Mecmesin
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VectorPro™ Lite
for *dV* Test Stands and
Instruments

Bruksanvisning

Mecmesin
FORCE & TORQUE TEST SOLUTIONS
www.mecmesin.com

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Scope of this document

This document refers to Mecmesin VectorPro™ Lite software version 2.1.0.0, for use with Mecmesin *dV* range test stands, and digital force and torque instruments.

You may also need to refer to these documents:

431-459   MultiTest-dV Drag och tryck provställ, Bruksanvisning

431-468   Vortex-dV Motoriserad system för vridmoment, Bruksanvisning

431-213   Advanced Force Gauge (AFG Mk4) Bruksanvisning

431-261   Tornado Digital Torque Tester, Operating Manual

Contents

1. Overview and Requirements

VectorPro™ Lite is dedicated software, based around a database core, for storing basic test routines for use with the Mecmesin dV range of force and torque test stands. It acquires data from force and torque sensors, performs calculations on the data, and passes data and results to export, file or report.

Operational sequences (or test routines) are easily constructed by drag and drop, and subsequent editing includes version control. Attributes for any kind of test can be created and used flexibly in order to best describe and record their purpose, for clarity and ease of use.

VectorPro™ Lite can also be used with a range of Mecmesin digital instruments for load/torque vs. time graphing, data acquisition, and results calculation.

1.1 PC minimum specification

- VectorPro Lite will run on Windows 7 and above, in 32 or 64-bit.
- A minimum of 4 Gb of RAM and a dual core processor 2 GHz or faster, are recommended.
- Recommended screen resolution is full HD 1920 × 1080.
- 2 free USB ports: one for the license key, the other for communicating with a test stand.
- VectorPro Lite will attach results to email messages in Microsoft Outlook and export to Excel. Outlook version 2010 and above, and Excel 2007 and above, are supported.

1.2 Connecting to a *-dV* test stand

Refer to the MultiTest-dV and Vortex-dV operating manuals (part nos 431-459 and 431-468) for this range of test stands.

The following are required:

- Part no. 351-092: 2 m communications cable, AFG (15-pin RS232), to dV stands (RJ11)
- Part no. 351-093: 2 m communications cable, dV test stands (USB B), to PC (USB A)
- USB license key (provided with VectorPro Lite). VectorPro Lite identifies a connected system but will only interact with it when a correct USB licence key is also connected to the host computer.

The USB license key also contains the software ready for installation.

1.3 Using a Mecmesin Advanced Force Gauge (AFG) or Advance Force and Torque Indicator (AFTI)

When using a Mecmesin digital instrument with a dV test stand, force or torque data can be recorded in results, but the instrument can also be used to set load/torque limits. The test stand can also be made to stop or reverse at these limits.

A Mecmesin AFG or AFTI is connected to a MultiTest-dV test stand using cable part no. 351-092.

For further gauge use information, refer to the AFG/AFTI user manual (part no. 431-213) and the respective test stand operating manual.

Reminder: On the AFG/AFTI Comms menu, set the gauge baud rate to 115,200, and 'TX Units' and 'TX sign' both to On.

2. Installing VectorPro Lite

All the required software is on the supplied USB license key.

Check whether the PC for the installation is 64-bit or 32-bit. (If you aren't sure, click the Windows start button, Right-click 'Computer' and select Properties.)

Install on 64-bit system

- Browse to the /64 bit folder and open it.

- Ensure that the files:
  novaPDF8PrinterDriver(x64).msi
  novaPDF8COM(x86).msi
  novaPDF8SDK(x64).msi
  setup.exe
  VectorPro.msi
  are present in the folder.

- (Windows 7 only) Ensure that the files:
  mu_.net_framework_4.5_r2_x86_x64_1076098.exe
  mecmesin_if_0.inf
  mecmesin_if_1.inf
  are also present in the folder.

Run the installation:

- (Windows 8, 8.1 and 10 only) Double click on the batch file:
  install(x64)-Win8-Win10.bat
  and click Yes when asked for authorisation.

- (Windows 7 only) Double click on the batch file:
  install(x64)-Win7.bat
  and click Yes when asked for authorisation.

- Go through all the installation steps, clicking 'next' and 'finish' when prompted and 'agree' to continue, if asked for authorisation or presented with warnings.

- When the black Windows command window closes, the installation is complete.

Install on 32-bit system

- Browse to the /32 bit folder and open it.

- Ensure that the files:
  novaPDF8PrinterDriver(x86).msi
  novaPDF8COM(x86).msi
  novaPDF8SDK(x86).msi
  setup.exe
  VectorPro.msi
  are present in the folder.

- (Windows 7 only) Ensure that the files:
  mu_.net_framework_4.5_r2_x86_x64_1076098.exe
  mecmesin_if_0.inf
  mecmesin_if_1.inf
  are also present in the folder.

Run the installation:

- (Windows 8, 8.1 and 10 only) Double click on the batch file:
  install(x86)-Win8-Win10.bat
  and click Yes when asked for authorisation.

- (Windows 7 only) Double click on the batch file:
  install(x86)-Win7.bat
  and click Yes when asked for authorisation.

- Go through all the installation steps, clicking 'next' and 'finish' when prompted and 'agree' to continue, if asked for authorisation or presented with warnings.

- When the black Windows command window closes, the installation is complete.

3. Launching VectorPro Lite

The logon dialogue for VectorPro Lite:
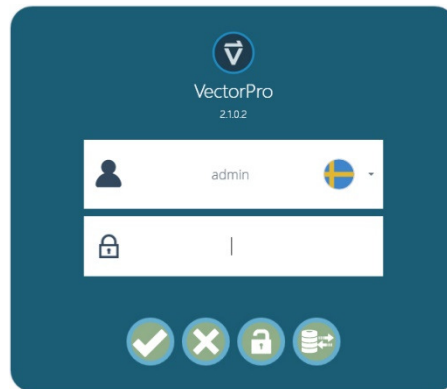
Enter the username and password, then click to open VectorPro Lite.

The default password for user 'admin' is 'admin'. Passwords are case sensitive.

Click to exit VectorPro Lite.

In the event of completely lost administrative access, Mecmesin technical support can unlock your system. Instructions will be given at the time.

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

The flag denotes the language setting *last used by each user*. When new users are added, they are not language specific. Language is changed when the user is logged on. Here, the users operate in their preferred languages:
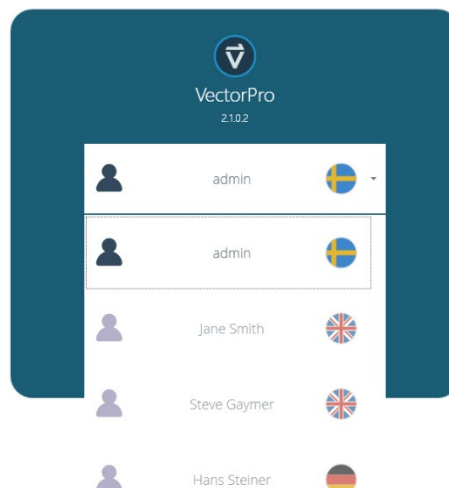
4. Workspace

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

The initial administrator's view of Vector, before any tests or results have been added, will look like this:
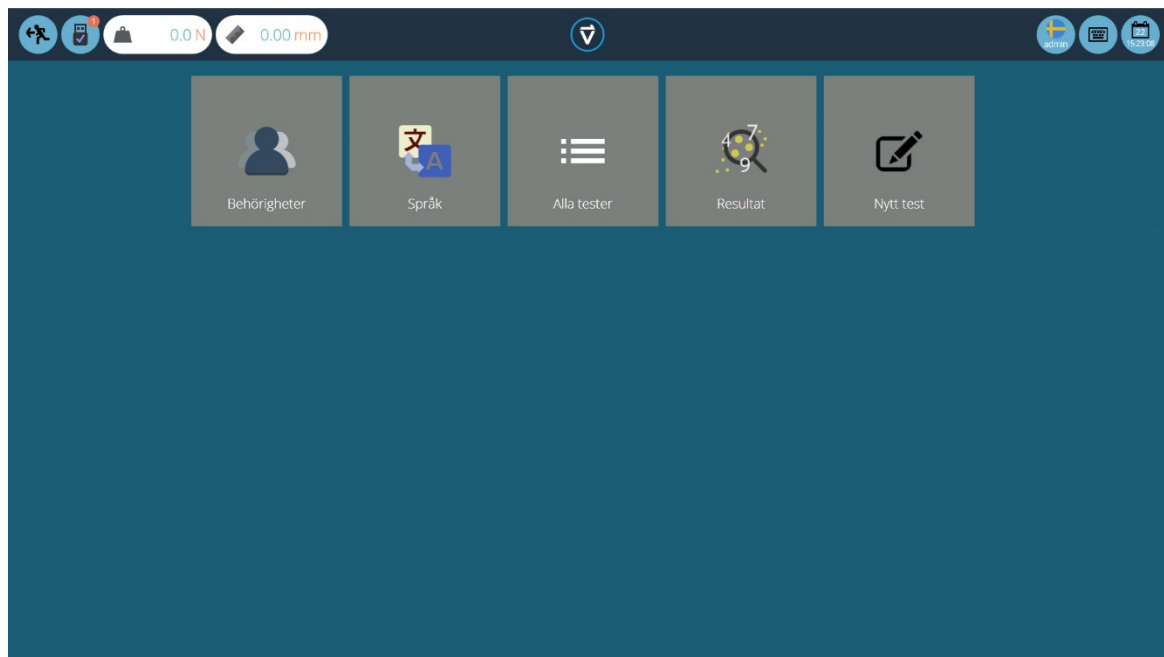
By default, the 'admin' user has access to every base module, whereas other users will need to be given permission before a module appears in their workspace.

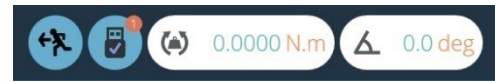## Maintaining tidy workspaces

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 (see section 5) and test permissions (see section 7.6).

4.1 Vector header bar features

Most of the header features are always visible:
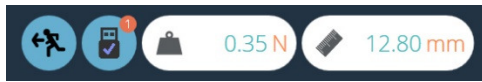
with MultiTest and AFG (force)   with Vortex and AFTI (torque)

 The first 'go back' icon will be familiar from the *dV* stand display.

 The next 'USB' icon, when showing a tick, indicates that a test system is connected and switched on. When a system is not active (and for serial instruments on their own), the tick is replaced by a red cross. If more than one device is connected, this will show in the red number circle.

- Click this icon to see details of any currently connected system, including its model and serial number.

The load display here is being fed by an AFG force gauge, and indicates the current gauge load. It will continue to display the actual load reading so long as the gauge is connected to the *dV* test stand and is switched on. To zero this reading, zero the gauge.

- To read alternative units of load or torque, adjust the units settings on the gauge.

