White Paper

© 2017 776BC Pty. Ltd. All Rights Reserved.

Technical Brief Series

776BC Motion: Next-Level Apparel. Best Level Performance.

The practise of biomechanics in sport has long been the preserve of those at the elite levels.

It is wholly reliant on precision technology and the expertise required to accompany it. This is a specialism within sports science that has become almost entirely exclusive to those with the access and the means.

For top athletes, this access has offered ways to unlock the smallest improvements in their movement and form that make the most significant difference to their performance.

The benefits of biomechanics are not solely for unlocking the potential of those competing at the top. Indeed, there is considerable value for athletes of all ages and skill levels in understanding the importance of education to develop proper mechanics.

For aspiring young athletes, recreational sportsmen and women, and enthusiastic amateurs alike, having that knowledge can improve enjoyment, accelerate development and prevent injury.

For coaches, analysing movement and communicating it back effectively this offers the best opportunity to support effective athlete development.

Indeed, visual feedback is one of the most impactful ways to modify an athlete's technique and allow them to perform at the most efficient level possible , something coaches are doing every day in the field at all levels.

This is where 776BC's Motion sportswear comes in – a completely new-to-the-world product unlike any other that exists in the market.

Using a set of visual biometric anatomical markers (pivot points), these garments are designed to focus attention on specific body points and key lines - such as the line of the spine.

Combined, this data enables the wearer to achieve best practice form and function in an exercise or activity.

In short, they allow any athlete or coach to harness real-time biomechanical feedback anywhere, any time.

It is this feature that is particularly important, because the Motion range is confronting a problem that sits at the centre of the traditional application of biomechanical analysis – the laboratory setting.

The challenge of sticking with tradition

The essence of biomechanics is a synthesis of biology and mechanics that seeks to understand and explain movement, particularly human movement.

In its truest form, it's often referred to as the link between structure and function.

Understanding that link in athletes requires a process of measuring complex biometric data and then analysing it to provide simple feedback – a process that has led to a natural bias and tendency towards computer technology to ensure accuracy and effective results.

Methods such as the use of 3D motion capture where athletes are filmed performing movements from multiple angles using advanced camera technology are among the most popular.

These systems are grouped into two main categories – non-optical and optical. The first harnesses inertial, mechanical motion, and magnetic systems to capture data points. The second uses passive markers and active markers to achieve the same outcome.

They are highly effective and offer incredibly accurate results, but it comes with compromise.

It's invasive. It's expensive and it requires a controlled environment in which the athletes' movements are constrained by the technology surrounding them.

As a result, it restricts and confines an athlete's capacity to execute realistic movements specific to their sport, meaning the chance to relate this data to their surroundings is severely limited.

For the coach too, there is the challenge of translating the data from this static setting into feedback that works within their athlete's sporting environment.

A rowing machine, for example, surrounded by computers, cameras and wires cannot effectively match the extrinsic impacts of competing against the elements, nor can it recreate the subtle effects of boat design.

Similarly, intrinsic pressures - such as the psychological effect of competition – and the impact they might have on athletes' movement and motion can't be replicated within a laboratory.

Technology has provided some early answers. The use of photography, video and new web-based applications has unlocked opportunities to capture movements for forensic analysis after training.

But what about real-time analysis? What about the moments on the water, on the field or on the track where the smallest of changes, in the moment, can make the biggest difference?

Motion's new approach to biomechanical analysis

The genesis of the Motion range exists within this separation between the traditional application and real-time biomechanical analysis.

Over the past two years, 776BC have sought to bridge that gap by developing an inexpensive, non-invasive solution that effortlessly marries biometric data with simple, immediate visual analysis of how a body moves in an exercise or activity.

They have created a product that isn't restricted by technology or the sanitised environments of laboratories, but something as suitable in the hands of an elite athlete as those of a novice seeking to understand the key movement patterns of an exercise.

For coaches, it is set to provide an extension of the analysis they may already be doing in the field with their athletes. Instead of making judgements on movement and form against standard training kit, the Motion design draws the eye to the key joints and body segments for quick and easy analysis.

It is a completely new concept that is set to take biomechanics out of the laboratory and into the field.

And it's a concept that started out by focusing on two questions:

- What will athletes be doing when performing their movements?
- And what will coaches look for when they're judging whether the athlete is successful or not?

To help them find the answers, 776BC enlisted the support of Dr Ed Wittich – a leading expert on athlete analysis and product innovation at BAT Logic.

Together they embarked on an extensive research and development programme in which they sought the insight of coaches, performance staff, consultants, and athletes, including 776BC founder, Cameron McKenzie-McHarg.

They also consulted Dr Harry Brennan – Head of Sports Science and Physical Preparation at the Victorian Institute of Sport.

