HIREKO

PROFESSIONAL GOLF CLUBS AT DOWN TO EARTH PRICES

The Dynamic Shaft Fitting Index

with Jeff Summitt

Technical Director, Hireko Golf

Thursday February 11, 2010

2-3PM Eastern Standard Time

Audio settings are set on listen only.
Please post questions in the upper right hand corner Chat box.
Question & Answer period will be at end of webinar.

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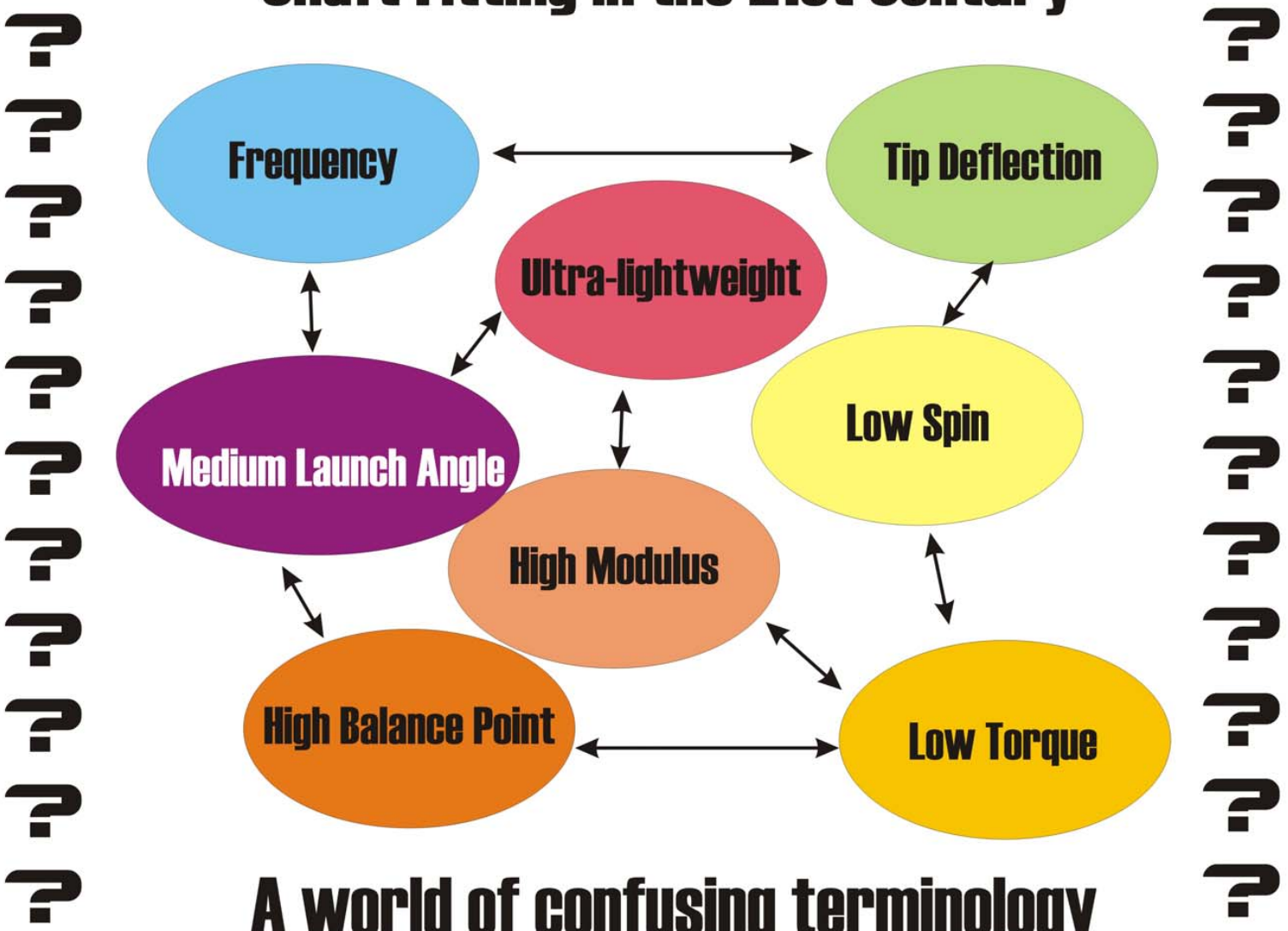
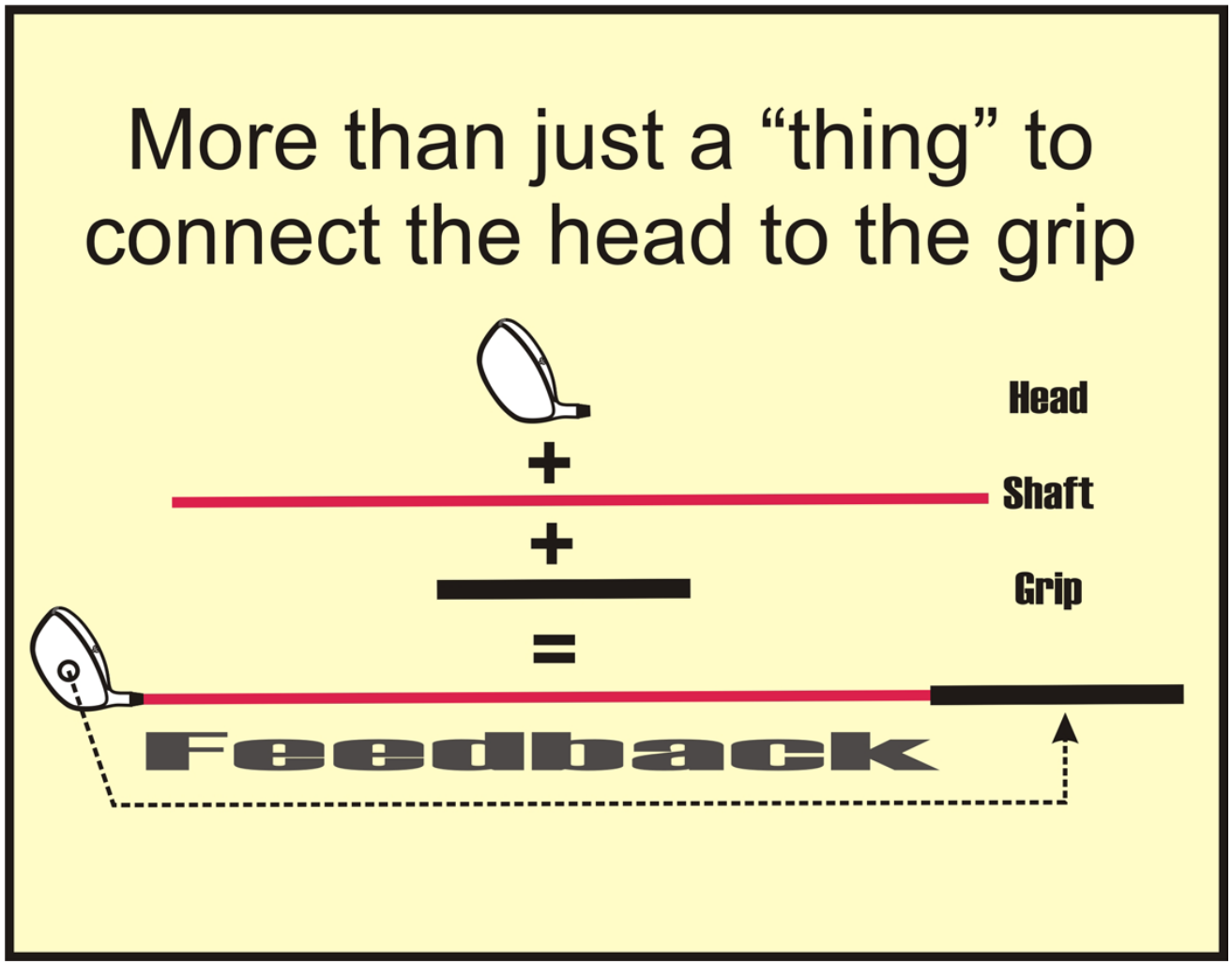
Shaft Fitting in the 21st Century

