Fit File Repair Tool

Merging a Bike Computer and Zwift activity file

Initial situation:

I have two files – one recorded with my bike computer (paired with my smart trainer), the other file recorded with Zwift (or any other trainer software!) running on my PC.

Merging the two files is a challenge because timestamps are similar but not equal.

Why are timestamps in both files not equal?
- The bike computer's internal watch might be wrong because it didn't have a GPS link before you started the recording of your indoor trainer session
- The watch built in the (smart) trainer might be wrong because it has to be set manually
- The computer (running Zwift etc) might have a wrong time

I use a Garmin Edge 830 as bike computer and Zwift (running on a PC) as training platform.
Even if my Edge 830 had a GPS link some hours before I started my trainer session and my PC is connected to the internet, I normally have a shift of 5 to 10 seconds between the two files that my devices record.

Motivation and Approach

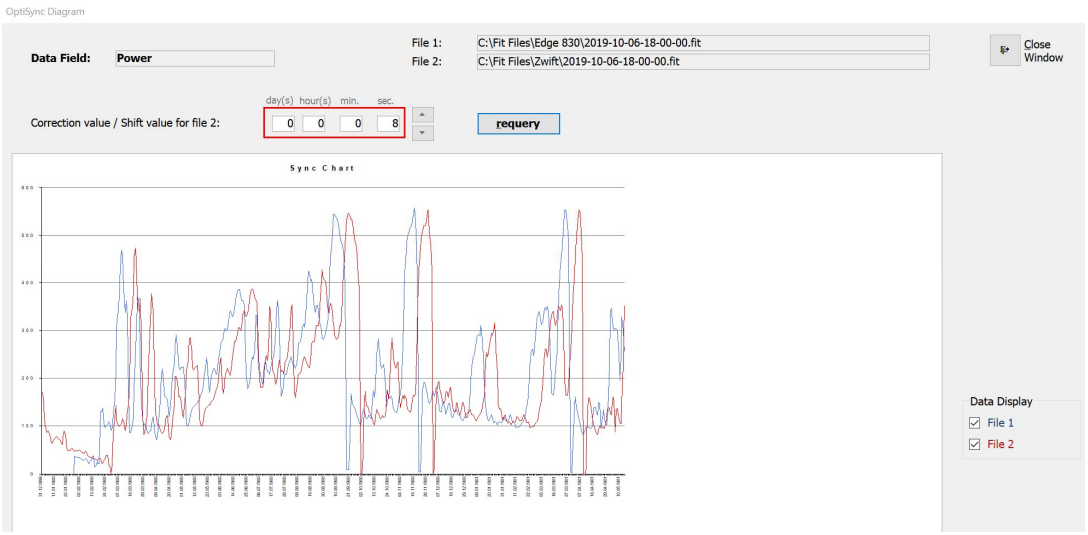
Why do I want to merge data of both files?

Because my Edge 830 calculates and stores Training Effect, Training Load etc which helps me to calculate my weekly training load. But my Edge 830's fit file contains no GPS position data, elevation and not the distance values which Zwift calculates etc.

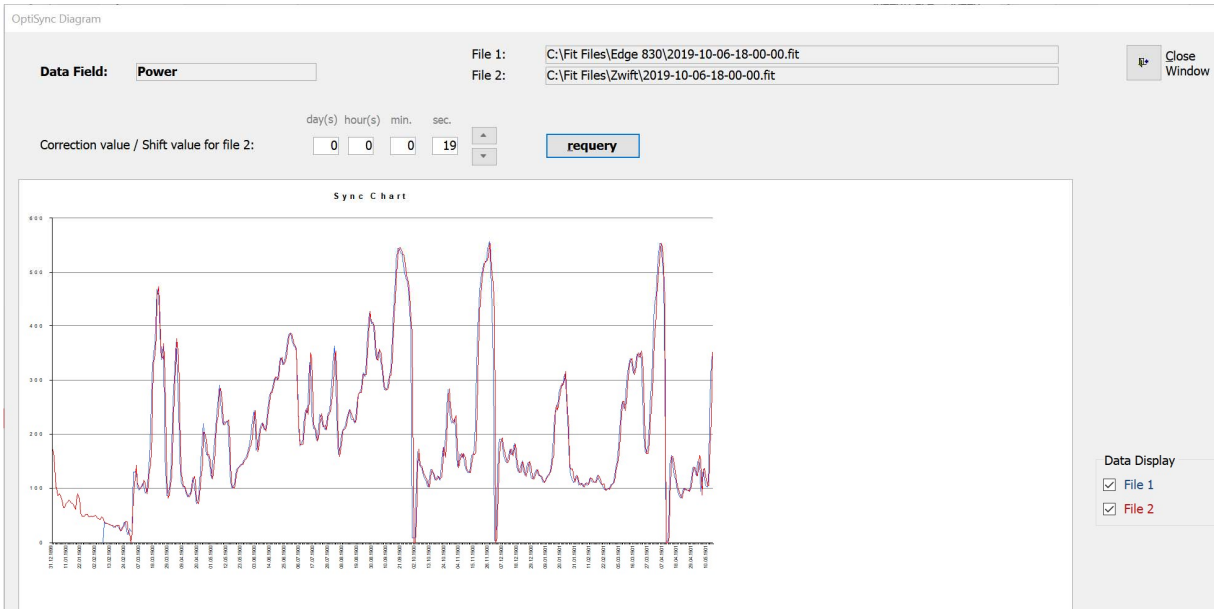
Having the Fit File Repair Tool I thought it would be easy to combine the "best of both worlds" by merging the bike computer's fit file and the Zwift fit file. But I noticed how hard it is to synchronise the merge because the timestamps are not equal.

Therefore I invested a lot of time during the last weeks to develop a technique to synchronize two activity files using a data field which both files contain and which has the same contents. Heart Rate, Cadence and Power are the data fields I chose because these are the values a bike computer (connected to a smart trainer via ANT+ or bluetooth) can record and which are contained in Zwift files as well. In these cases my algorithm compares the graphs and moves the second graph over the first one until it matches perfectly.

