BACK TO BASICS

How To Gain 26 Yards (Right Now)

EQUIPMENT

The launch monitor can be your distance machine provided you know how to use it

By Art Chou
Illustrations by Colin Hayes

David Keyworth, tour engineer at TaylorMade, sees a lot of tour players come through the magical place that insiders at the company call "The Kingdom." The high-tech test center is home to a lot of computers, high-speed cameras and the latest golf equipment. But the kingdom at TaylorMade, just like similar facilities at Callaway, Titleist, Ping and every other big-time golf clubmaker, is magic because it does one thing: It gives golfers more distance almost instantly. Says Keyworth: "Tour players gain about 12 yards after a driver-fitting session. But an average golfer can gain 20 or more yards from a better-fitting driver."

The technology of the launch monitor isn't just available to equipment companies. It's right down the

LOGO: ANDERS WENNGREN

street, as less-expensive launch monitors become standard equipment at almost every golf shop. Can average golfers expect the same sort of magic in lower-end machines? The answer for the most part is, yes.

Customization via the launch monitor leads to power. "This simple means of handing more distance to millions of golfers is right in front of them," says club designer Tom Wishon of Wishon Golf Technology.

Launch monitors reveal the ideal combination of launch angle and backspin for every ball speed. For instance, although "high launch, low spin" is the mantra on tour, average players who create less ball speed may need more spin to keep the ball airborne. That's why a launch-monitor fitting can be crucial. Clubhead-speed and ball-speed measurements help a clubfitter determine the right shaft flex for your swing. Launch-angle data helps pinpoint the right amount of driver loft. Spin measurements can be used to choose the best driver head size and ball type for your game. A fitting session costs as little as $50 or as much as $300. Sometimes fitters will waive the cost if you end up purchasing new clubs.

On the following pages, you'll get an education in how three kinds of launch monitors work and how important it is to know your fitter's qualifications. The cool thing is that if you can understand your launch conditions and how to improve them, you will be a lot closer to getting that magical 24½-yard increase in average driving distance that PGA Tour players have achieved in the last decade. Of course, you wouldn't have to wait 10 years for that kind of improvement. You could get it in an hour.

The numbers don't lie. Your potential improvement is quantifiable with a launch monitor. And it can be dramatic. With small tweaks in ball speed, launch angle and spin, an average golfer could find 26 yards.

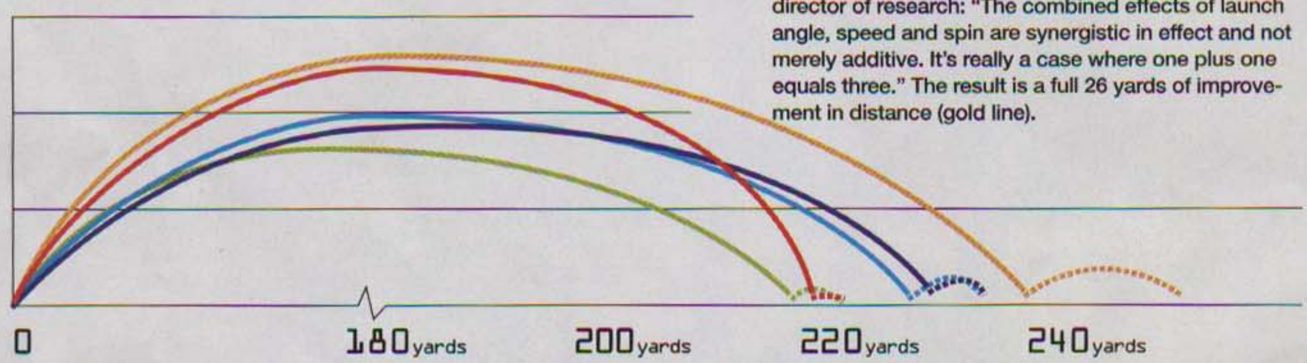
Using a launch-simulation program provided to Golf Digest by Wilson Golf, here's what the numbers show. If you start with 140 miles per hour in ball speed—about a 95-mph swing speed—you can go from 220 yards (green line) to 246 yards (gold line) by changing three launch conditions.

Increase the launch angle from 9 degrees to 12 degrees (by moving the ball forward in your stance, using a higher-lofted driver, changing the angle of attack), and you increase carry distance by four yards (red line), although total distance remains the same.