The displacement or angle display is the current displacement of the *dV* stand crosshead or drive spindle from tared zero. A negative figure indicates displacement *below* tared zero, a positive figure, *above* tared zero. To zero this reading, tare the position either on the *dV* test stand, or from the test run screen (see p. 36).

The first icon on the right shows the current user name, and flag of the display language.

Click this icon to select an alternative language. To make it easier to use VectorPro Lite 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:
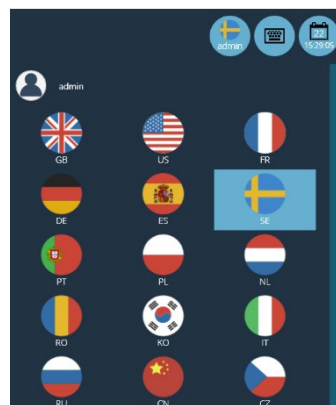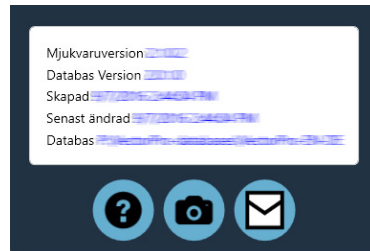
The **keyboard** icon activates the Windows onscreen keyboard (for touch screen displays).

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

Click this logo to display details of the current software version and database location:

- Click the question mark for help.
- Click the camera to take a screenshot. A .png image will be saved to C:\ProgramData\Mecmesin\VectorPro\images
- Click the email to send full system information as a table, in an email.

Note: These operations may take a moment or two to appear; do not Alt+Tab 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.

5. Users and Permissions

Behörigheter
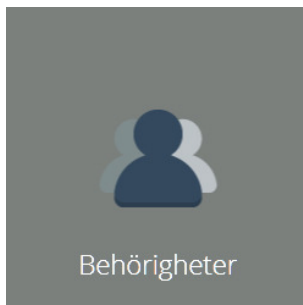
The main permissions module creates, edits and grants other user profiles. This populates their workspaces in turn with only selected modules, tests, results and administrative rights.

These general permissions relate to Vector overall, and to all tests in general. They include using a named test system (e.g. MultiTest-*dV*), adding, using, editing, and deleting tests, viewing all tests, all results, and using selected test attributes (labels, images and notes) when they are used in any tests.

In this example, it can be seen that lists have been added for devices and test attributes ('Testing Location' is visible). The number on an attribute shows how many tests are currently using it.
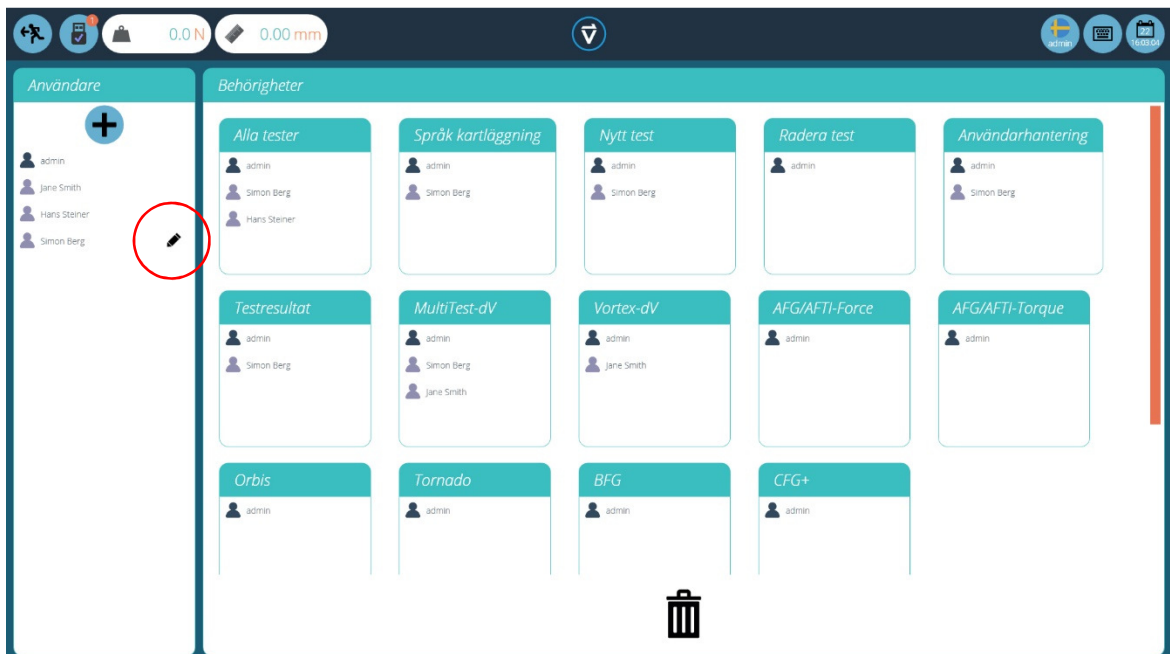
- To **add** a new username with password, click the + button.
- To **edit** a username or password, hover over the name and click the black pencil (shown above for Simon Berg).

- To **delete** a user, select to edit and click the bin icon in the edit dialogue box:
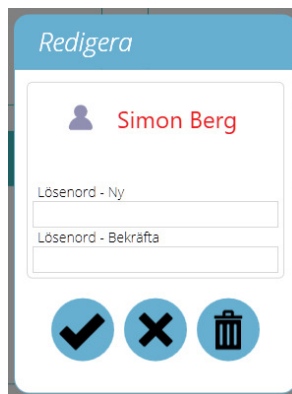
- Add a permission to a user by dragging their name into a permissions box. Names can be reordered by dragging names up and down.
- Delete a permission by dragging the name from a permissions box, down into the bin area.

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, permissions granted to edit and save, upload, execute, view and print reports from this test. (See Section 7.6, *Permissions*.)

A user may therefore only need to use, and see the results from, specific tests, not all tests or every version of one. Running specific test routines may be the only permission in their workspace, for example.

6. Language translation

Språk
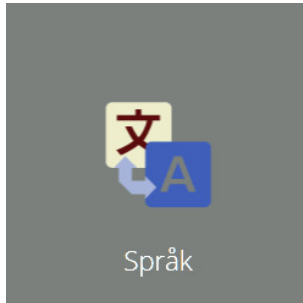
All commands used in the operation of VectorPro Lite are held in a user-editable dictionary, and may be edited:

Select the language to examine, and when or where necessary, edit entries as required. Save changes before closing.
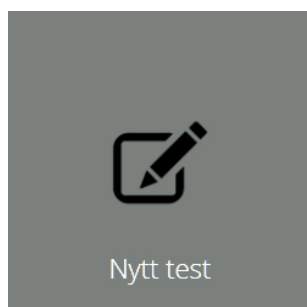
7. Designing a Test

Nytt test

7.1 Test names and versions

Click the New Test icon to configure a new test. This may be a test interacting with a motorised test stand, or with a digital device alone in order to acquire data and process results. The test name of up to 25 characters must be unique. Select the system or instrument for which the test is designed. These can be selected by test type (force/torque) or connection type (USB/RS232 serial). The test will then only run on this system or instrument:
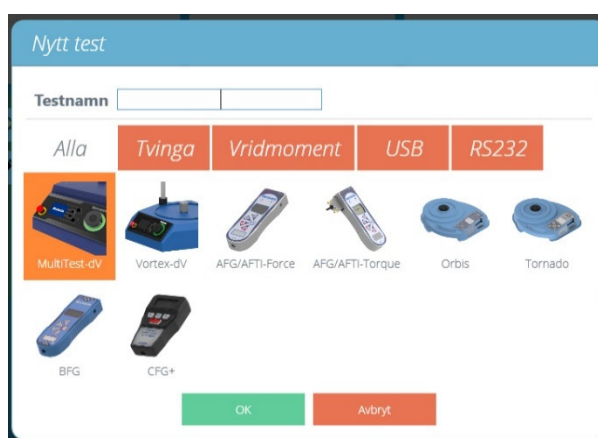
A new test for a dV test stand contains a series of descriptors (default and custom **attributes**), a sequential **operation** (one of the dV test stand test types), optional calculations to perform on **results**, an optional editable **report** layout, and **permissions** specific to this test.

A new test for an instrument (e.g. AFG or Tornado) is the same, except that Operations (control) and therefore cyclic calculation, do not apply.

In the Permissions option, 'Workspace' places the test in the workspace of the named user. Tests can in this way be viewed individually, rather than from the All Tests list, but

can only be run under the latest test version. Under 'All tests', every test and every version of it, is individually accessible for upload, running or editing.

When you leave the Test Design function, you will be asked to save your changes. Every time any of the parameters for a test is changed, the test is saved to the next incremental version number, which is shown in the top right of the Test Design space.

7.2 Attributes

An attribute is like a fieldset to use for your test database. Some are default, others are customisable. The attribute 'System' is not editable, and is available in results and reports to indicate the test system used for the test.

7.2.1 Test name

Default attribute. Names the test routine and all versions. This attribute can be edited but is inherited by all versions of the test, not just subsequent versions.

7.2.2 Test notes

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

7.2.3 Add new and existing custom attributes

A new attribute for one test becomes available for all tests. Once an attribute has been used in VectorPro Lite, it is incorporated into the database and becomes available to all tests. 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.
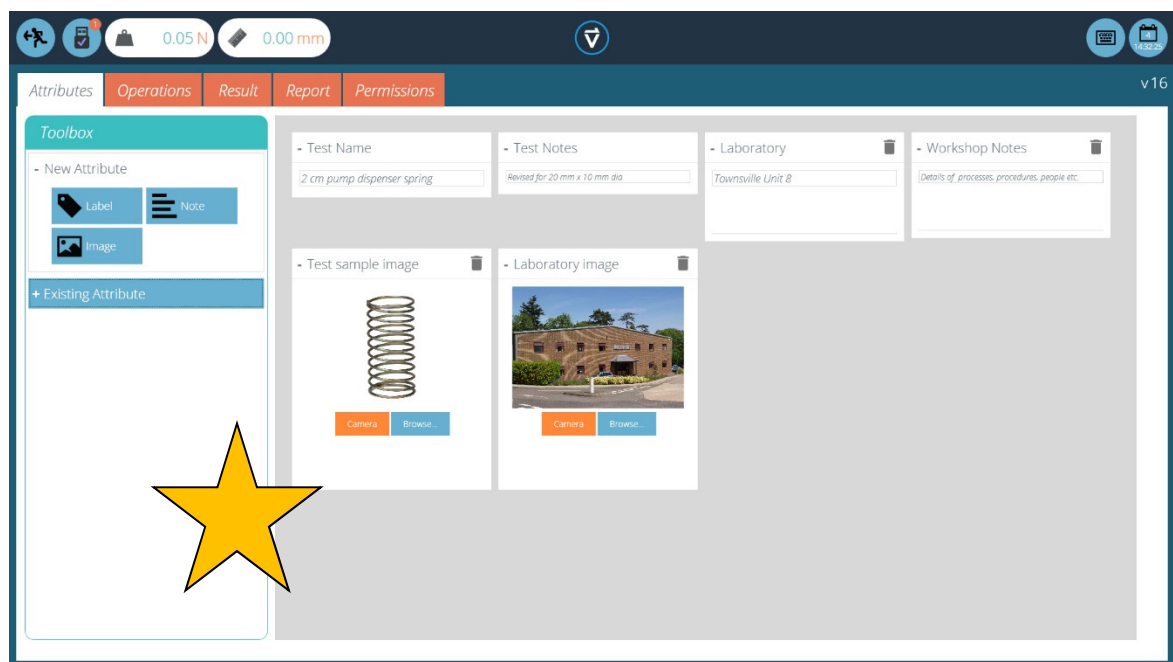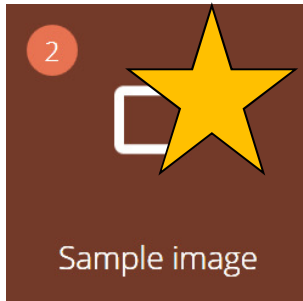
Image attributes allow the insertion of an image file, which may be browsed for, or captured on a webcam. The first image to be assigned will appear as the workspace icon for this test (attributes for a test, once assigned, cannot be rearranged).

