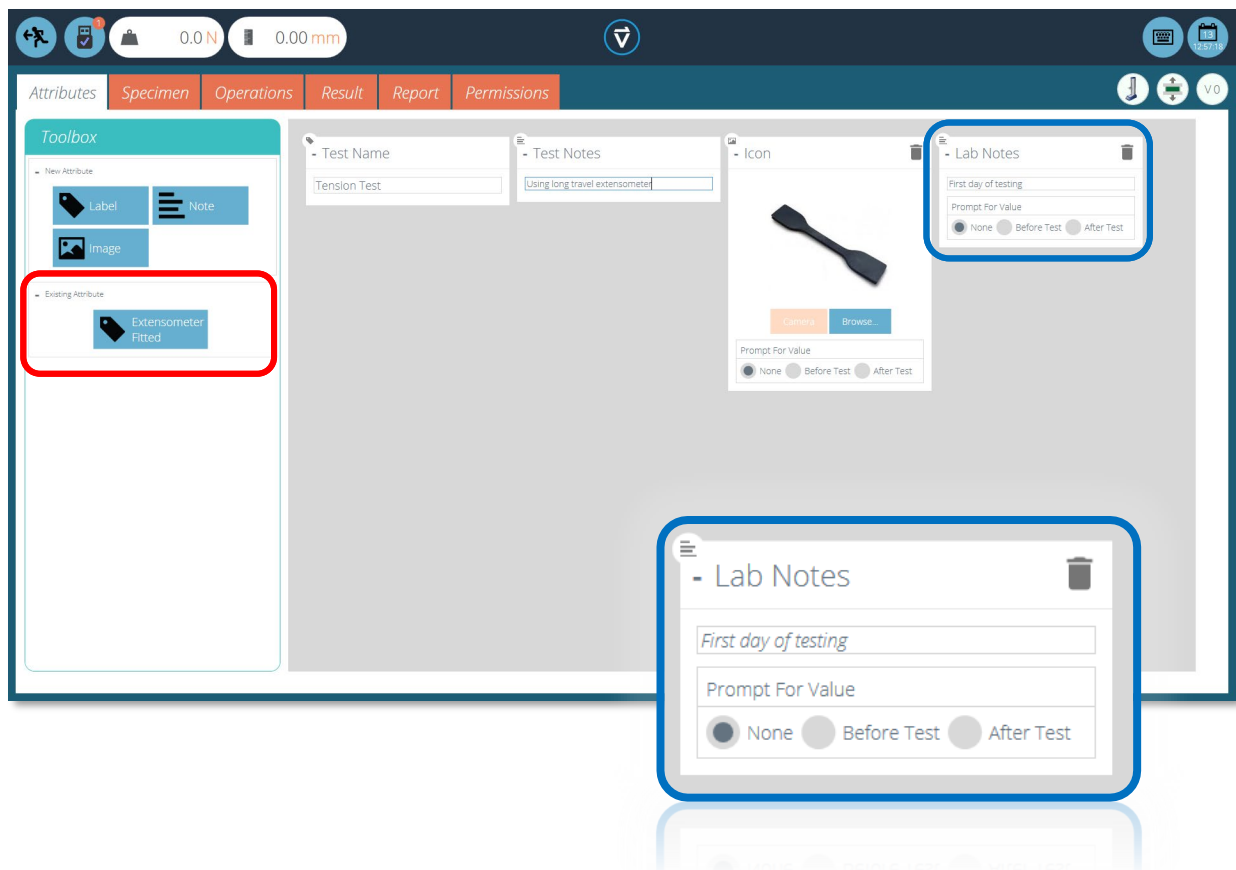
## 9.2.5. Grouping Attributes - Creating Test Folders



▲ Grouped attribute tile

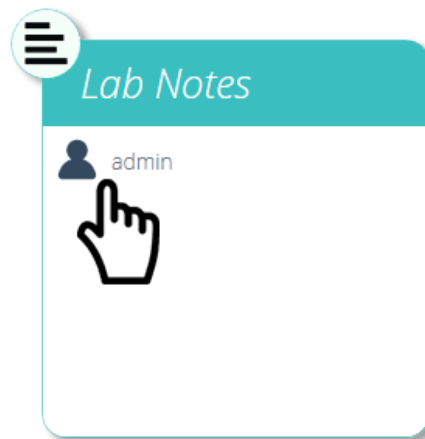
Within Vector it is possible to assign the same attribute to several tests so it can be used as a filter to group tests together on the main 'Workspace' screen.

This allows for easy grouping of tests based on a common image, note or label. These tests are then grouped into a brown tile like the one pictured above. How to achieve this is covered over the next pages.



Within the relevant tests place your desired attribute. For example, in the screen above an attribute called 'Lab Notes' is being used by the operator to describe the test being executed. You can find previously used attributes in the 'Existing Attributes' section (highlighted in red).

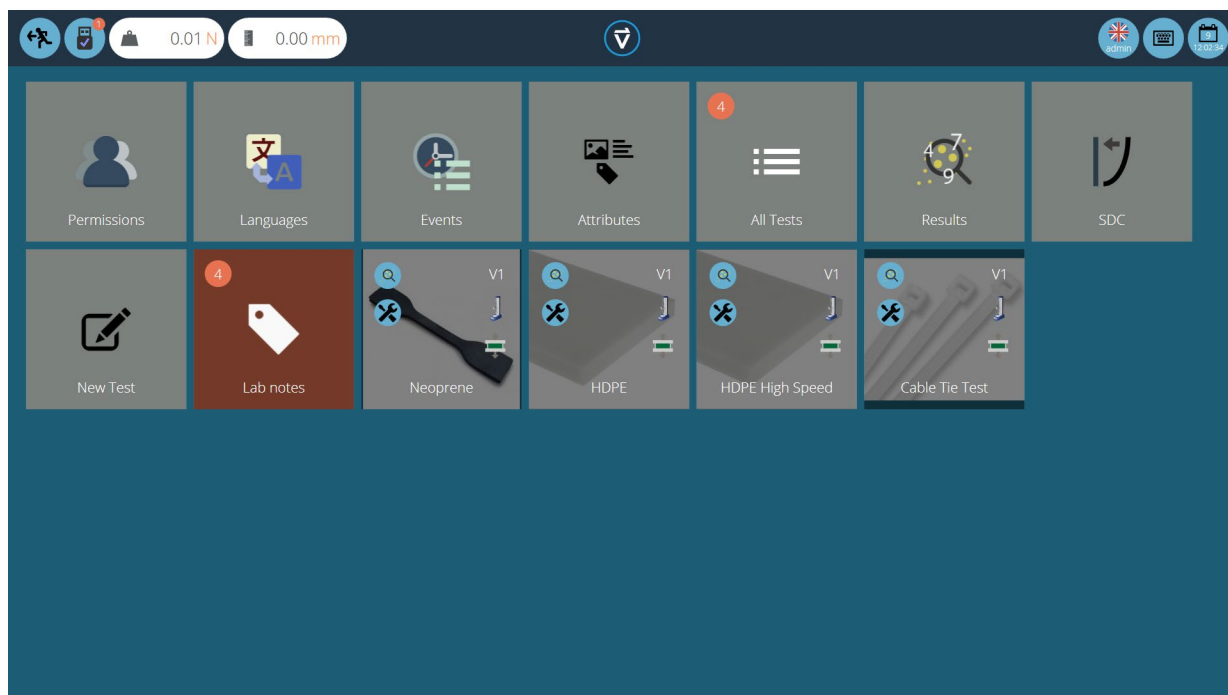




### ▲ Editing the attribute permissions

Next, you need to exit the test being edited and click on the 'Permissions Tile' located on the far left of the home 'Workspace'. From here drag-and-drop the relevant user into the specified attribute tile (See above Image).

Attribute tiles are located at the bottom of the 'Permissions' screen, below the test system tiles. You can also use the filter toolbar to show only attributes. In this example above, 'admin' has been given rights to see all tests using the 'Lab Notes' attribute.

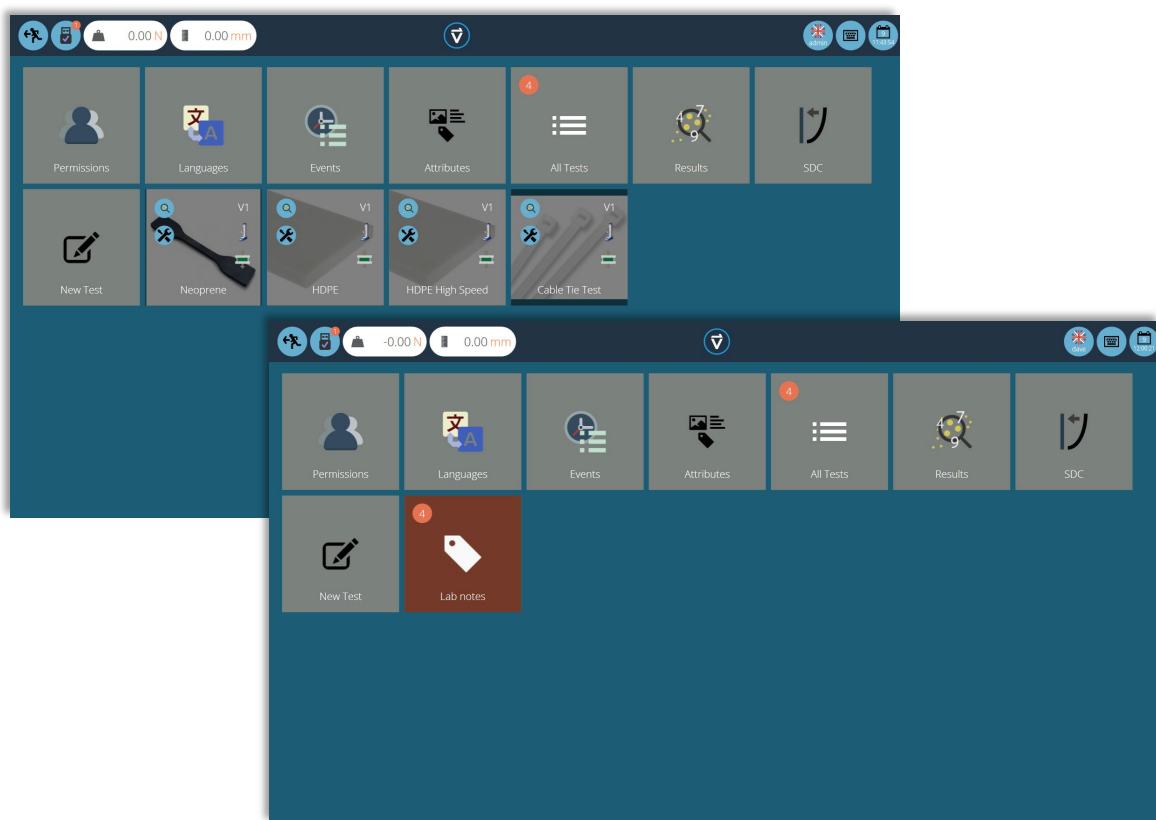


Now the attribute group is present in the home 'Workspace' for the admin user to see. For users running a large number of projects, you can organise all tests into groups only, removing individual test tiles, therefore helping to organise the screen to maximise the efficiency of the 'Workspace'.



To achieve this click edit on the test which you wish to make invisible, then navigate to the permissions tab and remove the relevant user from the 'Workspace' attribute. In this case, as the admin wishes to hide the test, this user is removed from the 'Workspace' tile by simply dragging and dropping the user into the trash, as pictured above.

In the second image below, the test files are only visible within the 'Lab Notes' attribute group. In this scenario, the workspace rights for admin have been removed from all test files but as the tests contain the 'Lab Notes' attribute (which admin has permission for) the tests appear as an organised folder instead of individual tiles.



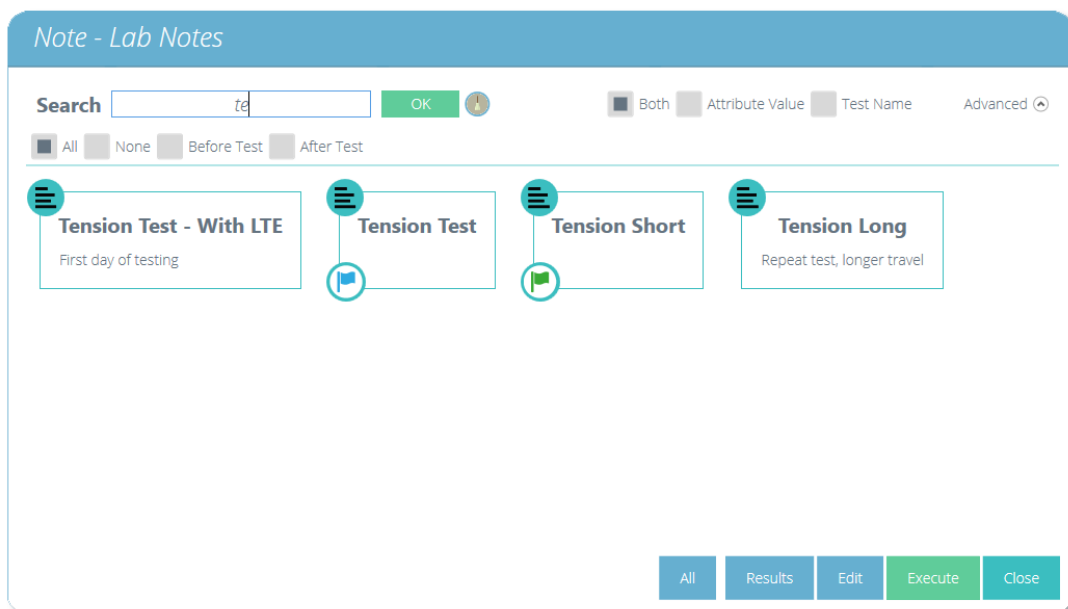
▲ Two workspaces using the same database, the lower has used permissions grouping for each individual test to create a subfolder with all the tests in

## 9.2.6. Searching Within Attribute Groups

Within VectorPro you also can search within your created 'Attribute Groups'. To access this feature click on a brown group tile that is either linked by a note or label attribute to open the window pictured below (search is unavailable on groups linked by image attributes).

Here you can see all the tests which contain the 'Lab Notes' attribute, the user can then search using the bar at the top of the window as well as using filters for prompt for value settings (None/Before Test/After Test). When entering a search term you are presented with three additional options for narrowing your search:

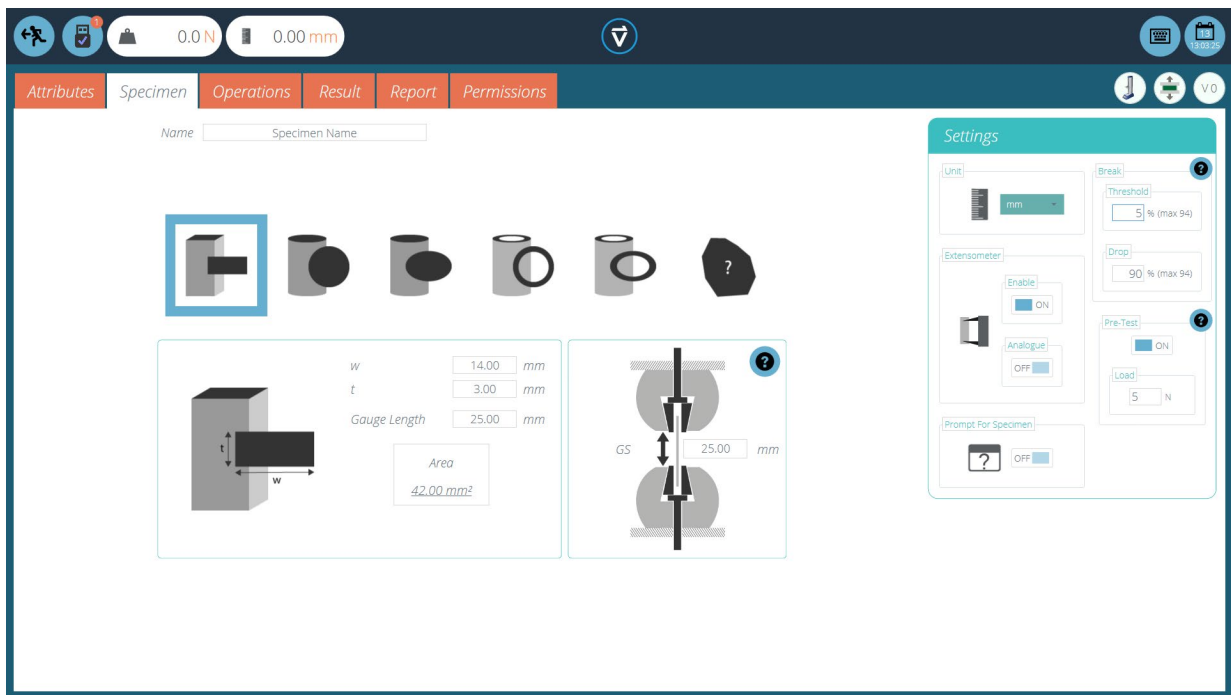
- **Both:** Search both the attribute value and the test name.
- **Attribute Value:** Search only the value entered into the attribute.
- **Test Name:** Search only the name of the test which contains the selected attribute.



Once you click a test attribute value you are presented with the following options at the bottom of the window:

- **All:** Will show you selected attributes test within the 'All Tests' viewer. Here you explore the test settings, operations, results and versioning.
- **Results:** Displays the selected attributes test within the 'Results' viewer. You can view and delete the test results here as well as being able to compare different tests and versions.
- **Edit:** This opens the selected test in the test designer screen.
- **Execute:** Clicking 'Execute' loads the operation sequence to the test stand and open the test display screen.
- **Close:** Closes the window.

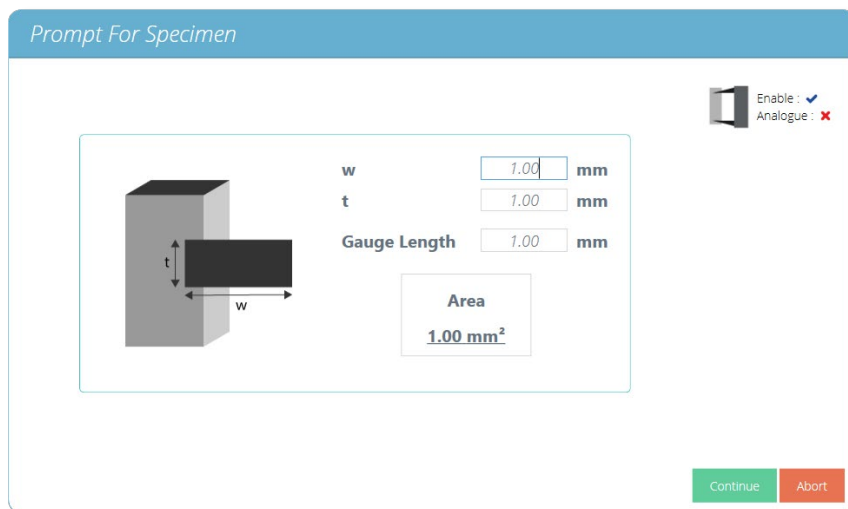
## 9.3. VectorPro™ MT - Specimen



▲ The 'Specimen' screen is used to define physical dimensions of the specimen and configure the extensometer.

The 'Specimen' screen is where you can define what is being tested. These physical characteristics are used to derive stress and strain calculations. Within this screen, you can also select whether or not an extensometer is being used, define the displacement units, name the specimen being used, set 'Pre-Test' preload, configure break detection and toggle whether to 'Prompt for Specimen' value before starting the test.

Enabling 'Prompt for Specimen' presents the screen pictured below before the test starts. Here you can enter the dimensions of the specimen at this point.









Please note, if prompt for value is not used the dimensions entered on this screen are applied to all specimens for that test.

The extensometer settings are displayed in the top right of the prompt for specimen window.

### 9.3.1. Specimen Shape Definitions

There are eight distinct shapes that can be selected to define the specimens dimensioning, below is a visual guide to explain these.

Icon	Shape Definition
	This is for setting the dimensions of <b>quadrilateral</b> specimens. You set the Width (w) and Thickness (t) of the specimen, as well as the gauge length.
	This is for setting the dimensions of <b>circular</b> specimens. You set the diameter (d) and the gauge length.
	This is for setting the dimensions of <b>elliptical</b> specimens. Enter parameters (a), (b) and the gauge length to define the specimen.
	This is for setting the dimensions of <b>hollow circular</b> specimens. Set the internal (d0) and external diameter (d1) as well as the gauge length to define the specimen.
	This is for setting the dimensions of <b>hollow elliptical</b> specimens. Set the internal and external dimensions as well as the gauge length to define the specimen.
	This is for setting the dimensions of <b>custom</b> specimens. Simply set the cross-sectional area and the gauge length of the shape



This is for setting the dimensions of **quadrilateral** specimens in a **3-point bend test**. You set the width (b) and height of the specimen (h), as well as the length of the specimen between the supports (l).



This is for setting the dimensions of **circular** specimens in a **3-point bend test**. You set the diameter of the specimen (d) and the length of the specimen between the supports (l).

### 9.3.2. Configuring an Extensometer

OmniTest and MultiTest- $dV(u)$  test systems can use Mecmesin external extensometer devices such as the LTE-700 (Part Number 432-700).

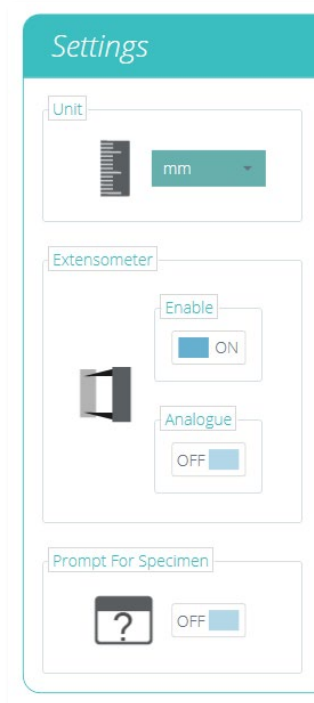
These enable accurate measurement of specimen performance by measuring strain between contact points on the specimen, this is crucial for calculating Young's modulus for example.

To use an extensometer with either an OmniTest or MultiTest- $dV(u)$  test system plug the Mecmesin extensometer into your test system and then switch the 'Extensometer' switch to 'On' for your desired tests.

For LTE-700 and LTE-1100 (Long Travel Extensometer) devices 'Enable' extensometer only.

For Mecmesin supplied short axial contacting extensometers/deflectometers select 'Enable' and 'Analogue'.

Within the 'Settings' panel, you can also configure the units used when entering the specimen dimensions.



### 9.3.3. Configuring Break Settings

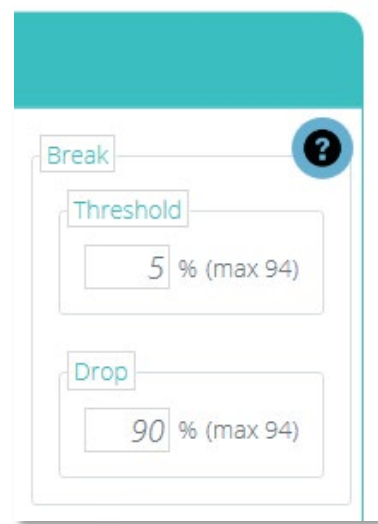
Break settings for the test can be configured on the right-hand settings panel. These options enable you to configure the settings to determine when a break condition is detected:

- **Threshold:** This is the percentage of the load cells capacity that the value must be above for a break event to be detected.

For example, if set to 5% on a 1000N load cell the reading would have to be above 50N for a break condition to be detected.

- **Drop:** This is the percentage the reading must drop from the last max value for a break condition to be detected.

For example, if set to 90% a specimen pulled to 100N would need to exhibit a sharp drop from 100N to 10N for a break condition to be detected.



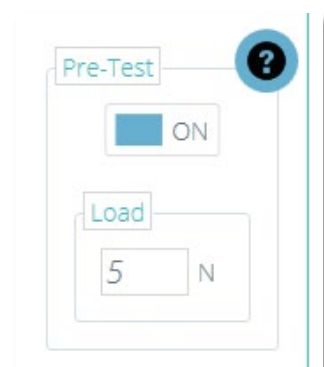
See **Section 9.6.4., Break Definition** for information concerning break calculations.

### 9.3.4. Configuring Pre-test Preload

Pre-test preload allows you to apply a specified force to the specimen prior to commencing the main operation sequence.

This is useful if you are using a contacting extensometer for example as it allows you to preload the specimen before fitting the extensometer.

The available settings are 'On/Off' and the desired load value.



### 9.3.5. Grip Separation

Grip separation is used in VectorPro to derive strain when an extensometer device isn't connected. This also includes tests where the extensometer is being removed before the end of the test.

Within the specimen screen the 'Gauge Length' field is used to populate the grip separation for the start of the test. This value is used to calculate strain when no extensometer is fitted.

In tests where an extensometer is being used the following is true (Also applies when the extensometer is being fitted during the test):

- The gauge length field should be populated with the gauge length of the extensometer.



▲ In the example above an extensometer with a gauge length of 50mm is being used.

In tests where grip separation is being used from the start of the test the following is true:

- The gauge length field should be populated with the starting grip separation, with the test sample loaded.



▲ In the example above grip separation is being used to derive strain. The starting separation is 65.72mm



## Notation - Nominal Strain

When an extensometer cannot be used, or it is required that it be removed after a specimen has yielded, there is provision (in certain test standards) to use the machine displacement as the strain source.

For example, ISO 527-1 Tensile Plastics test standard recommends the use of an extensometer until specimen yield and then removal of the device, with subsequent strain reading sourced from the machine's internal displacement. This method produces "Nominal Strain". This is advantageous if the gauge length of the extensometer does not cover the expected elongation range of the specimen, or if a sample necking region occurs outside of the fixed gauge length.

To incorporate this type of strain measurement, VectorPro allows the use of a specimen entry called "Grip Separation". This is the distance between the contact face of the opposing jaw faces in each grip and is usually measured manually following a pre-stress or load to the specimen.

Grip Separation is either used to calculate all strain measurements if no extensometer is used or it is used in combination with extensometer strain readings (based on the device's gauge length) recorded to an agreed point (usually just beyond a yield). This is followed by a pause and removal of the extensometer. Strain from this point is based upon the grip separation entered.

The combined strain results following removal of an extensometer are "Nominal Strain" values.

## Configuring a Test

For example test configurations, please refer to the following section: *Enter Grip Separation Pause Operation* (**Subsection of 9.4 VectorPro™ MT - Operations**).

## 9.4. VectorPro™ MT - Operations

### 9.4.1. Operation Definitions





The 'Operations' screen is where you configure how the test physically runs during the test. The system works using drag-and-drop actions, to move operations from the left-hand plane into the timeline. These commands can be edited to enable you to run a vast array of tests.









Within the operations there are three main categories, these are common, relative and target.

#### Common

These are operations that are not dependent on crosshead position or test type and function the same in all tests.

**Note:** You will only see the operations applicable to your test type within the test designer.

Icon	Action	Settings
	Apply a pre-load to the specimen in tension.	<ul style="list-style-type: none"><li>• Data Acquisition</li><li>• Prompt For Operation</li><li>• Preload Force</li><li>• Hold Time</li><li>• Speed</li></ul>
	Apply a pre-load to the specimen in compression.	<ul style="list-style-type: none"><li>• Data Acquisition</li><li>• Prompt For Operation</li><li>• Preload Force</li><li>• Hold Time</li><li>• Speed</li></ul>
	Move the crosshead back as quickly as possible to the last tared zero.	<ul style="list-style-type: none"><li>• Data Acquisition</li><li>• Prompt For Operation</li></ul>
	Tare the load value.	<ul style="list-style-type: none"><li>• None</li></ul>

Icon	Action	Settings
	Tare the displacement value from both the ballscrew encoder and the extensometer.	<ul style="list-style-type: none"> <li>• None</li> </ul>
	Tare the extensometer value only.	<ul style="list-style-type: none"> <li>• None</li> </ul>
	Tare all values. (Load, displacement and extensometer value).	<ul style="list-style-type: none"> <li>• None</li> </ul>
	Pull the specimen at a constant speed until a break condition is detected.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Speed</li> </ul>
	Apply a compressive force to the specimen at a constant speed until a break condition is detected.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Speed</li> </ul>
	Apply a flexural compressive force to the specimen at a constant speed until a break condition is detected.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Speed</li> </ul>
	Pull the specimen at a constant load rate until a break condition is detected.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Load rate</li> </ul>
	Apply a compressive force to the specimen at a constant load rate until a break condition is detected.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Load rate</li> </ul>





## Load Rate Operations

Please note in some instances such as when testing a material which exhibits sudden changes in stiffness it is possible for the system to 'resonate' against the specimen, especially if the material has a high tensile strength.

In these instances, the stand should be stopped immediately and load rate control should not be used. Continuous use can lead to damage to the test stand or operator.






## Relative

These are operations that are based on current channel values. For example, if the crosshead is at 40mm displacement and you set an operation to move up 10mm, the final position is 50mm.

Icon	Action	Settings
	Move the crosshead down at a constant speed, with optional hold time.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Displacement</li> <li>• Hold Time</li> <li>• Speed</li> </ul>
	Move the crosshead up at a constant speed, with optional hold time.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Displacement</li> <li>• Hold Time</li> <li>• Speed</li> </ul>
	Increase the load on the specimen at a constant speed, with optional hold time.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Load</li> <li>• Hold Time</li> <li>• Speed</li> </ul>
	Decrease the load on the specimen at a constant speed, with optional hold time.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Load</li> <li>• Hold Time</li> <li>• Speed</li> </ul>




## Target

These are operations that are based on the last tared channel values. For example, if the system is at 150mm displacement and you target 100mm, the system will move down 50mm to place the crosshead 100mm from the last tared zero.

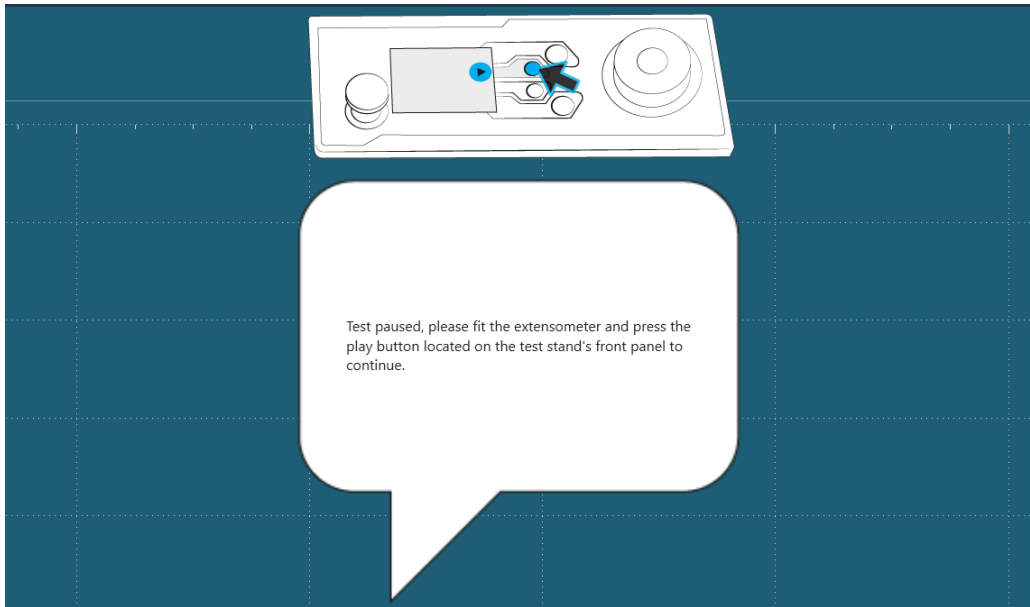
Icon	Action	Settings
	Move to a load value at a constant speed, with optional hold time.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Load</li> <li>• Hold Time</li> <li>• Speed</li> </ul>
	Move to a crosshead position at a constant speed, with optional hold time.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Displacement</li> <li>• Hold Time</li> <li>• Speed</li> </ul>
	Move to a strain value at a constant speed, with optional hold time.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Strain</li> <li>• Hold Time</li> <li>• Speed</li> </ul>
	Move to a stress value at a constant speed, with optional hold time.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Stress</li> <li>• Hold Time</li> <li>• Speed</li> </ul>
	Move to a target load at a constant load rate, with optional hold time.	<ul style="list-style-type: none"> <li>• Data Acquisition</li> <li>• Prompt For Operation</li> <li>• Load rate</li> <li>• Load</li> <li>• Hold Time</li> </ul>

## Pause

These operations pause the test. For example, a pause operation can be used to allow extensometry devices to be fitted after preloading or to remove an extensometer before a specimen breaks, preventing the equipment from becoming damaged.

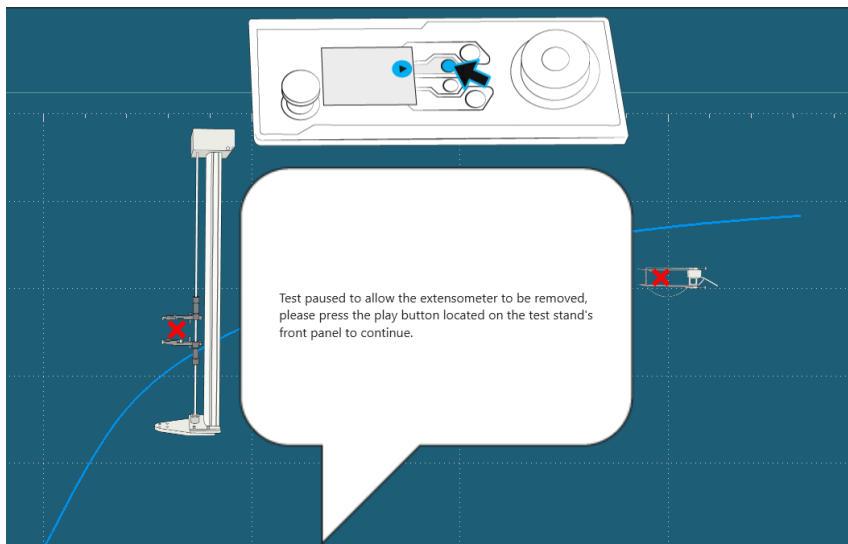
Icon	Action	Settings
	Pause the test and display a user-defined message.	<ul style="list-style-type: none"><li>• Customise On Screen Message</li></ul>
	Pause the test to allow the extensometer to be removed, by default the displacement source is then swapped to the test stand encoder.	<ul style="list-style-type: none"><li>• Customise On Screen Message</li></ul>
	Pause the test to enter grip the separation.	<ul style="list-style-type: none"><li>• Customise On Screen Message</li></ul>

## Pause Operation



The pause operation in VectorPro stops the test stands movement and display a popup text message when the operation is reached in the test timeline. The text displayed can be set by editing the operation settings in the test timeline. In the example above the message prompts the user to fit an extensometer. To continue the test the user must press the play button on the front panel of the test stand.