Original situation without time shift:



My algorithm shifts the second graph until a good match is reached:



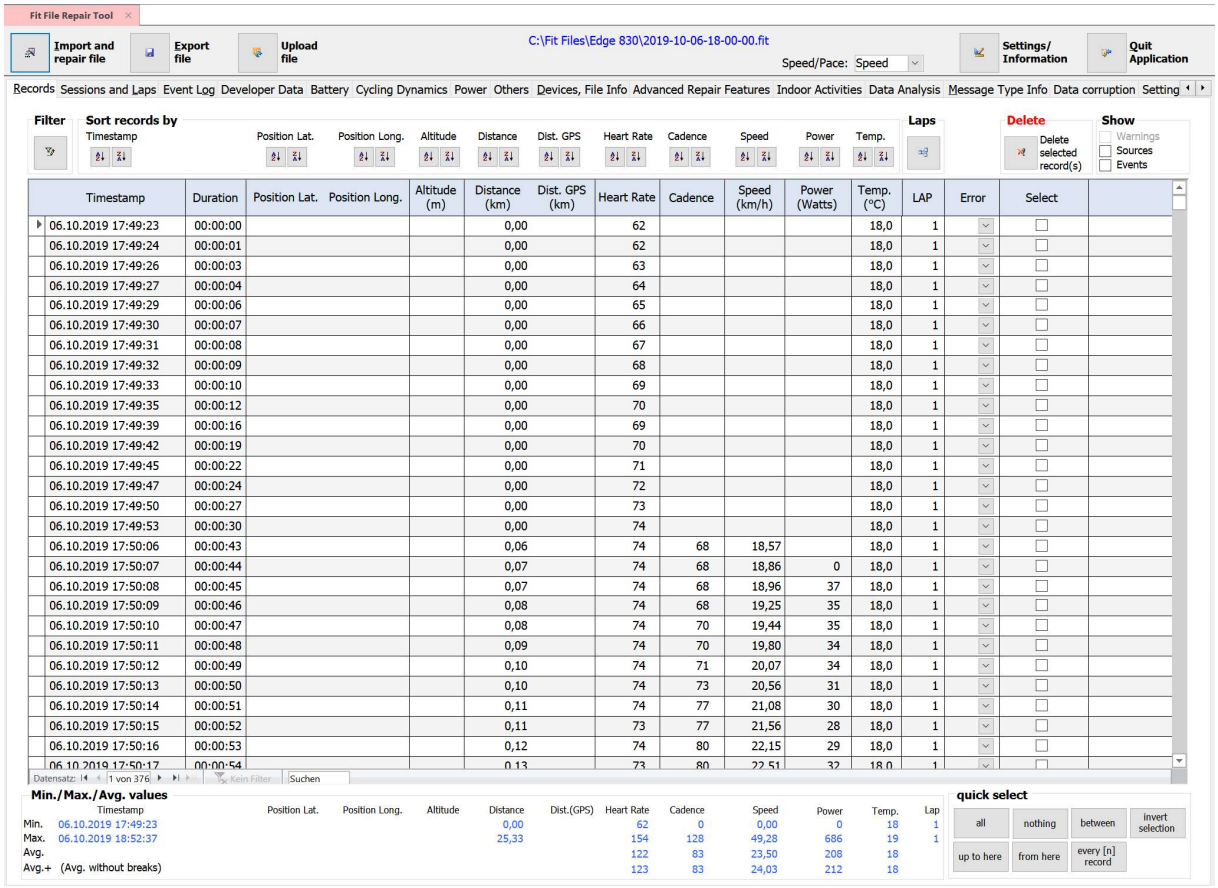
In this case the calculated time shift value is 19 seconds.

I named my algorithm “OptiSync” and implemented it in Fit File Repair Tool.

File 1: Bike computer file

In this documentation the bike computer recording consists of a **fit** file. But the file can be in **tcx/hrm/xml** format as well.

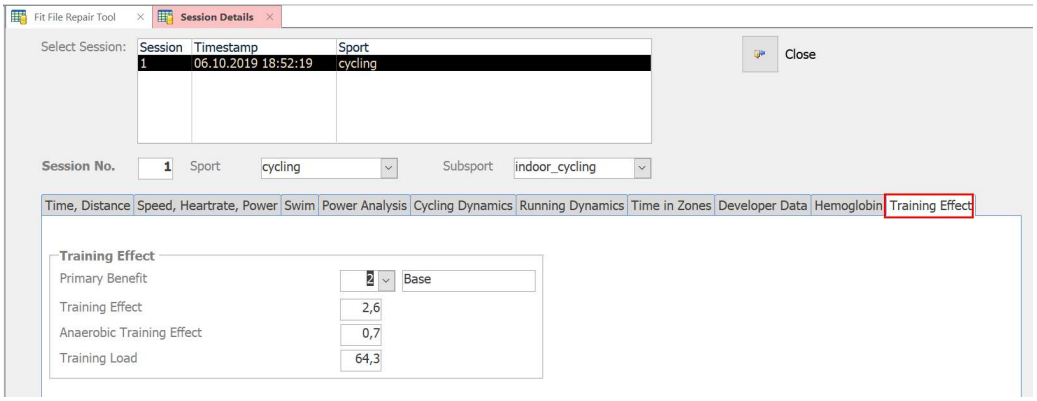
The bike computer file contains Heart Rate, Cadence, Power (which I want to keep) but:
- no GPS position data and
- “real world” distance values (0-25 km) which I want to replace by values calculated by Zwift
- “real word” speed values which I also want to replace by values calculated by Zwift



My device used the “smart recording” mode, there are some gaps at the beginning of the file which is not a problem to the syncing process:

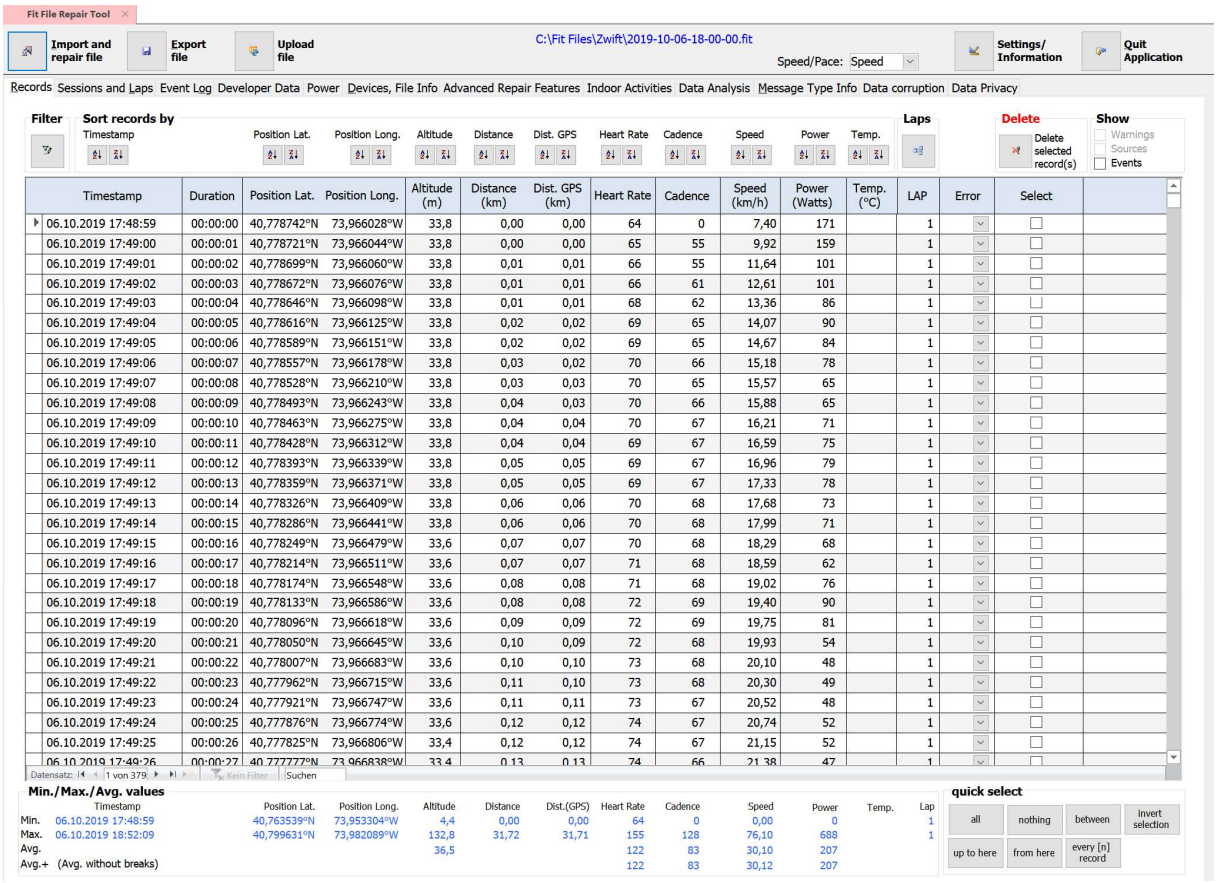
Timestamp	Duration
06.10.2019 17:49:23	00:00:00
06.10.2019 17:49:24	00:00:01
06.10.2019 17:49:26	00:00:03
06.10.2019 17:49:27	00:00:04
06.10.2019 17:49:29	00:00:06
06.10.2019 17:49:30	00:00:07
06.10.2019 17:49:31	00:00:08
06.10.2019 17:49:32	00:00:09
06.10.2019 17:49:33	00:00:10
06.10.2019 17:49:35	00:00:12
06.10.2019 17:49:39	00:00:16
06.10.2019 17:49:42	00:00:19
06.10.2019 17:49:45	00:00:22
06.10.2019 17:49:47	00:00:24
06.10.2019 17:49:50	00:00:27

My bike computer file contains “Training Effect” data (which I want to keep) as shown on register tab “Session Details”:



File 2: Zwift file

File contains Heart Rate, Cadence, Power, GPS position data (Watopia) and “virtual reality” distance values (0-31 km).

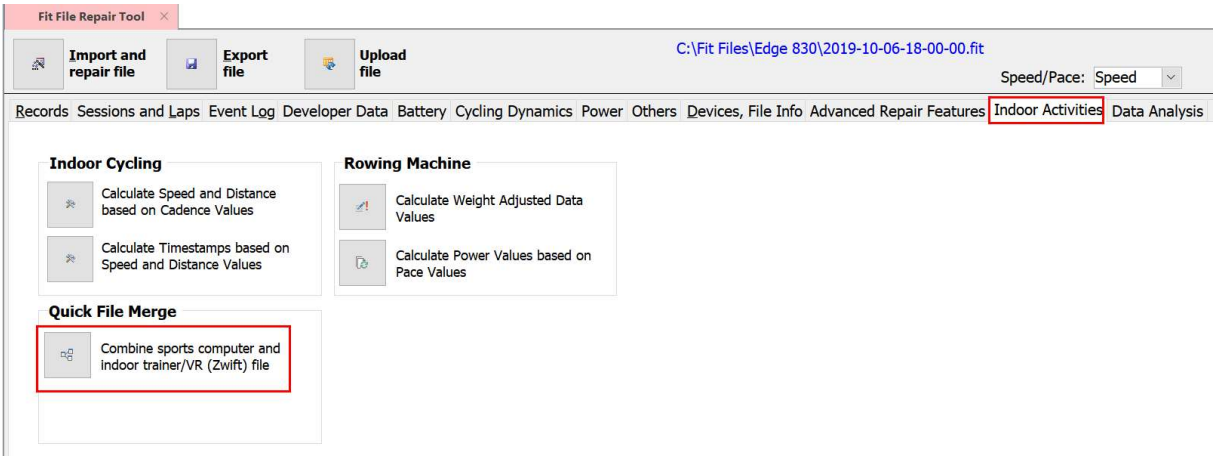


The Zwift file doesn’t contain Training Effect data.

