

# Speed-Strength Training Basics:

## *Tips for All Athletes from All Sports*

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### 1. Introduction – The Truth About Getting Faster

It is common for people to think of elite sprinters as having the ‘natural’ gift of speed, and in many respects, this is true. Genetics are probably the most important determinant of sprinting potential. However, what many people don’t know is that it can take anywhere from five to ten years – or even longer – to develop a world class sprinter to his or her potential. Some of today’s top sprinters in the world are in their early- to mid-thirties, and still haven’t achieved the peak achievement of their career. This tendency for sprinters to develop late in their careers has important implications for athletes in other sports who want to improve on the sprinting capabilities.

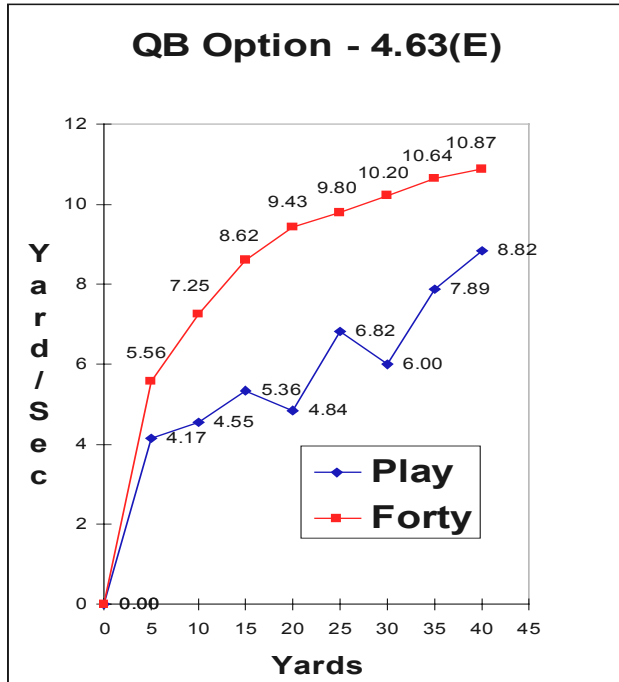
One of the most important facts about sprinting that all athletes in all sports that require you to run fast is that **speed is an acquired skill**. This means that in order to reach your full sprinting potential, you have to work hard to develop a number of key athletic qualities, including:

- Technique and Posture
- Neuromuscular Recruitment
- Maximal Strength
- Flexibility for Increased Range-of-Motion

These athletic qualities will be explained in greater detail – along with tips for enhancing each quality – later in this article. But first, it is important to learn what kind of sprinting capabilities team sport athletes need to enhance their performance in their sport.

### 2. Training for the Right Kind of Speed

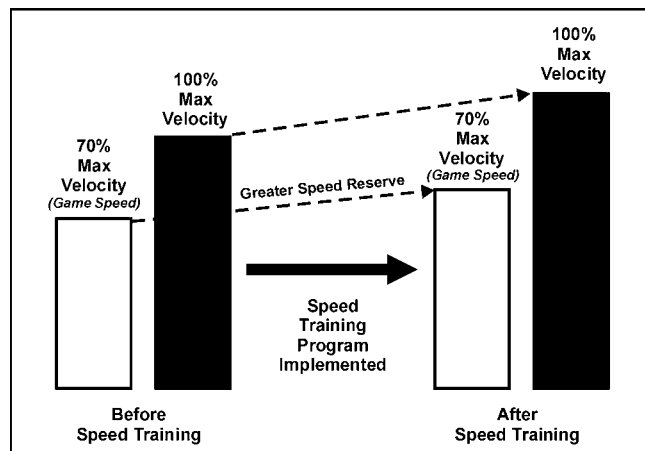
It is important to note that while the best speed training coaches are Track and Field sprint coaches, you can’t train a team sports athlete exactly like a 100m sprinter. A 100m sprinter is trained to run as fast as possible over the entire 100m distance, managing his or her energy supply and technique to get the most out of their bodies. In most team sports, there is no possibility whatsoever that a player will need to sprint at 100% output for 100m. In fact, you will rarely see a team sports athlete sprint at maximum effort for more than 10-20m. Only for specific situations, such as a breakaway in soccer or a long pass in football, will a longer sprint come into play – and even then, the sprint will not be much longer than 30 to 40m. Thus, your sprint training should reflect these aspects of your sport.