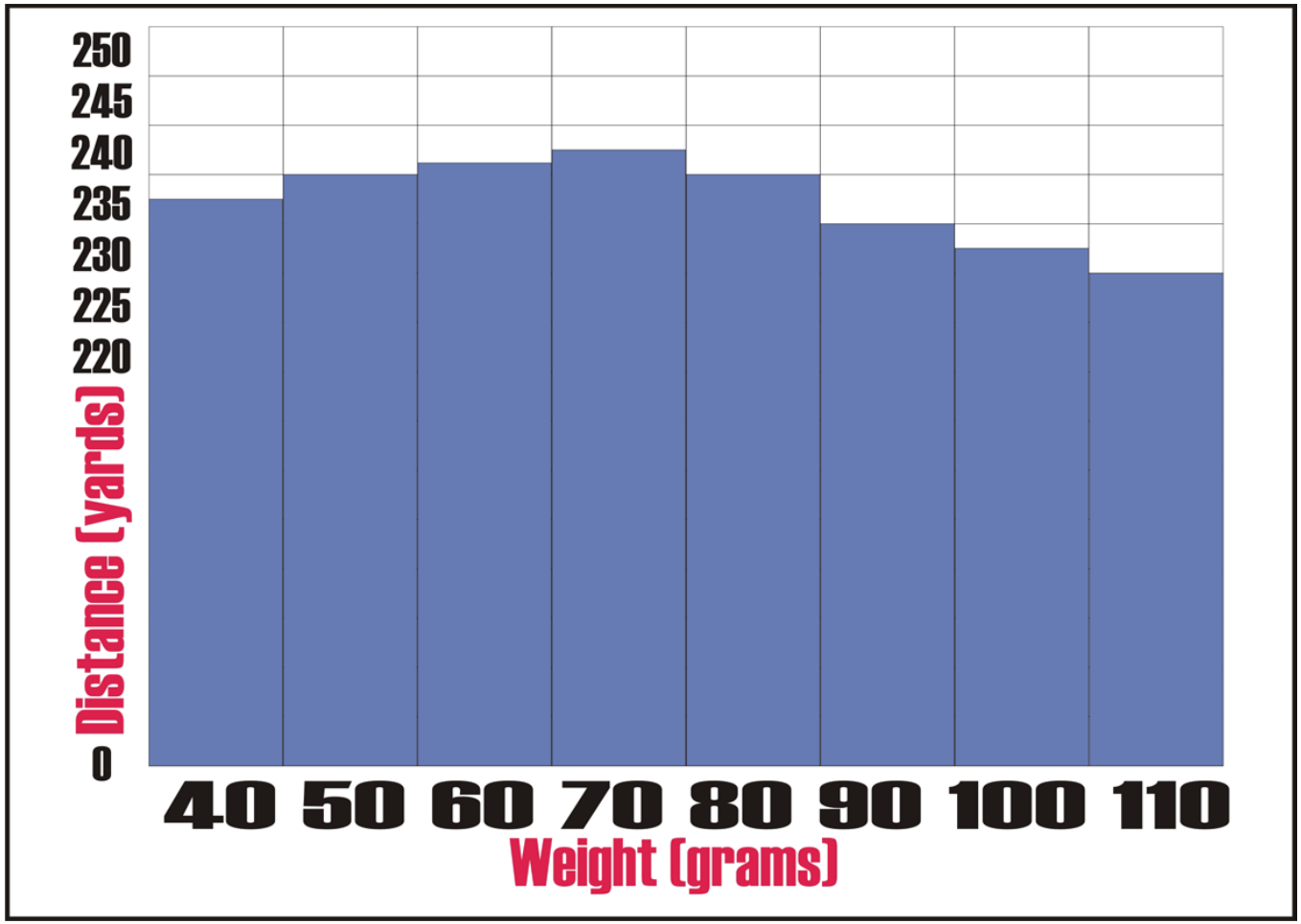


A world of confusing terminology

The shaft acts as a "transmitter"