Merging both files

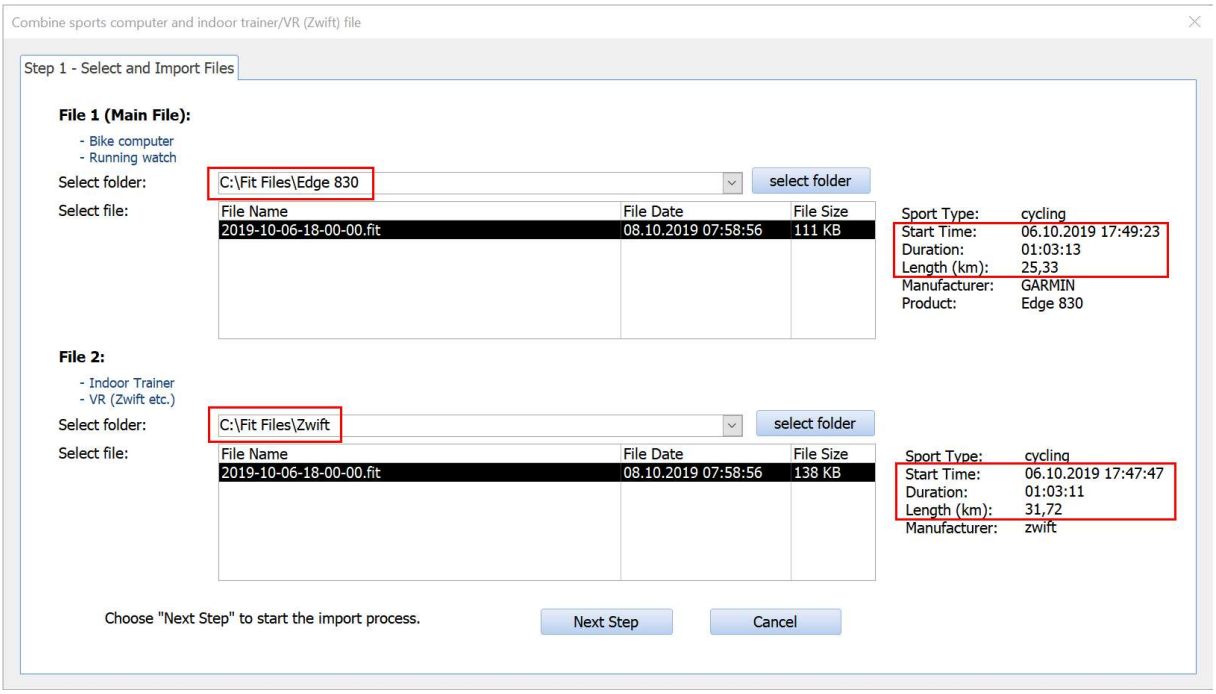
Step 1:

Call the new function “Combine sports computer and indoor trainer file”



Step 2

Select the file folder(s) which contain your two files and select the proper files:

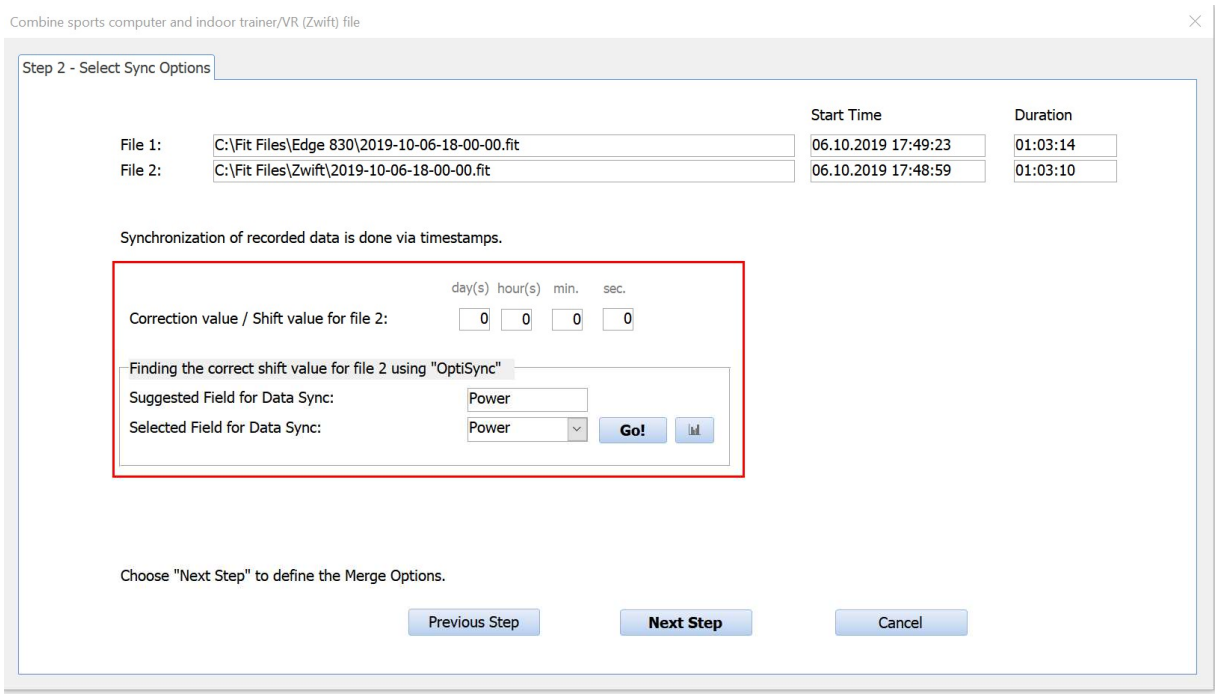


Please verify you selected the correct files by verifying the file information that is displayed after you selected the files.

Please click on the button “Next Step” – now the two files will be imported which will take a while.