## Remove Extensometer Pause Operation



This operation allows the extensometer to be removed during the test to eliminate the need to keep the extensometer on until break. This is crucial for the preservation of extensometers when testing specimens that could cause damage when they fail or if the elongation range of the specimen is higher than the device's measurement range.

In a typical situation, the specimen is pulled to just past the linear section of its elastic region before removing the extensometer.

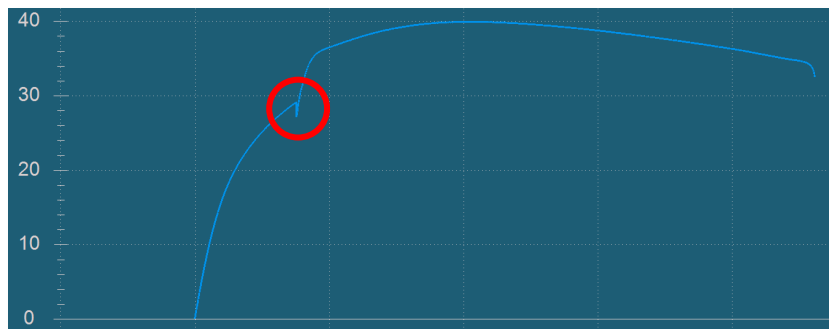
The text displayed can be customised by editing the operation's individual settings in the test timeline. In the example above the default message is used, this prompts the user to remove the extensometer.

To continue the test the user must press the play button displayed on the front panel of the test stand.

### Important Information

Upon removing the extensometer strain measurement for the test is swapped to use the test stand encoder, as opposed to using the extensometer that was previously fitted. Please note that as the test stops the specimen can 'relax' this will cause a visible drop on the graph (see the circled image below).

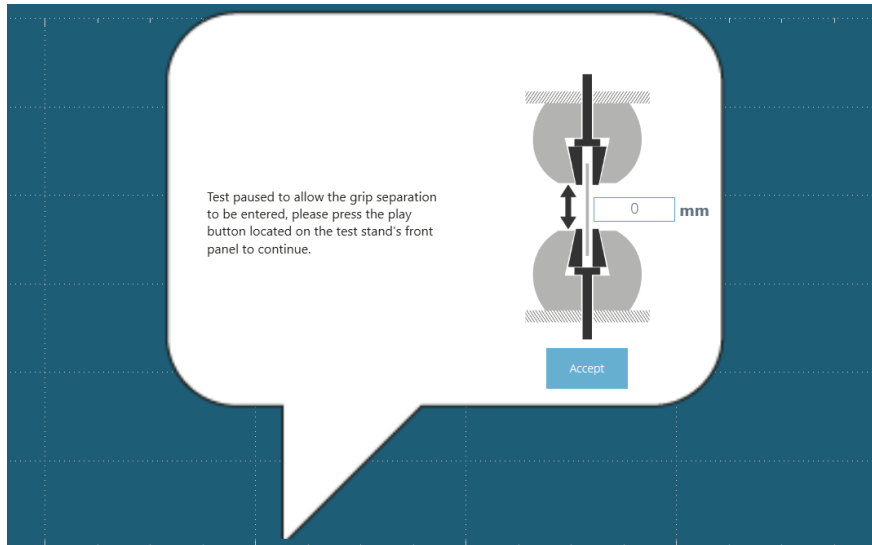
Elastic specimens will typically have a larger drop. Equally taking longer to remove the extensometer and grips with high system deflection may also increase the size of the drop.



For more information relating to configuring a test that allows an extensometer to be removed please see the following section '*Example Grip Separation Test - With Extensometer*'.



## Enter Grip Separation Pause Operation



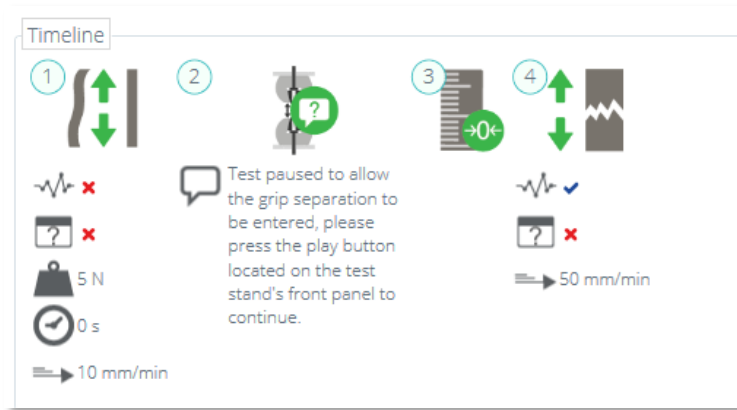
This operation is designed for tests where an extensometer is not being used or is being removed during the test. It allows the grip separation to be entered during the test; in most situations, this operation is used after the sample has been pre-loaded.

The next sections cover how to use grip separation with and without an extensometer, it is recommended to read **section 12** of this user manual before running the test

### Example Grip Separation Test - Without Extensometer



1. When deriving strain from grip separation in a test with no extensometer, it is important that you first enter the distance between the upper and lower grip face into the section labelled 'Gauge Length', as shown in the image above. This is found under the 'Specimen' tab, see **section 9.3**. The value entered here automatically populates the grip separation section, labelled 'GS', with the same number. This distance should be measured with the sample fitted,

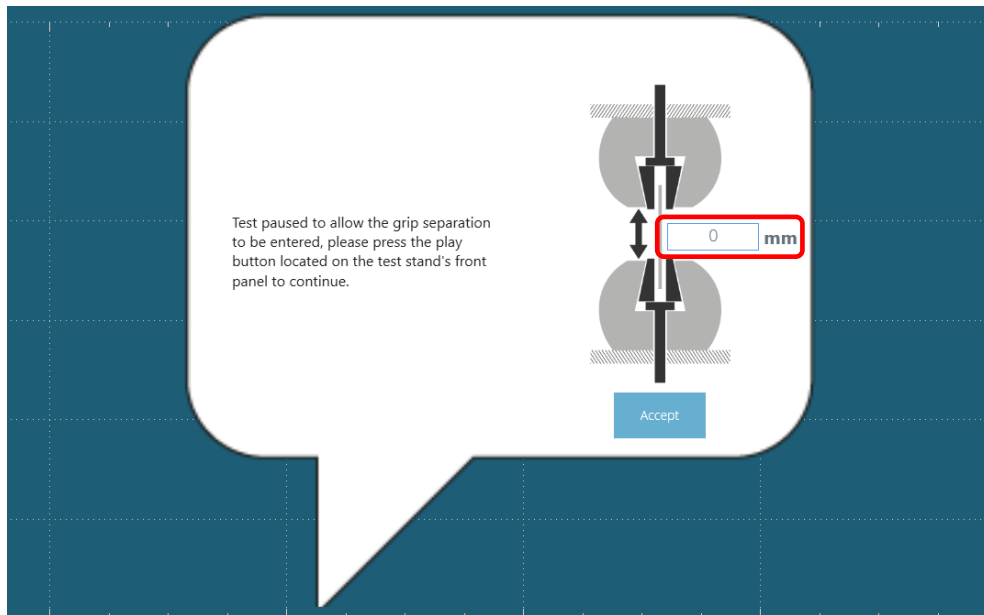


2. Next, navigate to the 'Operations' tab and configure a suitable preload stage for your test sample, see operation 1 in the image above,
3. Immediately after the pre-load stage place an 'Enter Grip Separation Pause' operation', followed by a 'Tare Displacement' operation, as seen in the image above.

The timeline operations proceeds as followed; the sample is pre-loaded to 5N, the test then pauses (operation 2) allowing the operator to measure and enter the grip separation. This method ensures any machine compliance (movement of grips or load cell) is negated.

This grip separation value is then used to derive the strain for the test, updated from the value entered in step 1,

4. In this example, the displacement channel (used to derive the specimen strain) is then tared by operation 3. The test then continues,
5. At operation 4 the sample is pulled until break,
6. Next, configure any attributes, results, reports and permissions within the test designer and save the test,
7. To run the test click the appropriate icon located on your workspace. If you haven't already done so, load the sample into the test stand. Next, zero the stand and set the home position with sample loaded, **see section 12.1.1** for more information,
8. To start the test press the play button located at the top right of the screen,



9. After the pre-load stage the onscreen pop-up shown in the image above appears. The grip separation should be measured and entered it into the box highlighted above, once ready press the accept button onscreen.
10. Press the play button located on the front panel of the test stand to continue,
11. The test will run until completion. If it is safe to do so press the home button on the front panel of the test stand to return to the loading position set in step 7.

**Note:** It is not a requirement to use the 'Enter Grip Separation Pause' for tests using grip separation as the feedback for strain.

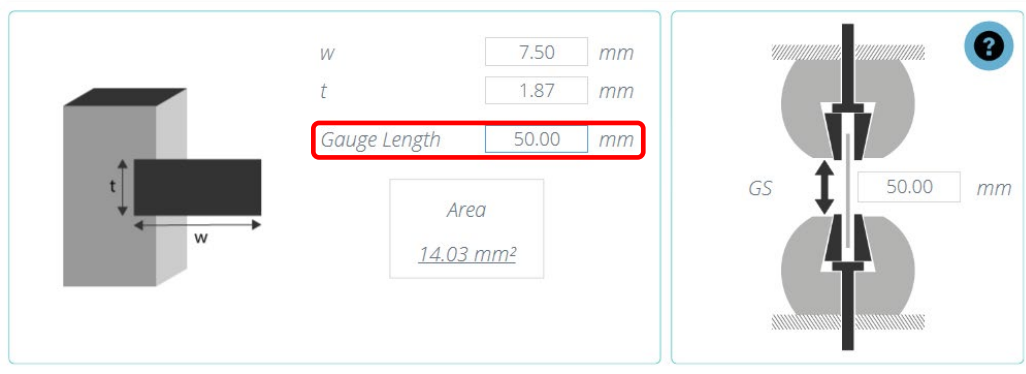
The specimen gauge length entry alone will supply the required value to calculate test strain but it can however, yield more accurate results using the method described above.

If using the gauge length from the specimen screen only it is crucial that the sample and grip setup have no measurable deflection before starting the test and that the grip separation at the beginning of the test matches the value entered in the specimen tab.

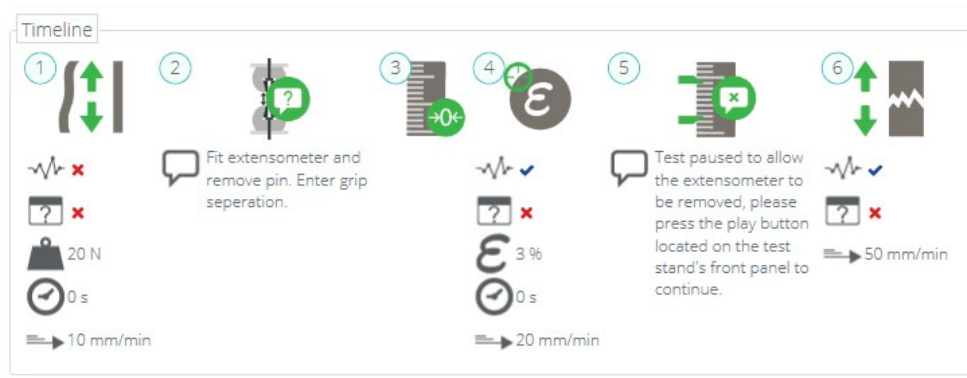
## Example Grip Separation Test - With Extensometer

For tests where grip separation is being used to derive nominal strain after an extensometer has been removed you need to use both the 'Enter Grip Separation Pause' and 'Remove Extensometer Pause' operations.

Extensometers may be removed to protect the device when testing samples that fail with high elastic energy or fracture violently, or if the elongation range of the specimen is higher than the device's measurement range. Below is an example showing one possible test configuration:



1. When using an extensometer, it is important that you first enter the gauge length of the device in the 'Specimen' tab of the test designer, as shown in the image above,
2. Next, configure in the right-hand panel of the 'Specimen' screen whether a digital (long travel) or analogue (short travel) extensometer is being used, for more information please see [section 9.3.2](#).



3. Navigate to the 'Operations' tab and configure a suitable preload stage for your test sample, see operation 1 in the image above,

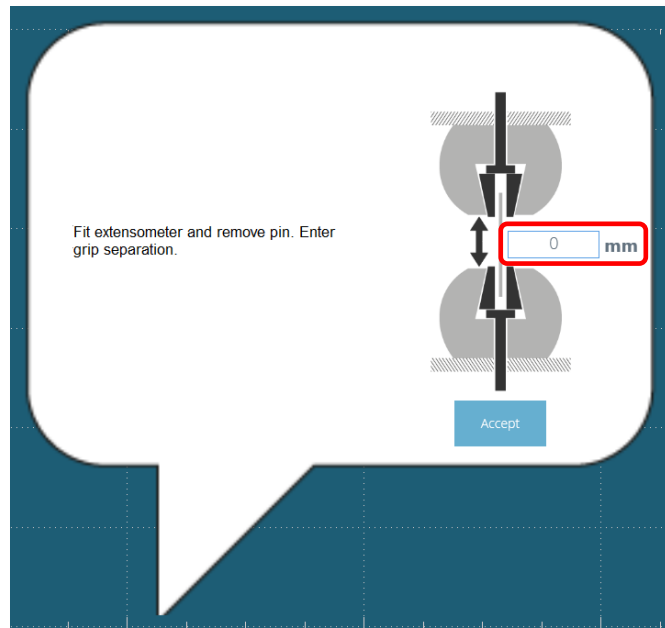
4. Immediately after the pre-load stage place an 'Enter Grip Separation Pause' operation', followed by a 'Tare Displacement' operation. See operations 2 and 3 in the example timeline,
5. In this example operation 4 is a strain target (It is also possible to use a load or displacement target). This target should be past the materials linear elastic region and safely before the sample's failure point.

This is the point at which the extensometer is removed and the strain reading swaps from the higher accuracy extensometer device to the grip separation derived calculation,

6. Operation 5 is a 'Remove Extensometer Pause' operation; this enables the extensometer to be removed.

From this point forward, the strain is derived from grip separation. The test ends with a pull to break operation (Operation 6),

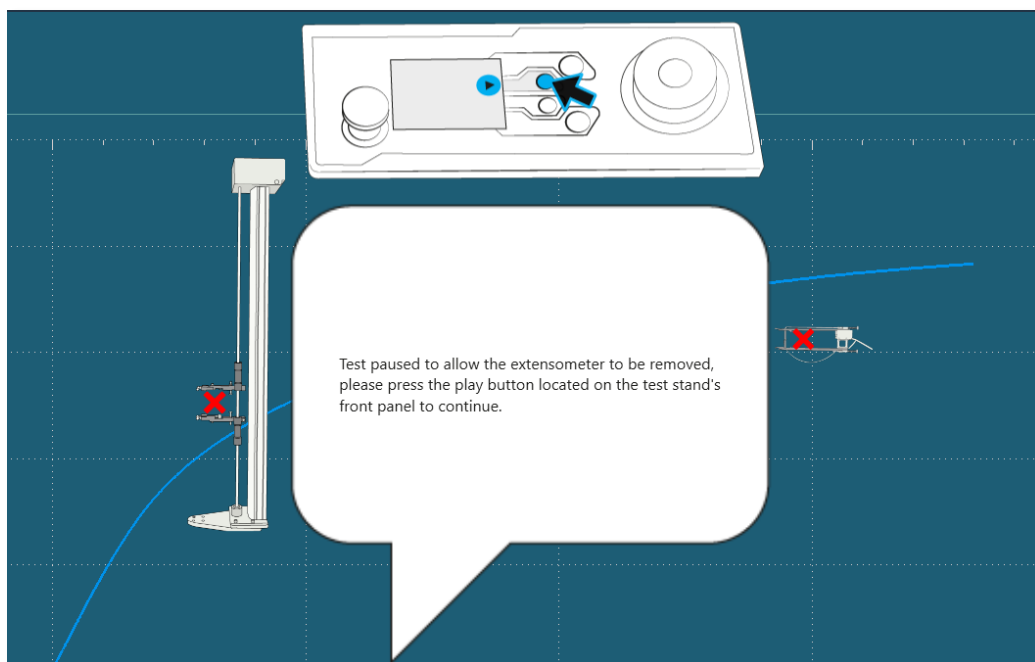
7. Next, configure any attributes, results, reports and permissions within the test designer and save the test,
8. To run the test click the appropriate icon located on your workspace. If you haven't already done so, load the sample into the test stand. Next, zero the stand and set the home position with sample loaded, **see section 12.1.1** for more information,
9. Press the play button located at the top right of the screen,



10. After the pre-load stage the onscreen pop-up shown in the image above appears. The grip separation should be measured and entered it into the box highlighted above, once ready press the accept button onscreen.

At this point fit the extensometer to the sample. Once ready press the accept button onscreen.

11. Press the play button located on the front panel of the test stand to continue,

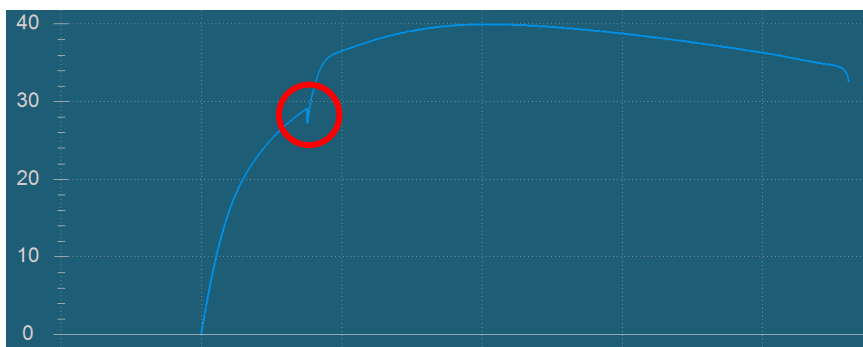


12. In this example from operation 4 the test runs until 3% strain is reached and pause. At this point the image above is shown, to continue safely remove the extensometer and press the play button located on the front of the test stand.
13. The test will then run until completion. If it is safe to do so press the home button on the front panel of the test stand to return to the loading position set in step 8.

### Important Information

Upon removing the extensometer strain measurement for the test is swapped to use the test stands encoder, as opposed to using the extensometer that was previously fitted. Please note that as the test stops the specimen can 'relax' this will cause a visible drop in the graph (see the circled image below).

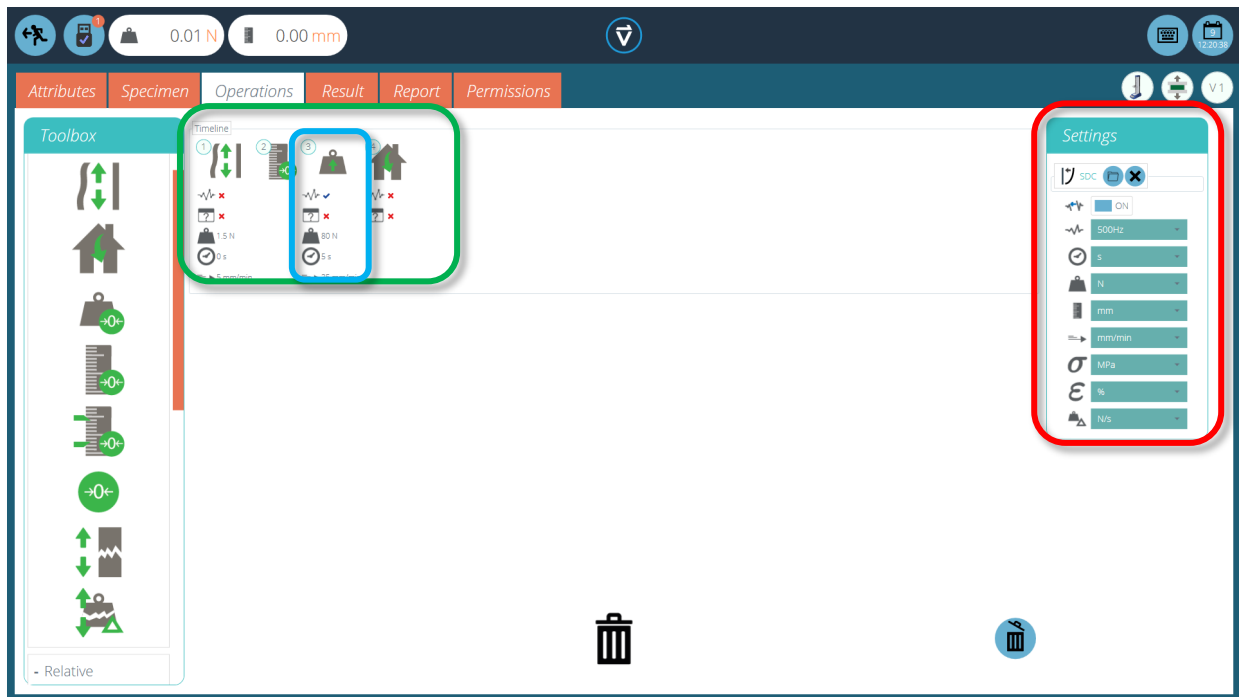
Elastic specimens will typically have a larger drop, taking longer to remove the extensometer and grips with high system deflection may also increase the size of the drop.



### Further Information

For more information regarding grip separation, nominal strain and the removal of extensometer devices it is recommended to read the following section **9.3.5 Grip Separation**.

## 9.4.2. Creating a Test Sequence



The 'Timeline' is where you drag-and-drop operation commands from the left-hand 'Toolbox' to define the test running sequence. In this instance the user has chosen to run a test that consists of:



1. Preload Specimen (to a force of 1.5N at 5mm/min) →
2. Zero Displacement →
3. Move upward to 80N at 25mm/min, pause for 5 seconds →
4. Return to the home position.

This operation sequence can be seen in the green highlighted box in the images above.

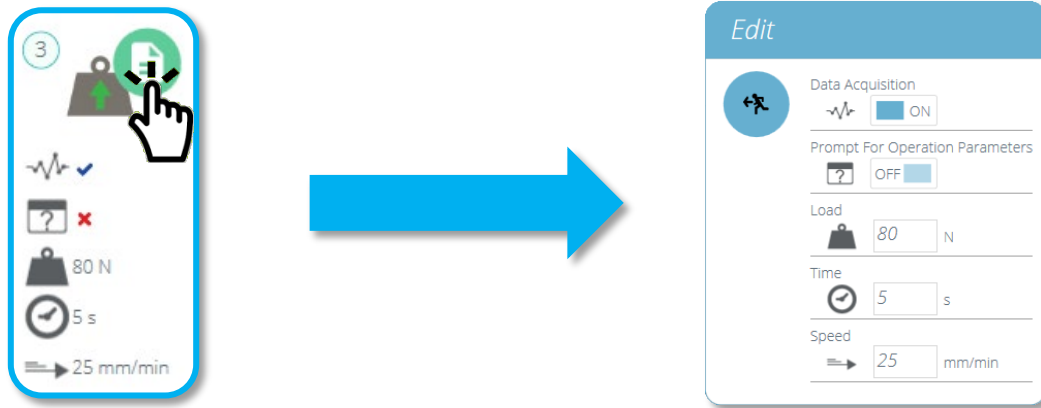


- To remove operations from the timeline simply drag-and-drop the icon into the centre 'trash' icon.
- To remove all operations click the right-hand blue 'trash' icon.



### 9.4.3. Editing an Operation's Settings

To edit the operations above simply hover your mouse over the desired operation then click the green symbol once it appears. This action opens the 'Edit' menu (pictured below) which is used to configure the operation.





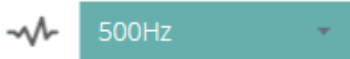







Each operation has parameters that can be edited. Such as displacement, target load, hold time and speed. Below you can see an example of an operation edit window; this is for a load based drive stage.

The 'Edit' window is annotated with red arrows pointing to specific settings, each accompanied by a text box explaining its function. The annotations are as follows:

- Enabling this setting will mean the operation will request parameters before the test starts** - points to the 'Data Acquisition' toggle.
- This changes whether or not data will be captured during this operation** - points to the 'Data Acquisition' toggle.
- This is the target value. In this instance 'Load' is the target for operation to move to** - points to the 'Load' input field.
- Select how long the test should hold for at the end of the operation stage** - points to the 'Time' input field.
- This is a control value. In this instance 'Speed' is the value used to control how the operation gets to the target value** - points to the 'Speed' input field.

### 9.4.4. Test Acquisition Settings

The 'Settings' menu located on the right-hand side of the 'Operations' screen (highlighted red on the image in [Section 9.4.2](#)) is used to configure various test parameters. Below is a table explaining these settings and the options available.

Icon	Setting
	This icon is used to load system deflection compensation settings; click the folder to open the SDC explorer window and select your SDC settings. Click the cross to remove loaded settings. See <a href="#">Section 15</a> for more information.
	With this feature "OFF", the test time axis remains intact, including any time for operations for which data acquisition is switched off. With this feature "ON", any time spent on those operations is removed from the test axis and all test data appears to be contiguous.
	<b>Data frequency</b> - Alters the frequency at which the data is captured
	<b>Time unit</b> - Lets the user select the unit for time.
	<b>Load unit</b> - Lets the user configure the unit for load
	<b>Displacement unit</b> - Lets the user configure the unit for displacement.
	<b>Speed unit</b> - Lets the user configure the unit for speed.
	<b>Stress unit</b> - Lets the user configure the unit for stress.
	<b>Strain unit</b> - Lets the user configure the unit for strain
	<b>Load per unit time</b> - Lets users configure their desired unit.

## 9.5. VectorPro™ Lite - Operations





The 'Operations' screen is where you configure how the test physically runs during the test. The system works using drag-and-drop actions, to move operations from the left-hand plane into the timeline. These commands can be edited to enable you to run a vast array of tests. This section is only applicable for VectorPro Lite motorised test stands.





Within this section, the operations are defined for MultiTest-*dV* and Vortex-*dV* test stands. For OmniTest and MultiTest-*dV* test stands with *dV(u)* mode enabled please see **Section 9.4**.

### Important Information!

The table below describes the operation with the MultiTest-*dV* and Vortex-*dV* 'Move to Start' feature turned off. For more information relating to the sequence of movement and the 'Move to Start' feature please see the end of this section.

#### 9.5.1. MultiTest-*dV* Operation Definitions

Icon	Action	Settings
	Cycle between two positions with the initial direction towards the base of the stand	<ul style="list-style-type: none"> <li>• Speed Up</li> <li>• Speed Down</li> <li>• Max Displacement</li> <li>• Min Displacement</li> <li>• Cycle Count</li> </ul>
	Cycle between two positions with the initial direction towards the top of the stand	<ul style="list-style-type: none"> <li>• Speed Up</li> <li>• Speed Down</li> <li>• Max Displacement</li> <li>• Min Displacement</li> <li>• Cycle Count</li> </ul>
	Move the crosshead between physical limit switches. The first direction of movement is down	<ul style="list-style-type: none"> <li>• Speed Up</li> <li>• Speed Down</li> <li>• Cycle Count</li> </ul>
	Move the crosshead between physical limit switches. The first direction of movement is down	<ul style="list-style-type: none"> <li>• Speed Up</li> <li>• Speed Down</li> <li>• Cycle Count</li> </ul>

Icon	Action	Settings
	Moves down to a load limit, or break point, as set by either the AFG gauge or front panel. Also allows cycle control between loads. Starting direction is downward. See <b>Section 9.5.5</b> for more information.	<ul style="list-style-type: none"> <li>• Speed Up</li> <li>• Speed Down</li> <li>• + AFG/Test Stand Settings</li> </ul>
	Moves down to a load limit, or break point, as set by either the AFG gauge or front panel. Also allows cycle control between loads. Starting direction is upwards. See <b>Section 9.5.5</b> for more information.	<ul style="list-style-type: none"> <li>• Speed Up</li> <li>• Speed Down</li> <li>• + AFG/Test Stand Settings</li> </ul>
	Moves the crosshead down at a constant speed	<ul style="list-style-type: none"> <li>• Speed</li> <li>• Max Displacement</li> <li>• Min Displacement</li> </ul>
	Moves the crosshead up at a constant speed	<ul style="list-style-type: none"> <li>• Speed</li> <li>• Max Displacement</li> <li>• Min Displacement</li> </ul>

### MultiTest-dV Operation Sequence and Move to Start

MultiTest-dV operations, such as the full and half cycle, consist of two datum points; a minimum and maximum. For operations with the main direction being downward the following is true:


- The 'Maximum' is the start position for the test and the 'Minimum' is the finishing position.

For operations with the main direction being up the following is true:

- The 'Minimum' position is the start position for the test and the 'Maximum' is the finishing position.

Within the 'Edit Test' display on your test stands front panel there is an option called 'Move to Start', setting this feature to 'Yes' means that the stand always moves to the start position. In some instances, this means the first direction of movement is opposite to the main test movement. With this feature set to 'No' the stand moves straight to the finishing position.

## 9.5.2. Vortex-dV Operation Definitions

Icon	Action	Settings
	<p>Moves between a starting position and an end position. The first direction of movement is clockwise.</p>	<ul style="list-style-type: none"> <li>• Clockwise Speed</li> <li>• Anticlockwise Speed</li> <li>• CW Angle</li> <li>• ACW Angle</li> <li>• Cycle Count</li> </ul>
	<p>Moves between a starting position and an end position. The first direction of movement is anticlockwise.</p>	<ul style="list-style-type: none"> <li>• Clockwise Speed</li> <li>• Anticlockwise Speed</li> <li>• CW Angle</li> <li>• ACW Angle</li> <li>• Cycle Count</li> </ul>
	<p>Moves clockwise to a torque limit or break conditions, control parameters are set using the test stands front panel or AFG. Also allows cyclic between torque points. See <b>Section 9.5.5</b> for more information.</p>	<ul style="list-style-type: none"> <li>• Clockwise Speed</li> <li>• Anticlockwise Speed</li> <li>• + AFG/Test Stand Settings</li> </ul>
	<p>Moves anti-clockwise to a torque limit or break conditions, control parameters are set using the test stands front panel or AFG. Also allows cyclic between torque points. See <b>Section 9.5.5</b> for more information.</p>	<ul style="list-style-type: none"> <li>• Anticlockwise Speed</li> <li>• Anticlockwise Speed</li> <li>• + AFG/Stand settings</li> </ul>
	<p>Moves to an angle in a clockwise direction</p>	<ul style="list-style-type: none"> <li>• Clockwise Speed</li> <li>• CW Angle</li> <li>• ACW Angle</li> </ul>
	<p>Moves to an angle in a clockwise direction</p>	<ul style="list-style-type: none"> <li>• Anticlockwise Speed</li> <li>• CW Angle</li> <li>• ACW Angle</li> </ul>

## Vortex-*dV* Operation Sequence and Move to Start

Vortex-*dV* operations, such as the full and half cycle, consist of two datum points; a minimum and maximum. For operations with the main direction being downward the following is true:

- The 'ACW Angle' is the start position for the test and the 'CW Angle' is the finishing position.

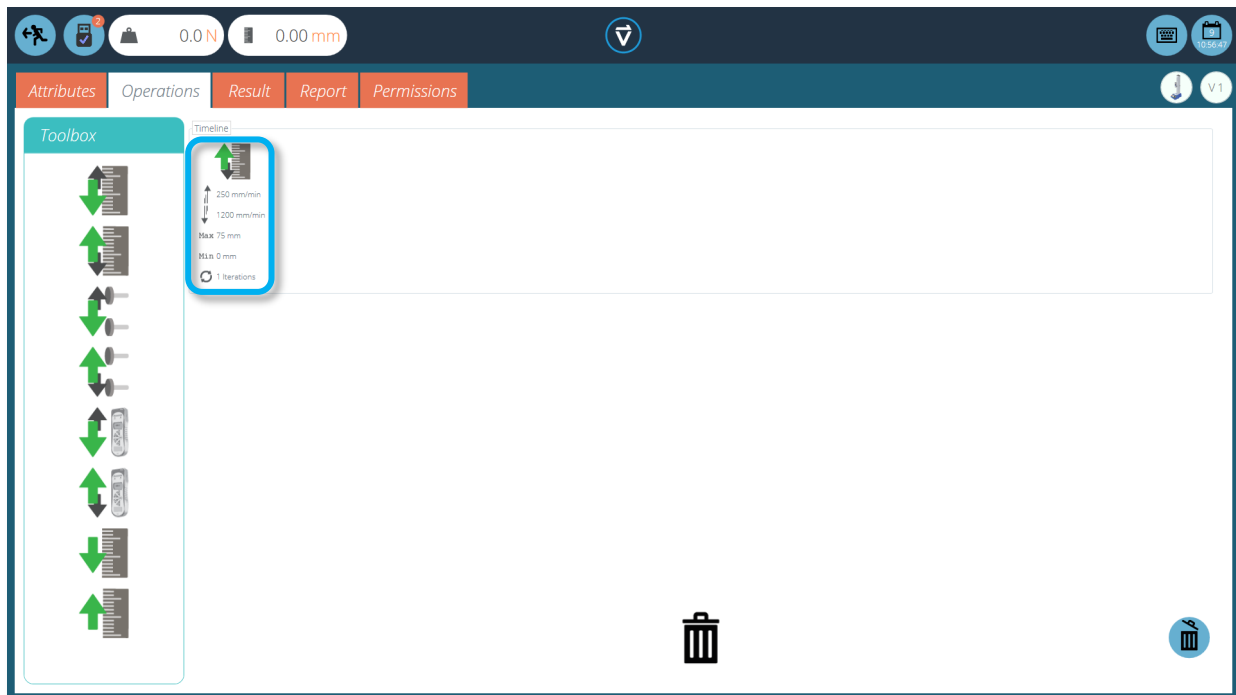
For operations with the main direction being up the following is true:

- The 'CW Angle' is the start position for the test and the 'ACW Angle' is the finishing position.

Within the 'Edit Test' display on your test stands front panel there is an option called 'Move to Start', setting this feature to 'Yes' means that the stand always moves to the start position.

In some instances, this means the first direction of movement is opposite to the main test movement. With this feature set to 'No' the stand moves straight to the finishing position.

### 9.5.3. Creating a Test Sequence



The 'Timeline' is where you drag-and-drop the selected operation command from the left-hand 'Toolbox' to define the test function. In this instance the user has chosen to run a test that consists of:

- Full cycle operation that runs from 0mm displacement up to 75mm displacement. The up speed is 250mm/min and the down speed is 1200mm/min.

