

# SOCCER FIT-FACTS

NOVEMBER 30, 2010

**NEW SOCCER FITNESS TRAINING CENTRE OPENING JANUARY 8-9, 2011!**

## INSIDE THIS ISSUE:

**NEW SOCCER  
FITNESS TRAIN-  
ING CENTRE  
OPENING JAN. 8-  
9, 2011** **1**

**WHY DO TREAD-  
MILL TRAINING?** **2**

**DYNAMIC CORE  
STABILITY  
TRAINING** **3**

**THE NEW SOC-  
CER FITNESS  
INC. TRAINING  
SERVICES OVER-  
VIEW** **4**

**SOCCER FITNESS  
STAFF PROFILES** **5**



**Soccer Fitness is extremely proud and excited to announce the grand opening of our brand new, state-of-the-art, 1500 square-foot, soccer-specific training facility, the Soccer Fitness Training Centre, on January 8-9, 2011!**

The centre is located inside the Trio Sportsplex, Vaughan's premier indoor soccer facility, at 601 Cityview Boulevard, conveniently located just west of Highway 400, off of Teston Road.

Our centre will be home to our newly implemented Treadmill, Plyometric, and Functional Strength Training protocols, all of which have been developed and tested in national and international sports science laboratories over the past 5 years. These programs will be combined with our already established Team Training and Power Running protocols, to form a comprehensive, periodized, soccer-specific training program unlike any other being offered in the Greater Toronto Area today.

As part of our grand opening, we are offering a **FREE TRIAL SESSION** to all athletes during the months of January and February of 2011. We would like to encourage all our readers to come by our facility, give us a call or send us an email to book a free trial today.

Our Centre will offer soccer players the unique opportunity to train using the latest and most advanced equipment and programs in the country, including:

- High Speed Running Treadmills (Woodway Pro-XL and Noramco HS Elite)
- Plyometric Jumping Platform and Power Ply Boxes
- Soccer Cords (revolutionary tubing that adds resistance to running and kicking movements)
- Dartfish Software (Video Biomechanical Analysis Software)
- Brower Electronic Timing Systems (Gold Standard physical assessment tools)

In addition to our training programs and services, we have also assembled a staff of some of the highest qualified fitness professionals in the country to deliver our programs, including:

- University Educated (Bachelor's and Master's Degrees) Exercise Physiologists
- Nationally and Internationally Certified Trainers and Strength and Conditioning Specialists
- Nationally and Internationally Licensed Soccer Coaches
- Former University Varsity and Semi-Professional Soccer Players

## LEARN ABOUT IN THIS ISSUE:

- Incline Treadmill Training
- Plyometric Training
- 360-degree Treadmill Training
- Soccer Fitness Framework of Training, Principles of Training, And Training Model
- Soccer Fitness Staff Profiles

This Issue of Soccer Fit-Facts has been dedicated towards introducing our readers to the exciting new features of our Soccer Fitness Training Centre, providing them with an overview of all of our new equipment and services, a more detailed explanation of the science behind our new Training Protocols and Programs, and a profile of our new Line-up of Staff and Trainers. We hope you enjoy it, and don't forget to visit [www.soccerfitness.ca](http://www.soccerfitness.ca) for more information.

## WHY DO TREADMILL TRAINING?

One of the highlights of our new services at the Soccer Fitness Training Centre is **Treadmill Training**, done on the revolutionary new Woodway Pro-XL high speed running treadmill. This article provides a background of traditional speed training, and a rationale for the science behind Soccer Fitness' Treadmill Training Protocols.

Traditionally, sprinting speed was thought of as the product of stride length (length either in time between ground contact of the feet, or distance covered, of an individual's running strides) and stride frequency (total number of running strides performed in a given amount of time). Gains in stride length were associated with increased strength, specifically in the muscles used during sprinting, such as the hip flexors, gluteals, quadriceps, hamstrings, and calves. Gains in stride frequency were associated with improvements in speed of muscle contractions, as well as mechanical efficiency, in the same muscle groups. If athletes wanted to run faster, the theory went, they needed to increase stride length, stride frequency, or both.

The inherent problem with this theory, however, is that increases in either stride length or stride frequency may not necessarily result in increased speed, because as one component increases, the other may decrease, and the net result in running speed may be the same. In fact, increasing speed has more to do with increasing an athlete's horizontal power output per unit of body mass, rather than simply improving stride length and/or stride frequency. These components will naturally accompany an increase in horizontal power output, and each individual athlete will find an optimal value for both stride length and stride frequency while running at their maximal speed. Improvements in horizontal power output are associated with adopting proper coordination strategies that enable athletes to most efficiently transfer power generated by explosive contraction of the lower extremity, maximizing propulsive forces, and minimizing braking forces.

