



CLUBMATE **GOLF** AUSTRALIA
GOLF CLUB COMPONENTS



June 2005 eTECHreport - Welcome!

- **Clubhead Measuring the TWGT Way**

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- **Hand Select Service Update**

Speaking of the accurate measurement of clubhead specifications, remember that TWGT offers the service of hand selecting and measuring any clubhead in our product line for precise loft, lie, face angle and headweight within the tolerance for each of these specs. [\[continues below\]](#)

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- **715CLC Report**

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- **A Word About Grips and Grip Size**

I remember years ago that my friend Jim Ulrich from Golf Pride Grips made the comment to me about his segment of the business, "We don't tend to get the attention or the glory that the head and shaft people do, but I still like the fact that our product is the only contact the golfer has with the club."

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Clubhead Measuring the TWGT Way

Last month, one of the threads on the TWGT Clubmaker Forum concerned some of the tips and techniques involved in the accurate measurement of loft, lie and face angle of clubheads. After contributing a post or two on this thread, I thought that covering this in the next eTECHreport would be important. Being able to know what these specs are on any head you are analyzing for a golfer, and then knowing how to measure loft, lie and face angle accurately are important skills for a clubmaker to have. Demonstrating these skills to prospective customers can definitely win the respect of the customer and end up in a sale.

There are definitely techniques for accurately measuring clubhead specifications (sic. "specs") on a clubhead that are not covered in any of the "user manuals" that may come with any of the industry's head spec-measuring machines. Primary among such techniques is just how the heads have to be positioned for perfect spec measurement. If the clubhead is not properly positioned in the specs machine, there is no way the measurements will be accurate. Because I do this every day in my work, and because I have trained many people in the proper measurement of head specs, I felt it would be helpful in this month's eTECHreport to cover some of the critical points for being able to measure head specs as accurately as possible.



(photo 1a) While I use a very heavy duty specs-measuring machine, there are a number of equally accurate, quality made and affordable clubhead measuring machines that are available to clubmakers.

You Must Have a Decent Specs-measuring Machine

Some of you have read about, or heard me talk about the famous "green machine" (see photo 1a); the large, heavy duty, clubhead specs-measuring machine that is used by the vast majority of the clubhead production factories and foundries in the golf equipment industry. Because of its size, heft and quality of manufacture, the actual "green machine" costs over \$1500 and is therefore a viable purchase only for clubmakers who are 100% involved in custom clubmaking, or who have some extra cash stashed under the mattress!

Not to worry. There are a number of quality-made head specs-measuring devices that cover a range of prices. However, do keep in mind that accuracy is the only reason for measuring loft, lie and face angle. Following is a list of some of the machines and gauges

available to clubmakers which in my opinion will allow you to measure clubhead specs accurately, once you know the proper techniques for setting the head in place for measurement.

From www.golfmechanix.com Model #'s 010200, 010310, 010220, 010320

From: Golfsmith Model #'s 8342, 240794.

From: GolfWorks Models Precision Milled GCG, Maltby Design GCG

There are a number of things to look for in a quality specs-measuring machine:



(photo 1b) Photo of the "Green Machine" with a specially made block perfectly machined to a 55 degree lie, 10 degree loft and 0 degree face angle that I use to periodically check the accuracy of my specs-measuring machine.

All sliding parts are tight with no movement other than in the intended direction.

The machine is heavy enough to not move around while you are positioning the clubhead in the device.

The clamp for the shaft or mandrel inserted in the hosel has the ability to slide up and down. This is very helpful for allowing the sole of the clubhead to remain in contact with the base of the machine when you move the lie angle of the machine up and down.

The machine has a part to slide against the face of an iron, wedge or putter to ensure a perfectly square measuring position on the face for loft.

The face angle indicator must be able to slide tightly to and away, as well as from heel to toe across the face.