With a background as a physiologist as well as a strength and conditioning coordinator, he was able to combine his expertise as both a coach and a scientist to support the design and production of the product – specifically helping to make the connection between the challenges of a coach and how Motion could provide a real solution and advantage to athletic performance.

Next step – Adding the science

The foundation of 776BC's Motion Range is grounded in well-established biomechanics and medical science. In fact, the core principal for the Motion concept is immersed in the fundamentals of human biomechanics:

- All human body movement occurs around key segments related to joint centres, bony landmarks and key functional pivot points.
- These specific segments can be traced through specific lines (i.e. line of the spine) and points.

These established points and lines are key to assessing any form of movement.

Bringing together this qualitative data from their insight work with these three fundamentals, 776BC and Dr Wittich set out to identify 'biomarkers' - a set of visual points and lines that identify "the key biometric and anatomical markers on the body to show how an athlete moves." These would ultimately become the critical components of the Motion concept.

As a process, it was not about discovering new types of markers, but rather analysing the way athletes move against the established segments, lines and points from which human body movement occurs.

From there, 776BC, Dr Wittich and the team used gold-standard lab-based practices - such as extensive motion capture technology - to isolate the critical areas that relate closest to the natural movements athletes apply in their sporting contexts.

The result – a series of biomarkers based on "strong evidence-based medicine and sports-based medicine" that could be incorporated into the garment designs to show the key movement generators and segments on an athlete.

The graphic below shows the biomarkers that were chosen.

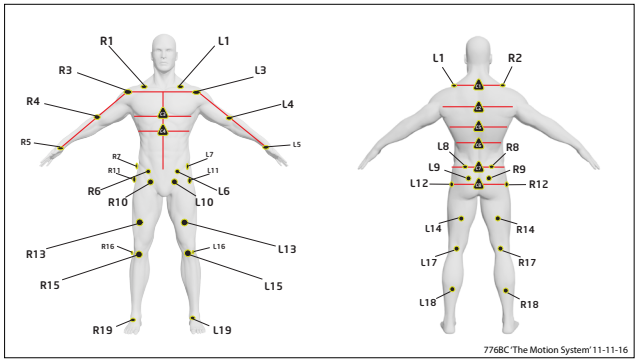


Figure 1.

When combined, each of the points you see in Fig.1 create an architecture that can accurately display ranges of motion, describe segments, trace patterns of movement and analyse patterns that show cause and effect.

It is this architecture that forms the basis of the visual language used across the Motion range.

As you can see in Fig. 2 below, the garments connect the markers through key lines on the body, allowing for simple, fast analysis of intricate movements such as the flexion of a knee when an athlete prepares to cut, or how much a rower side-bends through their mid-spine during their stroke, or why an athlete's shoulder moves before the bar is lifted in a deadlift.


Figure 2.

It is thanks to this visual language that such an acute level of analysis can be achieved right across the levels of sport and a host of practical scenarios.

Consider for example a frequent gym attender. Participating within a non-competitive setting, their focus is on the execution of multiple exercises that require correct form and technique to ensure quality of movement and to prevent injury.

Through the aid of a mirror, the markers and lines on the Motion range help to sharpen the user's focus for each exercise and enables them to assess whether they are moving correctly, both in real-time and in post analysis.

Another example, at a different level of sport, is that of a team of competitive rowers and their coach. Within this context, the coach's ability to assess the movement and form of their team can be restricted by their angle of observation.

Be it following in a launch or viewing from the water's edge, trying to assess whether the individuals are moving correctly, or collectively whether the crew is moving together, is a difficult exercise.

However, the Motion range clearly highlights the key movement of the athletes even from a distance and therefore provides real time analysis.

As Dr Wittich explains, this product was designed "to include everyone so that they can look at their movement in a more functional way".

Augmenting the Motion range in the digital sphere

Alongside the development of their sportswear range, 776BC have created the Motion Companion – a free-to-download digital application for iOS mobile, tablet and desktop devices.

Designed to enhance the Motion experience, it augments the value of the garments by offering a range of intuitive features and benefits that inform and support users.

Instructional content, such as which markers or lines on the garments to focus on for correct technique in a specific exercise or activity, is made available anywhere, anytime.

