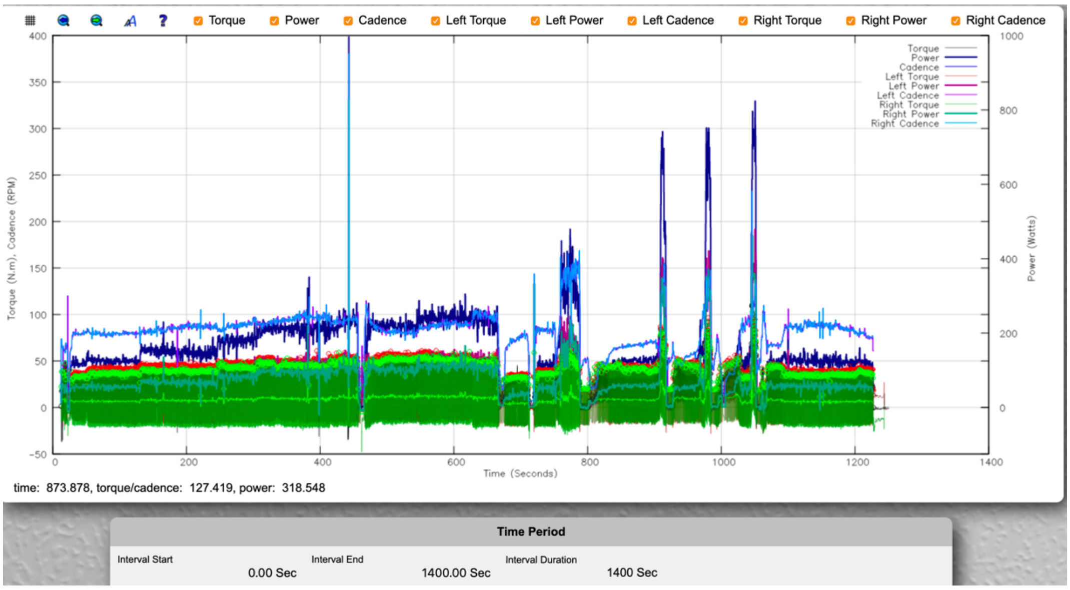
Test ride done on Smart Trainer in ERG mode. April 2020

The entire file is below. We are going to look at three portions where interesting aspects of recording and riding incurred.

1. Spike at around 420 seconds – this is caused by comms error
2. The 30 second effort where the effort “overran” the resistance on the Smart Trainer – how not to exercise.
3. The immediate aftermath of the 30 second effort. How little force can an InfoCrank® read.



In order to understand the anomalies, first we should look at **real pedal strokes**. What they look like helps to understand errors when they occur.

Characteristics are;

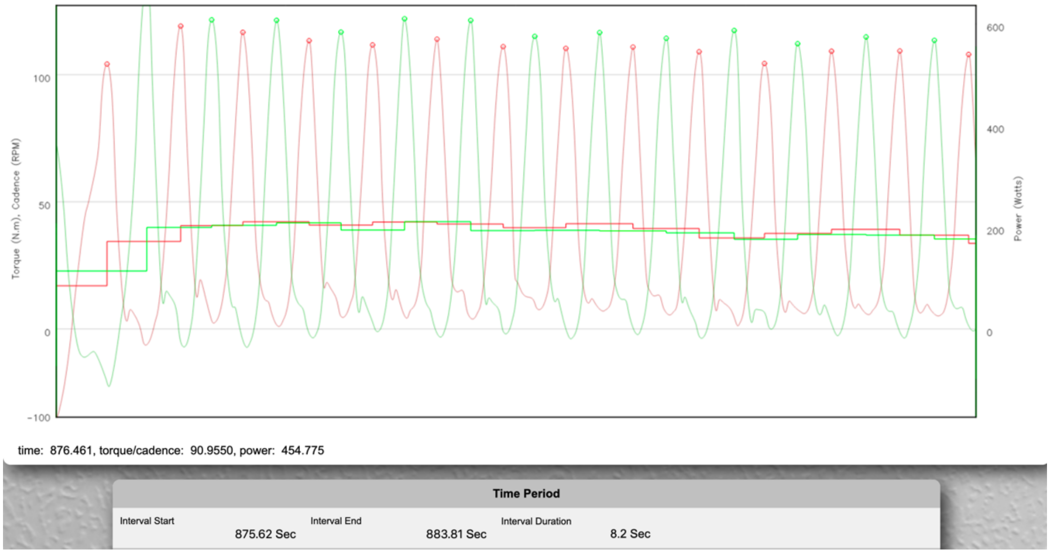
1.. One leg leads or follows the other - Red is left and Green is right.

