INSTALLATION GUIDE
3D MOTION PLATE

PART 2: SOFTWARE SETUP

swingcatalyst

CONTENTS

Installation Guide: 3D Motion Plate 2019

INTRODUCTION

The Swing Catalyst team has over the years gained extensive experience from studio installations all around the world.
This knowledge is now passed on to you as a valued Swing Catalyst customer.

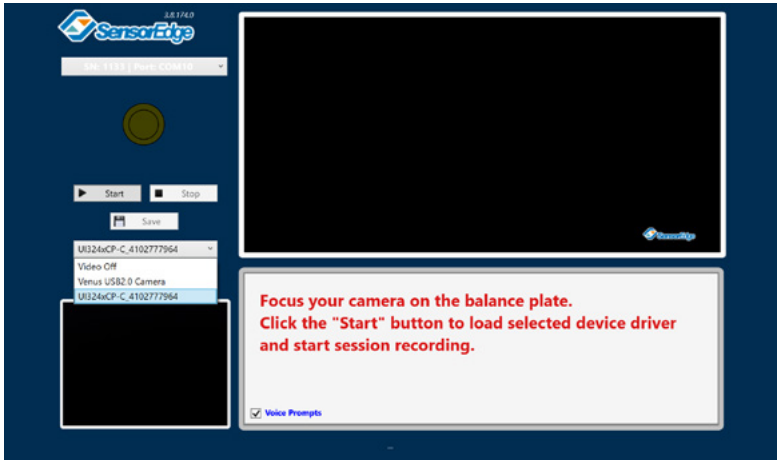
This guide offers instructions on how to get your Balance Plate up and running with the Swing Catalyst software and an explanation on the different data it provides and how you use it in your analysis.

Detailed information on a specific topic may be found at:

https://www.swingcatalyst.com/help

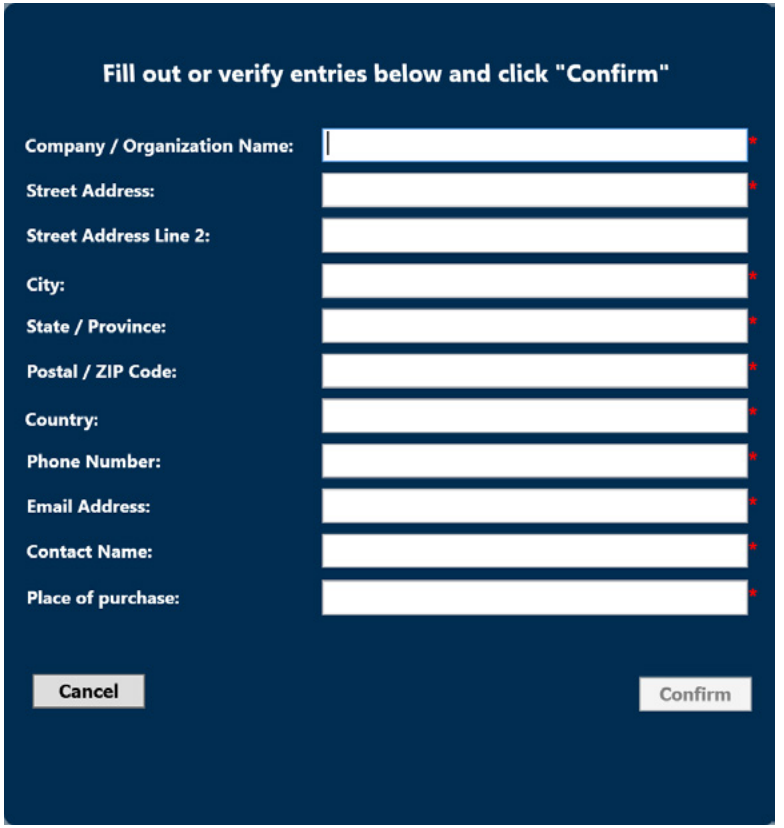
READY THE BALANCE PLATE

1. Download and run the calibration utility (http://www.sensoredge.com/dwnlds/SensorEdgeDiagnosticsUtilitySetup.exe)
2. When asked to install drivers, click yes.
3. Connect the Balance Plate to the computer
4. Open the newly installed SE Utility
5. Select a camera or webcam and focus it on the Balance Plate.
6. Make sure nothing is laying on top of the plate as
7.

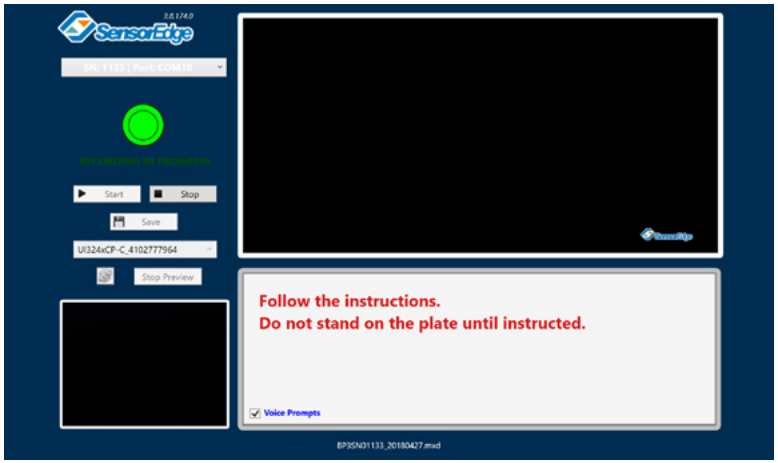


After clicking start a pop-up with a request to fill out warranty info will show up.

