

Ketty PhDee

PART 3: KETTIE BASICS.

Welcome back, Forkers! In part one, I highlighted several important captions and headlines that we will cover in the series, such as *kettie* (slingshot) terminology and equipment. In part two, we indexed the *kettie* lingo – terms and expressions like flats, hysteresis, starships, cocktails, and the African Wrap! We debunked the mystery of “*haasrek*” and discovered that the correct Afrikaans term for the instantly familiar collective South African term “*kettie*” is: “*Rekker*”.

We continue to explore the profound technicalities of *kettie* (slingshot) shooting to further the objective of the PhDee series: To educate you, equip you with core knowledge, and empower you with elective knowledge to become a competitive *kettie* shooting athlete. At Ketty Pty Ltd, we love the history and culture of *kettie* and respect and support all the diverse movements of *kettie* development, whether social, cultural conservation, or highly competitive shooting. When discussing organised/standard *kettie* shooting disciplines, we follow the SASF (South African Slingshot Federation) slingshot sports code. It is important to have recognised and accredited standard disciplines across the nation, with established rules, repeatable match play, and reliable results, along with administrative structures to build and support provincial and national leagues.

Memo

To defer from lectures and keep every part of the series a sustained, entertaining article, we typically oversee and refer to various subjects in each part to provide context and instant

practical guidance. However, as the series progresses, we revisit these aspects and discuss the subjects in detail.

No 1 Rule – Always shoot with eye protection (shooting or safety glasses)

Do not even be in the vicinity of slingshot shooting without glasses. If a poor shot is released and impacts the *kettie* frame or goes off target, it will ricochet, or may result from a misdirected shot. Reference part 1 on: RTS. Similarly, the biggest threat actually comes from elastic bands failing. You should get into the habit of exchanging your bands within their service cycle. This will also ensure consistent shots. You do not drive your vehicle until the tyres burst.

What to buy?

In part one of the series, I referred to the SASF *kettie* rules and suggested the equipment you should buy as a novice to begin the *kettie* fun. Visit reputable suppliers such as www.ketty.co.za. At this point and onwards, I already

assume you have your “utility” *kettle* and the basic equipment, such as steel and clay ammo (pellets), to participate in this series shooting exercises.

Precision versus Accuracy

PRECISION is the internal ballistics (call it “inherent precision potential”) of your *kettle*, and ACCURACY is the external ballistics, applying that precision to a target. Thus, precision represents the optimised theoretical precision capacity of your *kettle* setup under laboratory test bench conditions. Whilst accuracy reflects the application of that precision in real-world conditions, such as gravity (range/distance), wind, velocity, and aerodynamics. Precision metrics (elements) are entirely measurable, while accuracy comprises both measurable and unmeasurable elements. It should also be noted that accuracy is significantly influenced by the operator’s skill set (athlete’s proficiency).

PAM – “Precision-Accuracy-Matrix”

To control the mechanical workings (cause and effect) of your *kettle*, you need to understand the precision and accuracy matrix (PAM) theory and identify the individual practical elements (metrics) in the matrix and their interdependent effects. For example, how are precision and accuracy affected by various metrics, such as the bow (fork-prongs, forks, branches) length, if the throat is extended or a shallow pickle (PF)? What is the effect on a hammer grip if the bands are too heavy, or on the ammo (pellets) size and weight? The matrix (PAM) is a framework of metrics (elements) in a finely tuned balance. The answer is not the best, biggest, fastest, and certainly not the most expensive *kettle* or components – but the right combination – for you – a *kettle* frame (size, weight, fit), bands (pull, taper, gauge), pouch (size, surface, design), and ammo (size, weight, speed), grip style, etc. Everything in life, and certainly every *kettle* metric, has a fundamental truth (basic true value) to it that dictates the reality of limitations, applications, performance, etc. I always say: “You cannot shoot a crooked *kettle* straight, but you can shoot very crooked with a perfectly straight *kettle*!” If you understand and respect the complexity – cause and effect – “fit for purpose” – of your *kettle* component’s setup, you can make informed decisions and take decisive actions to optimise the equipment (precision), which will translate to better results (scores).

