



Ball Motion Analysis Form

“Real World Measurable Variables in the Pro Shop”

Prologue

In the fall of 2005, the USBC’s Equipment Specifications and Certifications team joined up with the bowling ball manufacturers to form the Ball Task Force. In an effort to better understand ball motion and the most influential variables, this task force worked together for two and a half years to complete the Ball Motion Study phases I and II.

During this time, the USBC utilized Harry, USBC's robotic ball thrower, and Super CATS, the 23 sensor system that measures position, velocity, and vertical angles, to evaluate balls in a comprehensive manner including multiple regression analysis in order to better understand ball motion. Upon completion of the testing, several debates were settled and the results were published in early 2008.

But not every bowling center, pro shop and coach has access to all the high tech equipment used to evaluate ball motion. So, in an effort to bring the ball motion study to the bowlers, coaches, and pro shops around the world, the USBC has developed in conjunction with Mo Pinel, IBPSIA Advanced HOTS instructor and CEO of Morich, this new Ball Motion Analysis Form. Equipment was supplied by Storm Products, Inc. and Morich Enterprises during the testing used to validate this methodology.

This form affords everyone the ability to better understand a ball’s dynamic properties based on a variety of factors including the flare pattern of that particular ball. The USBC graphical analysis and measured coverstock and core dynamic variables of the balls used in this testing **validated** this form, so use it with confidence!



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Instructions for Ball Motion Analysis Form

Note: There should be **ONE** sheet per ball; each ball needs a separate testing sheet.

Information Groupings and Definitions

Bowler's Information

- Name: Write the name of the bowler.
- Bowler's PAP: The Positive Axis Point (PAP) that the bowler states is their PAP, leave blank if the bowler does not know their PAP.

Test Information

- Location: The location at which the testing takes place.
- Date: The date testing occurred

Ball Information (Information Taken from Ball to be Tested)

- Serial #: The serial # of the ball
- Ball Brand: Write the company that manufactured the ball that you are testing.
- Ball Model: The model of bowling ball being tested
- Ball Surface: The surface at which the ball currently exists while testing, if you sand or polish the ball previous to testing, please write down the new surface.
- Ball Layout: If known, write down the pre drilling technique in the boxes provided using either the Morich Dual Angle Drilling Technique or the three measurement system consisting of Pin to PAP distance, MB to PAP Distance, and Pin to VAL distance.
- Wt Hole: Diameter and depth of the weight hole, if the ball has one.
- Wt HI Loc: The Location of the weight hole, either in coordinates from center of grip, or Morich's Gradient Line Technique.

Ball Test Data (Watch Ball Being Thrown with Bowler Lined Up to Hit the Pocket)

- Ball Location at Foul Line: Where the ball crosses the foul line
- Ball Location at Arrows: Where the ball crosses the arrows
- Ball Location at Break Point: Board at which the ball has its break point



Instructions for Ball Motion Analysis Form Continued

Ball Test Measurements (After the Ball is Thrown)

- PAP at Release: As measured by you during this test
- Axis Tilt: Axis Tilt as measured by you, refer to chart on page 5
- Actual Layout: Measure the post drilling technique using the Preferred Spin Axis (PSA) as found by the deTerminator, if available.
- Spin Time Drilled: Initial spin time of the bowling ball as measured by a deTerminator using the standard 60 degree procedure
- PAP at Breakpoint: PAP measured from the last oil ring
- PAP at Pins: PAP measured from the last whole “dry oil” ring
- Axis Migration in Oil: The length from initial PAP to PAP at Break Point
- Axis Migration in Dry: The length from PAP at Break Point to PAP at Pins
- Total Axis Migration: The total length of the axis migration from PAP at Release to PAP at Pins (Axis migration in oil plus axis migration in dry)
- Distance from Pin to PAP at Release: Distance from the middle of the true pin to PAP at Release
- Distance from Pin to PAP at Breakpoint: Distance from the middle of the true pin to PAP at Break Point
- Distance from Pin to PAP at Pins: Distance from the middle of the true pin to PAP at Pins.

Axis Migration Diagram:

- Draw a picture of the axis migration path including the pin to all the PAP distances and the axis migration distances in the oil and in the dry.
- In lieu of a drawing, place a digital picture of the axis migration in the space provided. Make sure dimensions are labeled on the photo.


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Ball Motion Analysis Form

Name		Ball Brand		Date	
Serial #		Ball Model		Location	
GIVEN Bowler's PAP		Ball Surface		Spin 1	Spin 2
				Spin 3	AVG Spin Time:
GIVEN Ball Layout		PAP at Release		Axis Tilt:	
Actual Layout		Wt Hole		Wt HI Loc	
Notes:					
Ball Location at Foul Line		Ball at Arrows		Ball at BreakPoint	
PAP at BP			PAP at Pins		
Axis Migration in Oil		Axis Migration in Dry		Total Axis Migration	

Pin to PAP distance at:

Release		Breakpoint		Pins	
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Axis Migration Picture:

Track Arc Length to Axis Tilt Conversion Table

For use with the Ball Motion Analysis Form

Distance Across the Track on the Surface of the Ball (inches)	Axis Tilt (degrees)
13.5	0
13	3
12.5	7
12	10
11.5	13
11	17
10.5	20
10	24
9.5	27
9	30
8.5	33
8	37
7.5	40
7	44
6.5	47