Please fill this in.

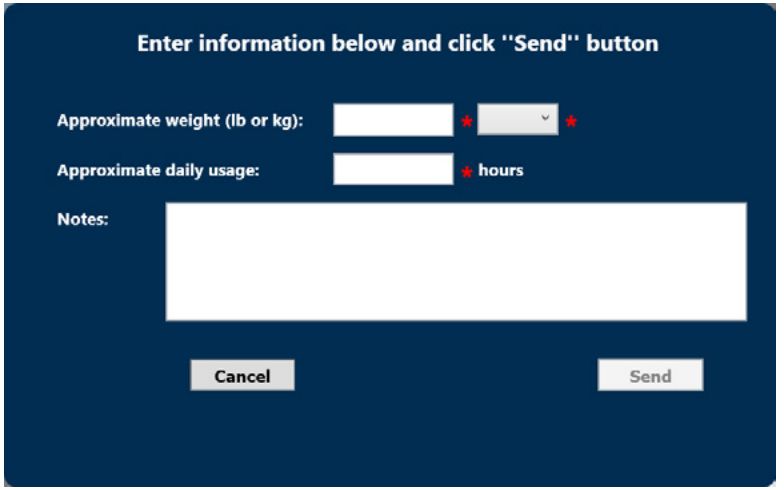


Once you've filled in the required information for warranty and service purposes click "Confirm"



After the utility has recorded data with no one on the plate, it will ask you to step into several positions, please make sure to try to follow this as accurately as you can.

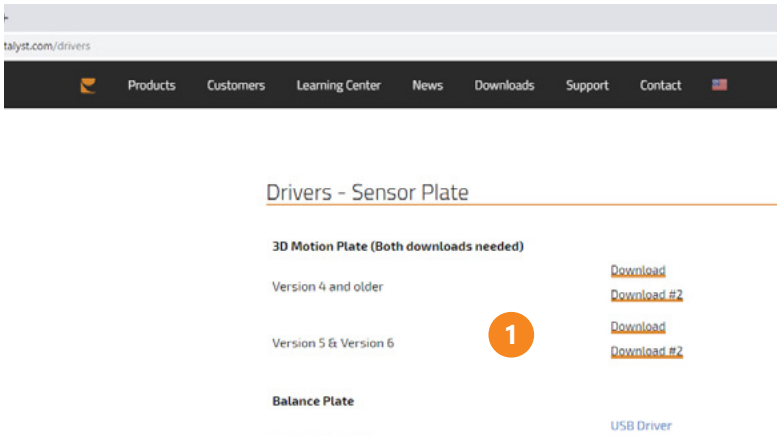
Once you have completed the session you will need to fill in your weight and approximate daily usage.



When the recording is complete you will be asked to save a new calibration file (file_name.mxd).

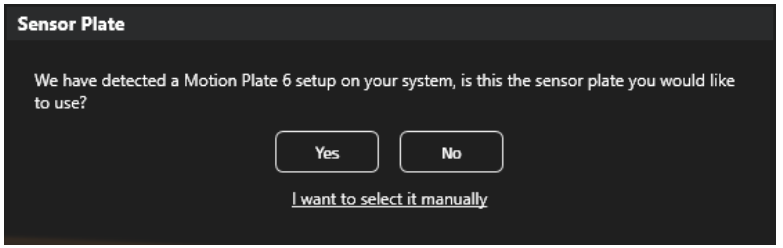
INSTALL FORCE PLATE DRIVERS

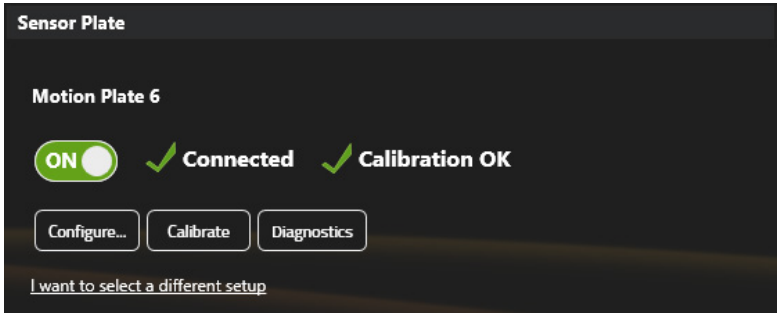
1. Download the Force plate driver (Version 6 - First link) (http://swingcatalyst.com/drivers)
2. Locate the driver file and double-click to install (CDM v2.08.30 WHQL Certified.exe)



SOFTWARE SETTINGS

1. Start Swing Catalyst and go to the Hardware settings in the main menu
2. The software will auto-detect your 3D Motion Plate, click"Yes"
3. Make sure it says Connected





Calibrate the Pessure plate

Click the "Configure.." button to open the configuration dialog.

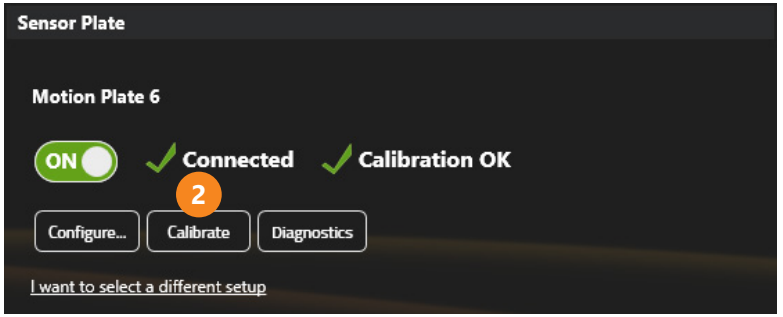
1. Go to the "Stance Sensor" tab, and click "Browse and Install"
2. Go to your downloads directory, likely C\User\Yourname\ Downloads and select the mxd file you just downloaded from the SE Utility.
3. When the installation is completed it will let you know and you can click "OK" to close the windows.

