SOCCER FITNESS INC.

SOCCER FIT-FACTS

VOLUME 4, ISSUE 3: NOVEMBER 5, 2012

# THE ALPHA HEART RATE WATCH—A REVOLUTIONARY TOOL TO MONITOR TRAINING INTENSITY

INSIDE THIS ISSUE:



LEARN ABOUT IN THIS ISSUE:

- **Heart Rate Monitoring During Training**
- **Single-Leg Strength Training**
- **Dartfish Camera-Based Video Analysis Software**
- **Use and Applications of the Functional Movement Screen**

A common challenge among fitness coaches working with soccer players is the ability to accurately monitor and quantify the intensity of their workouts. Heart rate monitors, which record the heart rate in beats per minute (BPM – the number of times the heart beats in one minute) are an efficient and accurate way for these measurements to be taken. This article will discuss the rationale for using heart rate monitoring, as well as feature some popular and common methods of heart rate monitoring and how they are applicable to soccer.

## Why Measure Heart Rate in Soccer?

When exercising, the heart rate must increase, in order for the heart muscle to supply enough oxygenated blood to the working muscles, so that they may continue to contract and move. During an intermittent sport like soccer, players will perform several hundred different actions over the course of a 90-minute game, with a change in activity – and intensity – happening every 3-5 seconds. These short, intermittent bursts of activity affect the heart rate by continuously raising and lowering it in response to the raised/lowered energy demands of each activity. The result is that the heart rate may be very high (>= 200 BPM) at times, and very low (<=100 BPM) at others. In a recent study by Helgerud et. Al (2008) the average heart rates of 26 players playing in both the English Premier League, and the UEFA Champion's League, during games, was 180-190 BPM. Players in this study covered an average of 8-12 kilometres at approximately 80-90% of their maximum heart rates throughout the games they played.

Monitoring players' heart rates during training is important in order for fitness coaches to ensure that the intensity of training is high enough to match or exceed the intensities experienced during competitive matches, as described above. If players' heart rates are too low during training, they will never achieve the improvements in aerobic endurance necessary to be able to compete at higher levels of play. Conversely, consistently high training heart rates during training, specifically during interval training, may indicate that the recovery periods between intervals are not long enough to facilitate adequate recovery, which can also compromise results and performance.

Several different methods of monitoring heart rate are presently being used by fitness coaches and sports scientists working with athletes. Three in particular have garnered acceptance from athletes, including soccer players, in training and competition:

1. Heart rate monitor with chest strap sensor
2. Wrist watch heart rate monitor with finger sensor
3. Wrist watch heart rate monitor with built-in sensor

## Heart rate monitor with chest strap sensor

The most conventional and traditional method of monitoring heart rate during exercise, there are several different models of heart rate monitors that use chest straps, wrapped around the athlete's chest, which record heart rate and send the information either to a wrist watch, and/or to software programs for analysis. Polar, and Suunto, two companies based out of Finland, sell sets of 10-20 straps, plus software programs, that are in use by several professional and college teams throughout North America and Europe.

## Wrist Watch with Finger Sensor

Using a relatively new technology, these watches provide accurate heart rate measurements without the use of chest straps. The original watch with finger-sensor technology, developed by Canadian inventor Liz Dickinson, and marketed through her company called Mio, has been on the market for over 5 years now. Athletes wearing the watch can check their heart rate by holding their fingers to the small sensors on the watch face, for 4-6 seconds, to get a reading.

## Wrist Watch with Built-In Sensor

This revolutionary new product, called the Alpha, combines the best features of both the chest strap (continuous monitoring) and finger sensor (convenience and ease of use) methods described above. Also invented by Liz Dickenson, this product uses revolutionary electro-optical technology that shines a light shone through the skin in the wrist, and measures the impedance – or interruption – of that light in order to read athletes' heart rates. This extraordinarily unique technology has been proven to be ECG (electrocardiogram) accurate at running speeds up to 12mph / 20 kmph.

The Alpha watch impressed us so much at Soccer Fitness that we have decided to include it in our Treadmill and Plyometric training sessions at the Soccer Fitness Training Centre. Its functionality and ease of use mean that we can now continuously and accurately measure our athletes' exercising heart rates throughout their treadmill, plyometric, and strength training workouts. Among the many useful measurements the Alpha watch allows us to take are:heart rate response during warm-ups; average heart rates during high speed, high incline treadmill workouts; peak heart rate during maximal speed treadmill running; heart rate recovery during breaks between treadmill/plyometric intervals; heart rate recovery post-exercise during cool-downs

