User guide
F-9930-1008-07-A

RENISHAW
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CARTO

Explore 3.0

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Legal information

Safety

Before using the laser system, please consult the laser safety information booklet.

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Renishaw part no: F-9930-1008-07-A
Issued: 04.2018

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Contents

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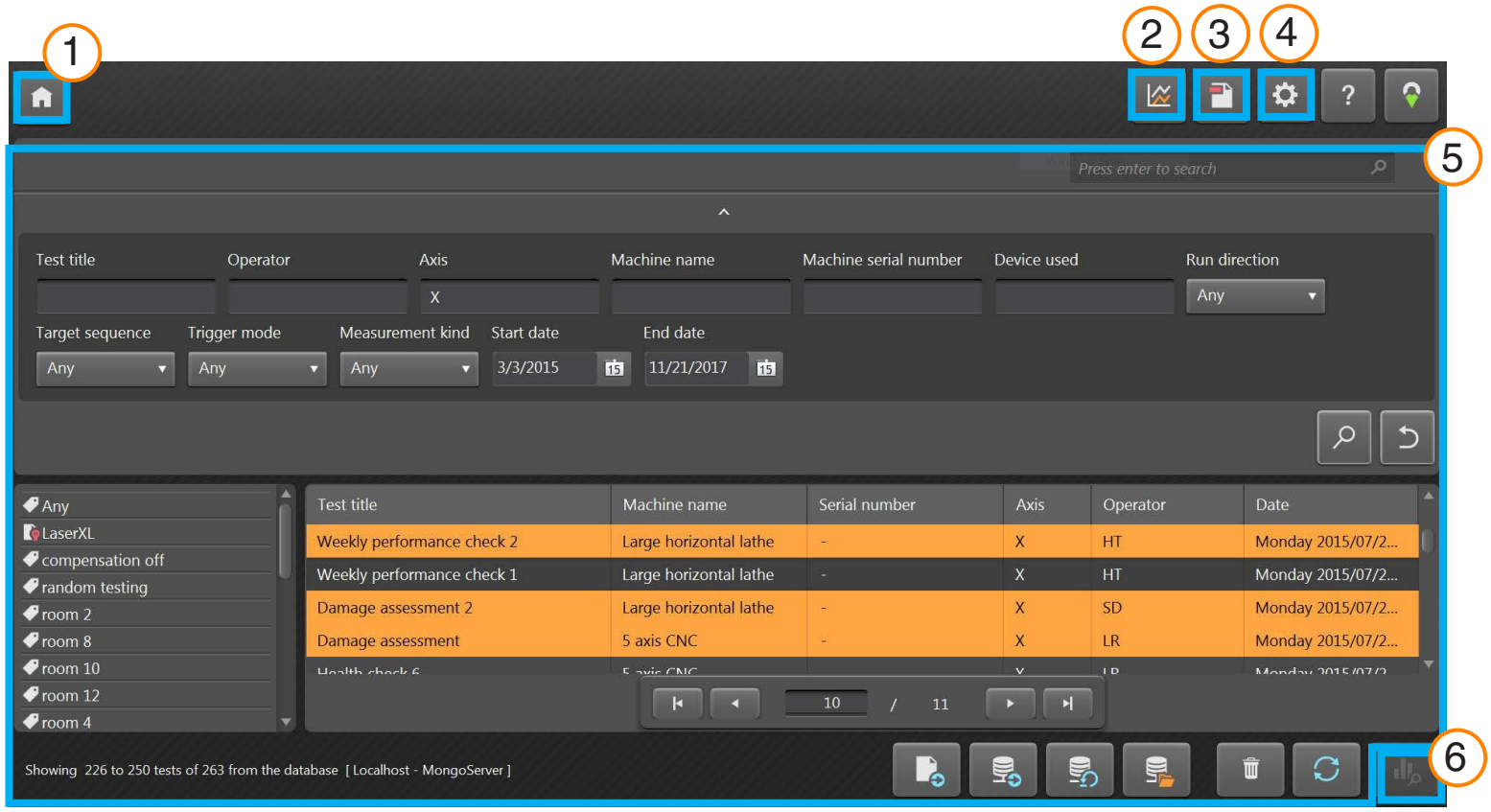
Introduction

The image below highlights the main areas of the Explore interface. Please use the contents page to jump to the relevant section.