Please note that installating can take a few seconds.

Note: It might be necessary to run a re-calibration of your Pressure plate with heavy usage, this can be done by clicking the diagnostics button in Swing Catalyst Settings, which will launch the SE Utility.

Calibrate the Force plate

1. Make sure nothing is on top of the plate.
2. Click the "Calibrate" button.
3. Once the Calibration dialog closes, the process is finished.



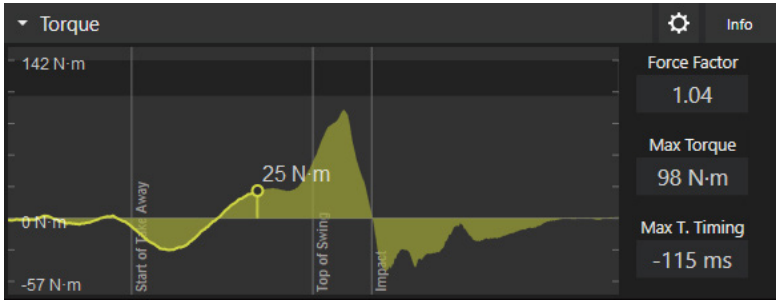
VERIFY DATA

Now it is time to verify that you receive data from the 3D Motion Plate.

1. Go to Analsysis mode
2. Verify pressure readings in the Pressure and Stance databox. To verify correct orientation, stand on one foot.

If the orientation is correct it should look like this (The CoP dot should be aligned under the foot)

3. Record a video. Make sure you see data in all force data boxes:
   - Torque
   - Vertical Force
   - Horizontal Force

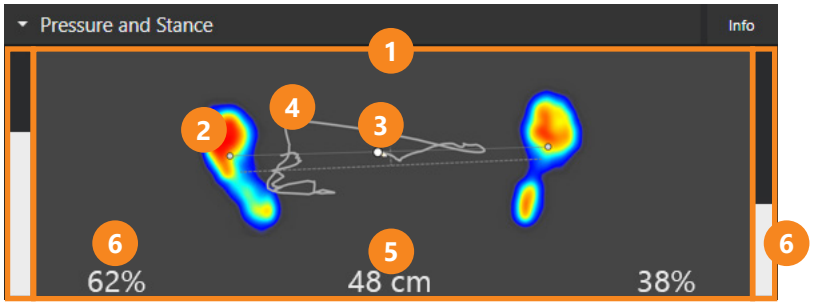


A graph should look similar to this, if it's flipped the orientation is wrong.

CHECKLIST

- [ ] Install Sensor Edge Utility
- [ ] Install Force Plate driver
- [ ] Enable the 3D Motion Plate in the software
- [ ] Verify the data rendered in Swing Catalyst

WHAT DOES THE PRESSURE PLATE MEASURE?

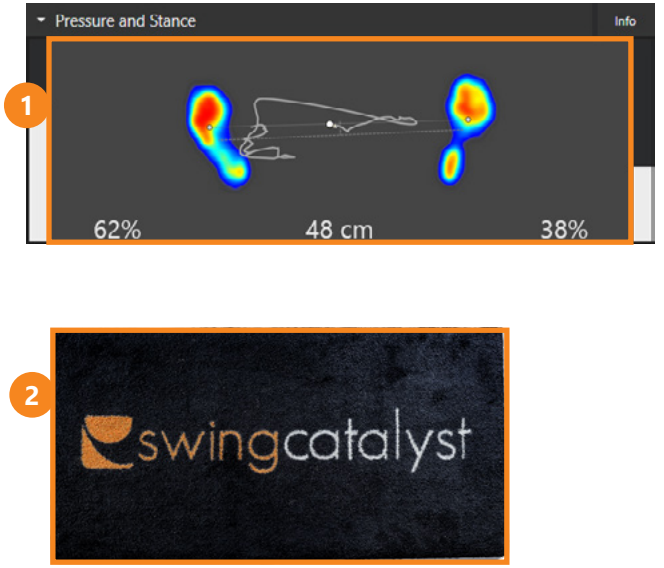


The top layer of the Swing Catalyst 3D Motion Plate consists of more than 2000 high-resolution sensors and measures the pressure applied to the ground by the golfer. The Balance Plate provides information on center of pressure, stance width, and pressure distribution between the feet. This information can be seen in the *Pressure and Stance* data box in the Swing Catalyst software:

1. 3D Motion Plate surface area
2. Footprints
3. Center of pressure (CoP)
4. CoP trace
5. Stance width
6. Pressure distribution

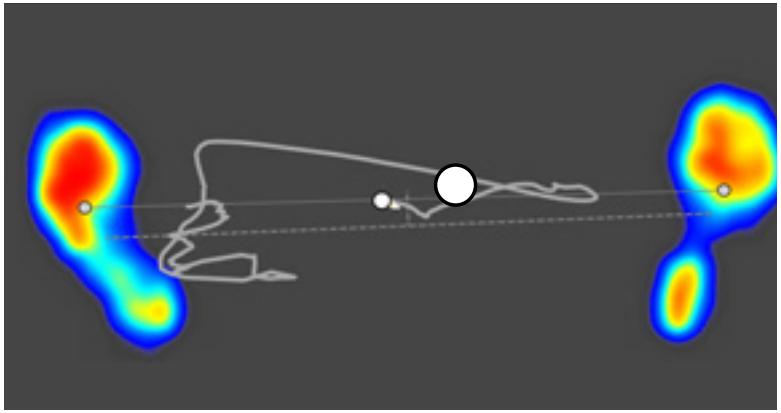
All pressure data is fully synchronized with the video images.