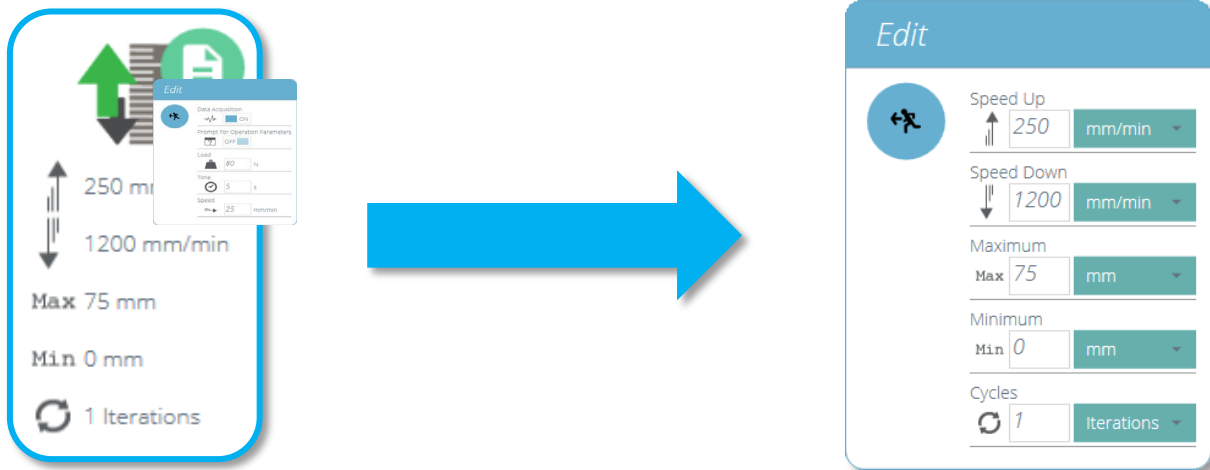
This test operation can be seen in the blue highlighted box in the image above.



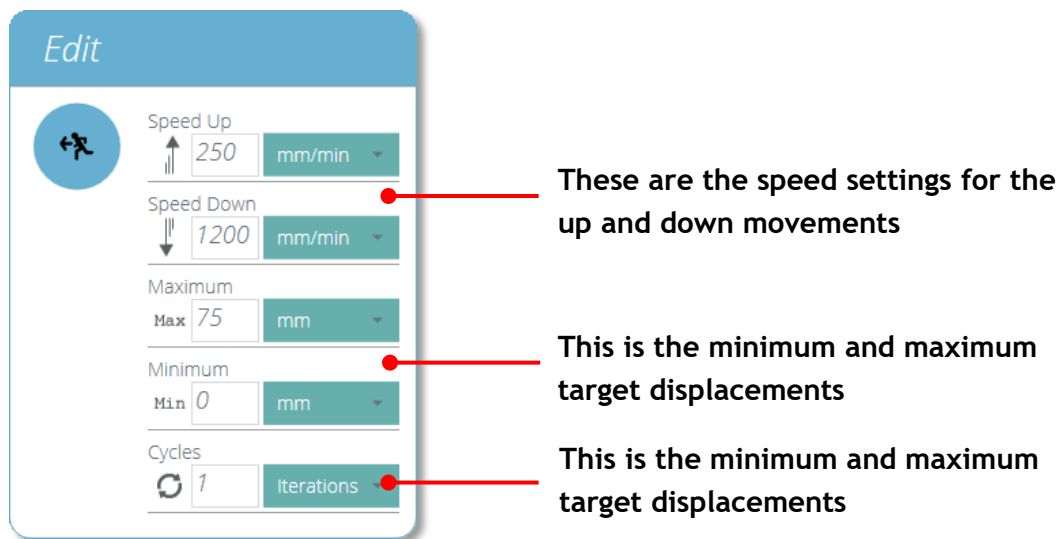
- To remove an operation from the timeline simply drag-and-drop the icon into the centre 'trash' icon.
- Alternatively, click the right-hand blue 'trash' icon.

### 9.5.4. Editing an Operation's Settings

To edit the operations above simply hover your mouse over the desired operation then click the green symbol once it appears. This action opens the 'Edit' menu (pictured below) which is used to configure the operation.



Every operation has parameters that can be edited. Such as displacement, target load, hold time and speed. Below you can see an example of an operation edit window; this is for a load based drive stage.





### 9.5.5. Setting Force/Torque Stand Control

For MultiTest-*dV* and Vortex-*dV* force/torque control tests settings are configured using the front panel and/or an attached AFG/AFTI gauge.

To use these tests in conjunction with VectorPro first, open the settings menu using the test stand's front panel, then select 'Edit Test' and ensure the test type is set to 'AFG/AFTI Control'.

Under force/torque control there are three test sub-types, these are detailed below along with the accompanying settings:

- **AFG/AFTI Control** - Control of the test stand using the AFG/AFTI's limit or break settings. **Settings:** limit force/torque and stop/reverse.
- **Force/Torque Limit** - Move in the configured direction until a force/torque limit is hit and then stop. **Settings:** limit force/torque.
- **Force/Torque Cycle** - Cycle between a limit force/torque and a return force/torque. **Settings:** limit force/torque, return force/torque and number of cycles.
- **Move to Break** - Move in the configured direction until a break condition is detected. **Settings:** break threshold (percentage of the load/torque cell's capacity that the test value needs to be above for a break condition to be detected).

Within this menu there are the following common settings:

- **Up/Clockwise Speed** - Set the upward or clockwise speed, this can also be configured within VectorPro,
- **Down/Anticlockwise Speed** - Set the downward or anticlockwise speed, this can also be configured within VectorPro,
- **Start Direction** - Select the test start direction, this must match the operation selected in VectorPro,
- **Test Sub-Type** - Select the test subtype.

## AFG Limits

Please note if any force or break limits are set within the AFG gauge these remain active and can stop the test stand if triggered. If using force control it is recommended that you disable all AFG limits.

## Configuring an AFG/AFTI Control Test



With an additional cable (351-092), a Mecmesin AFG/ AFTI Mk 4 digital force gauge can be used to set load/torque limits to control crosshead movement.

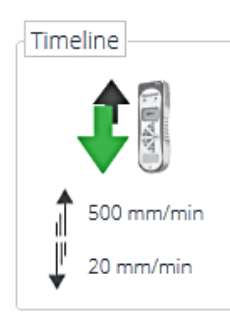
Please note for load cycling the front panel force/torque control test must be used. AFG/ AFTI cycling is not compatible with Vortex-*dV* and MultiTest-*dV* test stands

Load setpoint, action (reverse/stop) are all set on the gauge. The stand can then be set to move to a set load or break condition and stop.

For more information, please refer to the AFTI/ AFG user manual.

### Example Test Setup

1. In the test stand's front panel under 'Edit Test' select the test type 'AFG/ AFTI Control' and sub-type 'AFG/ AFTI Control',
2. Configure the speed and direction settings located within the 'Edit Test' menu,
3. On the AFG/ AFTI gauge hold ,
4. in page one of the AFG/ AFTI menu select 'STAND' using the  button,
5. Next select the action when the limit is hit, either 'REVERSE' or 'STOP'. For reverse you need to select the reverse direction as either 'UP' or 'DOWN',
6. Once the action has been selected configure the limit control. This is either a 'BREAK' condition or force/torque 'LIMIT'. For 'BREAK' set the break threshold, for 'LIMIT' select the limit force/torque,
7. Within VectorPro create a new test, select the AFG/ AFTI operation (See right-hand image, MultiTest-*dV* shown) and ensure the speed and start direction match your settings configured within the test stand in step 2,



8. Save the test and select the corresponding test icon on your workspace,
9. At this point the test start direction and speed, as set in VectorPro, are uploaded to the stand.
10. Press play to start the test, the current AFG/ AFTI settings are used to control the test limits with the speed and direction settings coming from VectorPro.

## Configuring a Force/Torque control Test

Force/torque control tests can be used to set load/torque limits or a break condition to control crosshead movement.

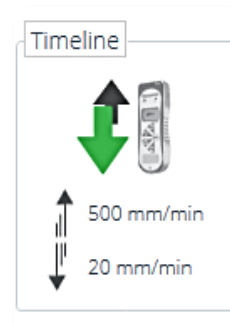
As per the AFG/AFTI control tests these are accessed within the stand's front panel under the 'AFG/AFTI Control' test type but these tests do not use AFG/AFTI settings and are configured using the test stand's front panel. Within this test type you have three force/torque control sub-tests:

- **Force Limit** - Move in the configured direction until a force limit is hit and then stop.
- **Force Cycle** - Cycle between a limit force and a return force.
- **Break** - Move in the configured direction until a break condition is detected.

For more information please refer to the Vortex-*dV* or MultiTest-*dV* user manual.

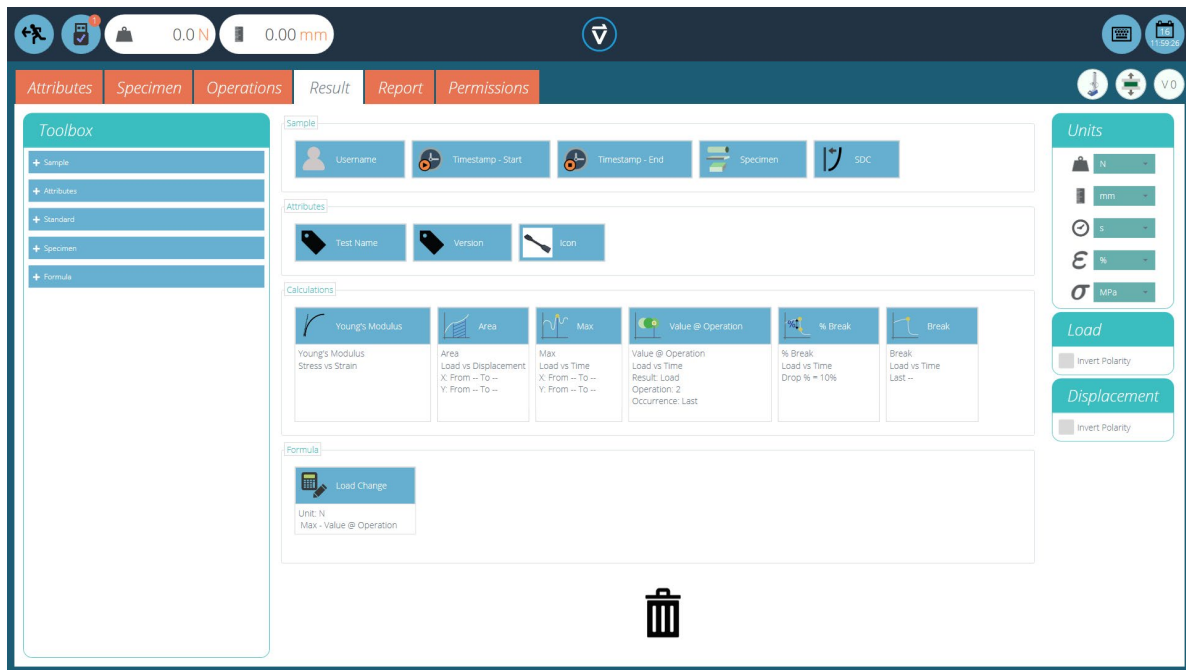
### Example Test Setup

1. In the test stand's front panel under 'Edit Test' select the test type 'AFG/AFTI Control',
2. Under 'Test Sub-Type' there are three options; chose from either 'Force Limit', 'Force Cycle' or 'Break',
3. Depending on the test selected in step 2, navigate through the on-screen menu to configure the test settings: Start direction, test speeds, limits such as break condition or force/torque setpoint and number of cycles (If applicable),
4. Within VectorPro create a new test, select the AFG/AFTI operation (See right-hand image, MultiTest-*dV* shown) and ensure the speed and start direction match your settings configured within the test stand in step 2,
5. Save the test and select the corresponding test icon on your workspace,
6. At this point the test start direction and speed, as set in VectorPro, are uploaded to the stand.
7. Press play to start the test, the current stand settings are used to control the test limits with the speed and direction settings coming from VectorPro.



## 9.6. VectorPro™ MT - Result

The 'Result' tab is where calculations used for data analysis and reporting are added. The 'Toolbox' area contains all the elements for producing results from test data. Within this window, you can configure calculations as well as adjusting unit display settings.



▲ The results screen populated with user configured calculations and

Details of the elements that exist within the result screen are explained below. Some elements are application specific and do not appear for stands without extensometry support. To edit an individual result click the edit icon located in the top-right corner of each individual result tile.

### 9.6.1. By Sample

These elements relate to the specimen and test setup, useful for tracking test details and system setup for example. Elements added here are also added to the report table. The elements include:

- **Username:** Adds the 'Username' of the person who undertook the test to the results screen,
- **Timestamp start/end:** Adds a timestamp for the start/end of the test to the results screen,
- **Timeline:** This is used to add details of the tests operation to the results screen. When the 'Timeline' icon is clicked on within the post-test results screen you are presented with the operations for that test along with the settings used for that specific specimen.
- **Specimen:** Adds the dimension properties of the specimen to the results screen,

### 9.6.2. Attributes

These are the attributes attached to the specific test as configured earlier within the 'Attribute' tab. Elements added here are then available to add to reports. If an attribute within a test is not added to the 'Result' window, you will not be able to add it to a report.

### 9.6.3. Standard Calculations

Standard calculations are based on the entire timeline and all data features. In all cases, name, axes, decimal place display, range and verify may be added:

**Name:** Edit the display name for the calculation

**Axes:** Select the axes for the calculation

**Decimal Places:** configurable from 1 to 9

**Range:** Define the boundaries for the calculation

**Verify:** Enable to set a Pass/Fail boundaries for the calculation

**Result:** Is used to give an alternate result at the calculated point. For example, this calculation has been setup to find break using 'Stress vs Strain' but will give the 'Result' as 'Strain'.




















**Peak and Trough calculations also include:**

**Drop/Rise** 5% to 50% of peak/trough value

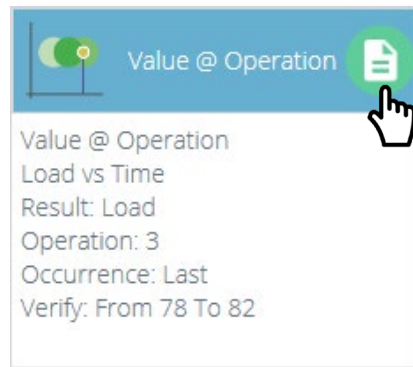
**Occurrence** Peaks or troughs by time sequence

**Order** Peaks or troughs by magnitude sequence (greatest = order 1)

## Calculation Function

 Area	The area under a curve. When load vs displacement, this represents energy or work done. With stress vs strain, this is equal to the toughness of the material or modulus of resilience (If calculation boundaries limit calculation to the elastic region).
 Best Fit	Trendline: the <b>gradient</b> of a straight line of best fit through all the data points within an x-range, and the <b>y-intercept</b> of this line.
 Slope	Trendline: the <b>gradient</b> of a straight line of best fit through the first and last data points within an x-range, and the <b>y-intercept</b> of this line.
 Average	Mean (sum of all data values divided by the number of point values)
 Break	The Break calculation returns the maximum load or displacement within a defined range before the end of a test. See below for more explanation.
 Peak	Peaks are defined by percentage drop after rising in y value. Here, select which peak by time sequence.
 Number of Peaks	The total number of peaks, this is defined by percentage drop and x/y range settings.
 Average of Peaks	The average value for all peaks within the defined boundaries. This is defined by percentage drop and x/y range settings.
 Trough	Troughs are defined by percentage rise after falling in y value. Here, select which trough by time sequence.
 Number of Troughs	The total number of troughs, this is defined by percentage rise and x/y range settings.
 Average of Troughs	The average value for all peaks within the defined boundaries. This is defined by percentage drop and x/y range settings.
 Value	The value of y for a specified value of x.
  Peak	Peaks are defined by percentage drop after rising in y value. Here, select which peak by magnitude order.
  Trough	Troughs are defined by percentage rise after falling in y value. Here, select which trough by magnitude order.
 Max	Maximum y-axis value within a range on the x-axis.
 Min	Minimum y-axis value within a range on the x-axis.
 % Break	Percentage break, as defined using drop percentage.
 % Break X-Intercept	X-Intercept value at the percentage break calculated point, as defined using drop percentage.
 Value @ Operation	The value at operation result is used to return a specified value at the desired point on the operation timeline.

## Value at Operation Result



The value at operation result is used to return a specified value at the desired point on the operation timeline. Clicking on the edit button at the top right of the result opens the following window:



Within this operation you have two additional key settings, first is the 'Operation' section. Clicking the magnifying glass opens an additional window where you can select the desired operation for the result to be determined from. In the example above operation number 3 has been selected.

Within the 'Result' section an additional time setting is also added, this option allows you to select whether you would like the value at the first data point recorded in the selected operation, the middle data point recorded in the selected operation or the last data point recorded in the selected operation.

In the example above the last data point from operation 3 would be reported, the result would be given as a load as this is selected in the top 'Result' dropdown.

### 9.6.4. Break Definition

The Break calculation is an assessment of the rate of loss of load. A specimen may exhibit a peak or trough value before a break event, whereas a break is an ultimate failure to sustain sufficient load.

The range of time or displacement to be examined can be adjusted; this is entered into the 'Break' section. This value determines how far before the end of the test is analysed for the break value calculation.

### 9.6.5. Specimen Calculations

These are calculations that only apply to specimen specific values. As with other calculations, you can adjust the specific settings within the 'Edit' window as well as adding validation boundaries.

## Calculation Function



Offset Yield

Offset yield is calculated using the Stress vs Strain graph and provides the intercept between a line parallel to and offset from the Young's modulus value. You can set the offset value to suit your needs.



Young's Modulus

Young's modulus or modulus of elasticity calculation. Is derived from an algorithm that determines the greatest linear slope within specified boundary conditions.



X-Intercept

Calculates the strain value at a specified stress value, the x value is determined using an offset gradient from the Young's modulus calculation.



ISO 6892 Break

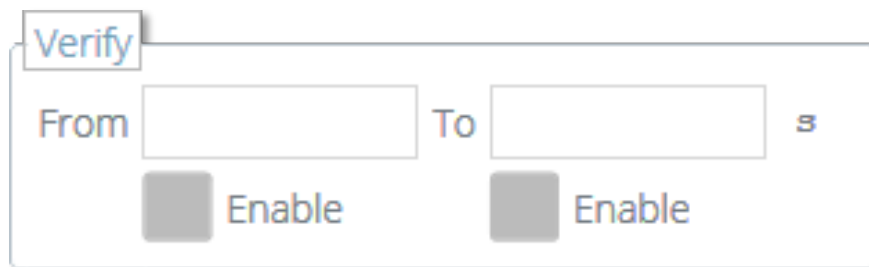
Determines the break value using the algorithm from ISO 6892.



% Break X-Intercept

Calculates the strain value at the ISO 6892 calculated breakpoint, the x value is determined using an offset gradient from the Young's modulus calculation.

### 9.6.6. Verification of Calculations



Within the calculation 'Edit' window it is also possible to set up verification ranges that can be used to verify whether the data is above, below or within a specified range. You can find how to view whether a result is within the verification boundaries in **Section 11.1.4**

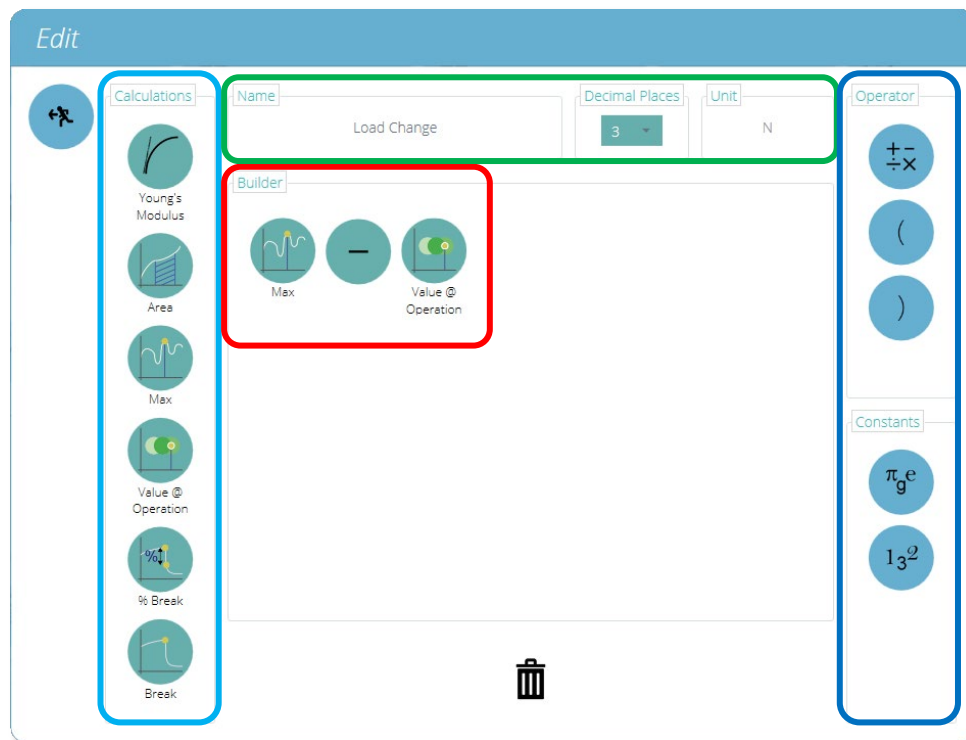


### 9.6.7. Formula



Within VectorPro it is possible to create custom calculations using the output from other standard and specimen calculations. This is achieved using the 'Formula' calculation, first drag and drop the tile (See above) into the 'Formula' section.

Once the formula result is in place. Select the edit icon located in the top-right corner of the individual formula icon to configure the calculation.



▲ Custom results can be created using the drag and drop formula result.

The window, shown above will be displayed on screen. Using this window formula can be constructed using the following sections:

- **Input Calculations (Highlighted in Light Blue)** - The input calculations consist of calculated results from other standard and specimen calculations currently configured within the 'Results' window. See section 9.6.3 and 9.6.5 for more information,

- **Input Operators and Constants (Highlighted in Dark Blue)** - These operators and constants are used with the input calculations to build your formula.

Operators available include:

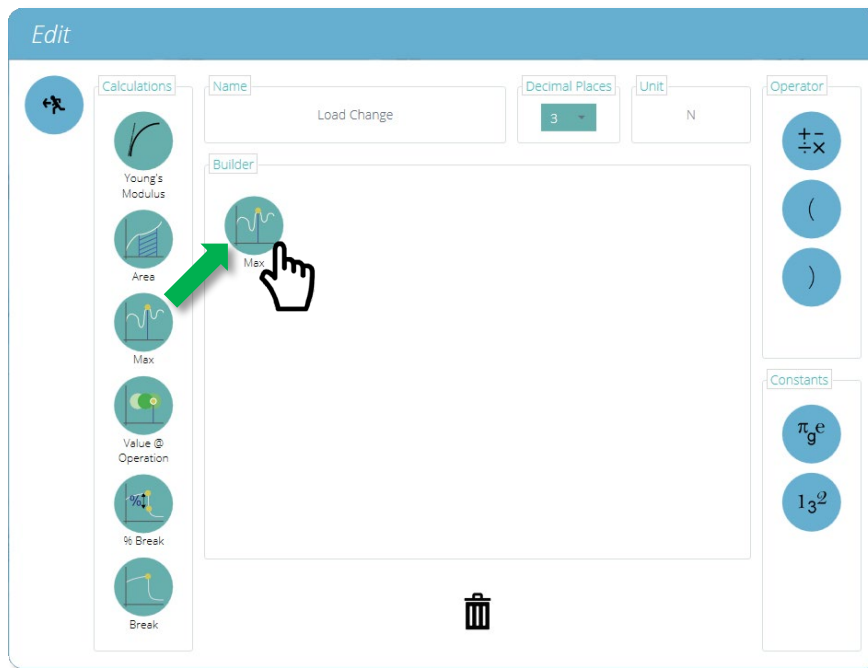
- **Add:** +,
- **Subtract:** -,
- **Divide:** ÷,
- **Multiply:** ×,
- **Brackets:** (),

Constants available include:

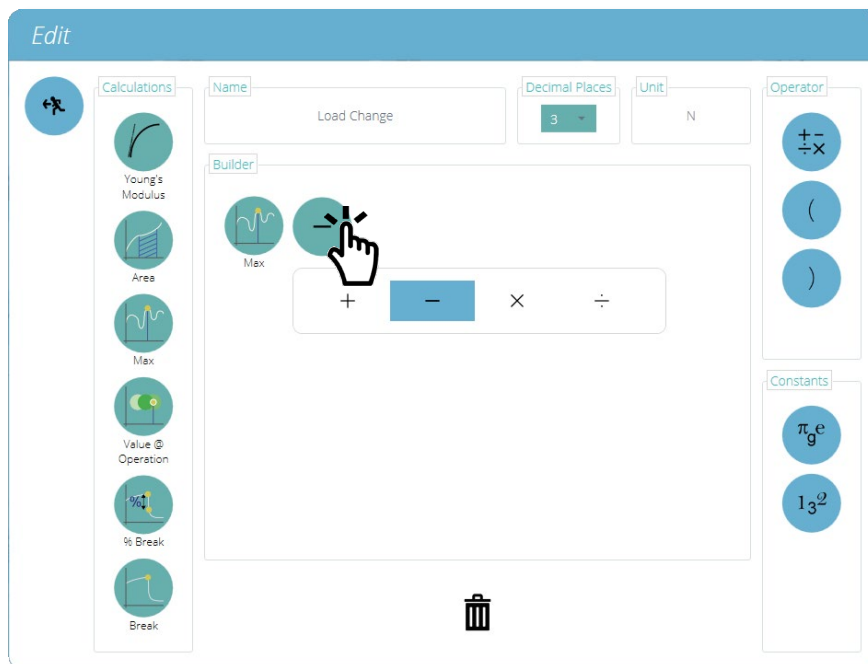
- **Pi (Π):** Value of Pi to 9 decimal places (3.141592654),
  - **Gravitational Constant (g):** Earths gravitational constant (9.80665 m/s<sup>2</sup>),
  - **Euler's Number (e):** Value of Euler's number to 9 decimal places (2.718281828),
  - **Custom Constant:** Selecting the icon pictured below enables you to enter a custom constant,
- **Formula Builder (Highlighted in Red)** - This section is used to build the formula, input calculations, operators and constants are placed here using intuitive drag-and-drop control,
  - **Calculation Definition (Highlighted in Green)** - This section is used to define the calculation; set the name, number of decimal places and an applicable unit for the calculated result.

## Building a Formula Result

To create a formula result drag and drop elements into the central space:



To configure an operator/constant, place the desired component into the formula builder, then click on the component to reveal the operator or constant settings menu. As shown in the image below:



To save the formula press the back icon located in the top left of the 'Edit' window.

## Example Calculation

The image shows a configuration window for a calculation. At the top, there are three fields: 'Name' containing 'Load Change', 'Decimal Places' set to '3', and 'Unit' set to 'N'. Below these is a 'Builder' section containing three circular icons: 'Max' (a graph with a peak), a minus sign '-', and 'Value @ Operation' (a graph with a point on the curve).

In the image above the load change for the test is being calculated by subtracting the result of the 'Value @ Operation' calculation from the result of the 'Max' calculation.

The given result is the load difference between the end of the pre-load stage and the maximum reading for the test.

The formula has been named 'Load Change' and uses the units 'N', the result will show 3 decimal places. The input calculations are configured as followed:

- The 'Max' calculation is configured to give the maximum load for the test,
- The 'Value @ Operation' calculation is configured to give the load at the end of the pre-load stage.

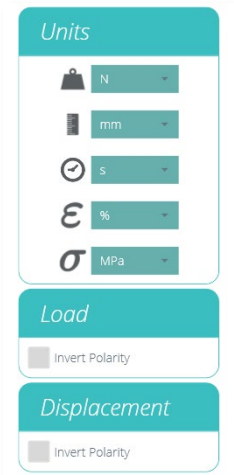
**Note:** The software does not verify the configured units for the formula, please ensure your calculation is configured correctly and that the correct units are entered.

### 9.6.8. Sequence of Calculations

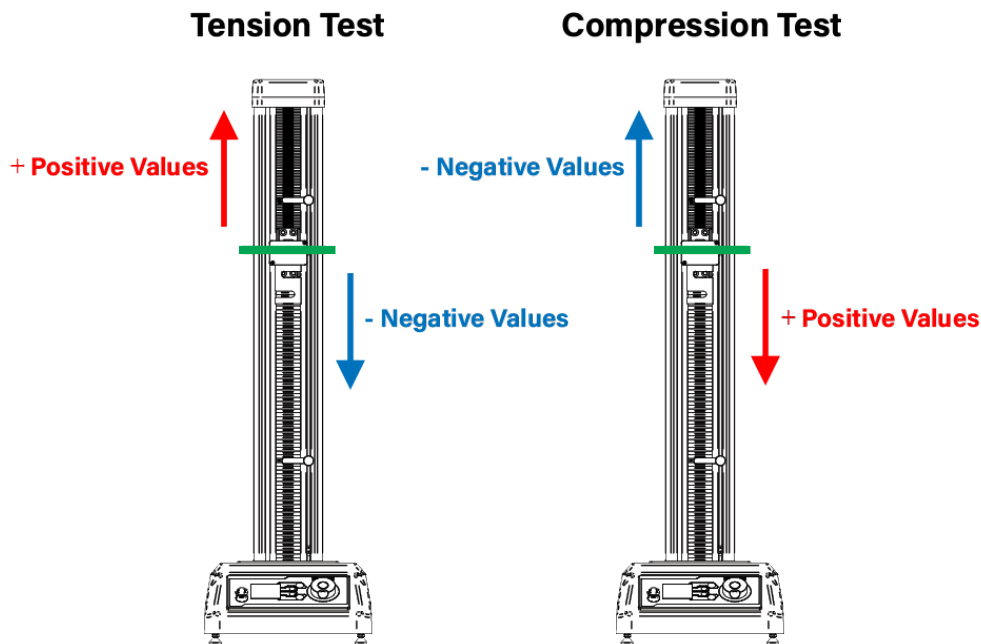
Calculation results are ordered on screen and in reports as laid out here. Calculations on the far left will be at the top of the 'Results' screen and calculations on the right will be at the bottom, bear this in mind when setting attributes on the 'Result' editor screen.

### 9.6.9. Units and Polarity

On the right-hand side you can select the default units and axis polarities for this test:



- Units can only be set for a new test, and cannot be changed if you have results associated to the test.
- Inverting load will invert load readings for the desired test. By default in compression and 3-point bend tests downward motion is positive and in tension tests upward movement is positive. Polarity cannot be changed if you have results associated with this test.
- Inverting displacement polarity can also be used to alternate whether upward or downward motion is positive or negative.



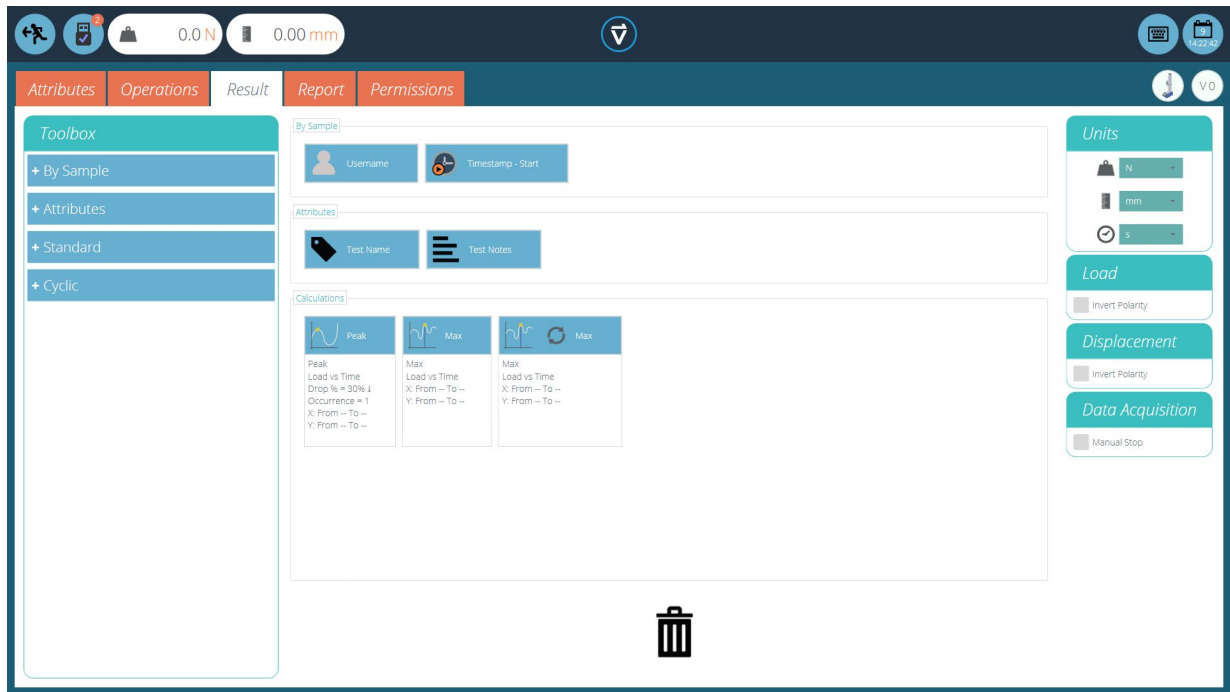
▲ Default polarity for tension and compression tests.

In the image above you can see the default polarity for tension and compression tests. For a compression test, a downwards motion is positive, with upward being negative. In a tension test, an upward motion is positive, with downward being negative.

Three-point bend tests are the same as compression tests. The green line on the image above denotes the centre line of the crosshead.

## 9.7. VectorPro™ Lite - Result

The 'Result' tab is where calculations used for data analysis and reporting are added. The Toolbox area contains all the elements for producing results from test data. Within this window, you can configure calculations as well as adjusting unit display settings.



▲ Here you can see the result screen prior to setting any calculations.

Details of the elements that exist within the result screen are explained below. Some elements are application specific and will not appear for stands without extensometry support.

### 9.7.1. By Sample

These elements relate to the specimen and test setup, useful for tracking test details and system setup for example. Elements added here will be added to the report table. The elements include:

- **Username:** Adds the 'Username' of the person who undertook the test to the results screen,
- **Timestamp start/end:** Adds a timestamp for the start/end of the test to the results screen,

### 9.7.2. Attributes

These are the attributes attached to the specific test as configured earlier within the 'Attribute' tab. Elements added here are then available to add to reports. If an attribute within a test is not added to the 'Result' window, you will not be able to add it to a report.

### 9.7.3. Standard Calculations

Standard calculations are based on the entire timeline and all data features. In all cases, name, axes, decimal place display, range and verify may be added:

**Name:** Edit the display name for the calculation

**Axes:** Select the axes for the calculation

**Decimal Places:** configurable from 1 to 9

**Range:** Define the boundaries for the calculation

**Verify:** Enable to set a Pass/Fail boundaries for the calculation

**Result:** Is used to give an alternate result at the calculated point. For example, this calculation has been setup to find break using 'Load vs Time' but will give the 'Result' as 'Displacement', thus giving the displacement at break for the specimen

**Peak and Trough calculations also include:**

**Drop/Rise** 5% to 50% of peak/trough value

**Occurrence** Peaks or troughs by time sequence

**Order** Peaks or troughs by magnitude sequence (greatest = order 1)

## Calculation Function



Area

The area under a curve. When load vs displacement, this represents energy or work done. With stress vs strain, this is equal to the toughness of the material or modulus of resilience (If calculation boundaries limit calculation to the elastic region).