Step 3

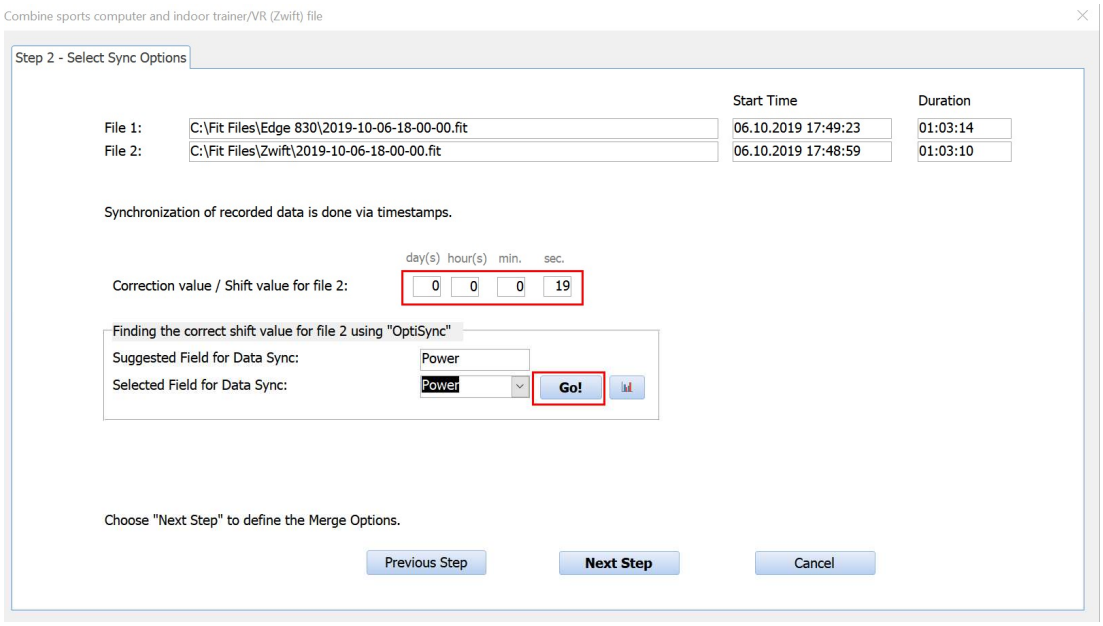
Note the result and the initial correction / time shift value for file 2 – and the suggested data field for performing a sync with “OptiSync”. The tool analyses the contents of the data fields heart rate, cadence and power and suggests the best choice.



Step 4

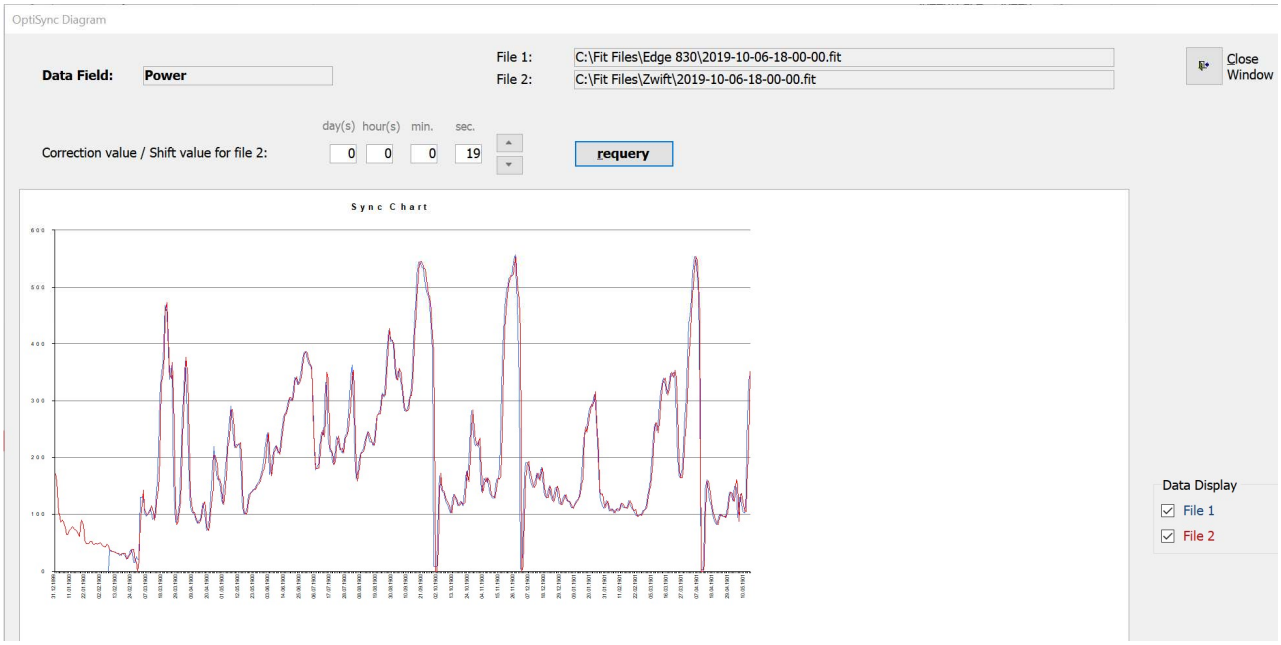
Either use the suggested data field or choose another data field for performing the syncing process, then click on the button “Go!”.

“OptiSync” will calculate some seconds, then the found correction / shift value will be displayed:

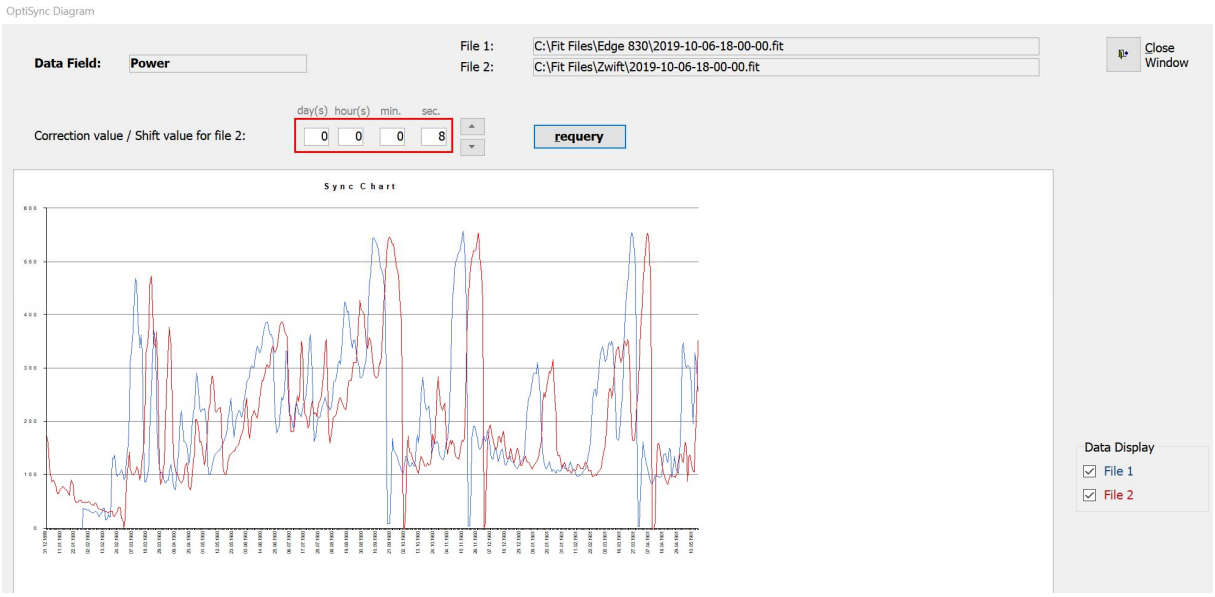


Step 5

OptiSync diagram: After a successful execution of “OptiSync” you can display a diagram which shows data of the selected field and applies the calculated correction value for file 2:

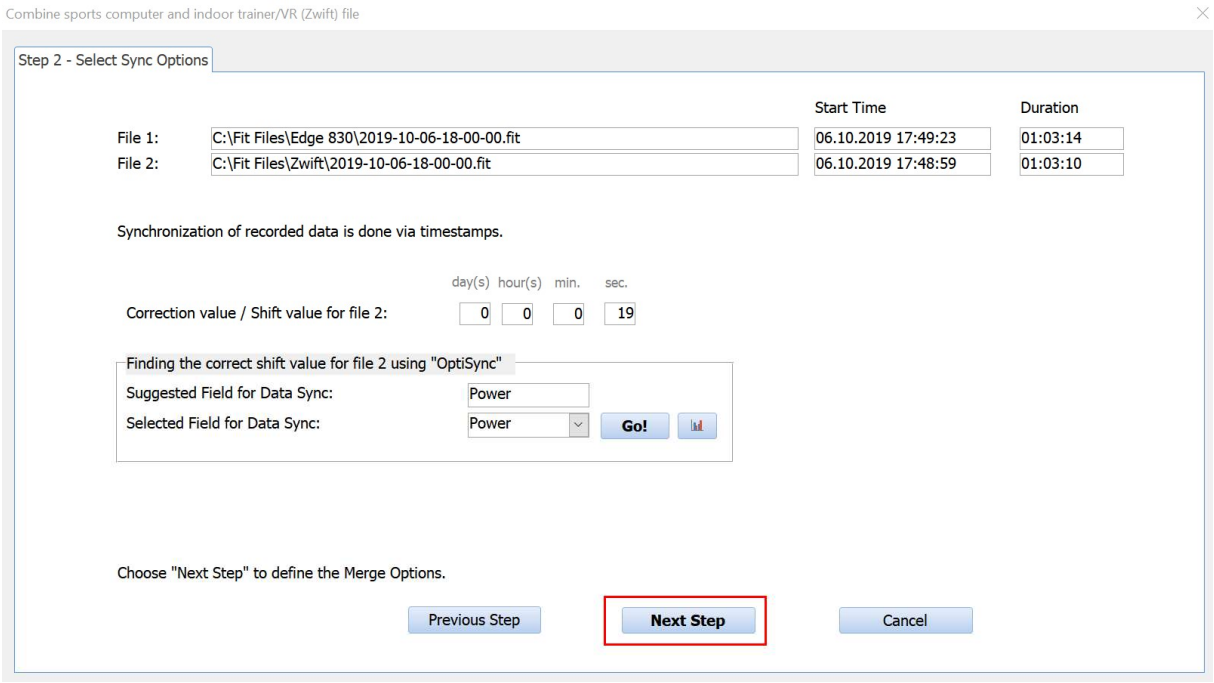


You can manually change the correction / shift value and will see the difference when you requery the graph:



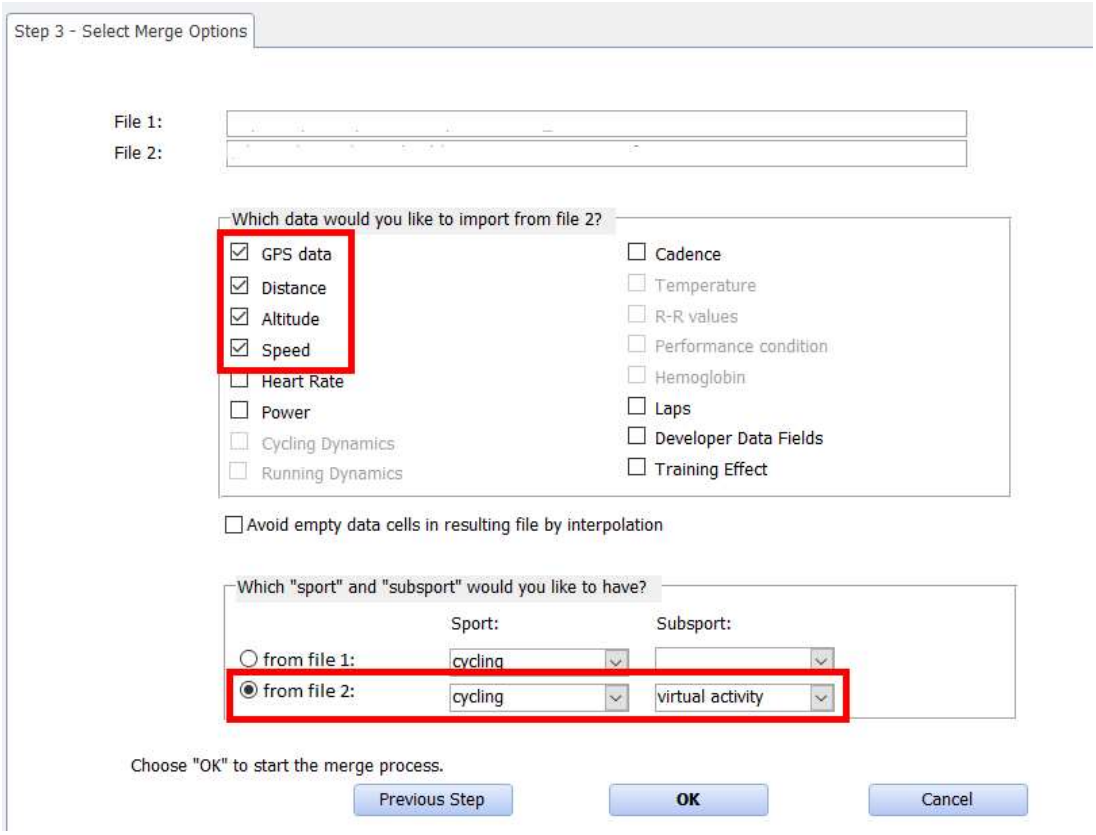
Step 6

Please close the diagram window and click on “Next Step”.



