



AIMING HIGH

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Safe, effective pole vaulting begins by choosing the right pole.

BY JAN JOHNSON
Director
Pole Vault Safety Certification Board

Selecting the proper pole is one of the most important aspects of safe and effective pole vaulting. Before we get into that discussion, it is important that I define some essential terms and concepts.

Kinetic energy: Vaulters' speed and take-off technique create their potential for height. In pole vaulting, we say that when kinetic energy is combined with the take-off angle it yields the vaulters' height potential.

Energy equation: Vaulters' runway speed and take-off technique create their kinetic energy in any pole vault attempt. This energy determines the handhold height and pole stiffness most appropriate for the vaulter. When vaulters select the proper handhold and pole size to match their take-off speed, they produce the optimal pole speed, so that the pole rotates (rolls) to vertical just as they push off to clear the bar. When this happens, the vaulter has balanced his or her energy equation to vault safely and with optimal efficiency.

Energy input: The speed at which the vaulter takes off, combined with his/her jump off the ground, and the rigidity of his/her arms at takeoff combine to form a vaulter's basic kinetic energy. Vaulters with greater kinetic energy can grip the pole higher and jump on stiffer poles.

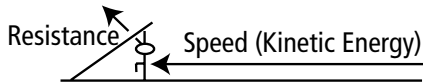


Fig. 1

Pole speed is the rate (speed), at which the pole rises to the vertical position. With optimal pole speed, the pole rises to vertical at the moment the vaulter releases the pole to clear the bar. In this type of jump, the vaulter will land in the center of the preferred landing zone (PLZ). Pole speed is primarily affected by vaulters' runway speed and secondarily by vaulters' take-off and swing-up mechanics.

Square or lined-up takeoff: The vaulter should leave the ground in a position of alignment. The vaulter's body should be straight up, leaning neither right nor left, with the top hand positioned overhead at the moment of takeoff.

Vertical pole: For safe and efficient vaulting, vaulters must select the hand-grip and pole size that best fits their running speed and technical efficiency. This process of adjustments is called balancing the pole vault energy equation. The goal is to enable vaulters to "roll the vaulting pole to vertical," so that they can jump with proper technique and land safely on the landing pads. This type of energy-balanced vault, when rehearsed often enough in practice, also produces the most technically efficient vaults so that athletes can clear higher bars relative to their top handholds, and thus ultimately vault much higher.

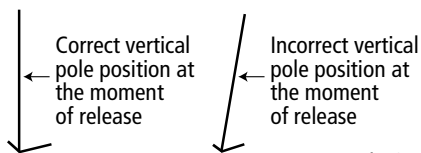


Fig. 2

Resistance: Resistance, which is also known as resistance to penetration, is used to describe how hard it is to penetrate and land safely on the pads. The resistance a pole offers is predetermined by two components: the stiffness of the pole (length and max weight) and the handhold the vaulter chooses. If vaulters choose too high a grip or too stiff a pole for their take-off speed and mechanics, they will not be able to execute proper

technique, and consequently may not be in position to land safely in the pit.

The resistance a pole offers is expressed by the inter-relationship between its length and weight values. Six inches in pole length corresponds approximately with 10 pounds in weight.

Penetration is used to describe getting the pole sufficiently to vertical to land in the PLZ.

Rolling the pole: A term vaulters use to describe the feeling they have when the pole is lifting them and moving toward vertical. When vaulters are rolling the pole with too much energy but not over-bending is called "blowing through." When the pole is not rolling sufficiently and vaulters are coming up short in the pit, it is called "stalling out."

Pole stiffness: In general terms, the resistance a pole offers to penetration (rolling to vertical), is expressed in its length and weight. Poles that are stiffer offer more resistance to rolling to vertical, slower pole speed, and greater potential for high vaults. Softer poles are easier to roll to vertical but offer less potential for height. As a general rule, six inches in pole length equals 10 pounds in stiffness. For example, a 12' 120 is approximately 10 pounds softer than a 12'6" 120.

Grip height: Grip height, as measured from the bottom of the pole to the top hand, is another form of resistance to penetration (rolling the pole to vertical). As vaulters raise their grip, two things happen. First and most importantly, the axis through which the hands must pass becomes greater, increasing the poles' resistance to rising to vertical. Secondly, the pole becomes slightly softer, slightly reducing its resistance to penetration and returning its unbending energy more slowly.

Push-off efficiency: Perhaps the greatest indicator of pole vaulting proficiency is athletes' ability to clear crossbars above their handhold height. The more an athlete can push-off above his or her handhold, the greater their push-off efficiency. Push-off efficiency is the result of proper energy equation management over a period of time so that vaulters have many opportunities to practice properly getting the pole to vertical and landing safely on the pads.

Grip height plus push off equals vaulting performance. The vaulters' handhold height plus their push-off effi-

ciency is the key determinant of their performance. For instance, a vaulter using a 13-foot grip to clear a 13-foot crossbar requires an 8-inch push off. Keep in mind the box is approximately 8 inches deep.

