HOLTZMAN ENGINEERING, IN

GOLF CLUB *LOFT & LIE GAUGE*

www.holtzmaneng.com
info@holtzmaneng.com
10/16/14 MADE IN USA
PATENT PENDING

This gauge measures loft, lie, and face angle, and face progression and hosel offset on RH and LH heads with or without a shaft installed. These instructions detail preferred procedures; **others will work**.

ASSEMBLY Hold the riser's notch firmly against the base and screw it to the base. Attach the clamping bar to the riser on the end shown for RH heads, opposite for LH heads. The lowest hole is normally used when clamping on hosels of irons, hybrids, and fairway woods, the second from lowest on hosels of drivers and wedges, and the next-to-top hole when clamping on shafts (accuracy requires clamping on the shaft's parallel tip portion). Use what works best. Screw the support leg in the top hole of the riser's opposite end. Gauge positions are its **base position (PIC 2)** and its **edge position (PIC 4).** The work area must be (very) flat and (approximately) level.

DIGITAL LEVEL In all procedures, the level should first be **zeroed** on the **same side** used for measurement in a direction **parallel** to that of the intended measurement. **Use the level's top side (no magnets) on magnetic faces to avoid inadvertently moving the head.** The bulge and roll foot has four pads which provide stability for the level when placed on faces which are not flat (woods, hybrids). It is placed on the level with its shoulder against and anywhere along normally the level's front bottom edge.

POSITIONING THE HEAD The head must be positioned in the gauge in the proper lie angle and face angle and this requires **practice and patience** to achieve repeatable results. An error in setting these angles will produce an error in loft reading. For instance, a 1 degree face angle error results in about a ½ degree loft error.
Lie angle is NORMALLY adjusted so the **sole's center touches the base plate**. Place a vertical mark centered on the face's grooves and, using two business cards inserted between the sole and base plate (**PIC1**), adjust lie angle until the cards are equally spaced from the mark.
Face angle is NORMALLY adjusted so the **head's face is square with the gauge.** This adjustment is made with the gauge in the **edge** position. First zero the level on the upward facing base edge, then place the level it on the face with its **front edge held against the base (PIC 3).** If the face has more than about **45 degrees of loft**, tilt the gauge by placing a block (.75"-1") under the support leg to move the level's front closer to vertical. Rotate the head until the level reads zero, thus squaring the face (**PICS 3 & 5**). For curved faces, use the bulge and roll foot.
Check and re-check these angles multiple times **before proceeding** since a change in one affects the other.

LOFT and LIE ANGLE After the head is properly positioned (above), **loft** can be measured with the gauge in the **edge** position. Zero the level on the clamping bar's or riser's upward facing side, then place it on the face to read loft (**PICS 4 & 6**). For curved faces, use the bulge and roll foot. **Lie angle** is measured with the gauge in the **base** position by zeroing the level on the base and then placing it on the clamping bar; **actual lie angle is the level's reading subtracted from 90** (**PIC2**).

FACE PROGRESSION and HOSEL OFFSET **Face progression** is the distance from the hosel/shaft centerline to the leading edge of the club. The gauge's design puts the hosel/shaft centerline 1 inch from the edge of the base. Face progression, therefore, is the distance from the head's leading edge to the base's edge (PIC7) **subtracted from 1 inch**. For instance, if the measurement is .75", the face progression is 1"-.75"=.25", the positive number indicating the head's front edge "leads" the hosel centerline by .25". **Hosel offset** is the distance from the hosel's leading edge to the head's leading edge, so **hosel offset is the face progression less ½ the hosel diameter**. In the above example, if the hosel diameter is .550 inches, the hosel offset is .25"-(.550/2) = -.025, the negative number indicating the head's leading edge "lags" the hosel's front edge by .025".

OTHER LIE AND FACE ANGLES A club head's design may use different lie and face angle criteria than described above. For instance, a driver head may be designed to have an open or closed face angle (not square) when its sole is resting naturally on the ground (or on the base). Most driver heads are also designed to have a lie angle so the head is toe-up. These alternate lie and face angle positions can of course be chosen in the above procedures. The important thing when making **comparisons** is **consistency.**