**Adding heart rate monitoring to our training protocols will ensure that all athletes training at the Soccer Fitness Training Centre will allow us to constantly monitor, evaluate and adjust the intensity of training to suit each individual athlete. The end result is athletes who are better prepared to perform at their best.**

# HEART RATE MONITOR OPTIONS—ADVANTAGES / DISADVANTAGES

## 1. HEART RATE MONITOR WITH CHEST STRAP SENSOR

| ADVANTAGES | DISADVANTAGES |
|---|---|
| • the chest straps provide very accurate heart rate measurements<br>• the software programs provide coaches and athletes with detailed summaries and analysis of the heart rate data recorded | • chest strap can be uncomfortable to put-on/take-off, and wear<br>• straps are time-consuming to use with a full team<br>• straps require cleaning and sanitizing after every use |

## 2. HEART RATE MONITOR WITH FINGER SENSOR

| ADVANTAGES | DISADVANTAGES |
|---|---|
| the finger sensor technology provides an accurate and (relatively) quick heart rate reading<br>the watch is used without chest strap, so it is easier to use, and requires much less cleaning/maintenance | sensors only provide a reading when they are toughed/held, so it is not possible to get continuous heart rate recordings with this watch<br>it takes 4-6 seconds to get a reading, making it difficult to obtain any instantaneous measurements of exercise intensity |

## EXERCISE SPOTLIGHT—SINGLE LEG SQUAT

In this feature of Soccer Fit-Facts, Exercise Spotlight, we highlight an important exercise that can—and should—be incorporated into the training program of young soccer players. In this issue, we feature the single leg squat, an exercise which can help build soccer-specific strength and power, while also improving knee joint stability and flexibility. To perform this exercise, start by standing on one leg, keeping the standing knee completely straight, and the toe pointing forward. Maintaining balance, bend at the hip and knee, slowly lowering yourself to the floor. The hea and neck should be held upright, and the torso should also be kept in a straight line. Check that the knee is in line with the toe, and not in front of it. Continue lowering until your thigh is parallel to the floor (Figure 1).

Push with the glutes (back of the thigh) and quadriceps (front of the thigh) to straighten the leg and return to a single leg standing position. You should be able to maintain balance, and contact between the heel of the foot and the floor, throughout the movement (Figure 2).

Perform 2-3 sets of 10 repetitions with each leg, with about 1.5 minutes rest between sets, for optimal improvements in leg strength. This exercise can be performed on field, at the end of a training session, for a quick and convenient lower body strength workout.

Figure 1

Figure 2

# DARTFISH—ADVANCED VIDEO-BASED GAIT ANALYSIS

BY SANTIAGO MONTOYA



## Introduction

A new and exciting addition to our Soccer-Specific Fitness Assessments (to be offered as an option to all athletes being assessed, starting in January 2013) is Advanced Video Gait Analysis using our revolutionary Dartfish camera-based software. This analysis allows athletes to see for themselves any possible mistakes or imbalances that exist in their running gait, and receive video feedback so that corrections can be made. A Dartfish Media-Book will be given to each athlete who purchases our Advanced Video Gait Analysis.

## Before Dartfish

Since ancient times, trainers, coaches, and instructors have faced difficulties explaining to their students and pupils what they should do to improve their performance. This may sound simple, however, for the person hearing the instructions; it is challenging to understand why they need to modify something that they think they are doing right. It is simple for a trained eye to spot subtle movements that limits the optimal performance of a client. For example, it is easy for a coach to detect problems on drills or exercises because they have become unconsciously efficient detecting anything that deviates from the perfect form. However, trying to explain the problem is hard because clients do not see what they have done wrong. Due to the advancements of recording devices and software applications, coaches can now use a device called Dart Fish, which brings to life the expression "An image is worth a thousand words".

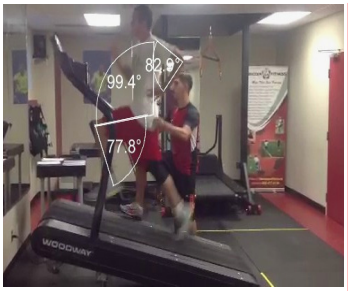
## Introducing Dartfish

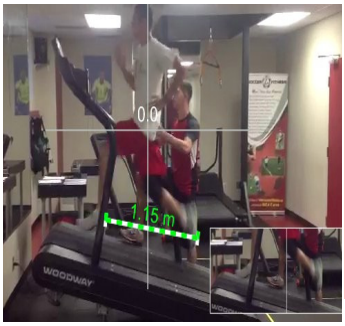
Dartfish is a program that takes advantage of the mobility and freedom that video cameras and laptops provide, to integrate live training with immediate visual feedback at different speeds, to the point that an entire drill can be observed frame by frame. This analysis allows clients to observe and learn in the comfort of their homes and without any time constriction.

