Training with Data

A Season Review

by Tim Cusick

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Introduction

A season review is a vital learning tool for athletes who want to consistently improve their performance. Why? When you know and can access the strengths and weaknesses of your annual racing performance and the training that supported it, you can use the knowledge gained from them to improve your plan for next year. An annual season review process builds consistency in your approach to identifying your performance limiters and reveals areas of improvement needed in your annual training plan. This is yet another area where training with data excels, as you have a wealth of quantitative data to look back at and use for improvement.

When I conduct a season review, I typically focus on both power and heart rate, along with specific training metrics, and I start by separating the review into two different areas: racing and training. When reviewing races, it is important to look at performance, peak powers, fatigue resistance/endurance, and any areas that were specifically addressed in the current annual plan. In a review of training, I look at volume, intensity, specificity, progression, and overload. There are too many possible areas to review to cover here, but I will attempt to provide some insight into some of the more unique ideas.

Race/Event Performance Review

Racing is hard! In races we tend to be highly motivated and push ourselves to the limits, so analyzing our race data gives us an insightful picture of our strengths and limiters when attempting maximal performance. I structure my race/event performance review around three areas: peak power, fatigue resistance, and specific targets.

Peak Power and Power Clusters

There are two ways to improve race performance: you can increase power over time or improve efficiency. In a season review, I focus on power over time, or Mean Max Power (MMP) as measured by specific time ranges. This does not mean that efficiency isn't important, but in the season review I'm specifically looking at the relationship between training and power; efficiency is a skill built on that relationship.

The MMP review focuses on X time ranges (5 seconds, 1 minute, 5 minutes, 20 minutes, 60 minutes), as each tend to represent specific physiological performance areas. I review these numbers in two ways: peak vs. previous year peak and percentage cluster. Whereas most of us are familiar with the idea of comparing peak performance, the idea of clustering might be new to some. I define clustering as a percentage representation of the "tightness" of near maximal efforts when compared to the absolute max. For well-training athletes who achieve peak form, this cluster is typically very tight, roughly 96% or above (higher is better).

Take a look at the WKO4 MMP Peaks chart above, filtered to represent *race data only*. In this image we see select time ranges (I've chosen 3 time ranges only for visual clarity) being compared with the previous year

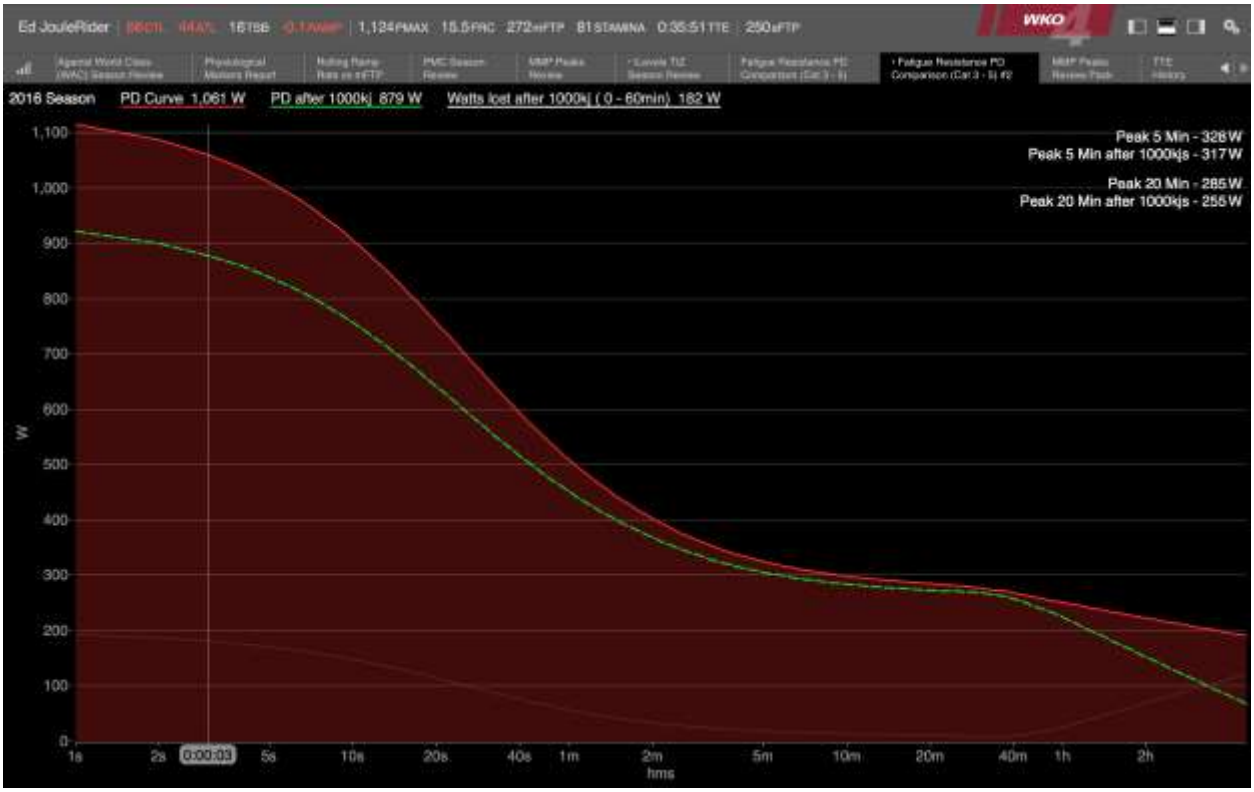
for both max and average of top 5 MMPs. This athlete made substantial improvements in max MMP and average top 5 MMP, but reviewing the MMP cluster (how close the average top 5 are to the max), we see a broader range. This tells me that though this athlete did produce more power, he was not able to reproduce it in a tight range. This suggests that the athlete did not truly achieve peak form, which indicates we need to review his training load and content in relationship to peaking.