The descriptive boxes can be collapsed and expanded by clicking on the headers.

Attributes are held in the VectorPro Lite database, so can be examined for their use by anyone who has that attribute visible in the workspace (see Permissions). In the workspace icon for this attribute, called 'Sample image', the number shows that it has currently been used in two tests, though not necessarily in the current versions of those tests.

By clicking on the icon, those tests can be examined. An attribute cannot be deleted.

7.3 Operations

VectorPro Lite operations are equivalent to *dV* stand control panel Test Types:

- Cycle between precise positions
- Cycle between the physical limit switches (force testing, MultiTest-*dV* only)
- Cycle under AFG/AFTI load/torque control
- Half-cycle between precise positions

MultiTest-*dV* (force)

Icon	Action	Settings
	Moves between a starting position and end position such that the first full stroke is down.	Speed Up Speed Down Maximum Minimum No. of Cycles
	Moves between a starting position and end position such that the first full stroke is up.	Speed Up Speed Down Maximum Minimum No. of Cycles
	Moves between physical limit switches such that the first full stroke is down.	Speed Up Speed Down No. of Cycles
	Moves between physical limit switches such that the first full stroke is up.	Speed Up Speed Down No. of Cycles

Icon	Action	Settings
	Moves down to a load limit, or break point, as set on the AFG gauge, and either stop or reverse to a limit switch. Also allows AFG under cycle control between loads.	Speed Up Speed Down + Gauge settings
	Moves up to a load limit, or break point, as set on the AFG gauge, and either stop or reverse to a limit switch. Also allows AFG under cycle control, to cycle between loads.	Speed Up Speed Down + Gauge settings
	Moves from a starting position to an end position, such that the full stroke is down.	Speed Maximum Minimum
	Moves from a starting position to an end position, such that the full stroke is up.	Speed Maximum Minimum

Vortex-*dV* (torque)

Icon	Action	Settings
	Moves between a starting angle and end angle such that the first full rotation between the two is clockwise.	Clockwise Speed Anticlockwise Speed CW angle ACW angle No. of Cycles
	Moves between a starting angle and end angle such that the first full rotation between the two is anticlockwise.	Clockwise Speed Anticlockwise Speed CW angle ACW angle No. of Cycles
	Moves clockwise to a torque limit, or break point, as set on the AFTI gauge, and either stop or reverse until stopped. Also allows AFTI under cycle control, to cycle between upper and lower torque values.	Clockwise Speed Anticlockwise Speed + AFTI settings
	Moves anticlockwise to a torque limit, or break point, as set on the AFTI gauge, and either stop or reverse until stopped. Also allows AFTI under cycle control, to cycle between upper and lower torque values.	Clockwise Speed Anticlockwise Speed + AFTI settings

Icon	Action	Settings
	Moves from a starting angle to an end angle, such that the first full rotation between the two is clockwise.	Clockwise Speed CW angle ACW angle
	Moves from a starting angle to an end angle, such that the first full rotation between the two is anticlockwise.	Anticlockwise Speed CW angle ACW angle

Position or angle is relative to tared zero. Note that where a starting position is set, the crosshead (or spindle) may first need to move to this in the opposite direction to that of the first full stroke or rotation.

To maintain the correct sense of the green arrows in the icons, ensure 'Maximum/CW Angle' is the upper (furthest clockwise) displacement position by having a greater number than 'Minimum/ACW Angle' (the intended lower displacement or furthest anticlockwise position).

- To add the required operation, drag its icon from the selection panel into the Timeline.

- To change the operation, first delete the current one by dragging it to the bin icon.

- Complete all edits by clicking 'Save Changes' (top right).

7.3.1 Editing an operation's settings

To edit the settings (speed, displacement/angle, cycles), click on the round green Edit button that appears when you mouse over the Timeline's icon:
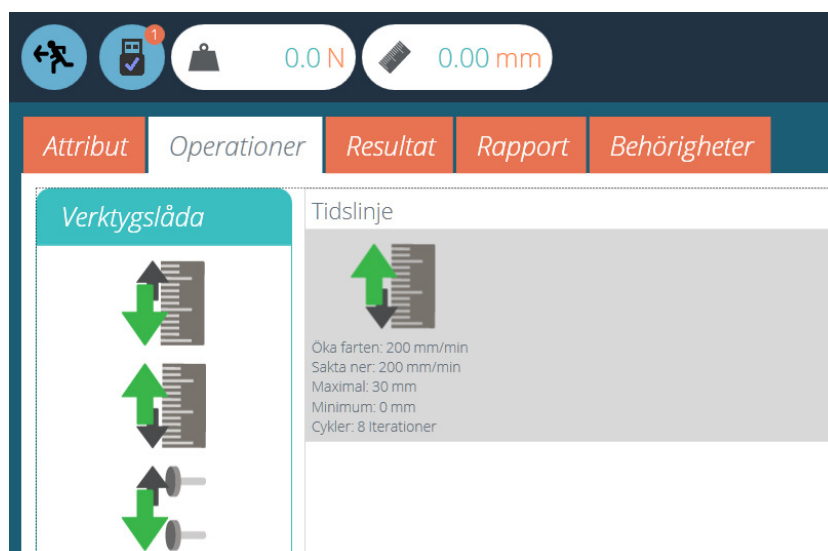
Every operation has parameters that can be edited. Edit the numeric fields, and select your units of measurement.

> **Note:** units are not dynamic. When units are changed, no automatic conversion of values takes place.

Positive displacement (angle) is above (or clockwise from) tared zero, negative is below (or anticlockwise).

Load and torque control values are set in the AFG/AFTI.

7.4 Result

The Result tab is where calculations are added. The Toolbox area contains all the elements for producing results from test data.

7.4.1 Attributes

These are the Attributes attached to the specific test. Add them to results here so they become available in Reports.

7.4.2 Standard calculations

Standard calculations address the whole test timeline, and all data features. In all cases, name, axes and decimal place display, range and verify may be added:

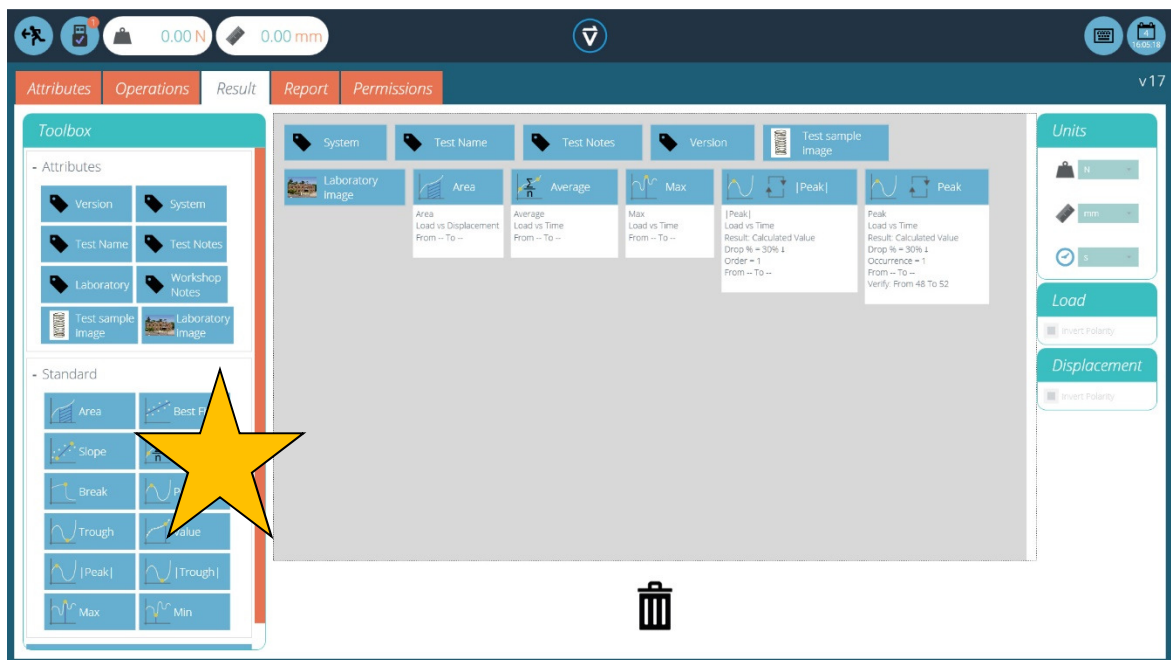|	
Name	Edit for the display heading in results and reports
Axes	Load/torque, Displacement/Angle, Time
Decimal Places	1 to 9
Range	From, To; calculate between two x-axis values (in a Break calculation, the 'To' value is the end of a test as stopped by gauge break detection, or an end position).
Verify	Enable/From, Enable/To; select enable to create either or both, upper and lower value boundaries; use this to create pass/fail criteria

Peak and Trough calculations also include:

Drop	5% to 50%
Occurrence	peaks or troughs by time sequence
Order	peaks or troughs by magnitude sequence (greatest = order 1)

Calculation	Function
Area	Area under a curve. When load/torque vs displacement/angle, this represents energy, or work done. (In units of N and mm, the energy value is mJ.)
Genomsnitt	Mean (sum of all data values divided by number of point values)
Best fit	Trend line: 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.
Brott	The Break calculation returns the maximum load/torque or displacement/angle within a defined range before the end of a test (e.g. under AFG/AFTI control). See below for more explanation.
Max	Maximum y axis value within a range on the x axis.
Min	Minimum y axis value within a range on the x axis.
Topp	Peaks are defined by percentage drop after rising in y value. Here, select which peak by time sequence.

