Improving Running Speed-Back to Basics

By Cheryl Coker

Speed training is not restricted to track and field anymore. Greater emphasis on speed can be found in a number of sports-and softball is no exception. To win in softball, you have to get more of your players around the bases than your opponent How many losses can be attributed to getting thrown out by just half a step?

To a certain degree, speed is dependent on genetics. However, speed and baserunning ability can be improved by increasing the efficiency of an individual's running mechanics through an appropriate training program. To accomplish this, a basic understanding of running mechanics is necessary.

Posture

The athlete should always run relaxed. Muscles have an elastic property that allows them to contract with more force than a voluntary contraction. Straining in sprinting is not productive and decreases the ability of the muscles to function efficiently and elasticity, resulting in slower speeds.

The athlete should maintain good body posture throughout the sprint. The back should be flat, the stomach tight, the legs and hips should be underneath the body, and the ankle should be very elastic.

Arm Motion

The arms should be at approximate at a 90 degree angle and should not cross the mid-line. There are several portions of the run of the body. The arm swing is initiated by driving the elbow backwards not forwards. Allow a natural forward arm recovery.

Running Machine

Sprinting can be broken down into three phases: the drive phase, the recovery phase, and the support phase (see Figure 1).

The drive phase is the segment of the running stride that results in the forward propulsion of the body. This phase is characterized by the powerful extension of the drive leg and flexion of the non-support leg. As the non-support leg flexes, the heel is actively lifted towards the buttocks. During this motion the heel and toe are up allowing for the active recovery of the non-support leg.

Once the foot of the drive leg has left the ground, the runner has moved into the recovery phase. Here, the drive leg recovers such that the lower leg is tucked close to the thigh. The non-support leg opens by extending once the foot has cleared the knee of the drive leg. After extending, the foot then actively pulls back towards the mid-line of the body in a pawing motion.

The non-support leg now prepares for the support phase (the point in the running cycle where the non-support leg prepares to contact the ground -also known as ground preparation). It is important that the ankle remains cocked (toes up) while pawing at the ground, The ball of the foot contacts the ground under or behind the center of the body. The cycle then repeats itself.

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Potential Problems

There are several portions of the running stride beyond "the basics" that commonly break down resulting in the loss of efficiency and consequently speed.

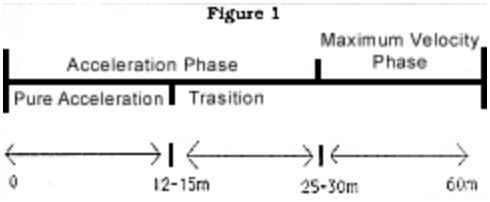
1. Failure to keep the toe up, heel up, and knee up once the foot leaves the ground will result in increasing the length of the leg which decreases the efficiency of its recovery. A familiar example of how limb length effects speed can be found in figure skating. When a figure skater wants to spin faster, she pulls her arms in close to her body. Likewise, when she wants to slow down, she extends her arms. Here, the skater is taking advantage of the fact that when the length of a rotating limb decreases, rotational velocity increases. This principle also applies to sprinting. By pulling the heel up to the buttocks so that the lower leg is tucked close to the thigh, and by keeping the ankle cocked, the leg length is decreased allowing it to swing through faster.
2. Breaking" is a problem that occurs when contact is made with the ground in such a way that it impedes forward propulsion thus slowing down the runner. In ground preparation, the foot pulls backwards as fast as possible, pawing at the ground. The foot must contact the ground under the center of mass while pawing. The farther ahead of the center of mass that the foot lands, the more breaking action and the greater the effect on speed.
3. Failure to keep the toe up throughout the running cycle causes similar problems. Running with pointed toes decreases ankle elasticity, reduces the "pawing" effect, and results in an increase in "breaking" due to the toe contacting the ground further away from the center of mass.

Several problems have been discussed here that can hamper speed and base-running. The greatest problem, however, is that most athletes have never been taught how to run properly. In order to "re-teach" athletes how to run, form running drills are used. These drills will be presented in Part II of this series.

Part II

By Cheryl Coker, DESIGNING A SPEED DEVELOPMENT PROGRAM

Improvements in speed and base-running ability can be obtained by learning correct running mechanics through form running drills. Good technique, however, can take an athlete only so far. Reprogramming the central nervous system through a fundamentally sound training program is required to change an individual's underlying speed. The purpose of this article is to present information that will help you design a speed development program for softball.



Speed can be broken down into acceleration and maximum velocity. (See Figure 1) According to this figure, softball players rarely reach maximum speed in base running. If this is the case, why don't softball players only train for acceleration, particularly out of the batter's box and off the base?

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To run faster, you have to change your underlying speed. As a player's maximum speed increases, improvement is realized at all percentages of that speed. The start (out of the batter's box and off the base), acceleration, and maximum velocity all need to be trained to achieve a player's maximum potential.

The Start

Exploding in the direction of the run is the key to powerful starts both out of the batter's box and off of the base. It is not within the scope of this article to discuss starting techniques. Regardless of the technique used, there are a number of drills that can indeed improve starting by improving power.

