



CLUBMATE **GOLF** AUSTRALIA
GOLF CLUB COMPONENTS

eTECHREPORT

September 2004 eTECHreport - Welcome!

- **The Smooth 6 & 7 Putters (promo)**

Clubmakers and their golfers are raving about the combination of soft feel and off-center forgiveness, with the custom weighting capability of the new TWGT Smooth Model 6 & 7 putters. [[continues below](#)]

- **How Weight Adjustments Affect Ball Flight**

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- **The Most Sure Fixes for Distance Improvement**

It is possible to make a list of 21 different golf club, head, shaft and grip fitting specifications that define all of the possible performance differences between any two golf clubs. [[continues below](#)]

- **Tips for the Dreaded Pitch Shot (by David March)**

Do you have trouble with short pitch shots from inside 100 yards? [[continues below](#)]

- **TWGT 949G/Ti Driver Moves to the Head of the Graphite + Titanium Class**

I am glad to say we have achieved an "In-Stock" position with our popular new 949G/Ti graphite and titanium driver so our production has caught up with the demand. As a result, now I don't feel "guilty" about pointing out the specific design features of the 949 to show you the performance of this design, and worrying that we would have to backorder your request! [[continues below](#)]

- **Fitting is NOT Just for Better Players!**

There is a misconception among some clubmakers that golfers need to be of a certain skill level to benefit from custom fit golf clubs. While it is easier to "dial in" a golfer with a reasonable level of ball striking ability, in reality, less skilled golfers may very well benefit more from custom fitting. [[continues below](#)]

The Smooth 6 & 7 Putter

Clubmakers and their golfers are raving about the combination of soft feel and off-center forgiveness, with the custom weighting capability of the new TWGT Smooth Model 6 & 7 putters. Available in RH and LH, this putter is true forged from high grade 6061 aluminum which is the secret to its very soft feel with any ball construction type. Hit these putters off-center intentionally and you'll feel the other reason for their great performance – virtually no loss of distance with the putt when you make a slight mistake with your stroke.

Large rear sole weight cavity allows customizing putter headweight from 335g to 405g to fit virtually every golfer. Medallion cover for weight cavity included. 14g lead weight disks to be purchased separately.

Kudos for the Smooth Series putters:

"I make custom putters, and have used many many component putter heads over the years. Brand recognition is a huge selling factor for most golfers, too bad the brand name doesn't put the ball in the hole. Wishon is a name most serious golfers recognize, and lends us builders some of that brand recognition we need in order to sell higher end products.

"The Smooth series, especially the the 6 and 7, have a feel unlike most I've ever used. And they have a look that really works. I work in a small area that requires art as well as function, and these heads are the perfect compliment to that.

"I've heard the term 'point and shoot' a lot over the last several years, but the Smooth 7 is the first putter I've ever used (and I've used all the OEM stuff) that actually fits that description."

– Ken Davies, U.S. Embassy, Rabat, Morocco

SPECIAL This month, buy any version of the Smooth 6 or 7 putter heads and get the matching steel DB shaft and headcover included for free!*

Shown here (clockwise from the top left): Tungsten weights and medallion cover, Smooth mallet headcover, Smooth 6 shown fitted with a Double Bend belly shaft and New-wrap 2-pc putter grip and standard DB shaft configuration, Smooth 7 and Smooth 6 heads.



*Grip, tax and shipping not included. Offer good until October 31, 2004

Subject to change and availability.

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How Weight Adjustments Affect Ball Flight

It's not a secret that one of the trends in clubhead design that has gained momentum this year, and will undoubtedly increase in consumer demand through 2005, are drivers created to allow weight movement around the head as a means of correcting golfer ball flight problems. What this means is that clubmakers will be asked questions by golfers about how such weighting modifications actually change the ball's flight. Because TWGT knows it's important for clubmakers to be there with the right answers, the following information will help you explain to your customers how moving weight around a clubhead brings about this change.

Draw Bias Weighting

The term "bias" has been used in conjunction with weight distribution to connote the ability to move weight around a clubhead to create more of a tendency, or a bias, to a specific direction of ball flight. Hence "draw bias" weighting is when more mass is placed on the heel side of the clubhead to reduce a slice/fade, and in turn enhance the golfer's ability to draw the ball more than with a clubhead designed with "neutral weighting."

