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GOLF CLUB COMPONENTS



October 2004 eTECHreport - Welcome!

- **Golf Tips Tech Award to 770CFE**

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- **Golf Digest PhD summit meeting**

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- **Holiday print TECHreport coming**

Early December look for the next issue of the TECHreport magazine to arrive in your mailbox. [[continues below](#)]

- **TWGT 515GRT Fairway Woods a Smash Hit!**

According to clubmakers and golfers who have hit the new 515GRT #3- and 5-woods, "You have a VERY pleasant surprise coming if you have not yet tried the new 515GRT fairway woods!" [[continues below](#)]

- **A First Look at an Upcoming Shaft Technology**

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Golf Tips Magazine Top Concept Tech Award to 770CFE



Golf Tips Magazine, one of the five largest consumer golf publications in the game, announced this month that they had bestowed their "Top Concept" Tech Award for 2004 to TWGT's model 770CFE irons. With its third annual Technology Awards, Golf Tips Magazine continues to give long-overdue recognition to golf equipment designs and concepts that provide enhanced performance for amateur and professional golfers alike.

Recipients of the 2004 GT Tech Awards symbolize the continued evolution of the golf equipment industry and its implementation of advanced technology, new materials and computer-driven design. Award winners have each demonstrated new trends in a variety of areas, including the use of new materials, novel production techniques and innovative construction methods.

A panel that included Golf Tips' editorial staff, industry veterans and key retail merchants carefully selected the GT Tech Award recipients. The GT Tech Awards is yet another vehicle golfers can use to heighten their awareness of golf equipment technology and how it pertains to their game. In writing about the TWGT 770CFE irons, Golf Tips magazine said, "One of the more intriguing iron sets of '04, the 770CFE by Tom Wishon represents the first iron to feature a forged, variable-thickness face. The faces are constructed of three different steel

strengths in an attempt to maximize face deflection, which typically decreases as loft increases. For the layman in all of us, the 770CFE means more distance, more forgiveness and a more consistent trajectory from iron to iron."

In response to the announcement of his 770CFE iron design being awarded the "Top Concept" of 2004, TWGT founder Tom Wishon said, "Hey, that's cool".

More information on the 770CFE can be found [here](#).

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Golf Digest PhD summit meeting

I was recently accorded a very high honor when I was asked by Golf Digest magazine to be the only non-PhD to participate in the magazine's "PhD Technical Panel" discussions. The equipment editors for Golf Digest and its sister publications Golf World, Golf World Business, and Golf for Women wanted to convene a group of experts in the fields of physics, mechanical engineering, biomechanics and material engineering to advise them openly without marketing prejudice on the validity of the current technological areas of golf equipment design.

Golf Digest's equipment editor Mike Stachura said, "We at the Golf Digest companies are literally barraged with press releases and information from all of the golf companies about their latest equipment technology introductions. Because none of us who handle the editorial responsibilities are trained engineers or technical experts in the field, we felt we needed to convene a panel of true scientists who could advise us about what really works and what doesn't when it comes to golf equipment technology. We asked Tom Wishon to join the panel because all of us at Golf Digest have known him to always be completely honest and without bias every time we ask him questions about golf

equipment technology. We also knew that since Tom is an expert in so many areas of golf equipment technology, he could also 'translate' to we editors in laymen's terms what the PhD's might be saying in their engineering language!"

Members of the PhD panel came from Clemson, Michigan State, Michigan, University of Illinois Chicago, Stanford, and MIT. Each was selected for their unique expertise in engineering areas pertinent to the various aspects of modern golf equipment design. Topics discussed by the group included clubhead moment of inertia and center of gravity effects, the launch parameters and their interaction for ball flight, iron sole design, the relationship of the golfer to the club (aka "fitting"), shaft performance and flight characteristics of different golf ball designs.

Most of the PhD's already had done direct research related to various aspects of golf equipment technology so they were familiar with the science and did not hold back in their comments. And from a personal side, I was really pleased to come back from the meeting knowing that the information we are gleaning from our various research projects are all definitely sound and in line with true science.

More on the specifics of the information that came from the Golf Digest PhD Panel discussions will be offered in the next issue of the TWGT print magazine, TECHreport. Speaking of our print magazine...

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Holiday print TECHreport coming

Early December look for the next issue of the TECHreport magazine to arrive in your mailbox. As we are able to grow over the coming years, TWGT does plan to increase the frequency of our print TECHreport magazine to compliment our regular emailed eTECHreport and keep you better informed and educated about golf club and fitting technology.

Scheduled for the holiday print TECHreport will be the latest information to keep you at the forefront of fitting and golf club technology. Here's just a preview of what's coming in early December...

- More in-depth analysis of shaft bend profile to allow you to more clearly compare the performance benefits of one shaft to another.
- A practical look at the method and real benefits of matching golf clubs by Moment of Inertia to improve on-center hit percentage for all golfers.
- A complete report on the topics and specifics of the Golf Digest PhD panel discussions.
- A sneak peek at the brand new and VERY innovative TWGT model 715CLC driver.
- A first look at Tom Wishon's new book, The Search for the Perfect Golf Club and what it will mean to your clubmaking business in 2005.

