

EXAMINING THE VALIDITY OF THE HAWKIN DYNAMICS FORCE PLATES



Conducted By:
HD Engineer Team
Westbrook, Maine

Analysis By:
Dr. Jason Lake
University of Chichester
August, 2020

OVERVIEW

An in-house study comparing the Hawkin Dynamics bilateral force plate system and Bertec single plate system. The difference across 3 loads (10 trials at each load) was within 1 Newton, or 0.2%.



INTRODUCTION

Force plates enable practitioners to quantify neuromuscular characteristics of their athletes, including the athlete's readiness to train, their physiological response to sports training and competition, and the effectiveness of strength & conditioning programs. Simplistically, force plates can be described as very sensitive bathroom scales. Each of the four corners of the typically rectangular force plate house load sensors (e.g. strain gauges) that record a force signal that is proportional to their deformation when loaded. These force signals are collated by software to provide a record of the absolute force that athletes apply through their feet to the ground during common assessment tasks like vertical jumping.

With the above in mind, it is critical that force plate system accuracy is established so that practitioners and researchers can use them with confidence. We assessed the accuracy of the Hawkin Dynamics bilateral force plate system by comparing it to an industry gold standard force plate system (Bertec, model S029060, Columbus, Ohio).

MATERIALS & METHODS

We did this by positioning both force plate systems on a level and smooth top granite stone (engineering stone), comparing the forces that the respective system's software recorded in response to having known loads placed on them. A small layer of cardboard was placed on top of the force plates with avoid scratching from the calibrated weights. The force plates were then zeroed before the loads were applied. To examine a range of loads, we used calibrated 50, 75, and 100 kg weights (Figure 1). Each of the different loads were placed on the different force plates 10 times and weighed for 10 seconds continuously, and an average from each of the three load's 10 trials was calculated for comparison.

A Hawkin Dynamics dual force plate (serial #2019169), was randomly selected from in-house stock for comparison. Using the protocol described above, data were collected from each (left and right)



EXAMINING THE VALIDITY OF THE HAWKIN DYNAMICS FORCE PLATES

force plate separately. The Hawkin Dynamics mobile application was used to collect the data from each type of force plate. After each force plate was tested, the values were averaged. Below is a table of the data collected in the experiment, along with the known values of the calibrated weights, in Newtons

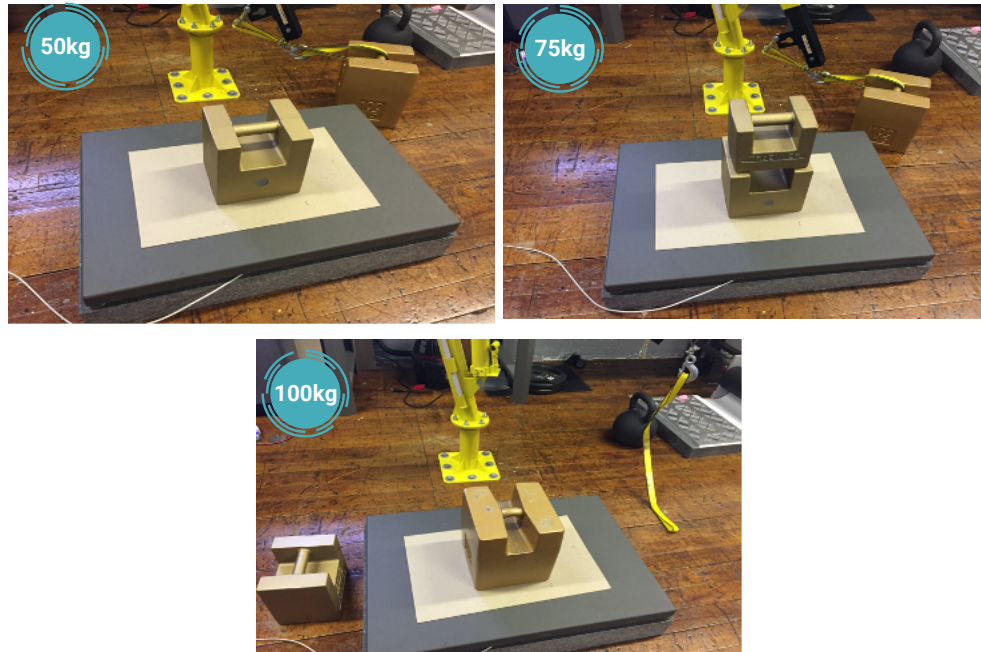


Figure 1. The three different loads (50 kg, 75 kg, and 100 kg clockwise from top left) positioned on top of the Bertec plate (model S029060, note the thin cardboard sheet).