The skill set

Accuracy inherently depends on a varying degree and combination of (1) external ballistics (wind, effective velocity, gravity, aerodynamics, etc.) and (2) the operator’s skill (ability, aptitude, dexterity, knowledge, expertise, fitness, determination). Let’s call it the athlete’s proficiency. It is clear that the skill set component in the accuracy equation becomes more or less critical depending on the *kettle* sport discipline and conditions. For example, caveat all (all things being equal), it is evident that you simply need a better skill set when moving



from 10 m and 15 m to 20 m indoors to be competitive. Similarly, in field target shooting, when engaging targets at various and extended distances, where wind and pellet drop (gravity) play a major role. The “right” (fit for purpose) equipment (great precision) that is ideal for you is important, but there is no substitute for actual shooting experience. Full score excellence, i.e., *kettle* sport mastery, can only be achieved with dedication. It is my opinion, similar to most other shooting sports, that: “... most athletes cannot shoot the accuracy of their weapons precision.” I believe that we tend to be overly occupied with equipment, using precision (internal ballistics / *kettle* potential) as an excuse for genuine poor accuracy, due to personal (athlete) performance.

Kettle Club

Where can I find a *Kettle* Shooting Club in South Africa? *Kettle* clubs are everywhere, and if there isn’t one near you, simply start your own! Contact SASF for information at info@ or <https://saslingshot.co.za>. Additionally, look out for official *kettle* shooting supporters like NATSHOOT Young Guns (*Kettle* Series) and the cultural custodians of *kettle* in South Africa: Die Voortrekkers. They all have clubs and shooting events. We are truly blessed to have such great support in South-Africa for *Kettle* Shooting.

Exercise regime

Nothing will make you a competitor except practise, period. Fortunately, with *kettle* shooting, you can practise practically anywhere. Choose a safe spot, set up your catch box, wear your safety glasses, and start practising. There is a difference between shooting *kettle* and practising the sport disciplines of *kettle* shooting. Ultimately, you will shoot (compete) as you practice. Thus, practise should represent and include very specific competition elements for proper (fit for purpose) event preparation. The key to any form or type of shooting is absolute consistency. The aim is to perfectly repeat every shot reliably, and to do that, everything must be repeatable, from your dress code (shoes, socks, underwear, etc.) to the flatbands (tied, length, etc.), shooting style (such as draw length), to your regime (reloading, posture, etc.), to your mindset. Sport psychology is very important, perhaps more

than physical skill and strength! There are various methods and technologies to enhance your technique, from coaching to using a mirror or video recording. In my opinion, the fastest method to learn is to literally see yourself, (not the perception you have); to create that personal consciousness, a self-awareness and cognisance to build confidence. Sport shooting is won and lost in the mind – period. The one very great advantage of *kettie* shooting over other shooting sports, even archery, is that you do not need expensive simulators to practice!

Shooting practice

What is the minimum a talented athlete should do to be competitive? Practise three full standard shooting disciplines three times a week. This is actually very little considering that a standard discipline in South Africa lasts five minutes, involving 10 targets (10 shots); all things considered, that totals practically 20 minutes a day for three days, or one hour a week. I always prefer to shoot more often rather than have long sessions. Of course, you must be tournament-fit and prepare accordingly. The value lies in practising form (physical posture) and technique to develop a consistent demeanour. Excellence requires commitment; it demands smart hard work, whereas mediocrity stems from complacency. Bad habits are easily and naturally adapted but very difficult to retrain. Shooting with a *kettie* for fun, with family and friends, at social gatherings, or while strolling on the beach or in the forest is fantastic, but do not confuse it with a dedicated scientific practise regime.

Slingshot precision

It is essential to understand that there is a direct and critical relationship between the weight (mass) of the ammo (pellet) and the flatband's ability to propel the pellet. This relation involves both geometry (size – thickness, length, taper (shape), elasticity, etc.) and the physical draw length (short draw, long draw (butterfly styles)), concerning optimised flatband expansion performance. The flatband's performance must always be optimised for your draw length. The bands' performance, in terms of stability and consistency from shot to shot, is extremely important in the *kettie*-ballistics model. Velocity should ideally be within 3% - 5% at worst.

Top Tip: At your full draw length, the flatband should expand to between 4.5 and 5 times its rested (relaxed) length.

Band basics

“Straight-cut” bands will provide the best longevity, while the more aggressive the taper (angular cut), the better the power delivery, but the shorter the lifespan. If a set of competition bands exceeds 300 shots, it is not used to its optimal potential. It should be understood that a band set should not only be designed for optimal performance in terms of speed, but also incorporate the performance equation, resilience, and stability, to ensure that it can outlast a tournament, a few practice sessions, the competition, and a potential shoot-off.



Top tip: The flatband taper (cut from the wide front end) affixed to the prongs (post), gradually tapering to the narrow rear end – attached to the pouch, should not exceed a ratio 50% of the actual band width. Example 20mm tapered to 10mm. The most ideal band set-ups are within the ratios of 1:1/4 (25%) to 1:1/2(50%). If an overly aggressive taper is required, to obtain a required speed, rather use an alternative band gauge (thickness) and size (width and length).