Other companies make claims that they keep you more up to date with clubmaking technology, but no other company delivers the depth and content of truthful and helpful technical information than TWGT – the leading name in clubmaking technology.

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TWGT 515GRT Fairway Woods a Smash Hit!

According to clubmakers and golfers who have hit the new 515GRT #3- and 5-woods, "You have a VERY pleasant surprise coming if you have not yet tried the new 515GRT fairway woods!"

Introduced in September, the new 515GRT fairway woods have absolutely amazed clubmakers with the difference a 0.830 COR design, coupled with GRT "no roll" technology, will mean for anyone's game. No new TWGT clubhead design has generated first-month unit sales anywhere near these two 515GRT fairway woods. And considering the 515GRT fairway woods were introduced in the post-season fall, the response is even more proof of the design excellence and expertise of TWGT.

TWGT will have one more large production shipment of its unique and powerful 515GRT fairway woods this year, due to arrive in time for you to make the golfers in your area very happy with this hot holiday present. This is not hype – TWGT is by far the leader in original golf equipment design in the custom clubmaking industry. And the 515GRT is proving that reputation extends throughout the entire golf equipment industry as well.

No major golf club company had been able to design fairway woods to reach the USGA COR limit of 0.830. But Tom Wishon's vast experience in face design physics and materials allowed TWGT to crack the COR barrier in fairway wood design. Both robot and golfer testing has shown the 515GRT 3-wood to deliver a ball speed that is only 4mph lower than the ball speed achieved by a 0.830 driver! But we didn't stop with the 3-wood, the 515GRT 5-wood also has a COR right at the USGA limit of 0.830.

Order now for your holiday gift clubmaking because we're scrambling to keep up with the demand!

More information on the 515GRT line is available [here](#)

Kudos for the 515GRT

"515 Fairway Woods - WOW!!!

"Played today with the 3w and 5w - WOW!!!

"My all time favorite, go-to, can't fail, never miss 5w just got its butt kicked by the 515! Did I say WOW!!! ?

"3w was nearly as long as my old driver! 5w nearly as long as my old 3w."

– Ed from the TW Forum

"The [515] fairways have that same addictive solid strike quality that every really good head does..."

– Ron via email

"Tom, these things are AWESOME! I handed him [a client] the 5, he set the ball up like on the fairway and BOOM! 245-250 yards. He looked at me and all he could say was "Ohhhh Myyyy Goodnesssss". I let him hit 4 more, all about the same and straight as an arrow.

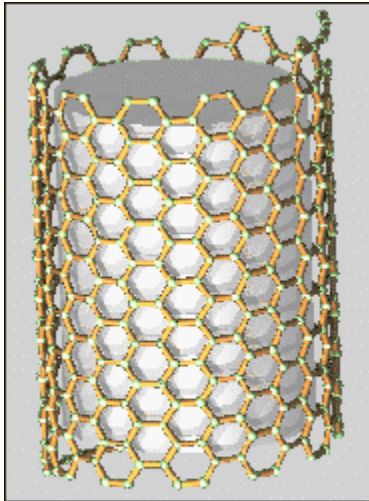
"Then I pushed the 3 at him. 275-280. He wanted to take them home with him. 'Sorry Joey, I can have a set for you the first of next week.' Cha-ching! Wishon strikes again!"

– Yogi from the TW Forum



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A First Look at an Upcoming Shaft Technology



Carbon nano-tube
Structure. ©nasa

As early as the 1960's, physicists theorized the coming of a time when products could be engineered "from the bottom up." What they meant was that by being able to actually manipulate the molecular structure of any material, using techniques and tools to place every atom and molecule in a desired place, it would be possible to create products that have incredible strength and performance properties. The science is called Nanotechnology, and it is on the threshold of moving from theory to reality.

While there is a common belief that nanotechnology is a futuristic science with applications 25 years into the future, in the last 15 years over a dozen Nobel prizes have been awarded in this field. In fact, because of the promise it holds for great advancement in product development, nanotechnology today is the highest priority funded science and technology effort since the space race.

Nanotechnology means working with materials that are on the size of 1 to 100 nanometers in one of their dimensions. Just to give you a frame of reference, 1 nanometer is 1 billionth of a meter! To look at it another way, pluck a hair off your

head, or arm, or wherever you have a surplus and try to imagine **1/80,000th** the diameter of that hair between your fingertips! Now you can see what the scientists mean when they say that nanotechnology is the science of building materials one atom and molecule at a time.