Key Insight: The athlete increased in peak power achieved but not in optimal peak/form.

Fatigue Resistance

Peak power gets a lot of attention these days because training is often focused on "more power," and fatigue resistance training easily gets lost in the mix. It's important to analyze the role of fatigue in performance because it gives us significant insight into athletes' race performance as they fatigue. I'm still a little old school in this area, and I use work (kj) as the basis for measuring race fatigue (Training Stress Score [TSS] is also a great way to do this). What I'm looking for is how an athlete performs after fatigue. There are plenty of riders who can produce a great 20-minute power when fresh, but can they do that after 1,000 or 2,000 kj of work? One of the key analytics I use to review an athlete's fatigue resistance is tracking his/her Power Duration and select MMP after a certain amount of work (the specific kilojoule target varies based on rider weight and racing level).

Take a look at the chart below.



This chart displays a typical Cat 4 racer's Power Duration Curve and peak 5-minute and 20-minute MMP *after* riding 1,000 kj of work. The red line is the athlete's maximal power duration curve, and the green dashed line

is after the 1,000 kj. Notice the areas of decline in the chart. As noted in the curve shapes, this athlete loses a substantial amount of sprint power when fatigued (the left-hand side of the chart), and his power also drops off significantly after 40 minutes. We can see the specific drop-off for 5 and 20 minutes in the top right annotation; 5-minute power drops off only 11 watts, but 20-minute power drops off by 30 watts. This tells us a lot about this athlete's general lack of fatigue resistance, as it represents a greater than 10% drop-off in 20-minute power after 1,000 kj, which at race pace for an average-sized male can be as short as 75-90 minutes.

Key Insight: The athlete's power increased, but his poor fatigue resistance/endurance negatively impacted his performance.

Specific Performance

Based on either the demands of the event(s) or the ability of the rider, each year I focus on some specific performance criteria to achieve goals. For example, I coached an athlete who did the Tour of the Catskills race, an event well known for its climbing. He had done the race the previous year before starting to work with me, so we had some baseline data. As part of his season review, one of the areas we looked at was climbing. At first glance it seemed most of his MMPs occurred while climbing, but I took a deeper look and learned something. Take a look at this custom analytics chart I built to review the specific demands of this event:

I knew that this event has some steep grade climbing, so I separated mean max power by average grade over select time periods (8 minutes is shown in this example), and I learned something important. Although the initial data review suggested this athlete was climbing well, once we broke the climbs down by grade, we learned that he struggled when things got steeper, losing about 7% of his power on climbs steeper than an

8% grade. This was a crucial diagnosis that demonstrated the need for a specific focus in preparing to return to the event, in this case a combination of technique and strength.