Take-off angle: The distance between the ground under the vaulter's foot at the moment of takeoff and his or her top hand. The greater this distance, the higher the angle of the pole as it makes contact with the back of the planting box. In general, taller vaulters with longer arms will have higher take-off angles than shorter vaulters with shorter arms.

Having a higher top hand position at takeoff is a mechanical advantage since the pole must rotate (roll) a shorter distance to get to vertical. In general, a high take-off angle allows vaulters to grip the pole higher.

Beyond the obvious limitations of body type, vaulters can do several things to increase the take-off angle. First, they can fully extend the top arm over their head prior to the pole tip entering the planting box. Second, they can leave the ground so that the take-off foot is directly below the top hand at the instant the pole strikes the back of the box. Third, they can jump up in the direction the pole is rolling.

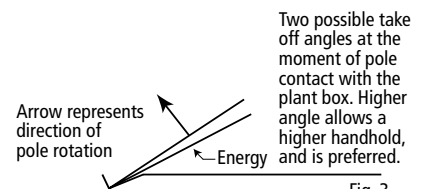


Fig. 3

Pole bend: Bending the pole allows vaulters to grip higher because it reduces the resistance of handhold height. When the pole bends, vaulters are actually holding lower than their measured grip when the pole is straight. This is the reason vaulters can vault higher on bending poles. As vaulters begin to learn how to bend the pole, they will be able to raise their grip dramatically.

It is during this time that the PLZ becomes an important tool for safety. It is also during these early stages of bending that control problems develop.

Over-bending: Also known as "smushing" or "crushing" the pole, this is a type of vault where vaulters bend a pole beyond its suggested maximum of 90 degrees, which generally produces a slow unbending or return and disrupts

higher will produce greater resistance to pole rotation to the vertical, so that the increased resistance of higher grip is offset by the speed gain (kinetic energy) of a longer approach run.

GENERAL RELATIONSHIP BETWEEN RUN LENGTH AND GRIP HEIGHT ADJUSTMENTS

Number of lefts	Possible grip height adjustment
3 lefts	Handhold height
4 lefts	+6"
5 lefts	+5"
6 lefts	+4"
7 lefts	+3"
8 lefts	+2"

PHILOSOPHY REGARDING POLE BEND AND TECHNICAL EFFICIENCY

In working with beginning vaulters, it is important to emphasize the fundamentals of good technique.

Encourage small bends. Small, quick bends are easier to swing upon. Big, slow bends will inhibit the vaulters' ability to push-off above their top hand. Small bends are less risky.

Encourage push-off efficiency. The distance vaulters can push-off above their top hand is a result of proper technique, handhold height, and pole stiffness. The height vaulters are capable of clearing is the result of their handhold height plus their ability to push-off above it. Both variables in this equation should be given equal weight in the teaching process.

Higher grips amplify mistakes. As handhold increases, planting and take-off mechanics become increasingly important. If vaulters are already landing near the edge of the PLZ, more grip or more bend will cause them to land even further from the center. Do not have vaulters raise grips or lengthen approach runs unless they are safely landing within the PLZ borders 100 percent of the time.

Handhold (grip) adjustments: All handhold height adjustments should be made in conservative increments.

Small adjustments are safer and allow for better learning. Pole vaulting grip adjustments are spoken of in terms of "fists" or "fingers." A finger adjustment is approximately one inch, and a fist adjustment is approximately four inches.

Coaches and athletes use this system to describe the amount the vaulters' handhold is raised or lowered in specific, measurable terms. To raise or lower the grip one finger would be a very small adjustment. To raise or lower the grip one fist would be a fairly major adjustment. The relationship between handhold height and pole speed should always be observed.

Bottom arm considerations: As handholds and pole bends increase, the space between the vaulters' bottom hand and his or her chest will grow during the takeoff and swing phase. Vaulters should attempt to put pressure into the pole with their bottom arm. This pressure will help bend the pole and allow for a slightly higher handhold. However, too much bottom hand pressure will inhibit beginners' ability to swing-up and invert.

The bottom arm does not need to be straight—it only needs to give pressure. A 90 degree angle at the bottom hand elbow, with the bottom hand positioned approximately 12 to 16 inches directly above the vaulters' forehead, will sufficiently pressure the pole and allow beginning vaulters to swing-up to inversion more efficiently. As handholds increase, the angle between the bottom hand and the chest will naturally grow. Too much emphasis on the bottom arm can disrupt this relationship.

The take-off step is key: Vaulters and coaches should pay close attention to the take-off foot's distance from the box and its relationship to the top hand. Jumping up onto the pole from a take-off step directly under the top hand produces a better take-off angle and makes it easier to swing up and finish the top of the vault.

Many times, raising the grip too much and too soon will result in "squashing" the pole and a chronic under-step. This makes it virtually impossible to swing up and finish the top of the jump in good form. The solution is to lower the grip and possibly go to a stiffer pole, so that the "out step" feeling is more comfortable.

