



The Integrated Tuning Process™

The average golfer is constantly struggling with how to hit the ball consistently. Unfortunately misfit, poorly manufactured golf clubs complicate this effort. Clubs bought off the rack are not designed for you or your playing style. Mass produced off the shelf clubs available on the market today have inconsistencies that do nothing but add more strokes to your game. By taking the time to learn a little more about golf equipment your game can undergo a dramatic positive transformation.

All OEM golf companies today manufacture their golf clubs using mass production techniques, and fail to practice the time proven precision process's used when making their PGA Tour Professional's clubs. At Dimension Z Golf clubs are manufactured to very exacting specifications and their uniformity from club to club within a set eliminates the many swing, grip, stance, and alignment adjustments each golfer makes to compensate for each club's variances. Our Integrated Tuning Process assures set perfection and uniformity on all Dimension Z clubs. If you order standard sets, you will still lower your scores because we have eliminated the inconsistencies found in mass produced sets. Getting fit properly will lower your scores even further.

To start we need to show the difference between iron sets that the PGA touring professionals play and the sets that are made available to the public.

The Integrated Tuning Process™ was developed because our engineers recognized the need for a complete method of building consistent sets of golf clubs. There are several existing techniques and processes that are practiced by some of the best club makers in the industry, but none that are as complete and technically sound as the Integrated Tuning Process™. This process has been in use at Dimension Z Golf for nearly nine years and has been refined and tested by some of the world's top players, teaching professionals, and amateurs alike. There are several production steps that make the Integrated Tuning Process™ work and they are as follows:

- Head Weights and Appropriate Gram Spacing (Delta)
- Circumferential Flexural Integrity Testing (CFI), & Synchronization
- Linear Flexural Integrity (LFI)
- Steel Spine Identification & Location
- Multi-Matching Shafts as a Set
- Frequency Testing
- Swing Weight Testing
- Gripping and Grip weights





Head Weight and Gram Deltas

Head weights have a profound effect on frequency and swing weight relative to length. In order to produce a set of irons that feel and play the same we need to have precise gram spacing between heads. The foundries that produce most of the industries heads have the same tolerances to defined specification. We tell them how much we want every head to weigh and they manufacture them using a +/- 3 gram tolerance. This window is quite large and can create sets that are inconsistent if gram weight spacing is ignored. Also, the longer the club is, the heavier its swing weight reading will become. We can make adjustments to swing weight by varying the weight of the heads we are using based on a given club length and targeted swing weight range.

What is Circumferential Flexural Integrity or (CFI)?

Circumferential Flexural Integrity is a test process developed by Apache Golf, Inc. This standard is an indication of how well the shaft manufacturer has maintained a targeted flexure around the radius of an individual shaft. This reading is obtained by rotating a shaft 360 degrees around its axis while deflected on a proprietary designed machine patented by Apache Golf, Inc. See the diagram at the bottom of this page. Why is CFI important? CFI is critical to both the performance of a shaft and a club manufacturers' ability to truly match one club to another. Attempting to frequency match or employ any other method of matching would be a dubious endeavor if the properties of the shafts are not in line with very tight tolerances.



Typical graphite shafts have one heavy wall.



Filament Wound shafts are perfectly concentric.

Poor CFI and the Importance of Spine Location

Spine finding shafts are necessary because most shafts do not have perfect CFI. In dealing with an imperfect component we cannot possibly make it perfect, therefore we need to minimize the imperfections. This is commonly known as "spine finding". This process allows us to orient the imperfections in a consistent spot when securing the head to the shaft. In steel shafts the spine is where the shaft has been either welded or brazed together. In graphite, poor CFI usually results in exaggerated orbiting, and inconsistent deflection, which cannot be corrected for by spine location. Don't be fooled there is technology that exists which can minimize the imperfection, but the shaft is still of poor quality and will still fall "out of phase" when loaded. In this case we must reject the shaft and select a new one.

What is Linear Flexural Integrity or (LFI)?

It is a test that was developed to measure planar oscillation. When shafts are placed on frequency analyzers and cycled, the shafts planar consistency is critical. Shafts that have planar oscillation can affect our ability to return the club square at impact. By measuring

LFI and orienting the shaft in its most consistent position is one more step in minimizing miss hits due to equipment flaws or tolerances.

Multi-Matching Technology?