Calculation	Function
|Topp|	Peaks are defined by percentage drop after rising in y value. Here, select which peak by magnitude order.
Lutning	Trend line: 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.
Dal	Troughs are defined by percentage rise after falling in y value. Here, select which trough by time sequence.
|Dal|	Troughs are defined by percentage rise after falling in y value. Here, select which trough by magnitude order.
Värde	Value of y for a specified value of x.

Break tests

The Break calculation is an assessment of rate of loss of load/torque, and gives a more accurate and flexible interpretation than an AFG/AFTI percentage break figure. A sample may exhibit a peak or trough value before a break event, whereas a break is an ultimate failure to sustain sufficient load/torque. It can be assumed or ensured that at some predictable point after break, the test will terminate.

- Under AFG/AFTI control, the gauge can be set to stop at a percentage break, terminating movement and ending the test.*

- Under a displacement or cycle test, the test ends at a limit deemed sufficient to guarantee a detectable break.

The range of time or displacement/rotation to be examined before this end point is entered in the Break calculation.

For axes, use load/torque or displacement/angle versus time.

* Note that the AFG/AFTI can also be set to freeze its Max value display, and stop the crosshead, but transmission of the final data point may be lost to VectorPro Lite. A manual test stop overcomes this.

Cyclic calculations

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

Since displacement is a required axis, cyclic calculations are only available to tests run on USB test stands.

7.4.3 Sequence of calculations

Calculation results are ordered on screen and in reports as laid out here. They may be repositioned here as required in those places.

7.4.4 Units and polarity

On ● the right-hand side, select the default units and axis polarities for this test:
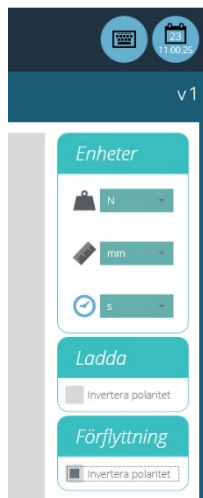
- Units can only be set for a new test, and cannot be subsequently changed at version level.

- Load/torque units must be matched on the gauge's settings (N here requires the gauge to be set to read N).

- Inverting load(torque) polarity shows compression (clockwise torque) as a positive value, and tension (anticlockwise torque) as negative. (Example: for compression-only tests the gauge could also be set to Unit sign = off to give all readings as positive integers.) Polarity cannot be changed at version level.

- Inverting displacement or angle polarity can also be used to ensure positive-axis values and display.

7.5 Report
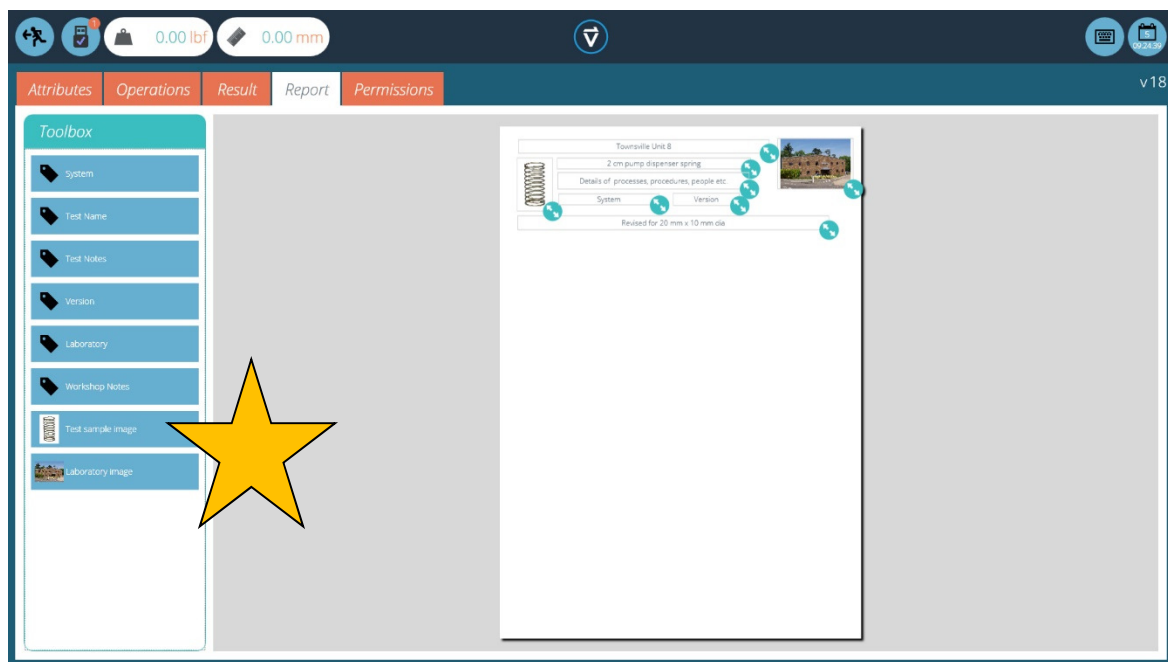
The report Toolbox is populated with those attributes added under Result. Drag elements into the report area to select those you want to appear in PDF and printed reports. Resize elements from their bottom right-hand corner, and position as required.

Below these elements, the report will display a table of all results, followed by a graph of up to eight samples. Additional samples appear on subsequent pages in sets of eight samples.

Complete report layouts are viewed in Results display (tabbed with the Graph display).

See Section 11.2, *Reporting* for how to lay out reports.

7.6 Permissions

Drag user names into the spaces to grant permission to save edits, upload the test to a test stand, execute the test, edit the report layout, print (export) reports or delete samples.

Exit the test design mode and respond to save changes.
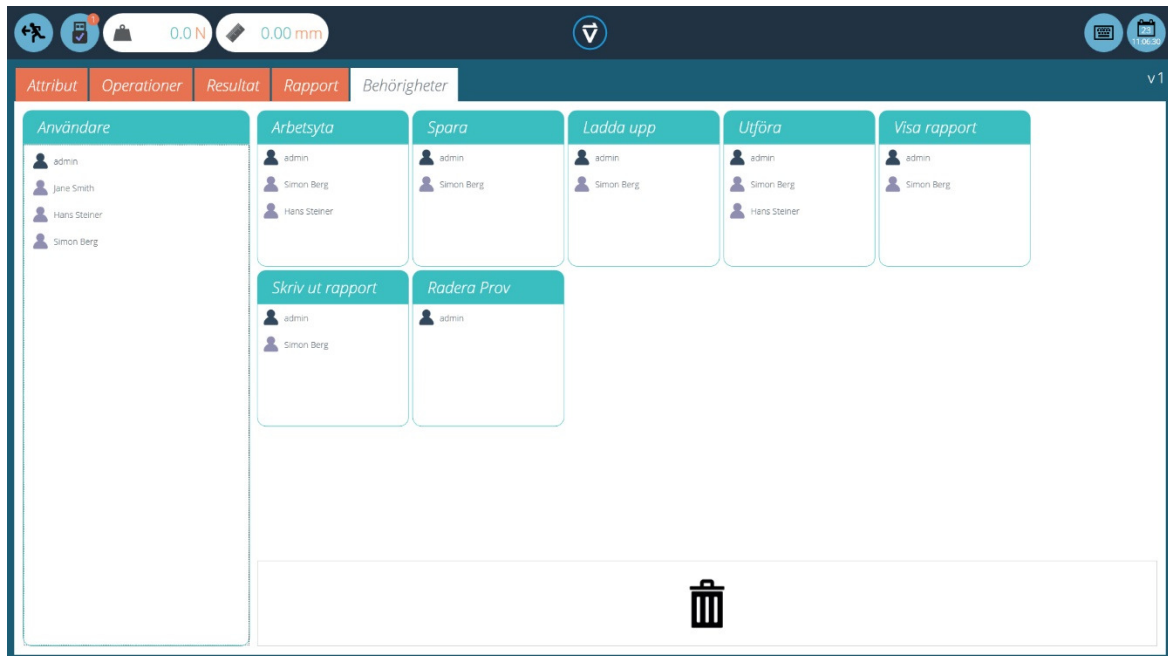
When a user is added into 'Workspace' the test will appear in their workspace when they log on. They must also be given permission to execute the test. In this way, a user whose only role is to run predefined tests, can always and only be presented with their set of tasks. For them, the test will always execute (upload and run) in the latest version. In the example above, Simon Berg can manage all aspects of this test, whereas Hans Steiner can only execute (run) it.

A test icon will only appear in those Workspaces selected in the test's permission. A user with permission to access 'All Tests', can still see a list of all tests in all versions, but only use tests and versions within the permissions granted.

VectorPro and *dV* stand test settings

Whenever a test is run from VectorPro Lite, the settings are passed to the *dV* stand, overwriting any edits subsequently made through the *dV* front panel control menus. If edits are made through the *dV* stand control menus and the test run from the *dV*, the edited settings are used, overriding the last uploaded test.

Note: Uploading a test rather than executing it, passes a set of test parameters to a MultiTest-*dV* or Vortex-*dV* to prepare it for subsequent manual operation with confirmed values. Tests can then be run without VectorPro Lite, using the test stand controls. Uploading from VectorPro Lite rather than using the stand menus is a reliable means of resetting a regular test profile.

8. All Tests Viewer

Alla tester

The All Tests viewer module is made available to a user through permissions. The number of tests saved to the library is shown in the orange circle. A user can view all tests, but not be able to edit or use them without permissions at test level.
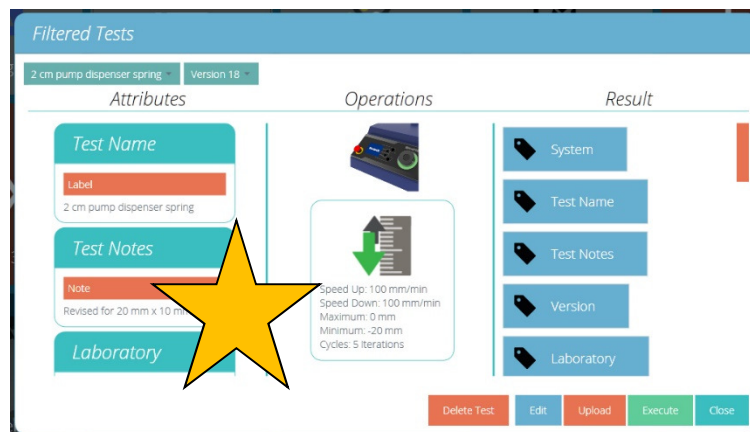
The drop down lists shows all tests available, and all previous versions. Attributes, device identity and operation, and results contents for the selected test and version are shown. In this way, previous versions of tests can easily be compared for changes in the way they are run and calculated.