Decrease spin rate alone from 4,400 revolutions per minute to 3,000 rpm (by fixing your slice, changing balls, changing shafts, changing drivers), and you increase distance by 10 yards (light blue line).

Increase ball speed alone by five mph, from 140 to 145 (that's harder to do, but a way to do it is by using a driver made after 2002, getting a longer shaft or embarking on an exercise and stretching program), and you add 10 yards in distance (purple line).

Combine all three and the result is even greater than the sum of its parts. Says Bob Thurman, Wilson Golf's director of research: "The combined effects of launch angle, speed and spin are synergistic in effect and not merely additive. It's really a case where one plus one equals three." The result is a full 26 yards of improvement in distance (gold line).



140 mph	140 mph	140 mph	145 mph	145mph
4,400 rpm	4,400 rpm	3,000 rpm	4,400 rpm	3,000 rpm
9 degrees	12 degrees	9 degrees	9 degrees	12 degrees
220 yards	220 yards	230 yards	230 yards	246 yards

What these things do

Launch monitors calculate the launch conditions of the ball immediately after impact. **Ball velocity**, **launch angle** and **backspin** are the "**big three**" pieces of data measured, but monitors also measure things such as **sidespin** (hooking or slicing) and **directional angle** (push or pull). A computer program takes the data and estimates the shot shape, trajectory height, accuracy and distance. Because these systems only measure the first few feet of ball flight, launch monitors are suited for indoor hitting nets. Most monitors use **high-speed cameras**, **Doppler radar** or **laser** to measure launch conditions.

First person

Zen & the Art of the Launch Monitor Fitting

So how does a launch-monitor fitting work? Art Chou, a Golf Digest Technical Advisor, packed a trunk full of drivers and visited a variety of clubfitters to find out.

TERMS YOU NEED TO KNOW Launch angle: The angle in degrees at which the ball leaves the clubface, measured relative to the ground.

LASER

WHAT IT IS:
Laser-based monitor

HOW IT WORKS:
Laser-based monitors use a series of emitters to create a sheet of laser beams at a specific distance and angle from the tee. Typically these systems involve several fields of lasers. One field focuses on the area behind the ball and measures clubhead information just before impact.

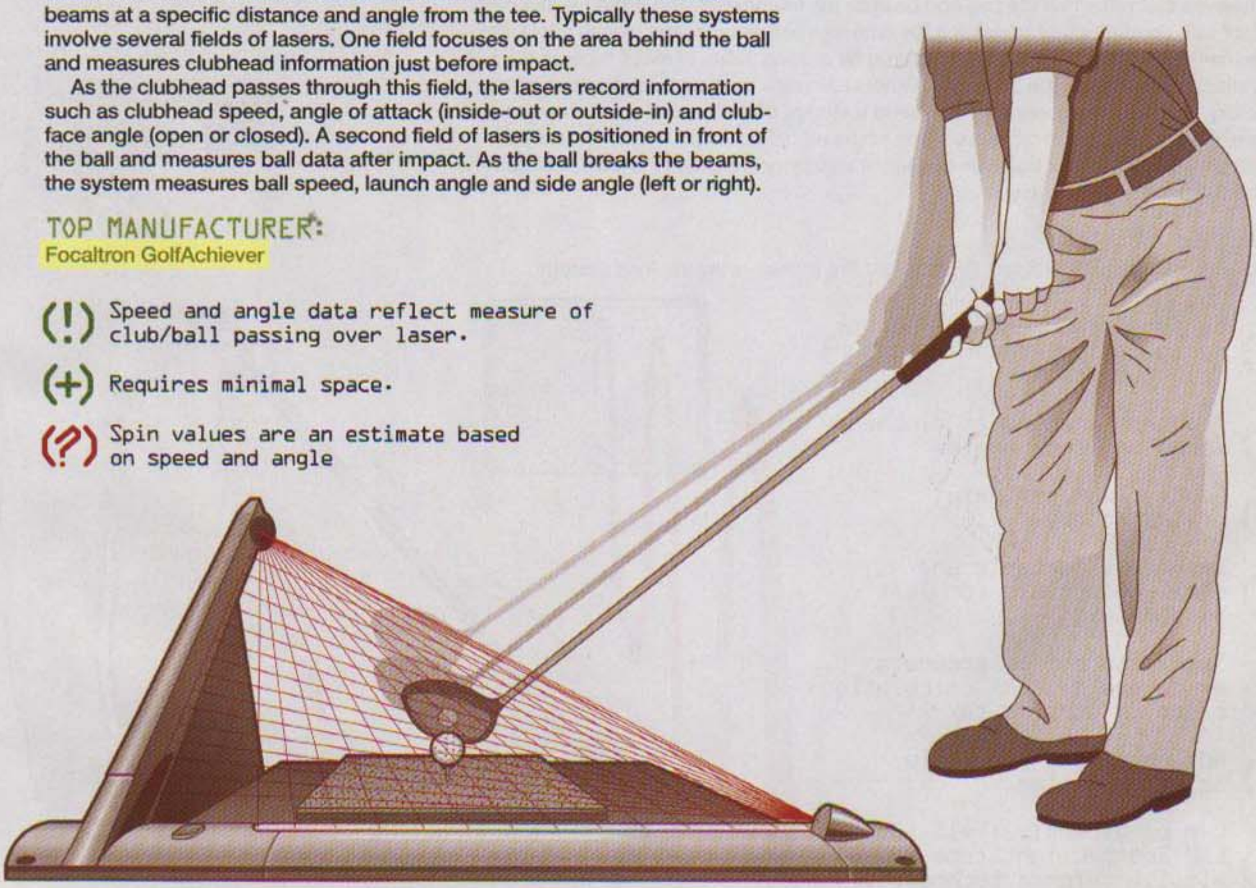
As the clubhead passes through this field, the lasers record information such as clubhead speed, angle of attack (inside-out or outside-in) and clubface angle (open or closed). A second field of lasers is positioned in front of the ball and measures ball data after impact. As the ball breaks the beams, the system measures ball speed, launch angle and side angle (left or right).