10m ZERO – ballistic performance table.

Distance yards	Velocity/ speed	Energy fp/e	Drop	TOF
0	280 feet per second	6 foot pound	0.0 inches	0.000 second
2	274 f/s	5 fp/e	0.4 "	0.021 s
4	269	5	0.6	0.043
6	263	5	0.6	0.066
8	257	5	0.4	0.089
10	252	5	0.0	0.112
15	238	4	-2.2	0.174
20	225	4	-6.2	0.239

15m ZERO - ballistic performance table.

Distance yards	Velocity/ speed	Energy fp/e	Drop	TOF
0	280 feet per sec	6 foot pound	0.0 inches	0.000 second
2	274 f/s	5 fp/e	0.7 "	0.021 s
4	269	5	1.2	0.043
6	263	5	1.5	0.066
8	257	5	1.6	0.089
10	252	5	1.5	0.112
15	238	4	0.0	0.174
20	225	4	-3.2	0.239

Round-Ball (Kettle/Slingshot) External Ballistics (Accuracy)

It is actually very complicated, and we will revisit the subject in detail in the future. Note that Firearm BC (ballistic Co-efficient) ballistics solvers (calculators) – nor intended for “round ball” ballistics, could provide misleading information. Know this: there is no such thing as a “flat shooting slingshot.” The moment the round ball (projectile) is released from the pouch, “pellet-drop” due to gravitational forces takes immediate effect. What needs to be understood at this stage in the series is that there is no flat shooting ballistic number (model) – “magic” centre holding (aiming) point – for shooting standard 10 m, 15 m, and 20 m disciplines. Anyone making this claim has not run the numbers on “pellet drop” (due to gravitational forces) and certainly does not understand elements like grouping mean radius (MR) dispersion, especially in the context of what seems to be erratic round ball behaviour.

Shooting an 8 mm steel ball with an average mass of 32.6 grains (2.11 grams) at the upper end of competition shooting speeds of 280 ft/s, if the zero distance is 15 meters, your zero will be +1.5" (3.81 cm) high at 10 meters and -3.2" (8.13 cm) low at 20 meters. Considering the MR dispersion statistical model of a kettle with a precision capability of a 2 cm grouping at 10 meters, and – that conventional ballistics suggests that 50% of the shots in a representative data sample (50 shots) will be within the 2 cm circle, 44% will fall in the next 2 cm circle (2 cm radius), and the mean radius is likely 2.2 cm (i.e., 4.4 cm extreme spread); 6% of shots will land in the third 2 cm circle. Therefore, at 10 meters, the precision on the largest target 1 target at 8 cm, is a 100% starting point from the centre of the target. However, on target 5, a 4 cm target, the statistical impact is only 93% at best. Thus, if you aim with the same reference point (the zero at 15 meters), you will be +2.81" (7.40 cm) high from the centre of the smallest 4 cm target, which gives you practical a practical zero impact percentage of 7% (considering your 2.2 cm mean radius



/ 4.4 cm extreme spread). Similarly, if the zero distance is 10 meters, the drop at 15 meters is -2.2" (5.58 cm) and at 20 meters -6.2" (15.75 cm). In practical terms, the takeaway for precision shooting is to devise an aiming reference point for each distance. Remember the definition and explanation of "gap shooting" in part two of the series.

Speed/velocity

Is 300 fs/s velocity necessary? Not at all, the real number is fp/e (foot-pound energy / knock-down power). In this series, you will learn that speed is not a big factor but rather a component (metric) in the precision equation/PAM. The correct question is: What energy is required to consistently knock down a standard discipline target, and how do you generate that amount of velocity/foot pounds energy (fp/e)? In ballistic terms: What is the "terminal velocity" required? One should consider that the additional energy is wasted, and what negative effects does it have on the "shooting system," including the athlete? Think about external elements like fatigue; consider internal ballistics, such as the additional movement of the *kettie* when greater pull and contraction energy are released. The fp/e can be increased by more speed and or heavier balls (pellets). In SASF the competition code (rules) prescribed a fixed 8mm pellet. Thus, in practical terms the speed (velocity) is the wieldy metric to be manipulated. Fortunately, velocity (speed) is one of the few metrics that can be easily measured with basic equipment, such as retail crony or radar devices.