1	Home
2	Compare
3	Combined report
4	Settings
5	Test browser
6	Data review and analysis

Home screen

The home screen allows the user to set up a new test or to use an existing test from the database. To return to the home screen at any point, select the home icon on the top left of the screen.

Test browser

The ‘test browser’ is an area used for handling and selecting results. Browse through the tests saved in the database and open them for analysis or export them.

Search

Quick – For a quick way to filter test results, use the search box available when the search area is not expanded.

Advanced – Expand the search area to use the advanced search. Results can be filtered based on multiple criteria at the same time.

Order

Left click on a category (test title, machine name, axis etc) to organise the tests based on the chosen category. Click it again to toggle between ascending and descending order. For fast loading time, long lists of test records are split up into pages. The number of test records per page can be adjusted in settings.

Export to files

Export test records to RTL, RTA and ST* files by highlighting a test or a group of tests and then selecting the ‘export tests’ icon. Exported files are compatible with Renishaw XCal-View software. To export files that are compatible with older file formats, go to ‘settings’> ‘application’ and tick ‘use the legacy LaserXL precision settings when exporting to files’.

Export to transfer file / import transfer file

To transfer test records to a CARTO database on a different computer, highlight the required test records and select the ‘export to transfer file’ icon at the bottom right of the screen.

Export all tests

To export all database records to a single .CARTO file, select the ‘export all tests’ button at the bottom right of the screen.

The ‘.CARTO’ file can then be transferred to a different computer and then imported to the new CARTO database by pressing the ‘import transfer file’ icon. When importing data from a ‘.CARTO’ file, the test records will be automatically tagged with a name that states when they were imported (dd/mm/yy).

Delete

Highlight a test record and select the ‘delete’ icon at the bottom right of the screen. Deleted test records can be restored from the home screen.

Refresh results

When tests are saved in Capture whilst the ‘test browser’ is open, the new tests will not be shown until the next time Explore is opened, or the ‘refresh’ icon is selected.

View results

Open a test record by double clicking on it with the left mouse button or by selecting the ‘view selected test’ icon when the test record is highlighted.

Tagging

Tags can be added by selecting a test record or group of test records and typing text in the ‘add tag’ field, then selecting the ‘enter’ icon. To add more test records to an existing tagged group, select the new test records and use the drop down list to assign the required tag. When a test record is selected, all of the tag names associated with it will be shown in the ‘tag window’. Remove the association between a test record and a tag name by holding the mouse over the name and selecting the red cross on the right hand side of it.

Importer

The importer button on the home screen allows users to import legacy file based tests into the CARTO database. This functionality is provided to assist a user in transferring to the CARTO suite from LaserXL or RotaryXL software.

Clicking the ‘search’ button on the left hand side will prompt the user to define the location folder of the tests to be imported.

For any tests that are missing an ‘axis under test’ label will be displayed red until this has been added by the user. This is done by using the ‘edit test’ button at the bottom right of the screen and selecting a letter in the dropdown under ‘Axis under test’. Tags can be added during the importing process in the same way as described in the ‘tagging’ section. Tests that have already been imported can be shown or hidden using the ‘show imported tests’ toggle.

Licensing

The functionality is limited to a 4 week period. Additional use requires a serial key; please contact your local Renishaw office.

View dynamic and flatness data

Data can be viewed, but not imported from legacy LaserXL data capture software. The following can be viewed:

- Dynamic time based (.rtx files)
- Dynamic displacement (.rtd files)
- Flatness moody and grid (.rtn files)

Settings

The first time Explore is opened, the ‘settings’ window will automatically open. Use the four ‘settings tabs’ to specify your preferences and then click ‘save’. These settings can be changed at any point by returning to ‘settings’. To choose whether error channels are named in the VDI 2617 or ISO 230-1 formats, tick the ‘display channel names according to ISO 230-1 standard’ box in the ‘application’ tab.

Use local date format for reports

As default, the ISO date format (YYYY-MM-DD) will be used in PDF reports. To change this to a local date format, go to the ‘application’ tab and tick the box called ‘use local date format for reports’.

Display straightness as average across all runs

To display straightness readings as an average across all runs:

- Go to the advanced configuration tab in settings.
- Tick the ‘display as average across all runs’ box.

Straightness results at each position will be averaged across all runs in the:

- ‘Raw’ graph.
- ‘Renishaw straightness 2012’ graph.
- ‘Compare’ graph.