Multi-Matching marks a first in the industry in terms of a complete approach to shaft matching. The Multi-Matching machine was created and patented by Apache's Research and Development Department. The machine was designed to allow accurate readings at any point of a shaft in terms of resistance to bending. A roller system is utilized to map the shafts CFI, or Circumferential Flexural Integrity. This testing standard indicates how well a manufacturer has maintained the targeted flexure. It is imperative to strive for this type of symmetry during the manufacturing process since ball dispersion can be greatly affected by it. Evidence strongly suggests that shafts that lack CFI are inaccurate in their dynamic response to deflection since their uneven distribution of flex causes an out of phase recovery. These tests allow Dimension Z Golf to better match the indicated readings of the longitudinal flex profile by assessing shafts based on their zonal flex characteristics. Among the most important functions is it's ability to match the tip and butt section of shafts to a much tighter tolerance than a frequency analyzer will allow. These readings are digitally obtained through load cells and provide each shafts resistance to bending. Matching the tip and butt sections of each set of shafts is the next generation of matching golf clubs.

What is frequency?

Frequency is a dynamic response measurement of a golf shaft's general flex characteristic. The measurement is expressed in terms of cycles per minute that a shaft will oscillate when set in motion with a counting device. Why is frequency important to you? Frequency is a method for measuring that is more accurate than traditional flex designations (i.e. regular or stiff). Your professional can analyze your swing and tempo to determine the exact frequency you need to produce maximum club head speed at impact. When fitted properly, clubs that are built to match one another provide greater distance, control and predictable yardage's. What is frequency matching? Frequency matching refers to a system of matching clubs developed and patented by Royal Precision. The system calls for creating a logical progression of cycles per minute from club to club within a set. For the end user, this means that regardless of length, each club will be matched in terms of the relative frequency (flex) recommended by the fitting professional.

When sets are assembled using precision techniques the result is a tuned set of irons which yield a straight upward sloping frequency line. Irons that are tuned in this fashion will yield more consistent directional patterns from club to club allowing you to "groove" one swing. This type of tuning requires several techniques not utilized in mass production. This type of precision is the standard for touring pros, and now it is available to you only through the The Integrated Tuning Process™

Mass produced sets and most sets built by average assemblers yield frequency results that are inconsistent and unpredictable, resulting in an increased number of poorly struck and uncontrolled shots. Most golfers spend time on the practice tee trying to "groove" their swing. The problem of inconsistent clubs is that they do not all perform consistently from one club to the next. You are then forced to "adjust" or "compensate" with your swing of each club to yield consistent results in your ball flight.

By understanding frequency matching technology you can begin to see the quality

difference that the big names in golf equipment do not deliver.

Now let's look at some other problems that are commonly noted with golf equipment today.

Shaft Flex and Length

When you use a set of clubs that are not the proper flex, it can be detrimental to distance and direction. It is easy to understand that playing irons that are not the correct flex, can affect the distance that you strike your irons. What most people do not understand is how flex can create consistently misdirected shots.

When building a set of irons correctly we go through a sorting process that allows us to identify sets of shafts that we can use together and get a good frequency result. We do this using a several digital devices. Every shaft that comes through our doors is measured on this machine and carefully sorted to match other shafts.

Length is also an important issue to address when discussing golf clubs. Most people play with irons that are too short, forcing them to bend over more or "dip" to get low enough to make solid contact shots. These compensations can have a negative effect on your golf swing and create errant shots as well as physical injuries and problems.

The other length issue that must be addressed when looking at mass produced golf clubs is consistent steps. Each club should step down 1/2 inch from the 2 iron to the PW. Unfortunately the "single stick" mass production process leaves several clubs either too long or too short, which can effect the distance of these clubs and create overlapping clubs and/or holes in your distances between each iron.

At Dimension Z you go through a fitting process that will help determine the right shaft flex and length for your playing style. When your clubs are built we also cut them together to make sure that the 1/2 step is correct. As you get older and your swing changes our "Fit For Life" program allows you to have your clubs reshafted and lie angle readjusted to suit your new style at a fraction of the cost of a new set of irons.

LIE ANGLE

You probably have heard the term "lie angle". This term refers to the angle of the shaft in conjunction to the sole of the club. Lie angle is important, because it allows the golfer to return the clubface to the impact zone in a squared position, taking "Droop" into account. Lie angles are set in the production of each head but can vary as much as 2 degrees of the desired angle. Most large mass production companies do not take the time to double check lie angles before the finished product is shipped. That can be a problem for the customer because:

When the lie angle is too upright the ball flight will go left.
When the lie angle is too flat the ball flight will go right.

