*21 Bishop Street*
*Skye*
*South Australia 5072*
*Australia*
*Tel +61 418 815 400*
*Postal Address: PO Box139 Fullarton South Australia 5063*
*Kodara Pty. Ltd. Trading as Fitness Technology A.B.N. 31 056 594 248*
*Web Site* *www.fittech.com.au*
*Email* *info@fittech.com.au*

# *About Fitness Technology (FT) – the chronological history*

***Prepared by: Ian Crossing Managing Director & FT founder – Oct 1 2020***
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## Overview

We started in the human measurement business back in **1987** which ultimately took our human functional capacity evaluation products onto the global market.
Most of our global sales inquiries now originate (via a Google or Bing ) from interested sports science professional readers, from a multitude of peer reviewed international scientific journal publications. Where our performance measurement technology was (Method / Procedures) listed in all these post-graduate level (Masters &/or PHD) journal publications! For a small random selection refer https://www.fittech.com.au/documents.html

## FT chronological history

It began back in **1987**, which led to establishing our business, with an apt trading name Fitness Technology (**FT**) That is when we started using the available electronic measurement technology. An objective method of being able to accurately measure human Functional Capacity Evaluation (**FCE**) to assess human functional performance.
FCE up until then was only being assessed subjectively! Coming from a professional electrical engineering background, it was obvious that load cell technology with linear position potentiometer technology, provided the accurate means to objective human FCE measurement & analysis! Accurate force & distance software calibrations provided accurate force & distance data for analysis. If you can measure it, you can manage it!
Our ongoing Research & Development (**R&D**) team consists of professional engineers (all with commercial skin in the game) providing the practical expertise required in electronic engineering and force sensing area. An essential requirement for the production of human FCE hardware & software!

In **1987** affordable IBM compatible computers were entering the market with Microsoft's Disk Operating System (DOS.) This provided unique new measurement opportunities to accurately measure human FCE. All now made possible with this affordable new PC technology with RS232 serial port connection for data streaming, of collected data. This new PC technology provided the gateway to new human FCE capabilities.

By **1992** with our FCE technology, had attracted the attention of Robert Newton who was then a PhD candidate from the Southern Cross University.

From **1995** our technology really took off with Microsoft's new Windows operating systems (W95 & later Windows versions) utilizing new laptop technology with USB ports. This provided a simplified connection to our hardware with massive improvements in processing capacity and speeds. A far more user-friendly option for all our customers!
This included utilizing Microsoft Office with Excel, which took our technology to a whole new level.
This continues today, enabling us to produce many new practical human movement testing applications using the latest in very affordable new laptop technology with our new Printed Circuit Boards (**PCBs**) units populated with the latest Integrated Circuits (**ICs**.)

From **1996** onwards, Dr. Rob Newton PHD has been the designer & author of all our software. Rob already had the fundamental and essential knowledge of the required laws of applied physics used in all his software. An essential advantage over traditional software programmers! With FT producing all the associated hardware supporting his unique software programs. This process is ongoing R&D. Rob developing new software functions and FT producing hardware with our associated Intellectual Property (IP) rights stemming from our ongoing R&D. This involves FT designing and producing all our data acquisition PCBs. Including providing direct after sales support. Why? Off the shelf data acquisition PCBs are simply not capable of providing all of our software functions!

The KMS software system running under Microsoft Windows with Excel was the first to use this then new USB technology which made all our technology very user friendly to install & use.

Next came the BMS software system running under Microsoft Windows with Excel using USB technology, initially just with the Linear Position Transducer (LPT) connection.

In **2003** we moved into developing the data acquisition interface PCB technology required for static and dynamic force plate applications.
In **2004** Dr. Robert Newton started as the Foundation Professor at Edith Cowan University in Western Australia.
Collectively our team now has well over 100 years of practical experience working in this specific scientific field.
In **2019** Professor Robert Newton received the WA Scientist of the year award.
In **2021** he is now the Professor of Exercise Medicine at Edith Cowan University.