**Figure 1:** Velocity Comparison – 40 yard linear sprint vs. 40 yard run in a football game (Source: A. Vermeil)

**Figure 1** above illustrates the difference in velocity between an athlete’s linear 40 yard sprint, and the same athlete’s velocity during a running play carried out in an actual football game. When compared to his top speed, it is apparent that this athlete does not run at the same speed during a game – primarily due to the fact that there are other people on the field trying to tackle him. Some coaches may argue that because he only runs at 6 to 8 m/s when playing football, there is no need for him to train at faster speeds. I would argue that increasing his ability to accelerate to beyond 10 m/s will enhance his ability to be effective at lower game velocities, and make it easier to maintain those game speeds throughout the entire game.

This brings us to the concept of “speed reserve” introduced by Canadian sprint coach, Charlie Francis. If we assume that most team sports are carried out at 60-80% of an athlete’s top speed, your goal should be to increase your top speed abilities so that all of our sub-maximal runs also increase in speed. Thus, the greater our top speed, the more “speed reserve” we have for sub-maximal activities as shown in **Figure 2**. So, not only are athletes able to perform at lower speeds more effectively, but also more efficiently so that they can perform at these speeds for longer (i.e. throughout an entire competition). This concept is consistently demonstrated when mature athletes compete against adolescent athletes. The maximal abilities of the mature athletes are so far above those of the young athletes that when they compete together, the mature athletes can literally “jog” throughout the competition, never really get tired, and still compete well above the abilities of the younger athletes.



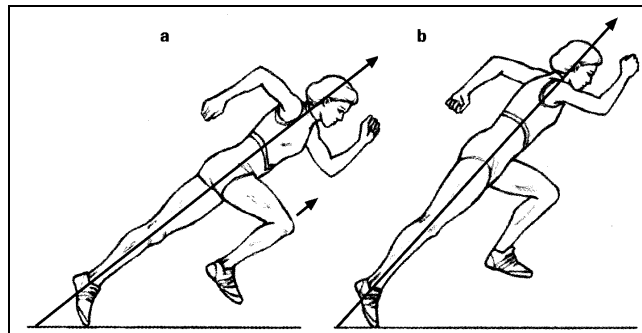
**Figure 2:** Enhancing Speed Reserve by Increasing Top Speed (Source: C. Francis)

As mentioned previously, a team sports athlete is typically accelerating for only five to 30 metres – what we would refer to as “pure acceleration.” It is very doubtful that team sports athletes will ever approach or reach their maximum speed – because of game play, the presence of other athletes on the field or court, and the need to perform skills such as dribbling, blocking, cutting or shooting. So, your sprint training should focus on developing the "pure acceleration" phase of the sprint. Or, in terms of distances, anywhere between five metres and 30 metres, for practical purposes.

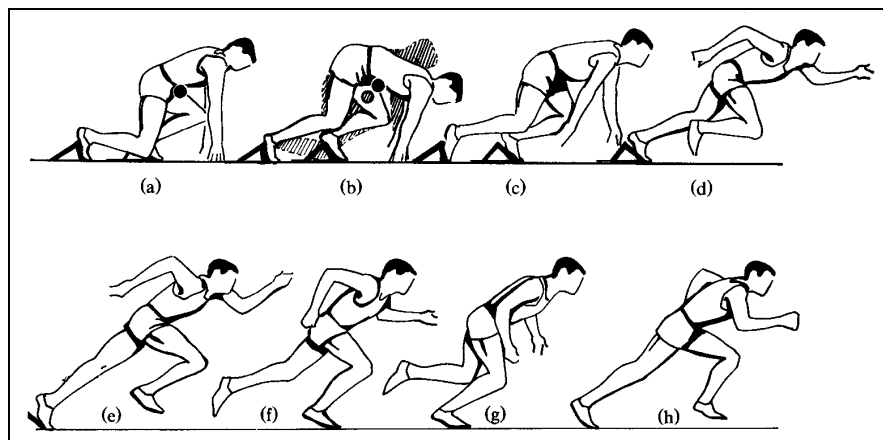
Since you will only be training for relatively short distances, there are important implications for your training that you must consider in order to maximize your sprinting potential. The rest of this paper outlines the four athletic qualities identified in the Introduction, and provides you with some tips on how to get the most out of your sprint training sessions and – more importantly – run faster in game situations.

