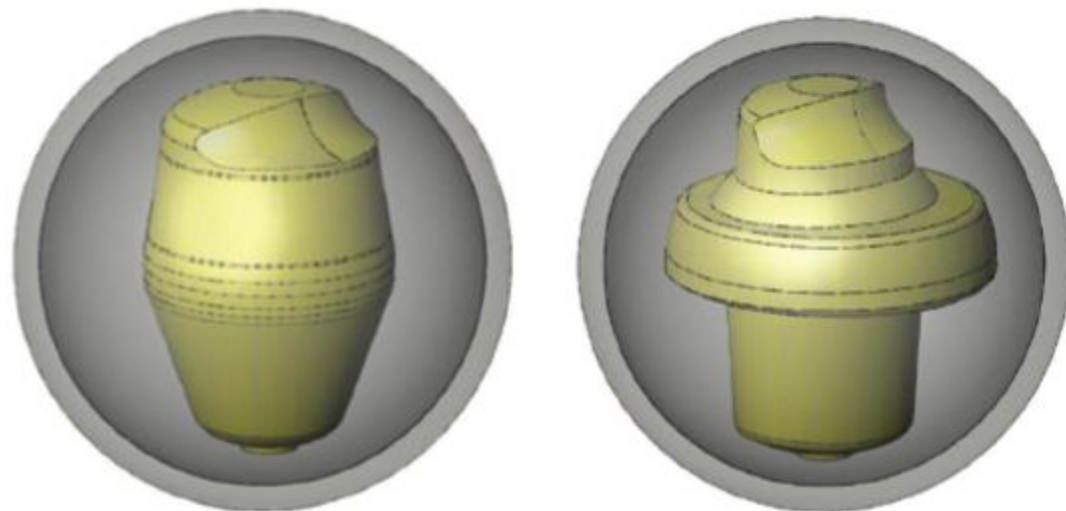


***Balance hole
recommendations
for both
symmetrical and
asymmetrical balls***

RADICAL

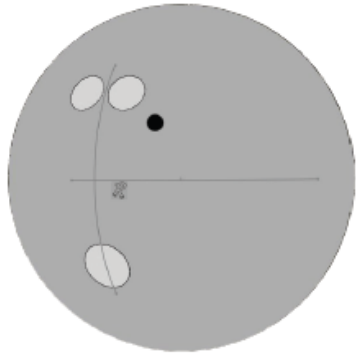
BOWLING TECHNOLOGIES®

Suggested Symmetrical Layouts



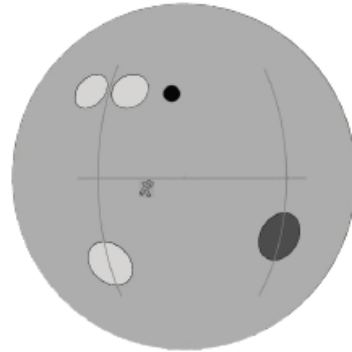
Symmetrical Drilling Suggestions

Pin Under – No Balance Hole - Ultimate Control Layout



Place pin 3" to 5" from PAP for desired flare.

Pin Beside with Balance Hole - Medium Revving with Continuation

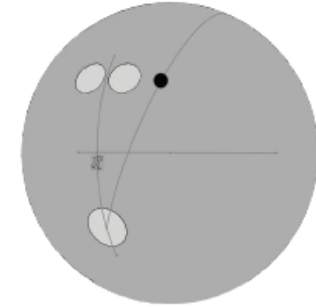


Place pin 3" to 5" from PAP for desired flare.

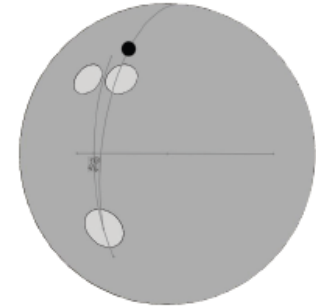
Place Balance Hole on the VAL, 1 1/2" below the midline.

