The Truth about Drilled Balls

By
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As an industry we have promoted the importance of the mass properties (RGs and differentials) of undrilled balls for years, but how much do those specs. really matter to the motion of a drilled bowling ball as it rolls down the lane. **NOT A LOT**! What really matters is the characteristics and the surface preparation of the coverstock and the mass properties of the drilled ball (the RG of the **P**ositive **A**xis **P**oint and the intermediate and total differential).

The coverstock characteristics are controlled by which coverstock you choose and what surface you choose to use on it. Unfortunately, that's mostly trial and error after assimilating all the marketing material you can find about coverstocks. That's a subject for an entirely different article which needs to deal with the science of coverstock technology and a discussion about the truth in marketing. This article will discuss the effect of drilling layouts and weight hole size and location on the mass properties of drilled bowling balls and, therefore their ball reactions.

Are there any people who care about how undrilled bowling balls roll? **I THINK NOT**! The decisions made about the layout and the size and location of the balance hole have a very significant effect on the reaction of the drilled ball. A complete layout of a bowling ball consists of two components. They are the drilling system used and the balance hole size and location. The drilling locates the pin and the **P**referred **S**pin **A**xis in relation to the bowler's **PAP**. This represents about 35 to 40 % of the drilled ball's reaction controlled by the mass properties. The remaining 60 to 65% of the drilled ball's reaction attributed to the mass properties is controlled by the size and location of the balance hole.

The drilling can be done accurately by using either of two systems. By swinging arcs from the pin and the **PSA** to the bowler's **PAP** and the **V**ertical **A**xis **L**ine is one way. The other way is to use the "Dual Angle Layout Technique" which can be found on www.morichbowling.com. This is the system that I prefer. Any accurate drilling system **must** take into account the location the pin (low RG axis) and the **PSA** (high RG axis) in relation to the bowler's **PAP** and the **VAL**.

I suggest using the "Gradient Line Balance Hole System" for controlling the ball reaction by locating the balance hole properly. It can also be found on www.morichbowling.com. The closer the balance hole to the **PSA**, the stronger the resulting ball reaction. The bigger the balance hole, when it's located near the **PSA**, the stronger the reaction of the drilled ball.

We prepared the following chart for the MoRich FRENZY to show how much the mass properties of drilled balls change from those of the undrilled ball by using different drillings and balance hole locations.

Summary of Drillings for Morich Frenzy

Frenzy 16 Lbs							
Mass	Drilling	Low RG	Diff	Int Diff	Ratio	Pin Out	Top Wt.
16.08	Undrilled	2.517	0.045	0.011	0.24	3.47 in	2.48 oz
15.65	30x4.25x20 BAL P4	2.519	0.064	0.028	0.44		
15.57	65x4x30 BAL P4	2.526	0.060	0.032	0.53		
15.72	65x3x40 BAL P2	2.526	0.045	0.017	0.38		
15.84	80x2.25x50 NO BAL Hole	2.523	0.045	0.014	0.31		

Frenzy 15 Lbs							
Mass	Drilling	Low RG	Diff	Int Diff	Ratio	Pin Out	Top Wt.
15.25	Undrilled	2.527	0.045	0.011	0.24	3.49 in	2.47 oz
14.85	30x4.25x20 BAL P4	2.528	0.064	0.028	0.44		
14.78	65x4x30 BAL P4	2.535	0.061	0.032	0.52		
14.92	65x3x40 BAL P2	2.536	0.046	0.017	0.38		
15.03	80x2.25x50 NO BAL Hole	2.532	0.046	0.014	0.31		

Frenzy 14 Lbs							
Mass	Drilling	Low RG	Diff	Int Diff	Ratio	Pin Out	Top Wt.
14.25	Undrilled	2.538	0.045	0.011	0.24	3.50 in	2.48 oz
13.89	30x4.25x20 BAL P4	2.539	0.062	0.028	0.44		
13.82	65x4x30 BAL P4	2.546	0.059	0.031	0.52		
13.96	65x3x40 BAL P2	2.546	0.044	0.017	0.37		
14.05	80x2.25x50 NO BAL Hole	2.543	0.044	0.014	0.31		

The layouts used in the chart are “Dual Angle Layouts” and the balance hole locations are “Gradient Line Balance Hole” locations. If you look at the chart carefully, you will notice how much the differentials change from layout to layout and from the drilled balls compared to the undrilled ball. Bear in mind that the total differential controls the amount of flare of the drilled ball and the intermediate differential controls how quickly the drilled ball reacts to lane friction. The larger the total differential, the more the ball flares causing the ball to react sooner. The larger the intermediate differential, the quicker and sharper the ball reacts to lane friction when it encounters it. Let’s look at these drillings. The 80x2.25x50 layout with no balance hole has both the lowest intermediate and total differential of all the drilled balls, therefore, it will be the smoothest and least hooking of the drillings listed. The 85x3x40 layout with a P2 balance hole has slightly larger differentials and, therefore, will produce a medium ball reaction. The other two drillings have substantially larger differentials and, therefore, will produce much stronger ball reactions. The 30x4.25x20 layout with a P4 balance hole has the largest total differential and will, therefore, react the soonest of the drillings listed. The 65x4x30 layout with a P4 balance hole has the largest intermediate differential and will have the sharpest breakpoint of all the drillings listed. There will be a **VAST** difference in reaction between these four drillings.

Keep in mind that adjusting the surface of the drilled ball to change the surface roughness of the ball will allow you to move the break point closer to the foul line or the pins in order to change length of the skid phase of the ball. The shape of the breakpoint is due to the ball chosen and the drilling used and the balance hole size and location employed.

I hope this article gives you an insight into how differently the same type of ball will react with different layouts and balance hole locations. These are your tools for dialing in the ball for each bowler and, therefore, increasing their enjoyment of the game.