Putting more mass in the heel side of the clubhead reduces the tendency to fade the ball in two ways:

1. By reducing the Moment of Inertia (MOI) of the head about the shaft axis or hosel. There are two important MOI's in the clubhead. First, the MOI about the axis of the Center of Gravity (CG) of the head, and second, the MOI about the axis of the hosel bore, i.e. the shaft centerline. MOI about the CG of the head has to do with allowing the head to be "more forgiving" from an off-center hit. MOI about the shaft has to do with the golfer's ability to rotate the entire head back to square during the downswing, before impact with the ball. Thus by adding more weight to the heel area of the clubhead, the MOI of the head is reduced, which makes it easier for the golfer to rotate the head from open to square or possibly even more closed, before the clubhead makes impact with the ball. For a person who slices the ball, adding weight to the heel allows them to deliver the club face less open and thus help reduce the amount of slice or fade on the ball. (see fig. 1)

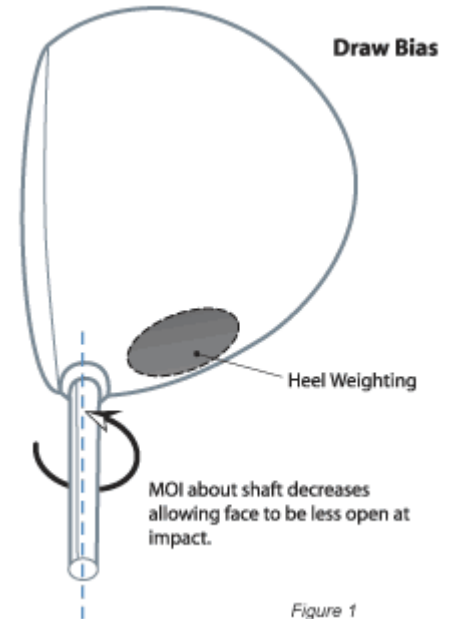


Figure 1

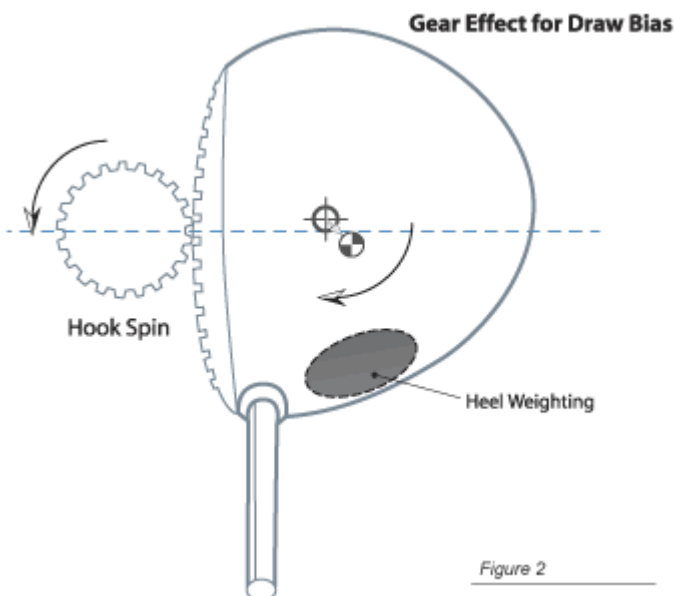


Figure 2

2. By changing the "gear effect" of the head in response to impact with the ball. As you know, the "gear effect" describes the way the ball is able to pick up more "hooking" sidespin when impact occurs toward the toe side of the CG position of the head. If the golfer makes contact on the toe side of the CG position in the head, the head will respond by immediately beginning to rotate clockwise around its CG (clockwise for a RH head, and counter clockwise for a LH head, but the effect is the same). In this split second of head rotation while the ball is on the face, the head rotation will cause the ball to slide and roll toward the hosel.

That movement of the ball across the face causes the ball to pick up more of a tilting of the axis of backspin rotation in a hooking direction. Thus by moving greater mass toward the heel of the head, the CG is usually moved in that direction as well which causes the golfer to be able to hit the ball in the center of the face and still receive this “gear effect” of slightly more hooking sidespin to reduce their amount of fade or slice. (see fig. 2)

Fade Bias Weighting

This is the opposite of draw bias weighting in that the weight is placed more toward the toe side of the clubhead. Thus, the explanation for how this encourages less tendency to draw the ball and more chance to enhance a fade action of the ball flight is exactly opposite to the explanations for how Draw Bias weighting works. The additional weight out toward the toe end of the clubhead increases the MOI of the clubhead about the axis of the shaft. This in turn causes the face to be delivered to impact a little more open, or less closed to thus create the change in ball flight for less draw or more fade movement of the ball. (see fig. 3) In addition, the “gear effect” of the “fade biased” clubhead is reversed from that of the draw bias weighting position so that a center face impact will result in more tendency for the head to rotate counter-clockwise (counter-clockwise for a RH head, clockwise for a LH head, but again, the results are the same to allow for more tendency toward a fade sidespin). (see fig. 4)