### 3. Technique and Posture

In most game situations, athletes are required to run fast over a short distance from a standing or jogging start. So, acceleration is a relatively significant aspect of game play. An important point to remember is that accelerating requires you to move the full weight of your body quickly over a given distance. This can be achieved quite easily by simply adjusting your posture. The optimal body position for accelerating is a **lean position** at approximately 45 degrees from the ground, as illustrated in **Figure 3(a)**. As the body begins to accelerate and greater speeds are attained, the athlete’s posture will slowly begin to become more upright, as in **Figure 3(b)**. This type of acceleration posture is precisely why Track and Field sprinters use starting blocks. The blocks put the athlete in a lean position and allow the sprinter to make use of the strong hip extension muscles (i.e. gluteus maximus) to apply force to move the body forward, as demonstrated in **Figure 4**. The lean posture also takes advantage of gravity’s pull on your body.

**Figure 3** – Greater acceleration can be achieved through a greater lean\*

\* Source – USA Track & Field Association, USA Track and Field Coaching Manual, 2000

**Figure 4** – Use of the starting blocks to create the most efficient acceleration posture

\* Source – Hay, J.G., The Biomechanics of Sports Techniques, 3<sup>rd</sup> Ed., 1983

Also, as part of the acceleration phase of running, your limbs must work to get your body moving quickly. Your hips extend fully to achieve as straight line through your body from your push-off leg, as demonstrated in **Figure 4(e)**. The legs are moving forward and back in a pistoning motion, with the athlete thinking “step, step, step” as the opposite foot applies force backward into the ground. Meanwhile, the arms are driving back, leading with the elbows, and reaching out to just in front of your line of sight. The alternating backward swing of the arms, which are flexed at 90 degrees, helps to bring the knees up and in front of the runner more swiftly. The hands should come out in front of the body on the upward swing to allow the runner to feel as though he or she is being pulled down the track.

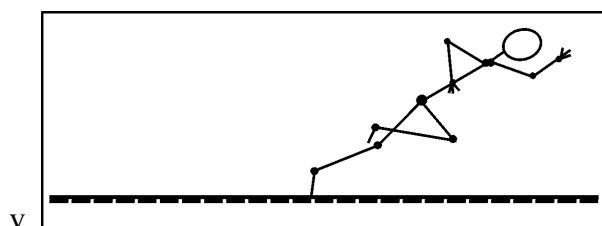
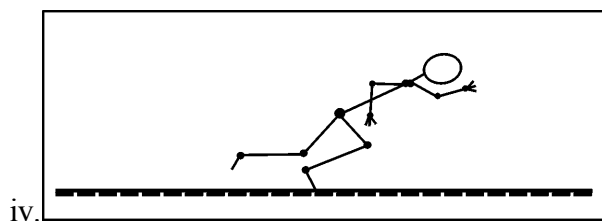
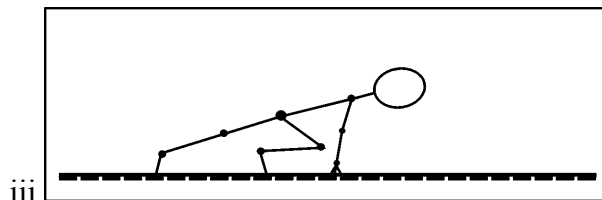
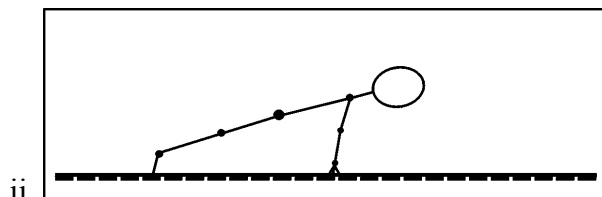
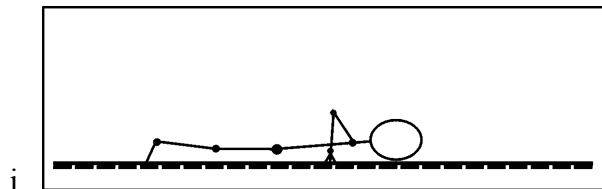
As the accelerating athlete begins to increase speed beyond 15-20 metres, the body becomes more upright and the running stride slowly begins to lengthen. Throughout this entire process of acceleration, it is important to stay relaxed and not rush or tense up during this phase. If you struggle in the acceleration phase, the result will be increased muscular resistance and decreased range of motion and, basically, an inefficient stride pattern.