A calibration device or head used to check the accuracy of the loft measuring protractor, the lie tilt of the machine, and the face angle device. (see photo 1b)

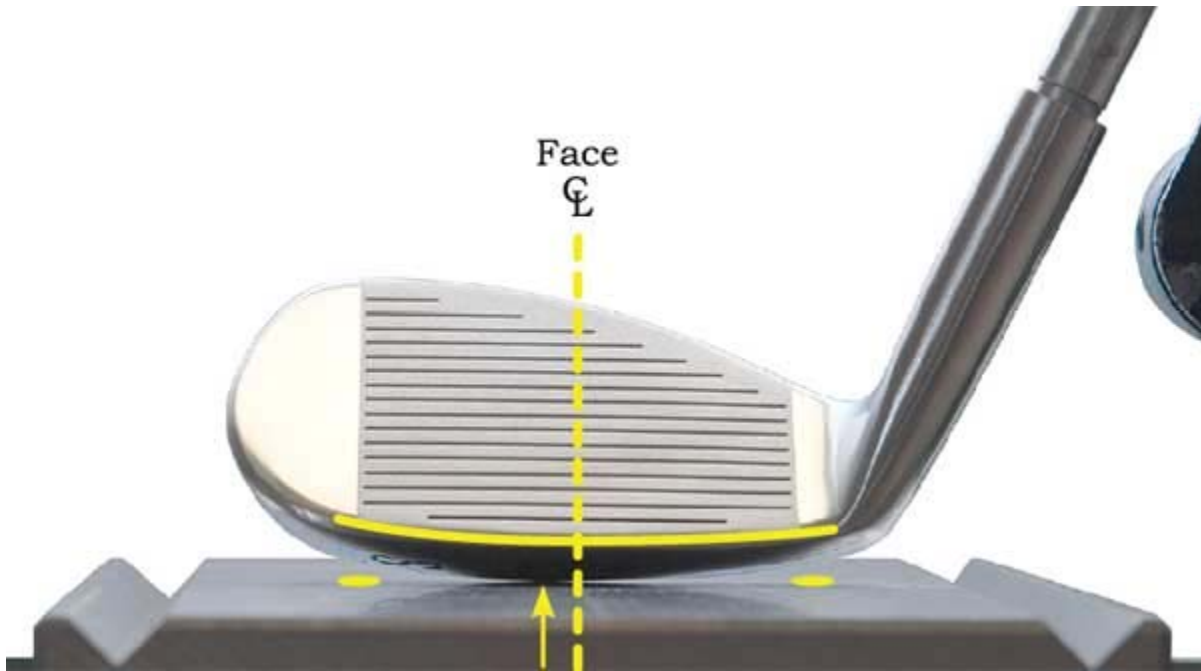
Positioning Iron/Wedge Heads for Measurement

Clubhead specs-measuring machines will allow you to measure the loft, lie, face angle and face progression/offset of any iron or wedge head – providing you know exactly how to properly position the head in the machine. Proper set-up of the iron/wedge head requires a full understanding of the various design aspects of the head that can “trick” you into thinking you have the head in the right position when in reality you do not. Over the course of my career I would estimate that 99% of the time a clubmaker has disagreed with a measurement I have made on a head, the reason is either they are trying to use a loft and lie bending machine to make the measurement, or they do not have the head positioned properly in their specs-measuring machine.