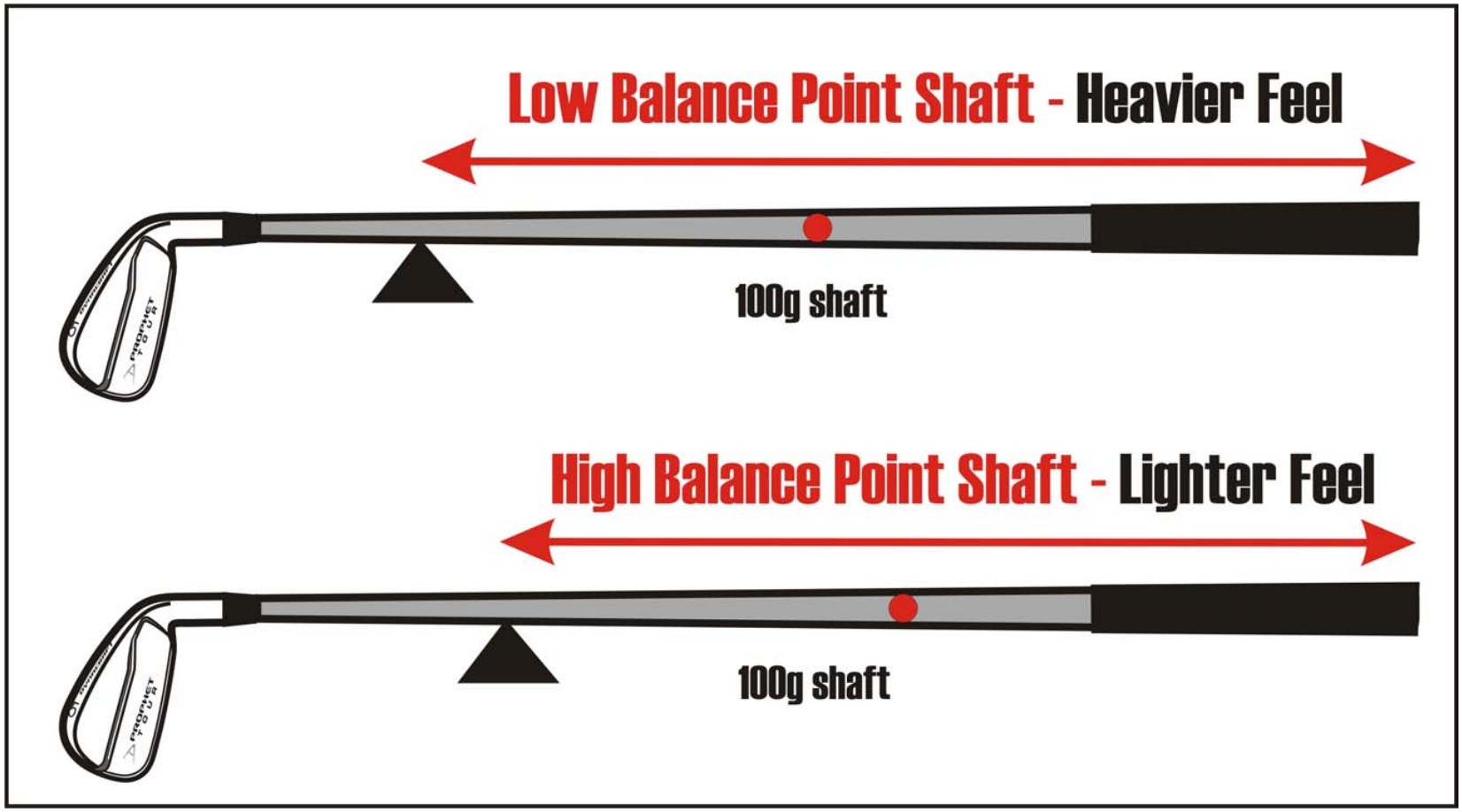


The shaft acts to control timing and rhythm



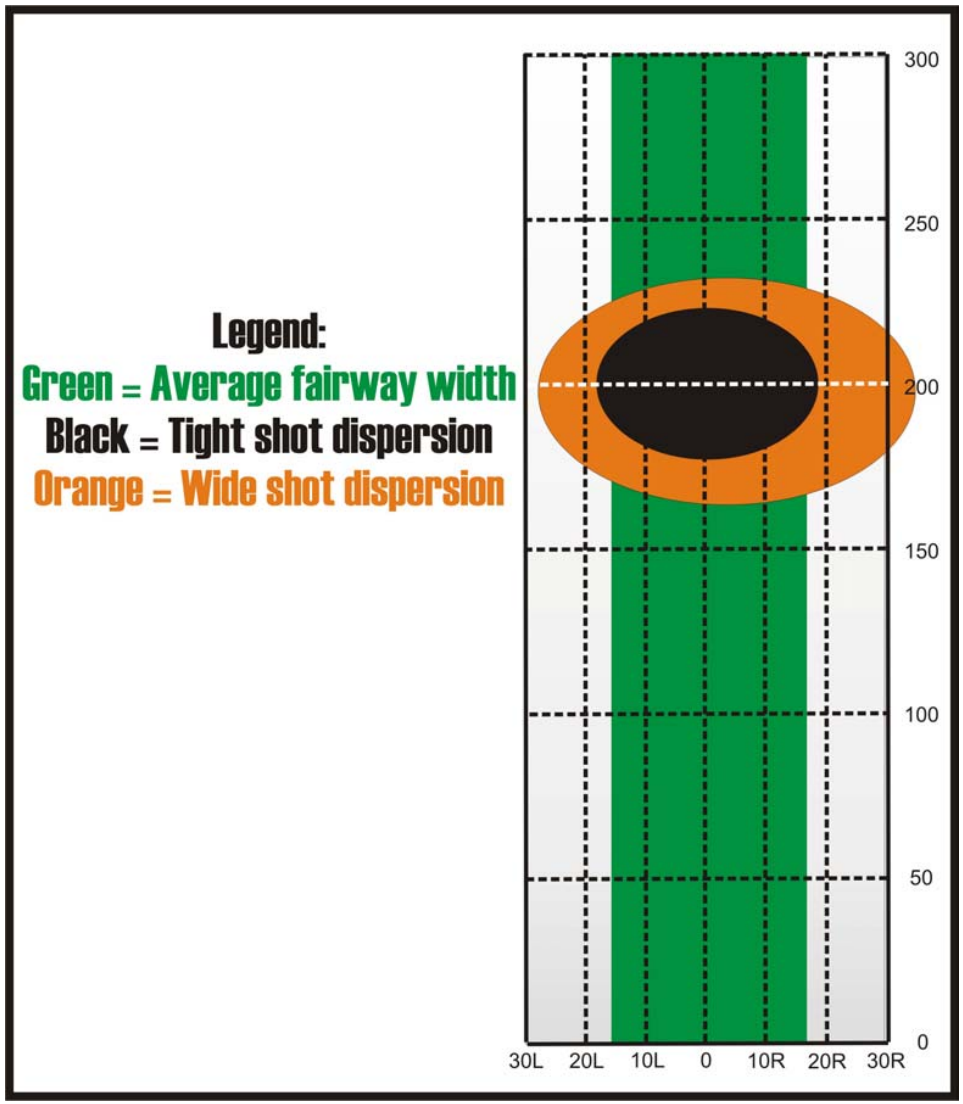
Each person had their personal bell curve