Add a personalised company logo for reports

Select ‘settings’>‘application’ and then browse for your personal logo.

Note: The size of the logo in reports will be 200 × 50 pixels. If the logo is not this size, the software will automatically scale the chosen logo to fit on the report.

Your personalised company logo will now appear on the top right hand side of PDF and printed test reports.

Font selection

Use the dropdown menu to select the font that is used when PDF reports are created.

Database servers

When CARTO users are using a shared network, it is possible to view, print, compare and even export (to files) test records from another CARTO database on the network. The method for this is: ‘settings’>‘server configuration’>‘add’>. The following details should be entered to the configuration:

- A name for the configuration.
- Network address of the computer to be linked to.
- Version number of CARTO on the computer to be linked to.

Entries for ‘server configuration’ can also be deleted by selecting them and pressing the ‘delete’ icon.

Data review and analysis

Test explorer

The ‘test explorer’ panel, found on the left hand side of the software when a test is open, contains details regarding the open test.

Measurements – Displays the ‘graph plot’ and ‘raw data’ table for the selected test. When viewing the ‘raw’ graph of an error channel, there is a toggle beneath the graph to change whether the channel is plotted against position or time.

Test information – Contains details of the selected test. The title, operator, notes and machine name of a test record can be edited (this is indicated by the pen symbol next to these fields). To edit the text, left mouse click in the field, type the new text and press the ‘save’ icon in the top right.

Environmental conditions – The ‘environmental conditions’ tab summarises the data captured by the environmental compensation unit during the test (when connected). Clicking on a graph will give more information and will allow printing or creation of a PDF file.

Analysis

Opening a standard – Once a test has been opened it is possible to view the data using one of the international analysis standards supported within Explore. The analysis standards can be found in the column on the left hand side.

Supported analysis standards – ASME 5.54 1992, ASME 5.54 2005, GB/T 17421.2 2000, GB/T 17421.2 2016, ISO 230-2 1988, ISO 230-2 1997, ISO 230-2 2006, ISO 230-2, 2014, JIS B 6192 1999, ISO 10791-4 1998, JIS B; 6190-2 2008, Renishaw 2012, VDI 3441 1977, VDI 2617 Template 1989.

Switching the data view – Data can be viewed in different formats using the tabs at the top of the data plot. The format options vary depending on the analysis standard that has been selected.

Enable and sort analysis standards – The ‘enable and sort analysis standards’ window allows users to choose which analysis standards should be displayed and to change the order. To toggle between showing and hiding the standard, select the eye symbol next to each standard. To change the position of an analysis standard, select the standard so it is highlighted, then press the ‘move up’ or ‘move down’ icon.

Graph plot options

Change the plot style – Select 'graph configuration' icon. This will give the user the following options:

a) **Scale tab** – Select desired scaling type for the X and Y axis independently. The available options are automatic, manual or manual centred scaling.

b) **Display tab:**

- Show legend – Displays the run identifications on the right hand side of the plot.
- Show grid – Displays a 'background grid' on the plot relative to the scale.
- Black and white – Switches all plot runs to black and white.
- Line thickness – Adjusts the thickness of the plot lines.
- Marker style – Select the style of marker used in RAW, Renishaw graphs.

Analysis feature highlights

Select an analysis feature in the analysis results tables to show the result graphically.

Graph interaction

When analysing a test within Explore the following options are available to customise the graph:

'Zoom' in and out about the mouse pointer:

- Place the mouse pointer over the graph and use the scroll wheel.
- Hold the 'control' key, press the + or – key to zoom in or out.

'Zoom' the axis scale – Place the mouse pointer over the required axis, click the left mouse button then scroll the mouse wheel.

'Zoom' to a manually selected area:

- Hold the mouse scroll wheel and drag to select an area to zoom.
- Hold the 'control' key, select and hold the right mouse button and drag to select the area to zoom.

'Pan' the axis scale up and down:

- Place the mouse pointer over the required axis and hold the right mouse button, then drag the axis.

'Pan' the graph plot:

- Position the mouse pointer over the graph, hold the right mouse button and 'drag'.
- Place the mouse pointer over the graph and 'left click'. Then hold the 'control' key and use the arrow keys.

'View' point coordinates and series details – Position the mouse pointer over a capture point on the graph and hold the left mouse button to view information.