NEW Drilling Layout - MOTion Hole Drilling - Strongest back end reaction

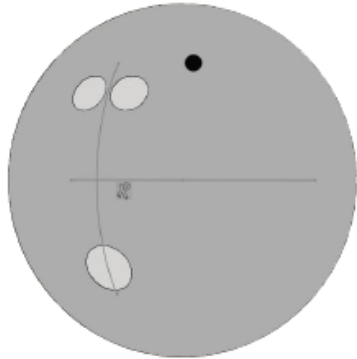
For PAPs 5" over or more:



For PAPs less than 5" over:

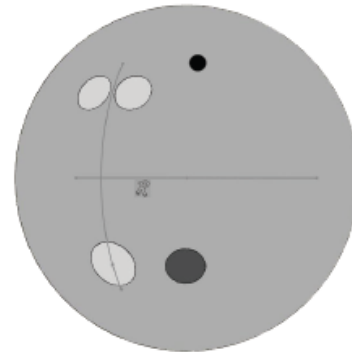


Pin Over – No Balance Hole - Later, Sharper Breakpoint with Control



Place pin 3" to 5" from PAP for desired flare.

Pin Above with Double Thumb Balance Hole - Fastest Revving Layout



Place pin 4" from PAP - 30 degree VAL angle. Place Center of Balance Hole 1 3/4" from edge of thumb assembly **Pitched** 1 1/4" away from the thumb. Drill balance hole 2 3/4" deep.

Draw a line on the ball from the center of the thumb hole through the pin. Extend the line 10" past the pin to the bottom of the ball and mark that spot that is 10" from the pin. That is the intended location for the balance hole. Place a piece of white tape on that spot. Bowl with the ball to make sure the ball doesn't flare over the tape. If the ball flares over the tape, move the tape sideways to miss the track flare. Drill the balance hole 4" deep. Start with a 3/4" diameter hole. Increase the diameter of the hole to as much as 1 1/4" to increase the backend reaction, if desired.

Balance hole location and size is critical to ball motion.

Balance Holes for Symmetrical Balls

4 locations to create ball motion.

- On the VAL, 1 ½” below the midline for sooner reaction.***
- Double Thumb hole for maximum hook. More reaction, sooner. (Best for medium and low track players.)***
- MOtion Hole for later, sharper reaction. (Great for high track players.)***
- Balance hole at the bowler’s PAP will reduce flare and overall hook.***

Start with a smaller hole about 2 ¾” deep.

Increasing the size will enhance the effect of the hole.

It’s much easier to make a hole bigger than smaller!

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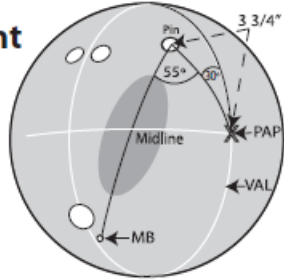
Suggested Asymmetrical Layouts



Asymmetrical Drilling Suggestions

Sharper Breakpoint layout =

55° Drilling Angle X 3 3/4" Pin to PAP X 30° VAL Angle



Recommended Pin Distance 2-5.5"

A

More Angular Breakpoint

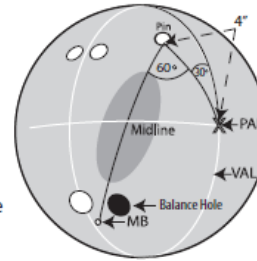
Use for most players on most patterns

High Track Bowlers
Less Than 12 Degrees of Initial Axis Tilt
Use: 70° X 3 3/8" X 30°
Recommended Pin Distance 2-5.5"

Low Track Bowlers
More Than 18 Degrees of Initial Axis Tilt
Use: 45° X 4 1/4" X 25°
Recommended Pin Distance 3-5.5"

Maximum Flare layout =

60° Drilling Angle X 4" Pin to PAP X 30° VAL Angle



Recommended Pin Distance 3-6"