The following table shows the approximate distances necessary for

optimal takeoffs as they relate to the vaulters' size and hand grip. Vaulters must take off further from the zero line as they grip the pole higher in order to achieve the highest possible take-off angle.

RELATIONSHIP BETWEEN BODY HEIGHT, HANDHOLD HEIGHT, AND TAKE-OFF DISTANCE FROM THE ZERO LINE

Vaulter's standing height	Handhold height to top of top hand	Take-off distance from back of box to toe
5'	10'6"	8'6"
	11'	9'
	11'6"	9'6"
	12'	10'
	12'6"	10'6"
5'4"	13'	11'
	11'	8'9"
	11'6"	9'3"
	12'	9'9"
	12'6"	10'3"
5'8"	13'	10'9"
	13'6"	11'3"
	11'6"	8'6"
	12'	9'
	12'6"	9'6"
6'	13'	10'3"
	13'6"	11'
	14'	11'6"
	14'6"	12'
	12'	9'
6'4"	12'6"	9'6"
	13'	10'
	13'6"	10'9"
	14'	11'6"
	14'6"	12'
	15'	12'6"
	15'6"	13'
	12'6"	9'6"
	13'	10'
	13'6"	10'9"
	14'	11'6"
	14'6"	12'
	15'	12'6"
	15'6"	13'
	16'	13'9"

Adjustments for safety, consistency, and performance. Most expert pole vault coaches believe the best location to coach from is several yards to the side of the runway between zero and 30 feet from the box. This position makes it possible to view the entire run and vault. In improving performance, it is important to determine if the pole is getting to vertical, where vaulters are landing, how they are running, and how their

technique looked.

Blowing through. Most top vaulters and coaches think of blowing through as a good problem. Blowing through simply means vaulters are running and planting the pole too well for the resistance the pole is offering.

Standard depth settings. Each vaulter should have a general concept regarding his or her best standard placement. It is the general opinion of most experts that the best standard settings for highest jumps and the best safety are between 15 and 30 inches (40-80 centimeters) behind zero.

It is a good idea to check the standard settings, also called “zeroing,” as a part of the warmup at any new or unfamiliar location. This can be simply done by asking that the standards be set at zero and having someone balance a pole at perfect vertical in bottom of the back of the box. Since the back of the box is slanted toward the landing system, and since zero is actually the top of the back of the box, the crossbar should be approximately two inches back when zeroed.

APPROACH SPEED AND CONSISTENCY

Speed and take-off angle are clearly the primary requirements for success in pole vaulting. They are also necessary for safety because the pole vault energy equation’s requirements must be met every time vaulters leave the ground. If these requirements are not met, vaulters won’t be able to land safely.

In an effort to improve vaulters’ approach and take-off consistency, it is recommended that coaches pay close attention to running mechanics:

Over-striding: Vaulters will commonly over-stride when they feel slightly too far away from the box. In fact, if they feel too far away they may simply refuse to take off. As vaulters develop a feel for pole vaulting, they will become increasingly sensitive to how far away from the planting box they need to be as they near the take-off step.

If they are too far away, they will generally over-stride, which causes slowing down. It is best to encourage shorter, quick strides, rather than long, slow strides. This is because it is better to jump up from short, rather than long strides.

It is best if vaulters run with an erect posture, carrying the pole tip between waist- and chin-height. The feet should

make contact with the ground so that the ball of the foot touches down directly underneath the knee on each step. Most experts agree it is better to chop the steps slightly rather than over-stride.

back. This can easily be done if the runway is marked. Keep in mind that the distance may vary slightly based on wind and runway conditions, temperature, and level of excitement.



Kirby Lee/Image of Sport

Many times, raising the grip too much and too soon will result in “squashing” the pole and a chronic under-step.

Make all adjustments in shoe-lengths. This helps standardize communication for approach consistency. Most coaches and vaulters speak in terms of shoes, half-shoes, moving up (toward the planting box), and moving back (away from the planting box). This system allows athletes to make minor adjustments in a simple, accurate way.

Require that all vaulters mark their step. This is commonly done on the side of the runway with playground chalk, tape, or some other marker. The measurement is called the vaulters’ nominal step or approach distance. This distance should be determined from experimentation in practice. It is best to establish the approach distance under non-wind conditions on your home runway.

Actual approach distances may vary according to runway conditions. Require that all vaulters know both their short and long run distances, so that they don’t have to run their steps

In general, vaulters may have to move their step a shoe length or two toward the planting box in cases of cold temperatures, head wind, or a slow, wet runway. In cases of warm temperatures, tailwinds, or fast runways, vaulters may have to move the starting point a shoe length or two back from the planting box.

Set up the runway markings the same every time. The adjustment to unfamiliar locations may be overcome by always setting up the runway the same way. These site markers will help vaulters feel more at home and promote consistency. ☆

Jan Johnson is the 1972 Olympic bronze medalist and a former world record holder. Johnson serves as National Pole Vault Safety Chairman and the Director of the Pole Vault Safety Certification Board. A schedule of Johnson’s camps can be found at www.skyjumpers.com.