Best Fit

Trendline: the **gradient** of a straight line of best fit through all the data points within an x-range, and the **y-intercept** of this line.



Slope

Trendline: the **gradient** of a straight line of best fit through the first and last data points within an x-range, and the **y-intercept** of this line.



Average

Mean (sum of all data values divided by the number of point values)



Break

The Break calculation returns the maximum load or displacement within a defined range before the end of a test. See below for more explanation.



Peak

Peaks are defined by percentage drop after rising in y value. Here, select which peak by time sequence.



Number of Peaks

The total number of peaks, this is defined by percentage drop and x/y range settings.



Average of Peaks

The average value for all peaks within the defined boundaries. This is defined by percentage drop and x/y range settings.



Trough

Troughs are defined by percentage rise after falling in y value. Here, select which trough by time sequence.



Number of Troughs

The total number of troughs, this is defined by percentage rise and x/y range settings.



Average of Troughs

The average value for all peaks within the defined boundaries. This is defined by percentage drop and x/y range settings.



Value

The value of y for a specified value of x.



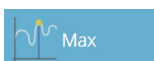
|Peak|

Peaks are defined by percentage drop after rising in y value. Here, select which peak by magnitude order.



|Trough|

Troughs are defined by percentage rise after falling in y value. Here, select which trough by magnitude order.



Max

Maximum y-axis value within a range on the x-axis.



Min

Minimum y-axis value within a range on the x-axis.



% Break

Percentage break, as defined using drop percentage.



% Break X-Intercept

X-Intercept value at the percentage break calculated point, as defined using drop percentage.



#### 9.7.4. Break Definition

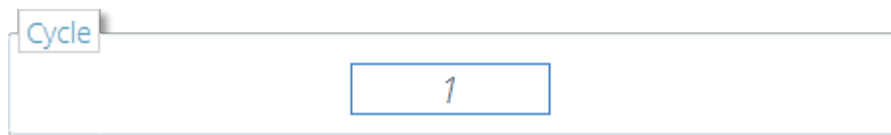
The Break calculation is an assessment of the rate of loss of load. A specimen may exhibit a peak or trough value before a break event, whereas a break is an ultimate failure to sustain sufficient load.

The range of time or displacement to be examined can be adjusted, this is entered into the 'Break' section. This value determines how far before the end of the test is analysed for the break value calculation.

#### 9.7.5. Cyclic Calculations

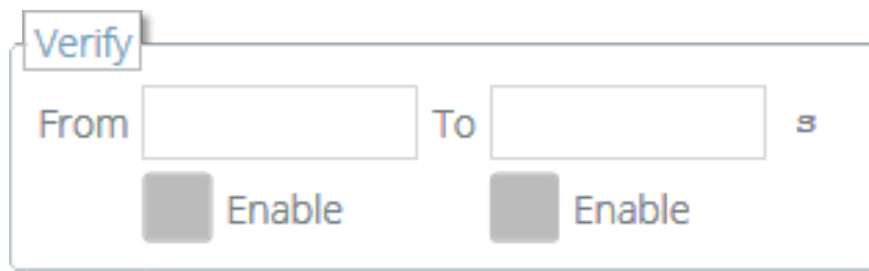
Cyclic calculations operate in exactly the same way but allow the additional selection of a specific cycle within the test to calculate the result.

When configuring a cyclic calculation simply select your desired cycle using the field at the bottom of the edit window (pictured below):



Cyclic calculations are only available with MultiTest-*dV* and Vortex-*dV* test stands.

#### 9.7.6. Verification of Calculations



Within the calculation 'Edit' window it is also possible to set up verification ranges that can be used to verify whether the data is above, below or within a specified range. You can find out how to view if a result is within the verification boundaries in **Section 11.1.4**.

#### 9.7.7. Sequence of Calculations

Calculation results are ordered on screen and in reports as laid out here. Calculations on the far left will be at the top of the 'Results' screen and calculations on the right will be at the bottom, bear this in mind when setting attributes on the 'Result' editor screen.

### 9.7.8. Units and Polarity

On the right-hand side you can select the default units and axis polarities for this test:

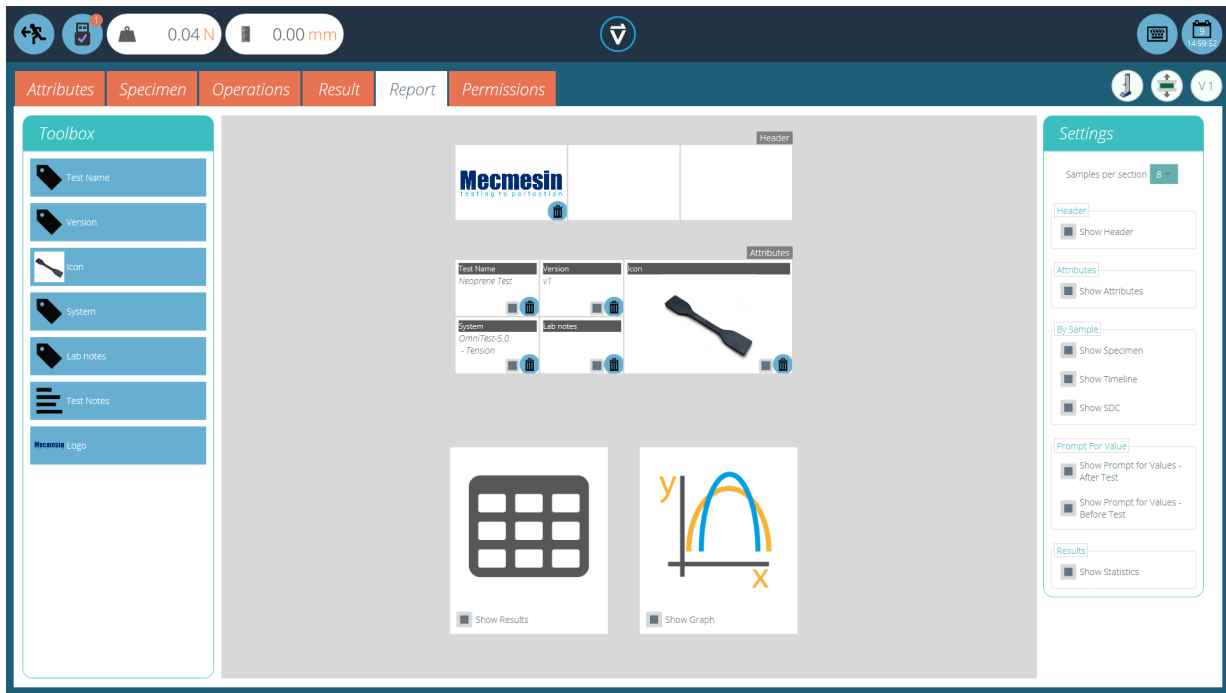
The image shows a software interface for configuring test parameters. It consists of four vertically stacked panels, each with a teal header and a white body. The first panel, titled 'Units', contains three dropdown menus: the first has a scale icon and is set to 'N'; the second has a ruler icon and is set to 'mm'; the third has a clock icon and is set to 's'. The second panel, titled 'Load', has a checkbox labeled 'Invert Polarity' which is currently unchecked. The third panel, titled 'Displacement', also has a checkbox labeled 'Invert Polarity' which is unchecked. The fourth panel, titled 'Data Acquisition', has a checkbox labeled 'Manual Stop' which is unchecked.

- Units can only be set for a new test, and cannot be changed if you have results associated to the test.
- Inverting load or torque polarity shows compression or clockwise torque as a positive value and tension or anticlockwise torque as negative. Polarity cannot be changed again once a test has been run.
- Inverting displacement polarity can also be used to alternate whether upward or downward motion is positive. By default an upward motion is positive.

**Note:** Polarity settings do not affect the test operation settings. You can also turn off polarity within the AFG or AFTI gauge, this will cause all load/torque readings to be positive.

## 9.8. Report

Certain areas within this section are specific to VectorPro MT compatible test stands, any specific information is clearly marked. The screenshots illustrated are using an OmniTest-5.0 and show the features available to this test stand.



The report Toolbox is populated with attributes added within the 'Result' window.

Simply drag-and-drop elements into the predefined areas on the report screen to select those you want to appear in the PDF and printed reports.



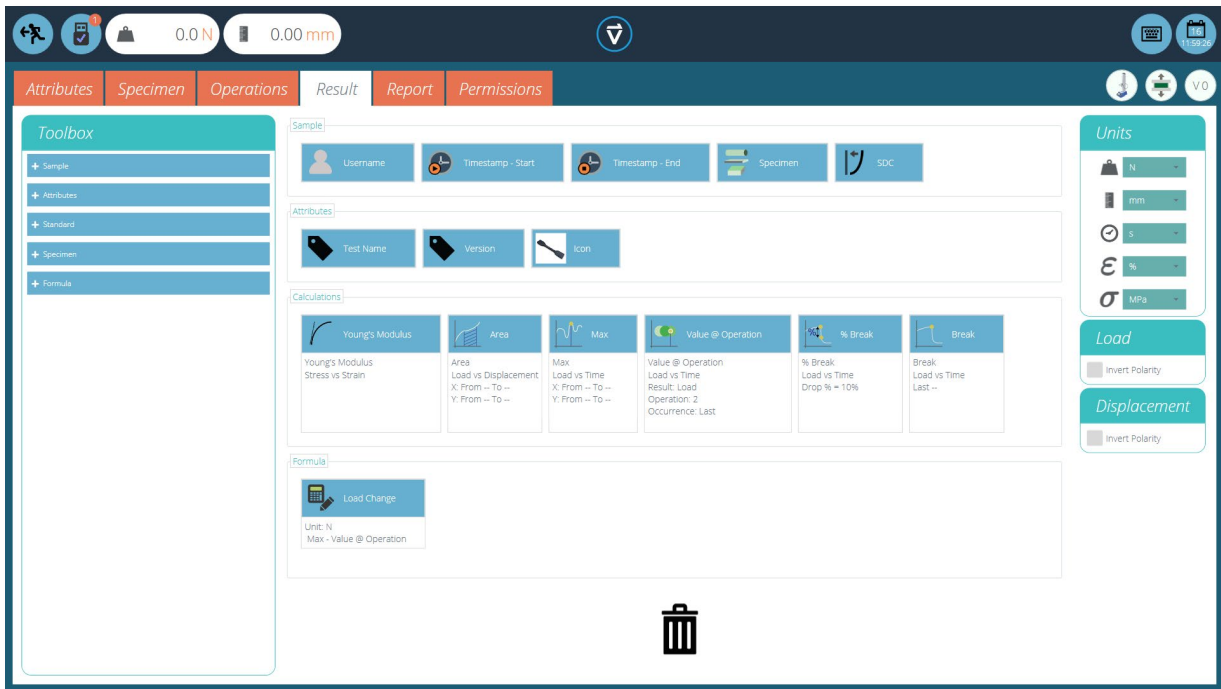
To view and export your completed report simply navigate to the 'Results' page for your desired test and click the 'Report' button (Pictured left).

For more information regarding exporting reports and data, see **Section 13**.

Preparing the report layouts has three main stages:

1. **Populate the report toolbox,**
2. **Populate the report template,**
3. **Position the elements and configure reporting options.**

## 9.8.1. Populating the Report Toolbox

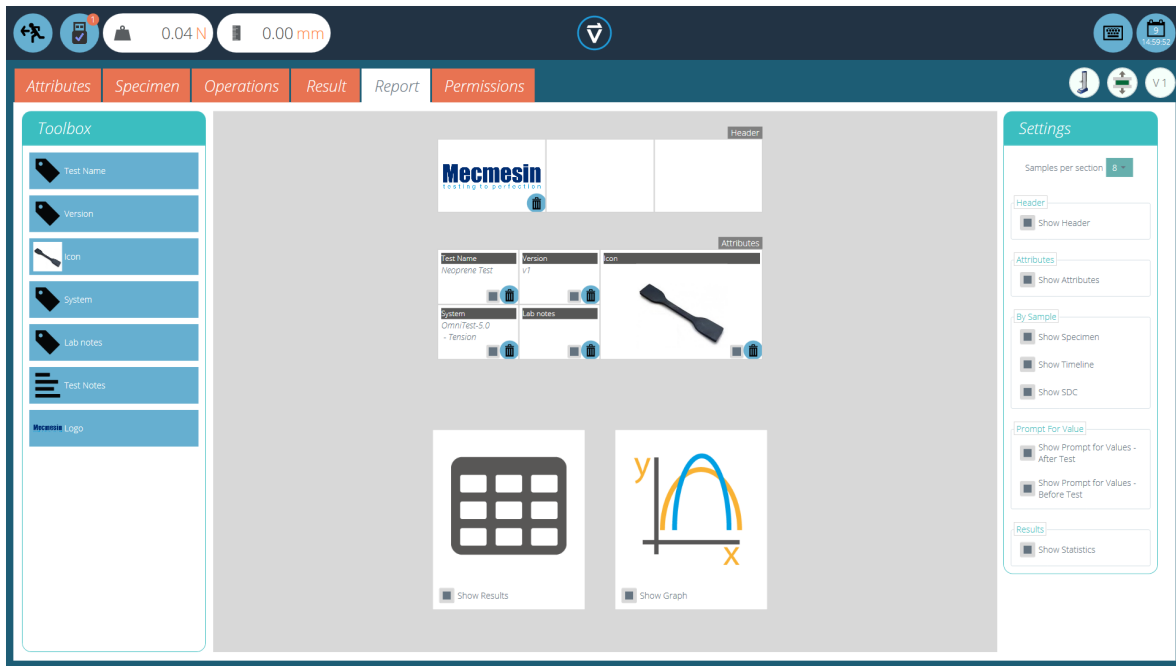


A report can include any attribute attached to a test. The default attributes available in any test are:

- Test name (the same for all versions),
- Test description (can vary by version),
- System (test system or instrument used).

These can be supplemented by any other custom attribute (image, label and note). Tables of results and graphs are available by default in every report.

In the image above you can see an example scenario where the user has added 3 'Attributes' to their 'Result' screen, these will now be available on the 'Report' designer screen.

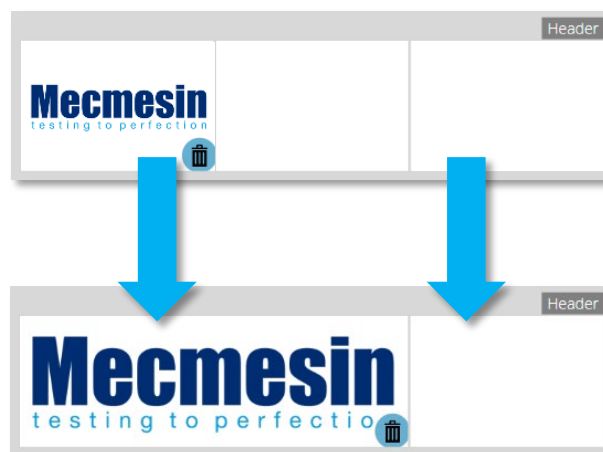


To populate your 'Report' follow the steps below:

1. Begin in the 'Result' tab within the 'Test Designer' screen. Then simply drag-and-drop attributes or calculations into the main screen. Attributes and calculations have to be placed within their corresponding section on the main screen.
2. Go to the 'Report' tab, where you will find the selected attributes in the 'Toolbox', next to a blank page.
3. Drag attributes onto the blank page into your desired position. These can be refined, alongside graph and results table at the next stage. For 'Report' configuration see the next page.

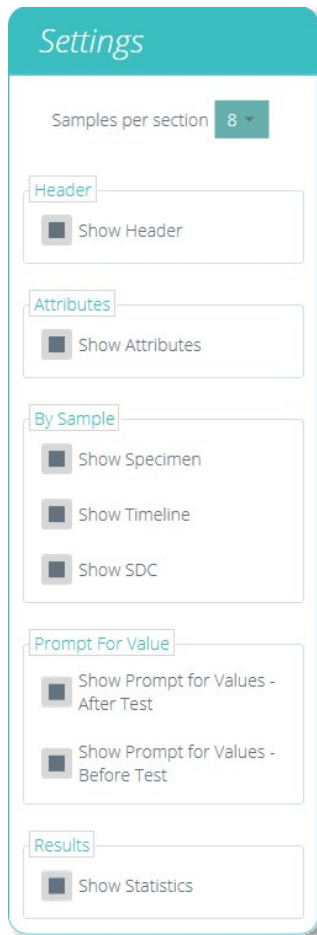
### 9.8.2. Report Configuration

Dividers (see right) can be removed or added by clicking them and attributes can be deleted by selecting the 'Delete' icon at the bottom of each attribute.



Below these elements, the report will display a table of all selected samples, followed by a graph of up to eight samples (The number of displayed samples can be changed in the right-hand plane).

Additional samples appear on subsequent pages in sets of eight samples.



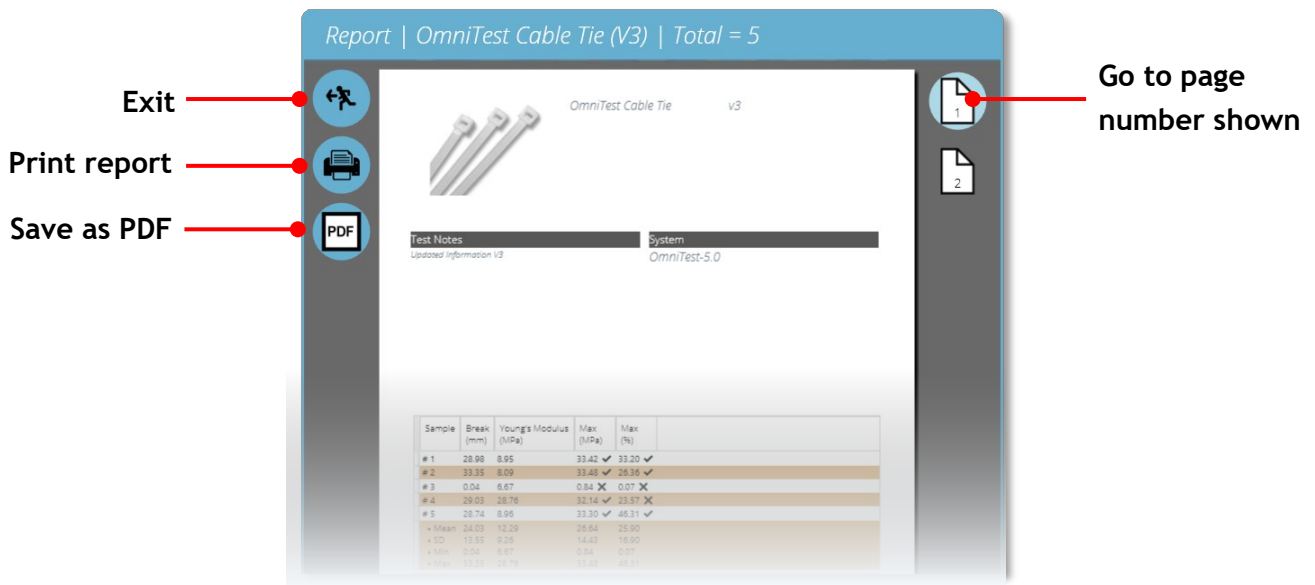
Located on the right-hand side of the screen is the report 'Settings' menu. From here you have the ability to change several other elements, such as:

- **Show Header:** selects whether or not to display the header,
- **Show Attributes:** selects whether attributes are visible,
- **Show Specimen:** choose to display the specimen dimensions to the report. VectorPro MT only!
- **Show Timeline:** choose to display the timeline to the report. VectorPro MT only!
- **Show SDC:** choose to display SDC settings in the report. VectorPro MT only!
- **Show 'Prompt for Values' - before the test:** choose to display values entered before the test,
- **Show 'Prompt for Values' - after the test:** choose to display values entered after the test,
- **Show Statistics:** Configure whether or not statistics are shown in the final report.

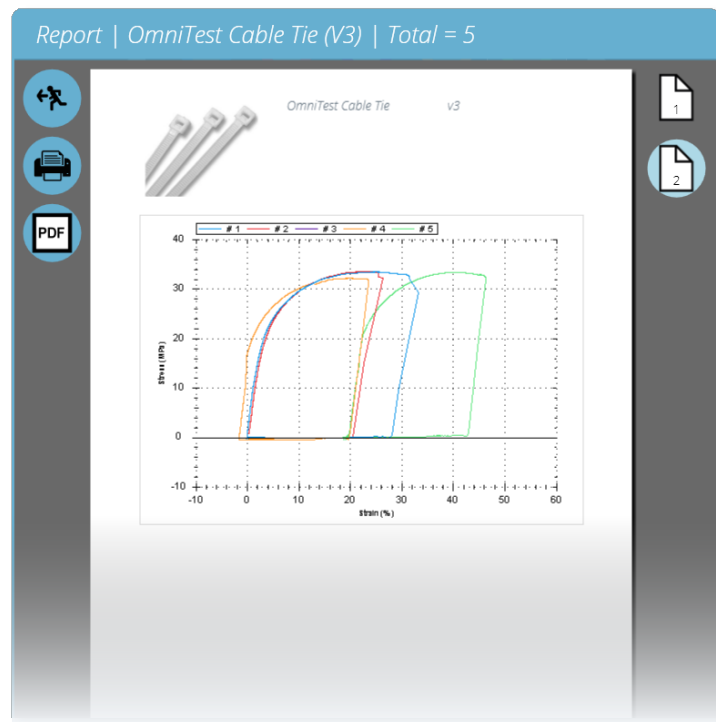
Selecting 'Show Prompt for Values' enables these attributes to be exported via Email, Excel and PDF.



To view and export your completed report simply navigate to the 'Results' page for your desired test and click the 'Report' button (Pictured left).



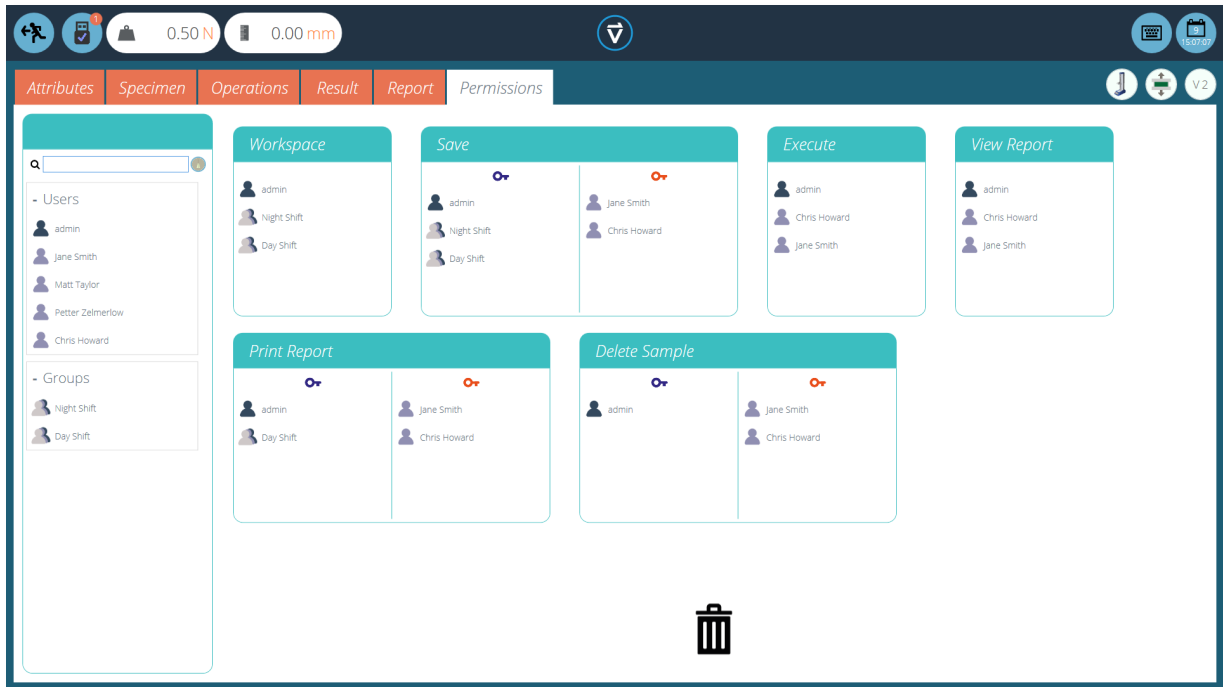
Reports are laid out with user-placed elements on page 1, followed by tabulated results and a graph. Up to eight samples are shown per page, up to a further eight on the next page and so on. Statistical results are shown below the final table.



By default PDF reports are saved to C:\ProgramData\Mecmesin\VectorPro\reports

## 9.9. Permissions

The test 'Permissions' tab works the same as the main 'Permissions' control in VectorPro. Simply drag users into the cards to grant permissions to save test copies and edits, execute the test, view the report, print (export) reports or delete samples.



In the example above, 'Jane Smith' and 'Chris Howard' can manage all aspects of this test, whereas the group 'Night Shift' has limited permissions. To remove a user from a card simply drop them into the trash located at the bottom of the screen.

It is important to ensure if you only want a user to execute a test that they have access to both 'Execute' and 'Workspace' permissions as well as access to the test system being used, this is configured in the main 'Permissions' screen. See **Section 7.8** for additional information.

The 'Workspace' permission places a tile for the test being edited in the user's workspace, by default this is always created for the user who created the test. It is possible for a user to access tests without having the 'Workspace' permission by using attribute permissions. This is fully explained in **Section 9.2.5**.

A user with permission to access the 'All Tests' viewer can also see a list of all tests and subsequent versions of each test but is only able to use tests and versions for which they have permission.

**Note:** For a user to be able to execute a test they must be granted correct permissions within the test itself and must have permission to use the corresponding instrument for this test. For the above examples, all users must be placed into the OmniTest-5.0 permissions card.

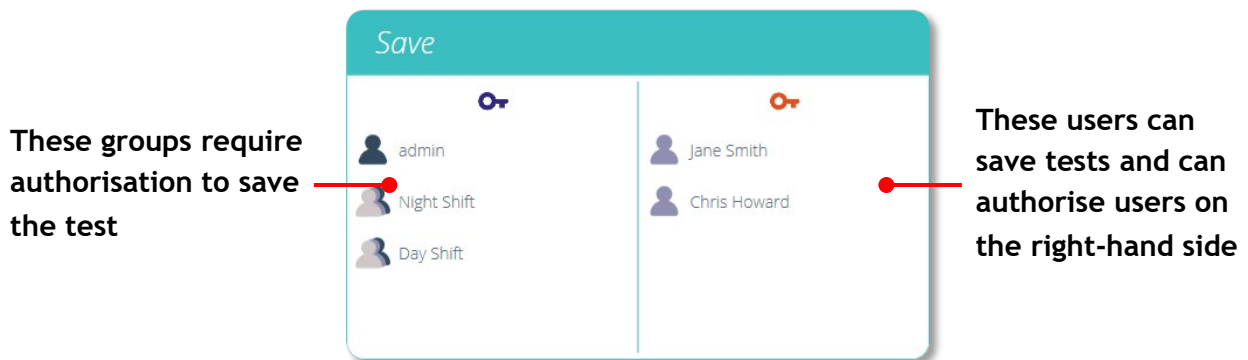


### 9.9.1. Prompt for Authorisation Settings

For certain functions, such as saving a test and deleting samples, it is possible to assign a user the ability to carry out the function only with authorisation from another user with 'authorisation' rights.

To do this place the user on the left-hand side of the permissions card, users on this side of the card require permission to carry out the designated function, expect 'admin'. The 'admin' account cannot be removed from authorisation cards and will always have full authorisation permission.

Users on the right-hand 'authoriser' section of the card have the ability to carry out the function (in this case saving the test) and they also have the ability to authorise users on the left-hand side to carry out this function.



In the above example, all users on the right-hand side have permission to save without authorisation and can authorise the action of other users. The two groups on the left-hand side can only save with authorisation from users on the right.

If a user contained within the 'Day Shift', for example, attempts to save a test they will be presented with the 'Prompt for Authorisation' sign off window shown in the next section.

**Note:** In instances where users are on both sides, they may be part of a group on the left-hand side but be as an individual on the right, the user will have always default to having 'authoriser' permission.

For the above example, Jane Smith is located on both sides as her user account is contained within the 'Day Shift' group. This is located on the left-hand side and requires permission to carry out the action, but as Jane Smith's user account is also located on the right-hand side she does not require permission and can carry out the action with no additional input.

### 9.9.2. Prompt for Authorisation Sign Off



When a user who requires authorisation carries out a function the following pop-up will appear on the screen. Here you have three entry fields:

- **Authoriser:** The top drop down section allows you to select your desired authorisation account,
- **Password:** The middle section is where the selected user enters their login password,
- **Authorisation note:** This is where the authoriser can enter a note detailing what action has been taken. It is required to accept or decline for this note to be saved.

At the bottom of the screen the user is presented with three actions, these allow the user to:

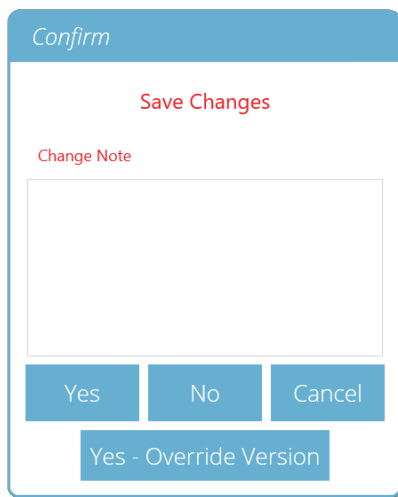
- **Accept** the change made and save the note to the event log,
- **Decline** the change made and save the note to the event log,
- **Cancel** the change, the note will not be saved but all actions are still logged in the event log.

The note saved can be viewed in full in the event log along with the details relating to the change such as the user who asked for authorisation, the user who authorised the change, the time and date of the event and what was changed.

## 9.10. Saving a Test

When you leave the Test Design function, you are presented with the pop-up box pictured below and asked if you wish to save your changes, the default 'Yes' command saves the test and increments the version number.

### There are certain factors to be aware of when saving a test



- When a test name is changed, it applies to the latest version, all previous versions will be linked to this test but the previous versions name attribute will show the previous name.
- When an attribute or calculation is added or removed, or test parameters changed, these are not applied to previous versions of the test.
- The test version that is edited becomes the new version (e.g. a test reaches version 5, and version 3 is then edited – this edit becomes version 6 and changes added to versions 4 and 5 are therefore not included).

**Note:** Users without 'admin' rights to save a test version, but can save with authorisation will be presented with an authorisation screen when attempting to save.

This must be accepted or declined by another 'admin' user with authorisation rights for this function.

### 9.10.1. Override Test Version

Within VectorPro, you can override a version of the test when saving it, rather than having to increment the test version.

When exiting a test, which is being edited, the pop-up box pictured above appears, the 'Yes - Override Version' option allows you to save any changes made, without incrementing the version number.

This feature is useful if the changes are minor or if you are making alterations before having completed any tests.

You can also control if a user can override versions, to do this simply drag-and-drop users into the override version card in the general permissions menu to give them the ability to override test files or remove them from the card to take away their permission. This is useful for protecting tests from being changed without incrementing the version.

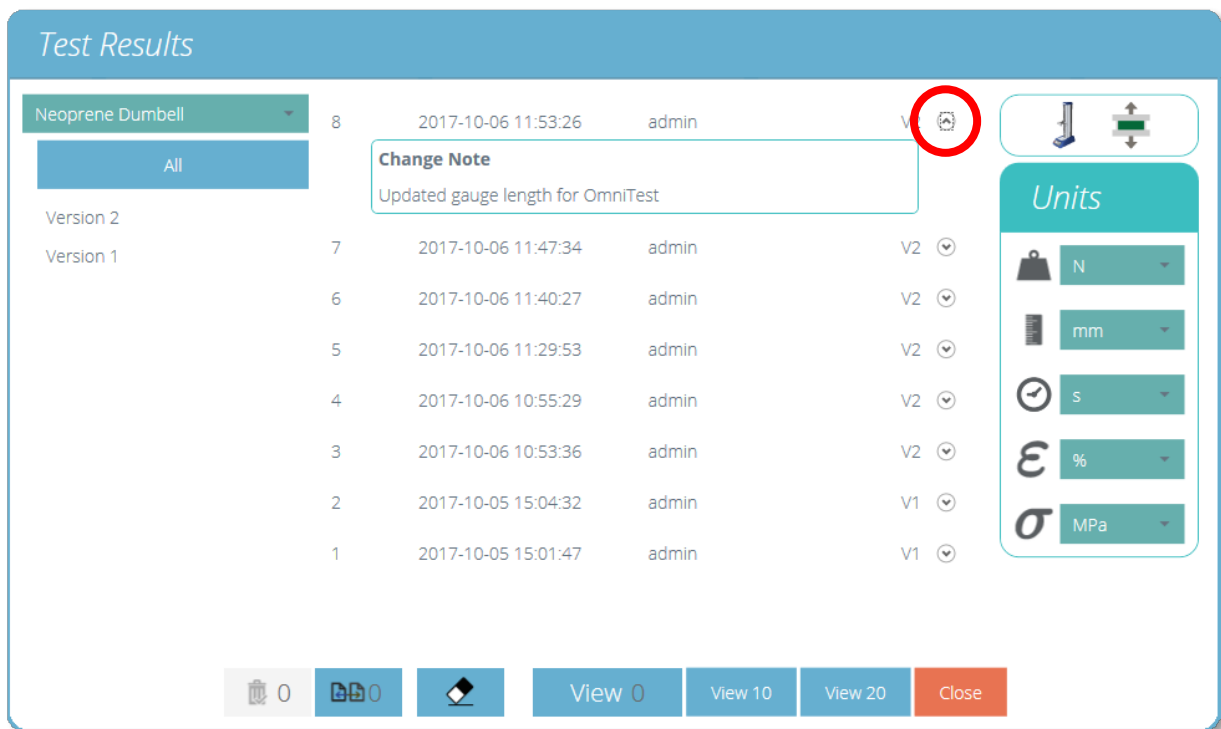
### 9.10.2. Adding Change Notes to Saved Tests

In addition to the override feature, there is also a 'Change Note' field within the save confirmation window. The change note field is an area where you can input text detailing the alterations that have been made.

This is saved with the test and can be viewed in the 'All Tests' window and 'Test Results' screen as well as being stored in the event log. Change notes are only saved when clicking either 'yes' or 'yes - override version'. Please note there is a 300-character limit.

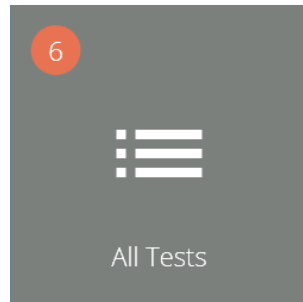
To view change notes on the 'Test Results' screen you simply click the arrow icon (Circled) to expand the field and display the change note for the select test version.

**Note:** When using 'Yes - Override' to save change notes, the previous save note will be replaced and unavailable for future viewing. This note will still be viewable in the event log.

