What the Research Says: How Do Release Changes & Equipment Impact Ball Reaction

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I present research findings on how various factors (revolutions, speed, axis rotation, RG values, etc.) contribute to more or less hook. The important research summary provides insight into how much more or less can be created by the bowler. Ball Reaction : What the Research Says How does revolutions, axis of rotation and ball speed impact the amount of skid and hook? Research at Columbia 300, Ebonite & USBC provides answers.

Increasing Revolutions

Increasing revolutions clearly adds hook. But, how much? Columbia 300 found that an increase of 30 RPMs leads to 2 boards of extra hook on the backend. Being able to adjust your rev rate is important to matching-up to the lane condition. If you can increase your RPM by 60 RPMs, this will give you 4 extra boards of hook. Sometimes, you need to descrease your rev rate. But, the important fact is your ability to increase and decrease with accuracy and repeatability. See Simple Method to Change the Amount of Revs for more information.

Revolutions and Push

Push is the amount the ball will push past the end of the oil pattern. In a project at the USBC Equipment Specifications and Certification Department, research revealed that rev rate was more important to "push" than ball speed. Specifically, the results of 14 test bowlers, on a 37 foot sports pattern, are as follows: REVOLUTION RATEMILES PER HOUR PUSH (in feet) 170 - 200 16.9 2.3 200 - 250 17.7 2.7 250 - 300 18.1 5.4 300 - 350 18.0 7.7 350 - 400 18.4 6.3 400 - 500 18.7 5.9See Er Angle, Part 3, Bowling This Month, April 2006, Page 6 - 7

Increasing Length through Surface Preparation Surface preparation is an important element of elite bowling. Abralon pads can alter the surface, 360, 500, 1000, 2000, 4000. But, how much extra length can actually be realized with a high grit as compared with a low grit. Ebonite found that, on a shorter high volume lane house condition, a bowler could achieve 2.5 feet extra of length, comparing the length of a 4000 grit surface and a 360 surface. The breakpoint was further right and the backend movement reduce by 2 boards. Combined, this lead to a higher degree of entry angle. Now, we see why surface preparation is so critical. Impact of Speed on Amount of Hook and Entry Angle Columbia 300 found that an increase of 1 Mile Per Hour (1.6 KPH) led to a decrease in 2 to 3 boards of hook. Entry angle was also decreased .2 to .3 for every MPH increase. This is also an important area to be able to change ball speeds reliably.

Impact on Hook by Increasing the Axis of RotationColumbia 300 determined that a bowler can obtain 5 more boards of hook from increasing the release from 30 to 45 degrees of axis rotation. With this 15 degree increase, this would also increase the entry angle from 3.1 to 4.5 degrees. By increasing to 60 degrees of axis rotation, from 45 degrees, a bowler would hook the ball 3 more boards on the backend and increase the entry angle from 4.5 degrees to 5.6 degrees. This is assuming a ball thrown at 270 RPM and 18 MPH. See the 4-Point Release System for more information on how to accurately alter your release.

Impact of Core RG on Hook PotentialThe Radius of Gyration values of the core of the bowling ball can have a major impact on the backend reaction. Columbia 300 research helps us determine how much. For every .1 of increase RG, the bowling ball hooked 1 extra board on the backend. This is assuming a ball thrown with 45 degree axis of rotation release at 270 RPM and 18 MPH.

Difference Between Positive CG & Negative CG Placement in a Symmertical Core Bowling Ball

USBC conducted research on the ball motion differences that were produced with a bowling ball with a positive CG placement and another with a negative CG placement. USBC measured 20 different variables of ball motion. Both balls had the PIN above the fingers and the PIN to CG at 45 degrees. Only one bowling ball has been tested so far. Harry, the automatic throwbot threw the ball at 17 MPH and 375 RPMs.

(*) The Positive CG ball had larger values on 14 of the 20 variables measured.

(*) The Positive CG ball had 1.25 ounces of positive side weight. The Negative CG ball had 1.35 ounces of negative side weight.

(*) The Negative CG bowling ball was 6 feet further, down the lane, to the roll phase.

(*) The Negative CG bowling ball has 2 extra feet of skid and 4 extra feet of length in the hook phase.

(*) Negative CG bowling ball went 2 feet further before starting the hook phase. Or, conversely, the Positive CG bowling ball hooks 2 feet sooner than the Negative CG ball.

(*) The Positive CG ball had 2 additional boards of hook on the backend and was 1.25 feet shorter than the Negative CG Ball. POSITIVE CG BALLNEGATIVE CG BALL SKID DISTANCE 23 Feet25 Feet HOOK PHASE ENDED 41 Feet 47 Feet HOOK DISTANCE18 Feet 22 FeetFrom USBC: “It is worth noting that even though these are minor differences, they are still differences. Mathematically, the difference in position is roughly only about 10 percent; this is not always easy to tell on the lanes observing from 60 feet away. USBC had thought the balls looked very similar in reaction; however, the math paints a different picture.”