From here, depending on permissions given at individual test level, the user may:

- delete an entire test (all versions)
- view or edit
- upload any version of any test
- execute any version of any test.

8.1 Deleting a test

Whole tests can be deleted, but versions of a test cannot. Deleting a test also removes all access to any results from previous use of the test.

8.2 Editing a test

Every time a test is edited in any way, a new version is saved. The latest version is shown in the test's icon in a user workspace; here, version 3:
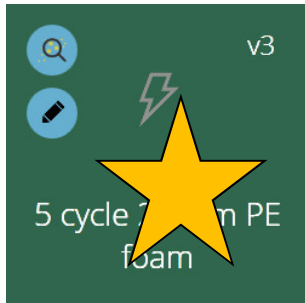
From any test Edit button (the pencil icon here, or the Edit button elsewhere), any user can view the full details of a test. If they have also been assigned 'save' permission in the test itself, they may change parameters and save a new version.

- When a test name is changed, it applies to all versions.

- 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).

Calculations can also be edited from the Results view: see Section 9.2, *Viewing results*: calculations display. If you want to try a calculation adjustment first, before creating more test versions, this may be preferred.

9. Results Viewer
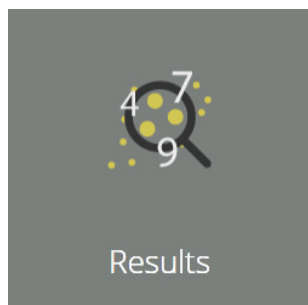
Results

As with the All Tests viewer, the Results viewer gives access to all tests that are available to a user, and their results. Click this icon to select your test, and the results to view.

v3

5 cycl 20 m PE foam
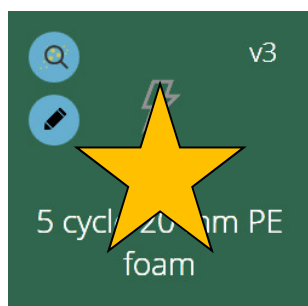
Test icons also carry two blue buttons, the upper result button opens all results for this test.
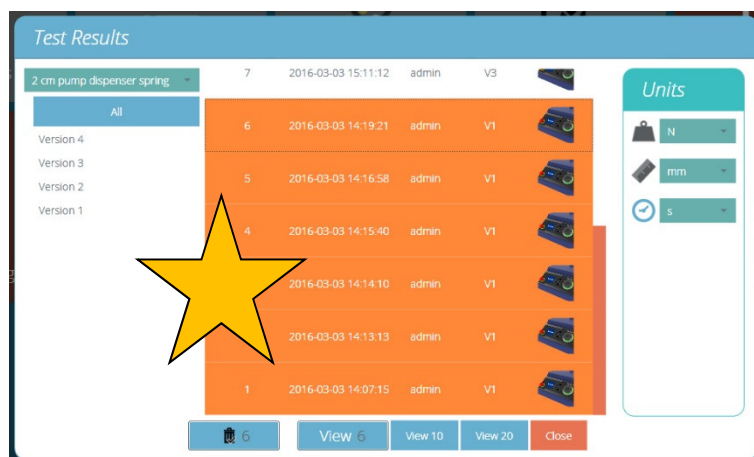
Here, six results for a test have been selected, all from running version 1, and will be viewed with Version 4, where subsequent calculations have been added.

- 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.

9.1 Viewing results: graph display

Previous results may be reviewed selectively and in detail, along with the calculations in the test profile used. Any changes to sample annotations can be saved, and spot calculations made that are not saved. Here, five samples of a three-cycle test are displayed as a load/time graph:

9.1.1 Formatting the graph display

The x/y button on the left offers graph display controls.

| force | torque |

Here you can, **for display and reports:**

- choose x and y axes (load/torque, displacement/angle, time)

Note on Area calculations:

Displaying area under a curve requires the graph to default to load vs displacement (torque vs angle), and in the case of a cyclic test, to show cumulative displacment.

---

and for screen display only, not reports:

- Display data points
- Select line thickness
- Select plot area background colour
- Show/hide gridlines
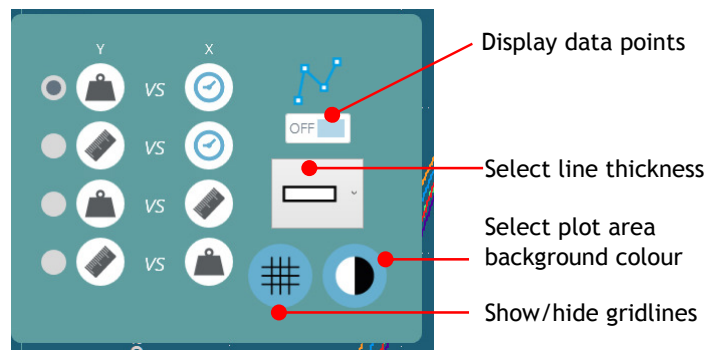
9.1.2 Sample display

Each sample is represented at the top of the graph display, in a row of coloured disks between blue arrows. Up to nine 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 top right, 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.

Test run start date and
time. Click to **hide**
sample in this view.

First two eye icons
toggle to view all, or
only this sample.

Select a different **colour**
for this sample. Others
will not change.

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

Deselect this sample
from the current
selection.

Delete this sample
completely from the test
record.

Add a **name** to this
sample (click the tick if
you want this to be saved
with the results).

View/delete annotations.

Clear this sample's offset.

Sample display properties

9.1.3 Calculations results

The calculations as defined by the test version being used, can be displayed in two ways.
To view all results instead of the graph, click the Results tab (see section below).
Alternatively, results can be viewed side by side with the graph, in a scrolling display, by
clicking on the bar down the right-hand side of the graph:

Click the sidebar again to view the graph alone.

Add annotations

Capture plot area

Apply spot calculation

Offset all current displayed samples

Select cycle of selected sample
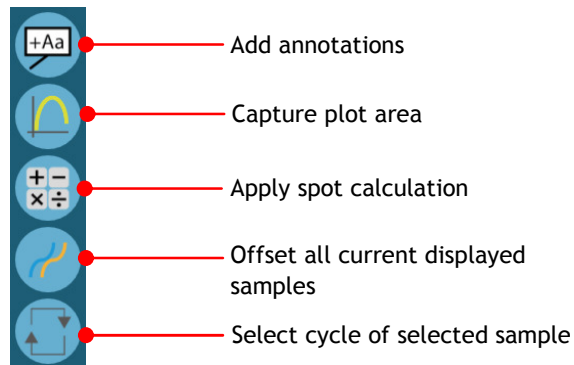
Additional spot calculations can be used by clicking the math symbols icon on the right. The selected calculation will apply to the current selected sample. Other samples will be hidden from view until the calculation is cleared. Either a graphical interpretation (e.g. a best fit line, or shaded area) and the result value will be displayed, or a labelled data point (e.g. peak or max). See Section 7.4.2, *Standard calculations* for explanations.
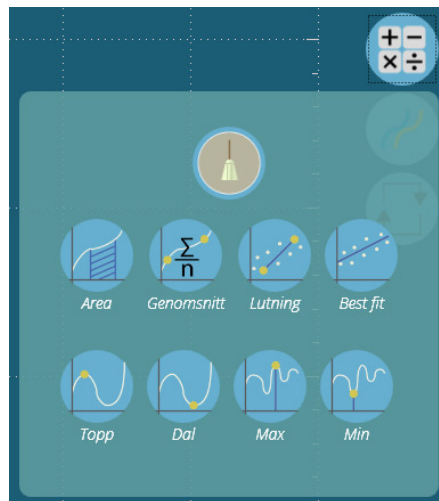
The upper 'broom' button clears the calculation.

9.1.4 Add annotations

Annotations to a sample trace can be enabled to add 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', below).

Enable annotations, clear all, view all or hide all:
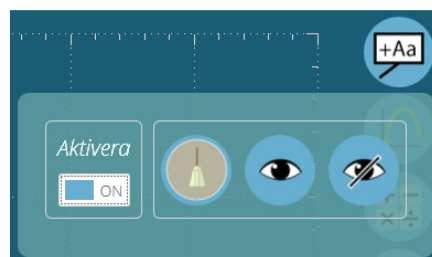
- Click on the data point to annotate (you may choose to select out a sample or samples first).

- Click in the plot area where the text should appear.

- Above the data point values, ??? represents your label area.
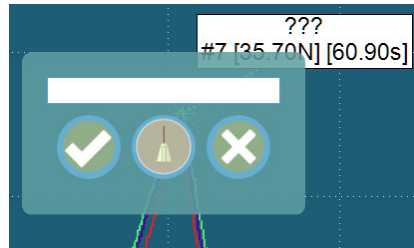
- Add text and tick to save, cross to delete, or the broom to clear the text box.

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

All annotations will now be visible when you click on the annotations icon (see below). Click a cross to delete the annotation, or click an annotation to make it visible. A sample's annotations also appear in its settings.

Annotations remain associated with a sample until the test is closed, whether it is being displayed or not, and selecting an annotation will bring a hidden sample trace back into display. In this example, the third annotation belongs to a deselected sample. Clicking on the annotation will restore the sample and annotation to view.
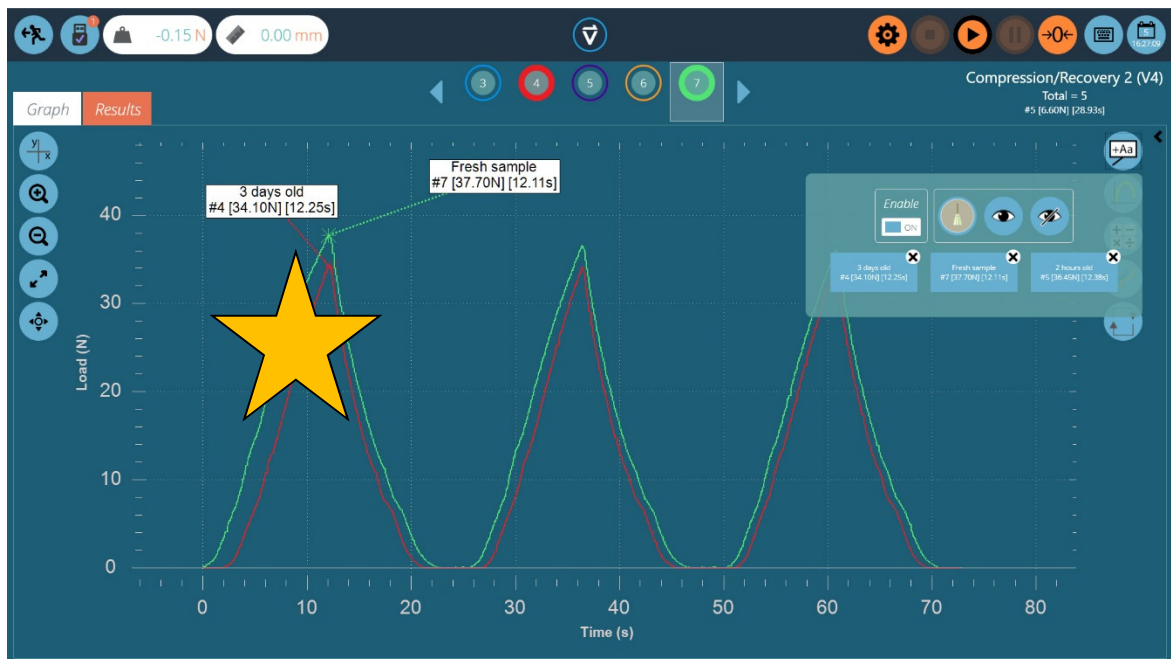
Annotations cannot be repositioned or resized, so place them carefully not to obscure each other.