Key Insight: This athlete has a significant issue with steep climbing power, which needs deeper review.

The Training Review

Once you complete the review of race and performance data and have identified strengths and limiters, it's very important to go on to the next phase, the training review. In this stage you will determine the specific relationship between training load/content and the strengths and limiters we identified in the first part of the review, as there is usually a cause-and-effect correlation between the two.

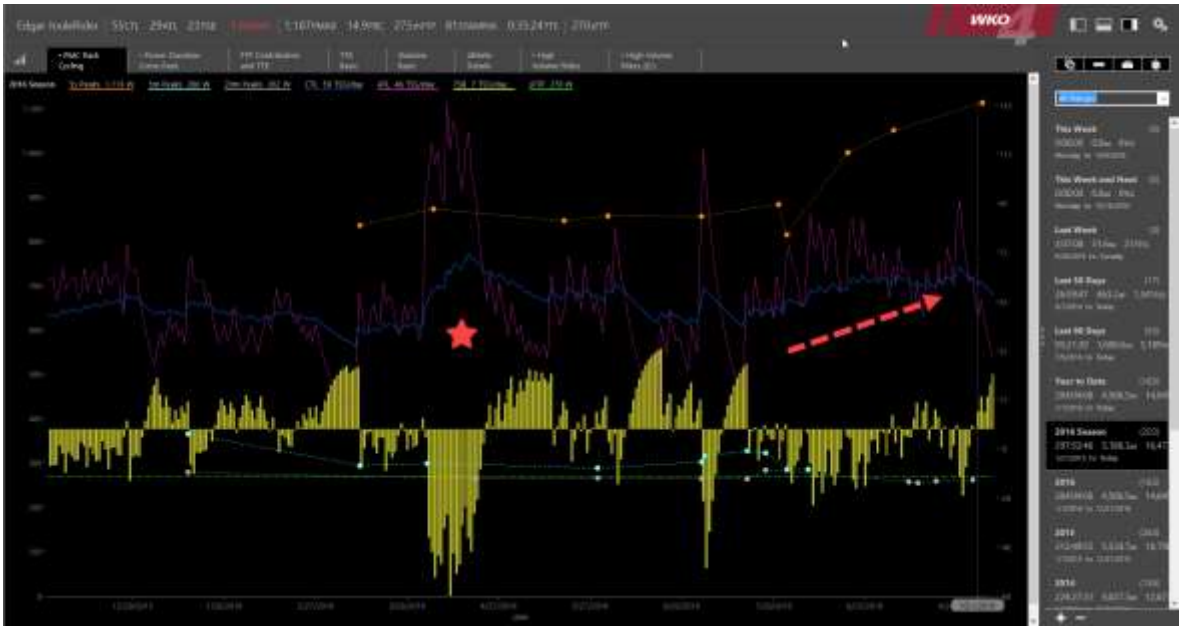
The process is simple enough in writing, but it takes time and patience to look deep into the data and review, one by one, each learning point gained from the race/performance review. For the sake of keeping this article short and concise, we will drill down into one specific example.

As you'll remember from above, our race review of Ed JouleRider revealed that Ed's power increased, but his poor fatigue resistance/endurance negatively impacted his performance.

Now that we understand this performance limiter, we can review the two key elements of training that can affect performance like this: training load and training content. The process should be one of drilling down by starting with the overview data and then looking more and more specifically as we search for a cause or relationship between this specific limiter and Ed's training.

Training Load

First, let's take a look at Ed's training load. The best place to start is WKO4's Performance Manager Chart.