Improvements in horizontal power output, and thereby sprinting speed, can be accomplished by improvements in the following three areas of fitness:

1. isometric muscular strength
2. static and dynamic flexibility
3. explosive power/ extension of the lower extremity (hip, knee, ankle)

Biomechanical analysis of sprinting reveals that there are five main phases that the lower extremity experiences during a sprint cycle:

1. Late Swing
2. Foot Strike
3. Braking/Support
4. Propulsion
5. Early Swing

In addition to the five phases of sprinting in the lower extremity, three other biomechanical factors, relating to other parts of the body, will have an impact on overall running speed:

1. Pelvic orientation and stability
2. Forward lean
3. Arm swing

Proper sprinting mechanics, during each of these five phases of sprinting, as well as these other three key factors for sprinting, are crucial for the development and maintenance of sprinting speed.

The Soccer Fitness Treadmill Training protocols were designed to aid the athlete in the following three areas of performance:

- Developing a coordination and running style which enables the athlete to maximize propulsive forces, and minimize braking forces
- Teaching proper total-body coordination and running mechanics for high speed and sprint running
- Training and improving recovery between high intensity exercise, which has been shown to be the most important predictor of performance in soccer

Treadmill training at Soccer Fitness is able to accomplish these goals through a unique combination of spotted level running and incline sprints, with closely controlled work-to-rest ratios. The purpose of this section of the Training manual is to introduce and familiarize you with the science behind Treadmill training, as well as the specific procedures and protocols of Soccer Fitness' Treadmill training sessions.

Previously, the point was made that athletes wishing to improve running speed must adopt a coordination strategy that allows them to maximize propulsive forces and minimize braking forces. Incline running, whether on a treadmill (graded) or on the ground (up a hill), is an optimal way to achieve these two goals. During uphill running at high speed, the powerful extensor muscles in the lower extremity must produce a greater amount of force per stride to push the body upwards, maximizing propulsive forces. Stride length

is increased, and proper sprint biomechanics, including a greater degree of hip flexion and more powerful hip extension, must be maintained in order to get "up the hill". Furthermore, braking forces in the lower extremity must be significantly reduced, in order to counteract the effect of gravity and ensure balance and stability while travelling forwards and upwards.

There is simply no better way for athletes to achieve the combination of maximal propulsive forces and minimal braking forces than incline running at high speed. The key to achieving these benefits, however, is that the incline running must be done at a high velocity. If the propulsive forces from extension movements in the lower extremity are carried out at lower velocities, the net resulting force will not be great enough for the athlete to "get up the hill" in a quick and efficient manner. It is in the achievement and maintenance of high velocity, and thereby more powerful propulsive forces, during incline running, where Treadmill training holds the greatest advantage over ground-based running.

When running up a hill on the ground, the athlete must make a conscious effort to increase their speed, and furthermore must maintain a high speed regardless of fatigue. In a high intensity, repeated sprint workout, achieving and maintaining high speed with incline runs can become difficult and impossible. During incline running on the treadmill, however, athletes must achieve and maintain a high running speed, as set out by the protocol, during the entire duration of the sprint. Furthermore, the use of a Trainer to spot the athlete during the run ensures that the athlete will be pushed just beyond their threshold for maintaining a particular speed and grade, leading to increased improvements in strength, speed and anaerobic endurance.

Treadmill running at higher speeds, both during incline and level running, also forces athletes to adopt total-body coordination patterns which optimize movement efficiency, and thus improve running speed. As mentioned earlier, the athlete must maintain a certain running speed, and will be spotted by a Trainer to ensure that they do so. This spotting will help the athlete to adjust and correct various different aspects of their running stride, including hip flexion and extension, proper foot positioning, proper pelvic positioning, and arm swing. In addition to having a Trainer provide manual spotting, Soccer Fitness also uses Dartfish integrative video analysis software, so that all athletes are able to view themselves and receive optimal corrective feedback.