It has always been our strategy to release new PCB technology that is backwards compatible with our previous products out in the market. For example:

- The KMS software product range has now moved from the Version 1 to the Version 2 with new functions.
- The BMS software product range has now moved from Version 1 to Version 2 with all the new ground breaking force plate functions (that Forcedecks & Hawkin systems simply don't provide.)
- The Pacer software product range used for the Woodway Force 3 and Curve 3 athlete powered treadmill range has also moved from the Version 1 to the Version 2 software functions.
- In 2003 when we started to design & then produce all the PCB units for both the Pacerv1 & BMSv1 software, which has always read the data from all of the force sensors individually. Meaning we have never summed the data from these sensor channels as it only reduces the data collection options that would otherwise be available!
- All these FT PCB units are not only used for all our performance force plate applications using the BMSv1 & BMSv2 software programs, they are also used in the PacerV1 & PacerV2 software programs (Professor Rob Newton the designer of all these programs) used in all the Woodway Force3 & Curve3 athlete powered treadmills as they all utilize our same PCB core components & connections.

**Introducing one of our new 2020 products - the 400S+ performance force plate**
Our new 400S+ Performance Force Plate web site (with its user manual link at the bottom of this page) refer
https://www.fittech.com.au/Force_Plate_400Splus/Force_Plate_400Splus.html
Then compare it with our previous 400S Performance Force Plate model web site (with its user manual link at the bottom of this page) refer
https://www.fittech.com.au/Force_plate_400s/Force_Plate_400S.html
Note:

1. Both use our same data acquisition PCB & are fully compatible with our MTP rig + LPT for barbell tracking + magnetic brake units on our FT700 power systems with both the BMSv1 & BMSv2 software programs (Prof Rob Newton the program designer of both.)
2. Both models provide unilateral and bilateral measurements plus anterior posterior and medio lateral force measurements all on the one force plate. Here is a link that

proves this fact. What our force plates can do that is simply not possible to do on a dual force plate system!

3. In the last 15 years we have only found two shear beam manufacturers that can provide validated lab test results confirming that these products provide a 'natural frequency' of at least 1000Hz. Other force plates on the market can make some amazing sampling rate claims here but when checking for this 'natural frequency' validation with the manufacturer via their make and model used, their replies, (if forthcoming,) mostly provide major concerns. The real test will be when a savvy peer reviewer asks for validation of the 'natural frequency' of the force sensors used on the force plate used in that scientific journal publication. Without this sampling rate validation their saved data could be highly questionable!
4. Both our above force plate models use a carbon fibre top but note the weight of 400S+ is only 14.5 Kg which is 6.1Kg less than the previous 400S model at 20.6 Kg.
5. With a 400S+ total weight of just 14.5Kg - it is very light & portable but it still has the same 400S functional footprint size, large enough for the centre of mass to be over it for accurate and reliable force data recording on every movement phase. This very light weight maximizes the achievable sampling frequency recorded.
6. By comparison, dual force plate systems, where all the sensors' data on each plate are only summed, they are effectively just an expensive set weight scales as they can only measure right and left leg vertical force data & medio / lateral coming from the four force sensors on each plate but can't track any essential anterior / posterior force movements.
7. Portability is also questionable on dual force plates with a total weight of 46 Kg (23Kg for the Right side + 23Kg for the Left side of each plate.)
8. The heavier the Mass of the force plate top, the less responsive is the actual sampling frequency recorded.