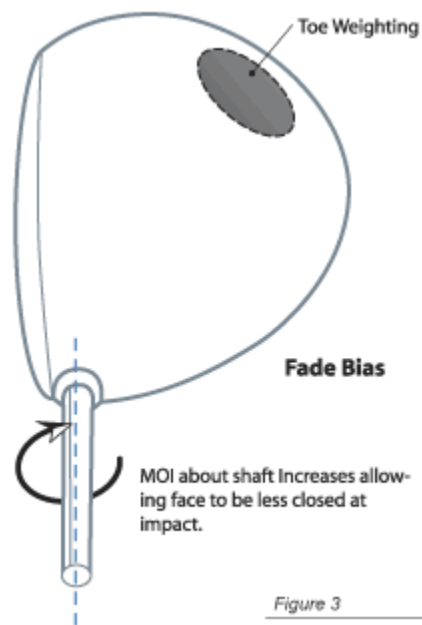


Figure 3

High Launch Weighting

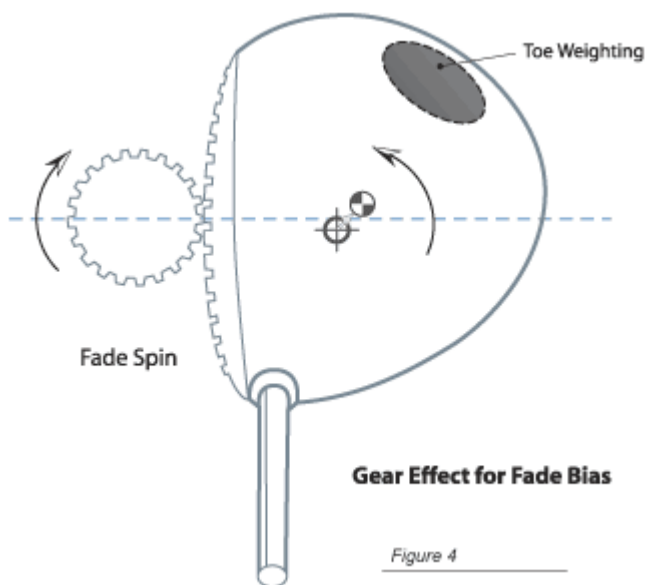


Figure 4

With weight moved toward the rear of the clubhead, the center of gravity will be moved farther back in the head away from the shaft centerline. This more rear-located CG position will cause the shaft to flex forward more, and from that, increase the actual loft on the clubhead at the moment of impact with the ball. (see fig. 5) Thus with the actual loft on the head at impact increased by the forward bending of the shaft, the ball takes off on a higher launch angle and achieves a higher trajectory in flight. The reason the more rear-located CG position causes the shaft to flex forward more before impact is because under the force of the wrist-cock release, the CG tries to get in direct line

with the center of the shaft at the grip end of the club. Using the weight of the head, this action of physics causes the head to move more forward and thus flex the shaft forward. Thus because the higher flight results from the action of the clubhead’s CG on the flex profile of the shaft, rear weighting in a head can and will be affected by the actual overall flex of the shaft. If the golfer uses the same shaft in the rear-weighted head

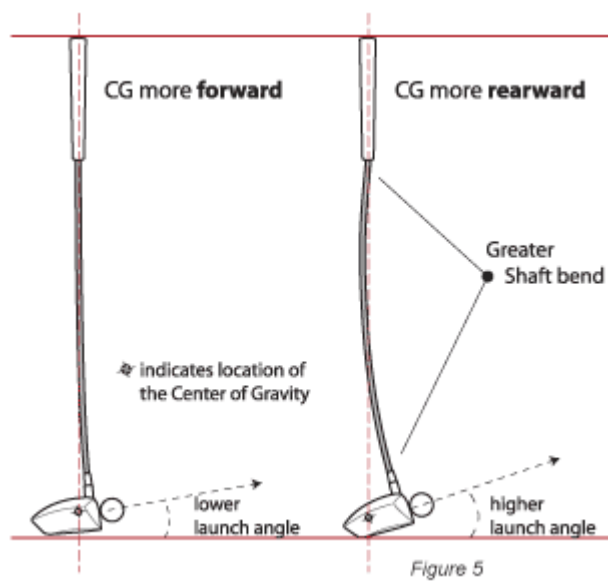
as was used in a normal-weighted head, if the two heads have the same loft, the one with the more rear-located CG will increase the launch angle by approximately 1.2° for each 5mm more the CG has been moved back from the shaft.