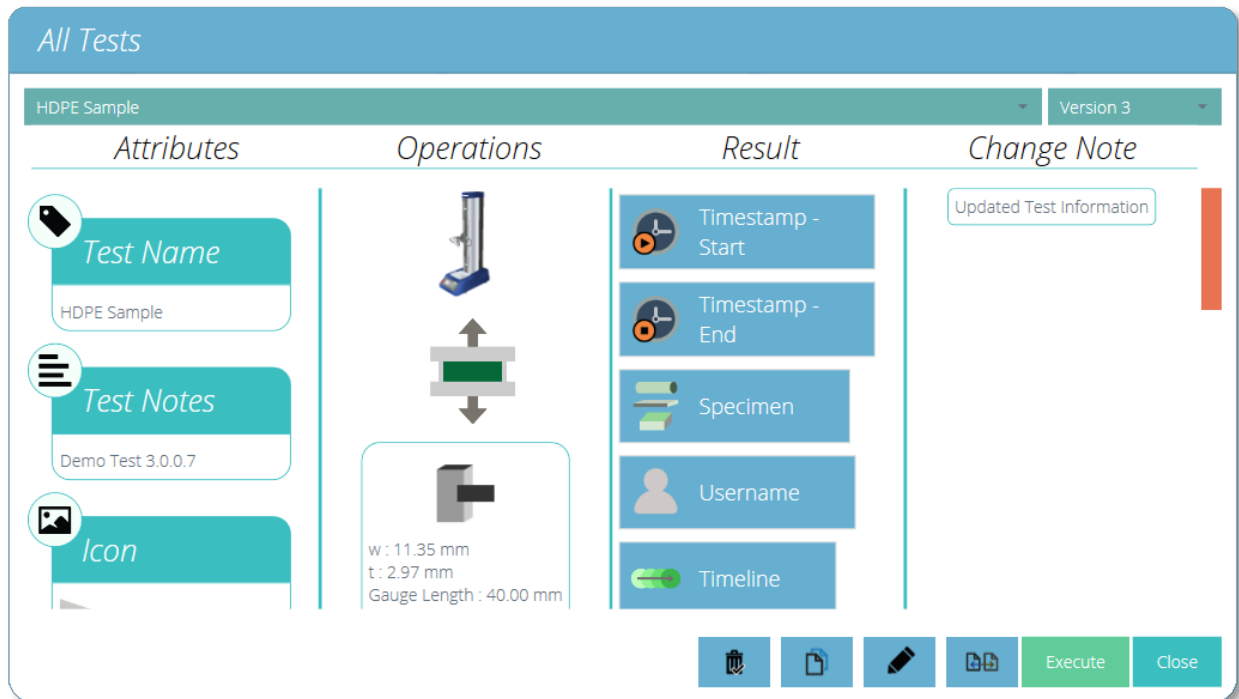


▲ 'Test Results' viewer showing the change note for the latest test revision.

## 10. All Tests Viewer



The 'All Tests' viewer is made available to users by granting the corresponding permission. A user can view all tests, but will not be able to copy, edit or use them without the correct permissions.



The drop-down lists at the top of the window displays all the tests available and all previous versions of the selected test.

Attributes, device identity (Image), system operations, result contents and change notes are all shown in the main section. This table enables quick reference to compare different tests or different test versions for example.

You can also see change notes that were added when a new version of a specific test was saved.

From here, depending on permissions given to the user you can complete the following actions:



**Compare test samples:** This opens the comparison window that allows you to compare samples from multiple tests. See **Section 10.2**, for more details.



**Edit current test:** This action enables you to edit the current test. Note certain actions will be greyed out if the test has been run before. See **Section 10.1**, for more details.



**Create a duplicate test:** This duplicates the test at its current version number. The newly created test will revert to version zero. See **Section 10.3**, for more details.



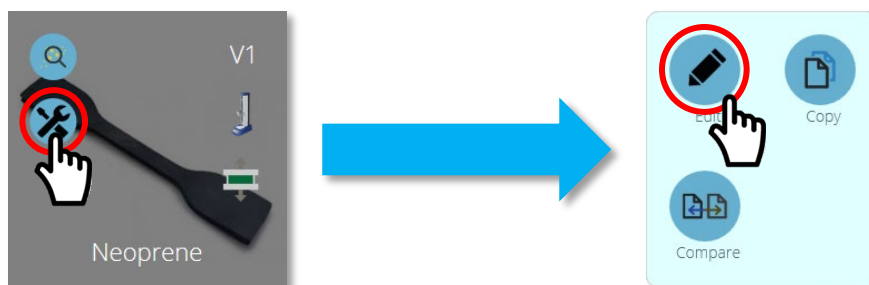
**Delete:** This deletes ALL versions of the test including results files.



**Execute:** This opens the selected version of the test file ready for data acquisition.

## 10.1. Editing a Test

To edit an existing test simply click the tools icon located on the relevant test tile (circled below). This opens the tools menu pictured right, simply click the pencil icon located within. You can also edit a test by clicking the pencil icon at the bottom of the 'All Tests' viewer.

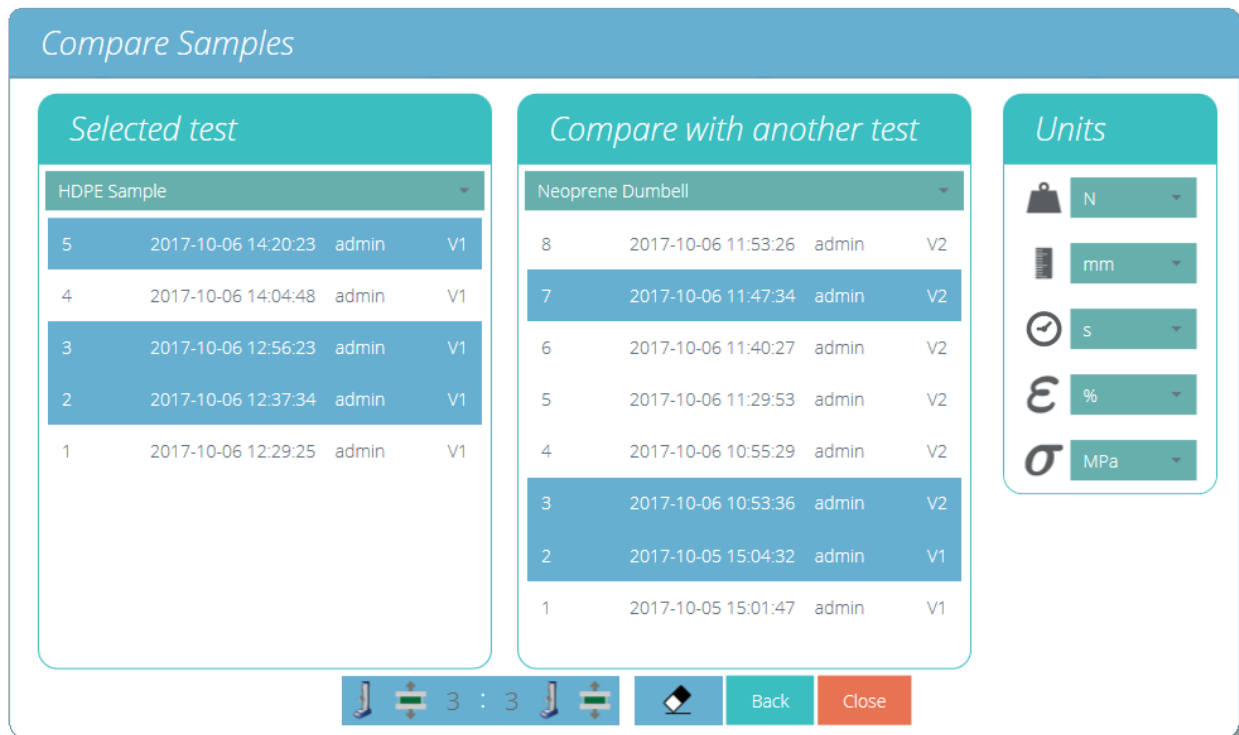


From the edit button, you are loaded into the test designed screen where you can view and alter all details of the test selected. If the user has also been assigned 'save' permission in the test itself, they may change parameters and save a new version or override the existing version.

- Once you are happy with the changes that have been made click the back symbol located at the top left of the screen and save the test.
- For more information regarding the saving of tests please see **Section 7**.

Calculations can also be edited from the 'Results' tab located within the 'Test Designer' screen, see **Section 9.6**, and the 'Results Viewer' see **Section 11.2**. If you wish to try a calculation adjustment first, before creating more test versions, this may be preferred.

## 10.2. Compare Test Samples



### ▲ Compare samples screen

To access the compare samples function you simply click the corresponding button which is located on each individual test tile within the tools menu and at the bottom of the 'All Tests' explorer, these are both pictured below.



The 'Compare Samples' window allows you to evaluate results from different test files. As pictured above you can select two tests, then within each test, you can see the individual test files. The test result naming convention consists of:

- The test result title consisting of the date (YYYY-MM-DD) and time of day (HH:MM:SS),
- The user that ran the test,
- Test version used for that sample (e.g. V2 is version 2)

Test results are selected using the two drop-down menus located at the top of the window; to select the desired result files simply click the files you wish to view. Selected files are highlighted in blue.



To clear any currently selected result files simply hit the eraser button located at the bottom of the screen.

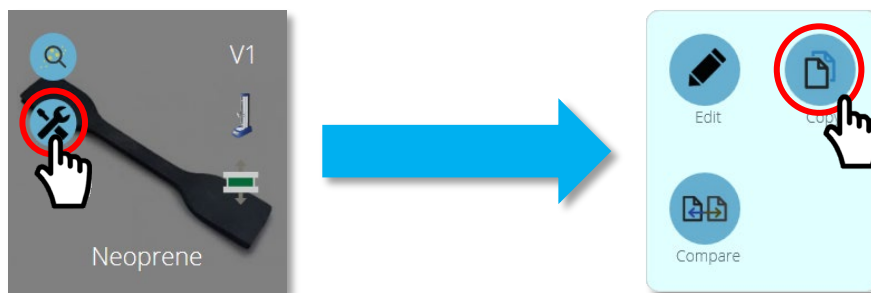
On the right-hand panel, you can select the global units for this test. This will ensure all displayed results are in the same base unit. Once you have your desired test results selected, click the compare button, your results will then be displayed in both graphical (**Section 11.1, Results Viewer**) and numerical form (**Section 11.2, Results Viewer**).

The report and results template used for comparing the samples is sourced from the primary selected test (The test from which the comparison button was pressed), this covers the export template and calculations. It is only possible to compare samples from the same hardware category, below is a table with the four main categories. The right-hand column shows the comparable instruments within that category.

Hardware Category	Comparable Instruments
Serial Force	AFG, AFTI-Force, BFG, CFG+
Serial Torque	AFTI-Torque, Orbis, Tornado
Stand Force	MultiTest-dV, MultiTest-dV(u) & OmniTest
Stand Torque	Vortex-dV

**Note:** Users cannot run a test when comparing sample results.

### 10.3. Duplicating a Test



Duplicating a test can be achieved by clicking the duplicate test icon. This is located on each individual test tile as seen above or at the bottom of the 'All Tests' explorer window.



Clicking the 'Duplicate Test' button located on the test tile will create a copy of the test at its latest revision, upon pressing the button you will be immediately loaded into the 'Test Designer' screen.

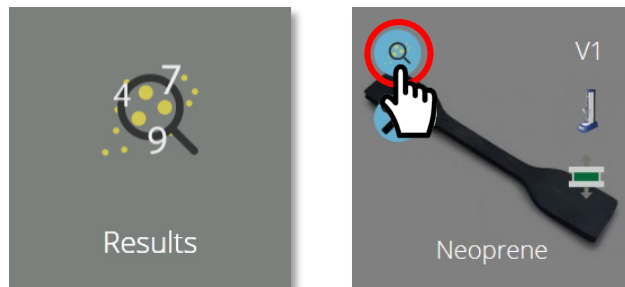


Clicking the 'Duplicate Test' button located at the bottom of the 'All Tests' window will create a copy of the version currently being viewed.

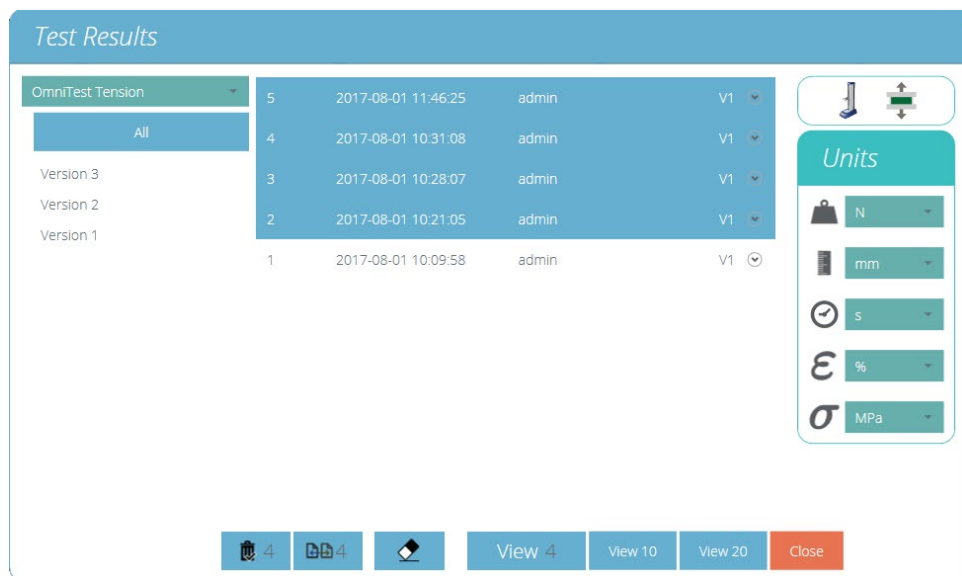
**Note:** Please be aware that test results are not duplicated, only the design of the test is copied.



# 11. Results Viewer



As with the 'All Tests' viewer, the 'Results' viewer gives access to all tests that are available to a user. Click the grey 'Results' tile on the 'Workspace' to open the 'Results' viewer. You can also access the results viewer by clicking the results icon located on each individual test tile (circled above).



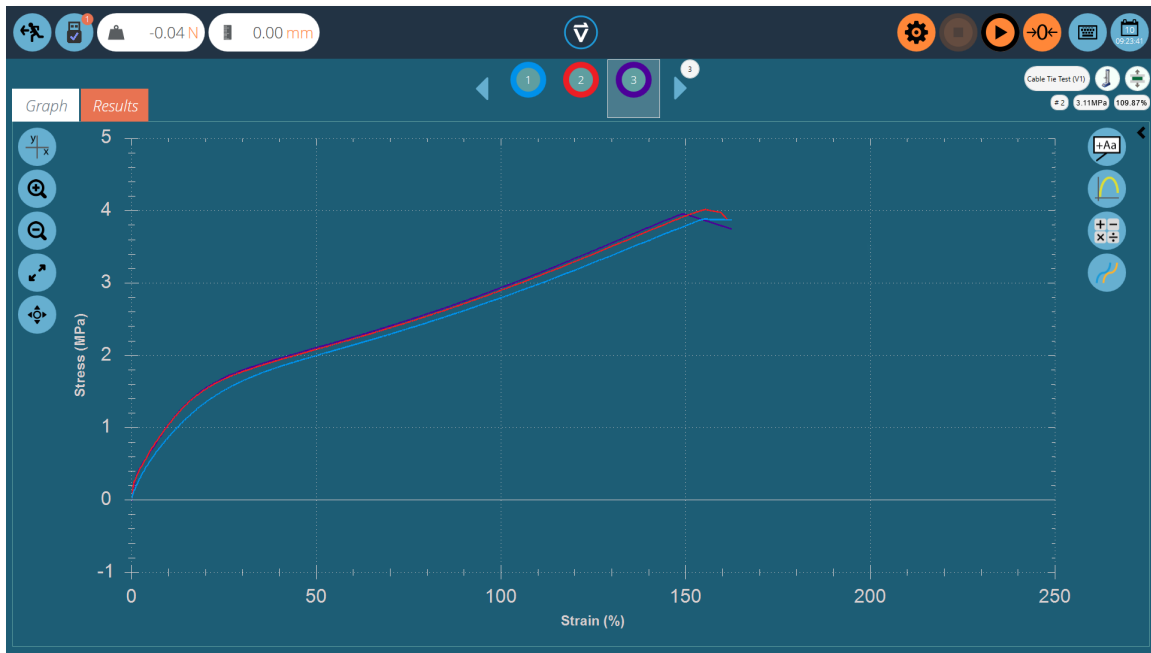
Here, four results from the test have been selected. You can filter the results display by their 'Version' number on the left-hand side of the screen. In the image above 'All' versions have been selected. To view the tests simply click 'View', you can also select 'View 10' and 'View 20' to open a predefined number of tests. When using the 'Results' viewer you should be aware that:

- If a version is not selected, any selected results will be viewed in the latest version, with its results and report profile. Later results cannot be viewed in an earlier version.
- To view results from a particular version of the test, select the test version on the left. Results from only this version are displayed, using the results and report profile from that version.
- To view all versions again, click 'All'.
- Click on each individual result you wish to see or compare. Select 'View 10' or 'View 20' selects the most recent results.

## 11.1. Viewing Results: Graph Display

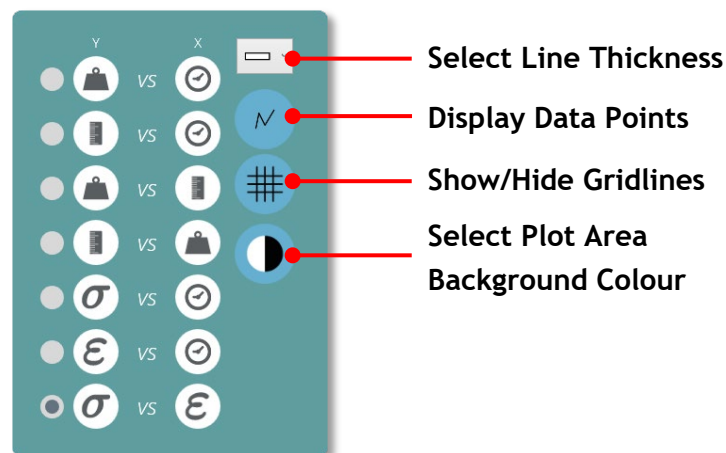
Upon clicking the 'View' button the samples selected are displayed in the 'Results' window. Immediately this loads into the graphical display, whereby you can see your results plotted.

Within this windows there is an array of options that can be used to help you analyse your data to its fullest, these options and settings are covered in the sections below.



### 11.1.1. Formatting the Graph Display

The X/Y button on the left offers graph display controls. You can choose between **displacement, load, stress and strain** on the Y-axis and **time, displacement, load and strain** on the x-axis.



**Note:** Settings configured within this menu not only apply to the displayed graph but also to the reported graph.

### 11.1.2. Sample Display

Each sample is represented at the top of the graph display in a row of coloured circles, between the two blue scroll arrows. Up to eight samples appear at a time in the sample selector bar. Click the blue arrows to move between samples or to scroll to more. The total number of samples in the current selection is shown in the top right-hand area of the screen, below the test name.

The numbers are assigned sequentially each time the test is run, and are sequential across all versions.

Click *underneath* a colour circle to select a sample, or *inside* the circle to change how the sample is viewed (its display properties). Samples can be:

- Named,
- Hidden,
- Deleted,
- Offset,
- Assigned a different colour.

All these selections carry through to the graph display in reports.

The screenshot shows a control panel for a sample. At the top, it displays the date and time '2018-07-10 09:16:26'. Below this are four icons: 'Self' (an eye with a slash), 'Other' (an eye), 'Remove' (a trash can), and 'Delete' (a trash can with a checkmark). A central input field contains the text 'Sample C'. To the left is a 'Colours' palette with ten colored circles. To the right is an 'Offset' section with a numeric input field set to '0', a 'save' button (a floppy disk icon), and a 'View/delete annotations' button (a document icon with an 'x'). A small blue box shows 'End of Test #5 [53.13N] [12.23s]'. Red lines connect these elements to descriptive text on either side.

Time and date at the point the samples test was completed

'Self' hides the selected sample. 'Other' will hide all other samples

Select a different colour for this specimen. Others will not change

Offset this specimen's graph trace by the amount entered, in any direction, for viewing clarity

Deselect this specimen from the current selection

Delete this specimen completely from the test record. This CANNOT be reversed!

Add a name to this specimen (click the save button to store the custom name)

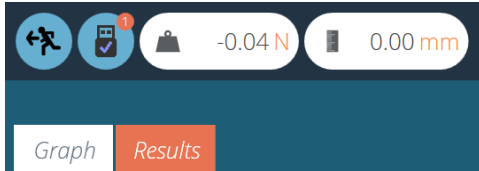
View/delete annotations

Clear this specimen's offset

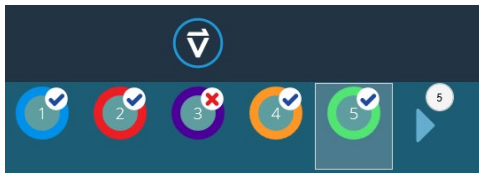
▲ Sample display properties

### 11.1.3. Header Bar

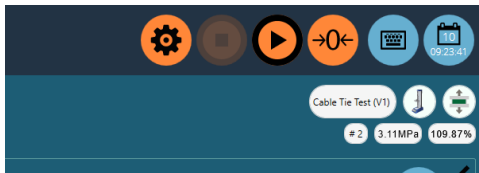
Within the results viewer, the header bar consists of three main areas, all of which provide specific functions to aid you in viewing your test results.



The upper left section contains the live readings, stand information (USB icon) and the tabs that enable switching between the graph and results screen.



The centre of the header bar contains the VectorPro logo, which contains help features, system information and screen switching options. The lower section contains the sample icons (with a pass or fail denoted by a tick or cross) and scroll controls, with the number of test samples indicated in the sample above



The upper right-hand section contains the on-screen keyboard button and calendar. The lower section contains test information such as the test name, test stand (graphic), test type (graphic), sample number selected and the X and Y position of the mouse on the graph in relation to the selected sample.

### 11.1.4. Calculations Results

Calculated results, as set within the test designer, are displayed in two main areas. To view all calculated results instead of the graph, click the 'Results' tab. Alternatively, calculated results can be viewed side by side with the graph, in a scrolling display, by clicking on the black arrow circles in the image below.



- Add annotations
- Capture plot area
- Apply spot calculation
- Offset all current displayed specimens

Additional spot calculations can be used by clicking the 'Apply spot calculation' icon. The selected calculation will apply to the currently selected sample.

Other samples will be hidden from view until the calculation is cleared. Either a graphical interpretation (e.g. a best-fit line, or shaded area) and the result value will be displayed or a labelled data point (e.g. peak or max). See **Section 9.6.3, Standard Calculations** for more details.



The upper 'broom' button clears any calculations.



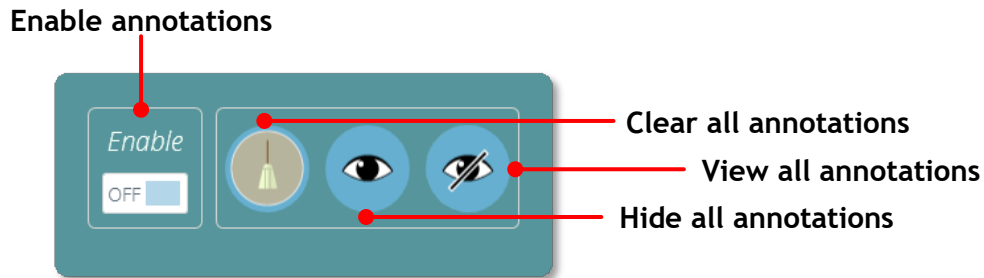
Calculations configured with verification options will display a 'Tick' or 'Cross' next to them for clear visual indication of whether that particular sample has passed or failed.

### 11.1.5. Adding Annotations



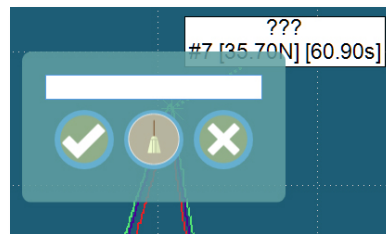
Annotations can be added to a sample trace to display data values and notes (up to 30 characters). These are not retained after closing but are captured in the image of the plot area (see 'graph capture', on the next page).

Below you can see the 'pop-up' box annotated:



To annotate a sample you simply need to complete the following steps:

1. Click on the data point to annotate (you may choose to select a specific sample or samples first).
2. Click on the plot area where the text should appear.
3. Above the data point values, '???' represents your label area.



4. Add text and tick to save, cross to delete, or the broom to clear the text box.

**Note:** Data point values displayed are true values, even in offset view.

To delete a single annotation click on the annotation icon and then click on the cross of the item you wish to delete. To delete all annotations click on the broom icon.

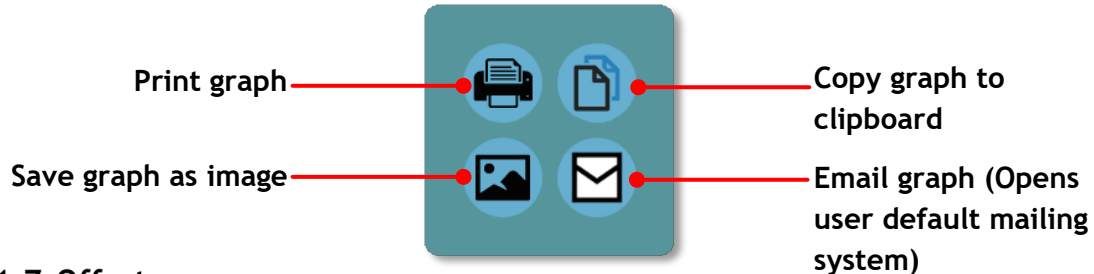


**Note:** Annotations cannot be repositioned or resized, so place them carefully to ensure they do not obscure each other.

### 11.1.6. Graph Capture

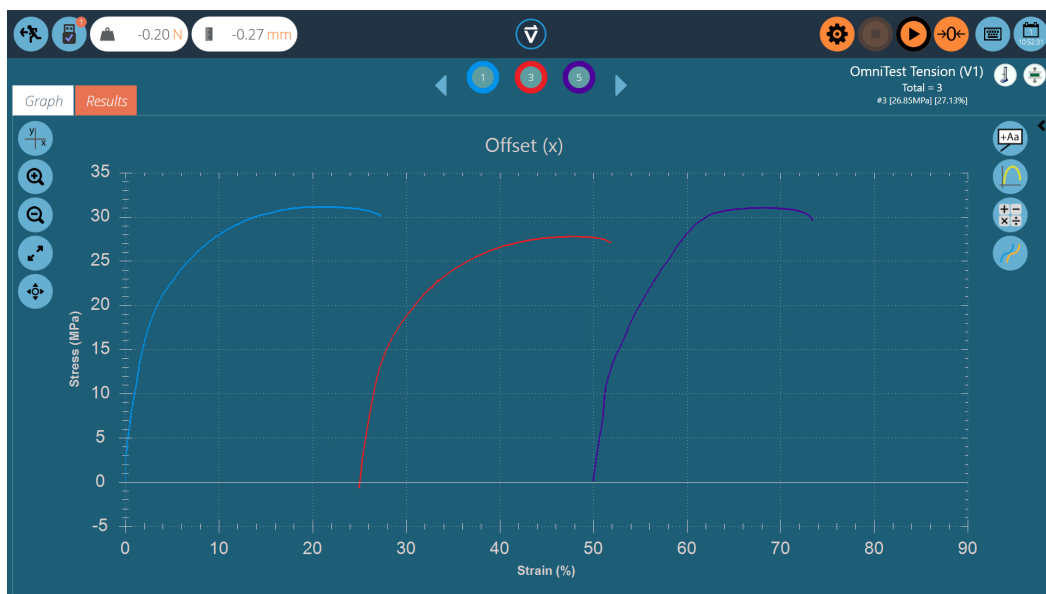
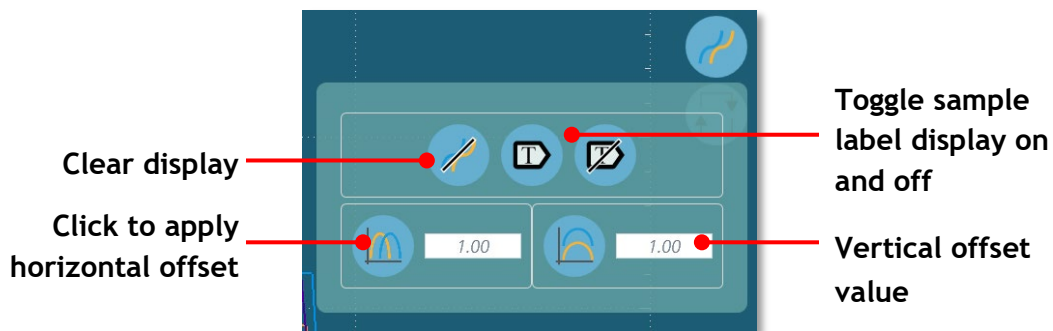


The plot area of the chart view can be captured: to print, copy, save as a graphics file (.emf, .png (default), .gif, .jpg, .tif, .bmp), or an email attachment (.png). To achieve this simply click 'graph' icon, pictured left. The options menu will then open below.



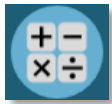
### 11.1.7. Offsets

An individual sample can be offset using its display properties. An offset can also be applied to all samples, to spread them out for clarity, e.g. horizontally to compare strain, or vertically to compare characteristics along the stress axis. Click the offset button to view the options pop-up, pictured below:

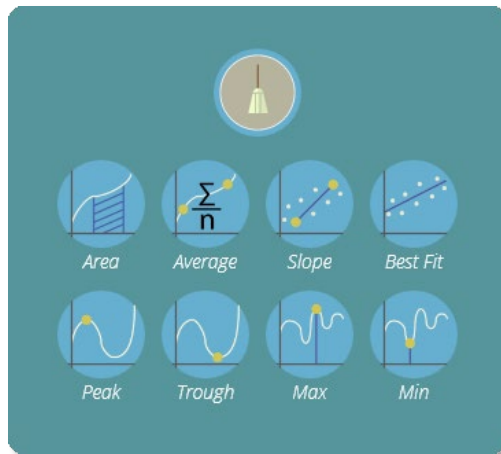


▲ Here, the plots of three samples have been offset horizontally for comparison.

### 11.1.8. Spot Calculations



Spot calculations are used to quickly verify data or test future calculations while also enabling visual display of the data on the graph display. To access spot calculations click on the spot calculation icon, pictured left. This will open the menu below:



Within this menu there are two main functions; the broom icon, this deletes any currently applied calculation and the calculation section. Here you can select the desired calculation to apply to the currently selected sample.

Below is an example graph showing the area under a curve for sample two.

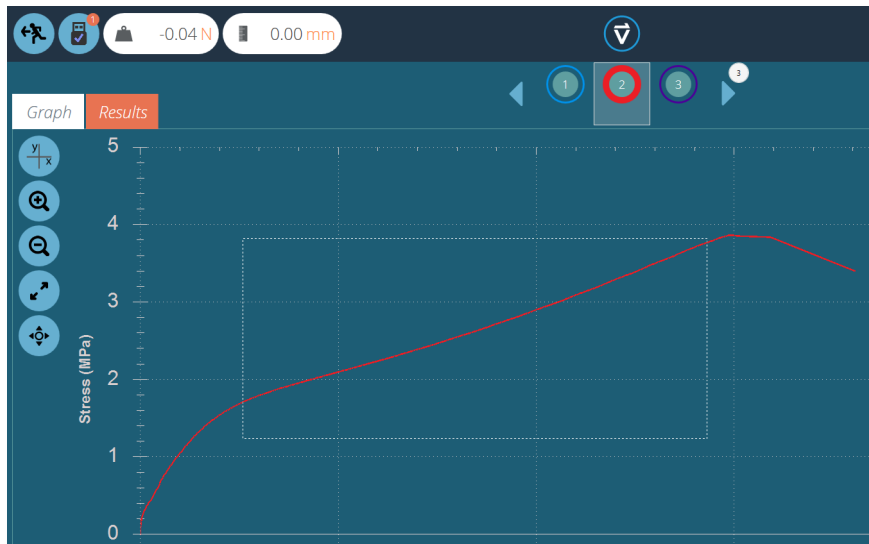


When selecting the calculation all other samples are hidden and a visual overlay is added to the display where the calculation is taking place. This can be saved for export using the graph capture buttons.

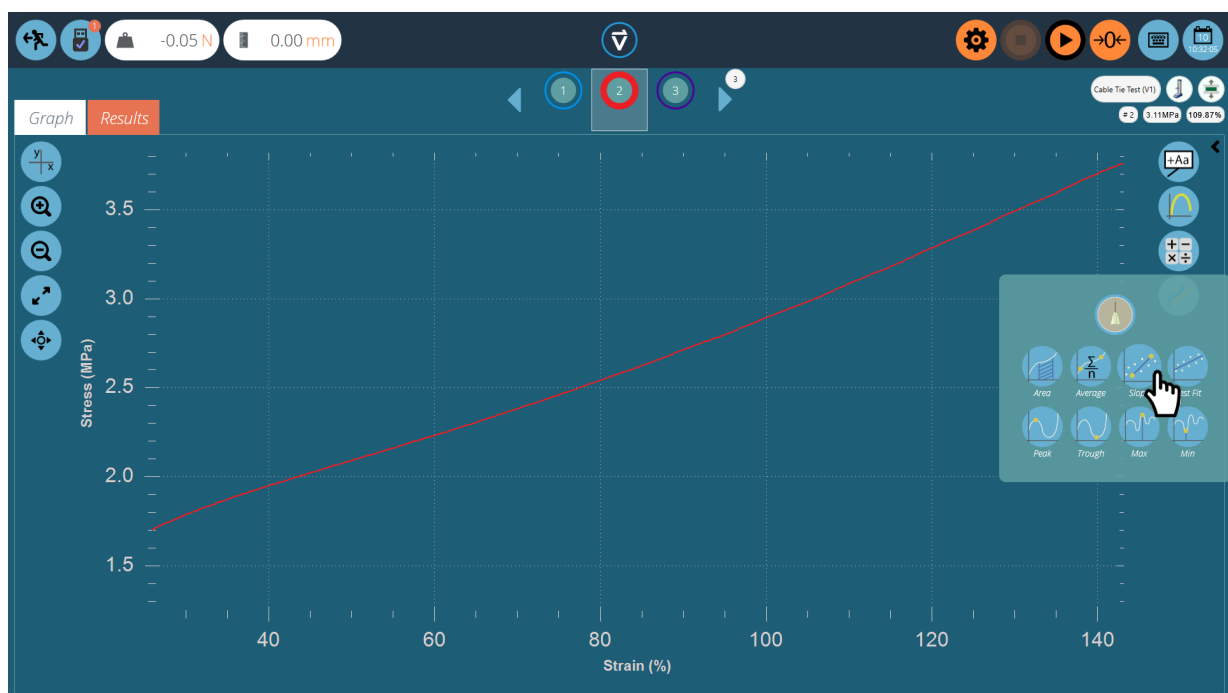


## Settings Boundaries

For certain calculations, such as slope, it is important to set boundary conditions so the calculation is performed on your desired selection of data. For spot calculations, boundaries are set visually. Simply use the mouse (or pinch command if using a touch screen) to zoom to a specific area of the graph, VectorPro will display a box showing the area you are currently selecting. This is pictured in the image below.



