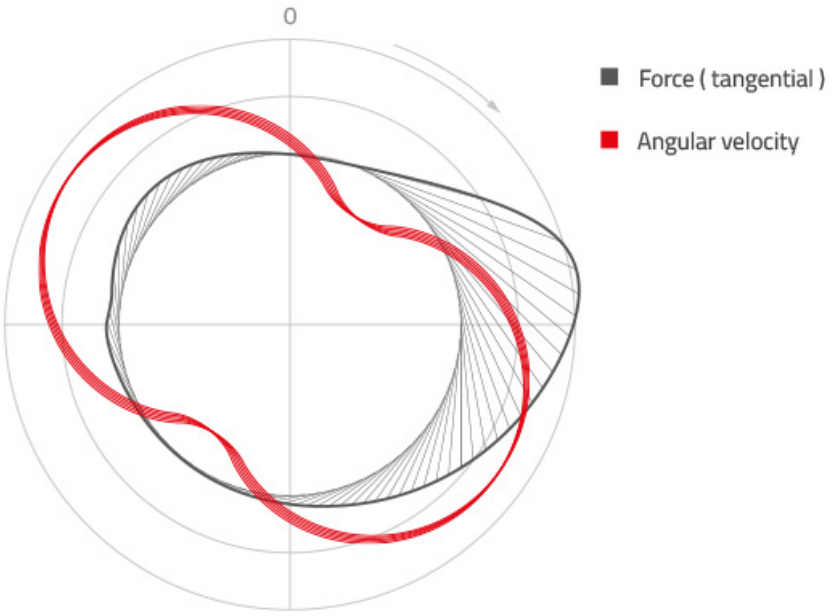
The Advantages of the IAV Power System

Many power meters calculate power on the basis of the average angular velocity (or cadence) per pedal revolution, as if the pedaling was always perfectly smooth and uniform. In this article we will see how this approximation can heavily impact the accuracy of the measured power data, especially when using **oval chain rings**.
In the end, we will see how the systems based on Instantaneous Angular Velocity, such as **IAV Power**, can guarantee and maintain the highest degree of accuracy even where the former fail.

Basics: how does a common power meter work?

High-precision power meters for cycling are positioned on rotating parts of the bicycle (pedals, crank arms, hub, spider, etc.) and, regardless of technical and construction differences, all perform the calculation of power on the basis of two quantities: the force and the angular velocity.

Both the **force** component and the **angular velocity** component are not constant but vary continuously within the same pedaling lap.

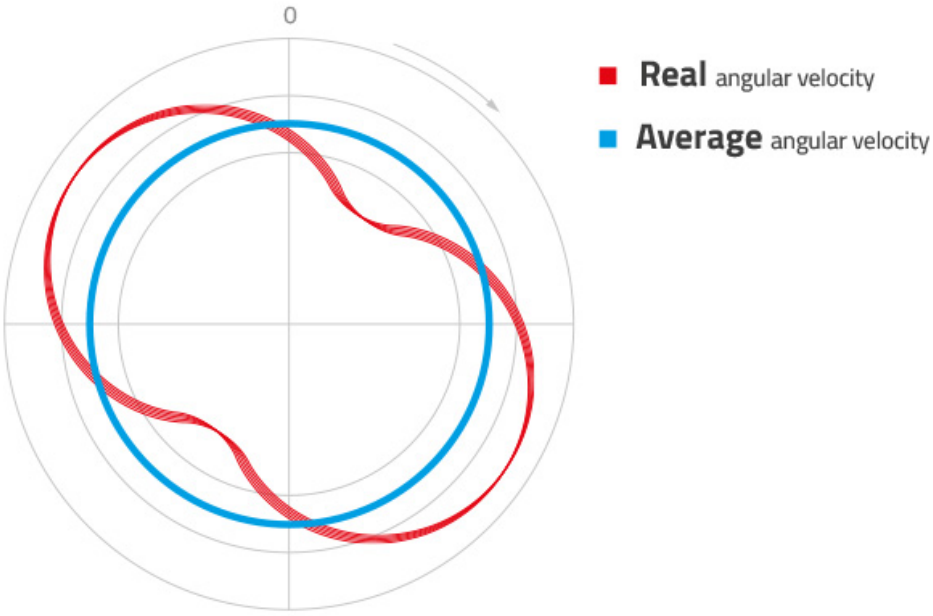


These variations can also be very significant and depend on various factors, such as: the style of pedaling, the athletic preparation of the cyclist, the type of chain ring used, the slope of the ground, the model of roller used, etc.