TOP MANUFACTURER:
Focaltron GolfAchiever

(!) Speed and angle data reflect measure of club/ball passing over laser.

(+) Requires minimal space.

(?) Spin values are an estimate based on speed and angle



A launch-monitor session can be a life-changing experience, so you can imagine my state of being after five such fittings. But I was pumped. Who wouldn't relish the chance to find the right driver? To find out the differences between launch monitors, I went armed with three drivers that differed only slightly, but I was betting a launch monitor would be the quickest, surest way to tell them apart. I was right. Sort of.

My first stop was Los Altos Golf Company in Los Altos, Calif., and veteran fitter Blair Philp. He uses the camera-based AccuSport Vector launch monitor (*next page*), which is set up in front of a hitting net. Blair says that my launch numbers for all three clubs are about the same. Most significant are my relatively low spin numbers, which he says might be attributed to the small amount of wrist cock employed in what some have referred to as my unorthodox swing. He favors the two smaller-headed 9.5-degree drivers, but he also says I have already done a good job of selecting a driver. Of course, if a launch monitor can't help me decide, then it's not much of an improvement over my own intuition.

My next stop is Bay Golf Club Fitting & Repair Inc. in San Bruno, Calif., where Matt Coe is in his 18th year of fitting golfers. Bay Golf's launch monitor is the laser-based GolfAchiever by Focaltron (*above*). The numbers we get, especially those for launch angle and speed, are similar to those with the Vector, although the spin rates are about 10 to 15 percent higher. It's hard to say what this means, but my fitter wants me to use a different driver. His recommendation is a driver with a 400-cubic-centimeter head, more loft (12 degrees) and a moderately stiff shaft. I never would have considered a driver with 12 degrees of loft, but the launch monitor proves me wrong.

Next, I try the camera-based Swing Dynamics Ball Flight Monitor at Golf Laboratories Inc., a top independent golf testing company, at its outdoor test site in San Diego. Right away I feel more comfortable hitting

Ball speed: The speed of the ball in miles per hour (mph) as it leaves the clubface. **Backspin:** The rotational spin of the ball in revolu-

(RADAR)

WHAT IT IS:
Doppler radar-based monitor

HOW IT WORKS:
A small transceiver is placed on the ground behind the ball. The transceiver sends out radio waves that reflect off the ball and back to the transceiver. The wave frequencies are sent to a computer that translates the data into ball velocity and launch angle. On some machines, spin rates can be measured by placing strips of metal tape on the ball that reflect the waves as the ball spins. Others calculate the spin based on the initial trajectory. Because the transmitter can send a stream of radio waves over a short burst of time, the radar monitor traces a section of the actual ball flight. And because the launch angle, ball velocity, ball type and initial trajectory are already known, this data can be used to calculate the spin rate.