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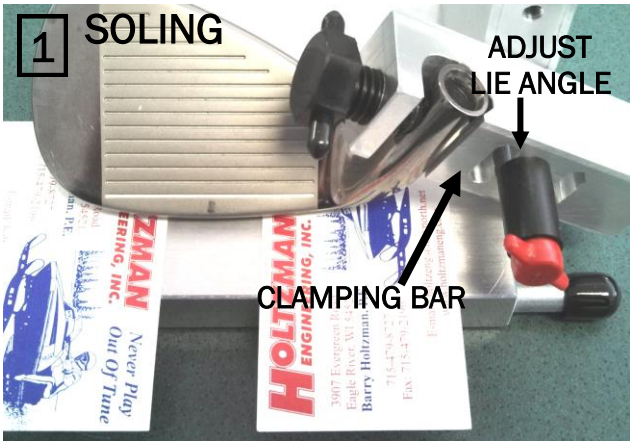

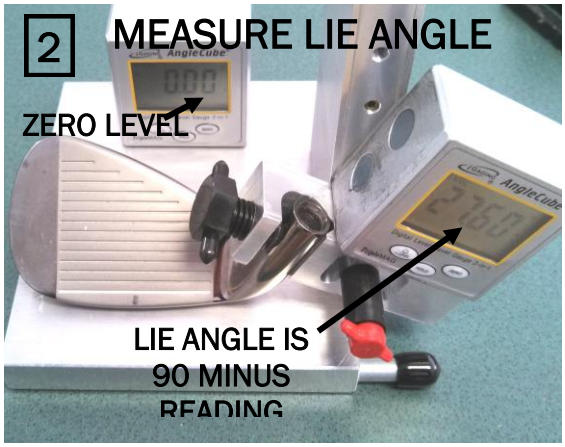

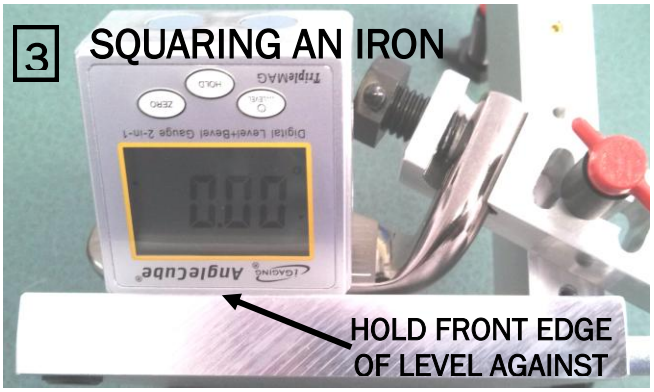

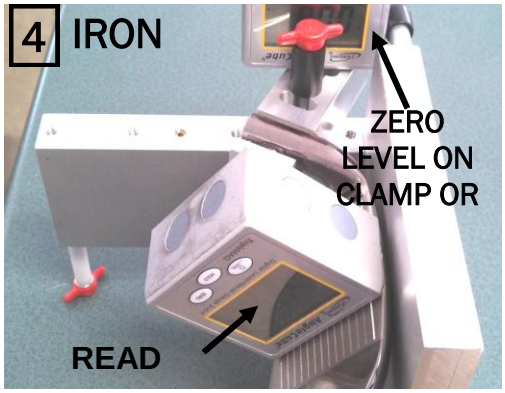

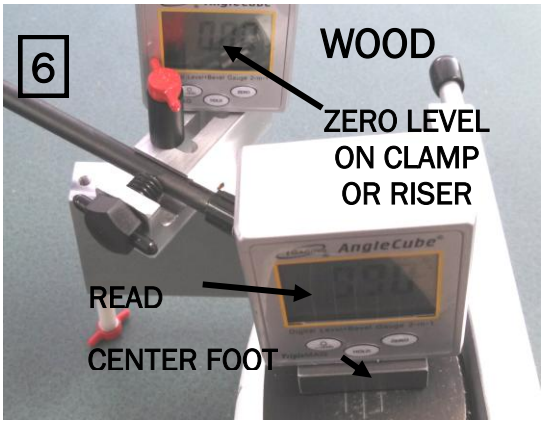

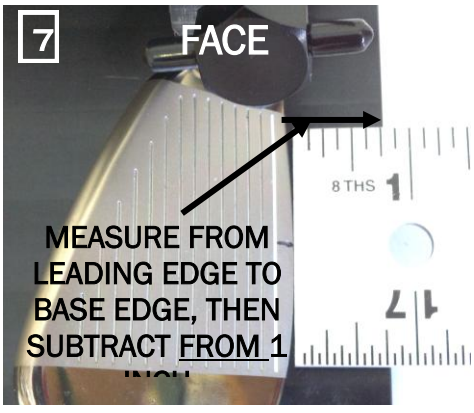

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