## DYNAMIC CORE STABILITY TRAINING: A COMBINATION OF SOCCER FITNESS PLYOMETRICS, AND THE NORAMCO HS ELITE HIGH SPEED RUNNING TREADMILL

Another new and exciting component of the services offered at our Soccer Fitness Training Centre is **Plyometric Training**, using our Plyometric Floor, plus the state-of-the-art Noramco HS Elite high speed running treadmill. This article provides a background on “dynamic core stability” training, as well as a rationale for the science behind Soccer Fitness’ Plyometric Training Protocols.

### Core Stability Defined:

Core stability relates to the bodily region bounded by the abdominal wall, the pelvis, the lower back and the diaphragm and its ability to stabilise the body during movement. The main muscles involved include the transverse abdominus, the internal and external obliques, the quadratus lumborum and the diaphragm. The diaphragm is the main muscle of breathing in the human body, and so breathing is important in providing the necessary core stability for moving and lifting. It is the action of these muscles contracting together upon the incompressible contents of the abdominal cavity (i.e. the internal organs or viscera) that provides support to the spine and pelvis during movement.

Whenever a person moves, to lift something or simply to move from one position to another, the core region is tensed first. This tension is usually made unconsciously and in conjunction with a change in breathing pattern. An example to try is to sit in a chair and to reach forward over a table to pick up a cup. This movement is first accompanied by a tension in the core region of the abdomen and can be felt by placing one hand on the abdomen as the movement is made.

As the load increases the key muscles contract around the viscera, which are incompressible, to form a stable ball-like core region against which the forces are balanced in coordination with posture. In martial arts, there is a saying that “power is generated from the ground up”, and core stability is necessary for the transfer of force and power from the ground across the body into any movement.

Core stability is essential for the maintenance of an upright posture and

especially for movements and lifts that require extra effort such as lifting a heavy weight from the ground to a table. Without core stability the lower back is not supported from inside and can be injured by strain caused by the exercise. Insufficient core stability can result in lower back pain, poor posture, and lethargy.

### Plyometric Training and Core Stability:

In acyclic athletic events such as soccer, stabilization of the core during movement becomes especially important in order to optimize movement efficiency and prevent injury. Soccer players must perform several different movements and movement patterns, which place extremely high forces and amounts of stress on the core muscles, including sprinting, changing direction, jumping and kicking, as well as challenging for the ball on the ground and in the air. Furthermore, most, if not all, of these movements in soccer must be executed with only one leg touching the ground at any given time, increasing the demands placed on the aforementioned muscles and support structures.

The Soccer Fitness Plyometric “Quick Feet” Protocols are designed to improve dynamic core stability by challenging the body to remain stable, and change direction quickly, as the feet and lower legs move away from the body’s centre of gravity. These exercises involve both single- and double-leg movements, and progressively increase the distance the legs must travel from the centre of gravity (which in turn increases the challenges to the muscles of the pelvis and trunk).

### Treadmill Training and Dynamic Core Stability:

The development of dynamic strength and stability can also be accomplished through multi-directional 360-degree runs on the revolutionary Noramco HS Elite high speed running treadmill. The muscles in the lower back, pelvis, and hip muscles (termed the “lumbo-pelvic-hip complex”) are of particular importance. It is within these crucial structures of the body that the base and foundation for optimal athletic performance is contained. Furthermore, athletes with weaknesses and/or strength imbalances in this area are considerably more prone to overuse injuries.

The unique 360-degree harnessed runs are the key to providing the “lumbo-pelvic-hip complex” with a dynamic load,

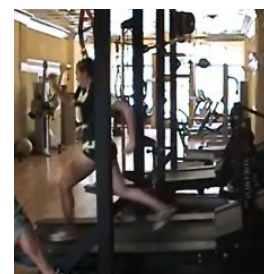
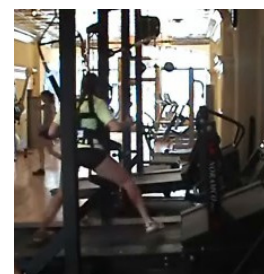
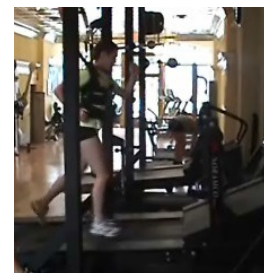
at sport-specific velocities. The point was made earlier in this article that athletic movements require athletes to produce maximal propulsive forces. In almost every sport, including soccer, the muscles of the lower extremity, hips and pelvis must continually contract at high speeds, causing the limbs to accelerate quickly, in order for athletes to execute movements efficiently. The inherent problem with most traditional “core” and lower body strengthening programs is that all movements and exercises are performed at low velocities. While there are certainly going to be benefits to the athlete in terms of increasing strength and range of motion, the aforementioned high velocity strength/power, which is a requirement of every sport, is neglected with traditional training methods.