Low Launch Weighting

Again, the explanation of how moving more weight toward the face and closer to the shaft to lower the flight of the shot is the opposite of the explanation for how rear weighting increases shot trajectory. By moving weight more toward the face, the CG of the head moves closer to the shaft. (see fig. 5) This in turn reduces the amount of forward bending of the shaft prior to impact with the ball, which means the actual loft of the clubhead is going to be less at impact than when the clubhead is much more rear-weighted.

And likewise, if the golfer uses the same shaft in the front-weighted head as was used in a normal-weighted head, if the two heads have the same loft, the one with the more front-located CG will decrease the launch angle by approximately 1.2° for each 5mm the CG has been moved closer to the shaft.

One of the most important things for clubmakers to understand and explain to their golfers is the fact that any driver head weight location change has to be compared to the weight distribution, loft and shaft of the golfer's existing driver head before any estimation for how much the weight movement will affect the golfer's ball flight can be predicted. In addition, all design specifications that affect shot direction and height also have to be considered on the old versus the new driver head.



Just simply giving a golfer a driver head in which the weight can be moved around the head will not necessarily guarantee each golfer will actually see a change in their ball flight direction or height. For example, let's say the golfer's current 11° loft driver has a more rear-located CG to begin with. If the golfer comes in and wants a new driver with movable weight to the rear of the head to further increase his trajectory, if that new driver had a loft of 10° and is much smaller in face-to-back size such that the movement of the weight in the new head can't get the CG back any farther than where it was in the golfer's current head, no increase in trajectory would occur. And the golfer might think that he has been "hoodwinked."

The same scenario could exist with regard to face angle on the golfer's current driver head compared to the face angle on the new weight adjustment head, for situations concerning the draw or fade bias design of the weight changeable head design. Let's say the golfer's current head has a face angle of 2° closed, but the face angle design of the weight adjustment head is 0 square. In that case, moving a moderate amount of weight toward the heel and expecting more fade reduction than what the golfer gets on his current head with 2° more closed face angle is just not going to happen.

So please, as the industry moves in the direction of altering woodhead weight distribution for game improvement head design, do keep in mind that you have to look at the entire matter of design specifications versus ball flight change for the golfer's former head design before you recommend one of the new weight movement models.

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The Most Sure Fixes for Distance Improvement

It is possible to make a list of 21 different golf club, head, shaft and grip fitting specifications that define all of the possible performance differences between any two golf clubs. A major theme of my 1997 book, The Practical Fitting Program, was to identify these fitting specifications and then to place a priority on which would have a significant effect on real ball flight changes as well as which would not. The concept I was stressing in prioritizing the fitting specifications in this manner was to inform clubmakers which fitting factors to focus upon when trying to build new custom clubs that would truly make a difference for each golfer.

The great thing about continuing to work in club design and fitting research is that I have the opportunity to learn more all the time about what makes golf clubs work, and well, not work too! Over the 7 years since I wrote The Practical Fitting Program, much has changed with respect to the priorities of what fitting changes can make the most dramatic change in ball flight. In addition we have determined more about the level of change that we can expect from certain fitting specification recommendations. While it is important for clubmakers not to ignore all of the fitting specifications which do not have as visible of an influence on game improvement, I wanted to offer the following fitting information as a means for you to be able to enable your customers to get the most “bang for their buck” when they come to see you for custom clubs.

As I did in the book, I will identify the most important fitting specification areas of game improvement because this is predominantly how you have to think about fitting changes for your golfers. The fitting recommendations then are listed in order of importance for each game improvement desired.

To Increase Distance for the Driver...

1. LOFT

While I first began to recognize in 1996 the beginning signs of advising more loft for slower swing speed golfers as a means to increasing distance, at that time I had only caught sight of the part of this iceberg that lay above the surface. Since 2002, we have been able to dig a lot deeper into this area of real distance gain to more fully understand how to determine what loft for which golfer will result in how much distance gain.