TOP MANUFACTURERS:
Zelocity PureLaunch, EDH Sport FlightScope Pro (phase-array tracking system)

(!) Measures thousands of points during swing; cameras measure just two or three.

(+) Accurate reading of clubhead speed and face angle.

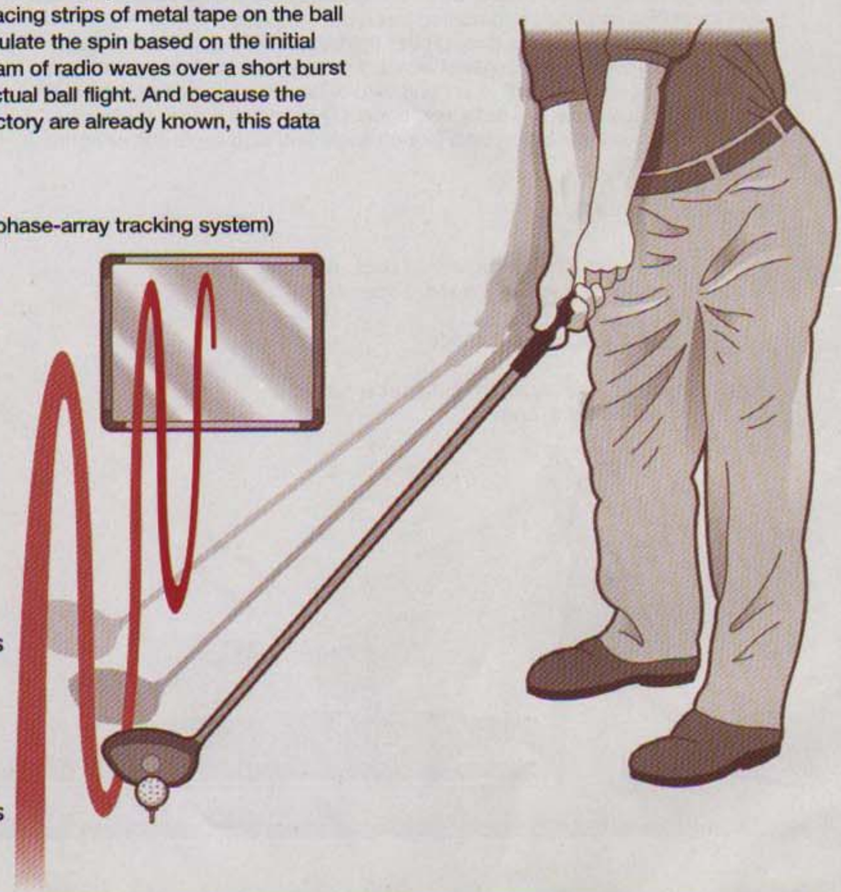
(+) Good, clear estimate of trajectory.

(+) Extremely portable and easily adaptable for left-handed swings.

(–) Spin data not as accurate as camera system; calculations based on other data.

(–) Not as widely available as other systems.

(?) Can be expensive. $15,500 EDH Sport FlightScope Pro uses missile defense technology.



outside instead of into a net. Again, this machine produces numbers that show a similar relationship between the clubs. When I try the highest-lofted of the three (10.5 degrees), I get an ideal set of numbers for my 143-mph ball speed. I won't complain about the 246 yards in distance, either. Tim Tomlinson, director of sales for Swing Dynamics, tells me I would be even longer if I could increase my launch angle and spin rate. He suggests even more loft, teeing it higher or using a high-spin ball. Even so, I've already gained seven yards.

After my Golf Laboratories session, I drive up the road to TaylorMade's test site at its Carlsbad, Calif., headquarters. TaylorMade engineers have developed their own camera-based launch monitor. Curiously, my original 10.5-degree driver now produces inconsistent results. One of TaylorMade's new 10.5-degree models shows better consistency and, more important, a seven-yard gain over my previous best.