During harnessed 360-degree runs on the Noramco treadmill, athletes must run forwards, sideways and backwards, all at a small incline (3-5%) while maintaining a certain running speed. The movements produced and muscles used in the “lumbo-pelvic-hip complex” during 360-degree runs are as follows (see Figures to the right for pictures of the 360-degree runs):

- during lateral movements: hip adduction, internal rotation, and lateral extension of the back leg (adductors, gluteals); hip abduction and external rotation in the front leg (abductors, gluteals)
- during retro (backward) movements: hip and knee extension (hamstrings, gluteals) and ankle flexion/extension (calves and shin muscles)

The main difference between training these muscles on the treadmill, as opposed to using traditional training methods, is that on the treadmill, they are trained at sport-specific velocities. The limbs are continually forced to accelerate – thus repeating and reinforcing the stretch-reflex pathway in the hip adductors, abductors, extensors and external rotators – in order for the athletes to keep up with the speed of the treadmill. The net result of the repetitive, high-velocity muscular contractions of the muscles of the “lumbo-pelvic-hip complex” is that the athlete develops dynamic core stability while using the same muscles, movement patterns, and movement speeds that are used in their actual sport.

**“The inherent problem with most traditional “core” and lower body strengthening programs is that all exercises are performed at low velocities...during harnessed 360-degree runs on the Noramco treadmill, the muscles are trained at sport-specific velocities”**



## THE NEW SOCCER FITNESS INC. TRAINING OVERVIEW

At Soccer Fitness, we have utilized over 15 years' worth of soccer-specific scientific research in order to develop our **Soccer Fitness Training Framework** (see right). The Training Framework explains the five necessary components required for successful and long-term improvements in soccer-specific physical fitness.

This Framework was created based on the 6 Soccer Fitness Principles of Training (below):

### 1. Athlete Assessment, Monitoring and Continuous Improvement

All Soccer Fitness athletes are assessed using the most current soccer-specific testing protocols. Intensity of training sessions is constantly monitored, and athletes are periodically re-tested with the ultimate goal of continuous athletic improvement.

### 2. Functional, Soccer-Specific Training

All Soccer Fitness training programs were designed to be functional to the sport of soccer. We train the specific energy system, muscles, movement patterns and directions that are required for optimal on-field performance. We also incorporate the ball for physical work that also helps develop athletes' technical and tactical abilities.

### 3. Science-Based Training

We used the latest and most up-to-date research from soccer-specific sports science research studies, including our own testing and training-based studies, to develop our Soccer Fitness training programs. Our science-based approach means we only tell athletes to do things which have been scientifically proven to generate results.

### 4. Customization and Periodization of Training

Since all our Soccer Fitness athletes are assessed prior to the start of their training, all our Soccer Fitness programs are customized to the individual based on their test results. Training programs are also periodized according to the athlete's soccer team schedule, to facilitate peak athletic performance at the optimal time for each individual athlete.

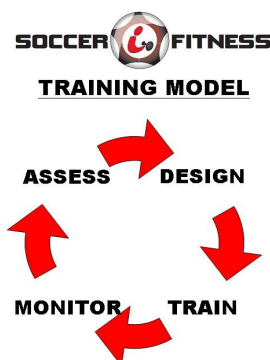
### 5. Athlete / Coach Education and Awareness

Athletes and Coaches training at Soccer Fitness are given a means to educate themselves, by gaining access to the Member's Area, the soccerfitness.ca password protected site, containing articles, pictures, videos and other information on several important soccer fitness related topics, including fitness testing, training, nutrition, and injury prevention.

### 6. Enjoyment

All Soccer Fitness programs are designed with the enjoyment of the athlete in mind. Our combination of a professional, welcoming atmosphere and highly qualified, knowledgeable, and personable staff ensures that all athletes enjoy the training process and want to continue to come back for more.

Based on our Framework of Training and Principles of Training, we have created the **Soccer Fitness Training Model** (see right), which breaks down the training process into four simple steps. The Training Model was designed to ensure that all Soccer Fitness Clients receive a customized, periodized program, that is constantly being monitored (and updated as needed) by their Trainer.