Shaft balance point role on weight

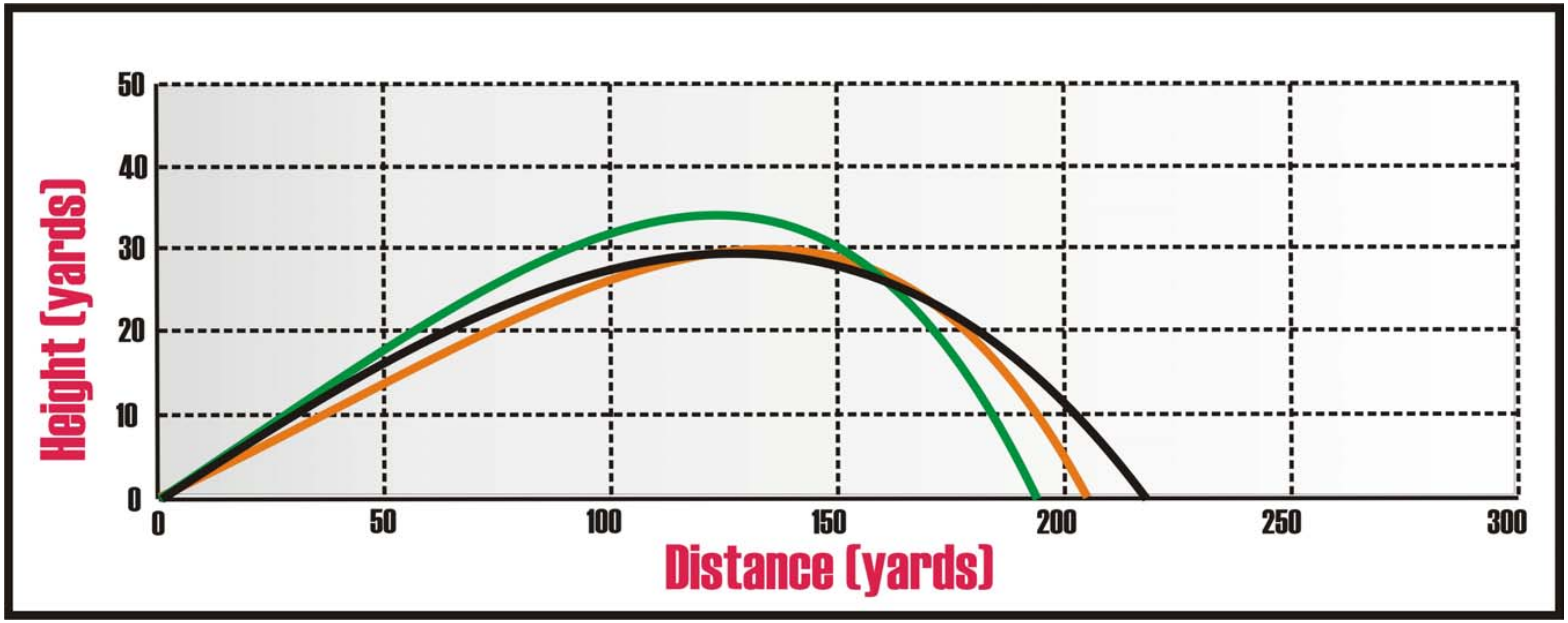


Contributes to the efficiency of the swing

The shaft should provide a balance between Feel and Control



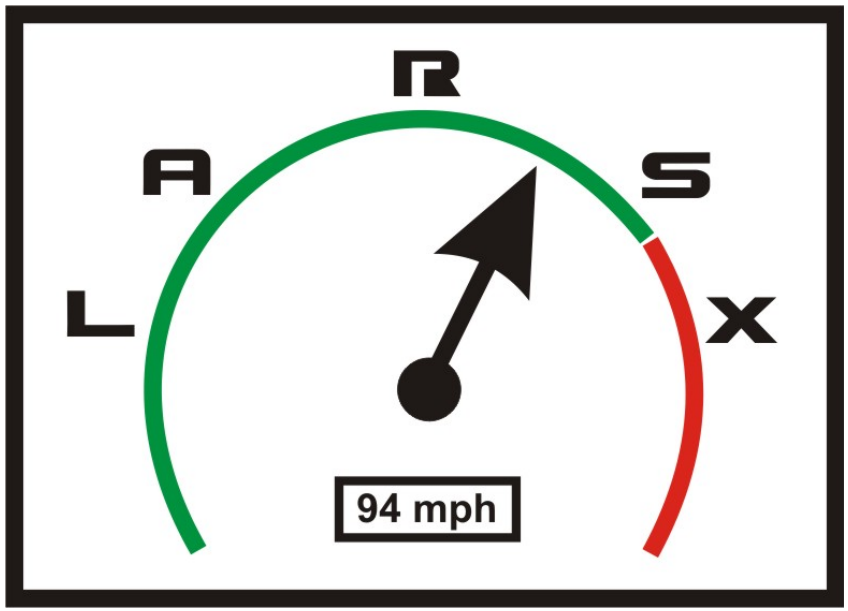
The shaft can provide some trajectory change



Some changes can be seen by the naked eye, others you need a launch monitor to see the subtle differences

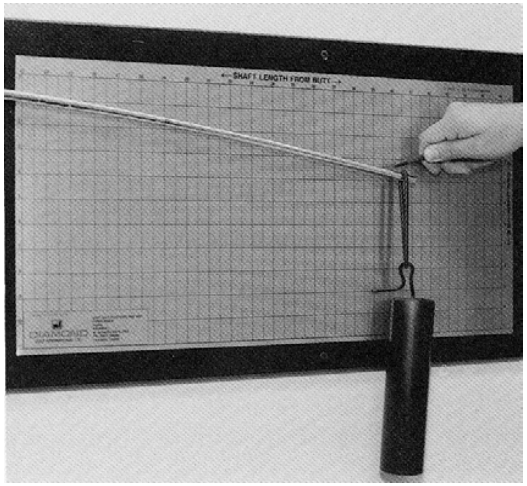
For years, shaft fitting was, and still is, based on swing speed and distance….

