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1. Start the system

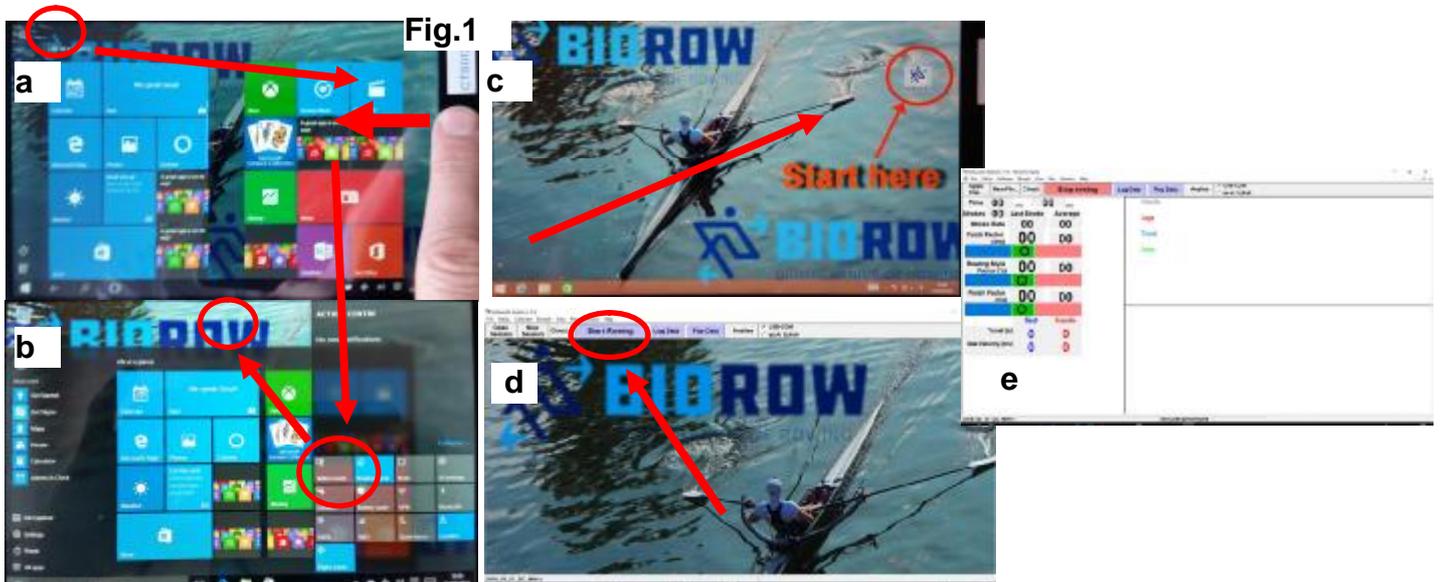
To power ON the tablet PC, press 2-3s the button on its top left edge (Fig.1, a). With Windows 10 tablet, you may need to switch “Tablet mode” OFF after booting. To do it, slide finger from the right edge of the screen, touch “Tablet mode” button (Fig.1, b) to and touch desktop outside icons.

Double-click “BioRowTech” button in the centre of the desktop to start the software (Fig.1, c).

Click “Start Rowing” button on the toolbar and start rowing (Fig.1, d).

The main working screen appeared (Fig.1, e), and the button will change colour to red and caption to “Stop Rowing”.

To finish the piece of rowing, press red button “Stop Rowing” and the main working window will be closed.



2. Settings

This function can be opened with menu **Setup - Settings – Feedback** (Fig.2) and defines how the main rowing indicators are evaluated. Please modify only circled variables.

RSF mode defines where the Rowing Style Factor (ratio of the seat and handle movements) is calculated:

- At certain **Percentage** of the drive length;
- At **Fixed length** of the handle travel (recommended value 0.30m). This option is useful, if you practice drills (half slide, catch only, etc.).