9.1.5 Graph capture

The plot area of the chart view can be captured: to print, copy, save as a graphic file (.emf. .png (default), .gif, .jpg, .tif, .bmp), or as email attachment (.png).
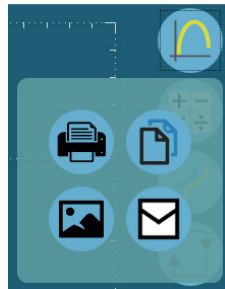
9.1.6 Offsets

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 load, or vertically to compare characteristics along a time line. Click the offset button:

Clear display offsets

Click to apply horizontal offset value

Toggle sample label display on and off

Vertical offset value
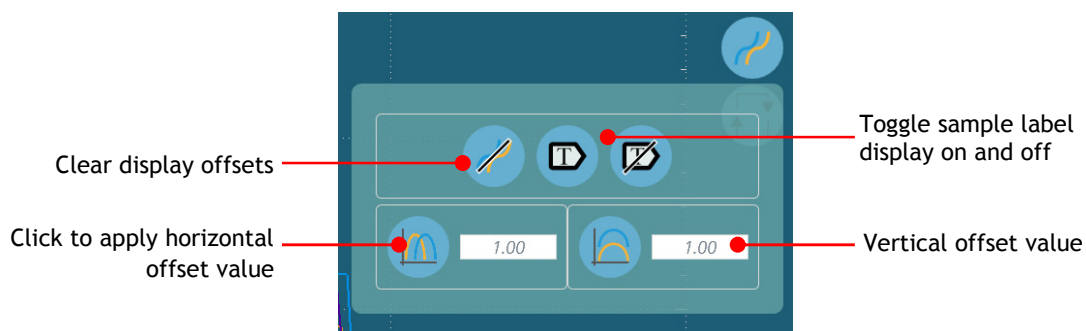
Here, the load-displacement curves of five foam samples under cyclic testing have been offset for comparison. Note that sample tags (user named) have been turned on:

9.1.7 Cycles

To examine one particular cycle of the current selected sample, click the cycle button. Other samples will be hidden from view until the calculation is cleared. This is especially useful where there are many cycles performed on a sample and the final characteristics are significant.

The + and – buttons increment the cycles, or type in the required number and click the arrow to go to the cycle:
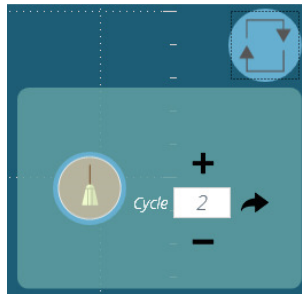
The 'broom' button clears the cycle selection and restores the graph to display all samples.

9.1.8 Zoom and examine

Graph characteristics and data points can be examined more closely by zooming in. These are the controls:
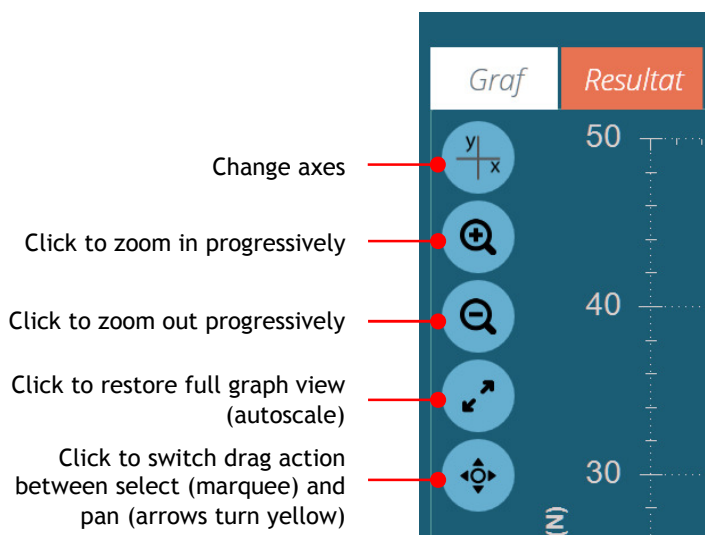
- A mouse wheel allows scrolling to become zoom control in the plot area.

- Hold the left mouse button to pan (move the graph within the window)

- When the marquee selection tool is active, hold Ctrl to change cursor control to pan.

Whenever the cursor is over a sample trace, the data values of its position are shown at the top right of the graph view, here for sample #7:
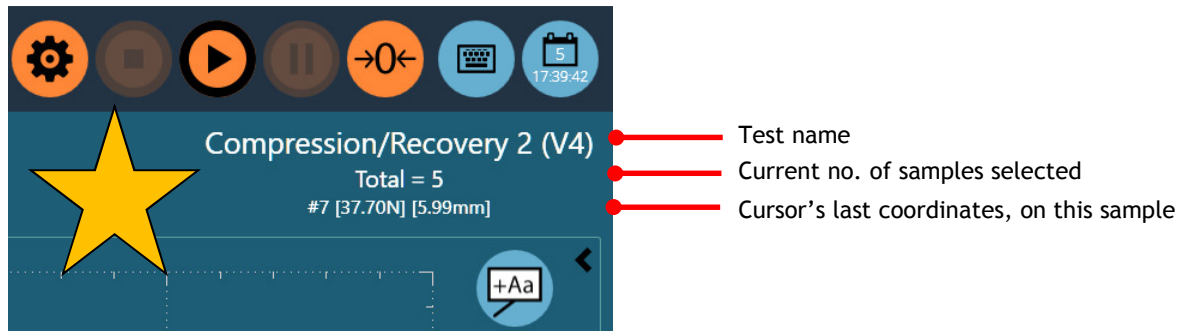
9.2 Viewing results: calculations display

Click the Results tab (or the Graph view sidebar) to see the results of calculations.

In this example, six results are shown, where Max and Min calculations have been set with Verify limits. Four samples pass within Max limits, and four pass within Min limits. At the top, the sample selector bar shows that only two pass overall by falling within acceptable Max *and* Min bands.

The sample selector bar can be used to edit colours, selected samples etc., the same as in Graph view.

- To edit or try adjusting a calculation, click on any result square in the row. This will not be saved unless you click to Save on exit.

- To view the graph of a particular sample with its calculation result, click the calculation picture icon. Mouse or pointer control in the graph is zoom and pan. Contrast and image capture buttons are on the right:
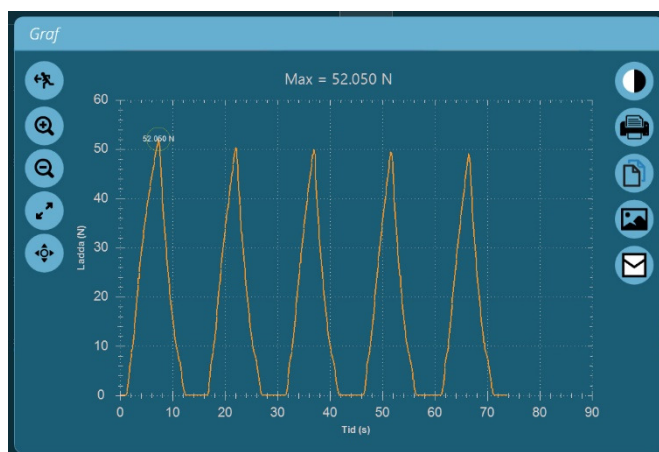
The left-hand column shows basic statistical results for all samples selected:

- Mean value

- Standard Deviation*

- Range of values across all selected samples

* Standard Deviation (SD) is sample not population SD (Variance calculated by dividing by N – 1).

9.2.1 Export data and results

Calculation results, including pass and fail, or raw data (all data points) can be exported or printed to reports:

TXT (comma or tab delimited) : Excel : Email results : print PDF report

For explanation of these functions, see Section 11, *Reporting and Exporting*.

10. Using a Test

When permission is given to a user for a test, an icon for the test will appear in their workspace. When images are applied as a test attribute, the first one placed shows as a background in the icon:
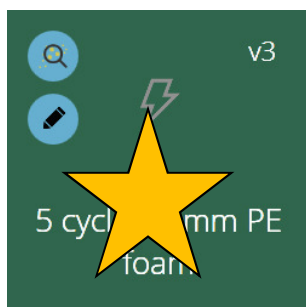
No image available, edit permission
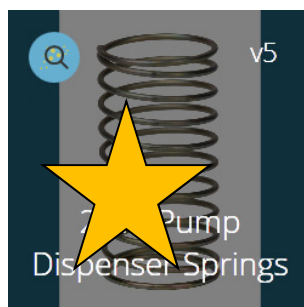
Image available, no edit permission