Flex	Traditional
L	Up to 60 mph
A	60 –75 mph
R	75 – 90 mph
S	90 – 110 mph
X	110 mph and up



Assumption #1 is that all shaft flexes are standardized – in reality they are not!

Shaft Flex Measuring Methods



Deflection: Static measurement by clamping the butt end of the shaft and applying a known weight to the tip of the raw or cut shaft or the assembled club. Measure the amount the tip deflects downward. The more it deflects – the more flexible the shaft.

Frequency: Dynamic measurement where the butt end is of the assembled club is clamped. The head is "plucked" and set in oscillation. The higher the number of oscillations (at the same given length), the stiffer the club is said to be.

***Not all deflection board and frequency analyzer readings will be the same**

acer Power Play APOLLO bella DYNACRAFT

Average Assembled Club Frequency

Drivers	Steel	Graphite
L-flex	236	229
A-flex	243	234
R-flex	252	246
S-flex	263	258
X-flex	270	271

#5-irons	Steel	Graphite
L-flex	286	264
A-flex	288	268
R-flex	301	281
S-flex	314	292
X-flex	323	304

All L-flexes measured for Driver and 5-iron, C-6 swingweight
All A, R, S & X flexes measured for Driver and 5-iron, D-1 swingweight
All measurements using a 5” clamp with each club gripped

Assembled Club Frequency Ranges

Steel Drivers #5-Irons

Flex	Low	High	Dev.	Low	High	Dev.
L	227	255	28	269	321	52
A	232	268	36	270	301	31
R	233	275	42	257	334	77
S	243	281	38	271	337	66
X	259	284	25	307	335	28

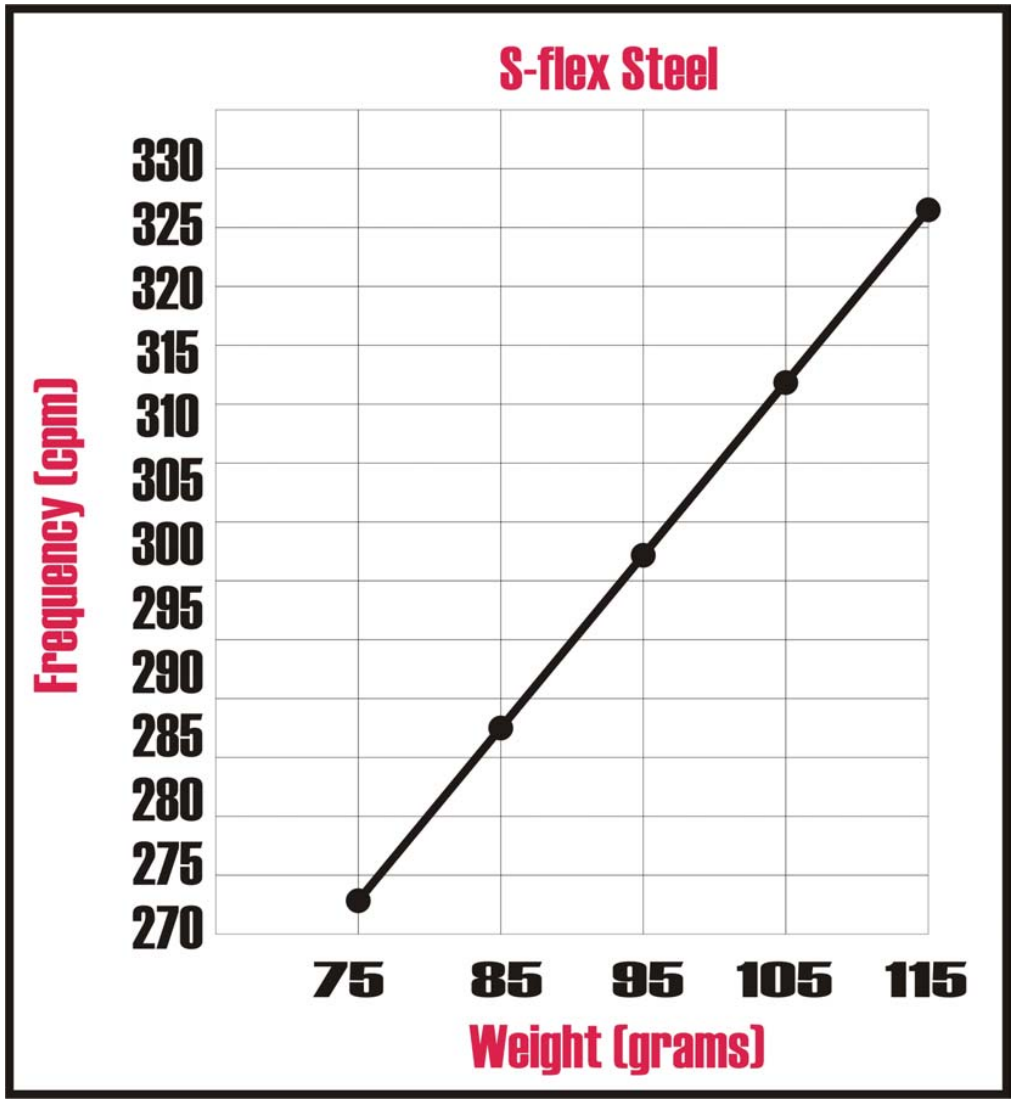
Graphite Drivers #5-Irons

Flex	Low	High	Dev.	Low	High	Dev.
L	204	272	68	227	313	86
A	219	267	48	239	303	64
R	225	277	52	260	320	60
S	226	298	72	267	348	81
X	246	309	63	269	347	78

10 cpm is generally considered one full flex, so 68 cpm would represent nearly 7 flexes.

Remember that there is only 5 flexes!!!