Catch Factor target values are defined as following:

- **CF Low (ms)** – defines the border between the green zone and blue zone on the left. Recommended value for RP3 erg is -40ms at stroke rate 20spm, and for C2 erg it is -50ms;
- **CF High (ms)** – defines the border between the green zone and red zone on the right. Recommended value is 0ms at stroke rate 20spm for both C2 and RP3 ergs;
- **CF margin** defines the scale of red and blue zones in relation to the scale of green zone. At the recommended value **2.0** and above scale of green zone 50ms=(0) – (-50), the right edge of red zone corresponds to +100ms= (0) +50***2.0**, and left border of blue zone equates to -150ms= (-50) - 50***2.0**
- **CF slope (ms/spm)** defines how target CF changes with the stroke rate. Recommended value 0.6 ms/spm means that CF increases by 0.6 ms at every 1spm increase of the stroke rate, or by 9 ms at 15spm higher rate.



The **Rowing Style Factor (RSF)** variables are defined in similar way:

- **RSF Low (%)** – defines the left border of the green zone and right border of blue zone. Recommended value is 80%;
- **RSF High (%)** – defines the right border of the green zone and left border of red zone. Recommended value is 100%;
- **RSF margin** defines the scale of red and blue zones in relation to the scale of green zone. At the recommended value **2.0** and above scale of green zone 20%=100% – 80%, the right edge of red zone corresponds to 40%= 80% -20%***2.0**, and left border of blue zone equates to 140%= 100% + 20%***2.0**

Finish Factor (FF) target values are defined as following:

- **FF Low (ms)** – defines the border between the green – zone and blue zone on the left. Recommended value for all ergs is -100ms;
- **FF High (ms)** – defines the border between the green zone and red zone on the right. Recommended value is 0ms at stroke rate 20spm for both C2 and RP3 ergs;
- **FF margin** defines the scale of red and blue zones in relation to the scale of green zone. At the recommended value **2.0** and above scale of green zone 100ms=(0) – (-100), the right edge of red zone corresponds to +200ms= (0) +100***2.0**, and left border of blue zone equates to -300ms= (-100) - 100***2.0**
- **FF slope (ms/spm)** defines how target CF changes with the stroke rate. Recommended value -2.4 ms/spm means that CF decreases by 2.4 ms at every 1spm increase of the stroke rate.

3. Data recording and replaying

You may want to record the data of your rowing. To do this, click “Log Data” button on the toolbar (Fig.3, a). The data will start recording and the colour of the button will turn into red, and the caption will change to “Stop Logging”.

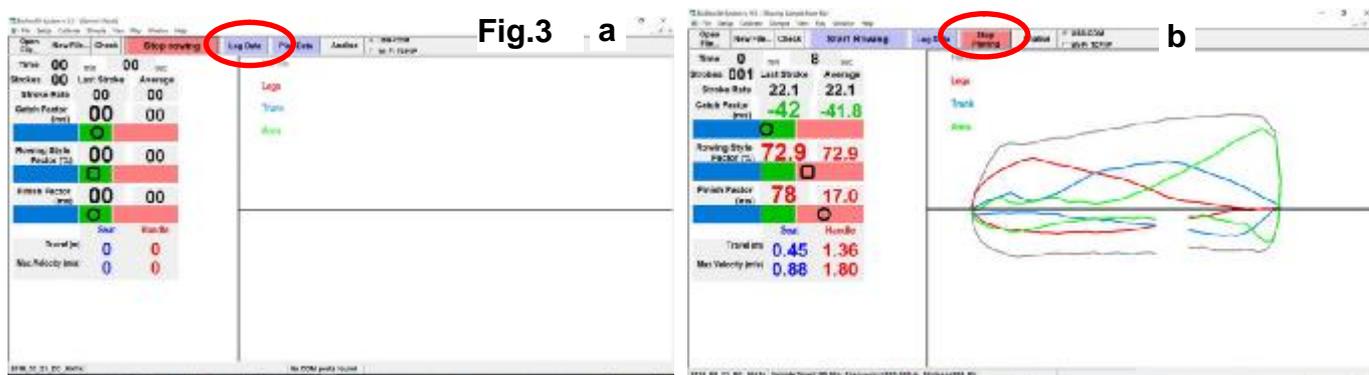
If you click this button again, the recording would stop, and the button will be again blue with colour and “Log Data” caption.

You can repeat logging cycle as many times as needed, and every time the data will be recorded in a sequential files numbered automatically.

To replay the data, click “Play Data” button (Fig.3, a), then choose the data file you want to play (they are located in the current session folder and have “.brt” extension).