- It is critical to be able to determine the golfer's angle of attack from their swing before being able to know what driver loft can maximize distance for the golfer. The angle of attack from the swing plus the loft of the driver head plus the golfer's swing speed determines their launch angle for the shot. The angle of attack describes whether the driver arrives at the ball on a downward path, a path level to the ground, or whether the club is hitting the ball on the upswing. (See table 1 below for examples of golfer swing speed compared to different angles of attack in the swing to note how different the optimum loft angle to maximize distance can be. Hence you must have an idea of the golfer's angle of attack to be able to know what loft will maximize distance for each different golfer.)
 - [Click here for more information on measuring the Angle of Attack](#)

The Effect of Swing Angle of Attack on Optimum Driver Loft for Maximum Carry Distance (Table 1)

Driver Swing Speed	Angle of Attack	Best Driver Loft	Carry Distance
Miles per hour	Degrees	Degrees	Yards
55 mph	downward -4°	26	96
	level 0°	21	101
	upward +4°	19	107
65 mph	downward -4°	23	131
	level 0°	20	137
	upward +4°	18	142
75 mph	downward -4°	21	165
	level 0°	17	169
	upward +4°	15	173
85 mph	downward -4°	18	194
	level 0°	15	198
	upward +4°	13	201
95 mph	downward -4°	16	220
	level 0°	13	222
	upward +4°	10	225
105 mph	downward -4°	13	242
	level 0°	11	245
	upward +4°	9	247
115 mph	downward -4°	11	263
	level 0°	10	266
	upward +4°	7	267

2. LENGTH

The length of the club is critical to the golfer's ability to hit the ball on-center the highest percentage of the time. Any fitting recommendations aimed at increasing distance for the golfer have to follow a pre-requisite of hitting the ball on center. Thus any change in shaft length intended to increase swing speed has no chance of successfully increasing distance unless the length is matched to the golfer's ability to swing the club under complete control.

With the vast majority of golfers using 45" drivers and correspondingly longer fairway wood lengths as well, the potential for switching golfers to lengths that are much more compatible with their athletic ability is great.

3. SHAFT WEIGHT

The weight of the shaft affects the total weight of the golf club more than any other component. The effect of a lighter total weight on the potential for greater swing speed has been known for some time among clubmakers. This factor of fitting for more distance has not changed in its importance – it is a fact that significantly lighter total weight clubs can be swung faster. However, two very important points have to be noted by clubmakers when trying to help golfers gain more distance.

- Many golfers already use very light graphite shafts in their driver and often, fairway woods as well. Thus, unless the clubmaker were to find a suitable flex shaft for the golfer that weighs at least 20-25 grams less than their current shaft weight, no more distance potential from shaft weight could be offered to the golfer. This is the main reason that shaft weight sits in the third position for priority in increasing distance for the golfer.

At the same time, there are a lot of golfers who still play steel shafts in the fairway woods and particularly in the irons. In these two areas the chance to shed a significant amount of total weight by switching the golfer from steel to light graphite, gaining distance in the process, is virtually untapped in fitting. However, this chance for more distance may likely be hampered by the increased cost of switching from steel to graphite in multiple clubs.

- Determining the best swingweight or MOI of the club for the golfer is absolutely critical for allowing the chosen shaft weight to deliver more distance. This is because the wrong swing balance of the golf club will cause the golfer to hit the ball off-center a higher percentage of the time, which means a loss of distance. Thus every effort has to be made when choosing a different shaft weight to nail down the right swingweight/MOI for the club for each individual golfer.

4. MOMENT OF INERTIA MATCHING OF CLUBS

In 1997, no one was working to create a method of truly MOI matching clubs to the strength, tempo, rhythm and athletic ability of the golfer. Thus all recommendations made to golfers for establishing the right swing balance of the club were in the area of swingweight. Now that MOI matching of clubs is a reality, early feedback is showing that if the right MOI is found for the golfer, an increase in distance can result both by allowing the golfer to hit the ball more on-center, as well as to squeeze out an increase in swing speed from the MOI being far better matched to the golfer's swing than a suitable swingweight.

Visit [Matching Golf Clubs by Moment of Inertia](#) for more info.

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Tips for the Dreaded Pitch Shot

By David March

Do you have trouble with short pitch shots from inside 100 yards?



1. Look at ball position. Many times players struggle because the ball is not played in the proper position in the stance. If the ball is played too far forward then the club will not contact the ball consistently. Sometimes hitting behind the ball, sometimes hitting the middle of the ball and on that rare occasion, exactly where you want it to go. So for more consistency the ball should be played in the middle of the stance so that the shorter club will catch the ball as the club is bottoming out in the swing.
2. If you are having problems with distance control, take a look at how you are trying to control it. Most players try to control distance by how hard they hit the ball vs. how long of a swing they take and what lofted club they are using.