This will 'crop' the graph to your desired selection, then select your desired calculation, like in the image below.



Upon clicking on your desired calculation the graph will be loaded complete with the visual reputation of the calculation. This can be seen on the next page.

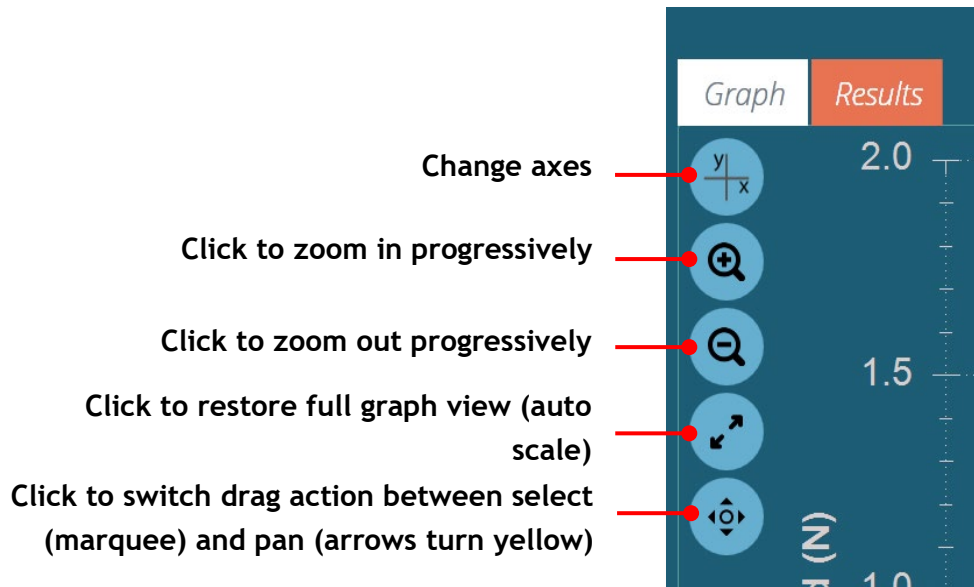


The calculation has now been set with boundaries based on the zoom window previously set.

Once again this can be captured using the graph capture settings and removed by using the 'broom' icon located in the spot calculations menu.

### 11.1.9. Zoom and Examine

Graph characteristics and data points can be examined more closely by zooming in. These are the controls available within VectorPro:

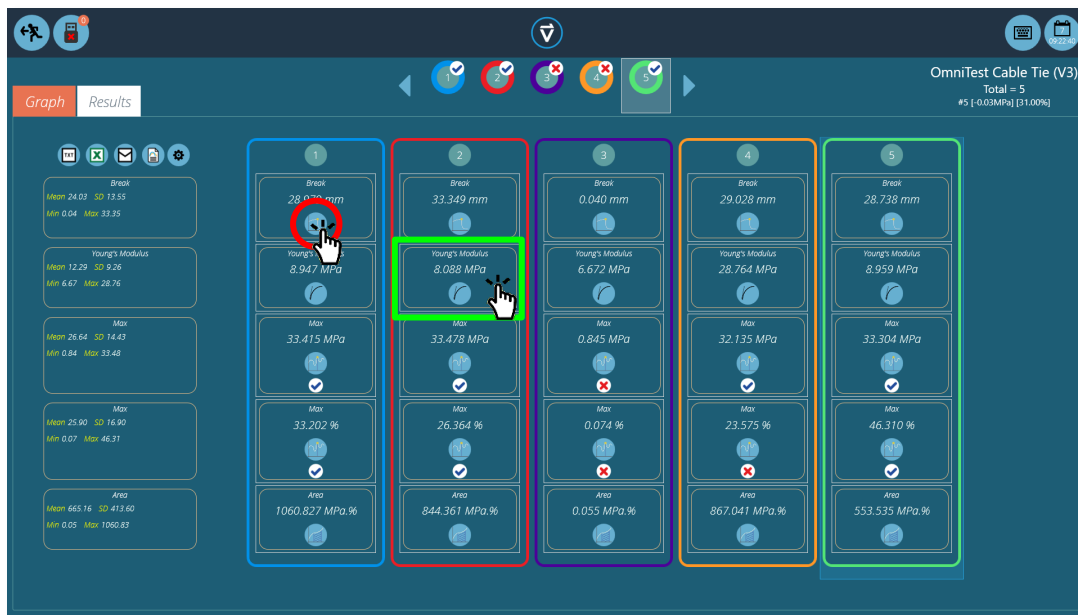


As well as the on-screen controls, you are also able to manipulate the graph using your computers mouse or touch screen (zooming only). These are the supported controls:

- Use the mouse scroll wheel to zoom in or out, this can also be achieved on touch screens by using a pinching motion,
- Hold the left mouse button and drag to crop the graph to a selected area,
- While holding the CTRL key, left click with your mouse and drag to pan across the graph area.

Whenever the cursor is over a sample trace, the data values of its position are shown at the top right of the graph view. See **Section 11.1.3**, for more information.

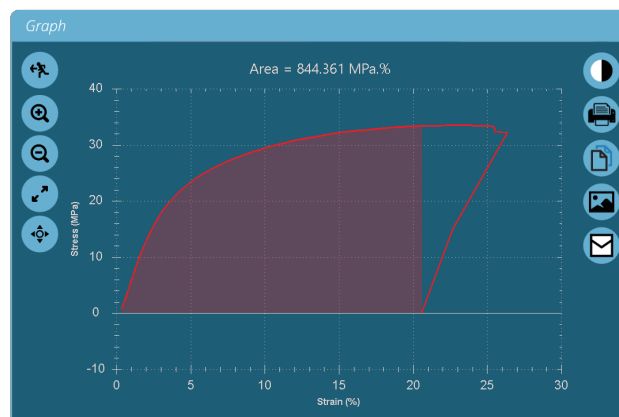
## 11.2. Viewing Results: Calculations Display



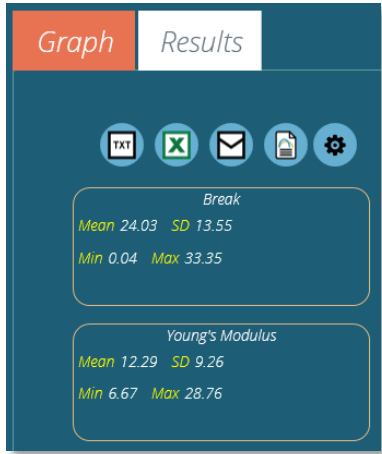
Click the 'Results' tab to see the calculated results screen. In this example, five results are shown where a 'Max' stress and strain calculations have been set up with verification limits. Three samples pass within the max strain limits and two fail (Sample 3 and 4). At the top, the sample selector bar shows that there were two fails overall, as sample four failed on the verification limit for the maximum strain. See **Section 9.6.6** for configuring verification limits.

Clicking the sample selector still provides the same functionality as it did on the graph display screen.

- To edit or adjust a calculation, click on any individual result square (See green box within the image above). This allows you to edit the calculation 'On the fly'. **Note:** This will not be saved unless you click on 'Save' on exit, any calculations that have been adjusted will be marked with an orange '\*' until the test is saved.
- To view the graph of an individual calculation applied to a specific sample, click the calculation picture icon. See the red circle in the picture above.



▲ Graph of an individual calculation, opened by clicking the calculation icon for the



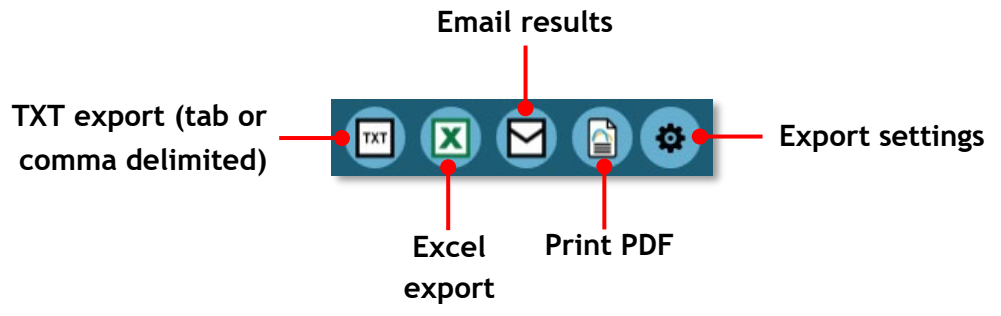
The left-hand column shows basic statistical results for all test samples, here you can see:

- Mean value,
- Standard Deviation\*,
- Minimum and maximum values across the sample range,

\* Standard Deviation (SD) is a sample, not population SD (Variance calculated by dividing by N - 1).

### 11.2.1. Exporting Data and Results

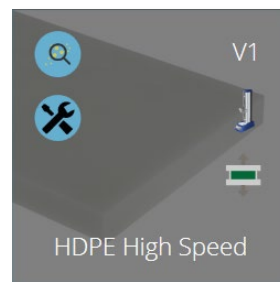
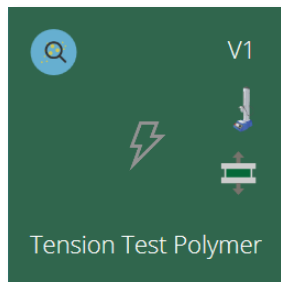
Calculated results and raw data (all data points) can be exported to specific files or printed to reports, using the control bar located at the top left of the screen. The buttons on the control bar perform the following tasks:



For an explanation of these functions, see **Section 13, Reporting and Exporting.**

## 12. Running a Test

When permission is given to a user for a test, a tile for the test will appear in their 'Workspace'. When images are applied as a test attribute, the first one placed in the test shows as the background in the tile:



**No image available, no edit permission**     **Image available, with edit permission**

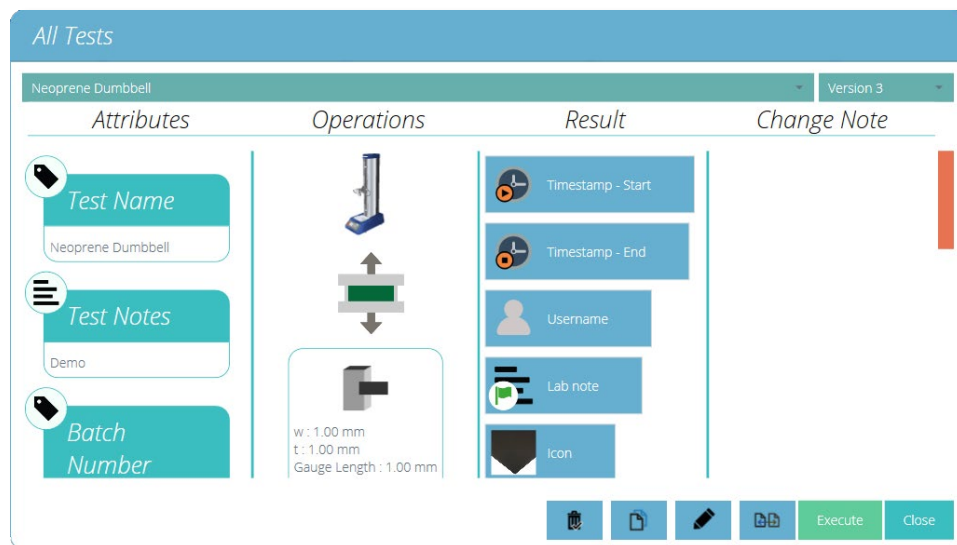
The latest version of a test is displayed top right. The blue buttons enable viewing of results, comparing tests and, where permission to save is given, test editing and copying.

Any test can be found by any user given permission for the 'All Tests' viewer.

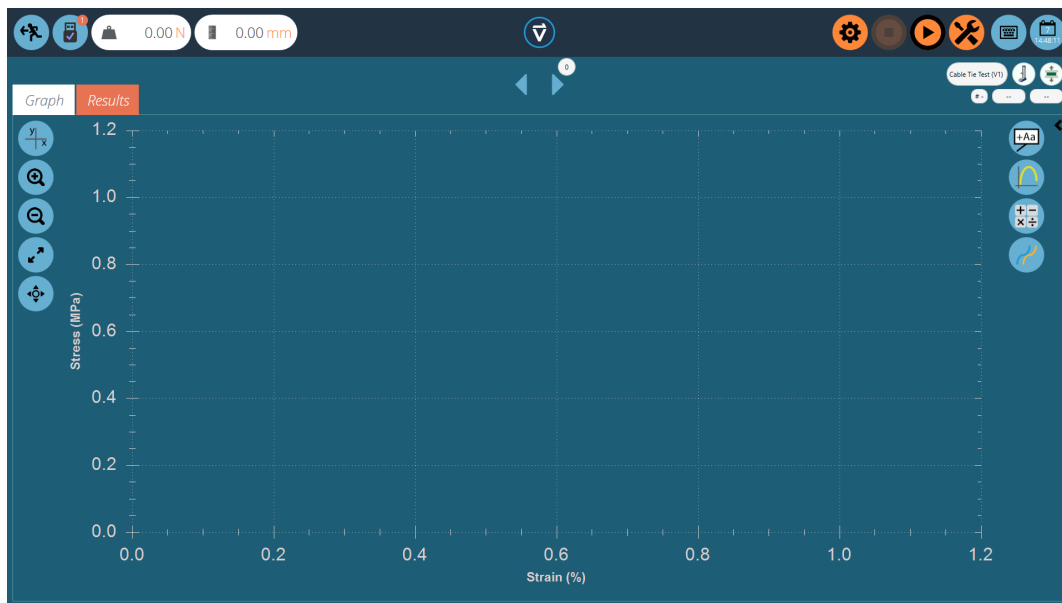
### 12.1. Open a Test

From the individual test icon, the latest version (shown in the icon) is selected. Just click the icon to enter the graph display and be ready to run your selected test.

A test can also be selected from the 'All Tests' viewer using the drop-down list, from here any version of the test can be used:



Click 'Execute' to progress to Graph display for running the test.

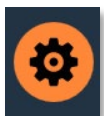


Here the test sequence has been opened and is ready to be executed, basic details such as the test name and version are displayed top right. In this example:

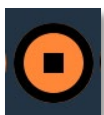
- The load display is not zero and can be reset on either the front panel of the instrument by entering jog mode or by using the tare button at the top of the screen.
- The displacement is not zero and can be tared on the OmniTest system itself or using the same icon button in VectorPro.
- Any of the graph controls can be used before a test, typically you would set the x and y-axis so the live data is plotted on a pre-configured graph. Once the test has started the axis are fixed until the test has finished.

### 12.1.1. Control Bar

The control bar located at the top right of the screen (orange buttons) is used when running a test. Below are definitions for each of the functions within the control bar:



Settings: described below in detail, sets the options for auto-exporting results and/or data at the end of each test.



The stop button ends the test and stops the stand motor. **Important!** This action may leave residual load, which must be removed by using front panel jog controls to ensure the machine is safe.



The play button starts the test. The test system must be in test-ready mode. If not, an alert message is given regarding the stand's status (e.g. in jog mode, displaying a menu).

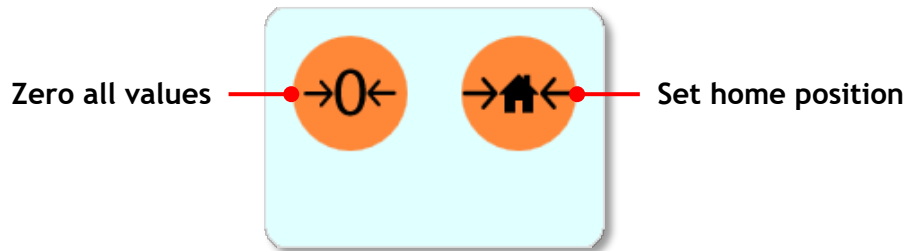


Zero the displacement, load and extensometer value (if fitted) of the test system.



The tools icon opens the test stand zero control panel. Motorised test stands only.

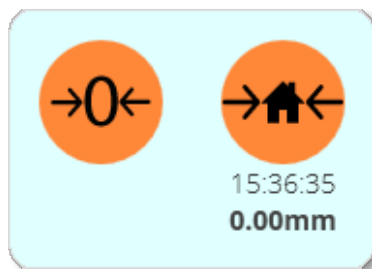
### 12.1.2. Test Stand Zero Control Panel



The test stand's zero control panel appears when pressing the tools icon located in the control bar at the top right of the screen.

Within this panel you have two functions, zero the displacement, load and extensometer (if fitted) or set the home position for the test stand.

Pressing the 'Set home position' button will set the home position at the current displacement and stored the displacement and time below the button (see the image below). This datum point can be used for a loading position when testing, that you can move to by using the home operation or by pressing the home button on the devices front panel at the end of the test.



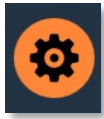
**Important!** When the test stand returns to the home position the displacement is not recalled automatically, if the displacement has been zeroed between setting the home position and returning to home, the displacement from the previous zero position will be shown, although the stand will still be at the set home position.

This function is only compatible with motorised USB test stands.



### 12.1.3. VectorPro™ Lite - Test Triggers

For VectorPro compatible test stands and instruments, it is possible to set triggers that start and end the data capture for the test at a specific load/torque or time set point.



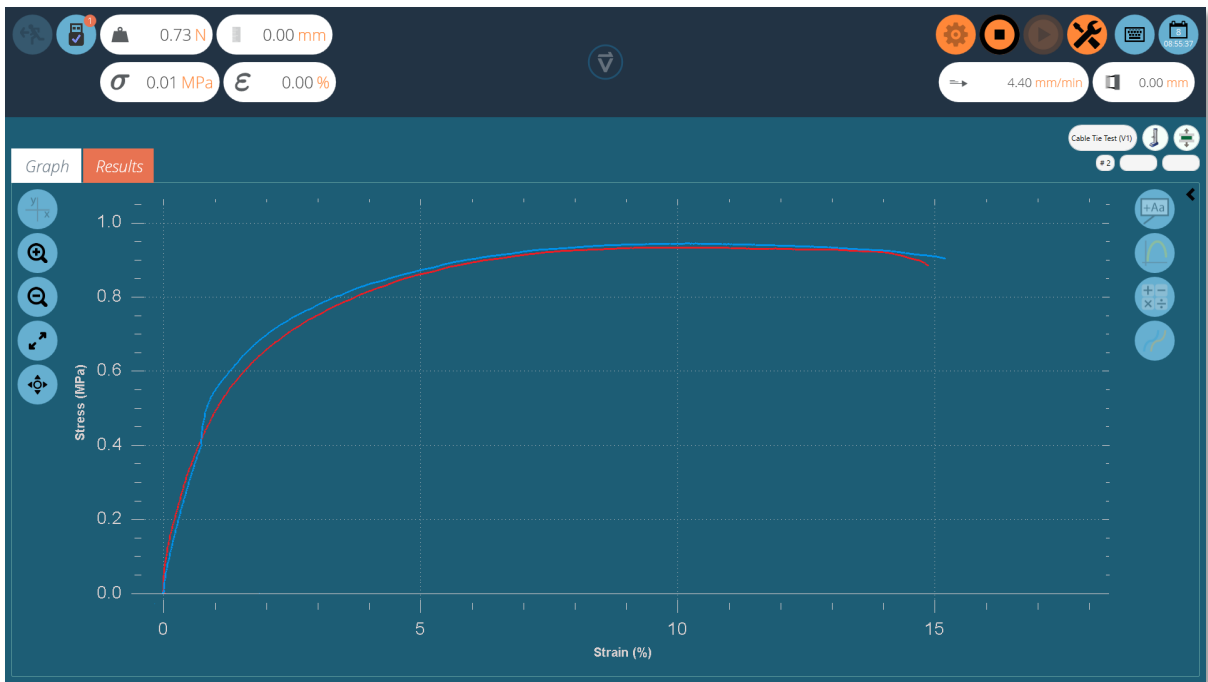
Click on the settings icon (pictured left), the menu shown below will then appear. Here you can set the start triggers, you can use either a time or a load/torque value to start and end the data capture.



In the image above pressing play will start the test operation, data capture will begin once the indicated load is above 5.00N. Once this drops to below 2.00N the data will stop being captured.

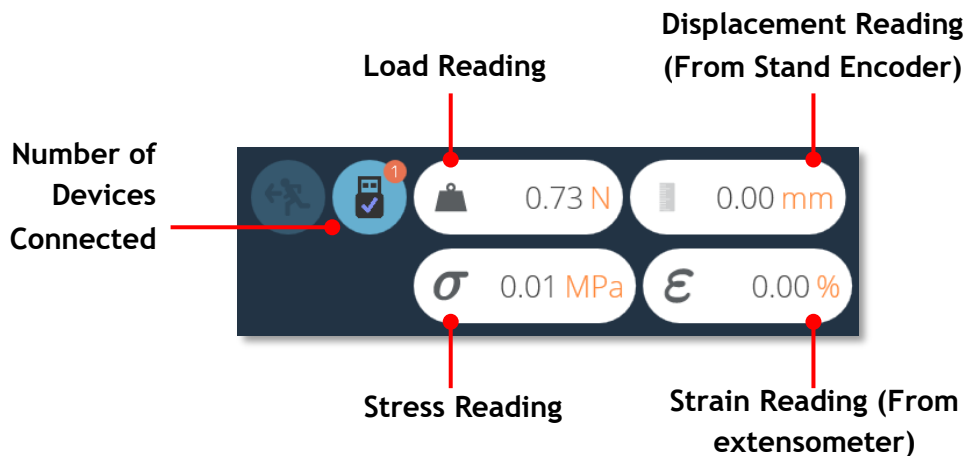
**Note:** Although the test data will stop being captured the operation will continue. To stop an operation at a specific load or torque setpoint an AFG/ AFTI control operation should be used. Please see **Section 9.5** for more information.

### 12.1.4. Live Display Bars



▲ Here you can see an example of a test being run. At this point, two samples have been captured with a third currently being recorded

Within VectorPro there are two main live display bar sections, these are situated in the top right and top left-hand sections of the screen when running a test. These bars display real-time information from the test system and extensometer, giving user's quick reference information during the entire running of a test program. Stress/strain and extensometry readings are only displayed for VectorPro MT compatible test stands.



▲ Left-Hand display section



▲ Right-Hand display section

# 13. Reporting and Exporting

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## 13.1. Exporting

From the Graph or Results view you can export raw data and calculated results to comma or tab separated files or to an Excel workbook. Results can also be emailed as a table or formatted as a PDF report.

Export settings are changed by clicking the 'Settings' icon in the control bar (see **Section 12.1.1, Control bar**), located in the top right of the test run screen or they can be accessed through the export toolbar located in the 'Results' screen, see the image below:



▲ Export toolbar

### TXT

Hitting the 'TXT' export button will generate a results file which contains calculated and statistical data, with the option to export raw data. Choose between a comma or tab delimited format. If 'Raw' is switched on, additional files will also be created for each sample currently selected. The results file name chosen is supplemented by a date and time stamp.

Sample	Min (N)	Max (N)
1	1.95	8.35
2	1.85	8.40

Results file

Time(s)	Load (N)	Displacement (mm)
0,2	0.07	
0.033,2	0.146	

Raw data file

### Excel

A single workbook will be generated with results in the first worksheet. If 'Raw' is enabled a worksheet of all data points for each sample currently selected. The filename chosen is supplemented by a date and time stamp. If 'Overwrite' is enabled, the timestamp in the filename is replaced by the test name. Switch 'Display' to 'On' for the file to open after being created.

**Note:** If 'Display' is switched to 'On' the workbook may open before the data has been exported. Please give time for data to fully export if working with large files, ensure that the excel document is fully populated before closing the workbook.

## Email

Simply enter complete email addresses, separated by semicolons. If left blank VectorPro will simply open a new message, with no recipient, in your default email software.

## Report

This creates a defined report, which can be printed and/or saved as a PDF file (See Section 9.8, for report designing).

### 13.1.1.Export Settings

To configure what types of export you would like to use simply click the relevant tab then 'Enable' that export type. Within each tab, you have a range of options to tailor the export to your requirements.



To export your results in your desired method click on one of the four icons on the left-hand side. This will export the data using your pre-configured settings to a location of your choosing.

**Note:** For export files such as PDFs and Excel documents, appropriate software such as Microsoft Excel and Adobe Acrobat Reader will be required to view these files. This software is not supplied by Mecmesin and is used at the user's discretion.

## Manual Export

The export toolbar is a quick way to perform a manual export, for example at the end of a series of test runs. Simply configure file names, locations and export settings then export the results in your desired format.

## Automatic Export

Automatic export will create files after every test. By default files are incremented and documents aren't overwritten. To avoid accumulating files, set export to 'Overwrite'. Be careful to use folder destinations to distinguish collections of results for different tests, especially when using the overwrite function.

### 13.1.2. File Naming Behaviour

File naming is dependent on the overwrite option. Tab-separated files are exported as .txt files and comma-separated files exported as .csv files.

## TXT with Overwrite

### First Export:

- One file for results: [file name]-[test name](test version).csv,
- Plus (if raw data enabled):
- a file for each sample: [file name]-[test name](test version)-sample-#.csv

### Second Export:

The results file is overwritten, along with any corresponding sample files.

- If more samples have been selected, new files are generated. If fewer, the older files remain.

## TXT with No Overwrite: Time Stamping Makes Results File Unique

### First Export:

- One file for results: [file name]-[test name](test version)-YYYY-MM-DD-hhmmss.csv,
- Plus (if raw data enabled):
- a file for each sample, [file name]-[test name](test version)- sample-#.CSV (no timestamp)

### **Second Export:**

A new time stamped results file is generated, along with any corresponding sample files.

- If more samples have been selected, new files are generated. If fewer, the older files remain.

## **Excel with Overwrite: Test Name and Version Identifies the File**

Please note when exporting raw data to Excel, that the whole workbook may take a few minutes to complete.

### **First Export:**

Generates the file: [file name]-[test name](test version).xlsx. If raw data is enabled a named worksheet for each sample will also be generated. The version number is that of the test in use when the export is made.

### **Second Export:**

Any correspondingly-named file will be reused.

- The Results worksheet will be replaced,
- New raw sample worksheets for previously unrepresented samples inserted,
- Worksheets for samples of the same name will be repopulated,
- Worksheets not represented in the later export will not be affected.

## **Excel with No Overwrite: Time Stamping Makes Results File Unique**

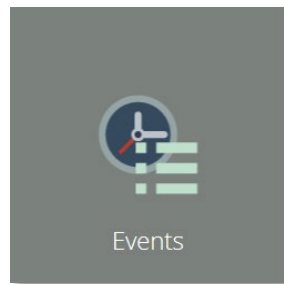
### **First Export:**

- Generates a file: [file name]-yyyymmdd-hhmmss.xlsx, containing a worksheet for results and (if raw data enabled) a worksheet for each sample.

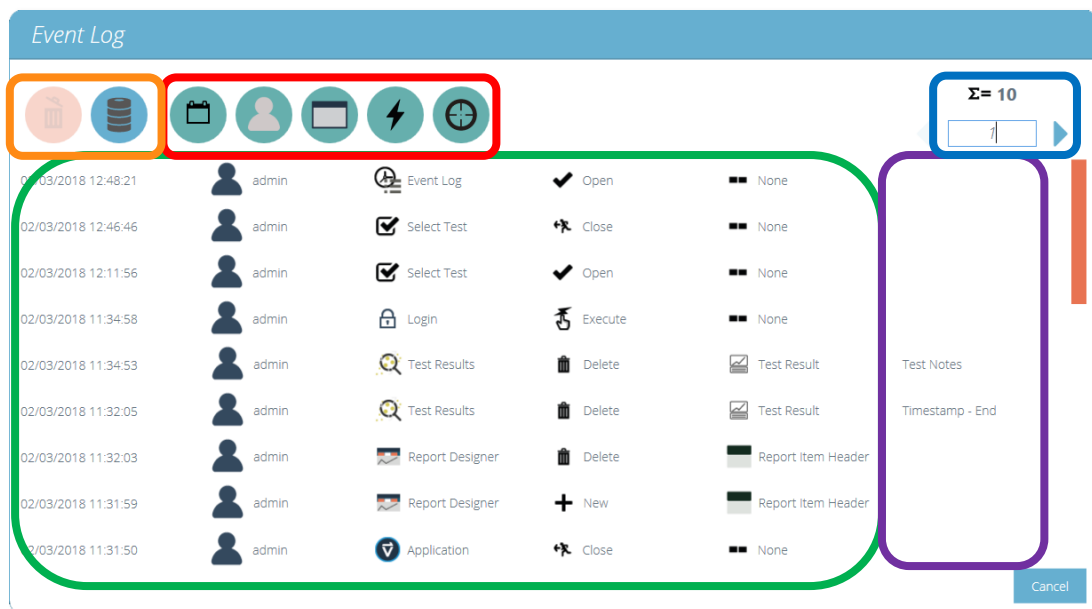
### **Second Export:**

- A whole new [filename]-[timestamp].xlsx is generated as if it were a first execution.

## 14. Event Log



To access the event log simply click on the 'Events' icon located in the main workspace, provided the currently active user has sufficient permissions to view the event log.



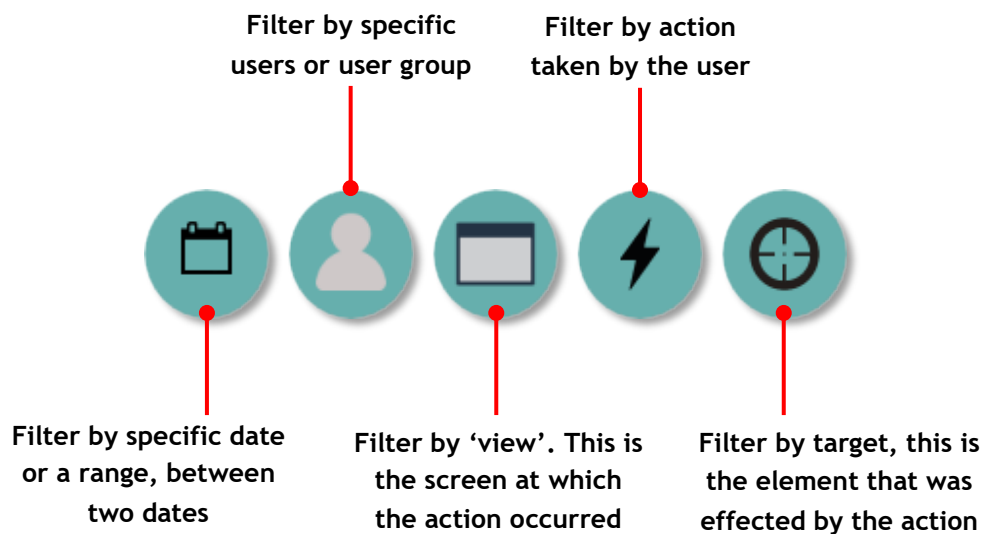
The event log is used to track user activity, here you can see what actions have been carried out, by who and when this event happened. The event log screen consists of these sections:

- **Event log:** Highlighted in green, this section shows a log of events within VectorPro. Here all actions are recorded by all users. This enables complete transparency when tracking user activity within the system.
- **Search filters:** Highlighted in red, these filters are used to display only logs relating to what you wish to see. See the next section for definitions of each filter.
- **Page control:** Highlighted in blue, this section displays the total number of event log pages available to view. The number entry field below can be used to 'jump' to a specific page by typing the number and pressing the arrow button to navigate to the page.

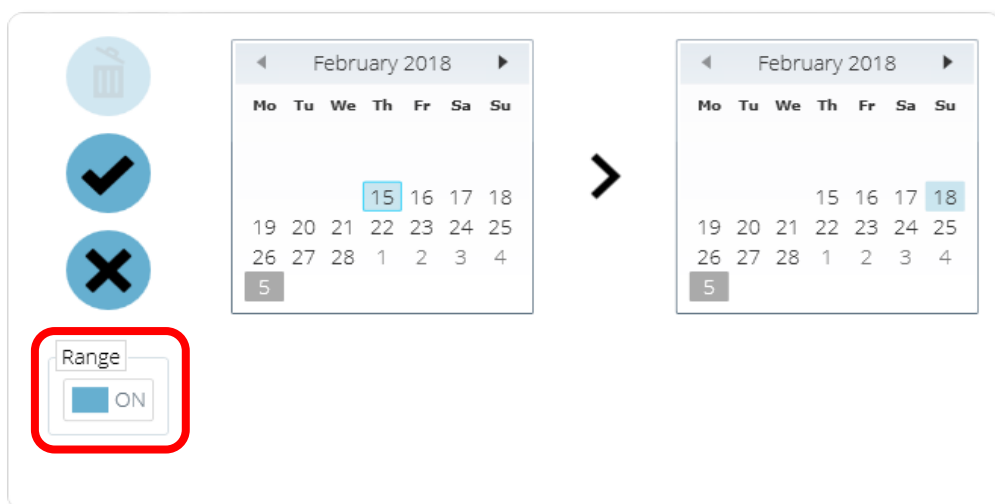
- **Event log controls:** Highlighted in orange, the left ‘trash’ icon is used to clear filters while the right icon is used to load archived event logs.
- **Additional Info:** Highlighted in purple, this displayed any additional information such as text entered by the user.

## 14.1. Search Filter Definitions

You can restrict your results using the search filters located at the top of the window. The function of these filters is detailed below.



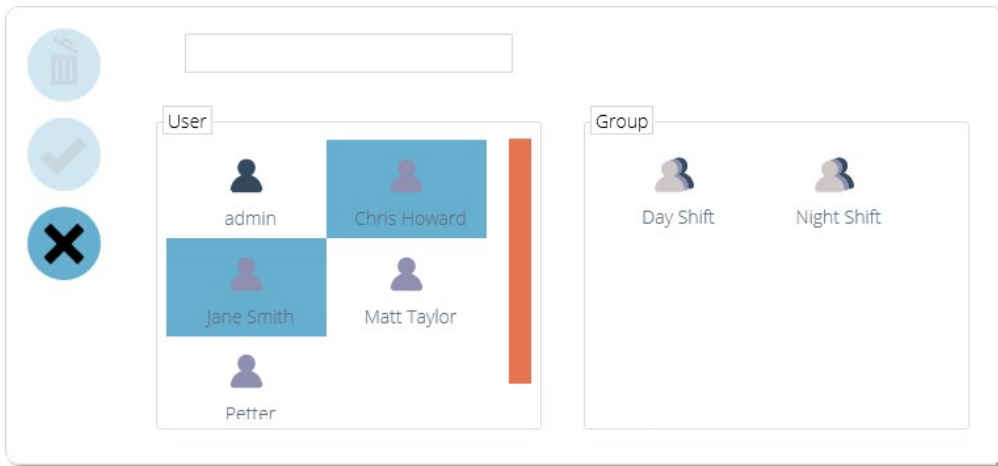
### 14.1.1. Filter by Date Range



To filter results to display information only between a specific date range click the filter by date icon and click the ‘Range’ toggle switch highlighted in red. To clear any date filters click the ‘trash’ icon located in the top-left of the window. To confirm your selection, click the ‘Tick’ icon and to cancel it click the ‘Cross’ icon.