2. Each pedal stroke has a distinctive peak – though sometimes a person may produce a double top.

3. Each pedal stroke has a valley - most riders producing negative torque at that point.

4. Each pedal stroke has a distinctive shape that can assist the cyclist/coach to optimise the style of pedalling or injury recovery.

Much more information is able to be gleaned from this data.

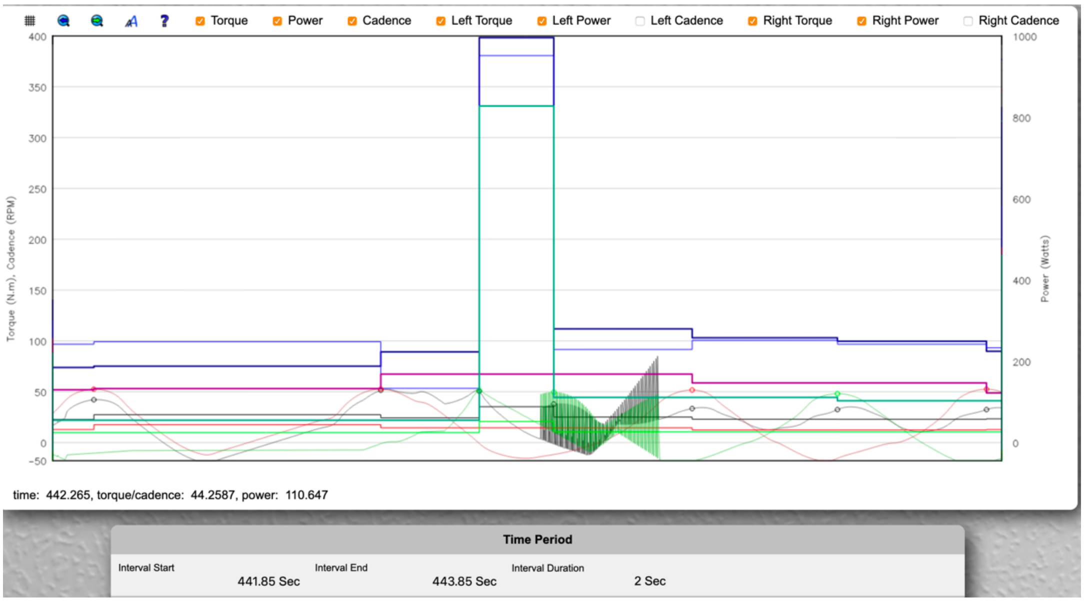


Spikes occur for a few reasons, such as lost radio transmissions, wireless interference or rocking on the cranks (for instance while standing at the lights or in some descending positions). In this case, it was caused by a lost signal from the right crank. When an ANT+ signal goes missing, the software tries to locate it before moving on – they are the fast-moving waves you can see on the diagram.
However, what you really need to notice is the double top on the torque signal. Note how the left and 'right" signals were quite obviously (in hindsight) not a turn of the cranks. This proximity of the two torque signals caused a cadence spike – that is the time stamp on each one was so close together that when calculated, it gave a sky-high cadence and a correspondingly high power number.