How (Steel) Shaft Flex is Affected by Weight

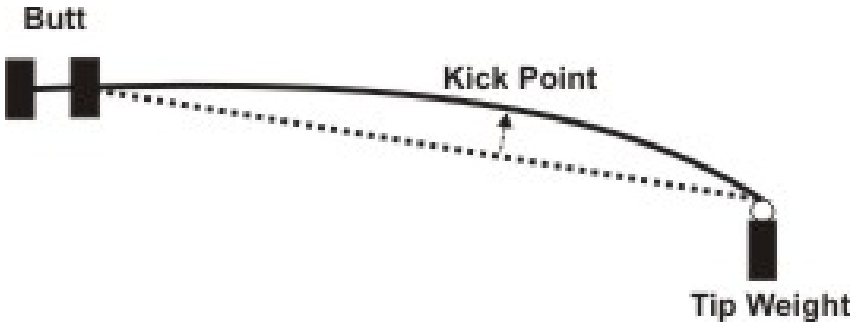


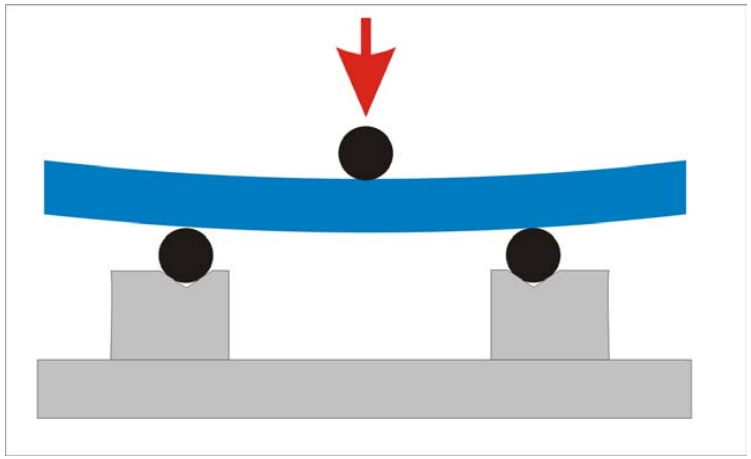
The lighter the weight, the lower the frequency should be

Stiffness Distribution of the Shaft – 3 Tests

Bend Point: The point of maximum bending on a shaft as measured by a compression test of the shaft on both the tip and butt ends and occurs @ 40% up from the tip in a narrow range.

Kick Point: The point of maximum bending of a shaft as measured by deflecting the tip end while the butt remains stationary and occurs @ 45% up from the tip in a narrow range.





Energy Inertia (E.I.) Curves: A three-point bending test that measures / analyzes the load or the stiffness distribution of a golf shaft more accurately inch-by-inch from the tip to butt. Data is feed to computer where a graph is made to replication deflection curvature. Shafts then can be analyzed side-by-side for comparison.

Understanding Stiffness Distribution

Definitions of Bend Point and Kick Point

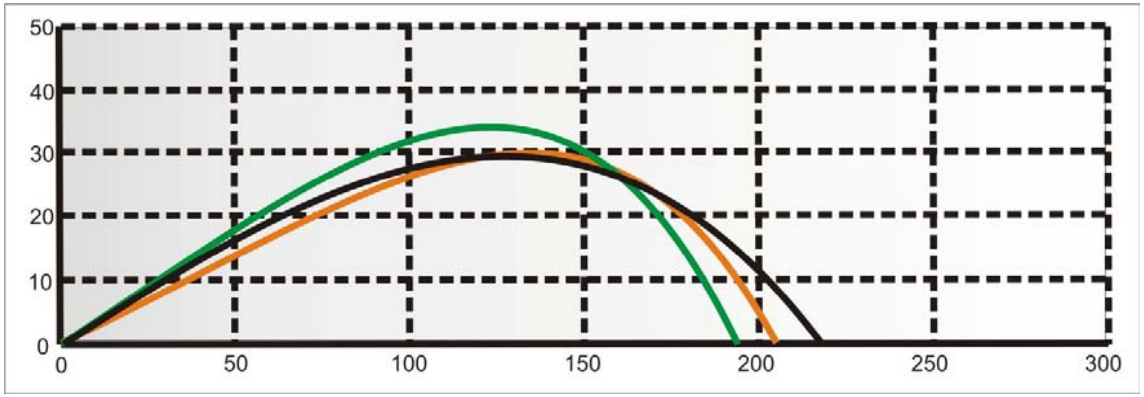
1. Tip firm and butt flexible — High bend or kick point
2. Tip medium and butt medium — Mid bend or kick point
3. Tip flexible and butt firm — Low bend or kick point

- No universal testing method adopted by golf industry
- Overlap from manufacturer to manufacturer
- Measurements are made on raw, uncut shafts – what happens when shaft is cut?

Manufacturers dropped the bend / kick point terms, in favor of ball flight or launch angle.

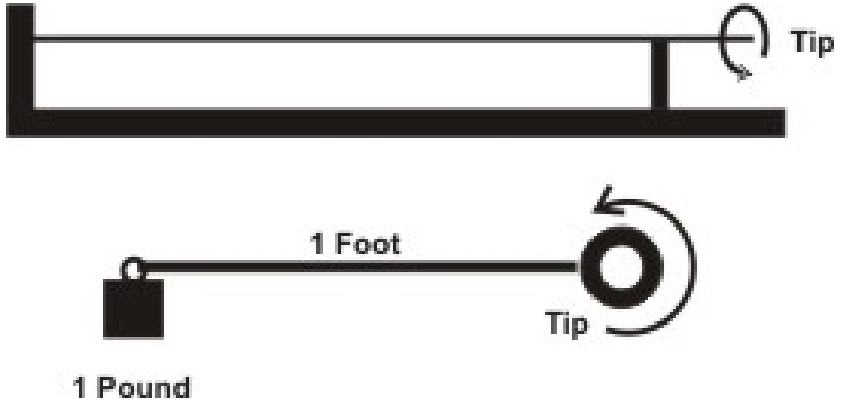
Companies will indicate the trajectory relative to other shafts within ***THEIR*** line based on launch monitor and/or robot data.