PRESSURE PLATE SURFACE AREA



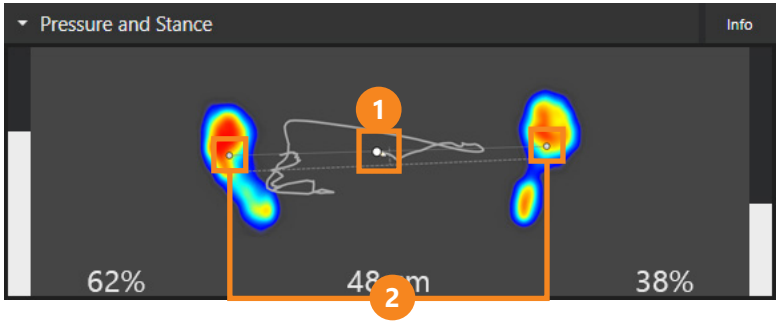
1. The grey area represents the surface area of the 3D Motion Plate
2. 3D Motion Plate

FOOTPRINTS



The colored footprints in the box indicate the contact that is present between the shoes and the plate. Different amounts of pressure are shown by different colors, with “colder” colors such as blue representing areas of low pressure and “hotter” colors such as red representing areas of high pressure.

COP

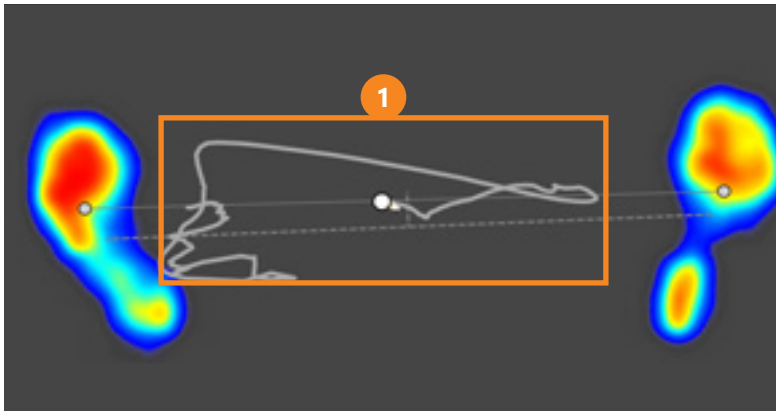


The white circle indicates the position of the total CoP, which is affected by the pressure distribution. For example, movement of the CoP toward the lead foot indicates a relative increase in pressure under the lead foot.

The smaller, grey circles indicate the position of the CoP under each foot. Between the two markers, a thin, straight line shows where the CoP of one foot is positioned relative to the other foot. The direction this line points has been correlated to the swing direction (or path) of the club in the downswing within each player.

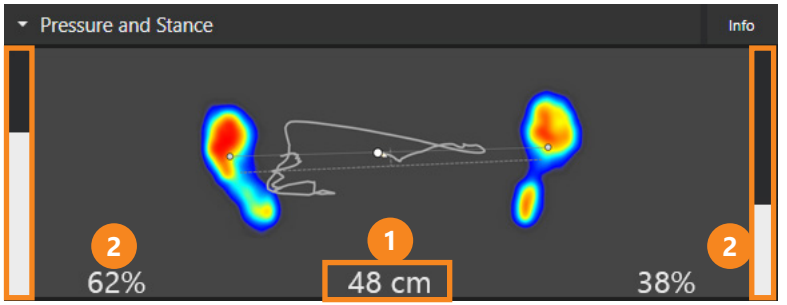
1. CoP
2. Individual CoP markers

COP TRACE



1. The movement pattern of the CoP throughout the swing is traced with a grey line. If the bookmarks are set, the grey line will change color to white/orange as the CoP moves along the trace as the video is scrolled forward.

STANCE WIDTH & PRESSURE DISTRIBUTION



1. The stance width is measured as the distance between the centers of the respective feet.

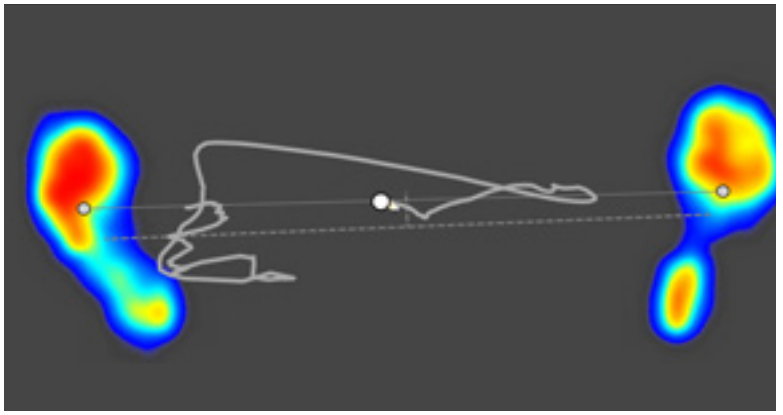
2. The white bars and percentages on each side of the box show how the total pressure is distributed between the two feet. In other words, it is a measure of how much the golfer is pushing down on one foot compared to the other. This is used to see where the golfer is exerting force on the ground.