The button colour will turn red and caption will be “Stop Playing”. If you click this button again, the playback will be paused, and the button will be blue again with “Play Data” caption. You can start and pause the playback as many times as needed until the end of the data sample.

To close the playback window, simply close the program with the “x” button at the top-right, and restart it.



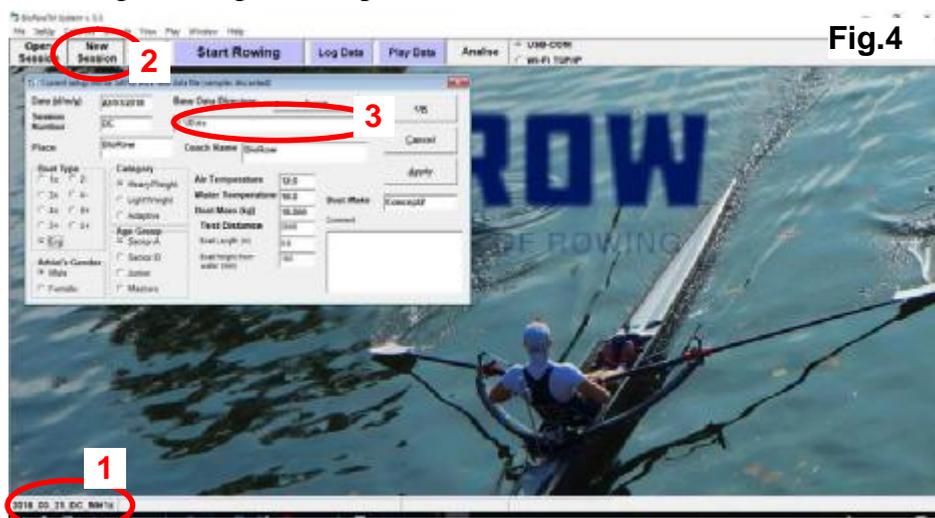
4. Data management

The data in all BioRow™ systems is organised using the Session concept. “Session” – means a set of data files related to a specific combination of rowing parameters, which are the following: the current date, type of boat or rowing machine, athlete(s) name(s), rigging variables, calibration numbers for measurement equipment, etc. Usually, a new session must be created, if any of these parameters are changed, but it may be created even more often to make data management easier.

The data for every session is stored in a separate folder, and the main settings will be stored in the Session file with the same name and “.txt” extension. The settings from this file are automatically loaded from this file every time the program starts, and its name indicated at the bottom-left status bar of the program screen (Fig.4,1). If this file and folder do not exist (deleted or moved/renamed), then the program shows error message after the start “Session data can not be found...”. In this case, you have to load the settings with “Open Session” button, then the program restarts.

A new Session folder and file can be created automatically with “New Session” button (Fig.4,2), and named automatically with the following format: “YYY_MM_DD_Session Number_Gender Weight Boat/Erg”. All setting will be copied into the new file (except the processed data), so make sure the proper Session settings are loaded before you create a new Session.

A new data folder and file in it will be created in the parent folder, which name is indicated at the top of the dialog box (Fig.4,3), so please make sure this folder exists.



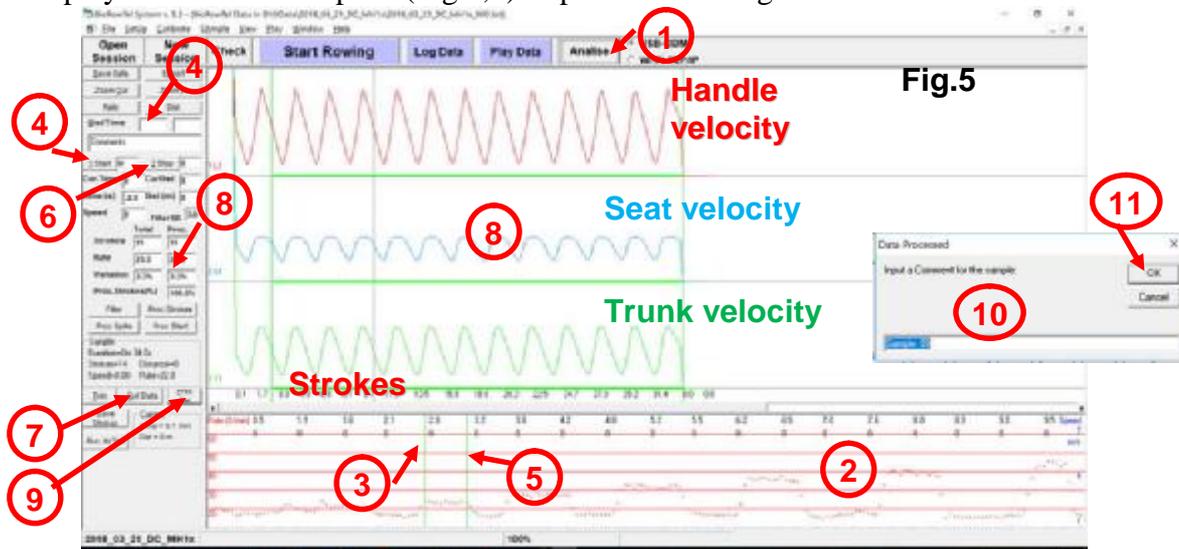
All recorded data samples will be stored in the current Session folder.