D

Most Aggressive Layout

Use for rev challenged players and longer heavier oil patterns

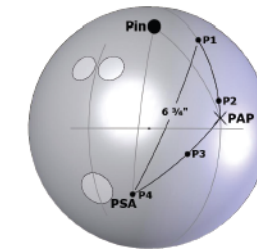
High Track Bowlers
Less Than 12 Degrees of Initial Axis Tilt
Use: 70° X 4" X 30°
Recommended Pin Distance 3-6"

Low Track Bowlers
More Than 18 Degrees of Initial Axis Tilt
Use: 50° X 4" X 30°
Recommended Pin Distance 3-6"

Determining the Bowler's Initial Axis Tilt: Initial Axis Tilt is best determined by measuring the distance across the bowler's initial ball track on the surface of the ball. A measurement of > 11 1/4" (< 12 degrees) indicates a high track bowler. A measurement of 10 1/4" to 11 1/4" (12 to 18 degrees) indicates a medium track bowler. A measurement of < 10 1/4" (> 18 degrees) indicates a low track bowler.

Ball Surface & Cleaning: RADICAL bowling balls are manufactured with a predetermined surface preparation. With the assistance of a qualified pro shop, sanding, scuffing, or smoothing the surface texture may be needed to optimize performance for different styles of players on different lane conditions. We cannot overemphasize the importance of regularly cleaning your RADICAL ball with a quality bowling ball cleaner IMMEDIATELY AFTER each use. Doing so will insure a more consistent reaction and maximize the life of your RADICAL bowling ball.

Balance Holes for Asymmetrical Layouts: If, and when, a balance hole is needed, we recommend using the "Gradient Line Balance Hole System". The Gradient Line extends from the PSA to P1 passing through the PAP.



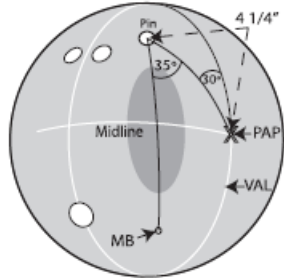
Balance Hole Locations on the Gradient Line

Balance hole Position	Location	Change in Ball Reaction
P1	6 3/4" from the PSA on the VAL	Weakens ball reaction
P2	1/3 of the distance from the P1 to the PSA	Maintains ball reaction
P3	2/3 of the distance from the P1 to the PSA	Strengthens ball reaction
P4	PSA	Maximizes ball reaction

Legend for the Asymmetrical Layout Pictures:

Midlane layout =

35° Drilling Angle X 4 1/4" Pin to PAP X 30° VAL Angle



Recommended Pin Distance 2-5.5"

B

Heavy Forward Roll

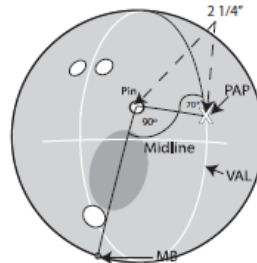
Use for Speed Dominant Players and/or heavier oil volumes

High Track Bowlers
Less Than 12 Degrees of Initial Axis Tilt
Use: 45° X 4" X 35°
Recommended Pin Distance 2-5.5"

Low Track Bowlers
More Than 18 Degrees of Initial Axis Tilt
Use: 20° X 4 3/4" X 30°
Recommended Pin Distance 3-5.5"

Reduced Flare layout =

90° Drilling Angle X 2 1/4" Pin to PAP X 70° VAL Angle



Recommended Pin Distance 2-4"

E & F

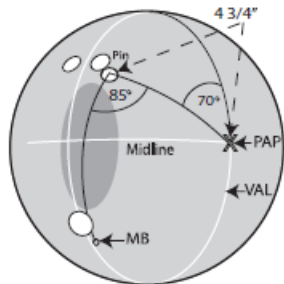
Least Aggressive Layout

Use for Rev Dominant Players and shorter, lighter oil volumes patterns

Use this layout for ALL BOWLERS

Control layout =

85° Drilling Angle X 4 3/4" Pin to PAP X 70° VAL Angle



Recommended Pin Distance 2-3"