   The pressure distribution determines the lateral position of the CoP. For example, leaning more on one foot will cause the CoP to move toward it. This represents a pressure shift, and is seen as increased and decreased values in the pressure distribution bars and the CoP moving left and right.

WHAT SHOULD YOU LOOK FOR?

The pressure plate component of the Swing Catalyst 3D Motion Plate provides a basis for analyzing the pressure exerted on the ground by the golfer during the golf swing, showing data that can reveal issues related to balance or pressure shift that may affect the swing.

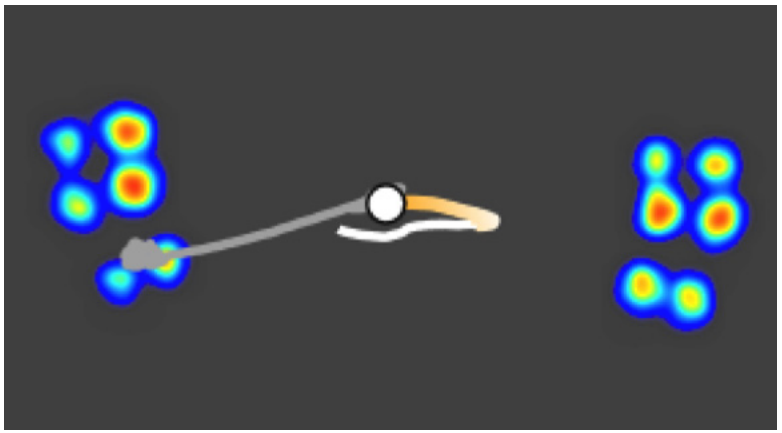
PRESSURE COLORING



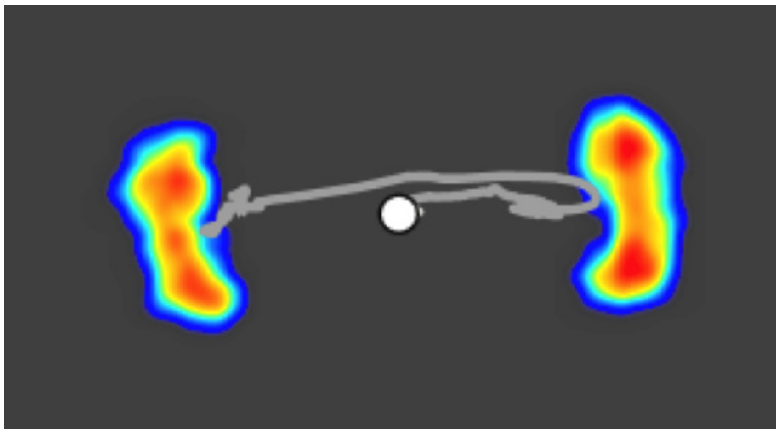
Pressure coloring will reveal tendencies to put pressure on specific parts of the foot during the swing. This is most obvious when there are differences between the heel and forefoot or between the inside and outside of the foot. Tendencies to lift parts of the foot off the ground or not be pushing them into the ground at all (even if they are still touching the ground) are revealed by a lack of pressure coloring.

Since Newton told us that it takes external forces to cause motion, and pressure is a measure of the perpendicular forces between the feet and the ground (external to the body), this pressure data can help us understand why the body moves the way it does to produce the impact conditions we're seeing in our golfers.

FOOTPRINT SHAPE

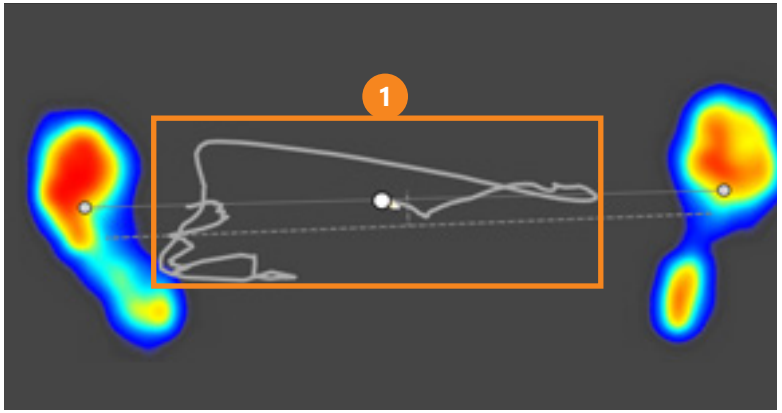


Since pressure is dependent on the area of ground contact, the footprint will be affected by the sole of the shoe that is worn (if no shoes are worn, the footprint will take the actual shape of the part of the foot that is in contact with the ground). For example, a cleated golf shoe will typically produce a footprint with specific points of high pressure where the cleats are located. This is because the force exerted on the ground by the golfer is spread over a small area, namely the cleats that are in contact with the ground. Note that wearing cleated shoes should not affect the pressure distribution between the lead foot and the trail foot.



A flat-soled shoe, on the other hand, will typically show a more even distribution of pressure over the foot. This is because the force exerted on the ground by the golfer is spread over a larger area. In this case, specific points of high pressure will be more dependent on where under the foot the golfer exerts the most force on the ground

COP TRACE

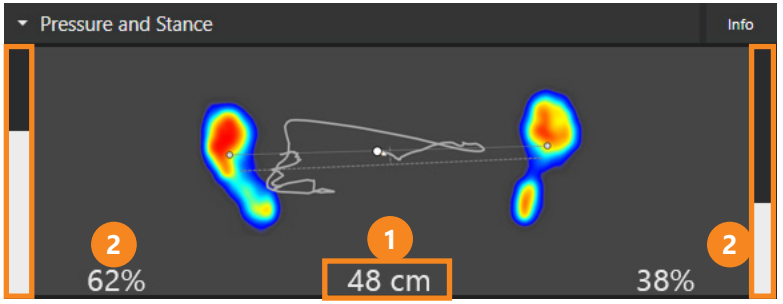


1 The CoP trace can reveal many different swing techniques. Based on our research, one important point to examine in the COP trace is the maximum movement of the COP towards the trail foot in the backswing.