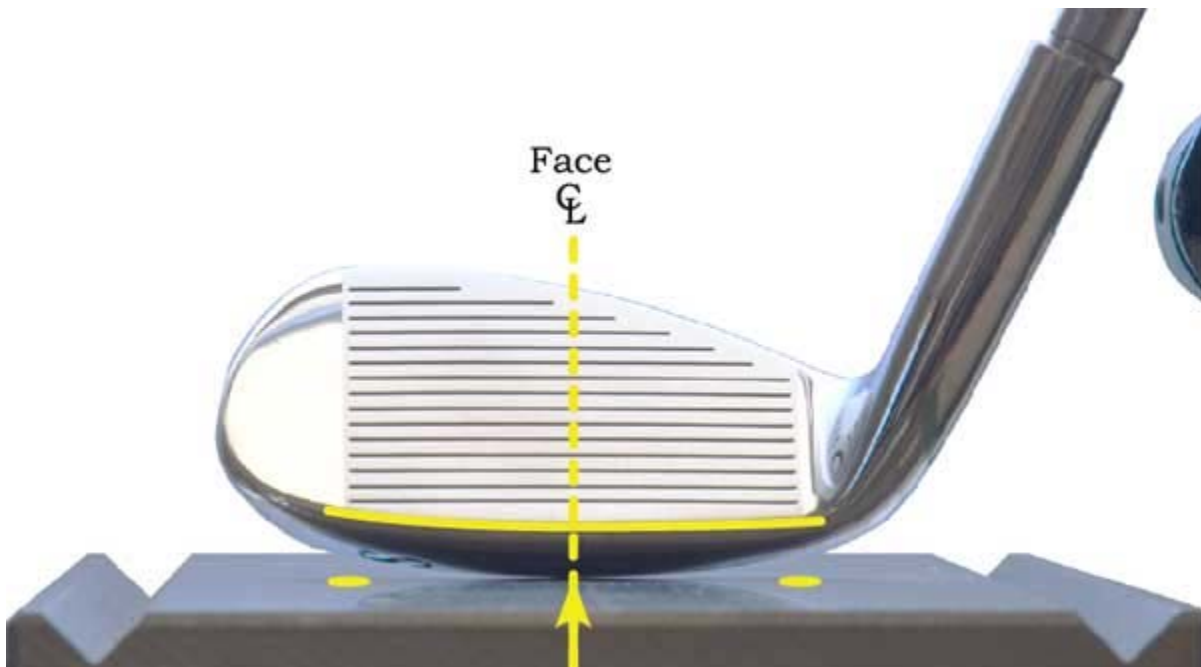
Iron/Wedge Head Measurement Tip #1

Reference the proper lie position ONLY from the leading edge radius

The iron/wedge head is in the proper position for measurement only when the center of the leading edge between the scorelines becomes the point closest to touching the base of the machine. Many people make the mistake of trying to position the head so that the center of the sole from heel to toe touches the base of the machine. The reason that this cannot be done is because most iron and wedge soles have a bounce sole angle, and because the sole usually becomes wider from heel to the toe (The main reason the sole of many iron and wedge heads is wider at the toe than the heel is to offset the mass of the hosel and thus keep the center of gravity in the center area of the face). A bounce sole angle will cause the head to touch the base of the specs machine on its back/trailing edge. If the sole is also wider at the toe than at the heel, the point of contact with the base of the specs-measuring machine will be on the toe side of sole center on the trailing edge when the head is actually in the proper measuring position. (see photo 2a and 2b)



(photo 2a) Here is a classic example of an iron/wedge head (770CFE SW) in its proper measuring position with the point of contact on the base of the machine being on the toe side of sole center. Focus your eyes on the radius of the leading edge which is emphasized by the bold line in the photo. Note that the low point of the leading edge radius in the center of the scoreline area is the point closest to touching the base of the machine.



(photo 2b) When the iron or wedge's sole (752TC SW) is not as tapered in width from heel to toe, the center of the sole directly under the center of the scoreline area will be the proper point of contact with the base of the machine to ensure proper position of the head for measurement.

Iron/Wedge Head Measurement Tip #2

The face MUST be perfectly square to measure the loft angle. It is not possible to position the face of an iron or wedge head square using your eyes. I can list the technical and optical illusion reasons for this, but I won't because I don't need to defend this statement. I have yet to see a QC person in a quality foundry ever make a loft measurement on an iron or wedge head without using the device that comes with the higher quality specs machines and is designed to position the face perfectly square. (See photo 3)



(photo 3) There is no "if, and or but" about using a device to square the face of an iron or wedge head for accurate loft measurement. It is impossible to measure the loft without one.

Iron/Wedge Head Measurement Tip #3

It is OK to use a small hand-held protractor to measure loft as long as its accuracy has been verified and the face remains square while loft is being measured.

Most of the clubhead specs-measuring machines are sold with a steel protractor made from a common machinist's protractor. It is important that the protractor be checked for accuracy because it's not that uncommon for such ordinary protractors to be inaccurate. The best way to do that is to have a handful of different iron/wedge heads on hand that have been accurately measured by someone who definitely has the experience to make such measurements. I have always volunteered to measure, record and send back heads that any clubmaker sends to me for such a purpose. Over the years some clubmakers have taken advantage of my offer; and I continue this service through TWGT.



(photo 4) When using a hand held protractor, you must keep the face square while taking the measurement for loft.