C

Smooth Continuous Hook

Use for Rev Dominant Players and/or lighter oil volumes

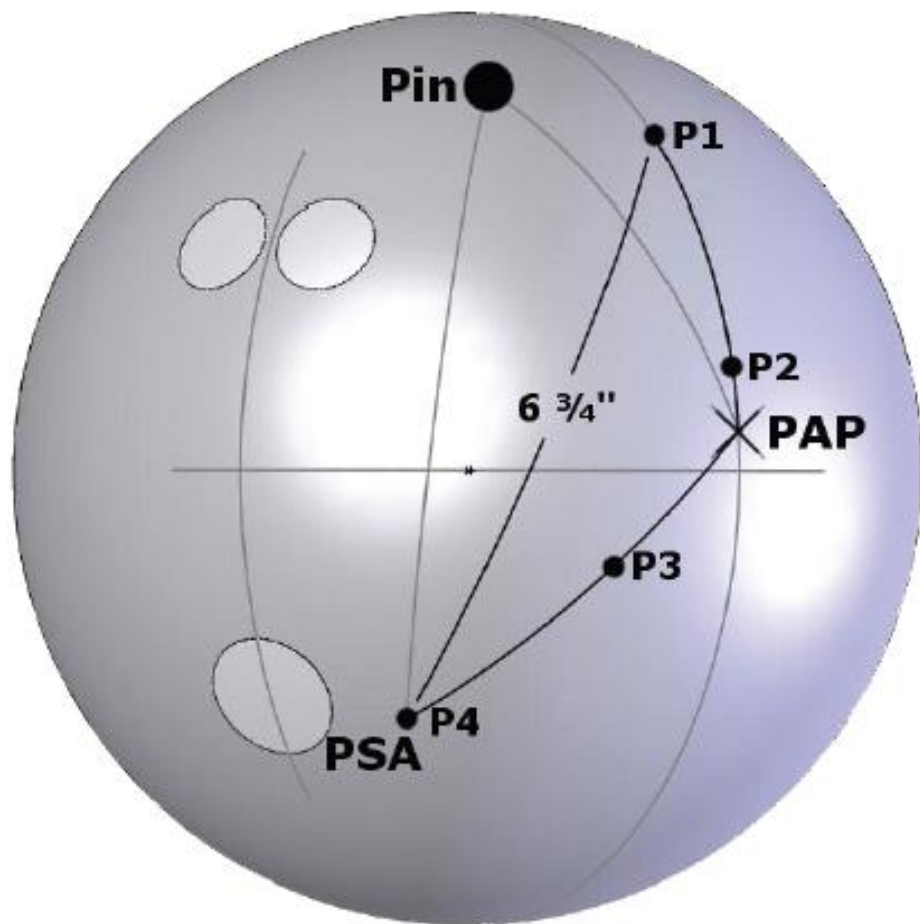
High Track Bowlers
Less Than 12 Degrees of Initial Axis Tilt
Use: 85° X 5 1/4" X 70°
Recommended Pin Distance 2-3"

Low Track Bowlers
More Than 18 Degrees of Initial Axis Tilt
Use: 30° X 5 1/4" X 60°
Recommended Pin Distance 1-4"

Dual angle layout and balance hole determines motion.

Balance Holes for Asymmetrical Balls

Balance Hole Locations on the Gradient Line



Balance hole Position	Location	Change in Ball Reaction
P1	6 $\frac{3}{4}$'' from the PSA on the VAL	Weakens ball reaction
P2	1/3 of the distance from the P1 to the PSA	Maintains ball reaction
P3	2/3 of the distance from the P1 to the PSA	Strengthens ball reaction
P4	PSA	Maximizes ball reaction

For more rev dominant players, check the location before drilling to avoid the track flaring over the balance hole.