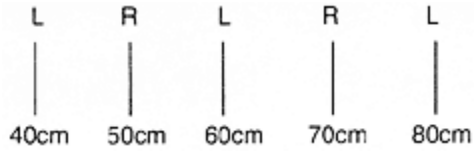
1. **Pushup starts**-Line up in the sprint start position (four point stance). The hips are raised into the set position. Maintaining the starting posture, perform a pushup. In a continuous motion, at the top of the pushup, an explosive horizontal drive is executed and players sprint a given distance.
2. **Medicine ball starts**-Medicine ball starts are underhand, between the legs throws. Stand with feet slightly wider than shoulder length apart holding a medicine ball with two hands. Lower the body by bending at the knees while simultaneously allowing the medicine ball to go back between the legs. Allow the body's balance to shift forward. From this position, throw the medicine ball at about a 35 to 45 degree angle to the horizontal. Generate the power to throw by exploding with the legs. At the height of release, the movement is converted to a sprint after the ball.
3. **Harness starts**-Using harnesses, or even a rubber bicycle tire tube, perform starts with resistance. One player is in the harness and drives from an arbitrary starting position while the partner provides resistance. Focus on knee drive.
4. **Get up starts**-These are a fun way to work on starts and are only limited by your imagination. The player will start in some predetermined position and perform a series of movements sprinting as fast as possible. An example could be to start on the stomach facing the opposite direction and on command get up and sprint. The complexity of the start can be increased to include a series of movements. For example, the player lies on her stomach facing the opposite direction to the run, does six pushups, rolls onto the back, performs six sit ups, six donkey kicks, and then sprints.
5. **Roll-over starts**-Players line up at the start with the toes of the back foot beside the heel of the front foot. They will then lean forward and at the point where they are just about to lose their balance, they explode horizontally and sprint as fast as possible.

Acceleration

Acceleration plays a major role in base running. Acceleration is characterized by the ability to overcome inertia at a high rate. Sprinting over distances of 10 to 40 meters will focus on the acceleration phase. The following drills will also improve acceleration:

1. **Wall Drill**-The wall drill teaches correct acceleration technique by forcing players to drive backwards into the ground. Stand three to four feet from a wall. Lean forward and place hands on the wall. Arms should be fully extended. In this position, drive the knees towards the wall. Ground contact time should be minimized. The technique used to perform this drill resembles that of pushing a car.

2. **Stick Drill**-The stick drill focuses on the increasing stride length that occurs in acceleration. Place a piece of tape (sticks, chalk, rope, etc.) 40 centimeters from the start line. Continue to place markers, adding 10 centimeters each interval, for five to 10 meters. Place the ball of the first foot just in front of the start line. Run through the "course" contacting each piece of tape. Correct technique is characterized by propelling the hips horizontally past the second piece of tape while the legs drive back into the ground in order to contact the tape. If done correctly, the body position will resemble that of the wall drill.
3. **Resistance Exercises**-Resistance exercises such as running with a parachute, harness tire, weighted vest, uphill, etc., focus on the expressiveness and power required to maximize acceleration. These exercises train specific strengths by requiring players to work harder over a given distance. Although these drills make running more difficult, technique should not suffer. If technique begins to deteriorate, decrease the amount of resistance.



Max Velocity

Maximum velocity is reached at distances of 30 to 60 meters. Maximum velocity is the highest speed achieved during a sprint. Efforts must range between 90 to 100 percent in order to improve top speed. The following drills are designed to stimulate the central nervous system and the muscles to develop maximum speed:

1. **Ins and Outs**-Ins and outs are a segmented run. The "in" is performed at 100 percent intensity. The "out" is a maintenance phase where the speed and stride frequently are sustained but maximum effort is controlled. An example of an ins and outs design would resemble the following: The distance for the ins and outs are controlled by the coach and the overall distance can range between 60 to 100 meters. Always end the run on an "in".
2. **Flying Starts**-Flying starts involve building up into an all out effort. An example would be a 15 meter flying start into a 40 meter sprint. In this example, players should reach top speed by the end of the 15 meter "fly". This speed is then maintained over the remaining 40 meters. Flying starts should be a gradual but proportional buildup to top speed. A sudden change in speed once the player hits 15 meters can result in injury and should be avoided.
3. **Over-speed Training**-Over-speed training is also an effective method of training maximum velocity. Running downhill will increase the runner's natural speed. The grade of the hill should not exceed 10 percent. Assisted running or "towing" with elastic tubing can also benefit maximum velocity. It should be noted, however, that the athlete should have a strong base before over speed training is introduced due to its demanding nature and increased chance of injury.

Designing a Program

Speed development should occur year round. By adjusting workout volume and intensity, peak speed can be realized during the competition season. Sport specificity also evolves from general to specific as the competitive season approaches.

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Speed development in the off-season involves high volume, low intensity workouts. The use of resistive and normal sprinting are high during this stage in the training cycle. As persuasion approaches, workout intensity increases and volume decreases. A shift to more softball specific training occurs and base running drills should be incorporated in the program. Assisted exercises can be introduced towards the end of this stage provided that a strong speed base exists. Peak intensities are found during the competitive season.

Chart I below can serve as a guideline for developing a sound speed development program for softball.

Chart 1

FACTOR	SPEED	SPEED ENDURANCE
When	early in week	later in week
Distance	5-80m	30-150m
Rest between reps	2-10 sec	25-90 sec
Percent of effort	95-100%	90-100%
Total volume	300-800m	300-900m
Number of sets	2-4	2-6
Rest between sets	5-10 min	4-10 min

Speed plays a key factor in maximizing base running performance. Base running can win or lose a game. Improving running technique and implementing a sound speed development program can increase your speed to stretch singles into doubles and doubles into triples.

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