1. High Launch or Trajectory
2. Mid Launch or Trajectory
3. Low Launch or Trajectory



Understanding Shaft Torque

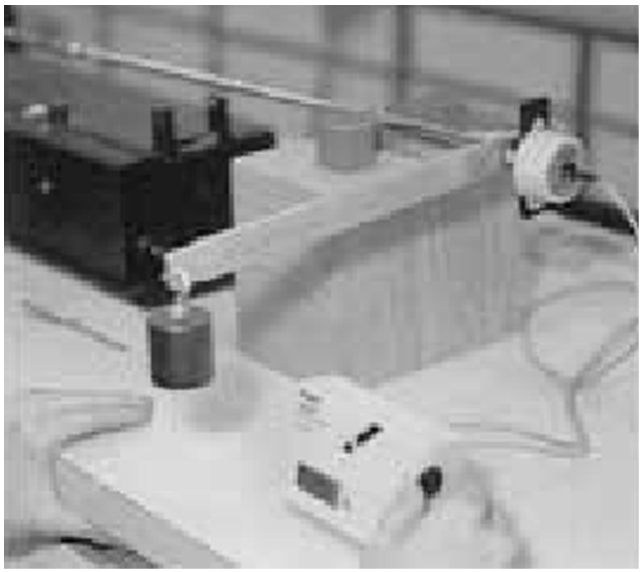
- No universal testing method adopted by golf industry, each manufacturer has their own internal method of testing
- Measurements are made on raw, uncut shafts – but what happens when shaft is cut?



Effect of a Variation in Torque Testing Parameters

2” butt clamp / 1” tip clamp; 1 ft-lb force	3.20º (baseline)
4” butt clamp / 1” tip clamp; 1 ft-lb force	3.09º (-3%)
2” butt clamp / 2” tip clamp; 1 ft-lb force	2.95º (-8%)
2” butt clamp / 4” tip clamp; 1 ft-lb force	2.54º (-20%)
2” butt clamp / 1” tip clamp; 2/3 ft-lb force	2.08º (-35%)
2” butt clamp / 1” tip clamp; 1/3 ft-lb force	1.06º (-67%)

What is the torque of this shaft? It can be any of these!



The Four Basic Shaft Fitting Parameters

Flex, Stiffness Distribution, Torque & Weight

Flex (Generic letters – L, A, R, S & X) – Subjective and ***NO*** uniformity of testing
Stiffness distribution (High, Mid, Low) – Subjective and ***NO*** uniformity of testing
Torque (Measured in degrees) ***NO*** uniformity of testing
Weight (Measured in grams or ounces) Finally something everyone agrees upon!

The only reliable fitting parameter is ***shaft weight*** - other than that lies ***confusion***.

So what is the ***solution***? Uniform testing!!!

50 Shaft Manufacturers, 3000 shafts and 20 years later – Hireko has two reference books:

Modern Guide to Shaft Fitting & the annual ***Shaft Fitting Addendum***

These two reference books available free on Hireko's website under the **SUPPORT** tab

http://support.hirekogolf.com/customer-support/dynamic-shaft-fitting-addendum-download-free/

Introduction to the Dynamic Shaft Fitting Index

Putting it together:
Accurate shaft fitting requires accurate data

- First test shafts using uniform testing methods / apparatus
- Examine data and why people like the shafts they do
- Create a best fit formula to list shafts in order of their stiffness
- Create a methodology that makes it easy to understand and put into everyday nomenclature

DSFI formula uses the data collected and creates a best fit formula to put a number on stiffness based on the measured:

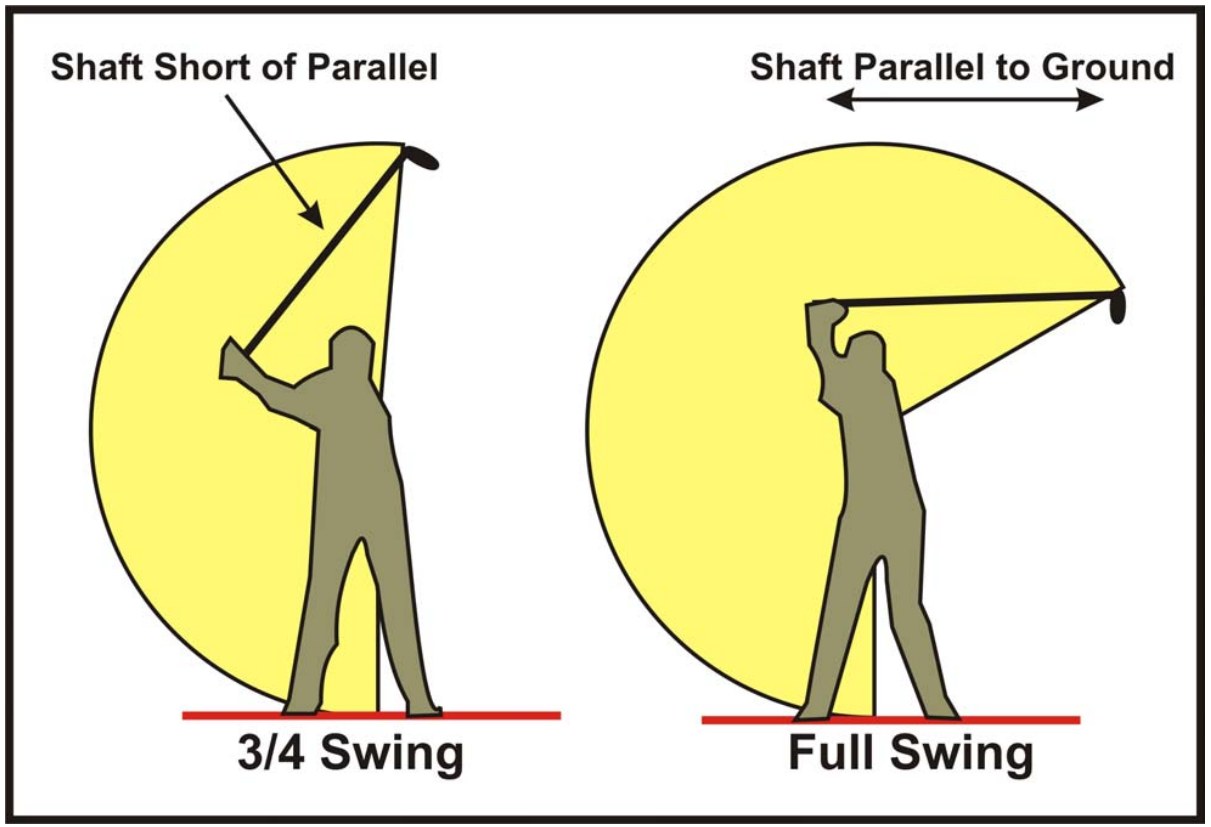
- Frequency
- Torque
- Tip & butt deflections
- Length