These is extremely variable across different players but is very consistent with good players (they produce the same amount of trail foot pressure with every swing). The amount of pressure transferred into the trail foot will depend on the dominance of their legs. A right-leg dominant right-handed golfer will transfer much more pressure into their trail leg during the backswing as compared with a left-leg dominant right-handed golfer.

Dialing in this pressure shift for each golfer based on their body's capabilities can really help improve the launch characteristics of their swing.

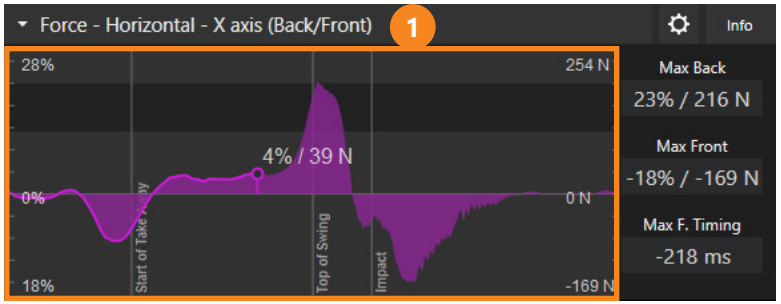
STANCE WIDTH & PRESSURE DISTRIBUTION



1 A wider stance will allow for greater linear/lateral movement of the CoP. Since the CoP is determined by the pressure at the feet, the absolute size of the CoP pattern is relative to the stance width. Note that a wider stance doesn't necessarily change the general shape of the CoP trace. While a narrow stance can make the golfer more rotational and less linear.

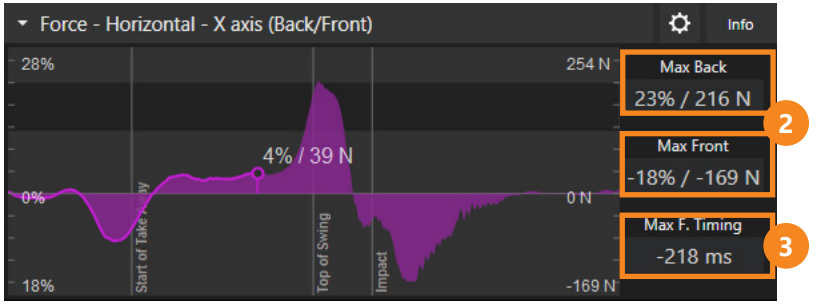
2 Similar to the CoP trace, the pressure distribution bars indicate if the golfer is predominantly exerting force on the ground at the lead foot or at the trail foot at different points during the swing. The changes in value of the pressure distribution bars over time represent pressure shift. With the exception of certain transition points in the swing, the pressure distribution is usually a good indicator of where the golfer's weight is placed.

HORIZONTAL FORCE (BACK/FRONT)



1 The Horizontal force (Front/Back) graph shows the amount of force the golfer is exerting on the ground in the right or left direction throughout the swing, relative to body weight. Note that the graph shows the total force resulting from both feet, and thus represents the resulting force acting on the golfer to produce linear or translational motions towards or away from the target during the swing. Values above the baseline (0% body weight) represents a total reaction force that is pushing the golfer towards the target, while values below the baseline represent total force that is pushing the golfer away from the target. Based on the bookmarks, vertical lines indicate the backswing and downswing phases, as well as the point of impact. The magnitude of force at a given point is indicated by the number next to the timeline marker. The dark horizontal area indicates the tour average +/- one standard deviation (male, driver).

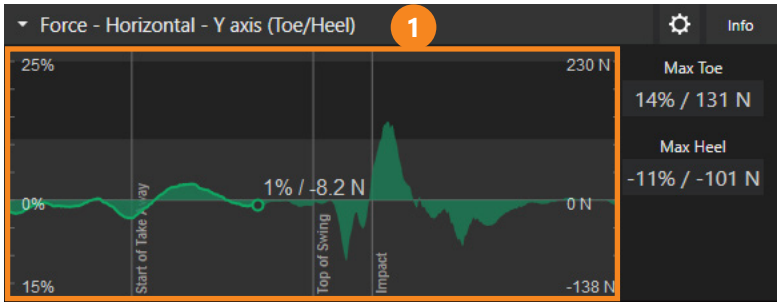
The shape of this graph generally has a positive peak near the top of the backswing (golfer producing linear momentum towards the target) and a negative peak near impact (golfer breaking/stopping the linear momentum to they do not sway too far past the ball).



2 The Max Right and Max Left values on the right side of the box show the magnitudes of maximum horizontal force toward the target and away from the target achieved during the swing, relative to body weight.

3 The Max R. Timing value on the right side of the box shows the timing of maximum horizontal force toward the target relative to impact, measured in milliseconds. A negative number indicates that maximum horizontal force toward the right occurs prior to impact, while a positive number indicates that it occurs after impact. Our research has shown that this should be the first force that peaks during the downswing in a properly applied kinetic sequence.