To measure iron and wedge head loft correctly, you must first position the head in the machine in the proper lie angle measurement position. If this is not done, there is no way the loft can be measured accurately. Second, as mentioned before, you must square the face with a device that comes with the specs-measuring machine that is made for this very purpose. Keep the face squaring device completely flat and tight against the face while making the loft measurement as shown in the photo below (See photo 4) and push the protractor flat against the face. The loft will be read directly off the protractor.

Positioning Woodheads for Accurate Specs Measurement

Accurately measuring the loft, lie and face angle of woodheads is far more difficult than measuring the same specs on iron and wedge heads. The reason is because wood soles are often made with a face-to-back radius and woodhead faces are usually made with a vertical curvature called Roll. This requires a lot more "judgment" on behalf of the clubmaker when placing the woodhead in the machine in the

proper position for lie and face angle. While loft on a woodhead with vertical Roll is always measured at the very center of the face, if the head is not positioned properly for lie and face angle, the loft measurement will never be correct.

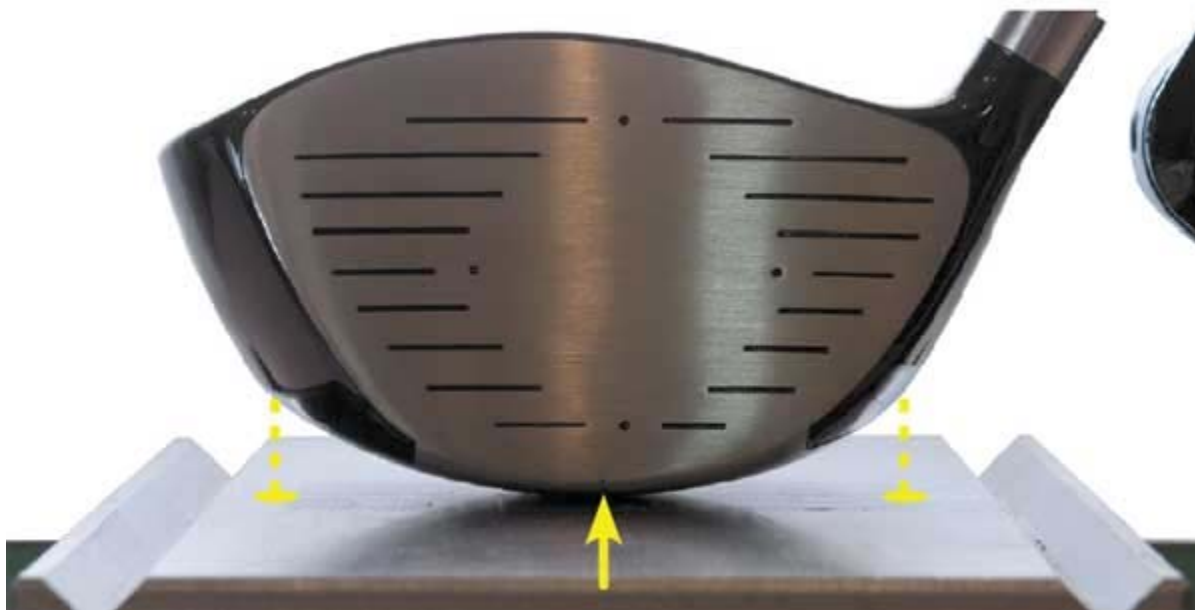
Because of all of the various “nuances” with differently designed woodheads, there is no possible way I can cover all that is required to ensure proper placement of the woodhead in the specs-measuring machine. Unfortunately, the recent practice of designing woodheads with a face-to-back radius has also caught most of the foundries off-guard as well. For decades, woodheads were designed with a flat surface on the sole from face-to-back and only with a radius from toe-to-heel. Such is not the case in the “modern design era” as designers (or foundries) create more and more woodheads with a slight-to-moderate face-to-back sole radius.

I can tell you that in every woodhead design I create, I also have to tell the foundry the exact point of sole contact on the base of the specs-measuring machine. Without this uniformity of measurement for my woodhead designs, there is no way the foundry can assure the lie, loft and face angle specs that I ordain on my designs.