Dynamic Shaft Fitting Index – Length of Swing

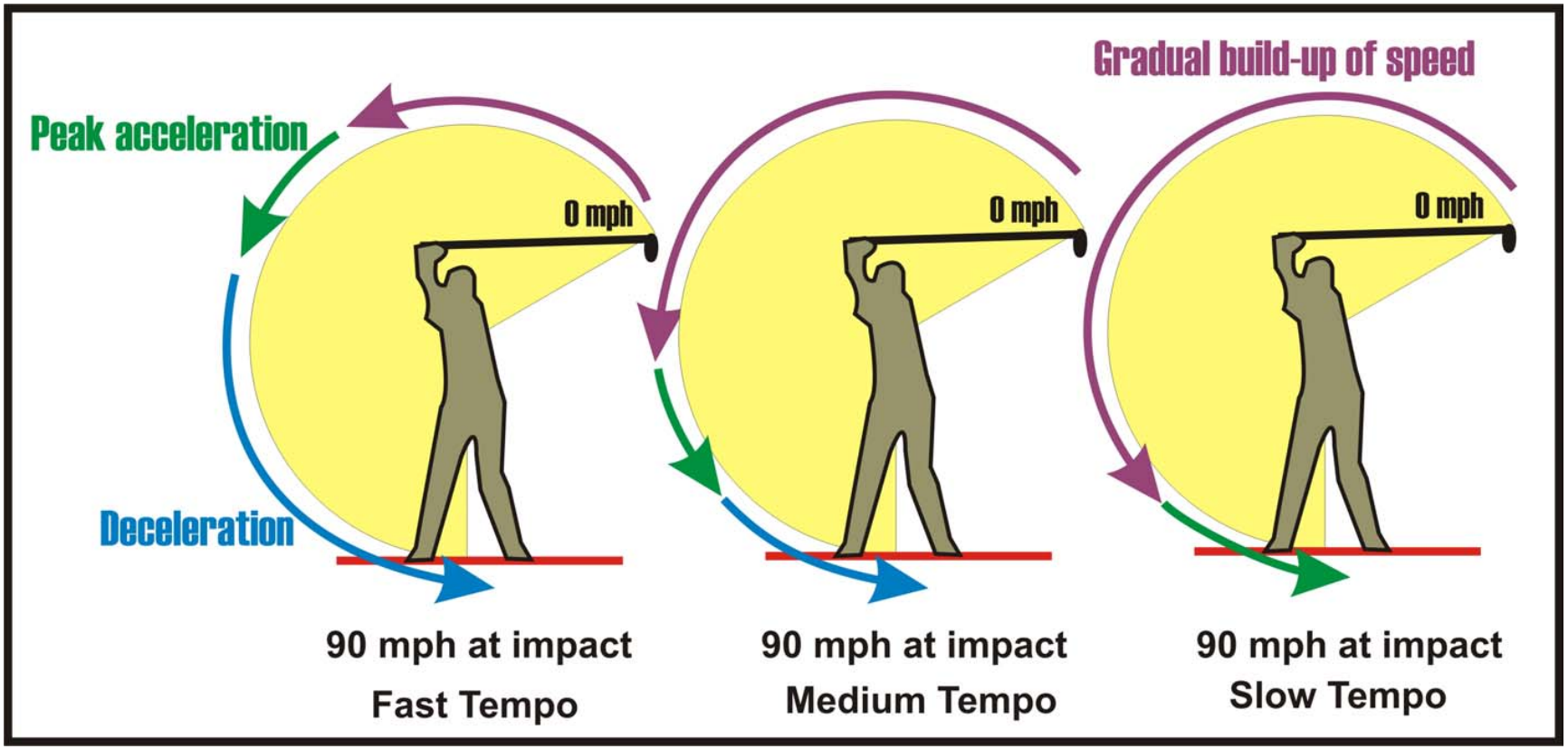
For ease of fitting we used swing speed (miles per hour) as the baseline...

...but we also tie in the length of swing and tempo too

A shorter swing will require a stiffer shaft given the same swing speed as there is less time for shaft recovery on the downswing



Dynamic Shaft Fitting Index – Tempo Range



The faster the tempo the stiffer the shaft needs to be for the same swing speed as more shaft deflection will occur during the downswing.

This is why a shaft with a DSFI of 90 may work well for a range of players with swing speeds between 87-101 mph

Dynamic Shaft Fitting Index – Shaft Comparison

Use the data as a comparative way of fitting – not everyone uses swing speed, but shafts with like features should feel and perform very similarly that is the weight, stiffness, stiffness distribution and torsion. But here is an example of what type of data you will find.

Manufacturer	Shaft	Flex	Shaft Weight (g)	Freq. (cpm)	Butt Deflect. (oz.)	Tip Deflect. (.oz.)	T/B Ratio	Torque Cut (deg)	DSFI
Aldila	Serrano	R	58.7	247	27	15	1.8	5.35	83
Fujikura	Fit-On E250	R	54.5	245	31	11	2.8	4.45	85
Grafalloy	ProLaunch Blue 55	R	53.2	244	32	11	2.9	4.80	84
Grafalloy	ProLaunch Platinum	R	57.1	247	30	8	3.8	4.07	85
New Image	Red Image Graphite	R	57.2	243	35	8	4.4	4.68	84
True Ace	Death Stick	R	50.3	252	32	11	2.9	5.31	85

Sub-sort for preferences like weight, material, stiffness distribution, color, brand name loyalty, dampening, etc…

DSFI: An accurate way to compare shafts...

...as we have already done the work for you

PROFESSIONAL GOLF CLUBS AT DOWN TO EARTH PRICES

THANK YOU FOR ATTENDING!

The webinar will be posted on **youtube.com/hirekogolf** and on our blog at **blog.hirekogolf.com** in just a few hours.

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