## What We Do With Dartfish

At soccer fitness, we are proud to use this amazing program to perform two key functions, which are the following: First, allow the client to see their performance with assistance of a trainer. The trainer would spot the mistakes to be able to show the client the issue during delay video. This way they can see why those mistakes should be avoided and what should be done during the next run to obtain the desire form and performance. If the client does not see the mistake(s), the trainer has the option to play the video in slower motion and use some of the tools available (see pictures). For example, the clone rectangle, which allows you to zoom in a specific area making it easier notice if the landing of the foot was performed on the ball of the foot or on the heel or if the knee isn't high enough to perform an optimal stride length.

Second, record specific drills which our senior coach would analyze frame by frame for the entire performance. The coach would give feedback through a media book in which the client would be able to see his/her performance, snapshots of specific moments, where our senior coach would either write or verbally state the mistakes and would give correction to improve. This analysis allows clients to observe and learn in the comfort of their homes and without any time constriction.




"Dartfish is a program that takes advantage of the mobility and freedom that video cameras and laptops provide, to integrate live training with immediate visual feedback at different speeds, to the point that an entire drill can be observed frame by frame."





# THE FUNCTIONAL MOVEMENT SCREEN

BY BHAVESH DHOKA

Another new and exciting addition to the Soccer Fitness Soccer-Specific Fitness Assessment Protocol is the Functional Movement Screen (FMS), a tool used by professional athletes and sport associations around the world. This article explain in more detail the specific uses and applications of the Functional Movement Screen.

The Functional Movement Screen (FMS) is an innovative system used to evaluate quality movement pattern for Soccer athletes. It's a valuable tool that bridges the gaps between pre-performance physical and performance tests, asses' functional mobility and stability data to improve performance and prevent Micro-traumatic Injury. FMS is an assessment tool that consists of a series of tests with a special grading system. While the FMS is not intended to diagnose orthopedic problems but rather to demonstrate limitations or asymmetries in Soccer athletes with respect to Soccer specific movement patterns and eventually correlate them with performance outcomes.

The Functional movement screen provides a Soccer fitness trainers and coaches a valuable world class tools by which they can evaluates the athletes which closely relates to their training. In a sense, the tests are improved by working on variations of the skills tested. The FMS allows evaluation with tools and movement patterns that readily make sense to both the Soccer athletes and the trainer or coaches.

The test is comprised of seven fundamental movement patterns that require a balance of mobility and stability. These fundamental movement patterns are designed to provide observable performance of basic loco motor, manipulative and stabilizing movements. The tests place the individual in extreme positions where weakness and imbalances become noticeable if appropriate stability and mobility is not utilized.

It has been observed that many athletes who perform at very high activity level are unable to perform these simple movements are prone to injury and poor performances during competitive events. These individual should be considered to be utilizing compensatory movement patterns during soccer drills and game, sacrificing efficient movements for inefficient ones in order to perform at high levels. If these compensations continue, then poor movement patterns will be reinforced leading to poor body mechanics and Injury.

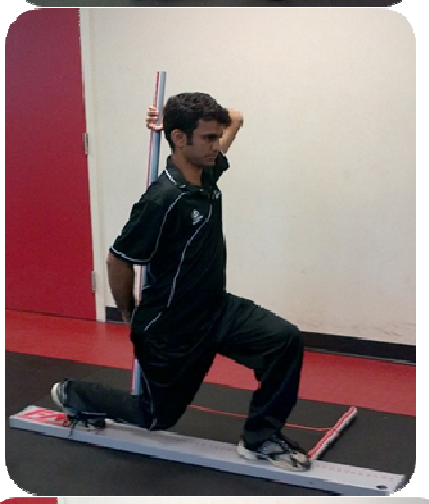
## FMS

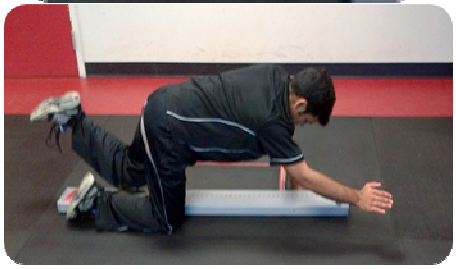
*FMS is an innovative system that asses STABILITY of the upper and lower quadrant which help to Identifies the FUNCTIONAL LIMITATIONS and ASYMMETRIES.*

The individual tests have certain criteria that must be accomplished in order to obtain a high score. The scoring is broken down into four basic criteria: a 3 is given if the individual can perform the movement without any compensations according to the established criteria, a 2 is given if the individual can perform the movement but must utilize poor mechanics and compensatory patterns to accomplish the movement, a 1 is given if the individual cannot perform the movement pattern even with compensations, and finally, a 0 is given if the individual has pain during any part of the movement or test. There are five tests which require bilateral testing; this will result in two scores for those tests. The lowest test score is recorded for the overall score; however, for assessment and data collection purposes, both scores are needed. Three tests: Shoulder Mobility, Trunk Stability Push-up and Rotary Stability have clearing test associated with them that are scored as pass/fail. If a person fails this part of the test, then a 0 is given as the overall score.