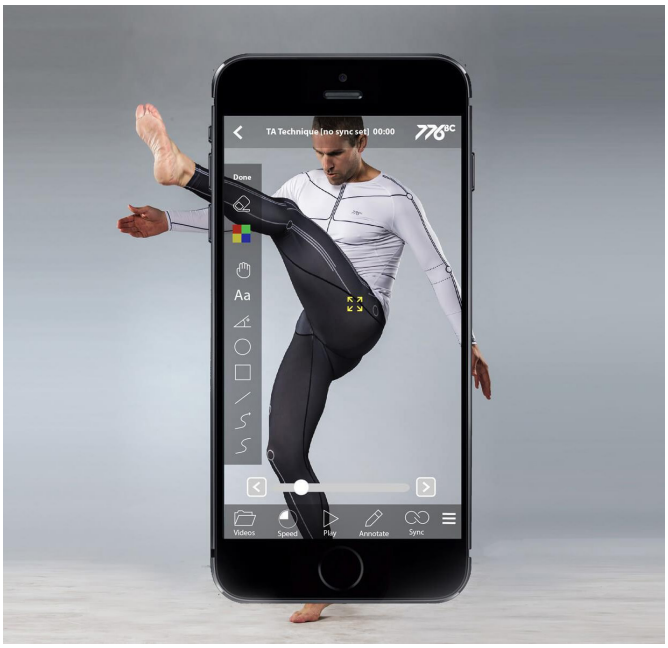


Figure 3.

While a repository of guidance videos features world-class athletes demonstrating correct technique, offers users a unique level of insight into how to best enhance their own performance.

Additional to this are the in-built performance analysis features such as live video capture, side-by-side comparison, and precision video analysis – the latter of which offers both slow motion and frame-by-frame review functionality.

For athletes or coaches wanting to annotate their video files, there is also the "Motion Draw and Notes" function that provides a series of interactive tools to measure angles, make notes, draw lines and select points.

On or off the training field, these features combine to enhance the benefits of the Motion sportswear and bring real value to the athlete's development.

For coaches, it complements the naked-eye and real-time visual analysis achieved with the Motion garments' biomarkers, and offers an opportunity to reinforce development points through visual feedback and demonstration. Thanks to the integrated sharing functionality (compatible with Facebook, YouTube, Twitter, messaging, and email), this means it is no longer restricted to face-to-face sessions, but can be achieved remotely. Meanwhile, for athletes, these features make it easier to build custom training and assessment programmes, while supporting them to maximise the benefits of the Motion sportswear.

The impact potential of the Motion Range

After two and half years of development the Motion sportswear range and Companion app is set to be launched into the sports market where the impact of this unique solution will finally be realised.

There is a neatness in the idea of the product that is set to take biomechanics out of the laboratory and into the field making its own journey from a test environment into the real world.

Once there, it will be down to several key factors that will determine the impact it will have on the end users.

The first is that Motion is a product that considered the athlete and coach first before developing the technology that will benefit them in the field, on the water or in the gym.

This is critical. Because 776BC approached the development process in this way, it means that the biomarker architecture works for athletes within their real sporting environments - the athletes can make true and proper biomechanical judgements relevant to their context rather than that of a laboratory setting.

Second, there is the biomarker design unique to the Motion sportswear that, combined with the support of the Companion app, offers an incredibly simple but highly effective means of translating complex biometric data into coherent real-time feedback that can make a difference.

For some athletes and coaches, it will be the difference that unlocks skills, exercises and movements that enhance enjoyment, speed up development or prevent injury.

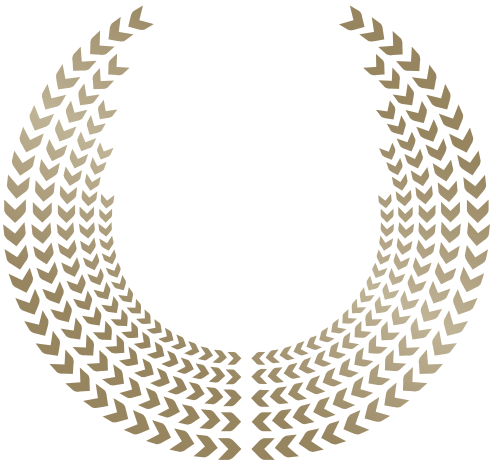
For those at the other end of the spectrum, who are accustomed to the intense and invasive procedures of traditional analysis, it will be the difference that opens a revolutionary new way of discovering the marginal gains needed for success at the top levels.

About 776BC

Founded in 2013 in Melbourne, Australia, by two-time Olympian and Beijing Silver medallist, Cameron McKenzie-McHarg and wife Kate McKenzie-McHarg, 776BC is a leading performance innovation company. The name, 776BC, references the founding year of the Olympic Games. This is when sport as we know it was born.

776BC offers a range of products and services designed to enhance athletic performance with each item combining technical performance solutions with true athlete insight.

776BC partners with elite athletes, teams, colleges, institutes and technology companies to link innovative technologies with true performance outcomes. performance solutions with true athlete insight.



www.776bc.com/us/motion

© 2017 776BC Pty. Ltd. All Rights Reserved.