Now you can choose which data fields you want to merge from file 2 into file 1.

I would like to import GPS position data, distance, altitude and speed data from Zwift.



I recommend to use “sport” and “subsport” from Zwift rather than from your sports computer.

Why? Because of the way Training platforms like Strava, Garmin Connect etc. handle timestamps.

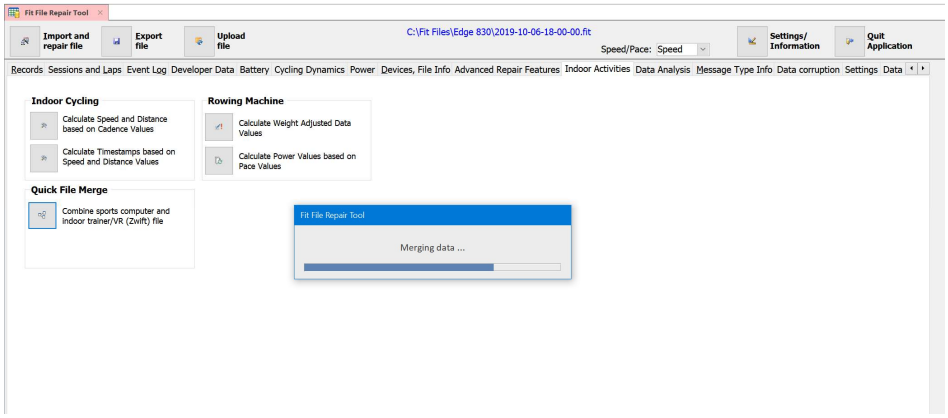
All timestamps in fit files are stored in UTC time (London time), not as local timestamps.
When you upload a fit file to Training platforms like Strava, Garmin Connect etc. the platform normally converts the UTC timestamps of your fit file into local timestamps during the import / upload process. Local timestamps are determined by GPS data in the fit file.

If your activity does not contain “virtual activity” as subsport GPS data in your fit file will be used to calculate local timestamps. Imagine you live In the USA and have local time of UTC – 6. If you do a Zwift workout based on the London map and upload the activity file to Strava then based on GPS data timestamps will be translated into London times. Result: start time in Strava will be wrong by 6 hours!

If your activity file contains “virtual activity” as subsport Strava, Garmin Connect etc. do not use GPS data in the file to calculate local timestamps. Instead of GPS data in the activity file they will use your customer profile to determine in which time zone you are located and calculate start time etc based on your home location.

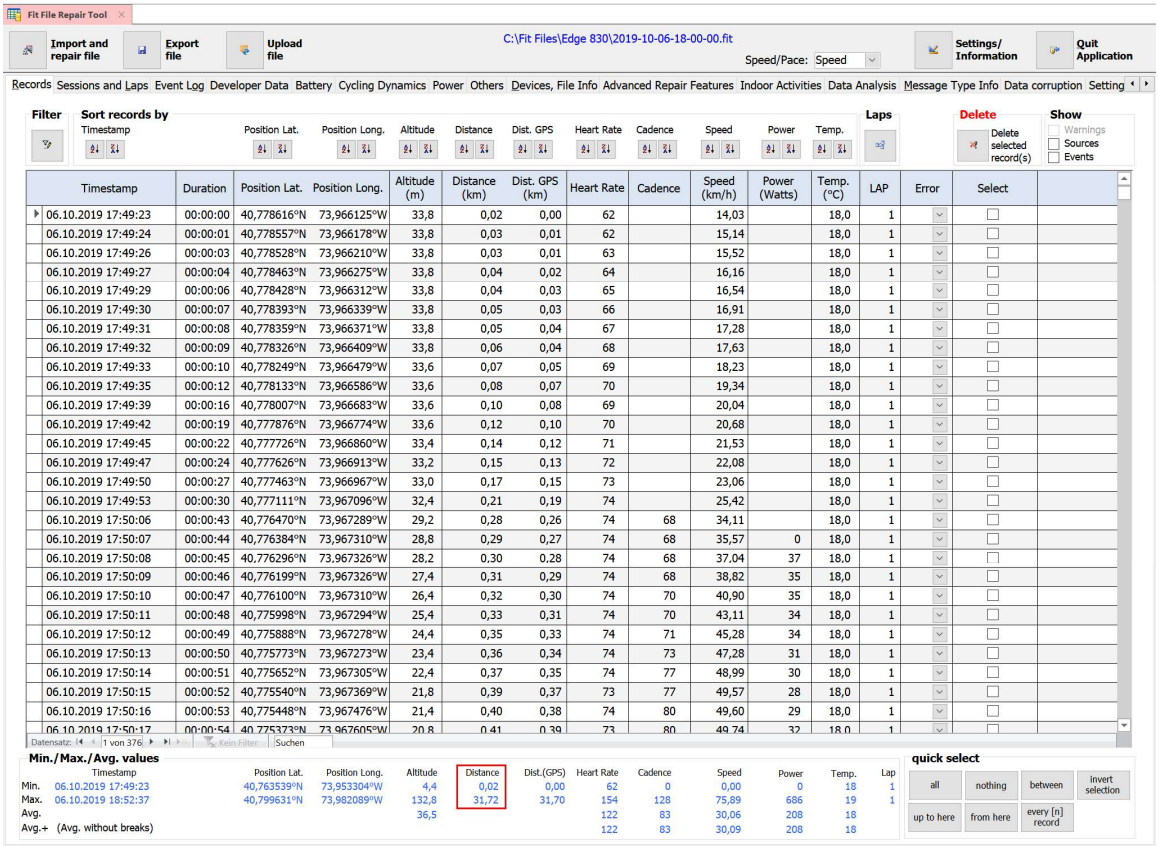
Step 7

Click on “OK” and the Data Merge will happen:

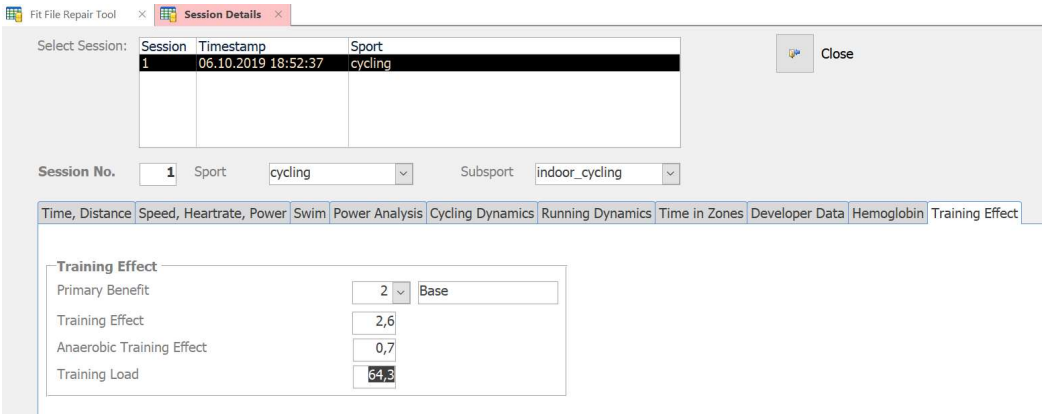


Step 8

Analyse the result: The result contains of file 1 plus the merged data from file 2.

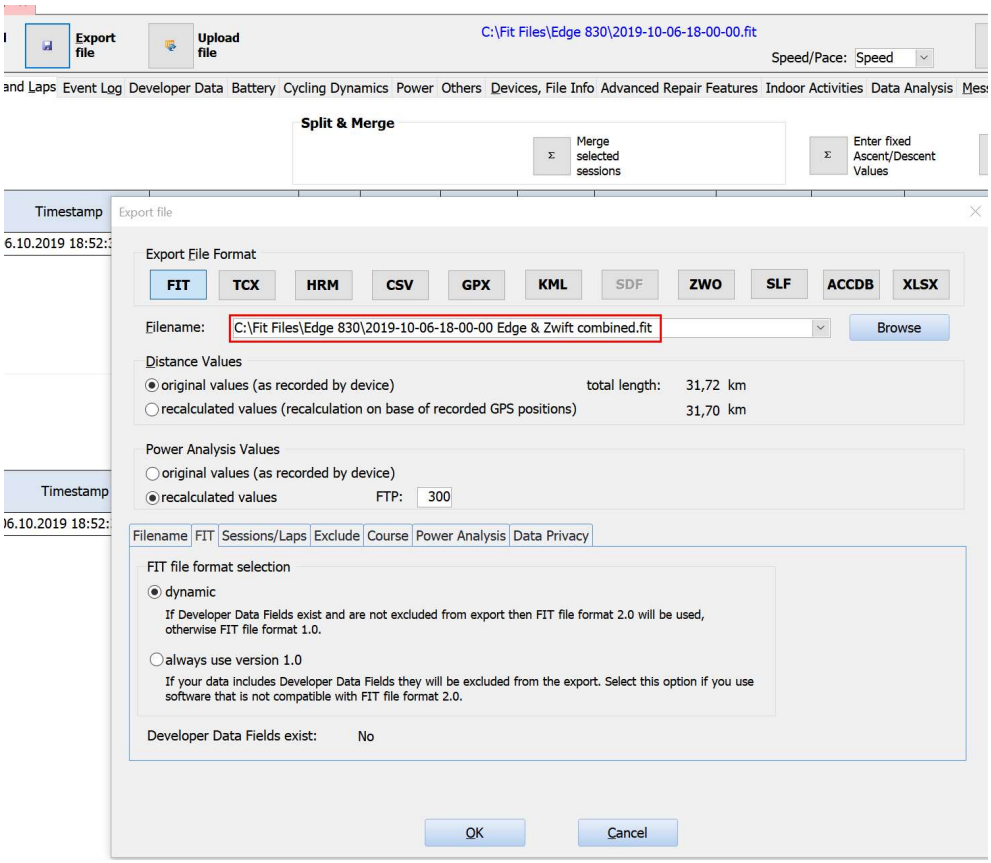


Training Effect data are still there:



Step 9

The export file that you create when you select “Export File” contains merged data of both files and can be uploaded to Garmin Connect, Strava and any other platform of your choice.


Export file
Upload file
C:\Fit Files\Edge 830\2019-10-06-18-00-00.fit
Speed/Pace: Speed
and Laps Event Log Developer Data Battery Cycling Dynamics Power Others Devices, File Info Advanced Repair Features Indoor Activities Data Analysis Mes
Split & Merge
Merge selected sessions
Enter fixed Ascent/Descent Values
Timestamp
6.10.2019 18:52:
Timestamp
6.10.2019 18:52:
Export file
Export File Format
FIT TCX HRM CSV GPX KML SDF ZWO SLF ACCDB XLSX
Filename: C:\Fit Files\Edge 830\2019-10-06-18-00-00 Edge & Zwift combined.fit
Browse
Distance Values
original values (as recorded by device) total length: 31,72 km
recalculated values (recalculation on base of recorded GPS positions) 31,70 km
Power Analysis Values
original values (as recorded by device)
recalculated values FTP: 300
Filename FIT Sessions/Laps Exclude Course Power Analysis Data Privacy
FIT file format selection
dynamic
If Developer Data Fields exist and are not excluded from export then FIT file format 2.0 will be used, otherwise FIT file format 1.0.
always use version 1.0
If your data includes Developer Data Fields they will be excluded from the export. Select this option if you use software that is not compatible with FIT file format 2.0.
Developer Data Fields exist: No
OK
Cancel