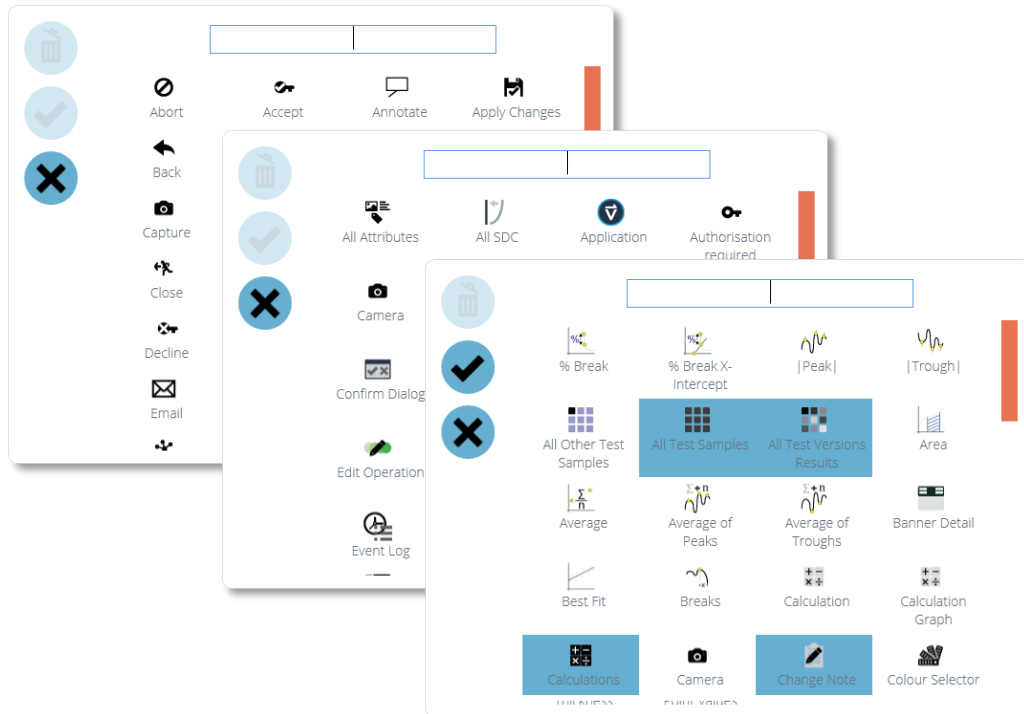


### 14.1.2. Filter by User



You can filter the displayed results by which user was responsible for the event. It is also possible to select multiple users by clicking on their icon located in the left-hand 'User' section. You can select a group by clicking on a group in the right-hand plane. To clear the filter click the 'trash' icon located in the top-left of the window. Click the 'Tick' icon to confirm your selection and the 'Cross' to cancel. Please note, you cannot select a group and a user at the same time.

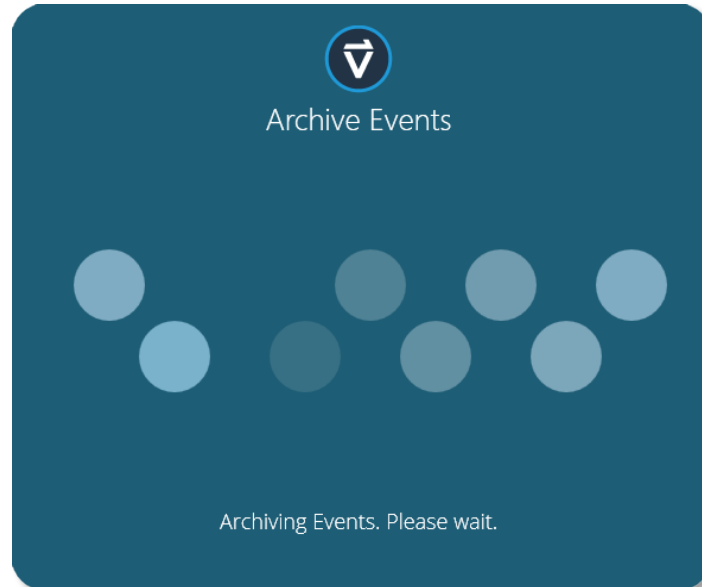
### 14.1.3. Filter by View, Action and Target



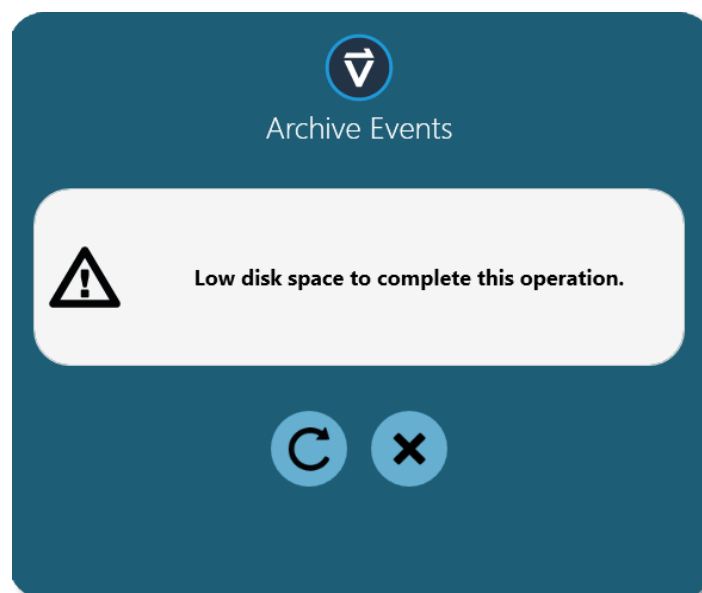
The three windows for filtering by view, action and target follow the same design. Simply select the elements you wish to filter and click the 'tick' icon. The 'Cross' cancels your selection and the 'trash' icon is used to remove any filters.

## 14.2. Event Log Archiving

After a period of 1 year has passed from the creation of the event log it will be archived, upon entering the software you will be presented with the following window.



To successfully archive the event log approximately 10GB of minimum space is required, although in practice a much smaller amount is used, VectorPro should not be used if you have less than this figure free on your hard drive. If you do not have sufficient space available you will be presented with the following error.

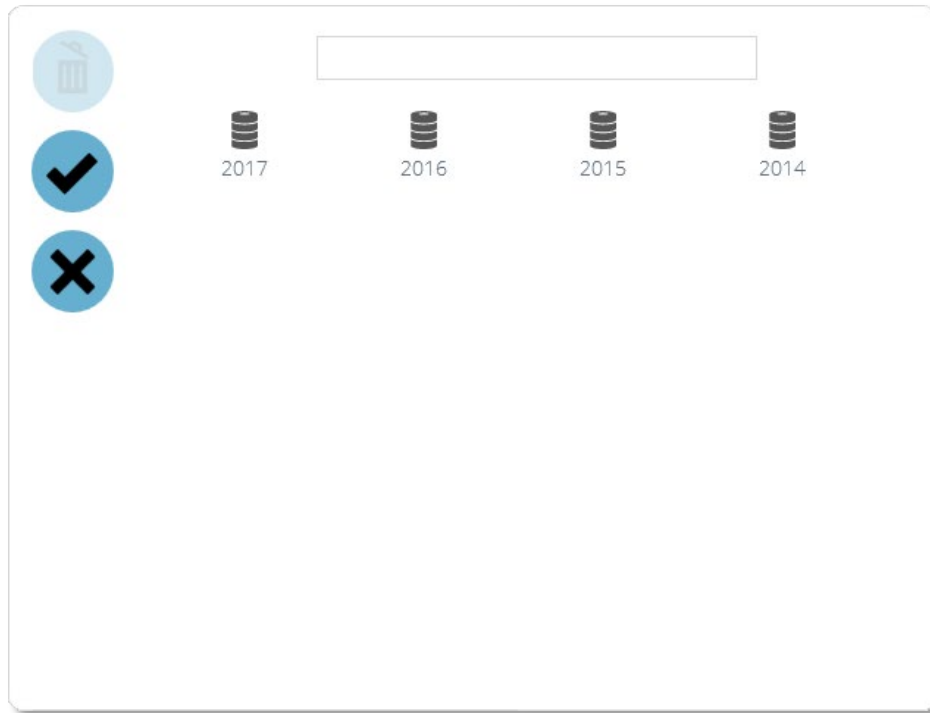


To successfully archive your event log you will be required to clear files on your hard drive until there is sufficient space free to complete the archiving process.

### 14.3. Accessing Archived Event Logs



To access old archives simply click the load event log icon, pictured left. From here you will be presented with the screen below. This is where you can view and load previous archived event logs. VectorPro is able to store numerous event log archives ensuring you always have this valuable data to hand.



Here you can see there are archived event logs for 4 years ranging from 2014-2017. To load a previous event log simply click on the desired archive and click the 'Tick' icon. To unload an archived event log from your current view click the 'trash' icon, the currently active event log will then be loaded in its place. To close the window click the 'Cross' icon.

**Note:** You can refine the results using the search plane located above the window.

# 15. SDC - System Deflection Compensation

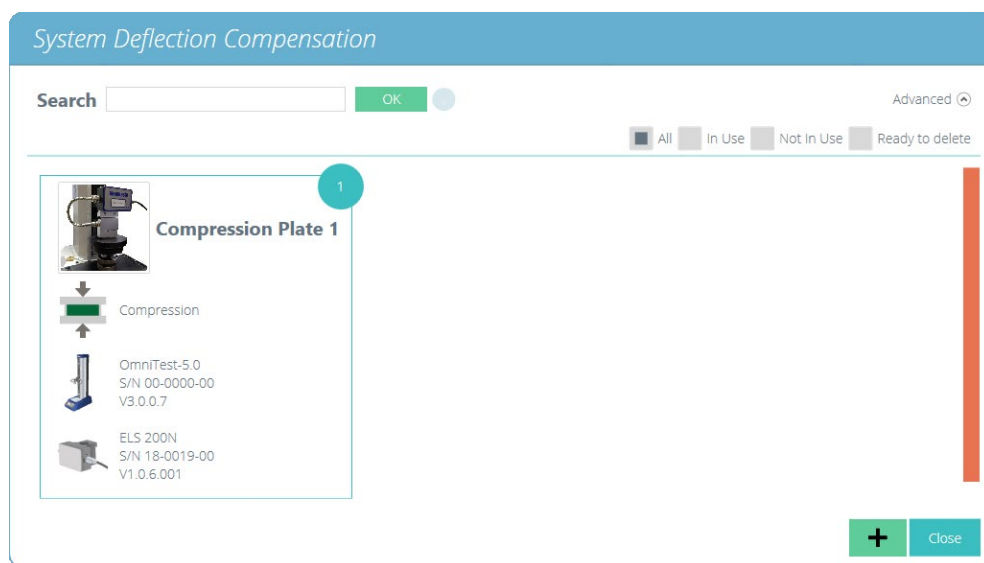


Under high loads, a very small element of measured displacement may be due to deflection within the system (test stand, loadcell and fixtures) rather than in the sample under test. The given displacement to create a force may, therefore, be slightly over-indicated. This system deflection can be measured and compensated for. It can be important where deflection in the sample is similar in magnitude to that in the system, and where very accurate readings are required. SDC is primarily used in top-load testing but can be used in tensile tests (typically where extensometers aren't being used).

Within VectorPro the test procedure consists of a preload stage, then a run to 90% of the SDC target to exercise the system (not plotted) and then the second run to 95% of the target load (plotted). This final run is saved and is used to determine the deflection compensation. SDC settings are saved in profiles, these can be created, viewed and deleted within the SDC viewer.

## 15.1. SDC Viewer

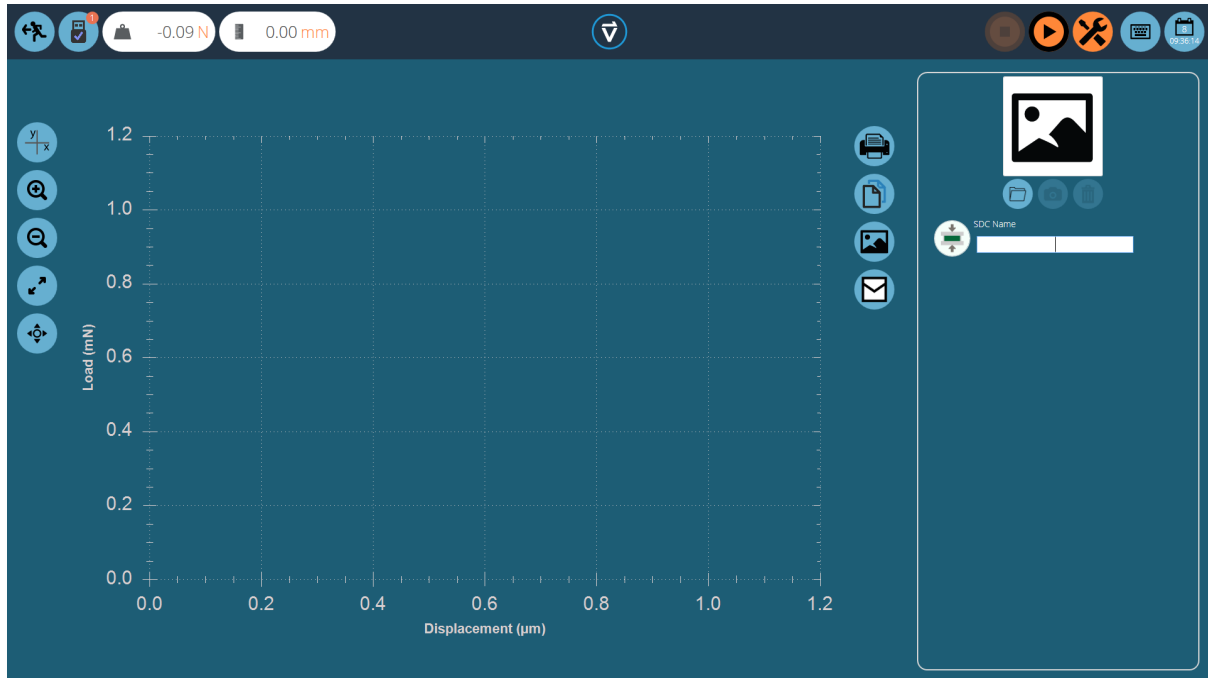
This is accessed by clicking on the SDC tile pictured at the top of this page. Within this window, you can search for specific SDC profiles, filter what is currently shown on screen to limit (using the checkboxes in the top right corner).



## 15.2. Creating a New SDC Profile



Clicking the 'Plus' icon opens the 'New SDC' window, simply select your current test stand and then your test type (compression or tension) to continue.



Within the SDC testing screen you have two main sections that are used to monitor and configure your SDC profile:

- **Graphic display:** This will display a real-time plot of the final SDC run. The graph can be exported as an email file or printed.
- **SDC settings panel:** The settings panel is located on the right-hand side of the screen, initial options are to name the test and load an image that will serve as the icon for this SDC profile.

### 15.2.1.SDC Profile Image

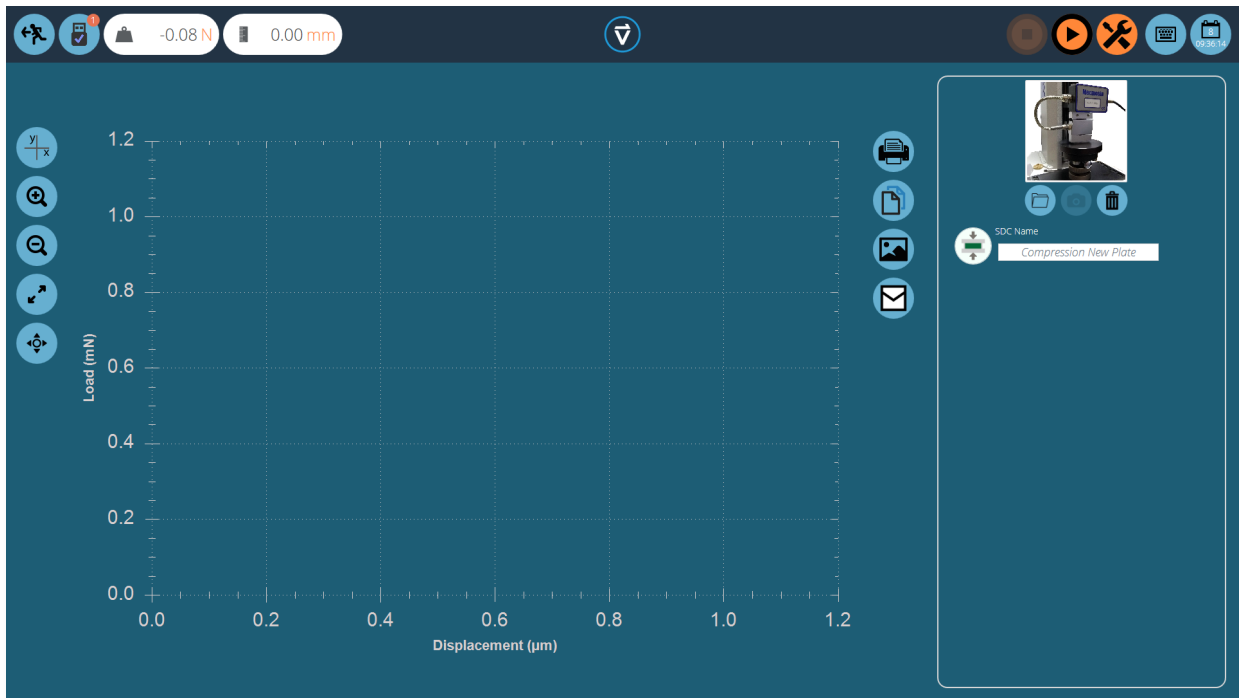
Custom images can be loaded to serve as the icon for the selected SDC profile, this enables easy visual recognition of grips and fixture setups through the icon of the profile. It is recommended that your picture clearly shows:

- The load cell used,
- The grip being used,
- Any addition fixtures,
- Test stand (if using multiple test stands),



To load an image select the folder icon and browse to your desired image using the explorer window. Users with webcams can press the camera icon to take an image. To clear a selected image press the trash icon.

### 15.3. Performing an SDC Test



Attach the required stand accessories (grips, plate and probe) without a sample. For force stands requiring compensation corrections in the compression direction, place the compression plate or probe very close to the anvil.

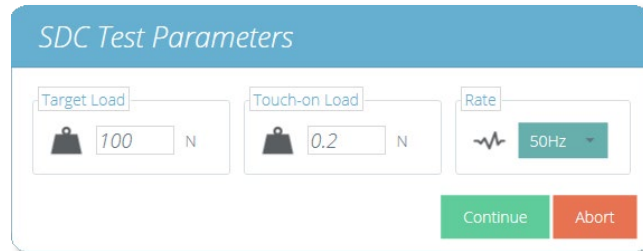
For tests in tension use a component with a high tensile strength in place of your sample, it is important that the sample exhibits no deflection during the SDC test.

Once you have loaded a suitable image and named your SDC profile, ensure the test system is ready to run, ideally minimal movement should be needed for the stand to test the system in either compression or tension.

### 15.3.1.SDC Test Sequence

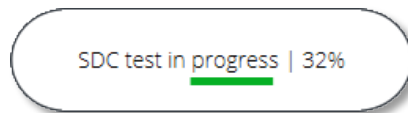
#### Step 1

First, use the tare command, located in the top right header bar, to zero the displacement and load values, then press the play command to continue.



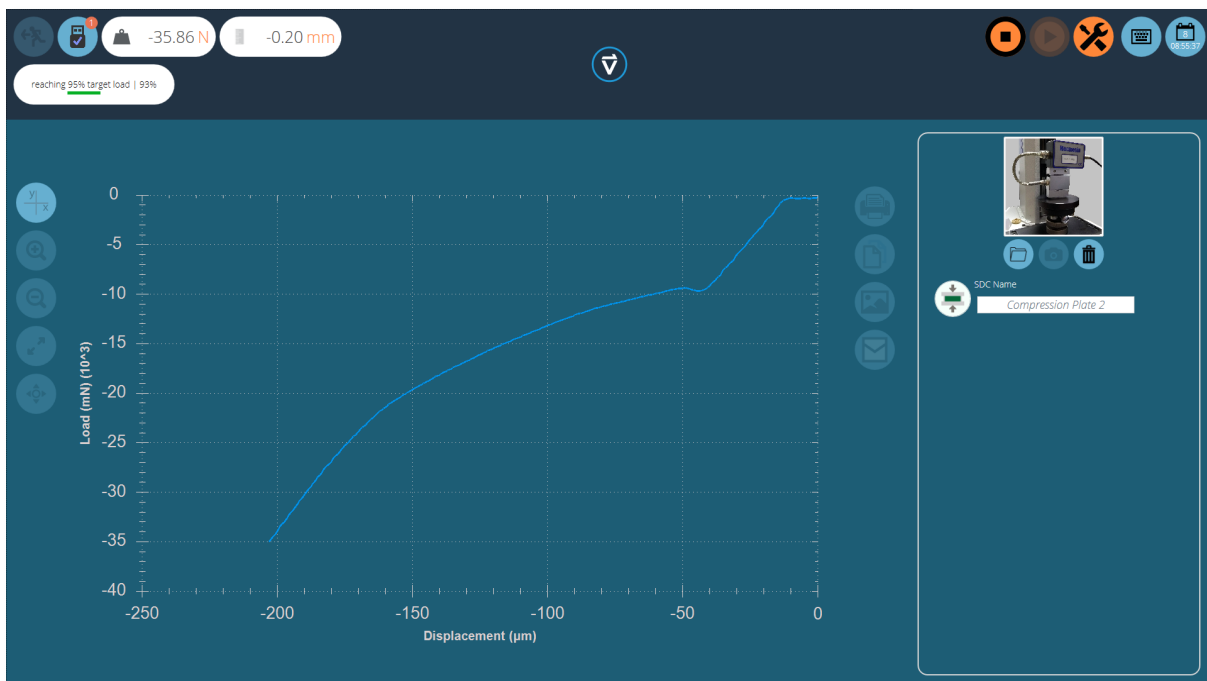
#### Step 2

The test parameter window, pictured above, will appear on the screen. Enter a suitable Touch-on Load and your desired target load. The data rate for the test can also be configured using the drop-down box on the right-hand side of the window. Once ready press continue.



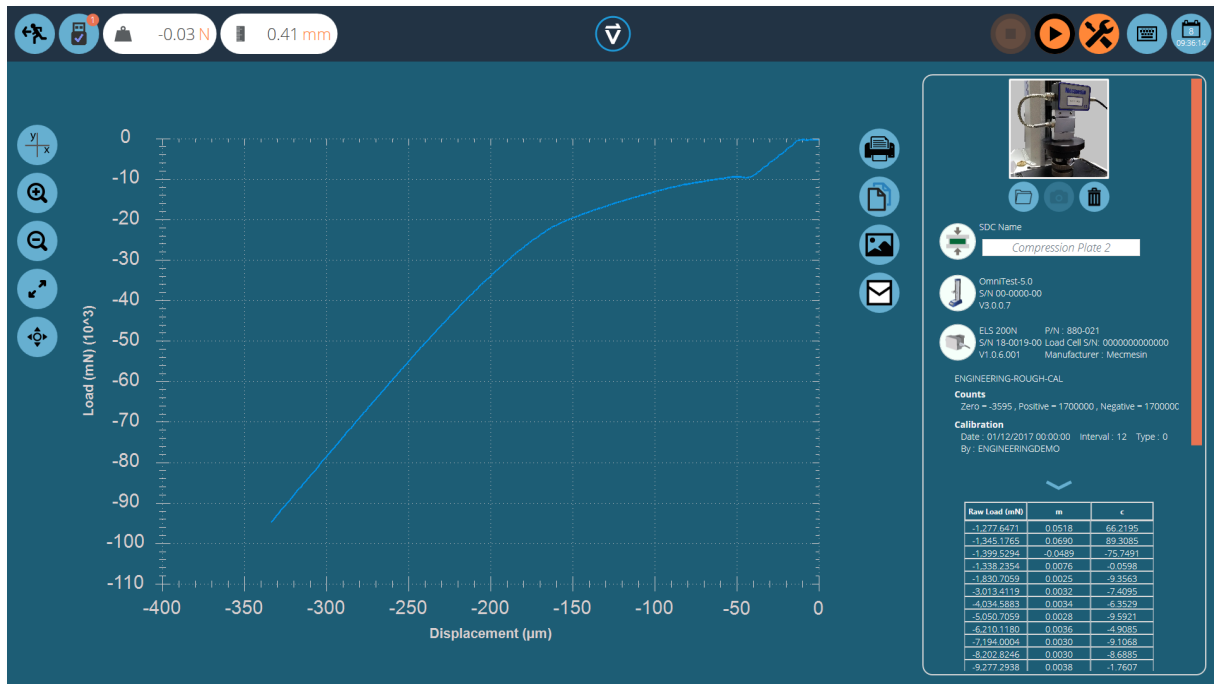
#### Step 3

The test will now begin, the initial two stages (pre-load phase and 90% run) are not captured. Test status is indicated by the progress bar located in the upper left corner (pictured above).



## Step 4

During the final 95% run the data will be captured, the image below shows a curve for a MultiTest- $dV(u)$  being run in compression. Values are captured in mN and  $\mu\text{m}$ .



## Step 5

Once the test is completed the graph will be shown in the main display area and the test details are stored in the right-hand plane.



## 15.4. SDC Test Information Panel

The right-hand plane stores the test results as well as test stand and ELS information. The diagram below explains what each of the sections represents.

The diagram shows a screenshot of the SDC Test Information Panel with several callouts pointing to specific features:

- SDC profile Image**: Points to the top image of the test stand.
- Image controls**: Points to the folder, camera, and trash icons below the image.
- SDC direction icon**: Points to the icon with a green bar and arrows, indicating the test direction.
- Test stand information: Stand type, serial number and firmware version**: Points to the 'OmniTest-5.0' section.
- ELS information: Capacity, part number, serial number and firmware version**: Points to the 'ELS 200N' section.
- ELS calibration information. Here you can see the raw calibration information, date of calibration and who calibrated the device**: Points to the 'Calibration' section.
- Raw SDC test results**: Points to the table of test results.

**SDC Name**: Compression Plate 2

**OmniTest-5.0**  
S/N 00-0000-00  
V3.0.0.7

**ELS 200N**      P/N : 880-021  
S/N 18-0019-00      Load Cell S/N: 0000000000000  
V1.0.6.001      Manufacturer : Mecmesin

ENGINEERING-CAL

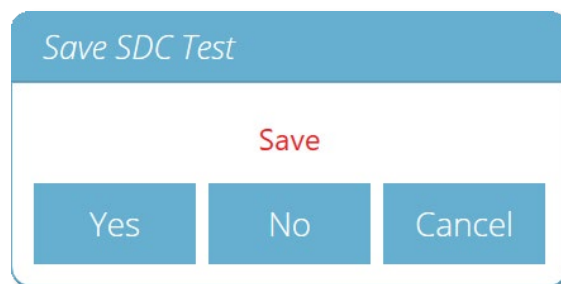
**Counts**  
Zero = -3595 , Positive = 1700000 , Negative = 1700000

**Calibration**  
Date : 01/12/2017 00:00:00      Interval : 12      Type : 0  
By : ENGINEERINGDEMO

Raw Load (mN)	m	c
-1.277.6471	0.0518	66.2195
-1.345.1765	0.0690	89.3085
-1.399.5294	-0.0489	-75.7491
-1.338.2354	0.0076	-0.0598
-1.830.7059	0.0025	-9.3563
-3.013.4119	0.0032	-7.4095
-4.034.5883	0.0034	-6.3529
-5.050.7059	0.0028	-9.5921
-6.210.1180	0.0036	-4.9085
-7.194.0004	0.0030	-9.1068
-8.202.8246	0.0030	-8.6885
-9.277.2938	0.0038	-1.7607

## 15.5. Saving SDC Results

To save your SDC results simply press the back button located at the top of the screen and then click the 'Yes' button in the 'Save SDC Test' window.



## 15.6. Loading SDC Profiles

SDC profiles are loaded for each individual test rather than as a global profile. SDC profiles can be loaded via the settings menu on the 'Operations' tab of the test designer screen.

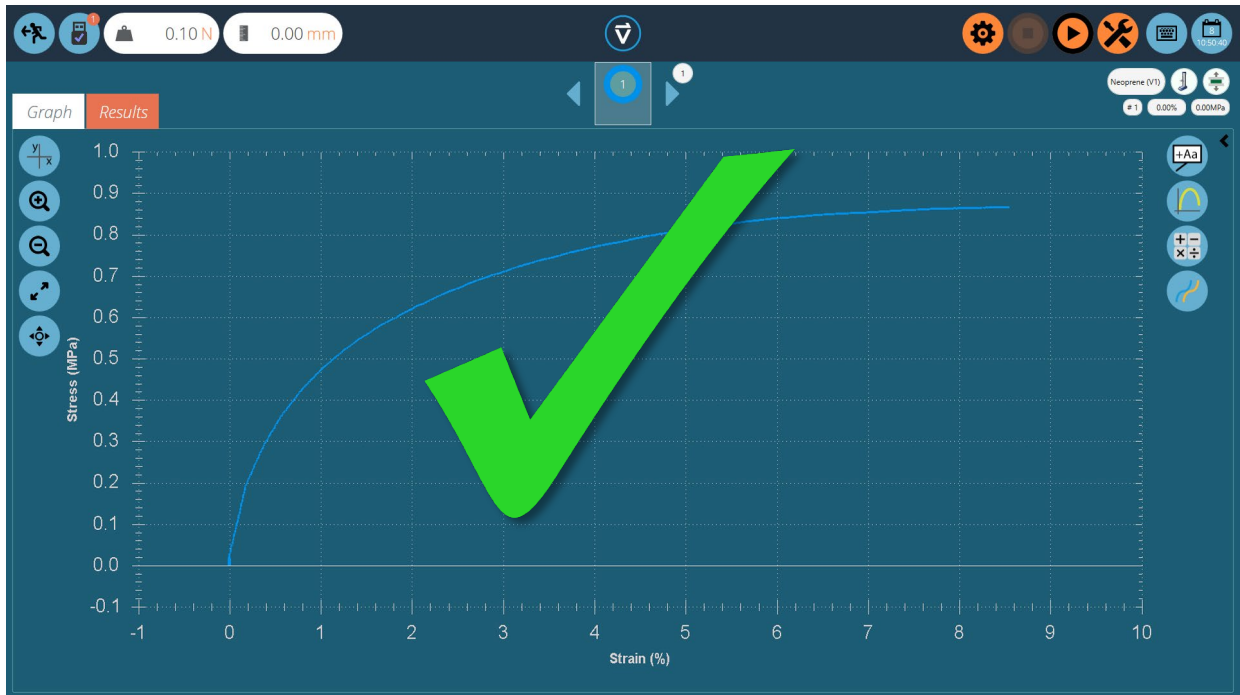


Simply click the folder icon then load your select profile. See **Section 9.4.4** for more information

## 16. Ready to Run

Congratulations on navigating this manual you are now ready to run your first tests!

If however you have any further questions or require further information, please contact your local Mecmesin agent for further support!



## 17. Change Log

---

### 17.1. New Features Patch Release - 5.1.8.0

- N/A.

### 17.2. Bug Fixes Patch Release - 5.1.8.0

- Fixed database upgrade issue.

### 17.3. New Features Patch Release - 5.1.7.0

- New operation 'Pause - Input Grip Separation',
- Operation timeline now supports non-HD displays.

### 17.4. Bug Fixes Patch Release - 5.1.7.0

- Fixed Dutch translation issue,
- Fixed database upgrade issue.

### 17.5. New Features Patch Release - 5.1.6.0

- OmniTest-7.5 implemented,
- Percentage drop box in peak and trough calculations changed to allow users to input their own number.

### 17.6. Bug Fixes Patch Release - 5.1.6.0

- Fixed issue affecting some patch versions of VectorPro where the software license would time out after 30 days.

### 17.7. New Features Patch Release - 5.1.5.0

- New formula feature implemented.

## **17.8. Bug Fixes Patch Release - 5.1.5.0**

- N/A.

## **17.9. New Features Patch Release - 5.1.4.0**

- N/A.

## **17.10. Bug Fixes Patch Release - 5.1.4.0**

- When a test is in a paused state, VectorPro failed to load the pause message and crashed due to a single display (monitor) being connected.

## **17.11. New Features Patch Release - 5.1.3.0**

- Added support for "pause operation" and "pause operation remove extensometer",
- Add database upgrade for new operations,
- Add Log event for display Pause Message.

## **17.12. New Features Patch Release - 5.1.2.0**

- Add the unique rule in the timeline for compression load rate break and tension load rate break operations.

## **17.13. Bug Fixes Patch Release - 5.1.2.0**

- Fixed bug where VectorPro expired UI was not refactored and the "switch monitors" section is visible,
- Fixed bug whereby insufficient decimal places are shown when attempting to report test,
- Fixed bug where pass/fail thresholds appear to operate incorrectly,
- Fix bug comparing database version incorrectly.

## 17.14. New Features Patch Release - 5.1.1.0

- Added "compress until break at constant load rate" operation to the "3 point bend" test type,
- Added the test name when exporting test results to text format,
- Export folder location is now permanent,
- Added new "difference (delta)" option in our existing "Value @ Operation" calculation,
- Added new "set home position" button,
- Updated VectorPro help manual,
- Updated French translation.

## 17.15. Bug Fixes Patch Release - 5.1.1.0

- Fixed bug where VectorPro would crash when adding break operation to the timeline in a 3 point bend test type,
- Fixed bug where VectorPro would crash with database path containing any accented characters,
- Fixed bug where VectorPro would crash creating an SDC test without any compatible stand,
- Fixed bug where VectorPro would crash when switching between force gauges and torque gauges,
- Fixed UI bugs.

## 17.16. New Features Official Release - 5.1.0.0

- New language translations,
- New user manual,
- UI enhancements with sample list,
- Added model image & test type on each workspace test tile item,
- Added new "tools" popup to contain "compare", "edit", & "copy" test for each test tile item,
- The jog wheel flashes to indicate when function buttons are pressed in VectorPro,
- Added support in the event log for MultiTest- $dV(u)$  test stands,
- Added support for MultiTest- $dV(u)$  test stands and switching back/forth to MultiTest- $dV$ ,
- Support for switching between multiple monitors,
- System deflection compensation (SDC) implementation,
- New calculation - "Value @ Operation".