If you want to go back to a previous Session to recover data, or use the its settings, you can use “Open File...” button and select the required Session folder and file.

5. Data processing

For more detailed analysis, you may open a recorded data file in graphic mode, process average patterns for rowing samples, and then analyse them and print a report. It is recommended to do it with a mouse and keyboard connected to the tablet PC, or on a desktop PC after transferring files from the tablet PC.

Click “Analyse” button on the top toolbar (Fig.5,1), or use menu function View-Scan Data file. Then, choose a file from the current Session folder, and the file will be scanned to stroke cycles, and all found strokes are displayed at the bottom pane (Fig.5,2) as points according to their stroke rate.



To select a sample, click with a mouse or touch-screen at its start (Fig.5,3) at the bottom pane and click “Start” (4) button or “Alt-1” keyboard combination. Then, click at the end of the sample (5) and use button “Stop” (6) or “Alt-2” keyboard combination.

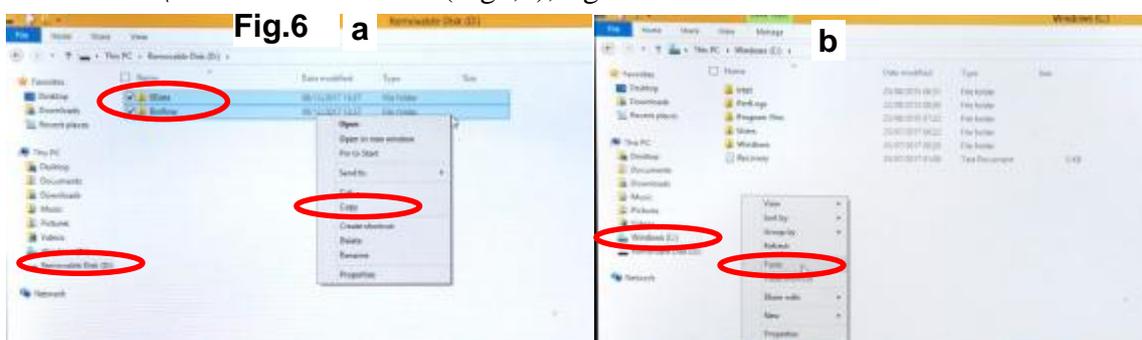
Click “Get Data” (7) and you will see the raw data of the selected sample in the top pane (8). You may select it more accurately, clicking on the top pane at the start and using “Start” (4) button or “Alt-1”, then at the end and “Stop” (6) or “Alt-2”.

Finally, click “Proc.Sel.” button(9), input a comment for the sample in appeared text box (10), or leave default automatic comment, such as “Sample 01”, ...02, etc. Click OK (11) in the comments box, and the selected raw data will be averaged into single sample curves are stored in the current Session file.