Therefore, according to what has been explained above, in order to guarantee the maximum degree of accuracy in any situation, the calculation of the power generated in a pedal revolution should take into account the variations of both the force AND the angular velocity.

Generally, power meters detect the variation of force through appropriate sensors (e.g. strain gauges); these allow the force to be measured hundreds of times per second during the entire rotation. The values measured are called the *samples*.

On the contrary, the variation of the angular velocity seems to be commonly neglected, i.e. it is not *sampled*. Many power meters use the **average** angular velocity of the lap instead of the **real** instantaneous value.



This, however, introduces an unforeseeable error into the power calculation.

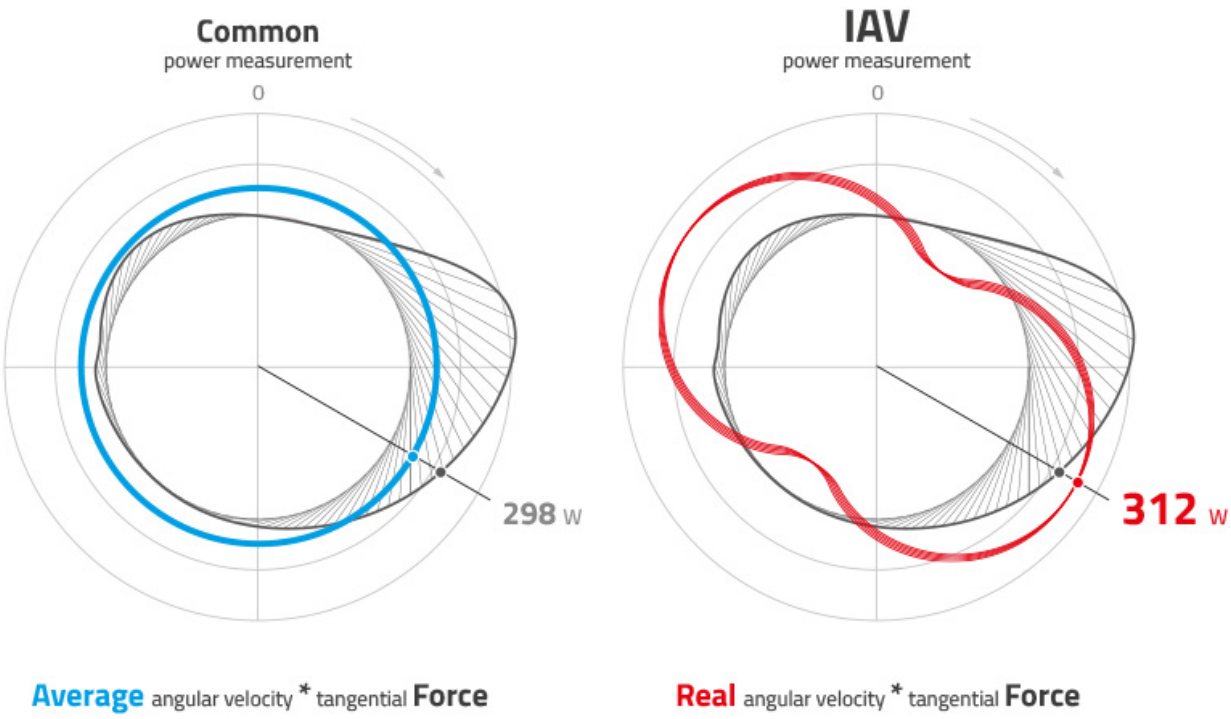
Where do some power meters go wrong?

Using the average value (Average) of the angular velocity, instead of its instantaneous form (Real), means considering each pedal stroke as perfectly round and uniform: this type of pedal stroke does not exist in reality.