First let's take a look at the swing. The best way to control the length of a shot is by the length of the swing. Imagine that you're swinging in a clock and that however far you swing going back, you'll mirror going through. So if you swing your hands back to the 9 o'clock position then you will want to follow through with the hands to the 3 o'clock position.



That would be for a mid-length pitch shot. To hit a shorter length pitch just shorten the backswing, and for a longer pitch, lengthen it.

A good mental picture for making crisp contact comes from Victor East who had his students hit balls from a few yards behind a low-hanging tree branch. He instructed them to try to hit the ball under the branch, which prevented the students from trying to scoop the ball into the air, and allowed the club's loft to easily pop the ball over the target.

Next, you can also control distance and height by changing which club you use:

1. If you want a lower flight that will run out, use a club like a 6- or 7-iron, and in some cases, like this year's British Open, a hybrid can be used.
2. If you want a higher and softer shot that will stop quickly use a 56° or 60° wedge. But again on these more lofted clubs remember to let the loft of the club do the work and try not to help the ball into the air.

Hopefully, keeping these pointers in mind will help you become more consistent with those yardages that are less than a full swing away from the hole.

David March is a member of the TWGT Sales and Technical Staff and a former member of the PGA of America. An accomplished teacher of the swing with years of experience, David was a member of the teaching staff of the Harvey Penick Golf Academy in Austin, Texas.

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TWGT 949G/Ti Driver Moves to the Head of the Graphite + Titanium Class

I am glad to say we have achieved an "In-Stock" position with our popular new [949G/Ti graphite and titanium driver](#) so our production has caught up with the demand. As a result, now I don't feel "guilty" about pointing out the specific design features of the 949 to show you the performance of this design, and worrying that we would have to backorder your request!

Over the past month I really have been working hard with our foundry to “fine-tune” the production tooling and manufacturing procedures so that completing the 949G/Ti drivers on a timelier basis became a reality. We’ve changed the installation and finishing process for the tungsten rear weights and all graphite sections of the head to ensure a smoother flow of the 949 through the production process. The result is no “bottlenecks” and superb quality and performance on all of the 949G/Ti driver heads.

The main design feature of the 949G/Ti is its more rear-located Center of Gravity (CG) compared to all of our current TWGT titanium driver designs and to the OEM graphite and titanium drivers we have been able to measure and analyze. Early this year, I had the chance to perform an analysis of a number of the industry’s graphite and titanium drivers in a project Golf Digest magazine had asked for my assistance. They wanted to compare the graphite + titanium drivers to the all-titanium drivers from a number of companies. Thus I had the chance to measure all specifications and be involved in robot hit testing to determine the differences. Table 2 below illustrates some of the design differences between these OEM drivers and TWGT drivers, focusing on the Center of Gravity and Vertical Roll for each of the heads I was asked to measure:

Center of Gravity Differences in All-Titanium and Graphite+Titanium Drivers (Table 2)

Model	Construction	Face Height	Face to Back Breadth	Vertical Face Roll	Rear CG	Vertical CG
Callaway Great Big Bertha II	All-Titanium	53mm	93mm	9"	33.5mm	33mm
Callaway Fusion	Graphite+Titanium	52mm	95.5mm	10"	38.8mm	33.5mm
Mizuno Blue Rage	All-Titanium	51mm	95mm	12"	35mm	33.5mm
Mizuno MP001	Graphite+Titanium	51mm	99.5mm	12"	34mm	33mm
Yonex V-Mass 400	All-Titanium	57mm	100mm	10"	34mm	35.5mm
Yonex Cyberstar Power Brid 400	Graphite+Titanium	57mm	98.5mm	12"	31mm	33mm
TWGT 915CFE 360cc	All-Titanium	51mm	102mm	15"	34mm	33.5mm
TWGT 915CFE 420cc	All-Titanium	54mm	105mm	15"	35mm	34.5mm
TWGT 919CCG 380cc	All-Titanium	56mm	103mm	13"	37.5mm	33mm
TWGT 515GRT 395cc	All-Titanium	56mm	102mm	15"/0" GRT	33mm	35mm
TWGT 515GRT 360cc	All-Titanium	54mm	100mm	20"/0" GRT	32mm	36mm
TWGT 949G/Ti 390cc	Graphite+Titanium	53mm	99mm	16"/0" GRT	41.5mm	33mm

Callaway, Great Big Bertha and Fusion are registered trademarks of Callaway Golf Company; Mizuno, Blue Rage and MP001 are registered trademarks of Mizuno Corporation; Yonex, V-Mass, Cyberstar and Power Brid are registered trademarks of Yonex Golf Company.