The FMS is an assessment technique, which attempts to identify imbalances in mobility and stability during fundamental movement patterns. This assessment tool is thought to exacerbate the individual's compensatory movement problems, allowing for easy identification. It is these movement flaws that may lead to breakdown in the kinetic linking system, causing inefficiency and micro trauma during activity.

The FMS should be introduced as part of the pre-placement/ pre-participation physical examination to determine deficits that may be overlooked during the traditional medical and performance evaluations. In many cases, muscle flexibility and strength imbalances along with previous injuries may not be identified. These problems, which have been acknowledged as significant risk factors for injury, will be identified using the FMS. This movement-based assessment will pinpoint functional deficits related to proprioceptive, mobility and stability weaknesses. If these risk factors can be identified and addressed utilizing the FMS, then decreases in injuries and improved performance should follow.





We are on the Web!
www.soccerfitness.ca

SOCER FITNESS INC.

SOCCER FITNESS TRAINNG CENTRE

2ND FLOOR, TRIO SPORTSPLEX

601 CITYVIEW BOULEVARD

VAUGHAN, ONTARIO, L4H 0T1

Phone: 647-829-4360

E-mail: richard@soccerfitness.ca

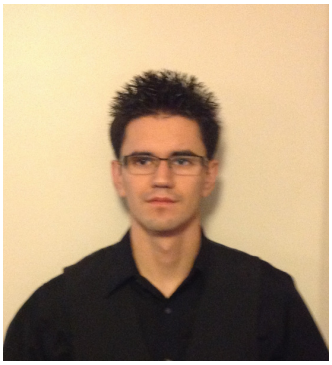
Soccer Fitness was created to help coaches at all levels of the game improve their knowledge and practical skills in training their athletes. With huge and growing numbers of players registered in Canada at the youth level, it often seems that there are just too many players and not enough qualified fitness trainers. Today, most clubs in Ontario have Club Head Coaches and Technical Staffs, whose primary responsibility is to help train, educate their club's "rep" or competitive coaches, and ensure that they are able to plan and deliver appropriate technical and tactical training to their respective teams. Physical training of soccer players, however, seems to be the missing link in most clubs' overall training programs. **Soccer Fitness is a company that aims to help coaches in understanding and implementing appropriate physical training programs for their athletes.**

## AUTHORS CONTRIBUTING TO THIS NEWSLETTER

### Bhavesh Dhoka

A 4th-year student in the Humber College Fitness and Health Promotion program, Bhavesh recently completed a Summer internship with Soccer Fitness Inc. from May—August 2012. During his internship, Bhavesh worked as a Trainer's Assistant in the Soccer Fitness Training Centre, also assisted the Director of Training with our Soccer-Specific Fitness Assessments each week, and created summaries of Global Positioning Satellite (GPS) data taken from Ontario Provincial and Canadian National team soccer games. He accumulated dozens of hours of work and became an expert in the use of the Functional Movement Screen, an assessment tool explained in more detail in his article on Page 4 of this newsletter. Originally born in India, Bhavesh is a Registered Physiotherapist, and is working on gaining accreditation as a Physiotherapist in Canada.

### Santiago Montoya



Also a 4th-year student in the Humber College Fitness and Health Promotion Program, Santiago also recently completed a Summer Internship with Soccer Fitness Inc. from May-August 2012. During his internship, Santiago worked as a Trainer's Assistant at the Soccer Fitness Training Centre. Among his responsibilities were: assisting Trainers with administration of Treadmill, Plyometric, and Functional Strength Training Protocols, assisting Trainers with On-Field Training and the Soccer Fitness Power Running Series, and conducting running gait analysis using Dartfish camera-based video analysis software. Santiago became an expert in the use of Dartfish to identify and correct weaknesses, imbalances, or mistakes in athletes' running form while performing level ground and high incline, high speed treadmill running. His article on Page 3 of this newsletter explains the use and application of Dartfish in general as a tool for gait analysis, as well as how it will specifically be used in the Soccer Fitness Training Centre for our Advanced Running Gait Analysis tests. Santiago was born in Colombia, and is looking to obtain a degree in Kinesiology and Health Sciences in the near future.