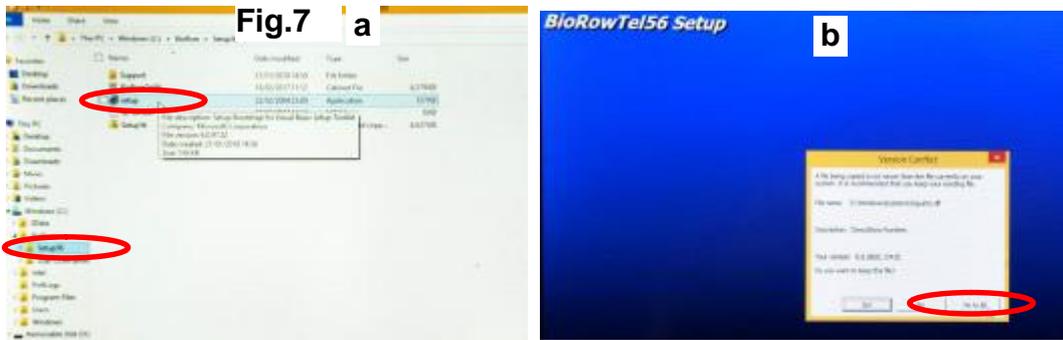
The averaged samples could be used for further analysis, see “BioRowTech Reports” manual below for further information.

6. Software installation and upgrade

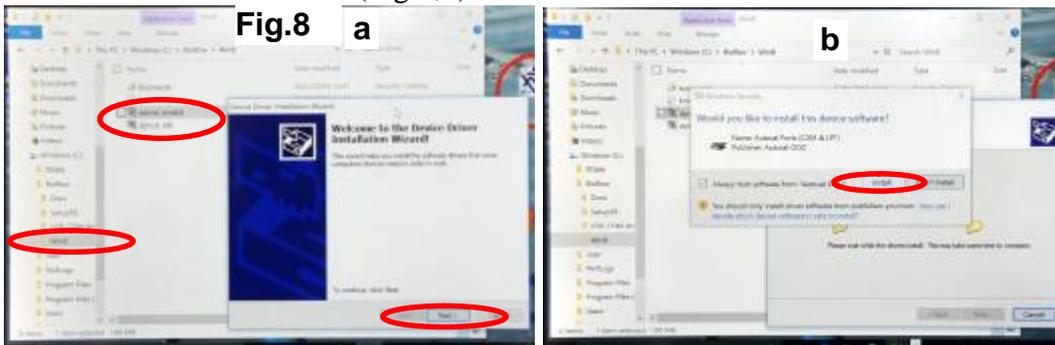
To install the software on a new tablet, you need to create or copy folders “BioRow” and “0Data” from supplied disk into root folder on the tablet (unzip them if they supplied on-line). To do this, select these both folders on the external drive (Fig6,a), right-click on them to open context menu, and choose “Copy” in it. Then, select the root “C:” folder on the tablet (Fig6,b), right-click and choose “Paste”.



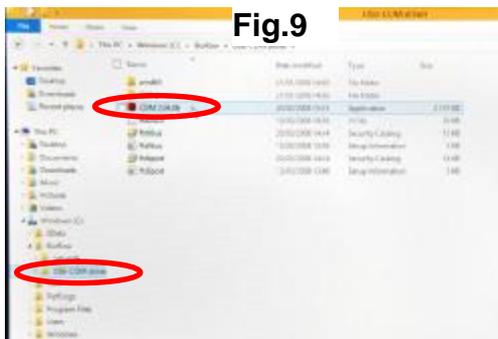
Run “Setup.exe” file from “BioRow/Setup56” folder (Fig.7,a) and follow instructions. If a request to keep files appeared (Fig.7,b), answer “No to all”.



Then, you need to install a driver for USB-COM adapter. With the latest version of the system with the Data Collector, got to “BioRow/Win8” folder and run one of two “.exe” files in it, depending on the operation system on your tablet PC (32 or 64 bit). Nothing wrong will happen, if you run incorrect file: you will get an error message. If the version is correct, you will see “the Device Driver Installation Wizard” (Fig.8,a). Then, follow instructions on the screen (Fig.8,b).



With older hardware versions (with BioRowTel slave extension unit), you need to run “CDM 2.04.06.exe” file from “BioRow/USB-COM driver” folder (Fig.9).



Finally, create a shortcut for the program: right-click somewhere on desktop, choose “New-Shortcut”, then select “BioROw/BioRowTech.exe” file

If you upgrading the software to the latest version, you only need to copy a new “BioRowTech.exe” file into BioRow folder, and replace the previous version.

If you received an amended calibration session, you will need to copy its folder/file into “0Data” folder, then open with “Open Session” function.