My goal in the design of each of my driver models is to create shape, design and performance differences so that each TWGT model can stand on its own with its individual performance characteristics. That is why you see the face-to-back CG location of the TWGT models each offer a little different position to correspond to different golfer types.

My goal in creating the new 949G/Ti was to use the graphite + titanium construction to move the CG farther back in the head than with any other TWGT driver. In comparison to the other graphite + titanium drivers I was asked to measure, I am pleased that we have been able to achieve that, as seen by comparing the Rear CG measurements of all the heads in the table below. If the higher trajectory required to maximize the golfer's carry distance can result from the Rear CG's effect on the forward bending of the shaft, then the loft can be reduced to slightly increase ball speed off the face.

Thus the 949G/Ti is designed for golfers who need a higher trajectory that would normally require increasing to as much as 12° of loft, but who do not wish to risk losing ball speed from actually moving to a 12° loft driver with a more normal Rear CG location of 34-35mm.

In addition, the Graduated Roll Technology (GRT) face design of the 949G/Ti becomes an added benefit to ensure a much more consistent launch angle over drivers made with as much roll curvature as 9" to 12". When a driver of >50mm face height is made with 9"-12", the loft on the bottom and top of the face will be between 2.5° to 3.5° different than it is in the center of the face. Thus low face hits fly very low and high face hits much higher, both of which can rob the golfer of distance. The game improvement performance of the GRT 0 Roll face is proven – feedback we have received from clubmakers this year has indicated their golfers who use the GRT face design on a TWGT 515 or 949 driver do experience a much more consistent launch angle with less distance loss when the golfer makes a swing error.

At TWGT we are proud of our clubhead design skills. Our commitment is to make not just the best performing designs in the component clubmaking industry, but to challenge the entire golf equipment industry with our original head designs.

Kudos for the 949G/Ti:

"The 949 is a real winner! With [Hand Selected] 11° loft and the rearward c.g. it is definitely longer than my previous 14° driver, with about the same trajectory."

– Bill Day

"This is the first driver head I've purchased from you and it is without a doubt, the best head I've ever hit."

"It is 15 - 20 yards longer than any driver head I've assembled."

– Grady Larson

"I Was a 6 handicap when I got my 915CFE driver and within 8 mos. I dropped down to a 3 hdc. Yesterday I received a 949G/Ti driver head and put on the same shaft"



that my my 915 was on. I hesitated to try it out today, as I felt it would be almost impossible to replace the head that had been so forgiving and easy to hit, surely the best driver head I had used in my 44yrs. as a golfer.

"Well I am happy to report that I was not disappointed with its performance.

- (A) It is as easy to hit.
- (B) It is very solid.
- (C) It has a higher trajectory.
- (D) It is much longer.
- **(E) It's in the bag to stay.**

"The feel is very solid unlike the hollow pinging sound of the all-metal woods, this has a much more pleasant sound somewhat along the lines of the old Persimmon woods.

"You have a winner here, and I wish you much success with it, and also with your complete line of superior products."

– Regards, Bob Barrette, Professional Clubmaker (Ret.)

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Fitting is NOT Just for Better Players!

There is a misconception among some clubmakers that golfers need to be of a certain skill level to benefit from custom fit golf clubs. While it is easier to “dial in” a golfer with a reasonable level of ball striking ability, in reality, less skilled golfers may very well benefit more from custom fitting.

With more and more clubmakers using launch monitors (or our Launch Angle Gauge mat, swing speed radar, and trajectory software) fitting has changed somewhat from an intuitive process to one that relies on hard numbers. This is where the difficulty lies in fitting less skilled golfers.

I've heard of clubmakers who try to fit higher handicap golfers on a launch monitor and become frustrated by the lack of useful data it produces. Incorrectly, they end up telling the golfer they need to work on their swing before custom clubs can help them.

This is wrong. Not only does it insult the golfer, but it can put the clubmaker on the receiving end of negative word of mouth advertising from a disgruntled client. With higher handicap golfers who have not developed much in the way of swing consistency, don't use a launch monitor. It is an analytical tool that is only designed to do its job if the golfer is able to hit the ball well enough to accumulate consistent output of launch parameters. Instead, focus on the measurable fitting specifications that aim at making the set easier to swing, easier to control, and easier to get the ball airborne. In a nutshell, that means length, loft, wood face angle, total weight/swingweight, iron lie angle, and grip size. I'll attempt to make the point that a less skilled player may benefit more from these fitting specifications than a more skilled player...