You can then see that the cranks quickly gave up trying to correct – the very fast signals in that fish design and picked up equilibrium again. In this case, a missed signal of the actual peak of that torque rotation made for a wrong power and cadence calculation.

Whether this sort of spike is caused by comms or by "bouncing on the pedals" such as waiting for a traffic light to change while balancing the bike,or descending with changing weight on the cranks without actually pedalling – the result is basically the same.

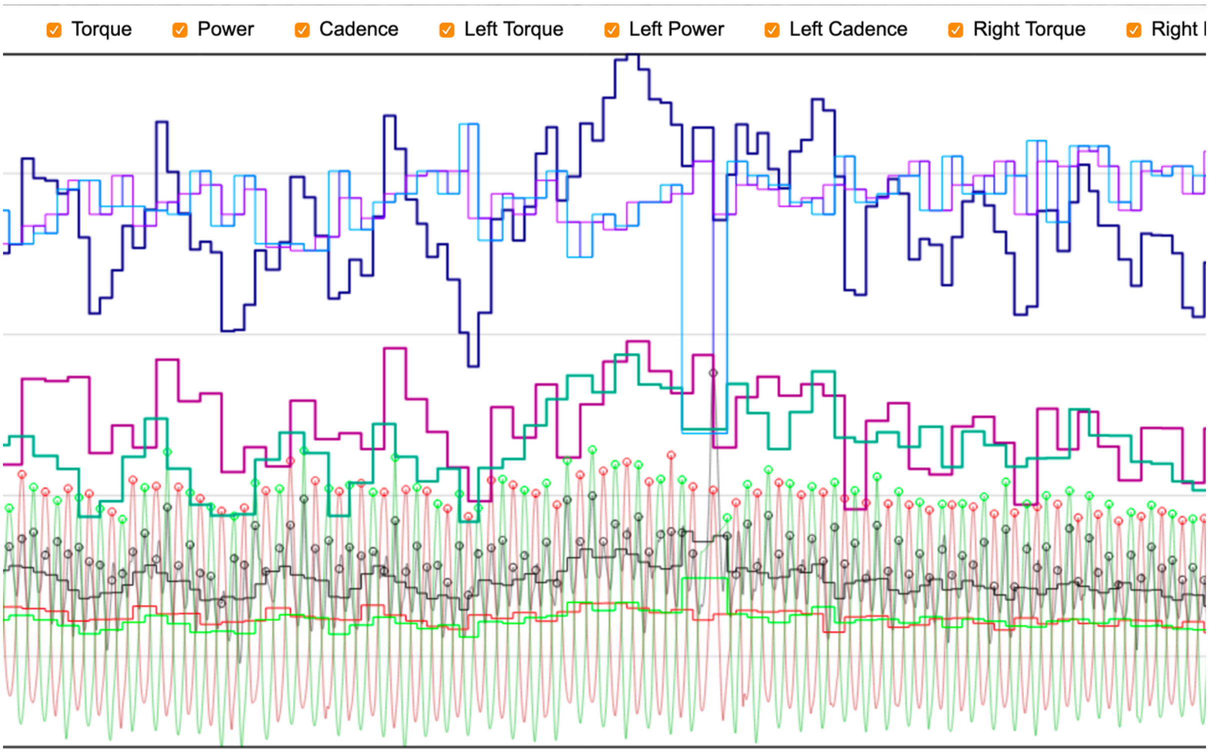
The system sees a fast peak and calculates the torque and quick time as a cadence event and therefore a power event. The only difference is that with lost comms, there is a gap maybe only for milliseconds (therefore not picked up by normal power meters) and in the bouncing spike, the torque number is correct and in place – just the calculation of cadence and power is erroneous.



The second issue relates to the "competition" between an **ERG** -trying to maintain a certain power number regardless of cadence – and an interval of potentially high power. It is very possible with virtually every trainer to over-run the capacity of the trainer and therefore speed up cadence and find that power is dropping.