Our services are differentiated into two separate components: **Power Running / On-Field Training**, and **Conditioning Room Training**. As you can see by reviewing the **Soccer Fitness Training Checklist** (see above), all of the necessary components of the Soccer Fitness Training Framework are provided to Clients, through sub-categories of Power Running, Conditioning Room Training, or both.

Be sure to visit our website: **[www.soccerfitness.ca](http://www.soccerfitness.ca)** for more information about all our Soccer Fitness Services.



## TRAINING CHECKLIST

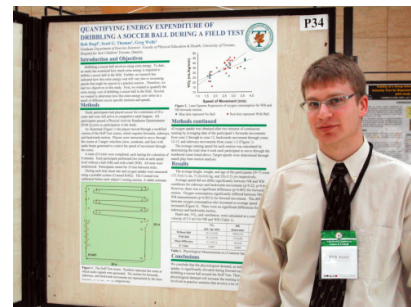
<b>TRAINING FRAMEWORK COMPONENT</b>	<b>SOCCER FITNESS TESTING AND TRAINING SOLUTIONS</b>
<b>INJURY PREVENTION</b>	<ul style="list-style-type: none"> <li>• FUNCTIONAL MOVEMENT TEST</li> <li>• FUNCTIONAL STRENGTH PROTOCOLS</li> </ul>
<b>SPEED AND POWER</b>	<ul style="list-style-type: none"> <li>• SPEED, POWER AND RSA FIELD TESTS</li> <li>• TREADMILL AND PLYOMETRIC PROTOCOLS</li> </ul>
<b>COORDINATION</b>	<ul style="list-style-type: none"> <li>• FUNCTIONAL MOVEMENT TESTS, DARTFISH GAIT ANALYSIS</li> <li>• TREADMILL, AND POWER RUNNING COORDINATION PROTOCOLS</li> </ul>
<b>SOCCER-SPECIFIC TRAINING</b>	<ul style="list-style-type: none"> <li>• YO-YO, RSA FIELD TESTS</li> <li>• POWER RUNNING AGILITY, SPEED, AND POWER PROTOCOLS</li> </ul>
<b>NUTRITION AND WELLNESS</b>	<ul style="list-style-type: none"> <li>• ATHLETE INFORMATION PACKAGE/NUTRITIONAL GUIDE</li> </ul>



## SOCCER FITNESS STAFF PROFILES

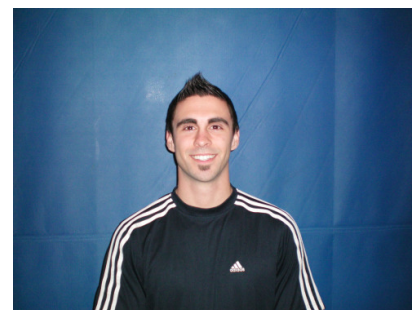
### Robert Rupf Head of Research and Development

- B ENG, University of Toronto
- MSc Exercise Physiology, University of Toronto
- Exercise Physiologist, Canadian Sport Centre Ontario
- Ontario Soccer Association Provincial "B" License
- Delegate, Presenter, VIth World Congress on Science and Football, Antalya, Turkey, 2007
- Delegate, Presenter, First World Conference on Science and Soccer, Liverpool, England, 2008



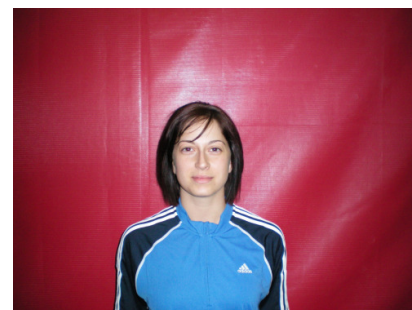
### Mike Pimentel Senior Strength and Conditioning Coach

- Hon. BSc Kinesiology and Health Sciences, York University
- MEd, York University
- Former Varsity Soccer Player, York University, 2004-2006



### Kristan Marques Senior Strength and Conditioning Coach

- Hon. BSc Kinesiology and Health Sciences, York University
- MSc Exercise Physiology, York University
- Certified Exercise Physiologist, Canadian Society of Exercise Physiology
- Certified Fitness and Lifestyle Consultant, Canadian Society of Exercise Physiology



### Matija Vugrinicek Senior Strength and Conditioning Coach

- Hon. BSc Kinesiology and Health Sciences, York University
- Certified Strength and Conditioning Specialist, National Strength and Conditioning Association
- Former Varsity Soccer Player, York University, 2005