Woodhead Measurement Tip #1

The center of the scorelines may not indicate the point on the sole that is to touch the base of the machine for proper lie angle position

With iron and wedge heads, the face is flat from toe-to-heel. On woodheads, the face always has a specific horizontal bulge radius from the toe to the heel edges of the face. Because of certain optical illusions created by the wood face extending past the center of the hosel (on irons this almost never happens) it is very common for foundries to position the scorelines on the face so that the middle of the lines is not precisely in the geometric center of the face. (See photo 5)



(photo 5) Note how the point of sole contact is in the center of the sole with the distance from the base of the machine up to the edges of the sole at the toe and heel the same yet the center of the sole is not coordinated with the center of the scorelines – this woodhead (919CCG) is in the proper lie angle position.

Thus when positioning woodheads in the proper lie position, the point of contact with the base of the specs-measuring machine should always be in the center of the sole and not directly under the center of the scoreline area.

The way that experienced people learn to set the woodhead in the proper lie position is to have the center of the sole be the point of contact with the base of the machine, and so the distance up from the base to the edges of the toe and heel sides of the sole is the same. In this position, the scorelines will almost never be parallel with the base of the specs machine.

Woodhead Measurement Tip #2

How the woodhead sits on the floor is how it has to be positioned for face angle measurement

Another reason that iron and wedge heads are easy to measure is because they do not have a "face angle". All golfers are taught to HOLD an iron or wedge so the face and leading edge are square to the target line for normal shotmaking. Not so with woods because we golfers allow the woodhead to "sit" on its sole and assume a face angle as the normal procedure for hitting shots with woods. As a result, woodheads not only have to subscribe to a toe-to-heel point of sole contact with the base of the measuring machine; there also has to be a point of sole contact defined for the proper positioning of a woodhead in a specs machine from face-to-back. (see photo 6)

One exception to this are woodheads that are designed with very little face-to-back sole radius. Typically, most fairway woodheads are designed with less face-to-back sole radius than drivers so they tend to "sit" in the specs-measuring machine with far less variation when it comes to measuring face angle.

To duplicate the natural address position of drivers in a specs-measuring machine, I now put a shaft in the head and let it sit on a hard, flat surface so that its size, CG location and the presence of the shaft in the hosel determines the point from face-to-back on the sole that is the primary point of contact with the flat surface. Then I have to peer under the head from the toe end of the sole and note where the driver is touching on the flat surface. I note this point and duplicate this point of face-to-back sole touching on the base of the specs-measuring machine. Thus when positioning driver heads for proper specs measurement I note both a toe-to-heel point of sole contact for the lie measurement and a face-to-back sole point of contact with the base of the machine for proper face angle notation.



(photo 6) Here you see an example of how the face-to-back point of contact on the specs-measuring machine can be different for different woodhead designs. Again, this is because of the effect of the head's CG and size on how the head sits naturally in its address position.

Woodhead Measurement Tip #3

The woodhead must remain in the proper position for loft and face angle measurement

Once you have the woodhead properly positioned in the specs-measuring machine, it does not take much to rotate the head out of its proper face angle measurement position. If the face angle position moves, the loft measurement will not be accurate. Thus care must be taken to use one hand to lightly hold the head in position while the other hand is used to record the loft (see photo 7), or move the face angle slide to touch the face for its measurement.

For loft measurement, remember that on heads with normal vertical roll, the loft protractor is to touch in the exact vertical center of the face to perform the loft measurement. If necessary, do make a small mark with a Sharpie® pen at this point so that you are sure where to position the protractor for loft measurement when the woodhead is positioned in the



(photo 7) GENTLY hold the head in position with one hand while the other positions the loft protractor against the proper position on the face for loft measurement

specs machine. For TWGT heads designed with a GRT face, the loft is measured against the vertically flat area on the bottom 2/3's of the face height.

Once again, one of the very best ways to “teach yourself” the proper positioning of clubheads in a specs-measuring machine is to have a handful of wood, iron, wedge or putter heads in your shop for which you KNOW the correct loft, lie and face angle. If you are interested in perfecting your spec measuring skills, box up 4-8 wood and iron heads you have lying around your shop and send them to TWGT. I will be happy to measure each one and write down the loft, lie and face angle and ship them back to you (You will need to pay for shipping both ways, but we can return your specs-verified calibration heads when shipping an order you purchase from TWGT). Then you can position the heads in your machine so that you duplicate the same measurements that I recorded and use this as your method of learning how to set up heads for accurate specs measurement.