'Revert back' to default settings:

- Place the mouse pointer over the graph and double click the mouse scroll wheel.
- Place the mouse pointer over the graph, press the control key and double click the right mouse button.
- Place the mouse pointer over the graph and select 'control-A'.
- Place the mouse pointer over the graph and select the 'home' key.

Creating reports

Reports can be created using the following methods:

- Copying and pasting the relevant data into another application for editing.
- Creating a formatted PDF from within Explore.

Note: Adobe® Reader or a similar program must be installed on the computer to view .PDF reports.

Copy and paste

Data within the software can be copied from any page where the copy symbol appears.

Create a PDF

A PDF report can be generated from any analysis screen by selecting the 'Adobe®' symbol icon. This allows selection of further Adobe options, such as save and print. Alternatively, select the 'print' icon to go directly to printing.

Combined report

A single PDF report can be created, displaying all six error channels in one report.

1. Go to the test browser.
2. Select a test record.
3. Press the 'combined report' button in the bar towards the top right of the screen.
4. Tick the relevant boxes for information (e.g. RAW plot, RAW stats, GB/T 17421.2 2016 etc) of the required error channels and select 'view pdf'.

Report builder

To build a report:

1. Go to the test browser
2. Open a test record
3. Select 'more'

Note: for XM system select the degree of freedom

4. Select 'report builder'
5. Select 'Options'
6. Select 'Print' to create a PDF report

Zero point offset

'Zero point offset' enables the data to be offset so the displayed and effective '0' position is different from that set at the time of data capture. This can be useful for error compensation of rotary axes.

Applying 'zero point offset'

1. From the bottom of the 'test explorer' panel, select the 'zero point offset'.
2. The 'zero point offset' dialog box will then be displayed.
3. Configure the 'zero point offset' as required.

Revert the settings back to original

Uncheck 'apply zero point offset' to revert to original settings.

Compare

Comparing data files

Comparing test records can be useful for applications such as comparing data before and after error compensation or viewing the effects of angular error for linear positioning. Whilst in compare view, zero point offset, slope removal and graph inversion can also be applied to the data.

To compare files:

1. Go to the test browser.
2. Select one or more test records.
3. Select the 'compare' button in the bar towards the top right of the screen.
4. In the table at the bottom of the page, tick the boxes of the error channels of interest.

- Extra test records can be added to the table by selecting 'add' button.
- Tests can be removed by selecting the 'reset' button to the left of the table.
- To make edits to how an error channel is displayed, select the error channel in the table and make adjustments using the panel on the left.

Note: When comparing different types of error, such as linear with angular, an additional Y axis will be created for angular units.

Error compensation

1. Expand the 'test explorer' panel on the left hand side of the software screen using the expand icon.
2. Select 'error compensation'.

Configuration

Compensation type:

- Unidirectional – One table of compensation values with a backlash value.
- Bidirectional – Separate values for forward and reverse directions.

Calculation type:

- Incremental – This gives values calculated with respect to the previous compensation point.
- Absolute – This gives values calculated at user defined points with respect to the reference position.

Resolution – The resolution of compensation values produced.

Sign convention – Configures the output values to either 'as errors' or 'as compensation'. Inverts the sign of compensation values produced.

Type:

There are two error compensation formats available: LEC.REN and LEC2.REN.

Choose a format which best suits the requirements for the relevant machine controller.

Reference position – The axis position where the zero point of compensation is applied.

Start – The start position on the axis where compensation is applied.

End – The end position on the axis where compensation is applied.

Spacing – The spacing between each compensation point.

No. of points – Instead of specifying the compensation spacing, the number of compensation points can be specified.

Saving configuration settings

If the configuration settings are required for future use they can be saved by selecting the ‘save’ icon.

Loading configuration settings

‘Load configuration’ icon can be selected to load a previously saved compensation configuration.

Viewing error compensation files within Explore

Once the configuration settings are complete select the ‘generate’ icon.

The error compensation data can then be viewed in ‘compensation table’ format or ‘graphical compensation’ format.

In graphical compensation view, the plot displayed will show the initial captured data results as well as the ‘predicted machine performance after compensation’.

Saving the error compensation file

When the error compensation has been generated select ‘export’ to save the compensation file. Select a location to save the compensation table.

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F-9930-1008-07

Issued: 04..2018

Part no. F-9930-1008-07-A