7. Troubleshooting

If the system does not work, please try the following:

1. Check out all connections and click “Check” button on the right of the toolbar. Move the handle or seat and make sure the signal moves in the channels 1, 2 and 3. If either signal from sensors does not move, check the connection again, and send a faulty sensor back to BioRow for repair or replacement.
2. If no signal could be observed with “Check” function and a message “No COM port found” is displayed at the status line, do the following:

Open Control Panel – Device Manager (Fig.10) and detect the USB Serial COM port number in Ports section (COM 4 in this case). Then, open Settings-General in the program (Fig.2), and input this port number, save it with OK and restart the program.

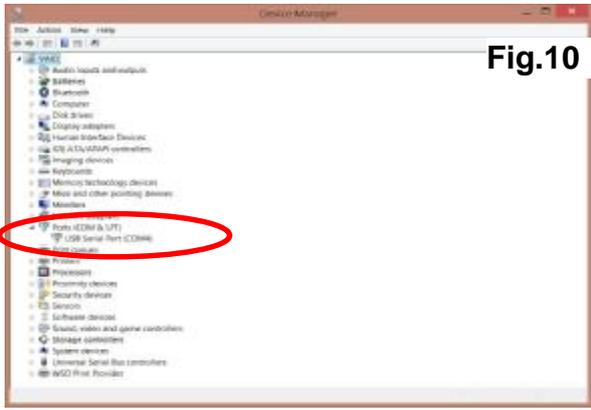


Fig.10

8. Using BioRowTech Reports

BioRowTech Reports.xls (BRTR) is an MS Excel application, which combines biomechanical analysis and data presentation in worksheets and charts with programming code for easy data managements (macros written in Visual Basic for Applications).

To use BRTR, you need Microsoft Excel installed on your PC. We recommend using MS Excel 2003, which works 5-10 times faster than Excel 2010 and 2013 and produces less errors. However, Excel 2010 and 2013 also work well.

Also, it is a good idea to install PDF printer in your PC, like pdfFactory or similar, and set it as a default printer. In this way, the report could be printed in pdf files, saved and then printed on paper, sent by e-mail and stored to longer time.

BRTR used data files produced by BioRowTech.exe data acquisition software, which created averaged data samples and records it in tab-delimited format in files with the following name template “YYYY_MM_DD_N_BoatType.txt”.

Therefore, Rowing Biomechanics analysis with BioRowTech consists of four stages:

1. Setting up a boat and oars calibration;
2. Data recording during rowing;
3. Data processing and producing averaged samples with BioRowTech.exe data acquisition software;
4. Data analysis and producing reports with BioRowTech Reports.xls software.