Practice attaining this body position by starting from a crouch position – such as a three point stance – or even allowing your body to lean forward from a standing position and fall into the start. The tendency will be for you to stand up right away and start running. Keep your lean position for at least 10m into the sprint, and make sure you lean with your hips – don't simply bend at the waist.

#### 4. Drills for Acceleration and Speed

Provided below are a few simple drills that will help build proper technique and much needed power for accelerating effectively.

##### A. Push Up Start



The “push-up start” drill can be performed slowly or in one quick motion. When first performing these drills, it is good to work through it slowly. Get the athlete to start on the ground, push up into an extended position and then step – so that the foot is either under or behind the hip (as shown in Figure iii). From this position, the athlete can start quickly into a sprint. The cues that you are providing the athlete out of the start are:

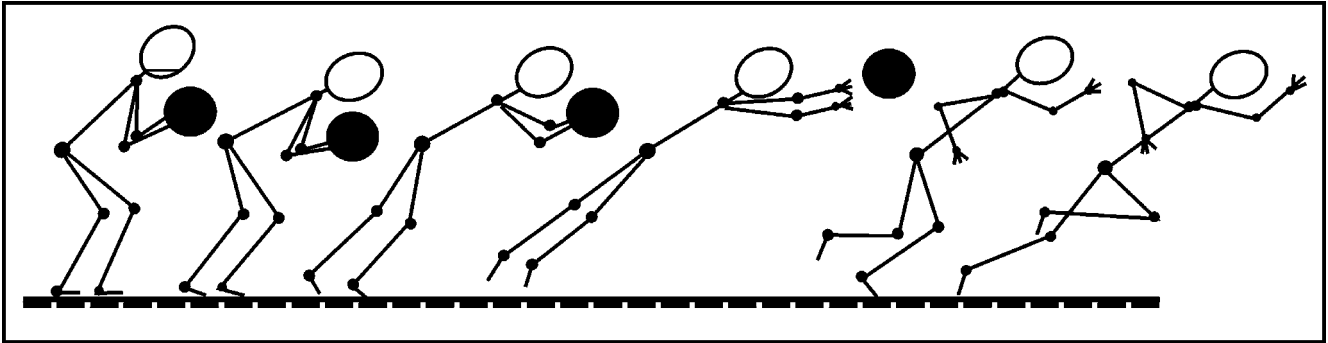
1. The hand on the same side of the front foot should lift off the ground and fire forward explosively. Once you lift the hand, the body will follow suit.
2. Keep the head in line with the spine. If the athlete lifts the head prematurely, they will stand upright and lose their optimal acceleration position.
3. In the acceleration position, the hands will cycle in front of the body – from your hips to in front of your face – to ensure that more weight is positioned forward. The athlete should feel like they are being pulled forward.

You can also start the athletes explosively from the full down position (Figure i). This works well because they will naturally assume the correct sprint position as they accelerate off the ground. The less you can get them to think about the technique – especially at full speed – the better off they will be.

