

TWGT SHAFT DESIGN & ANALYSIS

Frustrated by the inability of shaft flex letter codes to provide a clear comparison of shaft flex from a fitting standpoint, Tom Wishon began gathering empirical data on shafts back in the early 1980s. The early result of those hundreds of hours of research was his book, *The Modern Guide to Shaft Fitting* (1991).

However, while the book shed light on a lot of shaft-fitting factors, and demonstrated comparative frequency measurements for most of the industry's existing shafts, it soon became clear that the single butt frequency measurement was not nearly enough to explain the real fitting differences among shafts. Thus, in the mid-1990s, Wishon increased the number of frequency measurement points on the shaft to determine more of the shaft's empirical stiffness/flex differences. In what he calls 'zone stiffness' measurement, it became a little clearer how shafts with the same butt stiffness can exhibit drastically different overall bending profiles of stiffness, and thus perform as totally different shafts.

Continuing his work in 2002, it became apparent that Wishon's original methodology for trying to illustrate the entire shaft's bend profile was confusing and not sufficient for getting closer to learning whether a particular shaft is suitable for a golfer. Wishon's previous zone stiffness measurement protocol was hamstrung by the fact that the industry's testing equipment at the time was unable to read frequency measurements when shafts were clamped extremely close to the tip end.

However in 2002, TWGT successfully re-engineered the measurement capability of its testing equipment, and it became possible to obtain stiffness readings closer to a shaft's tip section. As a result of the new testing protocols, TWGT generated bend profile data that illustrated more logical shaft-to-shaft comparisons.

Among the most immediate benefits of this change in shaft testing, TWGT designed its inaugural 2003 line of shafts to more precise specifications of stiffness throughout the shafts' entire length. In turn, TWGT shaft designs matched more closely to specific golfer swing mechanics.

TWGT soon received a tremendous number of comments praising the playability of its ZT Series, InterFlexx, LV Technology and Series 5 steel shafts, and Wishon and his staff felt very satisfied that their many hours of work was providing real benefits to clubmakers and golfers.

For 2004, TWGT will unveil more about quantitative shaft comparisons in its monthly *eTECHreport* and *TECHreport* journal as well as on its web site, *wishongolf.com*. As always, Wishon's personal goal remains the offering of more and more shaft fitting data so clubmakers can better understand the differences in shaft design to more precisely fit their golfers. (For example, see Graphs 1, 2 & 3.)

Graphs 1 & 2 illustrate the individual Shaft Bend Profile illustrations of the InterFlexx (R) High Launch and Interflexx (R)

Mid/Low Launch wood shafts. Each graph shows the stiffness profile of the two shafts separately as a continuous upward curved line which is a far better way to show how the stiffness of a shaft unfolds over its entire length. Viewed individually, the two shaft model graphs appear very similar to one another. No real fitting observations are seen until they are overlapped, as shown in Graph 3.

Once one shaft bending profile has been superimposed over the other, it becomes clear how the Interflexx High (R) and InterFlexx Mid/Low (R) differ. With this information, it is possible to see that the two shafts possess the same butt stiffness, which allows them to be fit to the same golfer swing speed with no difference in initial downswing force. But, by following the stiffness of both shafts over their entire length, it becomes apparent how the launch difference is created by the change in stiffness at the shaft's center section in comparison to the more dramatic difference of the shafts' tip sections.

Imagine a player is interested in the InterFlexx R-flex shafts, but does not know anything about how either shaft plays. If a shaft profile graph is available for a shaft of which the player is familiar, it could easily be overlaid upon the InterFlexx shafts to reveal a more precise picture of the shafts' differences.

TWGT is continuing to build its data base of shafts using this new measurement method, and that data base will soon be available to clubmakers in illustrative form so that

bend profiles of different shafts can be overlaid for comparative purposes and for better understanding performance differences.

While the compilation of the graphic information in this new form requires constant on-going work, Wishon and the entire TWGT staff is very excited about the possibilities this will provide for custom clubmakers in learning more precise ways to select shafts and to visually show their customers how or why a particular golf shaft may or may not be a suitable fit.