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

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

10.1 Run a test

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

A test can also be selected from the All Tests icon drop-down list, and in this situation, any version of the test can be used:
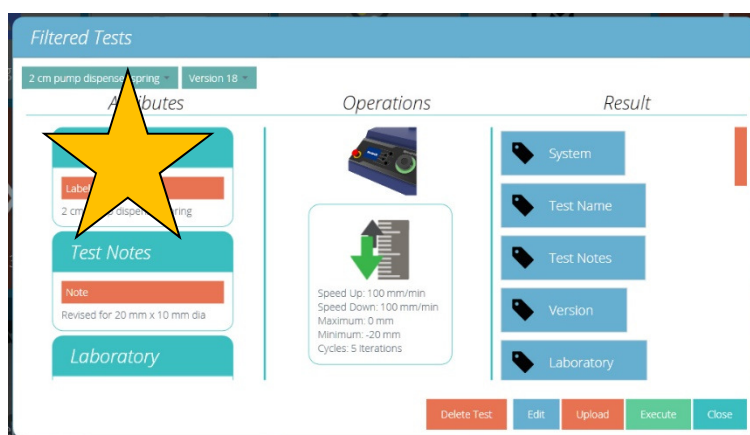
Click Upload to pass the test parameters to a connected test stand for manual use, or Execute to progress to Graph display for running the test:
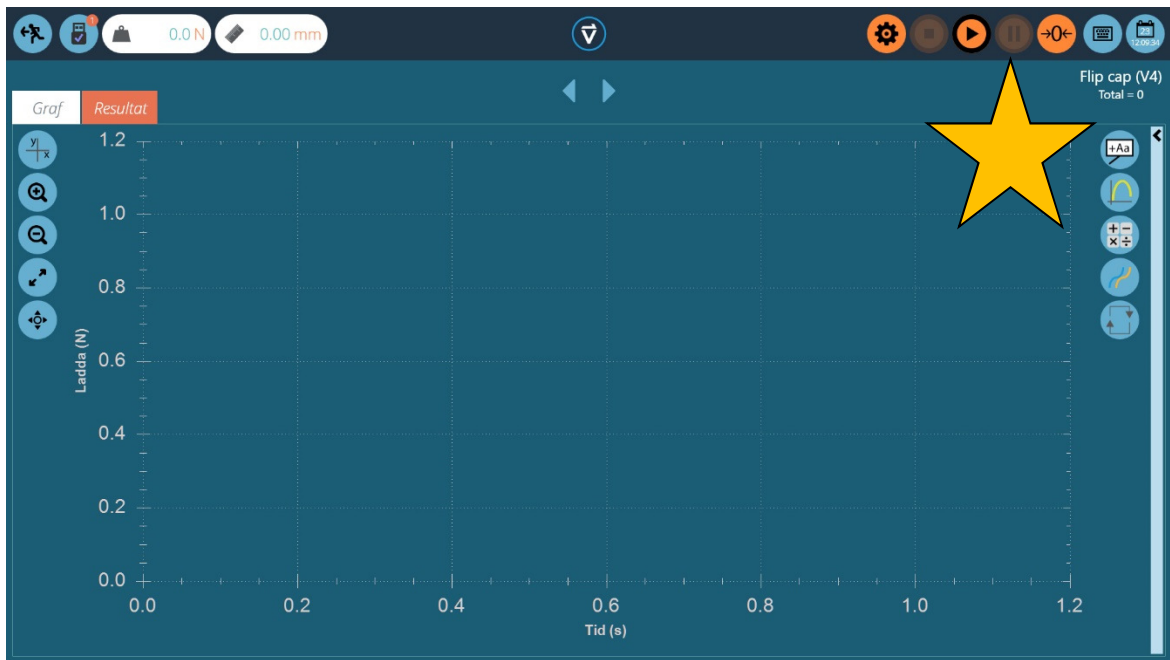
Here the test sequence has been uploaded to the dV test stand, with the test name and version displayed top right.

- The gauge load display is not zero, and can only be reset on the gauge itself.

- The displacement is not zero, and can be tared on the dV stand itself, or using the same icon button in VectorPro Lite.

- Any of the graph controls can be used before a test, most usefully to set the x and y axes. (Load/torque vs Time is the default.)

10.1.1 Control bar

The control bar (orange buttons) is used when running a test.

Any settings made here are lost when exiting VectorPro Lite, but remain when switching between tests.

Settings: described below in detail, sets start and end load/torque and displacement/angle triggers for recording data, and the options for auto-exporting results and/or data at the end of each test.

Ends the test and stops the stand motor.

> **Note: this action may leave a residual load or torque, which must be resolved by using front panel jog controls.**

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

Starting a test from the *dV* panel controls will not record data in VectorPro Lite.

Pauses the live graph display. Click again and the line will resume. This does not pause motor movement and does not stop data collection.

Zero the displacement or angle of the test stand.

10.1.2 Test triggers

The start of data recording and ending can each be set to a time or to a load/torque.

Select the required triggers and enter the required values. Click away from the settings box to use for this test, or click the test to save with the test on exit. For report and export settings, see section 11 below.

11. Reporting and Exporting

11.1 Exporting

From the Graph/Results view, Raw data (all data points) and results (from calculations) may be exported to comma separated or tab separated files, or to an Excel workbook. Results (only) can also be emailed as a table, or results and graphs sent to a formatted PDF report.

Settings for export are made from the test run toolbar (orange gear wheel icon, see 11.1.1 below) or the export toolbar (above the statistical results) using the arrow icon:
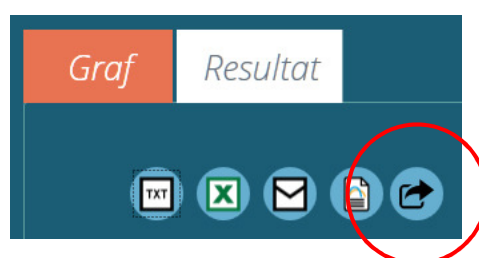
Export toolbar

TXT

A results file (calculations and statistics) will be generated. Choose between a comma-delimited or a tab-delimited format. If Raw is switched on, a file will also be created for each sample currently selected, containing all data points. The results file name chosen is supplemented by a date/time stamp.

```
Prov,Topp (Ordning 1) (N)
1,7.70
2,7.65
3,7.30
4,7.30
Medel,7.49
SD,0.22
Min,7.30
Max,7.70
```

```
Tid (s),Ladda (N),Förflyttning (mm)
0,0,0.017
0.035,0,0.044
0.065,0,0.069
0.095,0,0.096
0.131,0,0.126
0.162,0,0.155
0.197,0,0.18
0.227,0,0.206
0.26,0,0.235
0.293,0,0.261
0.329,0,0.292
0.365,0,0.324
```

Results file   **Raw data file**

Excel

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

Email

Enter complete email addresses, separated by semicolons.

Report

This creates a templated report, which can be printed and/or saved as a PDF file (see 11.2 below).

11.1.1 Export settings

Select a required export(s) by enabling that format, and complete the other options:

The icons down the side will perform the export immediately, or the dialogue may be closed for automatic export from the next test run. If automatic export is not enabled, the export toolbar can also be used.

Manual export

The export toolbar is the quick way to perform a manual export, for example at the end of a series of test runs. Set file names and destinations etc., but do not enable automatic export.

Automatic export

Automatic export will create files after every test, so to avoid accumulating files with increasing addition of samples, set export to overwrite. Be careful to use folder destinations to distinguish collections of results for different tests, especially when using the overwrite function.

11.1.2 File naming behaviour

File naming is dependent on the overwrite option. Tab-separated files are given extension .txt, comma-separated files are given .csv.

TXT with overwrite

First execution:

- 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 execution:

The results file is overwritten, along with any correspondingly-named raw-sample files.

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

TXT with no overwrite: timestamping makes results file unique

First execution:

- One file for results: [file name]-[test name](test version)-yyyymmdd-hhmmss.csv, plus (if raw data enabled):
- a file for each sample, [file name]-[test name](test version)-sample-#.csv (no timestamp)

Second execution:

A new timestamped results file is generated, along with any correspondingly-named raw-sample files. These overwrite previous files of the same names.

- 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 running raw data to Excel, that the whole workbook may take a few minutes to complete.

First execution:

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

Second execution:

Any correspondingly-named file will be reused.

- The Results worksheet will be replaced and

- new raw sample worksheets for previously unrepresented samples inserted.

- Worksheets for samples of the same name will be repopulated, and

- worksheets not represented in the later export will not be affected *and will not be included in the results*.

Excel with no overwrite: timestamping makes results file unique

First execution:

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

Second execution:

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

11.2 Reporting

Preparing report layouts has several stages:

1. populate the report toolbox
2. populate the report template
3. position and size the elements

11.2.1 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 attribute (image, label, note). Tables of results and graphs are available by default in every report.

1. Begin in the Test 'Result' tab, by dragging attributes across to join any calculations:

This can be the same illustration as at 7.4
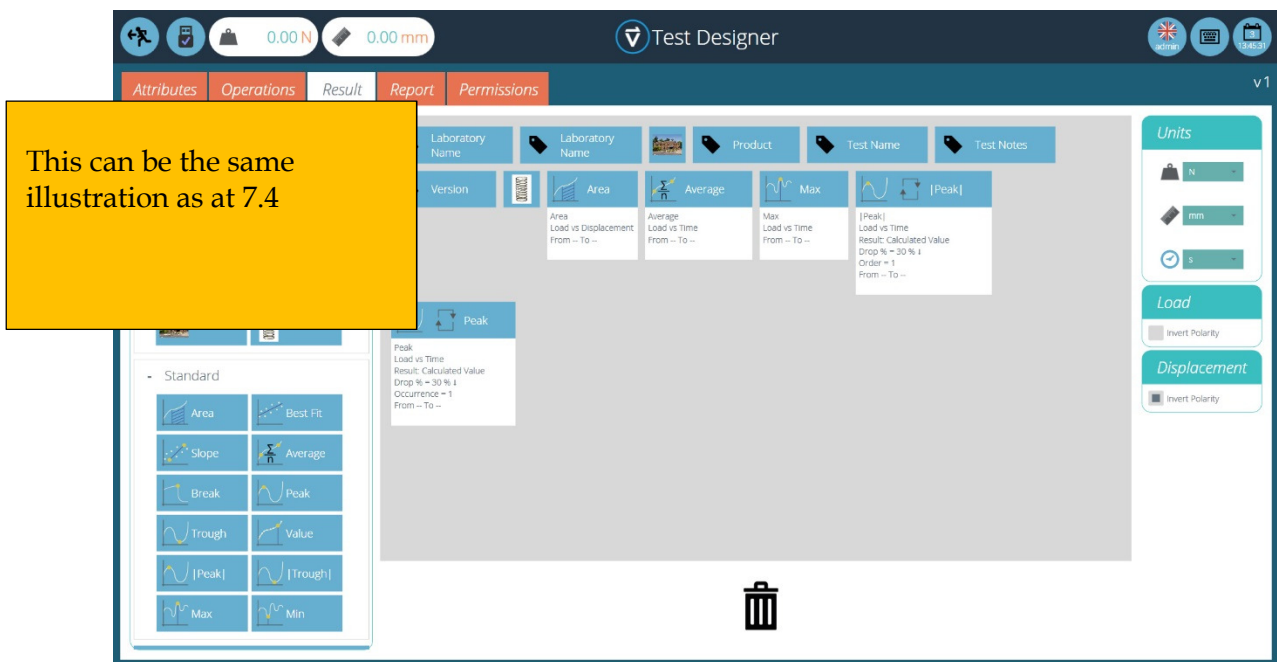
2. Go to the Report tab, where you will find the selected attributes in the Report toolbox, next to a blank page.

3. Drag attributes onto the blank page in rough position and size, to separate them. These can be refined, alongside graph and results table at the next stage.