## B. Med-Ball Push Start

This drill is used to develop starting strength and overall power. As illustrated in **Figure 3** below, the athlete holds the ball high under the chin in a slight crouch posture. In order to get into the optimal posture for starting, the athlete will fall forward slowly and then launch the ball forward. The throw should feel like a pulse originating from a two-footed push (even though the feel can be staggered). The pulse-like throw will allow the athlete to extend their body quickly, but still permit them to get into stride quickly and accelerate.

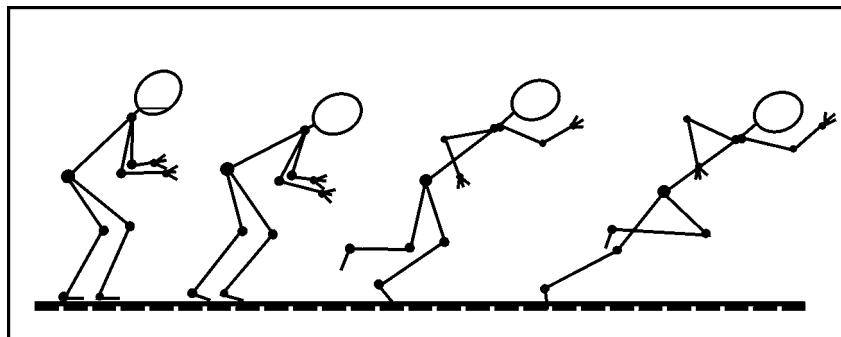
Figure 5 – Medicine Ball Push Start



## C. Falling Start

The previous two drills involve greater strength and exertion. This drill allows the athlete to accelerate with relaxed form – with the focus being on good technical execution. In a semi-crouch position, both hands are kept in front of the body to ensure that more weight is situated forward. The athlete then begins to fall forward, and fires the hand on the same side of the front foot to help extend the body forward into the acceleration position. As with previous drills, the hands cycle from the hip to in front of the face to ensure that weight is distributed forward. The emphasis is on leg turnover and relaxed form, not pushing or struggling.

Figure 6 – Falling Start



## 5. Neuromuscular Recruitment – Training Your Brain for Speed

The most important thing to remember about getting faster is: “In order to improve your speed, you must run fast in training.” So, running up and down a track or a field at 60-70% of your maximum speed will not make you a faster runner. You must run in the realm of 95-100% effort to make advances in your sprinting speed. In effect, you need to train your brain to activate and recruit your fast twitch muscle fibres to move your body quickly. The more muscle fibres you ‘teach’ your brain to recruit, the faster you will be able to accelerate. But in order to train at this high intensity, you must be fresh and well rested before each workout, and each repetition. Provided below are some key tips to remember when planning and implementing sprint workouts:

- **Emphasize "quality"** for each sprint, sprinting at 100% for the entire distance. Remember, if you don't run fast, you won't get faster.
- **Adequate rest and recovery** between sprints should be incorporated into your program. Give yourself at least 90 seconds between sprints. Don't rush through a speed workout. Adequate rest and recovery should also be provided between workouts. Don't do two sprint workouts on consecutive days. It takes 48 hours for your central nervous system to recover from high intensity sprint training.
- One way to motivate yourself to run faster is to **race against or chase your teammates** for the sprint drills. This will ensure that you are giving each sprint 100% effort.
- **Total volume** for individual sprint workouts **should not exceed 300m** for team sports athletes (i.e. 10 reps of 30m sprints, or 3 sets of 5x20m sprints). The neuromuscular system becomes very fatigued beyond this point for the average team sport athlete, the body cannot produce 100% effort consistently, and technique becomes sloppy (potentially resulting in poor technique).

## 6. Maximal Strength Development

In order to accelerate your body weight, you must be strong enough to exert the required force. This maximal strength must be achieved over the ranges-of-motion required for effective sprinting. Most athletes can do exercises with their own bodyweight to develop the necessary strength requirements for sprinting. Squatting, lunging and jumping drills can be used to develop necessary leg strength. Push-ups, dips and pull-ups are good for preparing the upper body for the rigours of sprinting. And, various abdominal exercise can be done to train the hip flexors required for driving the knees high in the acceleration phase of sprinting. You don't need fancy equipment to develop strength – you just need a bit of hard work and a well planned program.