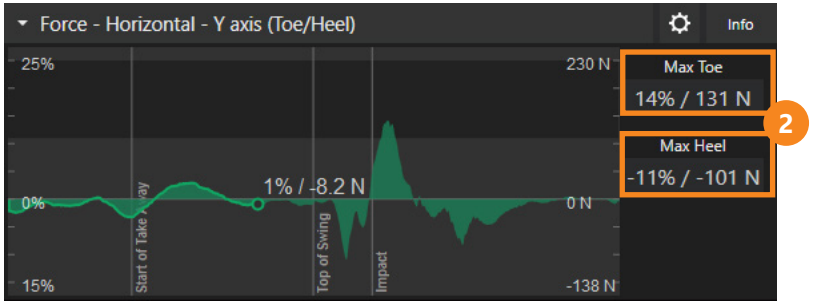
HORIZONTAL FORCE (TOE/HEEL)



1 The horizontal force (toe/heel) graph shows the amount of force the golfer is exerting on the ground in the toe or heel direction throughout the swing, relative to body weight. Note that the graph shows the total force resulting from both feet, and thus represents the resultant force that would be creating motions of the golfer towards or away from the ball. Values above the baseline (0% body weight) represent total reaction force pushing the golfer toward heels (away from the ball), while values below the baseline represent total reaction force pushing the golfer toward the toes (towards the ball).

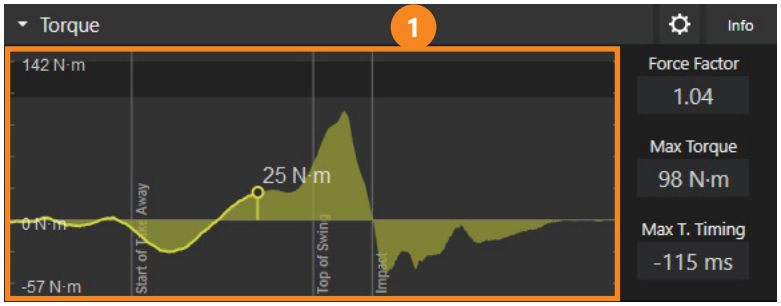
Based on the bookmarks, vertical lines indicate the backswing and downswing phases, as well as the point of impact. The magnitude of force at a given point is indicated by the number next to the timeline marker. The dark horizontal area indicates the tour average +/- one standard deviation (male, driver).

Since the feet push in opposite directions and use these forces to create torque in the swing, many times these forces will cancel each other out.



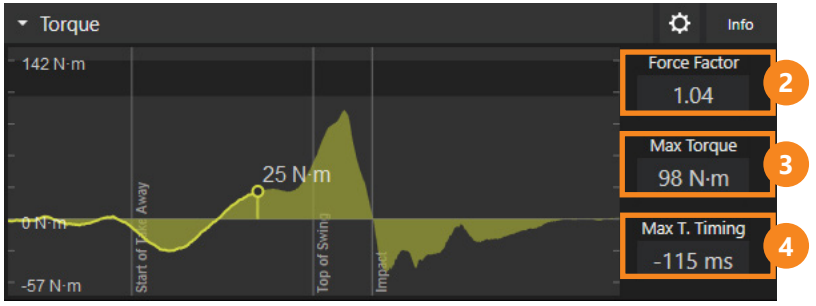
2 The Max Toe and Max Heel values on the right side of the box show the magnitudes of maximum horizontal force toward the toes and heels achieved during the swing, relative to body weight.

TORQUE (ROTATIONAL FORCE)



1 The torque graph on the left side of the box shows the rotational force the golfer is exerting on the ground about the vertical axis throughout the swing. Values above the baseline represent clockwise rotation (downswing rotations), while values below the baseline represent counter-clockwise rotation (backswing rotations). Downswing rotations are produced by the golfer producing action forces with their lead foot pushing towards the ball and the trail foot pushing away from the ball, this creates reaction forces pushing the lead hip/pelvis away from the ball and the trail hip/pelvis towards the ball. Backswing rotations are produced by the golfer producing action forces with their lead foot pushing away from the ball and the trail foot pushing towards the ball, this creates reaction forces pushing the lead hip/pelvis towards the ball and the trail hip/pelvis away from the ball.

Note that the graph shows the total torque resulting from both feet. Based on the bookmarks, vertical lines indicate the backswing and downswing phases, as well as the point of impact. The magnitude of torque generated at a given point is indicated by the number next to the timeline marker. The dark horizontal area indicates the tour average +/- one standard deviation (male, driver).

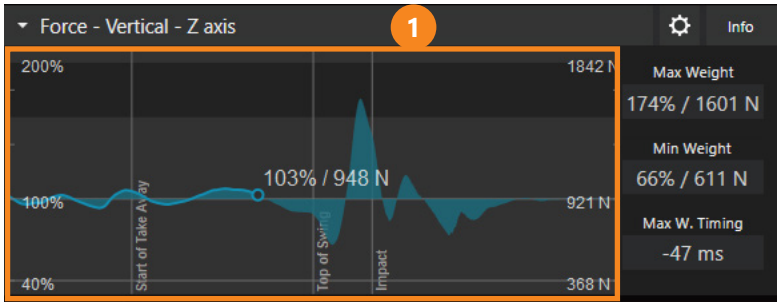


2 The Force Factor value on the right side of the box represents a relative measure of the maximum torque, to allow for even comparisons between golfers. To obtain the Force Factor the maximum torque is normalized by body mass, meaning it is divided by the golfer's body mass (in kilograms).

3 The Force Factor value on the right side of the box represents a relative measure of the maximum torque, to allow for even comparisons between golfers. To obtain the Force Factor the maximum torque is normalized by body mass, meaning it is divided by the golfer's body mass (in kilograms).