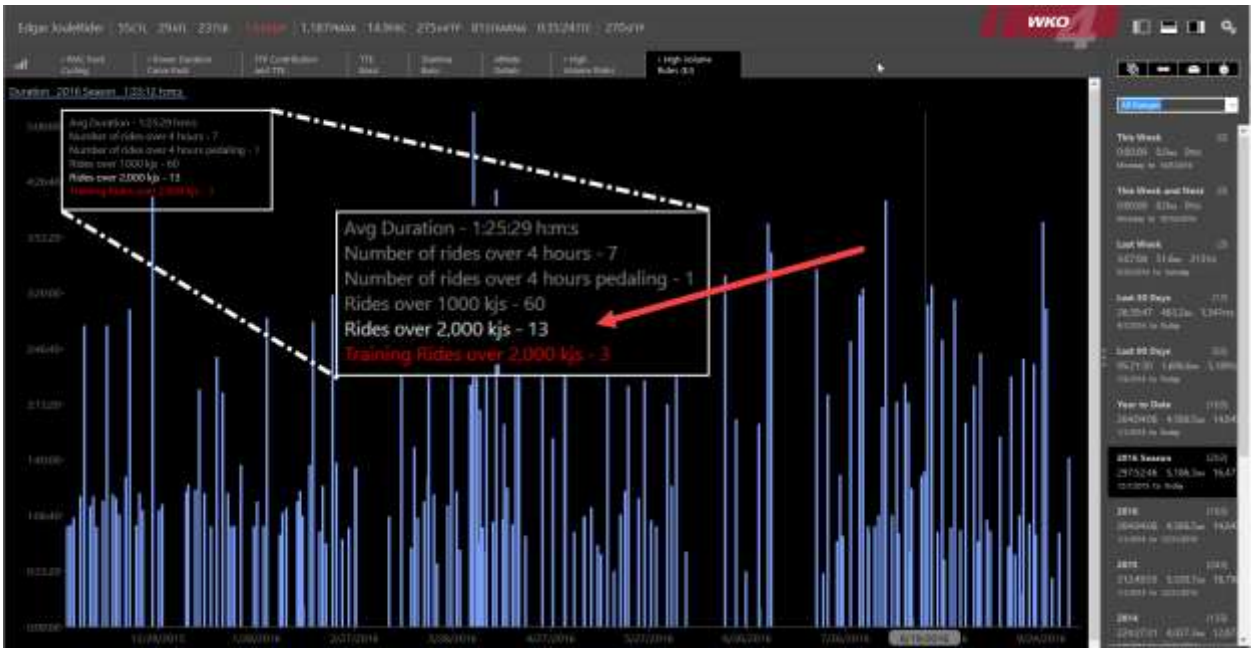
This is a pretty typical season for a category racer who works full time and has a family. A strong build in the spring once the weather breaks is typical, but we do notice a decline in Chronic Training Load (CTL, the blue line) after that early build push; this created some fitness limitations that were carried through most of the summer race season. The good news is that we can see the return to a nice steady build starting in July (still tracking the blue CTL line).

Key Insight: Ed had a good early training/fitness push, but "life happened" in May and June and interfered with his ability to build on that fitness.

Training Content

Let's take this key insight and look deeper at the content of Ed's training to figure out whether the issue was related to a lack of general fitness (driven by a training slowdown in May and June) or to something deeper.

To do this, let's create some custom analytics to help us understand Ed's training content in relationship to fatigue resistance. It is important to look at individual workouts to understand both the duration and the specific content of his rides. Let's start with duration and work.



