

Acceleration Development:
On and off the track

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What is acceleration

- Acceleration is the rate at which the speed of an object is changing.
- Acceleration takes place the first 0-30 meters or to about 3-4 seconds from the start of a sprint.
- After approximately 30 meters, acceleration turns into maximum velocity and top speed is hit.

Acceleration Mechanics

- **1) Stride Length = Short to Long**
Starts off short and increases until maximum velocity is reached.
- **2) Ground Contact Time = Long to Short**
Ground Contact Time is the amount of time each foot spends on the ground. It is longest at the beginning as the body is trying to overcome inertia, (the weight of your body fighting gravity).

Acceleration Mechanics

- **3) Shin Angle with ground = Small to Large**
The shin angle is going to determine the force application to the ground and the projection angle that the athlete is going to drive out at (roughly 45 degree projection angle is ideal).
- **4) Velocity = Slow to Fast**
Velocity is both the speed and direction that the body is moving. As the athlete accelerates, the rate and distance will increase with time.

Acceleration Mechanics

- **5) Stride Frequency = Slow to Fast**
Like ground contact time, it starts off slower (though still quite high) and increases until stride frequency reaches optimal level at maximum velocity.
- **6) Heel Recovery = Low to High**
Heels should recover quickly, with limited backside mechanics and shouldn't involve large amplitudes of motion behind the hips. During acceleration, especially the first 6-8 steps, you want to minimize your backside mechanics. Backside mechanics in sprinting, are movements occurring behind the center of mass.

Body Position

- Foot strikes on forefoot- foot should strike directly below or slightly behind the hips
- The body is driving out at a 45 degree angle to the ground (a straight line from your head to your back leg).
- Keep the heel recovery low
- Split the arms vigorously.

Body Position

- Step over the opposite knee and drive the foot down into the ground to create maximal force (Ankle steps over the knee)
- Face and neck relaxed
- Tight stomach, flat back, hips forward
- Arms – elbow is approximately at 90 degrees coming forward and opening up on the drive back.

Acceleration Drills

- **Short Hill Work**
 - This is a great speed drill for large groups.
 - Hills can naturally help athletes with their stride frequency and also help promote quick arm action.
 - Short hill work will help improve their straight ahead running.
 - Puts the athlete in proper acceleration mechanics naturally without any tools or cues. You are bringing the ground up to them as they will be driving out and running in the 45 degree angle to the ground.

Acceleration Drills

- **Stadiums**
 - When performing stadiums for acceleration work, make sure that your athletes are skipping a step so they are running every other step.
 - Running every other step on the bleachers mimics acceleration mechanics similar to short hill work. It is putting the athletes at that 45 degree body angle while they are running the stairs.

Acceleration Drills

- **Wall Drill**

- Have athletes stand with their hands against a wall with the arms parallel to the ground. The feet should be behind the hips and the athlete should be at, approximately, a 45 degree angle to the ground. The torso should be erect, hips forward, stomach and lower back tight so that one could draw a straight (45 degree) line from the head, through the hips to the ankles.
- From this position start a marching action. Have the athlete raise the right leg so that the ankle is beneath the hips, toe dorsiflexed. On command, the athlete will march, alternating legs, for a given number of repetitions. As they march, they should gradually cover distance and finish upright.

Acceleration Drills

- **Scramble Ups**

- Laying on back
- Push-up 'Up' position
- Push-up 'Down' position
- On 1 knee (always switch)
- Seated (facing forward)
- Seated (facing Backwards)

Acceleration Drills

- **Position Starts**

- Falling Start
- 2 pt. start
- 3 pt. start
- 4 pt. start

Acceleration Drills

- **Med Ball Starts**
 - The athlete starts with feet split as in a start, holding a medicine ball at their chest.
 - Have athlete provide an explosive chest pass, trying to propel the medicine ball as far as possible.
 - This will cause the athlete to use their legs and drive out. The instant the ball is released have your athlete keep that momentum going by sprinting out to 15 yards.
 - This is a good exercise for athletes that don't seem to be going any where their first couple of steps of acceleration and need to become more explosive.

Plyometrics

- Standing Long Jump
- Standing Triple Jump
- LL-RR
- Power Skips for Height
- Power Skips for distance

Weight Room

- Squats
- Step Ups
- Lunges
- Power Cleans
- Dead Lifts
- Box Hops?

Toys?

- Towing
- Bungee Cords
- Parachutes
- Apollo Exerciser



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