Club Length

The old clubmaking adage, “The longer the club, the more difficult to hit solid and on-center” may very well be more appropriate for less skilled golfers than for more accomplished players. Golfers with a decent swing are able to control length better than golfers with poor swing fundamentals. Golfers struggling to gain even a moderate level of swing

consistency are definitely going to have an easier time building that consistency with shorter clubs. For struggling golfers, go with lengths that are 1/2" to even 1" shorter than what the player's wrist-to-floor measurement would indicate. Do not go so short that they have to crouch or stoop more to get to the ball, but keep in mind that 6'2" Tiger Woods swings a 43.75" driver, and how many of your customers can swing like Tiger? An iron set based on a 37.5" #5-iron length for a person who measures to take a 38" length is just fine. Additionally, if you see the "outside/in" swingpath or the "over the top" move, a shorter length, particularly with the longer clubs, will aid in producing a straighter path.

Woodhead Face Angle

Most golfers who are getting the ball airborne at least 50-75% of the time usually develop a tendency to favor hitting the ball in one off-line direction more than the other. This is because the swing path and face angle take hold in an inexperienced player before their swing moves develop in a manner required to consistently stay down and behind the ball through impact. Take a good look at this golfer's swing path. If you can identify an "over the top" move and an "outside/in" swing path, look for them in your customer's swing. If you see them, regardless of what you see with the inconsistent ball striking, lean more toward a closed face angle on the woods. Only opt for a square face if the golfer indicates that more than half of the shots they hit well land in the fairway.

Total Weight

We all know the importance of getting the proper total weight so that it matches the strength, tempo and athletic ability of the golfer. While this golfer might not have a reliably consistent tempo, you can still evaluate their strength and their athletic ability. Here again, recommending a comfortable total weight may actually be more important for the less skilled player than the good ball striker. This is because trying to learn the right swing moves in succession is far more difficult to do if the clubs are too heavy or too light. As you know, when you talk total weight, shaft weight is the major factor to consider.

Lie Angle

No doubt this will be a little tougher to fit because of the inconsistency of the less skilled golfer's swing. The goal is to get them in the ball park, and to make sure the golfer's height vs. arm length vs. set up position are not causing any of the irons to be significantly off for the lie angle. The lie should be fit such that when these golfers do make a better swing, they are rewarded with a shot that flies as it should. While this might take a little longer to identify than someone who is grooved, be patient and do your best. The golfer will appreciate the service you are offering them that is above and beyond what off-the-rack retailers do.

Grip Size

You could almost make the statement that if the less skilled player has larger or smaller than average hands, they'd show some improvement overnight by just fitting them into a more comfortable grip. What less skilled golfer does NOT grip the club too tightly? Most do if for no other reason than the tension they have over trying so hard to get better. The proper grip diameter and resulting grip pressure is key to developing the beginning of a more fluid swing with a better wrist-cock release.

Shaft Flex

Ok, so we won't be able to pick the exact flex and bend profile for the less skilled golfer, but you can get them into a shaft that is more flexible to assist in delivering a more solid feel when they do make contact. The encouraging feeling of solid impact can do wonders for their commitment to practicing.

Swingweight/MOI

Here again the goal is to fit for comfort so that the golfer can begin to have a sense of where the head is during the swing. It may very well be that the golfer has no idea that they're supposed to feel the presence of weight in the head during the swing. So by all means tell them to look for it when you give them a little shorter, lighter, and more flexible golf club. In fact, a great approach to take with such golfers is to build one test club to the specs you are envisioning, then add some lead tape to teach them how to "look for" the headweight in the swing. From that you will know how to build the rest of the set, and removing one head to establish the swingweight in the head's weight bore is not that much of a burden. Again, the golfer will be impressed you care enough to go to such lengths to do it right.

Set Make-Up

This is a hugely important fitting specification to help a less skilled golfer. Offer no iron longer than a 5-iron, and even consider the cut-off to be a 6-iron in the beginning of your fitting work. As they get more consistent, they will likely add the 5. Consider their driver to be of higher loft, in the 13°-14° range that will be easier for them to get airborne and produce a straighter ball flight. Skip the 3-wood for now, and go right to a 5-wood for their fairway wood. The lure of distance will bring them back to you for a lower lofted driver once they begin to gain regularity with their swing. Focus on more high loft fairway woods, or flexible-shafted, iron-length hybrid clubs as well, then sit back and bask in the glow of your customer's adoration. You will no doubt dramatically improve their game.

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