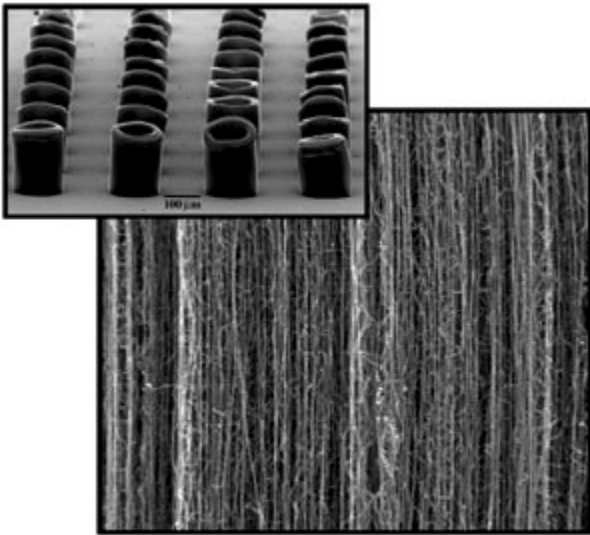
Every element or material has its own unique molecular structure. It is that molecular structure that makes each element or material what it is, different from any other element or material. Nanotechnology is a technology in which scientists will get right down to the atomic structure of an element or material and re-align the atoms and molecules to in essence, "soup up" the material and make it far more than it can be when naturally formed.

With nanotechnology, the future holds:

- Medicines with pinpoint delivery to the affected area of the body.
- Silicon computer chips that are much smaller and vastly more powerful.
- Cutting tools in manufacturing that last longer and cut more accurately.
- Paint finishes on cars and commercial products that are much more durable.
- Far smaller, more powerful, and more accurate lasers for both commercial and medical uses.
- And that's just naming a few applications.

Today however, nanotechnology is used primarily in the area of nano-particle reinforcement of existing materials. Because one of the first nano-particles developed is the carbon nano-tube, products made from graphite composite are among the first to be reinforced through the limited addition of the carbon nano-tubes. Last year graphite tennis rackets began to be reinforced with carbon nano-tubes. This year the technology is now finding its way into graphite golf shafts.

As a result, marketing departments throughout the golf industry will barrage you next year with the term NANOTECHNOLOGY, as companies begin making all sorts of claims for improvements in shaft design technology. Because marketing in the golf business has time and again shouted louder than it's delivered, TWGT wants to introduce you to what nanotechnology, in its present form, **can** and **cannot** do in golf shaft design and production.



Carbon nano-tube under a Scanning Electron Microscope. ©nasa

As it develops, nanotechnology in golf shafts will enable shaft companies to be able to produce much lighter shafts with the ability to withstand any type of golfer stress. For example, right now it is virtually impossible for shaft companies to manufacture shafts that weigh 35-45 grams with torque and flex that could fit golfers with swing speeds over 100 mph. Through nano-reinforcement, this will be possible. However, there is still the fact that not all that many golfers with high strength and high swing speeds will end up playing their best with that light of a shaft. Nonetheless, such a light and strong shaft will be possible through nanotechnology.

Carbon nano-tube reinforced shafts can be made with higher tip strength for greater durability when high swing speed golfers happen to make that bad swing resulting in that "high heel hit." At the same time, shaft tip strength is not much of a

problem today even with shafts designed from conventional composite materials.

Carbon nano-tube reinforced shafts can be manufactured with a lower percentage of resin, which not only will allow the much lighter shafts to be a reality, but could also bring about more consistently made shafts with fewer "voids" within and between layers of the graphite that make up each shaft. Layers of the graphite pre-preg may be able to be wrapped over each other with more pressure without fear of damaging the fibers, and in the process bring about a more consistently made shaft.

Graphite fibers have to be held together with a resin, not unlike an epoxy. Less resin in the graphite shaft combined with the capability of smaller diameter carbon fibers will also mean a different transmission of vibration from the clubhead's impact with the ball, up to the golfer's hands. Thus, the "Feel" of shafts reinforced with carbon nano-tubes will be a little different than shafts made today.

However, what will **not** change in the immediate future use of nanotechnology in graphite shafts is what ordains the actual performance elements of the shaft – the weight, torque and overall bend profile design. Thus, right now as this new "buzzword" of nanotechnology just begins to hit the golf market, do not be fooled into thinking that nanotechnology graphite shafts can be made with a weight, torque or bend profile that cannot be made in graphite shafts produced from conventional graphite composite materials. What makes ANY shaft perform in terms of how it affects the golfer's swing speed, accuracy and shot trajectory is its weight, torque and bend profile. Yes, true, nanotechnology graphite shafts may "feel" a little different, but always keep in mind that feel is something that appeals to one segment of golfers differently than another.

So as we in the golf club business are all on the very threshold of this fascinating new form of material reinforcement, be sure not to let marketing claims overshadow the real essence of what you do in fitting golfers with the right shaft – weight, torque and bend profile will always reign supreme in shaft fitting specifics. Right now, these aspects of graphite shafts made either from carbon nano-tube reinforced materials or conventional graphite composite materials are still the same in the shaft design world.

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