Acceleration
Track And Field’s Springboard

Tony Veney
trakcoach08@gmail.com

Acceleration

- The Closer You Get To Real Sprinting
- The Easier It Gets To Really Sprint

Acceleration

- 47% of the body’s mass is in the arms and legs

Acceleration

- Sprinting is a series of limb actions, reactions, actions, and interactions

Acceleration

- Energy is needed to:
  - Execute a proper start from zero inertia
  - Stopping and restarting limb movements repeatedly, at high levels of speed, power, and skill

Acceleration

- In positive acceleration, the higher a man or woman’s velocity, the more difficult it is to produce horizontal forces
- After you reach 7.5 meters per second, the ability to produce accelerative forces is almost zero (where this happens in the race depends on the ability of the sprinter)
- The time to produce necessary force changes with the changes in body position, balance, agility, and shin angles of the lower leg (ankles)
Acceleration

- The foot is skated low in the earliest stages of the run (hip swings front to back)
- Low heel recovery is needed to allow the foot to apply the necessary high force potential at the start
- The mistakes come from high heel recovery indicative of top end (max velocity) mechanics and up/down force application

Acceleration

- At the start, the feet are cocked at the ankle at low velocities (allowing time for high force application)
- The hamstring is not required for this
- Ground times are high and air time are very low

Acceleration

- A stumble or loss of velocity at the start is the result of not being able to catch the hips before a contact step with a hip force producing movement
- When the driving knee is allowed to stop or pause, the lower leg casts the foot, and loses the force coming from the hip and thigh resulting in a vertical step into the ground
- This results in poor recovery mechanics that kill horizontal forces and allow vertical forces to take a dominant role way too early

Acceleration

- Once the initial force production to leave the block has been executed:
  - The early acceleration ratio of ground to air time is 2:1
  - Around the steps 8-10, the ratio changes to 1:1
  - As acceleration transitions to max speed, the ratio changes to 1:1.3
  - From 55 to 85 meters, the ratio goes from 1:1.3 to 1:1.5

Acceleration

- The vertical component of the acceleration phase begins to take on a more dominant role past 10 meters (much earlier than many think)
- The horizontal and vertical components do not exist in isolation, but blends from one to the other from the first step of the acceleration

Acceleration

- Contrary to “popular” belief, the “head down” acceleration seen by some of our best sprinters should not be taught by what we see
- Do they do it because they need to, or just because they can?
- The longer and harder you “push” and apply block pressure, the more effective your start
- Your body's angle of block departure, and the quality and length of the departure depends on starting strength
Acceleration

- Acceleration Potential
- Transition Potential
- Max Speed Potential
- Negative Acceleration Potential

Acceleration

- **Acceleration Potential**
  - How to attack longer into the race, more powerfully and more effectively
  - Learn how to "wait for it"
  - "Pace" your sprint races - don’t over or under run the race (Volkswagen shifter)
  - The sprint then becomes a constantly changing production of acceleration, velocity, force application, and energy distribution

Transition Potential

- **Transition Potential**
  - You must learn how not to over run or under run the acceleration.
  - This takes practice-practice-practice
  - Coaches have to understand the value of developing the “feel” of the push to top end speed

Max Speed Potential

- **Max Speed Potential**
  - This phase of the run is a direct result of the potential found in the acceleration and transition to top end speed
  - You must learn when to start “tapping” after the push is done

Negative Acceleration Potential

- **Negative Acceleration Potential**
  - When the race gets tight, resist the urge to “push” again (a critical cue for the coach)
  - Train frequency in the later stages rather than pushing again (which is an acceleration mechanic and remember requires higher ground times - something you can’t afford late in the race)
  - The time it takes to accelerate will determine the longevity and quality of the acceleration, thus positively or negatively influencing the max speed and negative acceleration zone
  - So acceleration is the feeling of the run from start to the finish
Acceleration

- The problem with acceleration is once you’ve hit all you’ve got, that’s all you get
- You must resist the urge to continue to push once you reach top speed
- At top speed, your acceleration is zero thus leaving only the qualities of relaxation and technical maintenance
- So once you have reached all you’ve got, you must take your foot off the accelerator
- And it’s the tightness of the races over the last 25-30 meters that tempt you to push harder (to run faster), rather than “floating fast” to the finish, riding the momentum of the previous acceleration

Acceleration

- So the coaches job is to teach the acceleration so that the other qualities of the race can be exploited
- Psycho-motor stress is what cost you the medals in the last 25% of all races
- So hit the start to ensure the finish!

Acceleration

- Acceleration Power Work
- Full Squats
- Dead Lifts
- Deep Lunges
- Power Cleans
- Close Grip Snatch
- Deep Jump Squats