Using free weights is also a good way to develop the strength and coordination required for sprinting. The following primary weightlifting categories make up a well-rounded program for developing strength and explosive power:

- Squats – Including back squats, front squats, overhead squats and lunging movements.
- Pulls – Including deadlifts, cleans and snatches.
- Presses – Including bench press, incline press, shoulder press, and jerk press.

In order to contribute to the development of your sprinting abilities, these lifts must be conducted at a high intensity (85-100% of maximum), for low repetitions (2-5 reps) and with adequate recovery between lifts (2 to 5 minutes).

## 6. Explosive and Elastic Power

Jump exercises and medicine ball throws are effective means of training starting strength and explosiveness. If using jumps (or plyometrics), it is advisable to follow a gradual progression of work to ensure that athletes do not experience overuse or stress injuries, particularly in the feet, ankles and knees. Provided below is an example of how to progress with your jump program:

**Phase 1 – Jumps Up (3 to 6 weeks)** – All jumps in this phase are performed up onto some form of box, platform or steps. The idea is that athletes can work on jumping explosively upward without having to deal with the undesirable side effects of absorbing all of the landings from a significant height. You can have an athlete jumping onto a box, then step down and repeat more jumps (i.e. 6-10 jumps each set). Jumps up can be done from a crouch position, with a countermovement, with a step in, or with several small jumps preceding the jump up.

**Phase 2 – Jumps Over (3 to 5 weeks)** – Jumps in this phase are done over distance across a gym floor, rubberized surface or grass/turf field. They can consist of jumps over hurdles, cones or other safe obstacles. You can also simply hop or bound over a distance in series of 6 to 15 jumps. The idea is to focus on quickness/quality of ground contacts while maintaining horizontal velocity.

**Phase 3 – Jumps Down (3 to 6 weeks)** – These jumps focus on elastic strength and the ability to rebound off the ground after jumping down from a height. Box heights should be no higher than 18 to 20 inches, with athletes starting at very low heights (i.e. 10 to 12 inches). The choice of box height should be based on the quality of jump up off the ground observed by the coach. Athletes should be rebounding quickly off the ground. If the ground contact is long, loud or slapping, the athlete is likely working with boxes that are too high for their capabilities.

Medicine ball throws can be used as preparatory work for jump training. Explosive med ball throws typically involve the same mechanics as sprinting or jumping and can be a good way to develop effective starting and acceleration abilities. Push throws or reverse overhead heave throws are some of the more common explosive throws. Other rotational throws and abdominal based work can be added to develop overall strength in movements related to your sporting event.

## 7. Flexibility – Increasing Your Range-of-Motion

In basic terms, there are two ways to run faster: one way is to increase stride frequency, and the other is to **increase stride length**. Maintaining a regular stretching and flexibility program is one of the less strenuous ways of making yourself a faster sprinter. As your flexibility increases, you will become more accustomed to applying force over the increased range of motion and, in total, generate more force over each sprinting stride.

Your flexibility program should be two pronged – (1) work on passive stretching outside of your regular training activities, stretching at least once a day, with stretches held for 60 seconds, and (2) work on dynamic flexibility during your warm-up and workout routines, doing gentle arm and leg swings and rotations, working on the elastic properties of your muscles and connective tissues. These activities will also contribute to the prevention of injuries.

## 8. Conclusion

Remember, every athlete has the ability to increase his or her sprinting and accelerating capabilities. You simply need to work hard and work smart. The strategies presented in this paper can provide you with a starting point for your training program. Even minor adjustments in posture and technique can make you a better sprinter after just one training session. Finally, remember to warm-up sufficiently before doing a sprint training session. Gradually, build up to higher intensities throughout your warm-up before going 'all-out' in the workout. A proper warm-up before competition will also contribute towards enhanced performances in your games.

\*\*\* For more information, you can contact Derek Hansen at [derek@strengthpowerspeed.com](mailto:derek@strengthpowerspeed.com) or visit [www.strengthpowerspeed.com](http://www.strengthpowerspeed.com). \*\*\*