Table 1. The results of the comparison of Bertec and Hawkin Dynamics (HD) force plate records of a range of calibrated loads (average forces from 10 trials presented in newtons). Difference is calculated between the HD Left & Right Average and Bertec.

LOAD	HD LEFT	HD RIGHT	HD L & R AVG.	BERTEC	DIFF.
50 KG	489 N	490 N	490 N	488 N	+2 N
75 KG	734 N	737 N	736 N	733 N	+3 N
100 KG	980 N	980 N	980 N	982 N	-2 N
AVG. DIFFERENCE ACROSS 3 LOADS					1 N



EXAMINING THE VALIDITY OF THE HAWKIN DYNAMICS FORCE PLATES

RESULTS

The results of our comparison are presented in Table 1. We calculated the average, standard deviation (a measure of variance), and 95% confidence intervals (a measure of where results would fall 95% of the time if we repeated this test) of the difference between the average Bertec and Hawkin Dynamics forces from the three loads (Table 2). These showed no difference between the averaged values from the left Hawkin Dynamics plate and the Bertec plate (standard deviation = 0.2%, 95% confidence interval = -0.3 to 0.3%). Additionally, the largest difference found between the Bertec plate and the right Hawkin Dynamics force plate was 0.5% (from the 75 kg load), an average difference of 0.2% across the three loads (standard deviation = 0.4%, 95% confidence interval = -0.3 to 0.7%).

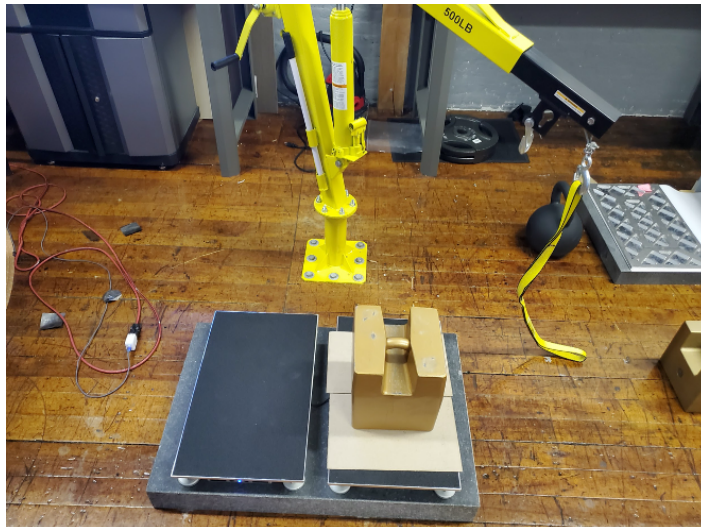
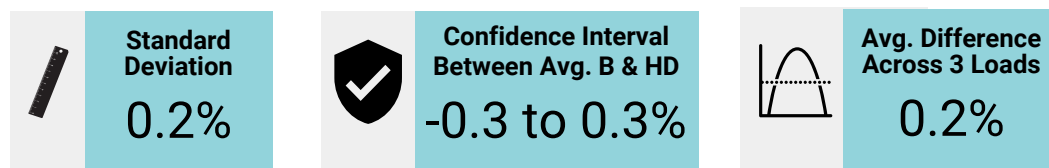


Figure 2. Hawkin Dynamics force plates with 100 Kg on the left force plate.

CONCLUSION

The findings from our in-house study indicate that the Hawkin Dynamics bilateral force plates are as accurate as the Bertec (model S029060) single force plate. Future research should attempt to validate dynamic movements simultaneously on both HD force plates and another industry standard force plate system (e.g. Bertec).

Interested in collaborating for another study? Reach out at ben@hawkindynamics.com