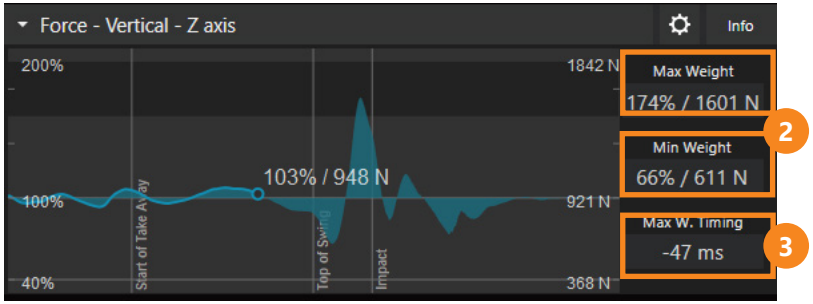
4 The Max T. Timing value on the right side of the box shows the timing of maximum torque relative to impact, measured in milliseconds. A negative number indicates that maximum torque occurs prior to impact, while a positive number indicates that it occurs after impact. Our research has shown that this torque should be second force to peak during the downswing in order to produce an efficient kinetic sequence. It should peak somewhere near lead arm parallel to the ground in the downswing (after the right/left force and before the vertical force).

VERTICAL FORCE



1 The vertical force graph shows the amount of force the golfer is exerting vertically downward on the ground throughout the swing, relative to body weight. Values above the baseline (100% body weight) represent vertical force greater than body weight, while values below the baseline represent vertical force lower than body weight. Upward vertical accelerations (by accelerating the body mass upwards or decelerating downward accelerations) will cause the graph to go above the body weight (100%) line, while downward accelerations (by accelerating the body downwards or decelerating upward accelerations) will cause the graph to go below the body weight (100%) line.

Based on the bookmarks, vertical lines indicate the backswing and downswing phases, as well as the point of impact. The magnitude of force at a given point is indicated by the number next to the timeline marker. The dark horizontal area indicates the tour average +/- one standard deviation (male, driver).



2 The Max Weight and Min Weight values on the right side of the box show the magnitude of maximum and minimum vertical force achieved during the swing, relative to body weight.

3 The Max W. Timing value on the right side of the box shows the timing of maximum vertical force relative to impact, measured in milliseconds. A negative number indicates that maximum vertical force occurs prior to impact, while a positive number indicates that it occurs after impact. Our research has shown that the maximum vertical force should be the last force to peak during the downswing (after the right/left force and the torque). The vertical peak should occur somewhere between lead arm parallel and club parallel in the downswing. If this force occurs too early or too late, it will not be as useful in speeding up the club and creating optimal impact conditions.

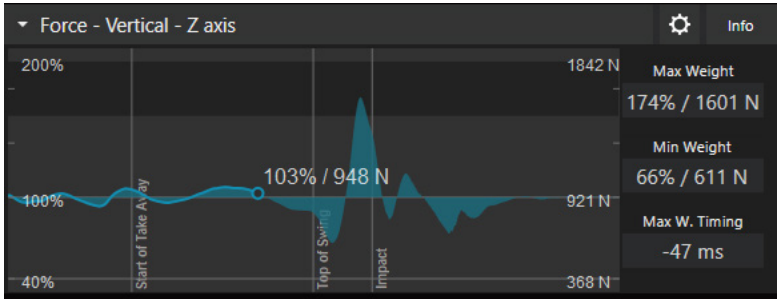
WHAT SHOULD YOU LOOK FOR?

The force plate component of the Swing Catalyst 3D Motion Plate provides a basis for analyzing the force production in the golf swing, showing data that can reveal issues related to magnitude or timing of force that may affect the swing. Analyzing the golfer's primary power source during the swing can help us understand which force(s) the golfer is primarily using to speed up the club and create the desired impact conditions.

KINETIC SEQUENCE

Virtually all good golf swings follow the same sequence of peak forces during the downswing. The kinetic sequence for peak forces in the downswing is as follows: (1) horizontal back/front force peaks first, (2) torque peaks second, (3) vertical force peaks third. The timing of these forces is really important to producing an effective golf shot and this sequence is seen in virtually all good golf swings.

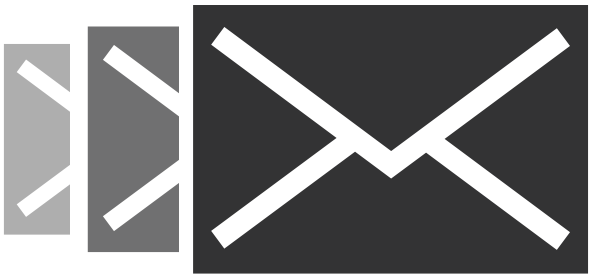
HORIZONTAL FORCE (TOE/HEEL) GRAPH SHAPE



The shape of the horizontal force (toe/heel) graph shows how the golfer's dominant direction of force changes throughout the swing. An increase in the direction of the toe indicates either backward movement or resisting forward movement, while an increase in the direction of the heel indicates either forward movement or resisting backward movement. Note that the direction of force does not necessarily reflect the distribution of pressure within the feet (for example, it is possible to push in the toe direction using the heel of the foot).

For most PGA Tour players the typical direction of total force is slightly toward the heels at the beginning of the downswing before gradually changing toward the toes approaching impact, with the maximum value in the toe direction occurring at impact or slightly after. Note that in the follow-through the golfer has typically turned and is no longer aligned with the original toe/heel directions.

SUPPORT



If you have any questions, please contact support:

support@swingcatalyst.com

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