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Hand Select Service Update

Speaking of the accurate measurement of clubhead specifications, remember that TWGT offers the service of hand selecting and measuring any clubhead in our product line for precise loft, lie, face angle and headweight within the tolerance for each of these specs. So far this year, thousands of heads have been ordered by clubmakers to precise specs through our TWGT Hand Select Service.

Specs available are +/- 1 degree for loft, lie and face angle from each head model's designed specifications as listed in the TWGT catalog. Not all Hand Select specs can be met because of

tendencies in the production of our head models. For example, it is much more difficult to find woodheads that are more open/less closed than what the design spec for the face angle is on each model – yet it is not that difficult to find woodheads that are less open/more closed than the spec for the face angle. This is just a tendency within the production of a woodhead with respect to the final position of the hosel on the body from the production methods of the heads. In any case that we cannot meet your Hand Select request, we will call or email you to inform you of what we can accomplish.



TWGT Hand Select is a \$4/head up-charge to the cost of the head and in most cases will not delay the shipping of your order. All you have to do is tell our representatives what loft, lie, and/or face angle spec you want for the heads you order and we'll take care of the rest.

As a side note, one of the benefits of the Hand Select program is that each Hand Select head is shipped to you with its measurement sheet filled out and signed. Clubmakers who request Hand Select heads have reported back to us that showing their customer the verified specs on the Hand Select sheet is an added marketing bonus that makes the customer feel very comfortable with the quality of the custom clubs being built for them.

		Hand Select Service Notice	Model: _____
Thank you very much for choosing Tom Wishon Golf Technology to meet your need for precise custom clubmaking specifications. We are pleased to be able to carefully hand-measure your request, and provide you with the most accurate components for the fitting and performance needs of your customer.			
Hand Select Requirement: _____		Notes:	
Specification: _____	Verified to be: _____		
Specification: _____	Verified to be: _____		
Specification: _____	Verified to be: _____		
Hand Select Performed by: _____			

Hand Select Service (sample)

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Additional QC Inspection Work at TWGT

TWGT has recently upgraded the assortment of equipment in its R&D workshop to give us even greater capability to monitor the quality of our clubhead designs. Several of our clubhead designs have very precise heat treatment and face thickness requirements to ensure their high performance. Models like the 770CFE irons, 515GRT fairway woods, and all TWGT drivers must be produced to very tight tolerances in their heat treatment and face thicknesses to deliver the ball speed and top performance that they are designed to offer golfers. A slight change in any of these specifications can affect the final performance of the models so TWGT has added a few new “toys” that we use to ensure production quality.

For models that require very specific and tightly controlled heat treatment to ensure the proper strength, modulus and hardness, we now select heads at random from each production run that we cut apart and check the Rockwell Hardness for the metals used in their manufacture. Because of the relationship of strength and hardness in metals, checking hardness to very precise accuracy will reveal the strength of the material. From that, it is then possible to know that the heat treatment of each production run has been conducted properly to ensure the required final specs of the metals used in each high performance head design.

In addition, TWGT has recently invested in a state-of-the-art ultrasonic digital thickness testing machine to be able to measure the body wall and face thickness of any of our high performance wood and iron head designs. With this machine we can now measure material thickness in any part of our head models to an accuracy of one thousandth of a millimeter (0.001mm). When we design a thin face wood or iron head, we demand a face thickness tolerance from the foundry of +/-0.05mm. While that sounds like a very small increment (indeed it is!) our design experience in thin face clubheads has taught us that to keep performance of the thin faces at the highest level, +/-0.05mm is the tolerance for face thickness that is necessary to achieve.

Again, with each production shipment of any of our thin face drivers, fairway woods or ironheads, we will select random samples for ultrasonic thickness testing. With this capability we are able to monitor and keep our production quality high, and from that, ensure top performance of the clubhead models we design and offer to custom clubmakers.



New QC toy #1 – Rockwell Hardness machine testing a section of the 515GRT 3-wood face to monitor the correct heat treatment of the T275 steel used to manufacture high COR fairway woods



New QC toy #2 – The digital thickness testing machine in action.