What you see here is the distinctly different shapes of the actions. The torque graph, which is the black line (for total rotations) and the black waves or spikes (Instantaneous torque) are both not what you would expect from 30 seconds of all-out effort. The cyclist is losing torque all the time- hence the waves and lack of constancy. Notice that even the cadence is box shapes not as a wave. Probably fair to say this is a not a good exercise to do on an

ERG.



ce: 62.4799, power: 156.200

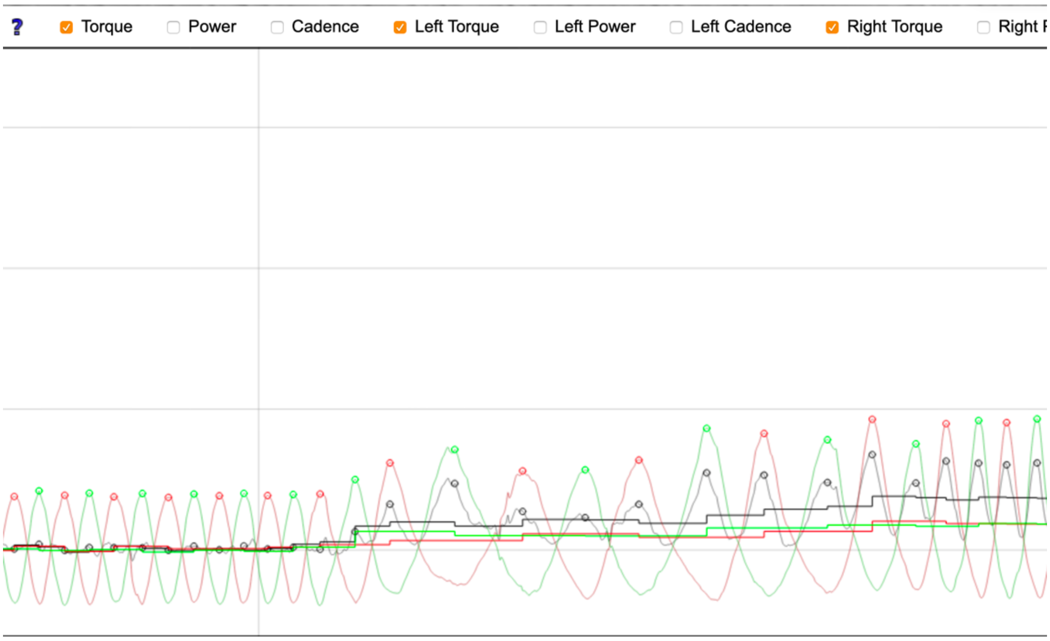
Time Period					
nterval Start	758.31 Sec	Interval End	788.04 Sec	Interval Duration	29.7 Sec

The final example from this test relates to that same ERG now slowing down as the cyclist lightly revolves the cranks, starts to catch breathe and finally get back into Rhythm.

What we observe here is that the cyclist is putting virtually no torque onto the cranks as the ERG itself is adjusting and more or less just following the cranks around. Almost no torque peaks are discernable but you can still see each pedal stroke.

In the middle part of the screenshot, the cyclist is now starting to act on the cranks but false peaks are being picked up as he is still “fighting” the ERG. For instance, note the left torque wave just after the commencement of this stage where there are two tops – but the InfoCrank® still detects that is NOT a pedal stroke. Notice also the misshapen torque waves as the ERG is still acting against the cyclist.

Finally, late in the segment, normality of a sort prevails. The minimum torque picked up in this segment was about 0.05nm (about 0.29w), while still detecting pedal strokes.



These examples of what is actually being recorded by InfoCrank® also help to show you where there are potentially errors in both cadence and watts shown. It is Verve policy to NOT delete data from a recording automatically. This is done by many devices and most uploading programmes in order to present nicer graphs, but in order to run those algorithms much perfect data is also deleted.

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