



April 23, 2015

On April 14 and 15, Strategic Shaft Technologies retained Golf Laboratories, Inc., of San Diego, Calif., to perform a series of tests on the effects of the SST PURE® Shaft Alignment process. The goal of the test was to isolate shaft orientation as the only difference between two sets of shots with the same club.

The protocol for the test series was created with input from the following people:

- Richard Weiss, SST
- Brian Adair, SST
- Jim Whelan, SST
- Gary Heil, TaylorMade Performance Labs
- Amit Kumar, TaylorMade Performance Labs
- Gene Parente, Golf Laboratories, Inc.

It was decided to test current model “stock” graphite only driver shafts and “stock” six-iron shafts made out of both graphite and steel. These were the shaft models selected:

Driver Shafts. All graphite.

Test ID	Model	Stiffness
A-1	Aero Burner Matrix Ozik	S
A-2	Aero Burner Matrix Ozik	S
B-1	Fujikura 57 Speeder Evolution	S
C-1	Fujikura 67 Speeder Evolution	S
C-2	Fujikura 67 Speeder Evolution	S
D-2	Fujikura 661 Speeder Evolution	S
E-1	Fujikura 757 Speeder Evolution	S

Six-iron Shafts

G-1	TaylorMade Reax 65g (Graphite)	S
H-1	KBS Tour 105g (Steel)	S
H-2	KBS Tour 120g (Steel)	S

Test Protocol

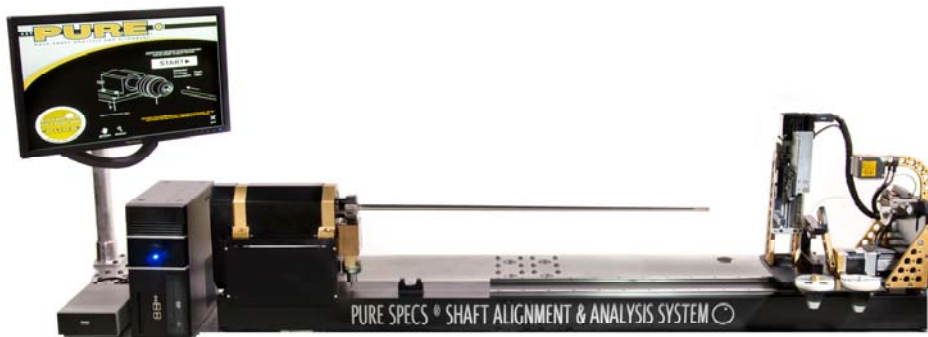
The driver head used throughout the entire test was a TaylorMade R15 (10.5 degrees) purchased off the rack from a retail golf store. The graphite-shafted six-iron had a TaylorMade RSi1 head and was a demo club directly from TaylorMade, while the head used for the two steel-shafted clubs was a RSi2. One shaft was from a new set custom made by TaylorMade for an industry executive and the other from a demo club that TaylorMade provided one of its fitting centers.

Only new **Titleist NXT Tour** golf balls were used.

The test was performed at Golf Laboratories’ test range south of San Diego. The industry standard Golf Laboratories robot was set to swing at 102 mph for each shot. This is the same machine TaylorMade and other major OEM’s use for their tests with Golf Laboratories.

The test was conducted in the following manner for each shaft:

- The shaft was analyzed and aligned using SST’s patented PURE SPECS® automated system to find its’ most stable, or PURE®, orientation.



- For each driver shaft, a **TaylorMade tip adapter** was installed with the neutral orientation 90 degrees from the PURE plane. The adjustable weights on the R15 head were left touching each other in the middle in the neutral position. Each six-iron shaft



was installed directly in the hosel in the PURE orientation. Where possible, each non-PUREd test was performed in the shafts original "logo-up" factory installed position.

- A **Golf Pride Tour Velvet 58 Round** grip with one wrap of double-sided tape was installed on every shaft.
- The finished club was put in the **Golf Laboratories swing robot** and hit 10 times in the PURE orientation.
- Each shot was measured using a **Trackman Golf launch monitor** as well as by a Golf Lab technician in the field at the landing spots.
- The clubhead was then removed and re-installed into a position deemed by SST staff to be a non-optimal orientation. The grip was not removed when the shaft orientation was changed.
- For the drivers, the tip adapters were removed and re-aligned. The adapters were re-used in most cases or replaced when damaged during removal.
- The club was reassembled in the non-optimal shaft position and hit another 10 times in the robot.
- The 10 shots in each shaft orientation were averaged.
- The process was repeated for each shaft.

Note: No swing robot will hit every shaft and clubhead combination straight, even when each club is placed in the robot with a square clubface. This is due to the constant swing speed used during the test. Off-line shots are caused by variations in shaft flex.

A constant swing speed is required, however, to isolate the shaft orientation as the only difference between sets. To accommodate this, during the PURE testing the face angle of each club was adjusted by a certain number of degrees to achieve a center of the clubface hit. Before each non-PURE testing, the face angle of each club was adjusted by same number of degrees as during the PURE test.

The goal was to swing the club in the exact same way in both the PURE and non-PURE positions, with the only difference being the orientation of the shaft.

What did it show?

Carry Dispersion

A significant variance was shown in shot dispersion from the PURE orientation to the non-PURE orientation. The distance is measured in feet to the left and right of the center line.

	PURE		non-PURE		△
<i>Drivers</i>					
A-1	12.9	R	124.2	R	111.3
A-2	9.8	R	45.0	L	54.8
B-1	4.2	R	59.0	R	54.8
C-1	2.5	R	44.7	L	47.2
C-2	13.1	R	46.5	R	33.4
D-2 (off-center)	17.3	R	40.0	L	22.7
E-1	0.5	L	14.7	L	14.2
				Average △:	53.3
<i>Six-irons</i>					
G-1	17.8	R	31.3	R	13.5
H-1	13.6	R	31.5	R	17.9
H-2	11.0	R	36.2	R	25.2
				Average △:	18.9

Spin Rate

Spin rates were significantly lower in the PURE position.

	PURE		non-PURE		△
<i>Drivers</i>					
A-1	3101		3976		875
A-2	2674		3874		1200
B-1	2964		3883		919
C-1	2877		3460		583
C-2	2996		4059		1063
D-2 (off-center)	3662		3133		-529
E-1	2838		2866		28
				Average △:	591
<i>Six-irons</i>					
G-1	5745		7191		1446
H-1	6655		6651		-4
H-2	5932		6212		280
				Average △:	574