Aiming sights

In Afrikaans, "visiere". It is a dedicated mechanism on your *kettie* used as an aiming device/sight to line up your *kettie* with your target. I find it very interesting that there is still a conversation (debate) among standard discipline slingshot competition shooting athletes about the fundamental question of whether to use or not to use "sights." Whether you have a dedicated aiming device or not, you use some part of the *kettie* as part of the "site picture" to align and stabilise (aim) the shot. In most cases, such as in "Gangsta Style",

the top (upper outside) corner of the so-called "post" on the prong is commonly used as the aiming reference. You might have experience or started off with more traditional *ketties* that do not have dedicated aiming devices (specific sight reference), and – those experienced athletes that always try to convey and enforce the myth that a *kettie* is shot with feeling (sensation/aanvoelling). However,

ironically, it is that additional refined sense that supports the fundamental fact that slingshots must be very meticulously aimed for precision. It is all science.

I believe the biggest single problem with aiming devices on *ketties* is that the aiming centre point is a singular pivot point, not a two-point reference (alignment) like with a rifle, a handgun, or even a bow with a front and rear string peep sight. It is more like a shotgun, and the reason why people in general notoriously struggle with shotgun shooting is the same reason Forkers seem to struggle with *kettie* sights: The shotgun must be essentially perfectly aligned, just as the *kettie* bands must be drawn equally, square to the frame, and the frame should be squared horizontally and vertically, without any induced wrist angular movement. In my opinion, drawing and shooting a *kettie* is more difficult than archery. Though there is a lot of similarity, as evidenced by archers trying their hand at slingshots, a *kettie* is drawn at an angle to the wrist by design, introducing a lateral bending moment, whereas a bow is drawn into the wrist. All the scientific evidence indicates that shooting with an "aiming sight" will give you a much greater precision element in your accuracy quest. In a game where 5% precision makes the difference between a medallist and a champion, I'll take every advantage I can get.

Safety

Remember the No 1 Rule – safety glasses. Before shooting, always inspect your bands for defects. Any little tear or sign of wear and fatigue demands replacement. After fitting your new bands, or by default, in any event, before shooting, first warm up and, more importantly, test your bands away from the proximity of your face (usually at waist level). Never dry fire your *kettie*!

The objectives of this series

The aim is to get you, the athlete, equipped with the (a) core knowledge (technical understanding) and (b) critical equipment to the 10 m standard discipline shooting-range line, open and ready for an expedient (c) elective knowledge learning curve (self-discovery) to be a competitive athlete.

10m ZERO - ballistic performance table.				
Distance yards	Velocity/speed	Energy fp/e	Drop	TOF
0	200 feet per sec	3 foot pound	0.0 inches	0.000 second
2	195 f/s	3 fp/e	0.8 "	0.030 s
4	191	3	1.2	0.061
6	186	3	1.3	0.093
8	182	2	0.9	0.125
10	177	2	0.0	0.159
15	166	2	-4.4	0.246
20	156	2	-12.6	0.340

The targets

Please reference the target designs and set-up in Part 1. We have to ensure that a *kettie* sport-shooting athlete, can “knock down” the steel targets at distances of 10 m, 15 m, and 20 m reasonably consistently to be competitive. We will discuss the requirements of engaging various targets at those distances and the varied target sizes from a typical match play scenario later in the series. Let’s first look at the minimum ballistic performance requirements. The SASF Standard discipline targets are designed to require a minimum of 2 lbs (2x British pounds) of energy to knock them over. In real

terms, this equates to shooting an 8 mm (carbon steel round ball) with a mass of not less than 30 grains (1.94 grams) and not more than 35 grains (2.26 grams) at a speed that generates in excess of 2 fp/energy. For example, an average steel ball at 32.6 grains (2.11 grams) at 200 fs generates 3 fp/e to 2 fp/e at 20 meters, and 280 fs generates 6 fp/e and 4 fp/e at 20 meters. Thus, speed is not the issue; it is about accuracy (external ballistics); in other words, placing the precision (grouping) of the *kettie* on the target.

Myth busting

“Put the *kettie* down – and the hand that naturally reaches out is the hand that holds the *kettie* frame”. Absolute nonsense! How do you distinguish a left-handed from a right-handed Forker? A left-hand athlete shoots with the *kettie* frame in his right hand, and a right-hand Forker shoots with his *kettie* in his left hand. You will learn in time that it is actually the rear hand holding the pouch that is doing all the shooting and is responsible for precision, whilst the leading hand is responsible for accuracy. So, your rear hand must be your smart hand (smart fingers), depending on whether you are left or right-hand oriented.

It is great to have you with us on this “Ketty PhDee” journey as we explore the science and legends, debunk the myths, and cultivate solutions to precision *kettie* shooting. Until next time, safe shooting! ↗