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715CLC Report

The unique weight adjustment design of the 715CLC driver continues to gain accolades as more and more clubmakers use the model to fit their golfers. Read what clubmaker Richard Kempton, a past recipient of the International Clubmaker of the Year award, had to say about his first experience with the 715 driver...

"The Pro who did the range testing has hit the R7 a lot and he said he wasn't anything like as impressed with it as he was with the 715. Apart from any other issues, he said it is much easier to 'work' the ball with the 715 than the R7. "He turned Pro only about a year ago - prior to that, his handicap was +2 (nearly +3, I think). Titleist recently measured his launch velocity at 182-185 mph. For the 715 test I asked him to throttle it back to about a 235-240 yard carry, which for him is a very smooth three-quarter swing.



"I initially set the club for low launch, neutral bias (shaft spined with a concentric tip weight in a spin indexer) and he hit half a dozen shots to get used to the shaft & balance. After that, it was like watching a swing robot - same launch angle & ball flight every time.

"After he'd also hit a series of controlled draws & fades with it (anything from 5-15 yards either way, to order), I moved the weight arm to maximum launch (neutral bias, again) and he did the same thing, except that the launch angle went up dramatically.

"Moving the weight arm to give various amounts of fade or draw correction was very interesting, because in positions 1 & 6 (maximum fade bias), he found that his 15-yard draw swing flew pretty well straight, as did his 15-yard fade swing with the weight arm set to maximum draw (positions 3 & 4).

("That, incidentally, is another reason why I would not try to orientate the shaft in the clubhead differently for any specific weight position - I'd be concerned about what that might do to the ball flight & consistency if the player decided to move the weight arm to a different position.)

"BTW, this guy can consistently pick out a badly-aligned shaft just by 'wagging' the club. Although he said the club felt different with the weight arm in different orientations, it still felt stable though impact and the ball flight was consistent at each weight setting.

"The other thing that impressed him was the sound and feel of the ball off the clubface of the 715; it does feel - and sound - great."

– Richard Kempton, Hadlow, Kent, England

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Richard also put the 715 through a launch angle test using his launch monitor. He was curious to know the difference in launch angle that was possible with the 715 comparing the weight arm in the "at the face" and "at the rear" positions. With the 35g weight arm, the launch angle difference Richard recorded for the two opposite positions of weight arm at the face vs at the back of the head with his launch monitor was 3.5 degrees!

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A Word About Grips and Grip Size

I remember years ago that my friend Jim Ulrich from Golf Pride Grips made the comment to me about his segment of the business, "We don't tend to get the attention or the glory that the head and shaft people do, but I still like the fact that our product is the only contact the golfer has with the club."

It's a fact. Grips may very well be the "Rodney Dangerfield" of the three major parts of a golf club. But if the grip does not feel good to the

golfer, the golfer won't be fully satisfied with the performance of the golf club.

Many clubmakers are not aware of the fact that all of the grips offered by TWGT are proprietary designs, each one with its own unique design differences that are intended to offer golfers a wide array of unique grip feel characteristics for achieving the high level of comfort so necessary with the grip. This month, TWGT will review two of the proprietary grip design features that set us apart.

- Larger Lower Hand Diameter

All models of TWGT slip-on grips feature a larger diameter for the lower hand than the normal lower hand diameter on other grips. While the standard lower hand diameter in the industry has been 0.780" for men's and 0.720" for ladies, TWGT designs its grips to have a lower hand diameter that is 0.045" to 0.055" larger on TWGT men's standard grips, and 0.045" larger on TWGT women's grips. This grip design improvement provides a more comfortable and secure feel.

- Wider "Wrap Segments" on the Model 402 New Wrap Grips

The width of each wrap segment on the TWGT New Wrap slip-on grips are designed to be wider than what has been standard for other rubber wrap style grips. This provides more surface contact between the fingers and the surface of the grip, so that the fingers do not tend to slide down in the groove between wrap layers. The result is a more comfortable and more consistent feel of the hands on the TWGT New Wrap Grip.

If you have not tried one of the proprietary grip designs from TWGT, we strongly suggest you do.

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