From the Results view, export toolbar, open the PDF format:
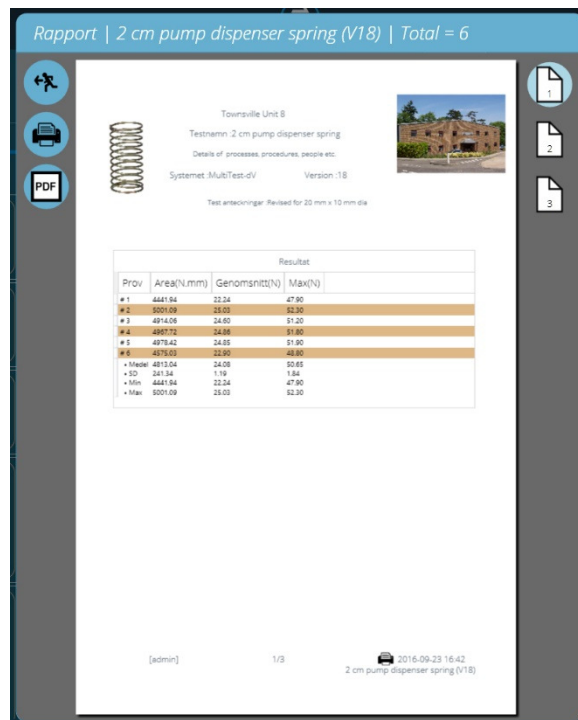
	Save and Exit
	Print
	Save as PDF
	Go to page number shown

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.

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

Each report has a protective default password applied to it: abc

12. VectorPro Lite with Force and Torque Instruments

VectorPro Lite can be used directly with Mecmesin digital force and torque instruments, for example the Advanced Force Gauge (AFG), Tornado torque tester, or an Advance Force and Torque Indicator (AFTI) with sensor. Connected via the appropriate cable to a PC with VectorPro Lite, load or torque vs time data can be acquired, with the same live graph display, calculations, results and reporting features as described in this manual. The differences are that, without measurement of displacement or angle, cyclic operations are not available. Similarly, graph overlay and offset features cannot be accurate without speed control.

12.1 Advantages of using VectorPro Lite with digital instruments

Mecmesin digital instruments have a number of useful features, including pass/fail alarms, max lock, first and second peak recording, averaging, and constant multipliers. They can transmit results to other devices, but only with data acquisition software can they be used to display live data, record any number of sample tests, tag, analyse and compare them.

Force gauges can be used with manual test stands for even application of force where precision of speed is less important, and torque testers can be used for small rotations, breakaway torque etc. where hand rotation can be reasonably smooth.

12.2 Procedure with instruments alone

Using VectorPro Lite with an instrument will typically follow a procedure like this:

• Create a test in VectorPro Lite as described in Section 7, *Designing a Test*. This will have no Operation element, but will define the instrument to be used, and results to be calculated.

• Connect the instrument to the host PC, and switch on, setting any required parameters, and force or torque units. Baud rate of the instrument need not be set.

• VectorPro Lite will not indicate that a USB system has been connected, so a red cross will be shown in this icon, but the current reading of the device will display its current reading (example below is a Tornado torque tester):

• Run (execute) the test. In the graph display, you will notice that there is no axis button, instead the plot area colour is shown, and on the right, no cycle selection is available:
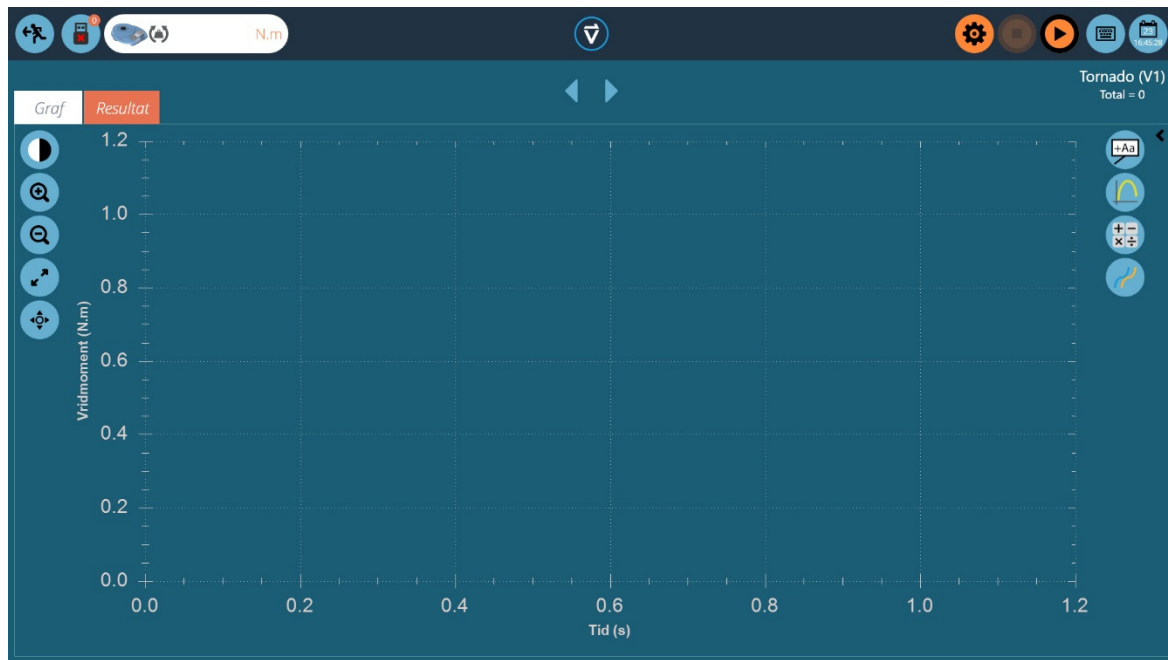
- Decide how the test run will be controlled. You can use either or both orange run and stop buttons, but without a fixed start time it is easier to use triggers (see 10.1.2, *Test triggers*). For example, this could begin recording at a minimum load or torque, and end at a set time sufficient for a test. This means the test will not start recording until a load or torque begins to be applied, and will not run on longer than necessary.

  Note: there is no instrument control feedback to stop VectorPro Lite recording data.

- Click the orange arrow start button, then perform the manual test.

- If there is no end trigger, click the orange stop button.

Results handling, retrieval and reporting is the same as when using a motorised test stand.

13. Quick Icon Reference

Run test control toolbar: see page 35

Test data settings   Stop test   Run test   Pause data display   Tare displacement/angle
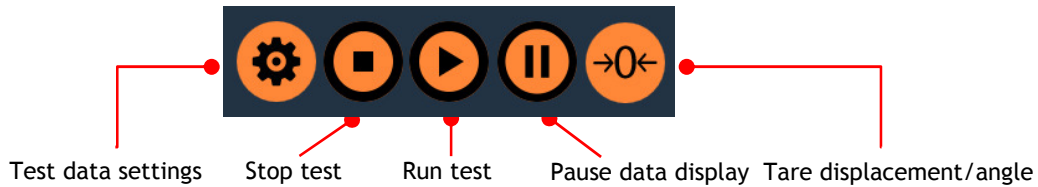
Graph display: see page 25

Display data points

Select line thickness

Select plot area
background colour

Show/hide gridlines
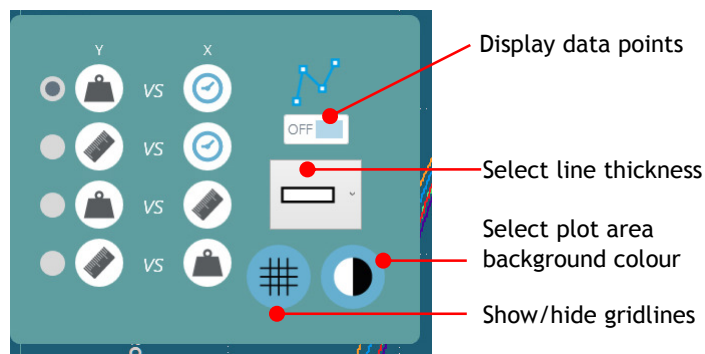
Test sample selection and presentation: see page 26

Test run start date and
time. Click to **hide**
sample in this view.

First two eye icons
toggle to view all, or
only this sample.

Select a different **colour**
for this sample. Others
will not change.

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

Deselect this sample
from the current
selection.

Delete this sample
completely from the test
record.

Add a **name** to this
sample (click the tick if
you want this to be saved
with the results).

View/delete annotations.

Clear this sample's offset.

2016-08-08 15:10:29

Sample name

Offset
0

Annotation title
#2 [8.35N] [9.30s]

Results examination: see page 28

Graph display controls

Click to zoom in progressively

Click to zoom out progressively

Click to restore full graph view (autoscale)

Click to switch drag action between select (marquee) and pan

Add data annotations

Graph capture tools

Add a spot calculation

Offset sample plot lines

Select a cycle to view
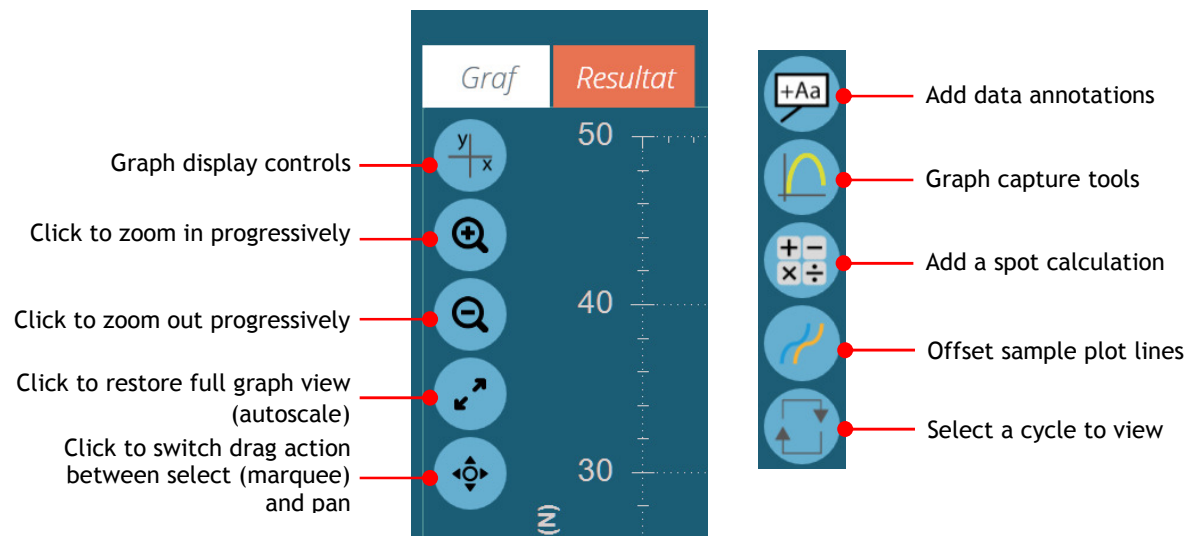
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