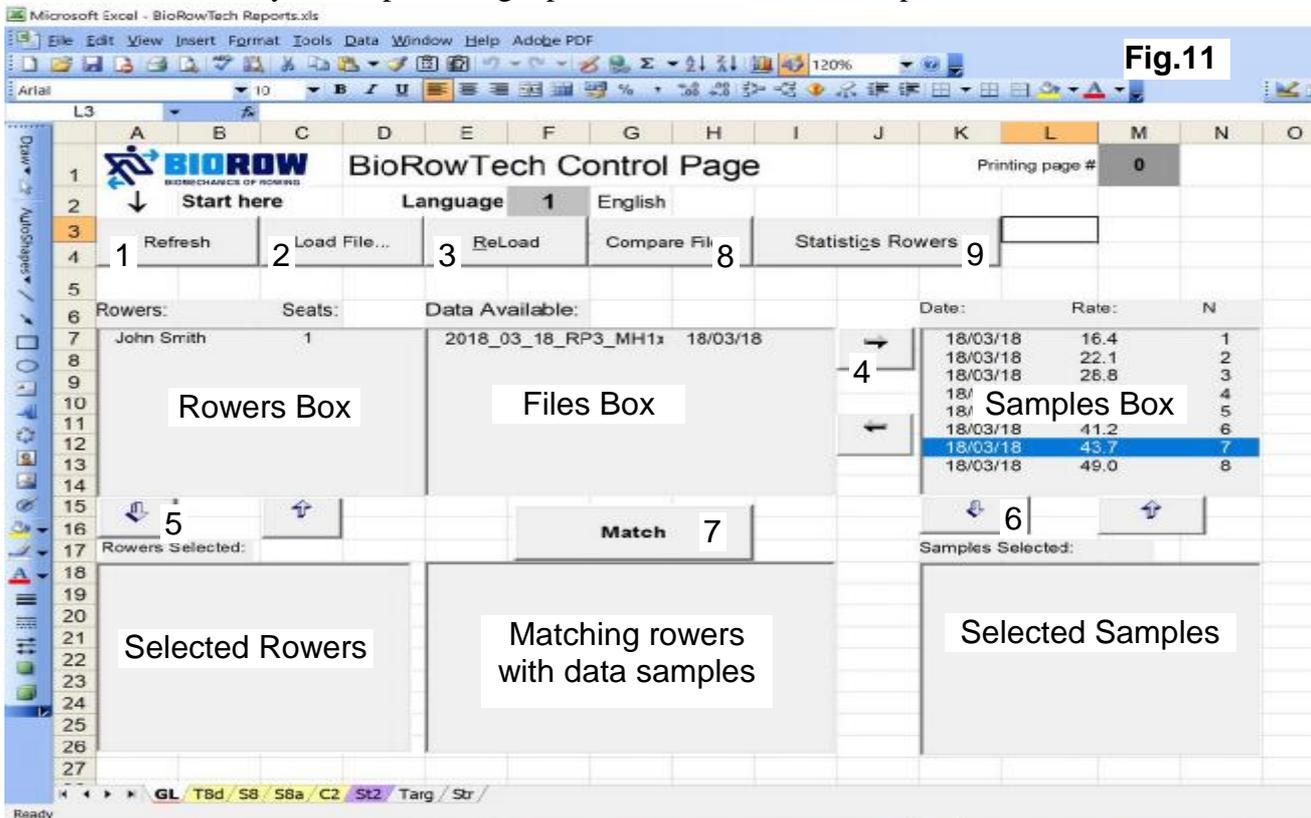


Fig.11

Getting started with Reports

1. Open Excel template file BioRowTech Reports.xls.
2. Activate the most left page “GL” marked with red colour in the bottom (fig.11).

3. If you want to use previous data, click “Refresh” (1) and the list boxes will be filled as it was before.
4. Click “Load File...” (2) button and select required data file to load a new data.
5. After loading completed, you can see rowers’ names in the top left box and file name and date in the top-middle box.
6. If you changed data file, click “ReLoad” (3) button and the current data file will be reloaded.
7. To see the samples in the loaded file(s), double click on its name in the Files Box, or select the name and click “→” button (4) next to it.

Every time, when new file loaded, the pages counter in the cell “M1” is set to zero, and for evaluation is chosen the second last sample in the sell “N3”. You can changed these numbers manually.

Printing all samples for one rower

1. Select the rower by double clicking on its name in Rowers Box, or click “↓” button (5) under Rowers Box.
2. Select all samples by clicking “↓” button (6) under Samples Box.
3. Click “Match” button.
4. Each of the first three report pages (marked in yellow) shows eight data samples for one rower, usually, at various stroke rates. You can print them one by one selecting it and pressing <Ctrl-P> keyboard combination.

Data comparison

1. To compare rowers or samples from different data files, click the button “Compare File...” (8) The currently loaded data will not be deleted, but appended with new data.
2. Select the rowers to be compared by means of double clicking their names in the Rowers B ox.
3. Select the samples to be compared by means of double clicking the File Name, then double clicking the sample. Repeat it for another file and samples in it.
4. Click “Match” button.
5. Page “C2” is a template for comparing two data samples. You can use other templates for comparing more samples.

Collecting statistics

There is a function to collect statistical data from many rowers for its analysis (ranking, etc.).

1. Place all data files to be analysed in one folder.
2. Load the first file in this folder with Load File (2) button.
3. Click “Statistics” (9) button. Each file in the folder will be loaded, all samples selected and its data stored on St2 page.
4. The data from St2 page can be copied and used for analysis using Pivot Table function or similar.

Changing the language

In the sheet “Str” translate the headings in the column C from English to your language and place them into the same row into the most right empty column. Remember the number in the top cell of this column (1 for English and so on) and input it into the cell “F2” on the sheet “GL”. Click F9 button to recalculate. All headings in all sheets will be in your language. Your can quickly switch between languages if you input the corresponding number into the sell “F2” on the sheet “GL”.

Do not change the cells in the rows A and B as they are references to the headings on the right!