By getting fit and determining what the correct lie angle is for your swing style you can substantially improve your consistency and accuracy. It is also good to carry that step even further than the fit. When golf professionals get a new set of irons, they go through

a process of "fine tuning" their lie angles. What this does is allow them to look at every club's ball flight and direction and determine if we need to change the lie angle a little bit one way or another to get the direction of the ball flight path exactly where they want it. This is a process that requires lie angle adjustments within 1/2 degree. Remember that 1/2 degree equals 5 yards right or left of your target line.

At Dimension Z we set every lie angle to its proper setting before they are cut to final length and provide a "Fit For Life" program that will adjust your lie angles free of charge for life (shipping not included).

GRIPS

One of the most underestimated parts of the golf club is the grip. Grips wear out frequently and people often change grip styles and makes based on what is new to the market. What most people do not understand is how the grip can effect the golf club. The grip can effect the golf in two ways:



1. Grips, depending on their weight can make the clubs swing weight heavy or light. It only takes 5 grams at the butt end of a club to change one swing weight. Boxes of grips from the major grips companies usually vary as much as 10 grams or 2 swing weights.

At Dimension Z we weigh all our grips and sort to within 1 gram to ensure consistency.

2. The size of the grip can affect your hands and how fast they release through the impact zone. The larger the grip the slower your wrists will release, and the smaller the grip the faster your wrists will release.

At Dimension Z we determine the best grip size for you in the fitting process.

The Hand Ground Difference



Like the foundation of a house, if it is not level, the house will never be level. The same reigns true with club heads. If they are not ground to the proper weight delta's the set will never be tuned (frequency matched). Frequency matched shafts will never correct unmatched heads. This "match pointing" process of hand grinding every

head is the foundation of a tuned set of golf clubs.

We also use hand grinding for shaping heads to the look a particular player would like to see. We can: Blunt Leading Edges, Round Toes, Thin Top Lines, etc... Due to the amount of man hours involved with head shaping we charge an hourly rate of \$20/hour to shape and/or polish heads.

Frequently Asked Questions??

1. How long does it take to go through the fitting process?

The fitting process takes anywhere from 30 minutes to an hour depending on whether you are fitting for just irons or irons and woods.

2. How much does fitting cost?

Fitting is usually free with no obligation to buy, but if you do not purchase do not expect the fitter to hand you your specifications. Our specifications qualify only for Dimension Z Golf products and cannot necessarily be translated to other brands or components.

3. What is the turn around time for my new set of clubs?

Usually we turn everything around in 3-5 business days. Special order items may take longer.

4. Why doesn't Dimension Z Golf utilize the SST PUREing Process?

99% of the graphite golf shafts that are made in the industry are inferior and need some sort of PUREing process to compensate for their imperfections. Do not be fooled by this statement. PUREing would not be necessary if shafts were made correctly and had minimal imperfections. Unfortunately, much like the tires on your car most shafts are not perfectly round and asymmetrical. Your tires need to be balanced in order for them to perform smoothly on the road. The same is true for most inferior golf shafts. They have such dramatic imperfections that the SST PUREing process is needed to minimize these imperfections. At Dimension Z Golf we have placed very tight restrictions on our graphite shaft manufacturers and we perform 100% shaft CFI testing to ensure our shafts are of the highest integrity possible. By rejecting the poorly made shafts and only using shafts with very tight Circumferential Flexural Integrity we eliminate the need for SST PUREing. Now, we have been told by Dick Weiss (founder of SST PUREing) that he does not believe this is possible and that every shaft needs to go through the PUREing process. We disagree because we can scientifically measure a shaft's resistance to bending in all 360 degrees and throughout the entire length of the golf shaft. By creating these highly definitive "shaft profiles", we can easily recognize and eliminate shafts that will create consistency problems once they are put into play. Contrary to what Dick Weiss believes there are more cost effective and efficient ways of determining how, or even if, we should use a particular shaft. I do believe that there is a place for SST PUREing technology in the industry. Primarily where poor quality shafts are being used, but here at DZ Golf there is no tolerance for inferior components, which immediately sets us apart from the rest of the world.

5. Can my current clubs be reshafted to compliment my fit?

In some cases yes they can, but it is important to remember that Frequency Matching is not only about shafts. It's also about head weight, and most mass produced products do not have proper grams weight deltas to ensure the ability to Frequency Match the set by reshafting. Problems can also occur when the fit calls for longer clubs. All mass produced

irons utilize a standardized weight specification. If those heads are then remade to a longer length the swing weights and over-all weights will grow exponentially. This is why buying a fitted iron from a mass production company such as Titleist or Callaway will usually not result in a well performing golf club. At Dimension Z Golf we carry several weight specs in order to build irons with optimum swing weights at several given lengths.