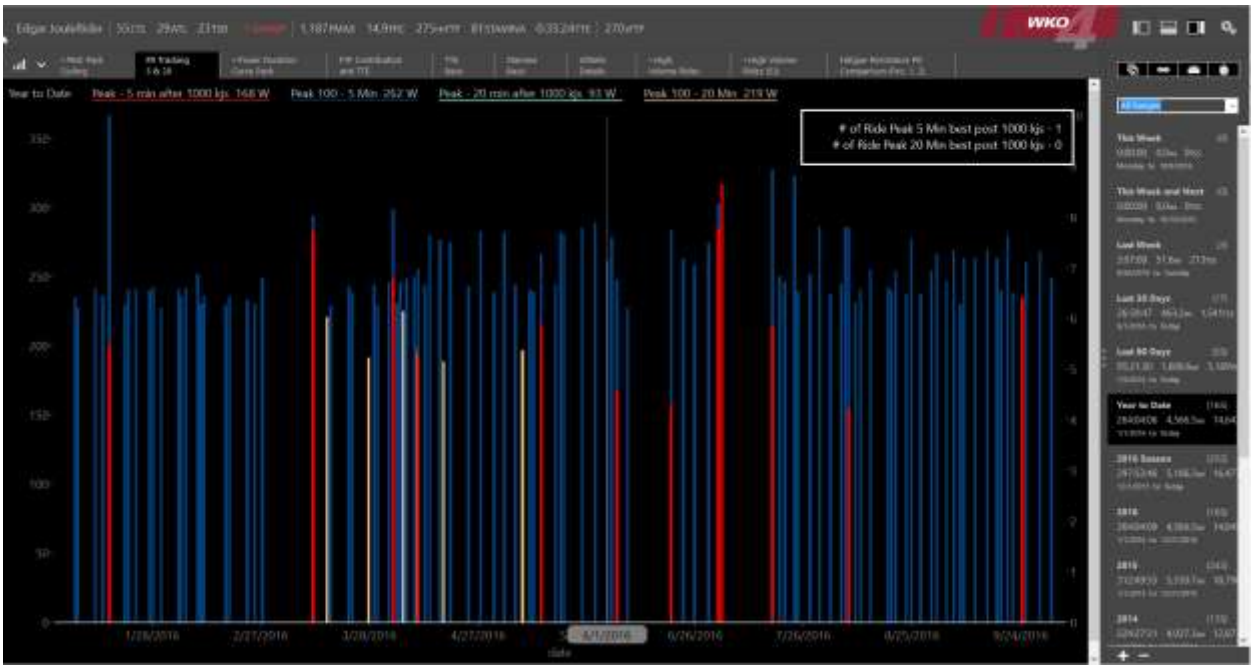
This chart visualizes several factors about Ed's daily training. First, as you can see by his average training duration, Ed has some time limitations and is actually forced to ride the trainer a fair amount in the early mornings and evenings, even when the weather is great. This clearly can affect his fatigue resistance, but let's look more specifically. He rarely is able to ride longer than four hours (only seven times in the 2016 season), and he did only one ride during which he actually pedaled for more than four hours.

We can see that he did sixty rides with over 1,000 kj of work (the base fatigue rate we used in part 1 of this article series), but since we know his limiter is performance after 1,000 kj, we need to gather more information. There are only thirteen workouts in which Ed expended over 2,000 kj of work, and when we eliminate race events from the list, we can see that he did only three training rides over 2,000 kj.

Key Insight: Ed did too few training rides targeting 2,000 kj and above. To improve his fatigue resistance, he needs to do higher work rides.

Staying on this track, let's drill even deeper. In order to perform well in most races, we need to be able to go hard late in a race after we've accumulated some fatigue. Great training is about specificity and training specifically for the demands of the events we enter. We know Ed has struggled late in races, and we now have some specific insights into his training load and general content, so let's look at his training after 1,000 kj. In this analytics chart, I have excluded all races and events; all the data shown is from his training only.

The chart below tracks Ed's 5-minute and 20-minute peak performance in training. Take a look at the frequency of peaks after 1,000 kj. His peak 5 minutes was achieved only once, and his peak 20 minutes was not achieved a single time throughout his training season.



Key Insight: Ed's training content and prescription was not focused on his limiter or the specific demands of his events.

Now that we've collected these key insights, we know what to do to empower and equip Ed for better performances next year.

Solution

We need to implement training strategies that require intervals and peak performance after a select amount of work to better mimic race demands and focus on this limiter.

Conclusion

A season review is one of the most important things we can do to improve our next season. We can work hard all year long, but if we want the best results possible, we've got to know we're focusing on the things that make a difference.

Want to learn more? Watch this recorded webinar that demonstrates the ultimate season review. You can also download a free trial of WKO4 here.