Favero Electronics research (access to research material) has clearly shown that not considering changes in angular velocity has a negative impact on the accuracy of power meters in any pedaling situation, especially when using oval chain rings. In fact, in the document "Influence of the Angular Velocity of Pedaling on the Cyclist Power" you can easily see how a power measurement system that does not detect the instantaneous angular velocity introduces an error that can reach 4.5%.

What are the advantages of IAV Power?

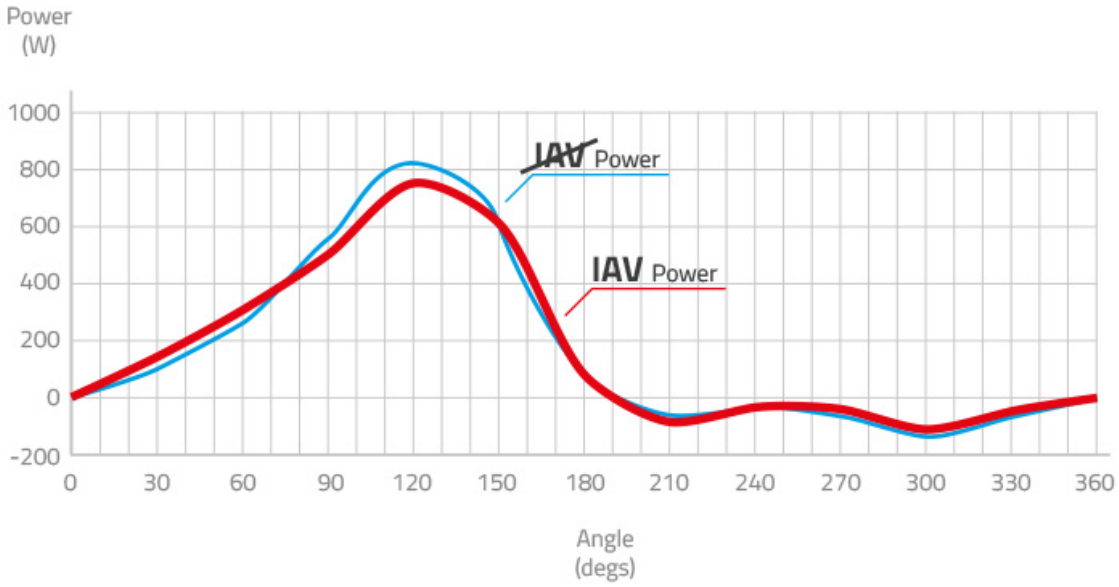
The IAV Power system is Assioma's new power calculation system based on the **real instantaneous angular velocity**.



Thanks to proprietary software solutions, Assioma fully exploits the potential of the **integrated three-axis gyroscope**: detecting the real trend of the angular velocity, with its variations, and integrating it into the calculation of power. In this way, not only has the overall accuracy been increased to ±1% but it is also guaranteed in real pedaling conditions. *Not just in laboratory tests*.

Here are some of the most common situations in which the **IAV Power** system proves its relevance:

- Piston-like pedaling: especially uphill with steep slopes, standing or sitting, the cyclist tends to give very irregular pedal strokes with very pronounced variations in angular velocity.
- On a bike trainer: each training roller has a braking system to recreate the right experience for the cyclist. This system changes from model to model, and since the inertia produced impacts directly on the angular velocity of the pedal stroke, there is an immediate influence on the expression of power.
- With non-circular chain-rings: oval or elliptical chain rings are designed to take advantage of the pseudo-sinusoidal course of the pedaling torque. In these cases, **it is essential** to have a power meter capable of instantaneously detecting the angular velocity, because the variations of this velocity are not only inevitable, but even mechanically accentuated.



The new IAV Power system by Assioma was created to meet actual real needs of cyclists and was not only inspired, but also implemented thanks to the continuous feedback of those who have already chosen us. In the end, the IAV Power system is just the newest of many unique solutions resulting from this valuable exchange of experience, yours and ours. To discover other features and strengths of Assioma, read also "Assioma: the only cycling power meter with...”