**Some of what is not visually obvious with our 400S+ performance force plate design is as follows:**

1. All our force plates with their data acquisition PCB units are designed, produced & supported here in Australia with technical online assistance provided globally. No supply line issues here from any of our component suppliers!
2. This 400S+ model has a unique carbon fibre top design that provides a different method of connecting the 4 x force sensors to it. There are specific structural reasons why we have done this. One being, to provide a major weight saving whilst still maintaining the required strength and durability required for all applications.
3. Over the last two decades we have produced several different performance force plate prototypes that we have field-tested. However, the identical 400S & 400S+ model footprint size always produced the best results. We found from field testing that if we halved the footprint size, we could halve the weight of the product. However, with all smaller size plates the athletes' centre of mass was not always over the force plate area which compromised saved force data.
4. The PCBs we designed and use here have always been exactly the same physical size with the same plug connections and have done so since we started producing them in 2004. However, as new PCB components with new capabilities were released all our existing customers could easily upgrade to add new measurement functions via a just simple PCB changeover that our customers could easily do.
5. These PCB units are not only used for all our performance force plate applications using the BMSv1 & BMSv2 software programs but they also used in the Pacerv1 & Pacerv2 software programs used in all the Woodway Force3 & Curve3 athlete powered treadmills as they all utilize the same PCB connections.

**Introduction to our 2020 Woodway Curve3 treadmill technology:**

1. All our data acquisition PCB units for Woodway Force 3 & Curve 3 models are designed, produced & supported here in Australia with online support provided globally. No supply line issues here from any of our component suppliers!
2. Our latest Woodway Curve3 athlete powered treadmill technology is now in place here in Australia with professional football teams in the AFL & NRL at their high-performance training centres. This is a World first that will not be ready for global release until at least late in 2020. These Curve 3 units now provide dynamic

measurements of gait analysis surpassing anything that current hamstring measurement technology currently provides. Thus, providing new measurement method for detecting & recoding gait asymmetry issues whilst athletes are actually running thus specificity required here. Namely, right & left leg horizontal and vertical force data, flight and contact time data & power all measured accurately and in real time with millisecond timing resolution. All done on this new Curve 3 athlete powered dynamic force plate PCB technology with the data sampling rate now increased from 200Hz to1000Hz.

3. A 20 second dynamic running test data here can now identify and quantify athletes' gait asymmetry issues & ongoing rehabilitation progress.
4. We have observed a multitude of sports where running is an essential component (which involves the hip flexor movement.) We questioned the relevance of just using the isolated Nordic curl force measurement method, as it lacks the specificity of the actual running technique. It will be interesting to observe future research publications on this comparison. **From the saved PacerV2 data done back in 2020, we believe we already knew the answer!**
5. In summary our 1000Hz data acquisition PCB was always capable of providing all this data two years ago. Unfortunately, with our enforced COVID quarantine restrictions over the last two years it slowed down the clinical trial process (but it did not stop it!)
6. **Now here is a 2021 technical report update that confirms what is now possible in advanced dynamic gait assessment diagnostics ……Technical Note - Data quality and parameter validity from 1,000 Hz versus 200 Hz sampling frequency on the Curve3 and Force3 Treadmills. (.pdf)**

## Summary

FT is a privately owned Australian business, based in South Australia where all our hardware has been designed, produced and where it is all distributed from.
FT has a well-established global client base where export sales currently exceed 84% of our annual sales.

FT - has a large global customer base which includes:

- Universities with sports science related faculties in USA, Canada, UK, Ireland, Sweden, Nederland, France, Singapore, Malaysia, Hong Kong, China, Taiwan, Japan. Thailand, Qatar, India, Portugal
- National & regional institutes of sport in USA, Canada, UK, Nederland, Sweden, Singapore, Malaysia, Hong Kong, China, Taiwan, Japan. Thailand, Qatar, India
- England & Wales Cricket academy (including every County cricket team)
- South Africa & India Cricket academies'
- England, Wales & Scotland Rugby Union
- UK - Premier League teams MUFC, MCFC, Chelsea FC, Leicester City FC, Liverpool FC, Celtic FC)
- France - Paris St Germaine FC, Federation Francaise De Ski (Nat Ski team)
- Woodway USA - use all FT PCBs with Pacer software in all their Curve 3 & Force 3 athlete powered treadmills (dynamic force plate applications)
- USA – NFL, NBA, US Military & NASA

FT – in Australia & New Zealand has a customer base which includes:

- Universities in all states with sports science related faculties
- National sports institutes (AIS & NZIS) & their regional affiliated institutes of sport
- Cricket Australia (including state cricket teams)
- AFL, NRL & ARU teams
- DSTO, SAS & Commando Regiments