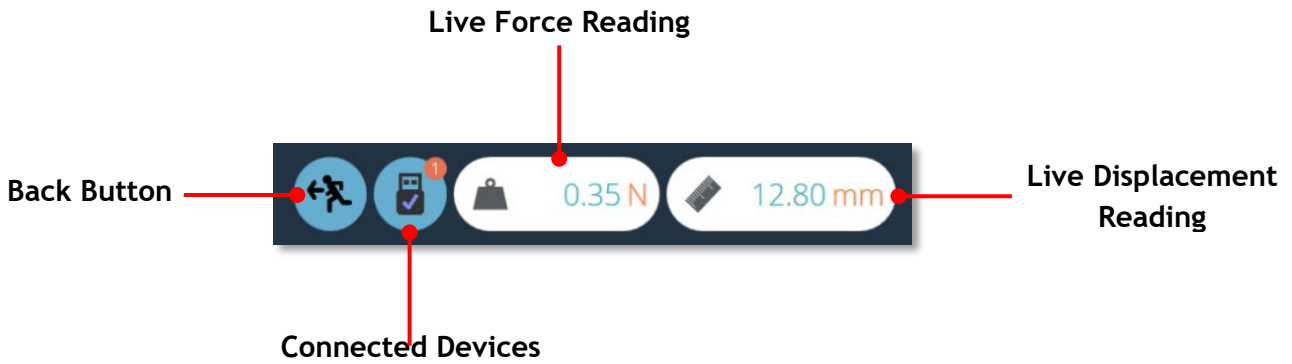
## 17.17. Bug Fixes Patch Release - 5.1.0.0

- Fixed legacy gauges crashing bug,
- Fixed test tiles being cut off when using portable gauges,
- Fixed ELS information being incorrectly reported,
- Numerous minor bug fixes and stability improvements.

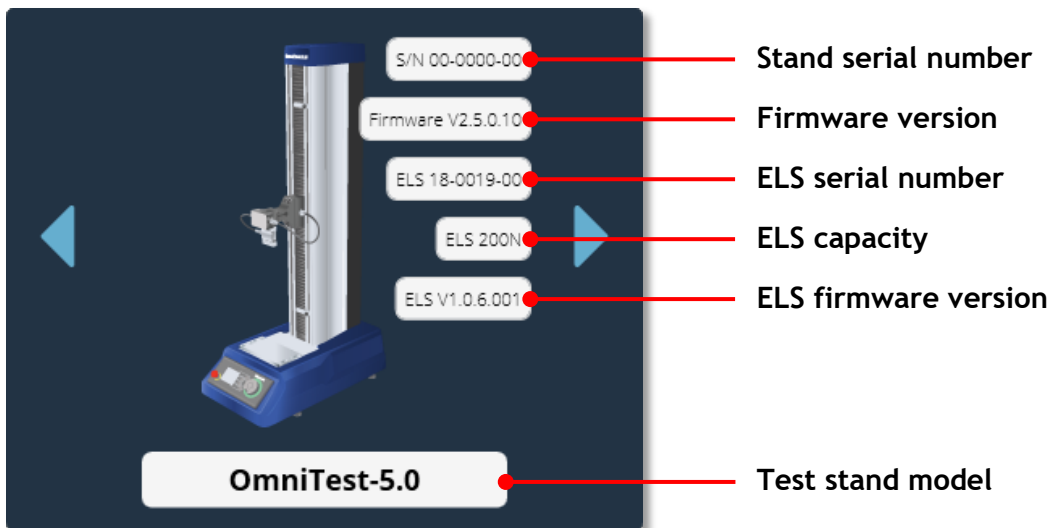
**Note:** For firmware updates and bug fixes please see your test stand's corresponding manual.

# 18. Quick Icon Reference

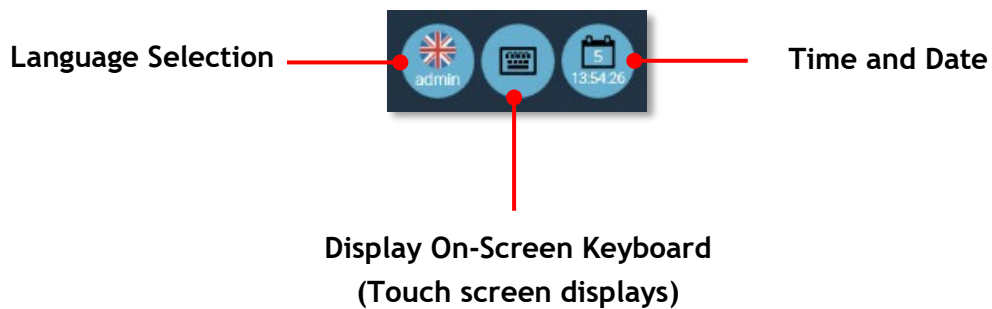
## VectorPro™ Header Bar Features: 25



## VectorPro™ Header Bar Features: 25

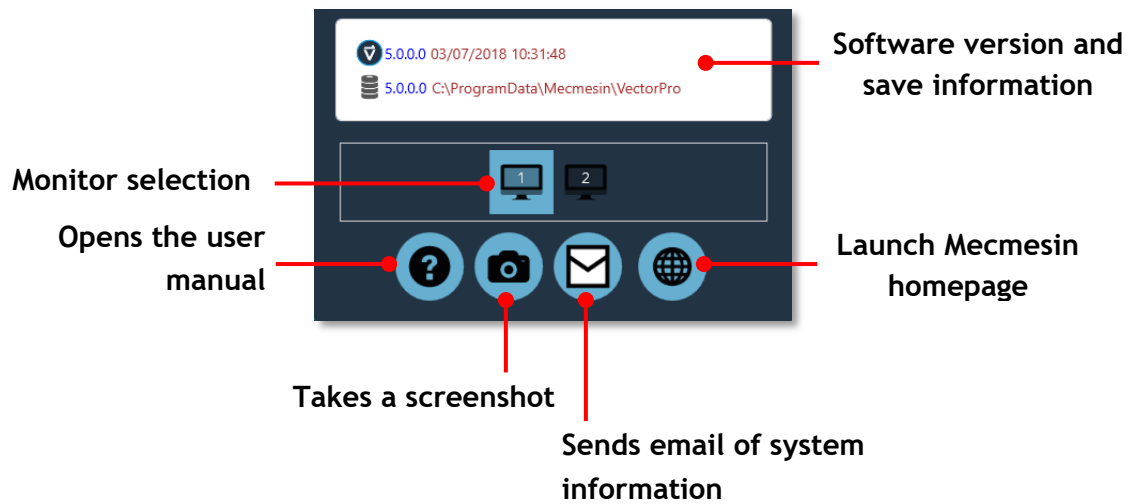


## VectorPro™ Header Bar Features: 26

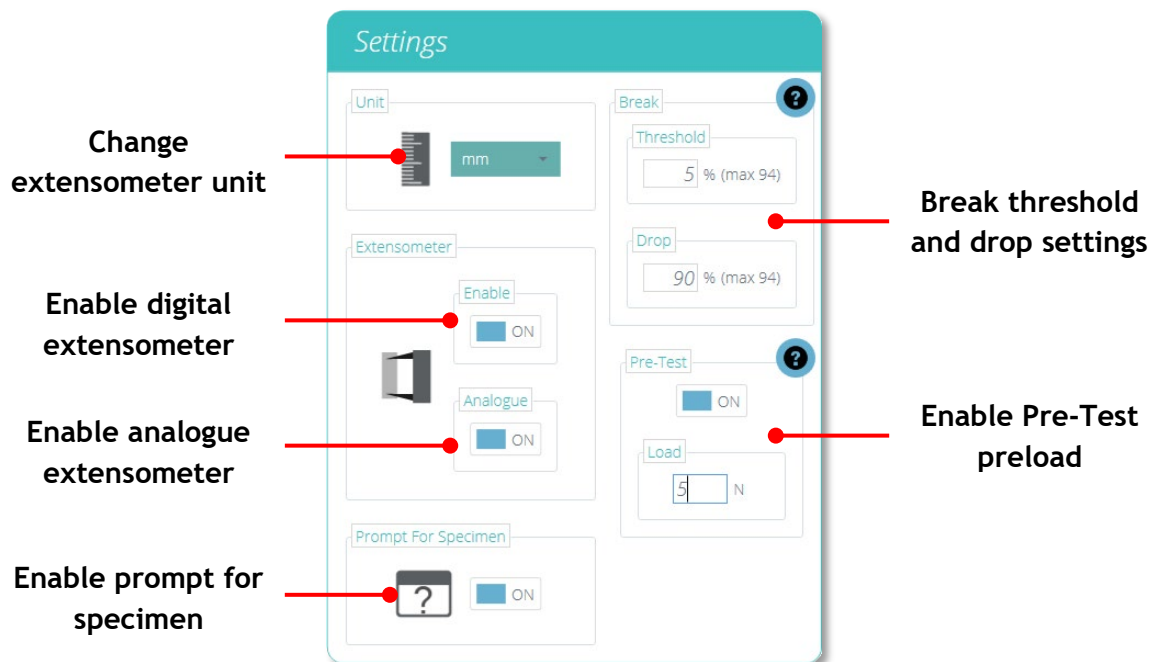




## VectorPro™ Header Bar Features: 26



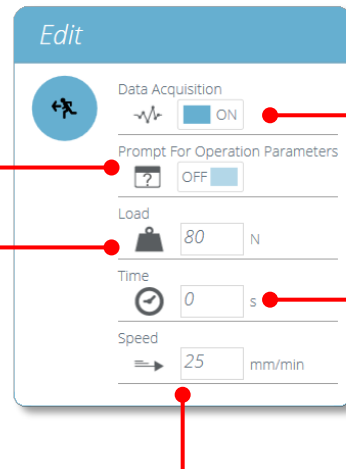
## Specimen Settings: 4646



## VectorPro™ MT - Editing an Operation's Settings: See Page 65

Enabling this setting will mean the operation will request parameters before the test starts

This is the target value. In this instance 'Load' is the target for operation to move to

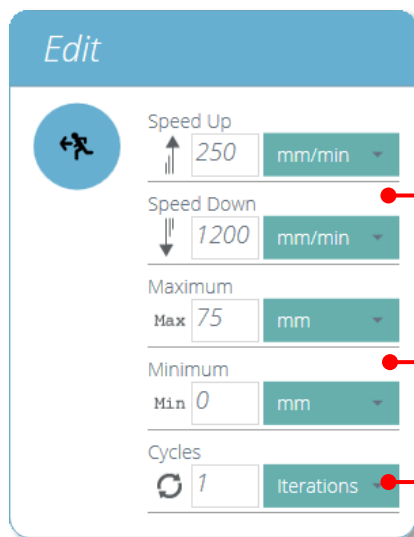


This changes whether or not data will be captured during this operation

Select how long the test should hold for at the end of the operation stage

This is a control value. In this instance 'Speed' is the value used to control how the operation gets to the target value

## VectorPro™ Lite - Editing an Operation's Settings: 65



These are the speed settings for the up and down movements.

This is the minimum and maximum target displacements.

This is the minimum and maximum target displacements.

## Standard Calculations: See Page 65/77

**Name:** Edit the display name for the calculation

**Axes:** Select the axes for the calculation

**Decimal Places:** configurable from 1 to 9

**Range:** Define the boundaries for the calculation

**Verify:** Enable to set a Pass/Fail boundaries for the calculation

**Result:** Is used to give an alternate result at the calculated point. For example, this calculation has been setup to find break using 'Stress vs Strain' but will give the 'Result' as 'Strain'.

## Report Configuration: See Page 95

**Save and exit**

**Print report**

**Save as PDF**

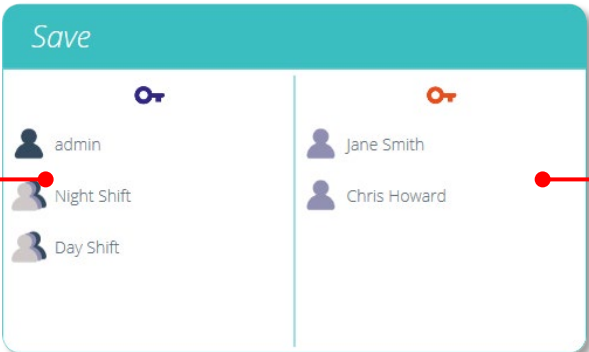
**Go to page number shown**

Sample	Break (mm)	Young's Modulus (MPa)	Max (MPa)	Max (%)
#1	28.98	8.95	33.42	33.20 ✓
#2	33.35	8.06	33.61	28.36 ✓
#3	0.04	0.67	0.84	0.07 ✗
#4	29.03	28.76	32.14	23.97 ✗
#5	28.74	8.98	33.90	48.31 ✓
• Mean	24.03	12.29	26.64	25.90
• SD	13.55	9.25	14.43	16.90
• Min	0.04	0.67	0.84	0.07
• Max	33.35	28.76	33.49	48.31

Sample	Area (MPa %)
#1	1060.83
#2	844.36
#3	0.05
#4	967.04
#5	553.53
• Mean	655.16
• SD	413.60
• Min	0.05
• Max	1060.83

## Prompt for Authorisation Settings: See Page 97

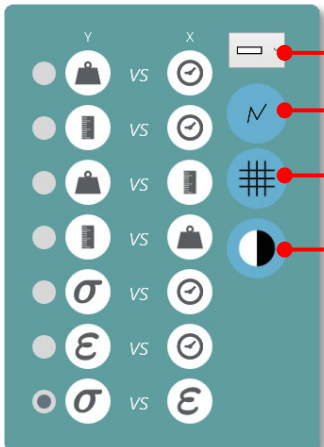
These groups require authorisation to save the test



The 'Save' dialog box is split into two columns. The left column, under a blue key icon, lists three groups: 'admin', 'Night Shift', and 'Day Shift'. The right column, under a red key icon, lists two users: 'Jane Smith' and 'Chris Howard'. Red lines connect the text on either side to the respective columns.

These users on this side can save tests and can authorise users on the right-hand side

## Formatting the Graph Display: See Page 106



The formatting menu is a vertical teal panel with various icons. Red lines connect the following options to their labels:

- Select Line Thickness
- Display Data Points
- Show/Hide Gridlines
- Select Plot Area Background Colour

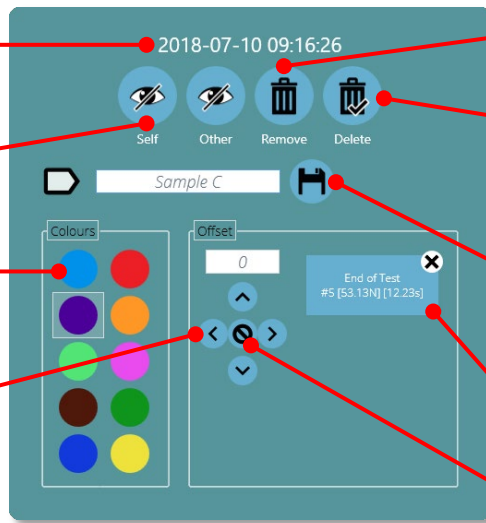
## Sample Display: See Page 107

Time and date at the point the samples test was completed.

'Self' hides the selected sample. 'Other' will hide all other samples

Select a different colour for this specimen. Others will not change

Offset this specimen's graph trace by the amount entered, in any direction, for viewing clarity



Deselect this specimen from the current selection

Delete this specimen completely from the test record. This CANNOT be reversed!

Add a name to this specimen (click the save button to store the custom name)

View/delete annotations.

Clear this specimen's offset

▲ Sample display properties

## Calculations Results: See Page 109



Add annotations

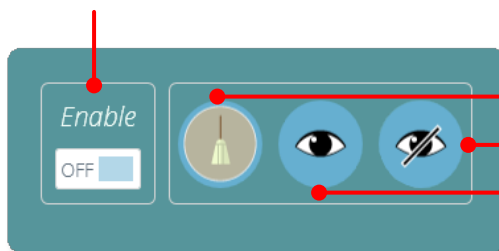
Capture plot area

Apply spot calculation

Offset all current displayed specimens

## Add Annotations: See Page 110

Enable annotations

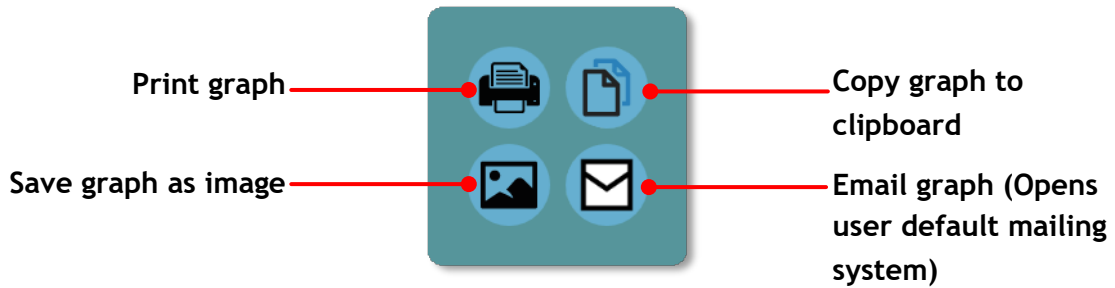


Clear all annotations

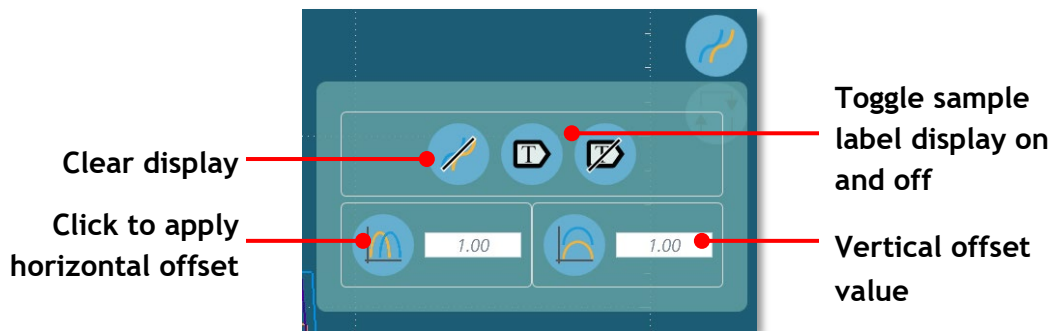
View all annotations

Hide all annotations

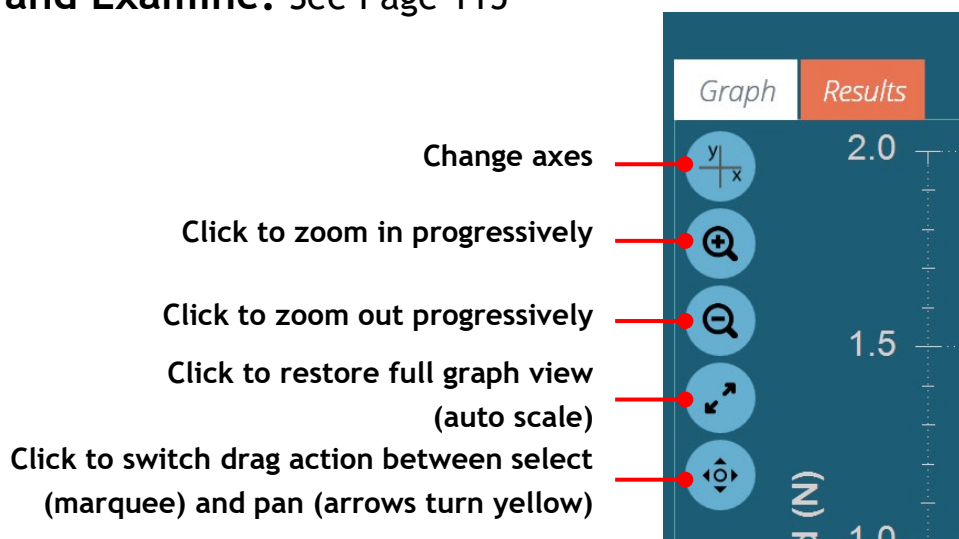
## Graph Capture: See Page 111



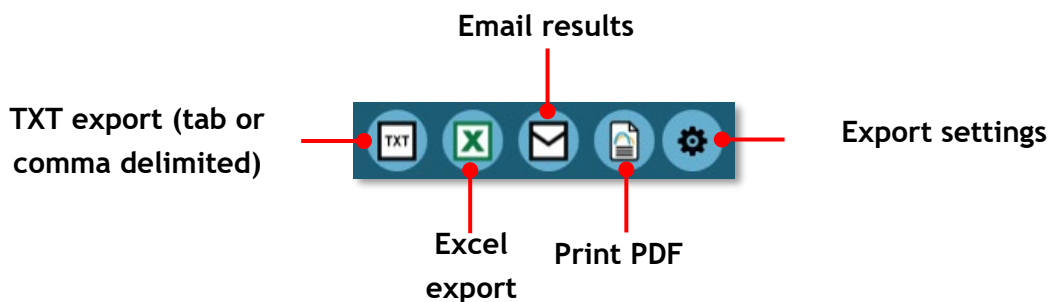
## Offsets: See page 111



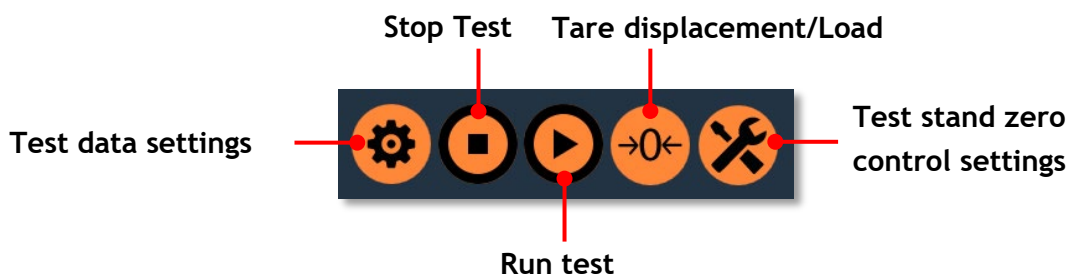
## Zoom and Examine: See Page 115



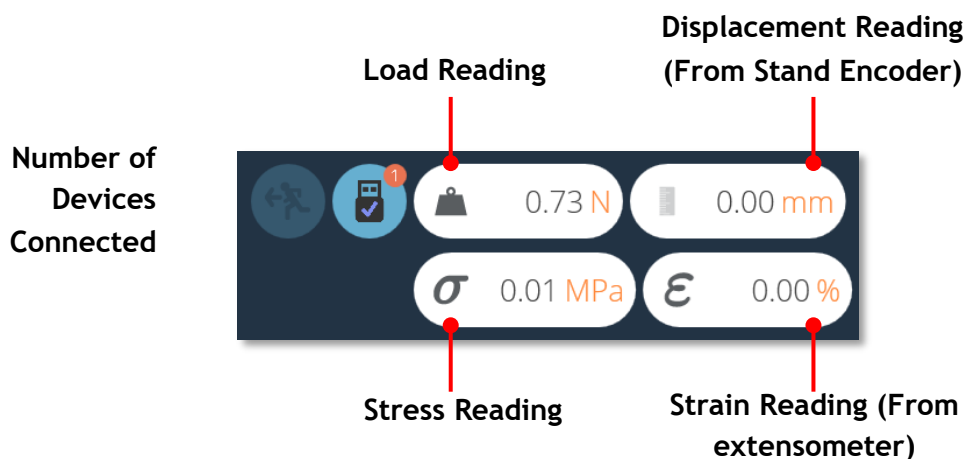
## Export Data and Results: See Page 117



## Control Bar: See Page 119



## Live Display Bars: See Page 122

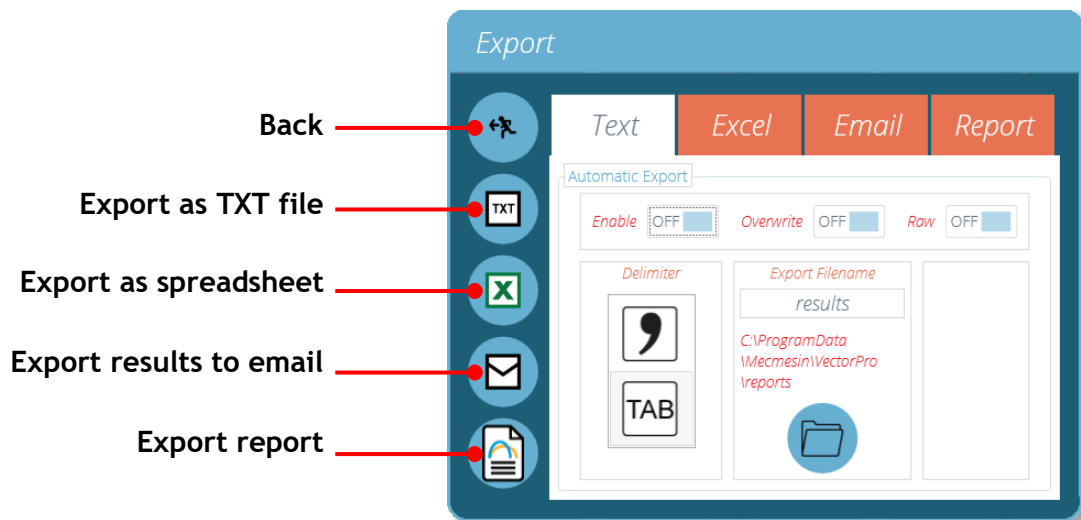


▲ Left-Hand display section

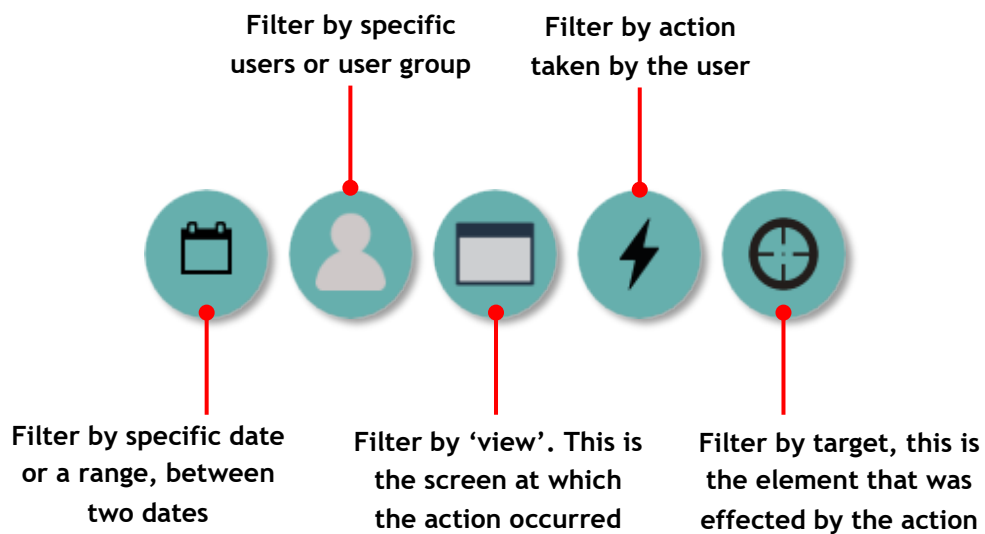


▲ Right-Hand display section

## Data Export: See Page 124



## Event Log Search Filter Definitions: See Page 128





## SDC Test Information Panel: See Page 137

The screenshot shows a software interface for an SDC test. It includes a profile image of the test stand, control icons, and detailed test parameters. A table at the bottom displays raw test results with columns for Raw Load (mN), m, and c.

**SDC profile Image** — points to the top image of the test stand.

**Image controls** — points to the folder, play, and trash icons below the image.

**SDC direction icon** — points to the icon with a green bar and arrows, indicating the test direction.

**Test stand information: Stand type, serial number and firmware version** — points to the OmniTest-5.0 information block.

**ELS information: Capacity, part number, serial number and firmware version** — points to the ELS 200N information block.

**ELS calibration information. Here you can see the raw calibration information, date of calibration and who calibrated the device** — points to the Calibration information block.

**Raw SDC test results** — points to the table of test data.

Raw Load (mN)	m	c
-1,277.6471	0.0518	66.2195
-1,345.1765	0.0690	89.3085
-1,399.5294	-0.0489	-75.7491
-1,338.2354	0.0076	-0.0598
-1,830.7059	0.0025	-9.3563
-3,013.4119	0.0032	-7.4095
-4,034.5883	0.0034	-6.3529
-5,050.7059	0.0028	-9.5921
-6,210.1180	0.0036	-4.9085
-7,194.0004	0.0030	-9.1068
-8,202.8246	0.0030	-8.6885
-9,277.2938	0.0038	-1.7607

# 19. Software License Agreement

---

## Mecmesin Software Licence Agreement

### Date

1st November 2018

### Parties

1. **Mecmesin Limited**, a company incorporated in England (registration number **01302639**) having its registered office at **Newton House, Spring Copse Business Park, Slinfold, West Sussex, RH13 0SZ**, is the “**Licensor**” of this software license agreement.
2. The “**Licensee**” is an **individual**, a **company** or an **organisation** who agrees and complies completely to this **Software Licence Agreement**.

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“**Agreement**” means this agreement including any amendments to this **Agreement** from time to time;

“**Effective Date**” means the date of execution of this **Agreement**;

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“**Software**” means the software identified as **VectorPro™** and any other software created or supplied by the **Licensor** which runs on either a computer or a mobile device, and also the **Firmware** that runs on any hardware manufactured by the **Licensor**;

“**Firmware**” means the software which runs on any hardware manufactured by the **Licensor**;

“**Software Defect**” means a defect, error or bug in the **Software**, or **Firmware** having an adverse effect on the appearance, operation, functionality or performance of the **Software**, but excluding any defect, error or bug caused by or arising as a result of:

- a) Any use of the **Software** contrary to the **Documentation** by the **Licensee** or any person authorised by the **Licensee** to use the **Software**;
- b) A failure of the **Licensee** to perform or observe any of its obligations in this **Agreement**;
- c) An incompatibility between the **Software** and any other system, network, application, program, hardware, anti-virus software or software not specified as compatible in the **Software Specification**;

“**Software Specification**” means the specification for the **Software** set out in the **Documentation**, and it may be varied by the written agreement of the parties from time to time;

“**Term**” means the term of this **Agreement**, commencing in accordance with Clause 2.1 and ending in accordance with Clause 2.2.

## 2. Term

2.1 This **Agreement** shall come into force upon the **Effective Date**.

2.2 This **Agreement** shall continue in force indefinitely.

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- c) Create, store, and store back-up copies of the **Software**;

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5.1 Nothing in this **Agreement** shall operate to assign or transfer any **Intellectual Property Rights** from the **Licensor** to the **Licensee** or from the **Licensee** to the **Licensor**.

## 6. Warranties

**6.1** The **Licensor** warrants to the **Licensee** that it has the legal right and authority to enter into this **Agreement** and to perform its obligations under this **Agreement**.

**6.2** The **Licensor** warrants to the **Licensee** that:

- a) The **Software** as provided will conform in all material respects with the **Software Specification**;
- b) The **Software** will be supplied free from viruses, worms, Trojan horses, ransomware, spyware, adware, and other malicious software programs;
- c) The **Software** shall incorporate security features reflecting the requirements of good industry practice.

**6.3** The **Licensor** warrants to the **Licensee** that the **Software**, when used by the **Licensee** in accordance with this **Agreement**, will not breach any laws, statues or regulations applicable under any applicable law.

**6.4** The **Licensor** warrants to the **Licensee** that the **Software**, when used by the **Licensee** in accordance with this **Agreement**, will not infringe the Intellectual Property Rights of any person in any jurisdiction and under any applicable law.

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**7.1** The **Licensee** acknowledges that complex software is never wholly free from defects, errors and bugs; and subject to the other provisions of this **Agreement**, and the **Licensor** gives no warranty or representation that the **Software** will be wholly free from defects, errors and bugs.

# Index

---

## A

AFG/AFTI, 12, 20  
All Tests viewer, 101  
Attributes, 35  
Automatic export, 125

## B

BFG, 20  
Break Definition, 80, 89  
Break Settings, 47

## C

Calculation Sequence, 85, 89  
Calculations, 77, 87  
Calculations Results, 109  
CFG, 20  
Change Log, 140  
Connecting Device  
    RS232, 20  
    RS232 Driver, 20  
    RS232 Settings, 21  
    USB, 19  
    USB Driver, 19  
Contextual Help, 9  
cyclic calculations, 89

## D

Database Upgrade, 23  
Default Password, 22

## E

Editing a Test, 102  
Event Log, 127  
Event Log Archive, 130  
    Accessing Archived Event Logs, 131  
Export, 123  
    Email Export, 124  
    Excel Export, 123  
    Text Export, 123  
Export and Print, 117  
Export Settings, 124  
Extensometer, 46

## G

Graph Annotations, 110  
Graph Display, 106  
    Graph Display Control, 106  
    Header bar, 108  
Graph Image Capture, 111  
Graph Point Values, 115  
Grip Separation, 48, 57  
    With Extensometer, 60  
    Without Extensometer, 57

## I

Images, 36  
Installing VectorPro, 14  
    Previous Installation, 14

ISO 6892, 80

## L

Language, 27

## M

Manual export, 125  
MultiTest-dV  
    dV(u) Switching, 26

## N

New Test, 34

## O

Occurrence, 77, 87  
Orbis, 20  
Order, 77, 87

## P

Password, 30  
Pausing Test, 54  
    Removing Extensometer, 55  
    Sample Relaxation, 56, 63  
PC specification  
    Minimum PC specification, 13  
    Recommended specification, 13  
Permissions, 96  
    Configuring Permissions, 31  
Prompt for Authorisation, 97  
    Authorisation Sign Off, 98

## Q

Quick Reference, 144

## R

Report Layout, 95  
Reporting and Exporting, 123  
Reports, Elements, 91  
Result Settings, 76, 86  
Results and Graph Display, 106  
Running a Test, 118

## S

Sample Numbering, 107  
Sample Offsets, 111  
Sample Selection, Graph Display, 107  
SDC, 132  
    Information Panel, 137  
    Loading SDC, 137  
    Loading SDC Test Settings, 66  
    New Profile, 133  
    SDC Viewer, 132  
Software License Agreement, 17  
    View Within Software, 28  
Spot Calculations, 109, 112  
    Visual Calculations, 112  
Statistical Results, 117

## T

- Test Controls, 119
- Test Icon, 118
- Test Name, Change, 99
- Test Version Numbering, 99
- Tornado, 20

## U

- Units and Polarity, 85, 90
- USB icon, 25
- User Administration, 30
- Users and Permissions, 29
  - Groups, 29
  - Users, 29

## V

- Vector Header Bar Features
  - Live display bars, 122
  - Results Viewer, 108
- VectorPro Lite

- Instruments, 12
- Operations, 67
- Result, 86
- Test Stands, 11
- Test Triggers, 121
- VectorPro MT
  - Home Position, 120
  - Operations, 50
  - Result, 76
  - Specimen, 44
  - Test Stands, 10
- Version Information, 28
- Viewing Results, 116

## W

- Workspace, 24

## Y

- Young's Modulus, 80, 89

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