My last stop is the practice tee at Olympic Club in San Francisco, where the folks at Zelocity Golf Corp. have set up their radar-based PureLaunch launch monitor. It produces similar ball-speed and launch numbers as the other machines, but it's the middle driver that fares the best this time. Again, there's a recommendation for more loft. I am already experiencing an eight-yard increase between the best and worst drivers; this gain should grow with a few more degrees of loft.

The Upshot

1. **Swing speed and launch angle are most important.** For the most part, swing speed determines shaft flex and launch angle determines loft. Backspin is fine-tuning—important for the stronger player, but only after speed and launch characteristics have been isolated.

tions per minute (rpm) as it leaves the clubface. **Swing speed:** The speed of the clubhead in mph just before ball impact.

CAMERA

WHAT IT IS:
High-speed camera-based monitor

HOW IT WORKS:
The camera is triggered by the sound of impact or by the clubhead passing through a "light gate." Once triggered, the camera records multiple exposures of the ball within the first two feet of its flight and calculates launch angle, velocity and spin data from those images.

TOP MANUFACTURERS:
Swing Dynamics, AccuSport Vector Launch System, Focaltron GolfAchiever Cam

(!) Most major equipment companies use a type of camera-based system.

(+) Only monitor available that takes actual measurements of launch conditions.

(+) More cameras + more exposures = more valid results.

(–) Precise setup and operator experience are key.

(?) Average golfer's inconsistency negates value of accurate spin readings.

2. **Different technologies produce similar results.** The different launch monitors are consistent when it comes to swing/ball speed and launch angle; in every fitting I was told I needed a medium stiff shaft (weak S or strong R) and at least 10.5 degrees of loft. But the machines can vary on spin. Benoit Vincent, TaylorMade's chief technical officer, agrees. "The spin rate accuracy of the average commercial launch monitor is bad," he says. "The velocity and launch angle data are more accurate. When it comes to fitting the average person, shaft and loft are 80-plus percent of the problem."

3. **Don't forget about consistency.** A driver fitting means not only optimizing launch numbers, but determining which club produces consistent numbers for your swing. Good but inconsistent launch results will probably not perform well on the course.

Would I do it again? You bet. The potential to find the right driver is higher than it has ever been, especially if you go into a launch-monitor session with an open mind.

Art Chou, a Golf Digest Technical Advisor since 1996, earned degrees in engineering from Drexel University and the University of Pennsylvania.

For an alternative view of launch monitors, see page 200.

THE DANGERS

1. OPERATOR EXPERIENCE: Most systems are fairly straightforward to operate, but the real challenge lies in evaluating the data. Turning the data into equipment recommendations requires experience not only in operating the launch monitor but in clubfitting technique. Also, any process involving the average golf swing requires part science, part psychology and a lot of patience. As with a good golf professional, experience does matter.

2. INDOORS VS. OUTDOORS: Most monitors work indoors and outdoors; most golf shops primarily use them indoors. Though the machine doesn't care, many golfers will make a more natural swing outdoors where there's the immediate feedback of ball flight. Says Gene Parente of Golf Laboratories: "Hitting balls into a net is like flying a plane IFR [using only instruments]. You can do it, but it's always better to see more than less."

3. SWING ISSUES: Launch-monitor data is only as accurate as the swing that produces the ball launch. The main goal during clubfitting is to reproduce your typical swing as consistently as possible. If your swing is "off," it might be better to reschedule the fitting session than to be fit for an atypical swing. However, most golfers' solid shots tend to produce similar launch conditions regardless of minor swing changes.

HOW TO PREPARE FOR A SESSION

1. Check your ego at the door. Getting fit with a monitor is like stepping onto a scale before beginning a diet. Don't be surprised by your (lack of) distance. It's not the machine's fault.

2. Get to know your shot trajectory. Like a visit to the doctor, the more information you provide (your typical miss, for instance), the better the diagnosis.

3. Try to swing consistently. Only your typical swing will result in a proper fit. That said, using a monitor can help you evaluate how a change in technique is improving your launch conditions.

WHERE TO FIND A LAUNCH MONITOR
For a list of launch monitors in your area, check out the launch-monitor locator at golfdigest.com/launchmonitors. The listing includes phone numbers and addresses.